OpenSplice DDS

Version 6.x

C Reference Guide

PRISMTECH

OpenSplice DDS

C Reference Guide

PRISMTECH

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Preface

About the C Reference Guide

The *C Reference Guide* provides a detailed explanation of the OpenSplice DDS (***S**ubscription **P**aradigm for the **L**ogical **I**nterconnection of **C**oncurrent **E**ngines*) Application Programming Interfaces for the C language.

This reference guide is based on the OMG's *Data Distribution Service Specification* and *C Language Mapping Specification*.

The C Reference Guide describes the Data Centric Publish Subscribe (DCPS) layer. The purpose of the DCPS is the distribution of data (publish/subscribe). The structure of the DCPS is divided into five modules. Each module consists of several classes, which in turn generally contain several operations.

Intended Audience

The *C Reference Guide* is intended to be used by C programmers who are using OpenSplice DDS to develop applications.

Organisation

The C Reference Guide is organised into the following topics.

The *Introduction* describes the details of the document structure.

Chapter 1, *DCPS API General Description*, is a general description of the DCPS API and its error codes.

Chapter 2, *DCPS Modules*, provides the detailed description of the DCPS modules.

Chapter 3, *DCPS Classes and Operations*, provides the detailed description of the DCPS classes, structs and operations.

The following appendices are included, as well as a *Bibliography* containing references material and *Glossary*:

Appendix A, *Quality Of Service*

Appendix B, *API Constants and Types*

Appendix C, *Platform Specific IDL Interface*

Appendix D, *SampleStates, ViewStates and InstanceStates*

Appendix E, *Class Inheritance*

Appendix F, *Listeners, Conditions and Waitsets*

Appendix G, *DDS_Topic Definitions*

Appendix H, *DCPS Queries and Filters*

Appendix I, *Built-in Topics*

Conventions

The conventions listed below are used to guide and assist the reader in understanding the C Reference Guide.

⚠ Item of special significance or where caution needs to be taken.

i Item contains helpful hint or special information.

WIN Information applies to Windows (*e.g.* XP, 2003, Windows 7) only.

UNIX Information applies to Unix based systems (*e.g.* Solaris) only.

C C language specific

C++ C++ language specific

C# C# language specific.

Java Java language specific

Hypertext links are shown as *blue italic underlined*.

On-Line (PDF) versions of this document: Items shown as cross-references, *e.g.* *Contacts* on page xxv, are hypertext links: click on the reference to go to the item.

```
% Commands or input which the user enters on the
  command line of the computer terminal
```

`Courier` fonts indicate programming code and file names.

Extended code fragments are shown in shaded boxes:

```
NameComponent newName[] = new NameComponent[1];

// set id field to “example” and kind field to an empty string
newName[0] = new NameComponent (“example”, “”);
```

Italics and ***Italic Bold*** are used to indicate new terms, or emphasise an item.

Sans-serif and **Sans-serif Bold** are used to indicate elements of a Graphical User Interface (GUI) or Integrated Development Environment (IDE), such as an OK button, and sequences of actions, such as selecting **File > Save** from a menu.

Step 1: One of several steps required to complete a task.

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Introduction

About the C Reference Guide

Document Structure

The C Reference Guide document structure is based on the structure of the DCPS Platform Independent Model (DCPS PIM) of the Data Distribution Service Specification. The detailed description is subdivided into the PIM Modules, which are then subdivided into classes.

Some of the classes are implemented as structs in the DCPS Platform Specific Model (DCPS PSM) of the Data Distribution Service Specification, as indicated in the Interface Description Language (IDL) chapter of the PSM (see Appendix C, *Platform Specific IDL Interface*). These structs are described in the respective chapters.

- In the classes as described in the PIM, which are implemented as a class in the PSM, the operations are described in detail.
- In the classes as described in the PIM, which are implemented as a struct in the PSM, the struct contents are described in detail.
- The order of the modules and classes is conform the PIM part.
- The order of the operations or struct contents is alphabetical.
- Each description of a class or struct starts with the API description header file.

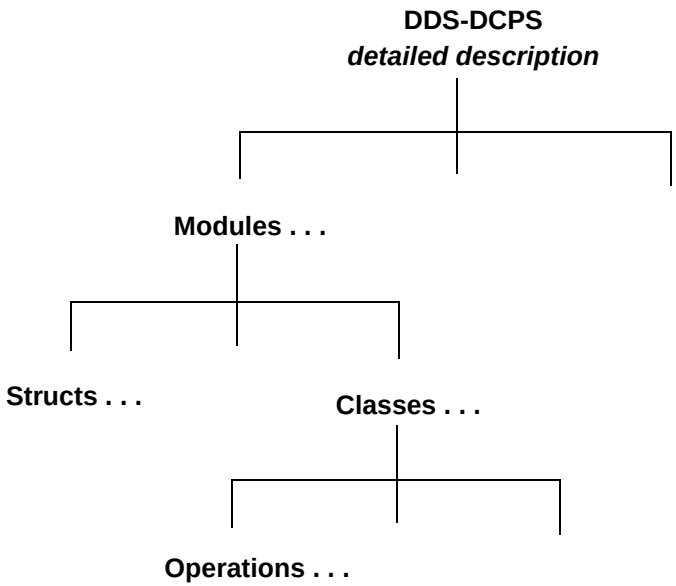

Figure 1: C Reference Guide Document Structure

Operations

Several types of operations are described in this manual. The different types of operations are: basic, inherited, abstract and abstract interface. All operations of any type can be found in their respective class. The details of their description depends on the type of operation.

Basic operations are described in detail in the class they are implemented in.

- Inherited operations only refer to the operation in the class they are inherited from. The detailed description is not repeated.
- Abstract operations only refer to the type specific implementations in their respective derived class. The detailed description is not repeated.
- Abstract operations which are implemented as an interface (`Listeners`), are described in detail in their class. These operations must be implemented in the application.

In the API description header file, the inherited and abstract operations are commented out since they are not implemented in this class.

Inheritance in the C API is implemented by prefixing the name of the operation with `DDS_` and the name of the class they are in. For example, the operation `get_name` in the class `Topic` is named `DDS_Topic_get_name`. Since this operation is actually inherited from the class `TopicDescription` the operation refers to the `TopicDescription` class for more information. However, in the `TopicDescription` class this operation is named `DDS_TopicDescripton_get_name`.

API Reference

CHAPTER

1 DCPS API General Description

The structure of the DCPS is divided into modules, which are described in detail in the next chapter. Each module consists of several classes, which in turn may contain several operations.

Some of these operations have an operation return code of type `DDS_ReturnCode_t`, which is defined in the next table:

Table 1: Return Codes

DDS_ReturnCode_t	Return Code Description
`DDS_RETCODE_OK`	Successful return
`DDS_RETCODE_ERROR`	Generic, unspecified error
`DDS_RETCODE_BAD_PARAMETER`	Illegal parameter value
`DDS_RETCODE_UNSUPPORTED`	Unsupported operation or `DDS_QosPolicy` setting. Can only be returned by operations that are optional or operations that uses an optional `DDS_<DDS_Entity>QoS` as a parameter
`DDS_RETCODE_ALREADY_DELETED`	The object target of this operation has already been deleted
`DDS_RETCODE_OUT_OF_RESOURCES`	Service ran out of the resources needed to complete the operation
`DDS_RETCODE_NOT_ENABLED`	Operation invoked on an `DDS_Entity` that is not yet enabled
`DDS_RETCODE_IMMUTABLE_POLICY`	Application attempted to modify an immutable `DDS_QosPolicy`
`DDS_RETCODE_INCONSISTENT_POLICY`	Application specified a set of policies that are not consistent with each other
`DDS_RETCODE_PRECONDITION_NOT_MET`	A pre-condition for the operation was not met

Table 1: Return Codes

DDS_ReturnCode_t	Return Code Description
DDS_RETCODE_TIMEOUT	The operation timed out
DDS_RETCODE_ILLEGAL_OPERATION	An operation was invoked on an inappropriate object or at an inappropriate time (as determined by QosPolicies that control the behaviour of the object in question). There is no precondition that could be changed to make the operation succeed.
DDS_RETCODE_NO_DATA	Indicates a situation where the operation did not return any data

The name scope (name space) of these return codes is DDS. The operation return codes DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_UNSUPPORTED and DDS_RETCODE_ALREADY_DELETED are default for operations that return an operation return code and are therefore not explicitly mentioned in the DDS specification. However, in this manual they are mentioned along with each operation.

Some operations are not implemented. These operations are mentioned including their synopsis, but not described in this manual and return DDS_RETCODE_UNSUPPORTED when called from the application. All constants and types are given in Appendix B, *API Constants and Types*.

1.1 Thread Safety

All operations are thread safe apart from the DDS_DomainParticipantFactory_get_instance operation. It is the applications responsibility to call DDS_DomainParticipantFactory_get_instance only from one application thread. This restriction only applies to the first call of DDS_DomainParticipantFactory_get_instance.

1.2 Signal Handling

UNIX

Every application that participates in a domain should register signal-handlers in order to protect the data distribution service in case of an exception or termination request. This is done automatically when the application calls the DDS_DomainParticipantFactory_get_instance operation. The data distribution service distinguishes between two kinds of signals: synchronous (*i.e.* exceptions) and asynchronous signals (*i.e.* termination requests).

1.2.1 Synchronous Signals

The data distribution service registers a signal-handler for the following synchronous signals: `SIGILL`, `SIGTRAP`, `SIGABRT`, `SIGFPE`, `SIGBUS`, `SIGSEGV` and `SIGSYS`. If a signal-handler is already registered for any of these signals it will be chained by the handlers registered by the data distribution service. Upon receiving any of the mentioned signals, the signal-handler will synchronously detach the application from the domain and call any chained handler if available. This allows core dumps to be created when an error occurs in application-code, without sacrificing the integrity of the data distribution service. Because the signal is processed synchronously, the offending thread will not be able to continue.

Synchronous signals can also be received asynchronously from another process (*i.e.* '`kill -ABRT <pid>`'). This is handled by the signal-handlers registered by the data distribution service and the behaviour will mimic the behaviour of a regular synchronous signal, occurring at the point in the application when the signal is received. A log message will be recorded stating that an asynchronously received synchronous signal occurred, including the source of the signal.

1.2.2 Asynchronous Signals

The asynchronous signal-handlers are only registered by the data distribution service if the application did not already register a handler, nor set the ignore-flag for these signals. If the data distribution service handlers are registered, the default handlers are chained. The signels that are handled are: `SIGINT`, `SIGQUIT`, `SIGTERM`, `SIGHUP` and `SIGPIPE`. When receiving any of these signals, the handlers of the data distribution service will ensure a disconnection from the domain. The default handler will in turn cause the application to terminate immediately.

1.3 Memory Management

When objects are being created, they occupy memory space. To avoid memory leaks when they are not used any more, these objects have to be deleted in order to release the memory space. However, when using pointers, it is difficult to keep track of which object has been released and which has not. When objects are not being released, the memory leak finally uses up all the resources and the application fails. On the other hand, when an object is being released twice because there were two pointers to the same object, the application fails. This implementation is based on the *OMG C Language Mapping Specification*. Accordingly, the CORBA rules listed below apply.

1.3.1 IDL Mapping Rules for Sequences

The names of the operations and types are given by the IDL mapping rules. For sequences several rules apply. The basic IDL definition of a sequence is defined by:

```
module name-space {
   typedef sequence<<sequence-element-type>>
<sequence-name>;
}
```

In the C language, this results in the following type definition of the sequence:

```
typedef
   DDS_sequence_<name-space-prefix><sequence-element-type>
<name-space>_<sequence-name>
```

In this type definition, the `<sequence-element-type>` is the type of the objects in the sequence. This `<sequence-element-type>` may be a standard type or a Data Distribution Service defined type. The `<name-space-prefix>` represents the name space in which the `<sequence-element-type>` is defined. The standard types have an empty prefix. In the Data Distribution Service all the typedefs are set within the module DDS block, therefore defined types have the prefix DDS_. Finally, the `<sequence-name>` is name of the sequence and is always prefixed by DDS_.

1.3.1.1 Standard Defined Type

The standard defined types are the types as defined in the Data Distribution Service specification. For example, for the standard defined `<sequence-element-type>` of type `string` with a `<sequence-name>` of `StringSeq`, the following IDL definition is given:

```
typedef sequence<string> StringSeq
```

In C, this results in the following type definition of the sequence:

```
typedef DDS_sequence_string DDS_StringSeq
```

1.3.1.2 User-Defined Type

The user-defined types are the types as defined in the application. For example, for the user-defined `<sequence-element-type>` of type `Foo` with a `<sequence-name>` of name `FooSeq` in the module `SPACE`, the following IDL definition is given:

```
module SPACE {
   typedef sequence<Foo> FooSeq;
}
```

In C, this results in the following type definition of the sequence:

```
typedef DDS_sequence_SPACE_Foo SPACE_FooSeq
```

1.3.1.3 Data Distribution Service Defined Type

For example, for the Data Distribution Service defined `<sequence-element-type>` of type `SampleInfo` with a `<sequence-name>` of name `SampleInfoSeq`, the following IDL definition is given:

```
typedef sequence<SampleInfo> SampleInfoSeq
```

In C, this results in the following type definition of the sequence:

```
typedef DDS_sequence_DDS_SampleInfo DDS_SampleInfoSeq
```

1.3.2 Plain Sequences

The following table shows the sequences for which the resources have to be managed. In other words, for these sequences `DDS_<sequence-name>__alloc` and `DDS_<sequence-name>_allocbuf` operations are available. For sequences, which are only used as an out parameter, the application does not need to use these allocation operations, since the Data Distribution Service allocates them. In this case, the application may use these operations for its own sequences. Furthermore to free the resources allocated with `DDS_<sequence-name>__alloc` and `DDS_<sequence-name>_allocbuf` the application must use the `DDS_free` operation. It does not make any difference whether the application or the Data Distribution Service does the allocation. When the application does not use the `DDS_free` operation, the application will fail. The `DDS_free` operation operates recursively, in other words all embedded structures are released.

Sequences and buffers can also be allocated on stack. However in case the application allocates a sequence or buffer on stack, the `DDS_free` operation may not be used on this object, otherwise the application will fail.

Table 2: Sequences

Sequence Name	Parameter Type			
	In	Out	Inout	Return
`DDS_ConditionSeq`		x		
`DDS_StringSeq`	x			x
`DDS_DataReaderSeq`		x		
`DDS_InstanceHandleSeq`			x	
`DDS_QosPolicyCountSeq`	Used in status struct only.			
`DDS_SampleInfoSeq`			x	
`DDS_sequence_octet`	Used in QosPolicy struct only.			

1.3.3 Sequences Embedded in QosPolicy Objects

The following table shows the `QosPolicy` objects for which the resources have to be managed because they contain sequences. In other words, for these `QosPolicy` objects `DDS_<QosPolicy>__alloc` operations are available. The buffers used in these `QosPolicy` objects must be allocated using the `DDS_<sequence-name>_allocbuf` operations. The `DDS_free` operation takes care of the embedded sequences and the buffers in a `QosPolicy`.

Table 3: QosPolicy Objects

QosPolicy Name	Parameter Type				Contains Sequence
	In	Out	Inout	Return	
DDS_DomainParticipantQos	x		x		DDS_sequence_octet
DDS_TopicQos	x		x		DDS_sequence_octet
DDS_PublisherQos	x		x		DDS_sequence_octet
					DDS_StringSeq
DDS_DataWriterQos	x		x		DDS_sequence_octet
DDS_SubscriberQos	x		x		DDS_sequence_octet
					DDS_StringSeq
DDS_DataReaderQos	x		x		DDS_sequence_octet

1.3.4 Sequences Embedded in Status Objects

The following table shows the `Status` objects for which the resources have to be managed because they contain sequences. In other words, for these `Status` objects `DDS_<Status>__alloc` operations are available. The buffers used in these `Status` objects must be allocated using the `DDS_<sequence-name>_allocbuf` operations. The `DDS_free` operation takes care of the embedded sequences and the buffers in a `Status`.

Table 4: Status Objects

Status Name	Parameter Type				Contains Sequence
	In	Out	Inout	Return	
DDS_OfferedIncompatibleQosStatus	x		x		DDS_QosPolicyCountSeq
DDS_RequestedIncompatibleQosStatus	x		x		DDS_QosPolicyCountSeq

1.3.5 Resources and operations

The interface description of the memory management operations is as follows:

```
/* interface Memory management */
   typedef struct {
```

```
      DDS_unsigned_long _maximum;
      DDS_unsigned_long _length;
      DDS_<sequence-element-type> *_buffer;
      DDS_boolean _release;
   } DDS_sequence_<name-space-prefix><sequence-element-type>;
   typedef
      DDS_sequence_<name-space-prefix><sequence-element-type>
         DDS_<sequence-name>

/* implemented API operations */
   void
      DDS_sequence_set_release
         (void *sequence,
           DDS_boolean release);
   DDS_boolean
      DDS_sequence_get_release
         (void *sequence);
   DDS_<sequence-name> *
      DDS_<sequence-name>__alloc
         (void);
   DDS_<sequence-element-type> *
      DDS_<sequence-name>_allocbuf
         (DDS_unsigned_long len);
   DDS_<QosPolicy>
      DDS_<QosPolicy>__alloc
         (void);
   DDS_<Status>
      DDS_<Status>__alloc
         (void);
   void
      DDS_free
         (void *);
```

The following paragraphs describe the usage of all memory management operations.

1.3.5.1 Sequences DDS_<*sequence-name*>

Synopsis

```
#include <dds_dcps.h>
      typedef struct {
         DDS_unsigned_long _maximum;
         DDS_unsigned_long _length;
         DDS_<sequence-element-type> *_buffer;
         DDS_boolean _release;
```

```
      }  DDS_sequence_<name-space-prefix>
<sequence-element-type>;
typedef DDS_sequence_<name-space-prefix>
            <sequence-element-type> DDS_<sequence-name>
```

Description

The typedef `DDS_<sequence-name>` represents the sequence which contains the objects of `<sequence-element-type>`.

Attributes

`DDS_unsigned_long _maximum` - the maximum number of elements that can be contained in the sequence.

`DDS_unsigned_long _length` - the actual number of elements in the sequence.

`DDS_<sequence-element-type> *_buffer` - a pointer to the sequence buffer.

`DDS_boolean _release` - indicates whether this sequence owns the memory of *`_buffer`*.

Detailed Description

The typedef `DDS_<sequence-name>` represents the sequence struct that holds the sequence attributes associated with the sequence buffer, which contains the objects of `<sequence-element-type>`. This sequence is allocated by calling `DDS_<sequence-name>__alloc`. The sequence buffer must be allocated separately by calling `DDS_<sequence-name>_allocbuf`. In other words when using a sequence, the memory space must be allocated for both the sequence struct and the sequence buffer. Whether, the application must allocate the resources or the Data Distribution Service allocates the resources, depends on the type of usage.

In or Inout Parameter

In case the sequence is passed as an in or inout parameter, both the sequence and the buffer must be allocated by the application. The application must set the attributes of the sequence according to the size and ownership of the buffer. Furthermore, for an inout parameter the application can control whether the Data Distribution Service must replace the elements in the sequence, the application can allow this by setting the `_release` attribute.

- When set to `TRUE` the Data Distribution Service is allowed to free any pointer types. The Data Distribution Service sets the `_length` attribute to the number of returned elements. The number of elements never exceeds the number set by the application in the `_maximum` attribute.

- When set to `FALSE` the Data Distribution Service is not allowed to free the pointer types. In this case, the Data Distribution Service allocates exactly the amount of elements and set the `_length` and the `_maximum` attributes of the sequence to that amount.
- In either case, the sequence and the buffer must be released by the application by calling `DDS_free` on the sequence. In this case also the buffer is released, since the `DDS_free` operation is recursive.

Out or Return Parameter

In case the sequence is used as an out parameter or a sequence is returned by a function, both the sequence and the buffer are allocated by the Data Distribution Service. The attributes of the sequence are set by the Data Distribution Service according to the size and ownership of the buffer. The sequence and the buffer must be released by the application by calling `DDS_free` on the sequence. In this case also the buffer is released, since the `DDS_free` operation is recursive.

In case the Data Distribution Service has no data to return, it returns an empty sequence with the `_length` and the `_maximum` attributes of the sequence set to zero, the `_buffer` attribute set to `DDS_OBJECT_NIL` and the `_release` attribute set to `FALSE`.

Allocation on the Stack

In case the sequence is allocated by the application. The application may also allocate the sequence on stack for performance reason instead of calling `DDS_<sequence-name>__alloc`. When the buffer is allocated on the stack the application must also set the _release attribute to FALSE as described below. In case the buffer is allocated using `DDS_<sequence-name>_allocbuf` then the application must release the buffer separately by calling `DDS_free` on `_buffer` of the sequence.

Attributes

The attributes of the `DDS_<sequence-name>` struct must be set after allocation. In case of an out parameter or the sequence is returned by a function, the attributes are set by the Data Distribution Service. In case of an in parameter or inout parameter, the attributes must be set by the application.

The `_length` attribute of the sequence must be set to the current length of the sequence. In other words equal to the number of valid sequence elements.

The `_maximum` attribute of the sequence must be set to the size of the allocated sequence buffer. In other words equal to the `len` parameter used in the call to `DDS_<sequence-element-type>_allocbuf`.

The `_buffer` attribute of the sequence must be set to the pointer to the allocated sequence buffer. In other words equal to the returned pointer from the call to `DDS_<sequence-element-type>_allocbuf`. Or in case of allocation on stack, the pointer to the variable.

The `_release` flag of the sequence may not be set directly. The `_release` flag of the sequence must be set by using `DDS_sequence_set_release` and may only be read by using `DDS_sequence_get_release`. `DDS_sequence_set_release` may only be used by the creator of the sequence. If it is not called for a given sequence instance, then the default value of the `_release` flag for that instance is `FALSE`.

If the `_release` flag of the sequence is set to `TRUE`, the sequence effectively "owns" the resource pointed to by `_buffer`; if the flag is set to `FALSE`, the application is responsible for the resource. If, for example, a sequence is returned from an operation with its release flag set to `FALSE`, calling `DDS_free` on the returned sequence pointer does not deallocate the memory pointed to by `_buffer`.

Before calling `DDS_free` on the `_buffer` member of a sequence directly, the application should check the `_release` flag using `DDS_sequence_get_release`. If it returns `FALSE`, the application should not invoke `DDS_free` on the `_buffer` member; doing so produces undefined behaviour.

1.3.5.2 DDS_sequence_set_release

Synopsis

```
#include <dds_dcps.h>
void
   DDS_sequence_set_release
      (void *sequence, DDS_boolean release);
```

Description

This operation sets the state of the `_release` flag of the sequence.

Parameters

`in void *sequence` - a pointer to the `DDS_`*<sequence-name>*.

`in DDS_boolean release` - the new state of the `_release` flag of the sequence.

Return Value

<none>

Detailed Description

This operation sets the state of the `_release` flag of the sequence. If the flag is set to `TRUE`, the sequence effectively "owns" the resource pointed to by `_buffer`; if the flag is set to `FALSE`, the application is responsible for the resource. If, for example, a sequence is returned from an operation with its release flag set to `FALSE`, calling `DDS_free` on the returned sequence pointer does not deallocate the memory pointed to by `_buffer`. Passing a `DDS_OBJECT_NIL` pointer or a pointer to something other than a sequence type to `DDS_sequence_set_release` produces undefined behaviour.

`DDS_sequence_set_release` should only be used by the creator of the sequence. If it is not called for a given sequence instance, then the default value of the `_release` flag for that instance is `FALSE`. The `_release` flag of the sequence may not be set directly. It may only be changed by this operation.

1.3.5.2.1 DDS_sequence_get_release

Synopsis

```
#include <dds_dcps.h>
DDS_boolean
   DDS_sequence_get_release
      (void *sequence);
```

Description

This operation gets the state of the `_release` flag of the sequence.

Parameters

`in void *sequence` - a pointer to the `DDS_`*<sequence-name>*.

Return Value

`DDS_boolean` - the present state of the `_release` flag of the sequence.

Detailed Description

This operation gets the present state of the `_release` flag of the sequence. If the flag returned is `TRUE`, the sequence effectively "owns" the resource pointed to by `_buffer`; if the flag returned is `FALSE`, the application is responsible for the resource. If, for example, a sequence is returned from an operation with its release flag set to `FALSE`, calling `DDS_free` on the returned sequence pointer does not deallocate the memory pointed to by `_buffer`. Before calling `DDS_free` on the `_buffer` member of a sequence directly, the application should check the `_release` flag using `DDS_sequence_get_release`. If it returns `FALSE`, the application should not invoke `DDS_free` on the `_buffer` member; doing so

produces undefined behaviour. Passing a `DDS_OBJECT_NIL` pointer or a pointer to something other than a sequence type to `DDS_sequence_get_release` produces undefined behaviour.

1.3.5.2.2 DDS_<*sequence-name*>__alloc

Synopsis

```
#include <dds_dcps.h>
DDS_<sequence-name>
   DDS_<sequence-name>__alloc
      (void);
```

Description

This operation allocates a new `DDS_<sequence-name>`.

Parameters

<none>

Return Value

`DDS_<sequence-name>` - the pointer to the newly-created empty DDS_<*sequence-name*>. In case of an error, a `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation allocates a new empty `DDS_<sequence-name>`. This operation does not allocate the buffer and leave the sequence empty by setting the `_length` and `_maximum` attributes to zero and the `_buffer` attribute to `DDS_OBJECT_NIL`. The application may also allocate the `DDS_<sequence-name>` as a variable on stack. In this case the application may not use `DDS_free` on the sequence. In case the `DDS_<sequence-name>` was allocated by this operation, and the application wants to release the `DDS_<sequence-name>` it must be released using `DDS_free` on the sequence.

In case there are insufficient resources available to allocate the `DDS_<sequence-name>`, a `DDS_OBJECT_NIL` pointer is returned instead.

1.3.5.2.3 DDS_<sequence-element-type>_allocbuf

Synopsis

```
#include <dds_dcps.h>
      DDS_<sequence-element-type> *
         DDS_<sequence-name>_allocbuf
            (DDS_unsigned_long len);
```

Description

This operation allocates a new DDS_<*sequence-element-type*> buffer.

Parameters

<none>

Return Value

DDS_<sequence-element-type> - the pointer to the newly-created buffer of DDS_<*sequence-element-type*>. In case of an error, a DDS_OBJECT_NIL pointer is returned.

Detailed Description

This operation allocates a new buffer of DDS_<*sequence-element-type*>. The application may also allocate the buffer of DDS_<*sequence-element-type*> as a variable on stack. In this case the application may not use DDS_free on the buffer. Furthermore, the application may only use DDS_free on the sequence when the _release flag of the sequence is set to FALSE and/or the _buffer pointer is set to DDS_OBJECT_NIL to prevent the buffer from being released. In case the buffer of DDS_<*sequence-element-type*> was allocated by this operation, and the application wants to release the buffer of DDS_<*sequence-element-type*> it must be released using DDS_free.

In case there are insufficient resources available to allocate the buffer of DDS_<*sequence-element-type*>, a DDS_OBJECT_NIL pointer is returned instead.

1.3.5.2.4 DDS_<*QosPolicy*>__alloc

Synopsis

```
#include <dds_dcps.h>
DDS_<QosPolicy>
   DDS_<QosPolicy>__alloc
      (void);
```

Description

This operation allocates a new DDS_<*QosPolicy*>.

Parameters

<none>

Return Value

DDS_<*QosPolicy*> - the handle to the newly-created DDS_<*QosPolicy*>. In case of an error, a DDS_OBJECT_NIL pointer is returned.

Detailed Description

This operation allocates a new DDS_<*QosPolicy*>. The behaviour is identical to DDS_<*sequence-name*>__alloc except that it creates a QosPolicy structure including its embedded sequences. Further, the embedded buffers are not allocated.

1.3.5.2.5 DDS_<*Status*>__alloc

Synopsis

```
#include <dds_dcps.h>
DDS_<Status>
   DDS_<Status>__alloc
      (void);
```

Description

This operation allocates a new DDS_<*Status*>.

Parameters

<none>

Return Value

DDS_<Status> - the handle to the newly-created DDS_<*Status*>. In case of an error, a DDS_OBJECT_NIL pointer is returned.

Detailed Description

This operation allocates a new DDS_<*Status*>. The behaviour is identical to DDS_<*sequence-name*>__alloc except that it creates a Status structure including its embedded sequences. Further, the embedded buffers are not allocated.

1.3.5.2.6 DDS_string_alloc

Synopsis

```
#include <dds_dcps.h>
DDS_char *
   DDS_string_alloc
      (DDS_unsigned_long len);
```

Description

This operation dynamically allocates a string of a specified length.

Parameters

in *DDS_unsigned_long* *len* - the length of the string to allocate. The allocated string has length len+1 (1 character is allocated extra for the terminating NUL character).

Return Value

DDS_char * - the pointer to the allocated string. If there are insufficient resources available, a `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation dynamically allocates a string of a specified length. The allocated string has length `len+1` (1 character is allocated extra for the terminating `'0'` character). If there are insufficient resources available, a `DDS_OBJECT_NIL` pointer is returned.

A string that is allocated via `DDS_string_alloc` must be freed using the operation `DDS_free`.

1.3.5.2.7 DDS_free

Synopsis

```
#include <dds_dcps.h>
void
   DDS_free
      (void *);
```

Description

This operation releases the allocated resources for the object in the parameter.

Parameters

in *void* * - contains the object which resources should be released.

Return Value

<none>

Detailed Description

This operation releases the allocated resources for the object in the parameter. The parameter may be a sequence in which case both the sequence and the sequence buffer are released since this operation operates recursively. Or the parameter may be a sequence buffer in case only the buffer is released. In both cases, the application is responsible to call this operation on the proper object in order to release the resources.

This operation may only be used when the resource was allocated using one of the `_alloc` operations. In case the object was declared as a variable on stack, the application may not use `DDS_free` on this object.

This means that there are four combinations of allocation possible:

Both the sequence and the buffer is allocated using the `DDS_<sequence-name>__alloc` and `DDS_<sequence-name>_allocbuf` operation. In this case the `DDS_free` operation must be used on the sequence to release both.

- The sequence is allocated on stack and the buffer is allocated using the `DDS_<sequence-name>_allocbuf` operation. In this case the sequence may not be released using the `DDS_free` operation but the buffer must be released using the `DDS_free` operation (operated on the buffer).
- The sequence is allocated using the `DDS_<sequence-name>__alloc` operation and the buffer is allocated on stack. In this case the `DDS_free` operation must be used on the sequence but the buffer may not be released using the `DDS_free` operation. Since the `DDS_free` operation works recursively, the application must put the `_release` flag of the sequence to `FALSE` and/or the `_buffer` pointer to `DDS_OBJECT_NIL` to prevent the buffer from being released.
- Both the sequence and the buffer are allocated on stack. In this case the `DDS_free` operation may not be used.

1.4 Listeners Interfaces

The `Listener` provides a generic mechanism (actually a callback function) for the Data Distribution Service to notify the application of relevant asynchronous status change events, such as a missed deadline, violation of a `DDS_QosPolicy` setting, etc. The `Listener` is related to changes in communication status.

The `Listener` interfaces are designed as an interface at PIM level. In other words, such an interface is part of the application which must implement the interface operations. These operations must be provided by the application. **All** `Listener` operations **must** be implemented, it is up to the application whether an operation is empty or contains some functionality.

Each DCPS `DDS_Entity` supports its own specialized kind of `Listener`. Therefore, the following `Listeners` are available:

- `DDS_DomainParticipantListener`
- `DDS_ExtDomainParticipantListener`
- `DDS_TopicListener`
- `DDS_ExtTopicListener`
- `DDS_PublisherListener`
- `DDS_DataWriterListener`

- DDS_SubscriberListener
- DDS_DataReaderListener

For example, since a DDS_DataReader is a kind of DDS_Entity, it has the ability to have a Listener associated with it. In this case, the associated Listener must be of type DDS_DataReaderListener. This interface must be implemented by the application. *All* DDS_DataReaderListener operations *must* be implemented, it is up to the application whether an operation is empty or contains some functionality.

As an example, one of the operations in the DDS_DataReaderListener is the DDS_DataReaderListener_on_liveliness_changed. This operation (implemented by the application) will be called by the Data Distribution Service when the liveliness of the associated DDS_DataWriter has changed. In other words, it serves as a callback function to the event of a change in liveliness. The parameters of the operation are supplied by the Data Distribution Service. In this example, the pointer to the DDS_DataReader and the status of the liveliness are provided.

Implementation

The struct DDS_<*Entity*>Listener represents the implementation of the Listener for an <*Entity*>. Since a Listener is implemented as a struct of pointers, the application must allocate this struct and initialise these pointers. The Listener is allocated using the appropriate DDS_<*Entity*>Listener__alloc operation. Each pointer must point to the appropriate callback operation defined in the application (when the status is enabled). It is up to the application whether an operation is empty or contains some functionality. An example is presented of the allocation and initialization of a DDS_DataReaderListener which is only enabled for the on_liveliness_changed. The on_liveliness_changed operation is provided by the application:

```
#include "dds_dcps.h"
static struct DDS_DataReaderListener *msgListener;
DDS_FooDataReader FooDR;
/* at this point, it is not important how to create the FooDR
*/
DataWriterListenerData UserDefined_ListenerData;
/* at this point, it is not important how
   UserDefined_ListenerData is implemented.
   This parameter can be used for Listener identification.
   If not used, the parameter may be NULL. */
    /* Prepare a listener for the Foo DataReader. */
    msgListener = DDS_DataReaderListener__alloc();
    msgListener.listener_data = UserDefined_ListenerData;
    msgListener.on_requested_deadline_missed = NULL;
    msgListener.on_requested_incompatible_qos = NULL;
```

```
msgListener.on_sample_rejected = NULL;
msgListener.on_liveliness_changed =
 (void (*)(void *, DDS_DataReader)) on_liveliness_changed;
msgListener.on_data_available = NULL;
msgListener.on_subscription_matched = NULL;
msgListener.on_sample_lost = NULL;

/* Set the Listener with a mask only
   to trigger on on_liveliness_changed. */
status = DDS_DataReader_set_listener
             (FooDR,
              &msgListener,
              DDS_LIVELINESS_CHANGED_STATUS);
```

1.4.1 Struct DDS_<Entity>Listener

The struct `DDS_<Entity>Listener` represents the implementation of a `Listener`.

The interface description applies to the different types of `<Entity>`, that is the `DomainParticipant`, `Topic`, `Publisher`, `DataWriter`, `Subscriber` or `DataReader`. The actual attributes depends on the `<Entity>`. Only for the `DomainParticipant` all the fields are applicable. the description of these structs is as follows:

```
struct DDS_DomainParticipantListener
{
   void *listener_data;
   DDS_DomainParticipantListener_InconsistentTopicListener
      on_inconsistent_topic;
   DDS_DomainParticipantListener_OfferedDeadlineMissedListener
      on_offered_deadline_missed;
   DDS_DomainParticipantListener_OfferedIncompatibleQosListener
      on_offered_incompatible_qos;
   DDS_DomainParticipantListener_LivelinessLostListener
      on_liveliness_lost;
   DDS_DomainParticipantListener_PublicationMatchListener
      on_publication_matched;
   DDS_DomainParticipantListener_RequestedDeadlineMissedListener
      on_requested_deadline_missed;
   DDS_DomainParticipantListener_
     RequestedIncompatibleQosListener
      on_requested_incompatible_qos;
   DDS_DomainParticipantListener_SampleRejectedListener
      on_sample_rejected;
   DDS_DomainParticipantListener_LivelinessChangedListener
      on_liveliness_changed;
   DDS_DomainParticipantListener_DataAvailableListener
      on_data_available;
```

```
    DDS_DomainParticipantListener_SubscriptionMatchListener
        on_subscription_matched;
    DDS_DomainParticipantListener_SampleLostListener
        on_sample_lost;
    DDS_DomainParticipantListener_DataOnReadersListener
        on_data_on_readers;
};

struct DDS_ExtDomainParticipantListener
{
    void *listener_data;
    DDS_ExtDomainParticipantListener_InconsistentTopicListener
        on_inconsistent_topic;
    DDS_ExtDomainParticipantListener_AllDataDisposed
        on_all_data_disposed;
    DDS_ExtDomainParticipantListener_OfferedDeadlineMissedListener
        on_offered_deadline_missed;
    DDS_ExtDomainParticipantListener_OfferedIncompatibleQosListener
        on_offered_incompatible_qos;
    DDS_ExtDomainParticipantListener_LivelinessLostListener
        on_liveliness_lost;
    DDS_ExtDomainParticipantListener_PublicationMatchListener
        on_publication_matched;
    DDS_ExtDomainParticipantListener_RequestedDeadlineMissedListener
        on_requested_deadline_missed;
    DDS_ExtDomainParticipantListener_RequestedIncompatibleQosListener
        on_requested_incompatible_qos;
    DDS_ExtDomainParticipantListener_SampleRejectedListener
        on_sample_rejected;
    DDS_ExtDomainParticipantListener_LivelinessChangedListener
        on_liveliness_changed;
    DDS_ExtDomainParticipantListener_DataAvailableListener
        on_data_available;
    DDS_ExtDomainParticipantListener_SubscriptionMatchListener
        on_subscription_matched;
    DDS_ExtDomainParticipantListener_SampleLostListener
        on_sample_lost;
    DDS_ExtDomainParticipantListener_DataOnReadersListener
        on_data_on_readers;
}

struct DDS_TopicListener
{
    void *listener_data;
    DDS_TopicListener_InconsistentTopicListener
        on_inconsistent_topic;
};

struct DDS_ExtTopicListener
{
```

```
    void *listener_data;
    DDS_ExtTopicListener_InconsistentTopicListener
        on_inconsistent_topic;
    DDS_ExtTopicListener_AllDataDisposed on_all_data_disposed;
};

struct DDS_PublisherListener
{
    void *listener_data;
    DDS_PublisherListener_OfferedDeadlineMissedListener
        on_offered_deadline_missed;
    DDS_PublisherListener_OfferedIncompatibleQosListener
        on_offered_incompatible_qos;
    DDS_PublisherListener_LivelinessLostListener
        on_liveliness_lost;
    DDS_PublisherListener_PublicationMatchListener
        on_publication_matched;
};
struct DDS_DataWriterListener
{
    void *listener_data;
    DDS_DataWriterListener_OfferedDeadlineMissedListener
        on_offered_deadline_missed;
    DDS_DataWriterListener_OfferedIncompatibleQosListener
        on_offered_incompatible_qos;
    DDS_DataWriterListener_LivelinessLostListener
        on_liveliness_lost;
    DDS_DataWriterListener_PublicationMatchListener
        on_publication_matched;
};
struct DDS_SubscriberListener
{
    void *listener_data;
    DDS_SubscriberListener_RequestedDeadlineMissedListener
        on_requested_deadline_missed;
    DDS_SubscriberListener_RequestedIncompatibleQosListener
        on_requested_incompatible_qos;
    DDS_SubscriberListener_SampleRejectedListener
        on_sample_rejected;
    DDS_SubscriberListener_LivelinessChangedListener
        on_liveliness_changed;
    DDS_SubscriberListener_DataAvailableListener
        on_data_available;
    DDS_SubscriberListener_SubscriptionMatchListener
        on_subscription_matched;
    DDS_SubscriberListener_SampleLostListener
        on_sample_lost;
    DDS_SubscriberListener_DataOnReadersListener
        on_data_on_readers;
};
```

```
struct DDS_DataReaderListener
{
   void *listener_data;
   DDS_DataReaderListener_RequestedDeadlineMissedListener
      on_requested_deadline_missed;
   DDS_DataReaderListener_RequestedIncompatibleQosListener
      on_requested_incompatible_qos;
   DDS_DataReaderListener_SampleRejectedListener
      on_sample_rejected;
   DDS_DataReaderListener_LivelinessChangedListener
      on_liveliness_changed;
   DDS_DataReaderListener_DataAvailableListener
      on_data_available;
   DDS_DataReaderListener_SubscriptionMatchListener
      on_subscription_matched;
   DDS_DataReaderListener_SampleLostListener
      on_sample_lost;
};
/* implemented API operations
 *       <no operations> */
```

The next paragraphs describes the usage of the DDS_<*Entity*>Listener structs.

1.4.2 DDS_DomainParticipantListener

Synopsis

```
#include <dds_dcps.h>
struct DDS_DomainParticipantListener
{
   void *listener_data;
   DDS_DomainParticipantListener_InconsistentTopicListener
       on_inconsistent_topic;
   DDS_DomainParticipantListener_OfferedDeadlineMissedListener
       on_offered_deadline_missed;
   DDS_DomainParticipantListener_OfferedIncompatibleQosListener
       on_offered_incompatible_qos;
   DDS_DomainParticipantListener_LivelinessLostListener
       on_liveliness_lost;
   DDS_DomainParticipantListener_PublicationMatchListener
       on_publication_matched;
   DDS_DomainParticipantListener_RequestedDeadlineMissedListener
       on_requested_deadline_missed;
   DDS_DomainParticipantListener_RequestedIncompatibleQosListener
       on_requested_incompatible_qos;
   DDS_DomainParticipantListener_SampleRejectedListener
       on_sample_rejected;
   DDS_DomainParticipantListener_LivelinessChangedListener
       on_liveliness_changed;
   DDS_DomainParticipantListener_DataAvailableListener
       on_data_available;
```

```
    DDS_DomainParticipantListener_SubscriptionMatchListener
        on_subscription_matched;
    DDS_DomainParticipantListener_SampleLostListener
        on_sample_lost;
    DDS_DomainParticipantListener_DataOnReadersListener
        on_data_on_readers;
};
```

Description

The struct `DDS_DomainParticipantListener` represents the implementation of the `DomainParticipantListener`.

Attributes

`void *listener_data` - a pointer to a user-defined object, which may be used for identification of the `Listener`.

`DDS_DomainParticipantListener_InconsistentTopicListener on_inconsistent_topic` - a pointer to the call back function implemented by the application.

`DDS_DomainParticipantListener_OfferedDeadlineMissedListener on_offered_deadline_missed` - a pointer to the call back function implemented by the application.

`DDS_DomainParticipantListener_OfferedIncompatibleQosListener on_offered_incompatible_qos` - a pointer to the call back function implemented by the application.

`DDS_DomainParticipantListener_LivelinessLostListener on_liveliness_lost` - a pointer to the call back function implemented by the application.

`DDS_DomainParticipantListener_PublicationMatchListener on_publication_matched` - a pointer to the call back function implemented by the application.

`DDS_DomainParticipantListener_RequestedDeadlineMissedListener on_requested_deadline_missed` - a pointer to the call back function implemented by the application.

`DDS_DomainParticipantListener_RequestedIncompatible QosListener on_requested_incompatible_qos` -a pointer to the call back function implemented by the application.

`DDS_DomainParticipantListener_SampleRejectedListener on_sample_rejected` - a pointer to the call back function implemented by the application.

DDS_DomainParticipantListener_LivelinessChangedListener
on_liveliness_changed - a pointer to the call back function implemented by the application.

DDS_DomainParticipantListener_DataAvailableListener
on_data_available - a pointer to the call back function implemented by the application.

DDS_DomainParticipantListener_SubscriptionMatchListener
on_subscription_matched - a pointer to the call back function implemented by the application.

DDS_DomainParticipantListener_SampleLostListener
on_sample_lost - a pointer to the call back function implemented by the application.

DDS_DomainParticipantListener_DataOnReadersListener
on_data_on_readers - a pointer to the call back function implemented by the application.

Detailed Description

The struct `DDS_DomainParticipantListener` represents the implementation of the `Listener` for the `DomainParticipant`. Since a `Listener` is implemented as a struct of pointers, the application must allocate this struct and initialise these pointers. The `Listener` is allocated using the `DDS_DomainParticipantListener__alloc` operation. Each pointer must point to the appropriate callback operation defined in the application. It is up to the application whether an operation is empty or contains some functionality. The `listener_data` attribute is a pointer to an application-defined object. This attribute can be used to supply the identity of the `Listener` that has been called. Descriptions of the other attributes are given in the appropriate `on_<status>` callback operations in each `Listener`.

1.4.3 DDS_ExtDomainParticipantListener

Synopsis

```
#include <dds_dcps.h>
struct DDS_ExtDomainParticipantListener
{
    void *listener_data;
    DDS_ExtDomainParticipantListener_InconsistentTopicListener
        on_inconsistent_topic;
    DDS_ExtDomainParticipantListener_AllDataDisposed
on_all_data_disposed;
    DDS_ExtDomainParticipantListener_OfferedDeadlineMissedListener
        on_offered_deadline_missed;
    DDS_ExtDomainParticipantListener_OfferedIncompatibleQosListener
```

```
        on_offered_incompatible_qos;
    DDS_ExtDomainParticipantListener_LivelinessLostListener
        on_liveliness_lost;
    DDS_ExtDomainParticipantListener_PublicationMatchListener
        on_publication_matched;
    DDS_ExtDomainParticipantListener_RequestedDeadlineMissedListener
        on_requested_deadline_missed;
   DDS_ExtDomainParticipantListener_RequestedIncompatibleQosListener
        on_requested_incompatible_qos;
    DDS_ExtDomainParticipantListener_SampleRejectedListener
        on_sample_rejected;
    DDS_ExtDomainParticipantListener_LivelinessChangedListener
        on_liveliness_changed;
    DDS_ExtDomainParticipantListener_DataAvailableListener
        on_data_available;
    DDS_ExtDomainParticipantListener_SubscriptionMatchListener
        on_subscription_matched;
     DDS_ExtDomainParticipantListener_SampleLostListener
        on_sample_lost;
    DDS_ExtDomainParticipantListener_DataOnReadersListener
        on_data_on_readers;
}
```

Description

The struct `DDS_ExtDomainParticipantListener` represents the implementation of the `ExtDomainParticipantListener` interface, which is an OpenSplice extension to the normal `DomainParticipantListener` interface that adds an additional callback operation to handle the `ALL_DATA_DISPOSED_STATUS` event.

Attributes

`void *listener_data` - a pointer to a user-defined object, which may be used for identification of the Listener.

`DDS_ExtDomainParticipantListener_InconsistentTopicListener on_inconsistent_topic` - a pointer to the callback function implemented by the application.

`DDS_ExtDomainParticipantListener_AllDataDisposed on_all_data_disposed` - a pointer to the callback function implemented by the application.

`DDS_ExtDomainParticipantListener_OfferedDeadlineMissedListener on_offered_deadline_missed` - a pointer to the callback function implemented by the application.

DDS_ExtDomainParticipantListener_OfferedIncompatibleQosListener on_offered_incompatible_qos - a pointer to the callback function implemented by the application.

DDS_ExtDomainParticipantListener_LivelinessLostListener on_liveliness_lost - a pointer to the callback function implemented by the application.

DDS_ExtDomainParticipantListener_PublicationMatchListener on_publication_matched - a pointer to the callback function implemented by the application.

DDS_ExtDomainParticipantListener_RequestedDeadlineMissedListener on_requested_deadline_missed - a pointer to the callback function implemented by the application.

DDS_ExtDomainParticipantListener_RequestedIncompatibleQosListener on_requested_incompatible_qos - a pointer to the callback function implemented by the application.

DDS_ExtDomainParticipantListener_SampleRejectedListener on_sample_rejected - a pointer to the callback function implemented by the application.

DDS_ExtDomainParticipantListener_LivelinessChangedListener on_liveliness_changed - a pointer to the callback function implemented by the application.

DDS_ExtDomainParticipantListener_DataAvailableListener on_data_available - a pointer to the callback function implemented by the application.

DDS_ExtDomainParticipantListener_SubscriptionMatchListener on_subscription_matched - a pointer to the callback function implemented by the application.

DDS_ExtDomainParticipantListener_SampleLostListener on_sample_lost - a pointer to the callback function implemented by the application.

DDS_ExtDomainParticipantListener_DataOnReadersListener on_data_on_readers - a pointer to the callback function implemented by the application.

Detailed Description

The struct `DDS_ExtDomainParticipantListener` represents an extended implementation of the `Listener` for the `DomainParticipant`. This extension is an OpenSplice addition to the normal `DomainParticipantListener` interface and adds an additional callback operation to handle the `ALL_DATA_DISPOSED_STATUS` event.

Since a `Listener` is implemented as a struct of pointers, the application must allocate this struct and initialise these pointers. This extended `Listener` is allocated using the `DDS_ExtDomainParticipntListener__alloc` operation, and may replace the normal `DDS_DomainParticipantListener` when the `ALL_DATA_DISPOSED_STATUS` needs to be handled. (If this event does not need to be handled, you can still use the normal `DDS_DomainParticipantListener` instead). Each pointer must point to the appropriate callback operation defined in the application. It is up to the application whether an operation is empty or contains some functionality. The `listener_data` attribute is a pointer to an application-defined object. This attribute can be used to supply the identity of the `Listener` that has been called.

Descriptions of the other attributes are given in the appropriate `on_<status>` callback operations in each `Listener`.

1.4.4 DDS_TopicListener

Synopsis

```
#include <dds_dcps.h>
struct DDS_TopicListener
{
   void *listener_data;
   DDS_TopicListener_InconsistentTopicListener
       on_inconsistent_topic;
};
```

Description

The struct `DDS_TopicListener` represents the implementation of the `TopicListener`.

Attributes

`void *listener_data` - a pointer to a user-defined object, which may be used for identification of the `Listener`.

`DDS_TopicListener_InconsistentTopicListener on_inconsistent_topic` - a pointer to the callback function implemented by the application.

Detailed Description

The struct `DDS_TopicListener` represents the implementation of the `Listener` for the `Topic`. Since a `Listener` is implemented as a struct of pointers, the application must allocate this struct and initialise these pointers. The `Listener` is allocated using the `DDS_TopicListener__alloc` operation. Each pointer must point to the appropriate callback operation defined in the application. It is up to the application whether an operation is empty or contains some functionality. The `listener_data` attribute is a pointer to an application-defined object. This attribute can be used to supply the identity of the `Listener` that has been called. Descriptions of the other attributes are given in the appropriate `on_<status>` callback operations in each `Listener`.

1.4.5 DDS_ExtTopicListener

Synopsis

```
#include <dds_dcps.h>
struct ExtTopicListener
{
    void *listener_data;
    DDS_ExtTopicListener_InconsistentTopicListener
        on_inconsistent_topic;
    DDS_ExtTopicListener_AllDataDisposed on_all_data_disposed;
}
```

Description

The struct `DDS_ExtTopicListener` represents the implementation of the `ExtTopicListener` interface, which is an OpenSplice extension to the normal `TopicListener` interface that adds an additional callback operation to handle the `ALL_DATA_DISPOSED_STATUS` event.

Attributes

`void *listener_data` - a pointer to a user-defined object, which may be used for identification of the `Listener`.

`DDS_ExtTopicListener_InconsistentTopicListener on_inconsistent_topic` - a pointer to the callback function implemented by the application.

`DDS_ExtTopicListener_AllDataDisposed on_all_data_disposed` - a pointer to the callback function implemented by the application.

Detailed Description

The struct DDS_ExtTopicListener represents an extended implementation of the Listener for the Topic. This extension is an OpenSplice addition to the normal TopicListener interface and adds an additional callback operation to handle the ALL_DATA_DISPOSED_STATUS event. Since a Listener is implemented as a struct of pointers, the application must allocate this struct and initialise these pointers. This extended Listener is allocated using the DDS_ExtTopicListener__alloc operation, and may replace the normal DDS_TopicListener when the ALL_DATA_DISPOSED_STATUS needs to be handled. (If this event does not need to be handled, you can still use the normal DDS_TopicListener instead). Each pointer must point to the appropriate callback operation defined in the application. It is up to the application whether an operation is empty or contains some functionality. The listener_data attribute is a pointer to an application-defined object. This attribute can be used to supply the identity of the Listener that has been called.

Descriptions of the other attributes are given in the appropriate on_<status> callback operations in each Listener.

1.4.6 DDS_PublisherListener

Synopsis

```
#include <dds_dcps.h>
struct DDS_publisherListener
{
   void *listener_data;
   DDS_publisherListener_OfferedDeadlineMissedListener
       on_offered_deadline_missed;
   DDS_publisherListener_OfferedIncompatibleQosListener
       on_offered_incompatible_qos;
   DDS_publisherListener_LivelinessLostListener
       on_liveliness_lost;
   DDS_publisherListener_PublicationMatchListener
       on_publication_matched;
};
```

Description

The struct DDS_publisherListener represents the implementation of the publisherListener.

Attributes

*void *listener_data* - a pointer to a user-defined object, which may be used for identification of the Listener.

DDS_publisherListener_OfferedDeadlineMissedListener
on_offered_deadline_missed - a pointer to the call back function implemented by the application.

DDS_publisherListener_OfferedIncompatibleQosListener
on_offered_incompatible_qos - a pointer to the call back function implemented by the application.

DDS_publisherListener_LivelinessLostListener
on_liveliness_lost - a pointer to the call back function implemented by the application.

DDS_publisherListener_PublicationMatchListener
on_publication_matched - a pointer to the call back function implemented by the application.

Detailed Description

The struct `DDS_publisherListener` represents the implementation of the `Listener` for the `publisher`. Since a `Listener` is implemented as a struct of pointers, the application must allocate this struct and initialise these pointers. The `Listener` is allocated using the `DDS_publisherListener__alloc` operation. Each pointer must point to the appropriate callback operation defined in the application. It is up to the application whether an operation is empty or contains some functionality. The `listener_data` attribute is a pointer to an application-defined object. This attribute can be used to supply the identity of the `Listener` that has been called. Descriptions of the other attributes are given in the appropriate `on_<status>` callback operations in each `Listener`.

1.4.7 DDS_DataWriterListener

Synopsis

```
#include <dds_dcps.h>
struct DDS_DataWriterListener
{
   DDS_DataWriterListener_OfferedDeadlineMissedListener
       on_offered_deadline_missed;
   DDS_DataWriterListener_OfferedIncompatibleQosListener
       on_offered_incompatible_qos;
   DDS_DataWriterListener_LivelinessLostListener
       on_liveliness_lost;
   DDS_DataWriterListener_PublicationMatchListener
       on_publication_matched;
};
```

Description

The struct `DDS_DataWriterListener` represents the implementation of the `DataWriterListener`.

Attributes

`void *listener_data` - a pointer to a user-defined object, which may be used for identification of the `Listener`.

`DDS_DataWriterListener_OfferedDeadlineMissedListener`
`on_offered_deadline_missed` - a pointer to the call back function implemented by the application.

`DDS_DataWriterListener_OfferedIncompatibleQosListener`
`on_offered_incompatible_qos` - a pointer to the call back function implemented by the application.

`DDS_DataWriterListener_LivelinessLostListener`
`on_liveliness_lost` - a pointer to the call back function implemented by the application.

`DDS_DataWriterListener_PublicationMatchListener`
`on_publication_matched` - a pointer to the call back function implemented by the application.

Detailed Description

The struct `DDS_DataWriterListener` represents the implementation of the `Listener` for the `DataWriter`. Since a `Listener` is implemented as a struct of pointers, the application must allocate this struct and initialise these pointers. The `Listener` is allocated using the `DDS_DataWriterListener__alloc` operation. Each pointer must point to the appropriate callback operation defined in the application. It is up to the application whether an operation is empty or contains some functionality. The `listener_data` attribute is a pointer to an application-defined object. This attribute can be used to supply the identity of the `Listener` that has been called. Descriptions of the other attributes are given in the appropriate `on_<status>` callback operations in each `Listener`.

1.4.8 DDS_SubscriberListener

Synopsis

```
#include <dds_dcps.h>
struct DDS_SubscriberListener
{
   void *listener_data;
   DDS_SubscriberListener_RequestedDeadlineMissedListener
       on_requested_deadline_missed;
```

```
    DDS_SubscriberListener_RequestedIncompatibleQosListener
        on_requested_incompatible_qos;
    DDS_SubscriberListener_SampleRejectedListener
        on_sample_rejected;
    DDS_SubscriberListener_LivelinessChangedListener
        on_liveliness_changed;
    DDS_SubscriberListener_DataAvailableListener
        on_data_available;
    DDS_SubscriberListener_SubscriptionMatchListener
        on_subscription_matched;
    DDS_SubscriberListener_SampleLostListener
        on_sample_lost;
    DDS_SubscriberListener_DataOnReadersListener
        on_data_on_readers;
};
```

Description

The struct `DDS_SubscriberListener` represents the implementation of the `SubscriberListener`.

Attributes

`void *listener_data` - a pointer to a user-defined object, which may be used for identification of the `Listener`.

`DDS_SubscriberListener_RequestedDeadlineMissedListener on_requested_deadline_missed` - a pointer to the call back function implemented by the application.

`DDS_SubscriberListener_RequestedIncompatibleQosListener on_requested_incompatible_qos` - a pointer to the call back function implemented by the application.

`DDS_SubscriberListener_SampleRejectedListener on_sample_rejected` - a pointer to the call back function implemented by the application.

`DDS_SubscriberListener_LivelinessChangedListener on_liveliness_changed` - a pointer to the call back function implemented by the application.

`DDS_SubscriberListener_DataAvailableListener on_data_available` - a pointer to the call back function implemented by the application.

`DDS_SubscriberListener_SubscriptionMatchListener on_subscription_matched` - a pointer to the call back function implemented by the application.

DDS_SubscriberListener_SampleLostListener on_sample_lost - a pointer to the call back function implemented by the application.

DDS_SubscriberListener_DataOnReadersListener on_data_on_readers - a pointer to the call back function implemented by the application.

Detailed Description

The struct DDS_SubscriberListener represents the implementation of the Listener for the Subscriber. Since a Listener is implemented as a struct of pointers, the application must allocate this struct and initialise these pointers. The Listener is allocated using the DDS_SubscriberListener__alloc operation. Each pointer must point to the appropriate callback operation defined in the application. It is up to the application whether an operation is empty or contains some functionality. The listener_data attribute is a pointer to an application-defined object. This attribute can be used to supply the identity of the Listener that has been called. Descriptions of the other attributes are given in the appropriate on_<status> callback operations in each Listener.

1.4.9 DDS_DataReaderListener

Synopsis

```
#include <dds_dcps.h>
struct DDS_DataReaderListener
{
   void *listener_data;
   DDS_DataReaderListener_RequestedDeadlineMissedListener
       on_requested_deadline_missed;
   DDS_DataReaderListener_RequestedIncompatibleQosListener
       on_requested_incompatible_qos;
   DDS_DataReaderListener_SampleRejectedListener
       on_sample_rejected;
   DDS_DataReaderListener_LivelinessChangedListener
       on_liveliness_changed;
   DDS_DataReaderListener_DataAvailableListener
       on_data_available;
   DDS_DataReaderListener_SubscriptionMatchListener
       on_subscription_matched;
   DDS_DataReaderListener_SampleLostListener
      on_sample_lost;
};
```

Description

The struct `DDS_DataReaderListener` represents the implementation of the `DataReaderListener`.

Attributes

`void *listener_data` - a pointer to a user-defined object, which may be used for identification of the `Listener`.

`DDS_DataReaderListener_RequestedDeadlineMissedListener on_requested_deadline_missed` - a pointer to the call back function implemented by the application.

`DDS_DataReaderListener_RequestedIncompatibleQosListener on_requested_incompatible_qos` - a pointer to the call back function implemented by the application.

`DDS_DataReaderListener_SampleRejectedListener on_sample_rejected` - a pointer to the call back function implemented by the application.

`DDS_DataReaderListener_LivelinessChangedListener on_liveliness_changed` - a pointer to the call back function implemented by the application.

`DDS_DataReaderListener_DataAvailableListener on_data_available` - a pointer to the call back function implemented by the application.

`DDS_DataReaderListener_SubscriptionMatchListener on_subscription_matched` - a pointer to the call back function implemented by the application.

`DDS_DataReaderListener_SampleLostListener on_sample_lost` - a pointer to the call back function implemented by the application.

Detailed Description

The struct `DDS_DataReaderListener` represents the implementation of the `Listener` for the `DataReader`. Since a `Listener` is implemented as a struct of pointers, the application must allocate this struct and initialise these pointers. The `Listener` is allocated using the `DDS_DataReaderListener__alloc` operation. Each pointer must point to the appropriate callback operation defined in the application. It is up to the application whether an operation is empty or contains some functionality. The `listener_data` attribute is a pointer to an application-defined object. This attribute can be used to supply the identity of the `Listener` that has been called. Descriptions of the other attributes are given in the appropriate `on_<status>` callback operations in each `Listener`.

1.5 Inheritance of Abstract Operations

The information provided here conforms to the

- PIM part of the DDS-DCPS specification (for module descriptions)
- PSM part of the DDS-DCPS specification (for class and operation descriptions).

For detailed information refer to the *OMG C Language Mapping Specification*.

At PIM level, inheritance is used to define abstract classes and operations. The OMG IDL PSM defines the interface for an application to interact with the Data Distribution Service. The DCPS API for the C programming language conforms to the IDL to C mapping as specified in the *OMG C Language Mapping Specification*.

Inheritance of operations is not implemented when different type parameters for the same operation are used. In this case operations are implemented in their respective derived class (*e.g.* `DDS_<Entity>_get_qos` and `DDS_<Entity>_set_qos`). These operations are commented out in the IDL PSM.

CHAPTER

2 DCPS Modules

DCPS is divided into five modules, which are described briefly in this chapter. Each module consists of several classes as defined at PIM level in the DDS-DCPS specification. Some of the classes as described in the PIM are implemented as a struct in the PSM; these classes are treated as a class in this chapter according to the PIM with a remark about their implementation (struct). In the next chapter their actual implementations are described.

Each class contains several operations, which may be abstract. Those classes, which are implemented as a struct do not have any operations. The modules and the classes are ordered conform the DDS-DCPS specification. The classes, interfaces, structs and operations are described in the next chapter.

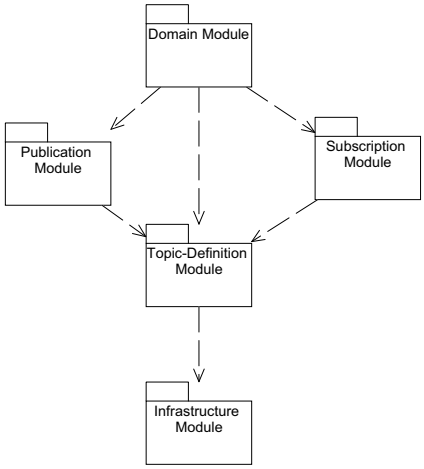

Figure 2: DCPS Module Composition

2.1 Functionality

The modules have the following function in the Data Distribution Service:

- **Infrastructure Module**: This module defines the abstract classes and interfaces, which are refined by the other modules. It also provides the support for the interaction between the application and the Data Distribution Service (state-based and event-based)

- ***Domain Module*** - This module contains the `DDS_DomainParticipant` class, which is the entry point of the application, the `DDS_DomainParticipantFactory` class and `DDS_DomainParticipantListener` interface
- ***Topic-Definition Module*** - This module contains the `DDS_Topic`, `DDS_ContentFilteredTopic` and `DDS_MultiTopic` classes. It also contains the `DDS_TopicListener` interface and all support to define `DDS_Topic` objects and assign `QosPolicy` settings to them
- ***Publication Module*** - This module contains the `DDS_Publisher` and `DDS_DataWriter` classes. It also contains the `DDS_PublisherListener` and `DDS_DataWriterListener` interfaces
- ***Subscription Module*** - This module contains the `DDS_Subscriber`, `DDS_DataReader`, `DDS_ReadCondition` and `DDS_QueryCondition` classes. It also contains the `DDS_SubscriberListener` and `DDS_DataReaderListener` interfaces

2.2 Infrastructure Module

This module defines the abstract classes and interfaces, which, in the PIM definition, are refined by the other modules. It also provides the support for the interaction between the application and the Data Distribution Service (event-based and state-based). The event-based interaction is supported by `DDS_Listeners`, the state-based interaction is supported by `DDS_WaitSets` and `DDS_Conditions`.

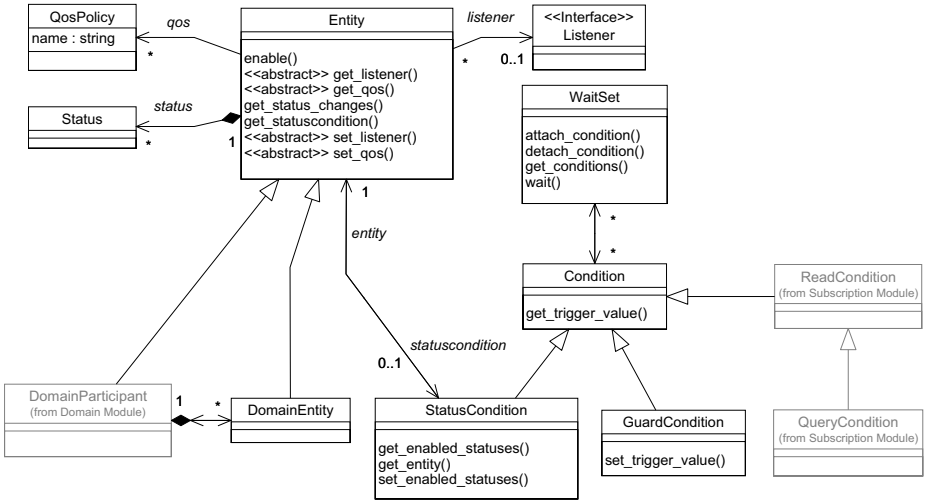

Figure 3: DCPS Infrastructure Module's Class Model

This module contains the following classes:

- `DDS_Entity` (abstract)
- `DDS_DomainEntity` (abstract)
- `DDS_QosPolicy` (abstract, struct)
- `DDS_Listener` (interface)
- `DDS_Status` (abstract, struct)
- `DDS_WaitSet`
- `DDS_Condition`
- `DDS_GuardCondition`
- `DDS_StatusCondition`

2.3 Domain Module

This module contains the class `DDS_DomainParticipant`, which acts as an entry point of the Data Distribution Service and acts as a factory for many of the classes. The `DDS_DomainParticipant` also acts as a container for the other objects that make up the Data Distribution Service. It isolates applications within the same `Domain` from other applications in a different `Domain` on the same set of computers. A `Domain` is a "virtual network" and applications with the same `domainId` are isolated from applications with a different `domainId`. In this way, several independent distributed applications can coexist in the same physical network without interfering, or even being aware of each other.

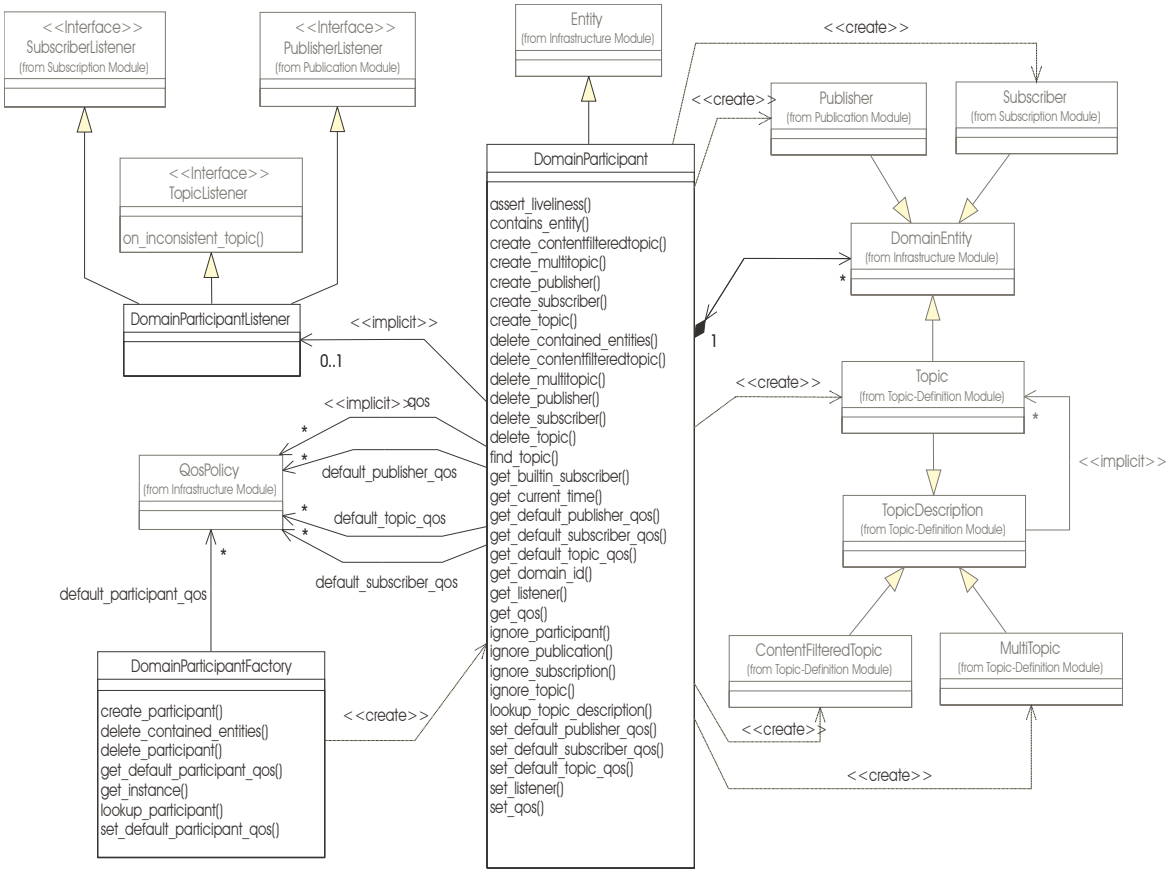

Figure 4: DCPS Domain Module's Class Model

This module contains the following classes:

- `DDS_DomainParticipant`
- `DDS_DomainParticipantFactory`
- `DDS_DomainParticipantListener` (interface)
- `DDS_Domain` (*not depicted*)

2.4 Topic-Definition Module

This module contains the `DDS_Topic`, `DDS_ContentFilteredTopic` and `DDS_MultiTopic` classes. It also contains the `DDS_TopicListener` interface and all support to define `DDS_Topic` objects and assign `QosPolicy` settings to them.

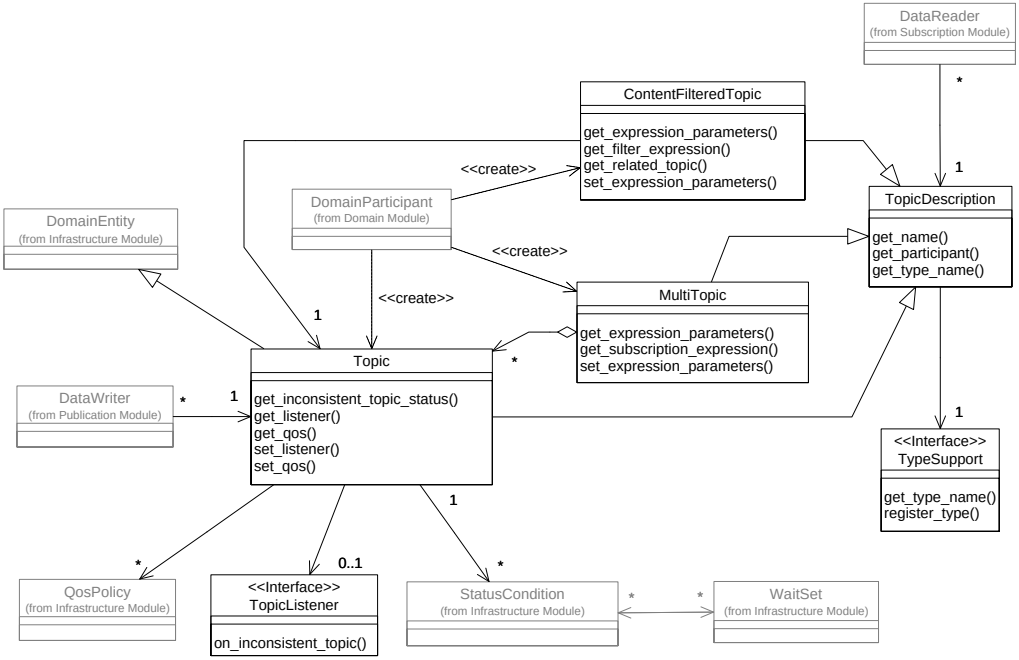

Figure 5: DCPS Topic-Definition Module's Class Model

This module contains the following classes:

- `DDS_TopicDescription` (abstract)
- `DDS_Topic`
- `DDS_ContentFilteredTopic`
- `DDS_MultiTopic`
- `DDS_TopicListener` (interface)
- Topic-Definition type specific classes

Topic-Definition type specific classes contain the generic class and the generated data type specific classes. In case of the user-defined data type `Foo` (this also applies to other types), defined in the module `SPACE`; "Topic-Definition type specific classes" contains the following classes:

- `DDS_TypeSupport` (abstract)
- `SPACE_FooTypeSupport`

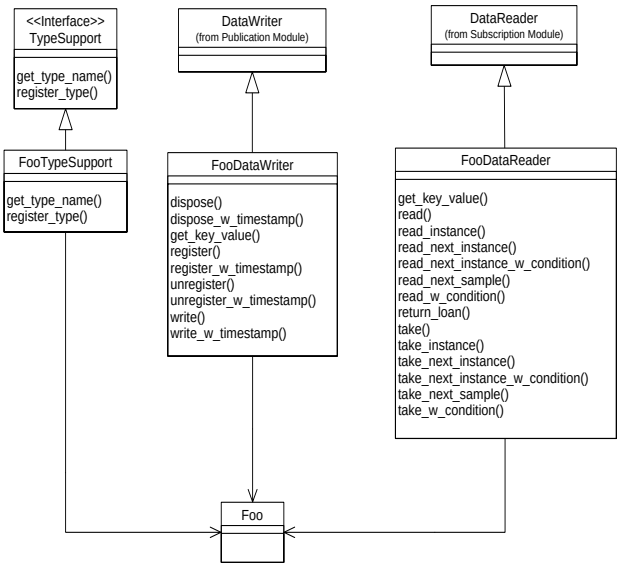

Figure 6: Data Type "Foo" Typed Classes Pre-processor Generation

2.5 Publication Module

This module supports writing of the data, it contains the `DDS_Publisher` and `DDS_DataWriter` classes. It also contains the `DDS_PublisherListener` and `DDS_DataWriterListener` interfaces. Furthermore, it contains all support needed for publication.

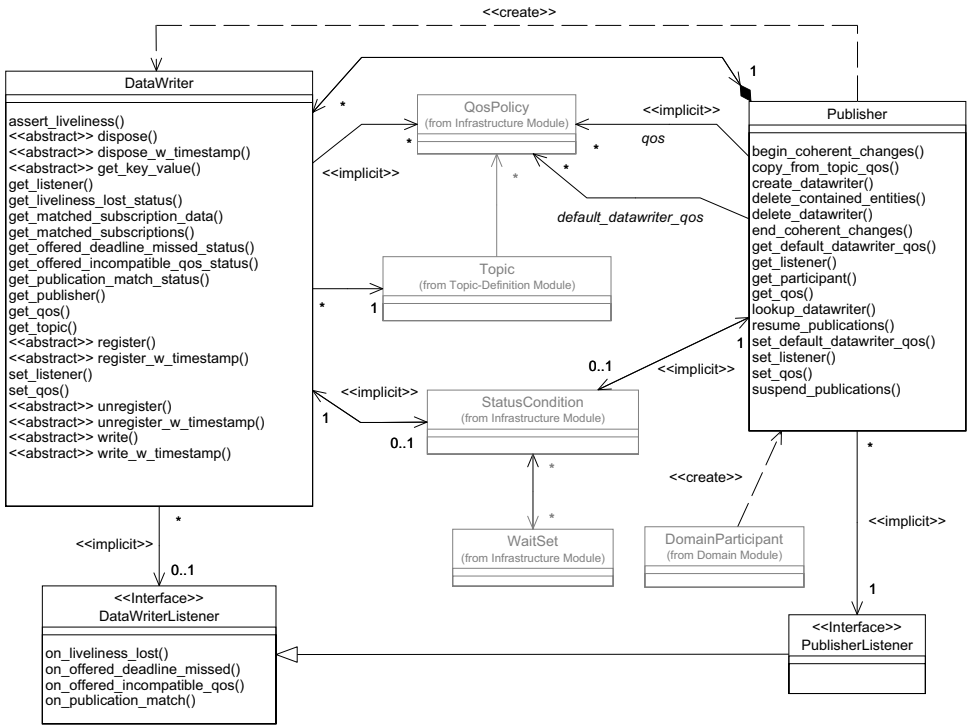

Figure 7: DCPS Publication Module's Class Model

This module contains the following classes:

- `DDS_Publisher`
- `DDS_PublisherListener` (interface)
- `DDS_DataWriterListener` (interface)
- Publication type specific classes

Publication type specific classes contain the generic class and the generated data type specific classes. In case of the user-defined data type `Foo` (this also applies to other types), defined in the module `SPACE`; "Publication type specific classes" contains the following classes:

- `DDS_DataWriter` (abstract)
- `SPACE_FooDataWriter`

2.6 Subscription Module

This module supports access to the data, it contains the `DDS_Subscriber`, `DDS_DataReader`, `DDS_ReadCondition` and `DDS_QueryCondition` classes. It also contains the `DDS_SubscriberListener` and `DDS_DataReaderListener` interfaces. Furthermore, it contains all support needed for subscription.

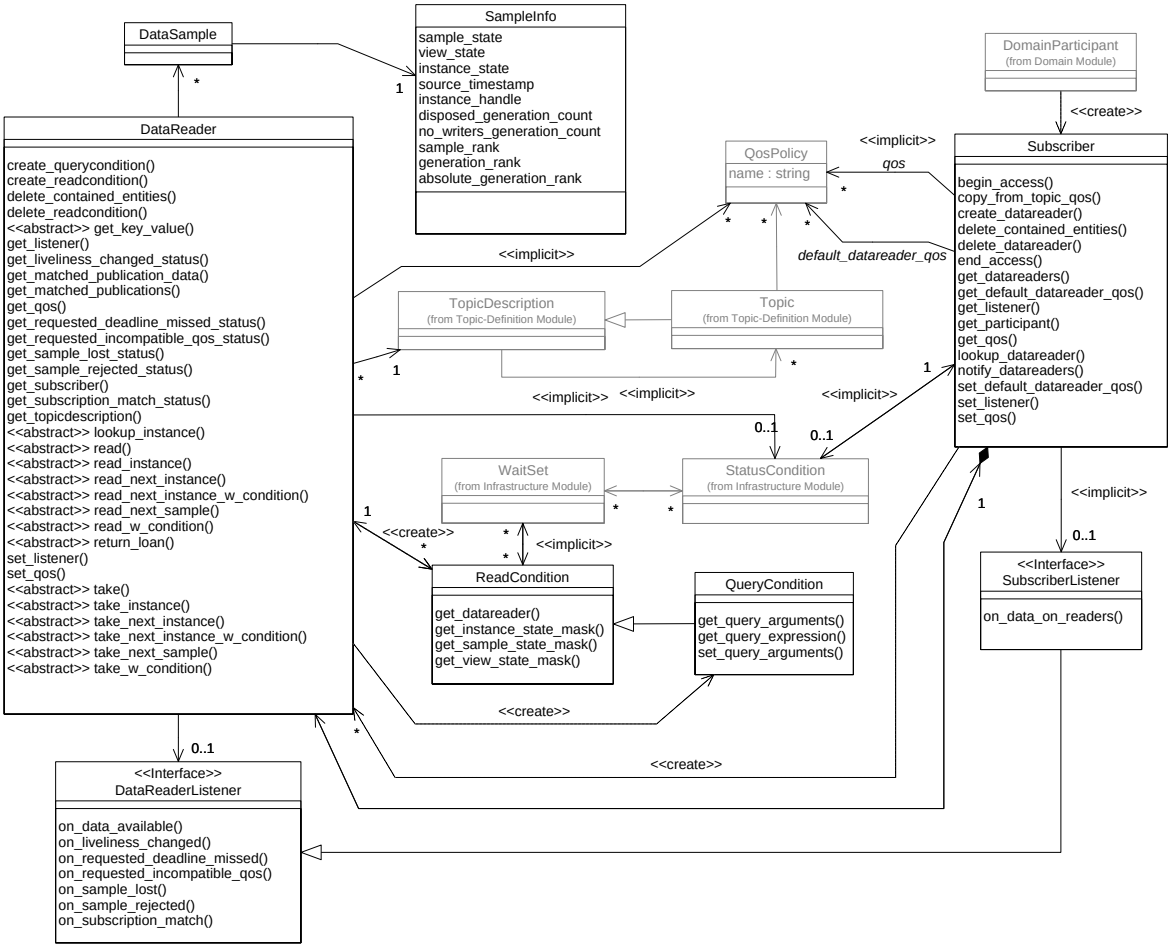

Figure 8: DCPS Subscription Module's Class Model

This module contains the following classes:

- `DDS_Subscriber`
- `DDS_DataSample`
- `DDS_SampleInfo` (struct)
- `DDS_SubscriberListener` (interface)

- `DDS_DataReaderListener` (interface)
- `DDS_ReadCondition`
- `DDS_QueryCondition`
- Subscription type specific classes

Subscription type specific classes contain the generic class and the generated data type specific classes. In case of the user-defined data type `Foo` (this also applies to other types), defined in the module `SPACE`; "Subscription type specific classes" contains the following classes:

- `DDS_DataReader` (abstract)
- `SPACE_FooDataReader`

CHAPTER

3 DCPS Classes and Operations

This chapter describes, for each module, its classes and operations in detail. Each module consists of several classes as defined at PIM level in the DDS-DCPS specification. Some of the classes are implemented as a struct in the PSM. Some of the other classes are abstract, which means they contain some abstract operations.

The `Listener` *interfaces are designed as an interface at PIM level. In other words, the application must implement the interface operations. Therefore, all* `Listener` *classes are abstract. A user-defined class for these operations must be provided by the application which must extend from the* ***specific*** `Listener` *class.* ***All*** `Listener` *operations* ***must*** *be implemented in the user-defined class. It is up to the application whether an operation is empty or contains some functionality.*

The Listener interfaces in the C API are implemented as `structs` *containing function pointers. All the function pointer attributes within the* `struct` *must be assigned to a function. It is up to the application whether a function is empty or contains some functionality.*

Each class contains several operations, which may be abstract (base class). Abstract operations are not implemented in their base class, but in a type specific class or an application-defined class (in case of a `Listener`*). Classes that are implemented as a struct do not have any operations. Some operations are inherited, which means they are implemented in their base class.*

The abstract operations in a class are listed (including their synopsis), but not implemented in that class. These operations are implemented in their respective derived classes. The interfaces are fully described, since they must be implemented by the application.

---

i *General note for type* `Space`*:* The name `Space.h` is derived from the IDL file `Space.idl`, that defines `Foo`.

3.1 Infrastructure Module

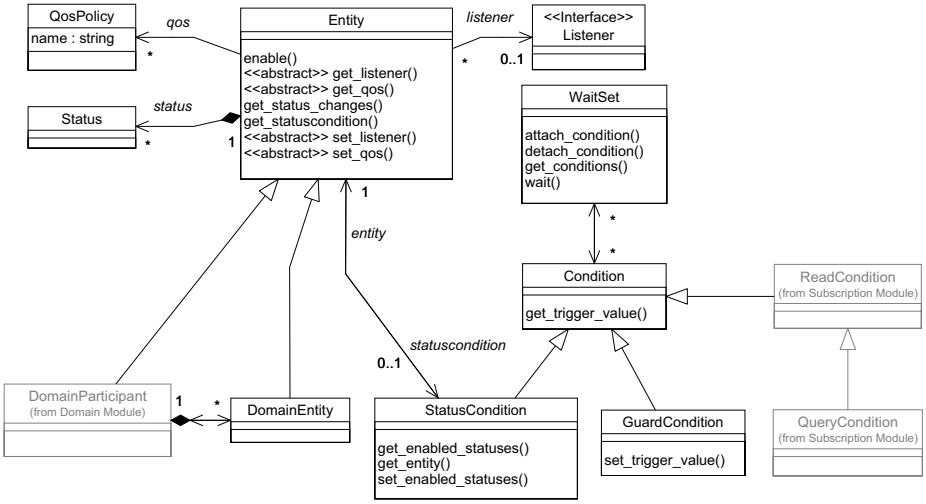

Figure 9: DCPS Infrastructure Module's Class Model

This module contains the following classes:

- `DDS_Entity` (abstract)
- `DDS_DomainEntity` (abstract)
- `DDS_QosPolicy` (abstract, struct)
- `DDS_Listener` (interface)
- `DDS_Status` (abstract, struct)
- `DDS_WaitSet`
- `DDS_Condition`
- `DDS_GuardCondition`
- `DDS_StatusCondition`
- `DDS_ErrorInfo`

3.1.1 Class DDS_Entity (abstract)

This class is the abstract base class for all the DCPS objects. It acts as a generic class for `DDS_Entity` objects.

The interface description of this class is as follows:

```
   /* interface DDS_Entity */
   /*  abstract operations (implemented in class
DDS_DomainParticipant,
    *  DDS_Topic, DDS_Publisher, DDS_DataWriter, DDS_Subscriber and
```

```
 * DDS_DataReader)
 */
/*
 * DDS_ReturnCode_t
 *    DDS_Entity_set_qos
 *       (DDS_Entity _this,
 *         const DDS_EntityQos *qos);
 */
/*
 * DDS_ReturnCode_t
 *    DDS_Entity_get_qos
 *       (DDS_Entity _this,
 *         DDS_EntityQos *qos);
 */
/*
 * DDS_ReturnCode_t
 *    DDS_Entity_set_listener
 *       (DDS_Entity _this,
 *         const struct DDS_EntityListener *a_listener,
 *         const DDS_StatusMask mask);
 */
/*
 * struct DDS_EntityListener
 *    DDS_Entity_get_listener
 *       (DDS_Entity _this);
 */
/*
 * implemented API operations
 */
   DDS_ReturnCode_t
      DDS_Entity_enable
         (DDS_Entity _this);
   DDS_StatusCondition
      DDS_Entity_get_statuscondition
         (DDS_Entity _this);
   DDS_StatusMask
      DDS_Entity_get_status_changes
         (DDS_Entity _this);
   DDS_InstanceHandle_t
      DDS_Entity_get_instance_handle
         (DDS_Entity _this);
```

The abstract operations are listed but not fully described because they are not implemented in this specific class. The full description of these operations is given in the subclasses, which contain the type specific implementation of these operations.

3.1.1.1 DDS_Entity_enable

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Entity_enable
      (DDS_Entity _this);
```

Description

This operation enables the `DDS_Entity` on which it is being called when the `DDS_Entity` was created with the `DDS_EntityFactoryQosPolicy` set to `FALSE`.

Parameters

`in DDS_Entity _this` - the `DDS_Entity` object on which the operation is operated.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_ALREADY_DELETED`, `DDS_RETCODE_OUT_OF_RESOURCES` or `DDS_RETCODE_PRECONDITION_NOT_MET`.

Detailed Description

This operation enables the `DDS_Entity`. Created `DDS_Entity` objects can start in either an enabled or disabled state. This is controlled by the value of the `DDS_EntityFactoryQosPolicy` on the corresponding factory for the `DDS_Entity`. Enabled entities are immediately activated at creation time meaning all their immutable QoS settings can no longer be changed. Disabled Entities are not yet activated, so it is still possible to change their immutable QoS settings. However, once activated the immutable QoS settings can no longer be changed.

Creating disabled entities can make sense when the creator of the `DDS_Entity` does not yet know which QoS settings to apply, thus allowing another piece of code to set the QoS later on.

The default setting of `DDS_EntityFactoryQosPolicy` is such that, by default, entities are created in an enabled state so that it is not necessary to explicitly call `DDS_<Entity>_enable` on newly-created `entities`.

The `DDS_<Entity>_enable` operation produces the same results no matter how many times it is performed. Calling `DDS_<Entity>_enable` on an already enabled `DDS_Entity` returns `DDS_RETCODE_OK` and has no effect.

If a DDS_Entity has not yet been enabled, the only operations that can be invoked on it are: the ones to set, get or copy the QosPolicy settings (including the default QosPolicy settings on factories), the ones that set (or get) the listener, the ones that get the DDS_StatusCondition, the DDS_Entity_get_status_changes operation (although the status of a disabled entity never changes), and the 'factory' operations that create, delete or lookup[1] other DDS_Entities. Other operations will return the error DDS_RETCODE_NOT_ENABLED.

Entities created from a factory that is disabled, are created disabled regardless of the setting of the DDS_EntityFactoryQosPolicy.

Calling DDS_<Entity>_enable on an DDS_Entity whose factory is not enabled will fail and return DDS_RETCODE_PRECONDITION_NOT_MET.

If the DDS_EntityFactoryQosPolicy has autoenable_created_entities set to TRUE, the DDS_<Entity>_enable operation on the factory will automatically enable all Entities created from the factory.

The Listeners associated with an DDS_Entity are not called until the DDS_Entity is enabled. DDS_Conditions associated with an DDS_Entity that is not enabled are "inactive", that is, have a trigger_value which is FALSE.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the application enabled the DDS_Entity (or it was already enabled)
- *DDS_RETCODE_ERROR* - an internal error has occurred
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation
- *DDS_RETCODE_PRECONDITION_NOT_MET* - the factory of the DDS_Entity is not enabled

3.1.1.2 DDS_Entity_get_instance_handle

Synopsis

```
#include <dds_dcps.h>
DDS_InstanceHandle_t
   DDS_Entity_get_instance_handle
      (DDS_Entity _this);
```

1. This includes the lookup_topicdescription, but not the find_topic.

Description

This operation returns the `instance_handle` of the built-in topic sample that represents the specified `DDS_Entity`.

Parameters

`in DDS_Entity _this` - object on which the operation is operated.

Return Value

`DDS_InstanceHandle_t` - Result value is the `instance_handle` of the built-in topic sample that represents the state of this `DDS_Entity`.

Detailed Description

The relevant state of some `DDS_Entity` objects are distributed using built-in topics. Each built-in topic sample represents the state of a specific `DDS_Entity` and has a unique `instance_handle`. This operation returns the `instance_handle` of the built-in topic sample that represents the specified `DDS_Entity`.

Some `DDS_Entities` (`DDS_Publisher` and `DDS_Subscriber`) do not have a corresponding built-in topic sample, but they still have an `instance_handle` that uniquely identifies the `DDS_Entity`.

The `instance_handles` obtained this way can also be used to check whether a specific `DDS_Entity` is located in a specific `DDS_DomainParticipant`. (See Section 3.2.1.2, *DDS_DomainParticipant_contains_entity*, on page 164.)

3.1.1.3 DDS_Entity_get_listener (abstract)

This abstract operation is defined as a generic operation to access a `Listener`. Each subclass derived from this class, `DDS_DomainParticipant`, `DDS_Topic`, `DDS_Publisher`, `DDS_Subscriber`, `DDS_DataWriter` and `DDS_DataReader` will provide a class specific implementation of this abstract operation.

Synopsis

```
#include <dds_dcps.h>
struct DDS_EntityListener
   DDS_Entity_get_listener
      (DDS_Entity _this);
```

3.1.1.4 DDS_Entity_get_qos (abstract)

This abstract operation is defined as a generic operation to access a struct with the `QosPolicy` settings. Each subclass derived from this class, `DDS_DomainParticipant`, `DDS_Topic`, `DDS_Publisher`, `DDS_Subscriber`, `DDS_DataWriter` and `DDS_DataReader` will provide a class specific implementation of this abstract operation.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Entity_get_qos
      (DDS_Entity _this,
        DDS_EntityQos *qos);
```

3.1.1.5 DDS_Entity_get_status_changes

Synopsis

```
#include <dds_dcps.h>
DDS_StatusMask
   DDS_Entity_get_status_changes
      (DDS_Entity _this);
```

Description

This operation returns a mask with the communication statuses in the `DDS_Entity` that are "triggered".

Parameters

`in DDS_Entity _this` - object on which the operation is operated.

Return Value

`DDS_StatusMask` - Result is a bit-mask in which each bit shows which value has changed.

Detailed Description

This operation returns a mask with the communication statuses in the `DDS_Entity` that are "triggered". That is the set of communication statuses whose value have changed since the last time the application called this operation. This operation shows whether a change has occurred even when the status seems unchanged because the status changed back to the original status.

When the `DDS_Entity` is first created or if the `DDS_Entity` is not enabled, all communication statuses are in the "un-triggered" state so the mask returned by the operation is empty.

The result value is a bit-mask in which each bit shows which value has changed. The relevant bits represent one of the following statuses:

- `DDS_INCONSISTENT_TOPIC_STATUS`
- `DDS_OFFERED_DEADLINE_MISSED_STATUS`
- `DDS_REQUESTED_DEADLINE_MISSED_STATUS`
- `DDS_OFFERED_INCOMPATIBLE_QOS_STATUS`

- DDS_REQUESTED_INCOMPATIBLE_QOS_STATUS
- DDS_SAMPLE_LOST_STATUS
- DDS_SAMPLE_REJECTED_STATUS
- DDS_DATA_ON_READERS_STATUS
- DDS_DATA_AVAILABLE_STATUS
- DDS_LIVELINESS_LOST_STATUS
- DDS_LIVELINESS_CHANGED_STATUS
- DDS_PUBLICATION_MATCHED_STATUS
- DDS_SUBSCRIPTION_MATCHED_STATUS

Each status bit is declared as a constant and can be used in an AND operation to check the status bit against the result of type DDS_StatusMask. Not all statuses are relevant to all DDS_Entity objects. See the respective Listener interfaces for each DDS_Entity for more information.

3.1.1.6 DDS_Entity_get_statuscondition

Synopsis

```
#include <dds_dcps.h>
DDS_StatusCondition
   DDS_Entity_get_statuscondition
      (DDS_Entity _this);
```

Description

This operation allows access to the DDS_StatusCondition associated with the DDS_Entity.

Parameters

in DDS_Entity _this - object on which the operation is operated.

Return Value

DDS_StatusCondition - Result value is the DDS_StatusCondition of the DDS_Entity.

Detailed Description

Each DDS_Entity has a DDS_StatusCondition associated with it. This operation allows access to the DDS_StatusCondition associated with the DDS_Entity. The returned condition can then be added to a DDS_WaitSet so that the application can wait for specific status changes that affect the DDS_Entity.

3.1.1.7 DDS_Entity_set_listener (abstract)

This abstract operation is defined as a generic operation to access a `Listener`. Each subclass derived from this class, `DDS_DomainParticipant`, `DDS_Topic`, `DDS_Publisher`, `DDS_Subscriber`, `DDS_DataWriter` and `DDS_DataReader` will provide a class specific implementation of this abstract operation.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Entity_set_listener
      (DDS_Entity _this,
        const struct DDS_Listener *a_listener,
        const DDS_StatusMask mask);
```

3.1.1.8 DDS_Entity_set_qos (abstract)

This abstract operation is defined as a generic operation to modify a struct with the `QosPolicy` settings. Each subclass derived from this class, `DDS_DomainParticipant`, `DDS_Topic`, `DDS_Publisher`, `DDS_Subscriber`, `DDS_DataWriter` and `DDS_DataReader` will provide a class specific implementation of this abstract operation.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Entity_set_qos
      (DDS_Entity _this,
        const DDS_EntityQos *qos);
```

3.1.2 Class DDS_DomainEntity (abstract)

This class is the abstract base class for the all entities except `DDS_DomainParticipant`. The main purpose is to express that `DDS_DomainParticipant` is a special kind of `DDS_Entity`, which acts as a container of all other `DDS_Entity` objects, but cannot contain another `DDS_DomainParticipant` within itself. Therefore, this class is not part of the IDL interface in the DCPS PSM description.

The class `DDS_DomainEntity` does not contain any operations.

3.1.3 Struct QosPolicy

Each `DDS_Entity` provides a `<DDS_Entity>Qos` structure that implements the basic mechanism for an application to specify Quality of Service attributes. This structure consists of `DDS_Entity` specific `QosPolicy` attributes. `QosPolicy`

attributes are structured types where each type specifies the information that controls an `DDS_Entity` related (configurable) property of the Data Distribution Service.

All `QosPolicies` applicable to a `DDS_Entity` are aggregated in a corresponding `<DDS_Entity>Qos`, which is a compound structure that is set atomically so that it represents a coherent set of `QosPolicy` attributes.

Compound types are used whenever multiple attributes must be set coherently to define a consistent attribute for a `QosPolicy`.

See Appendix A, *Quality Of Service* for details of the `<DDS_Entity>Qos`, along with a complete list of individual `QosPolicy` settings and their meanings.

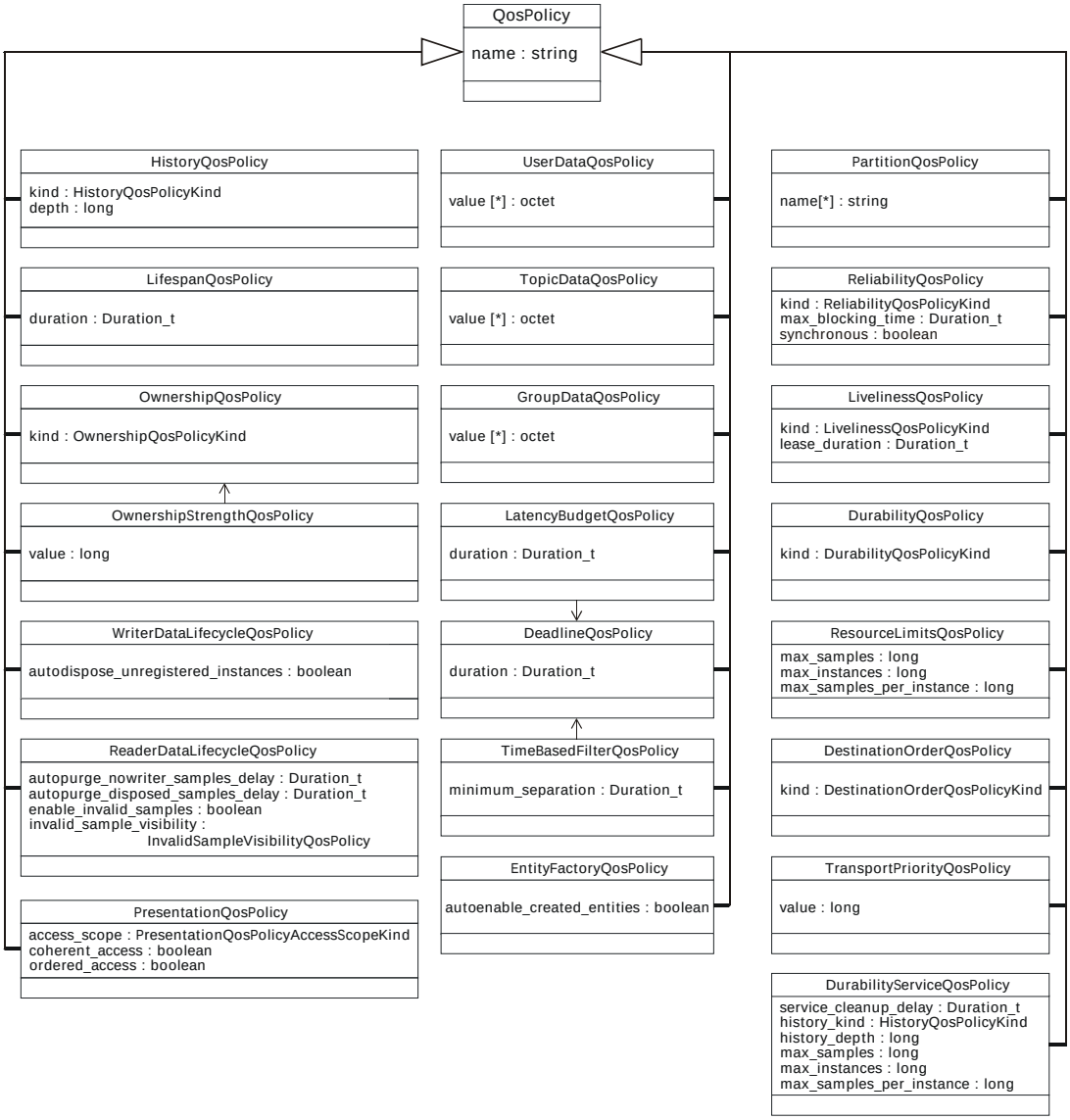

Figure 10: QosPolicy Settings

Requested/Offered

In several cases, for communications to occur properly (or efficiently), a `QosPolicy` on the requesting side must be compatible with a corresponding `QosPolicy` on the offering side. For example, if a `DDS_DataReader` requests to receive data reliably while the corresponding `DDS_DataWriter` defines a best-effort `QosPolicy`, communication will not happen as requested. This means

that the specification for `QosPolicy` follows the requested/offered (RxO) pattern while trying to maintain the desirable decoupling of publication and subscription as much as possible. In this pattern:

- the requesting side can specify a “requested” attribute for a particular `QosPolicy`
- the offering side specifies an “offered” attribute for that `QosPolicy`.

The Data Distribution Service will then determine whether the attribute requested by the requesting side is compatible with what is offered by the offering side. Only when the two `QosPolicy` settings are compatible, communication is established. If the two `QosPolicy` settings are not compatible, the Data Distribution Service will not establish communication between the two `DDS_Entity` objects and notify this fact by means of the `DDS_OFFERED_INCOMPATIBLE_QOS` status on the offering side and the `DDS_REQUESTED_INCOMPATIBLE_QOS` status on the requesting side. The application can detect this fact by means of a `Listener` or `DDS_Condition`.

The interface description of these `QosPolicy`s are as follows:

```
/*
 * struct DDS_<DDS_Entity>Qos
 *    see appendix
 */
/*
 * struct DDS_<name>QosPolicy
 */
   struct DDS_UserDataQosPolicy
      { DDS_sequence_octet value; };
   struct DDS_TopicDataQosPolicy
      { DDS_sequence_octet value; };
   struct DDS_GroupDataQosPolicy
      { DDS_sequence_octet value; };
   struct DDS_TransportPriorityQosPolicy
      { DDS_long value; };
   struct DDS_LifespanQosPolicy
      { DDS_Duration_t duration; };
   enum DDS_DurabilityQosPolicyKind
      { DDS_VOLATILE_DURABILITY_QOS,
        DDS_TRANSIENT_LOCAL_DURABILITY_QOS,
        DDS_TRANSIENT_DURABILITY_QOS,
        DDS_PERSISTENT_DURABILITY_QOS };
   struct DDS_DurabilityQosPolicy
      { DDS_DurabilityQosPolicyKind kind; };
   enum DDS_PresentationQosPolicyAccessScopeKind
      { DDS_INSTANCE_PRESENTATION_QOS,
        DDS_TOPIC_PRESENTATION_QOS,
        DDS_GROUP_PRESENTATION_QOS };
   struct DDS_PresentationQosPolicy
      { DDS_PresentationQosPolicyAccessScopeKind
            access_scope;
```

```
      DDS_boolean coherent_access;
      DDS_boolean ordered_access; };
struct DDS_DeadlineQosPolicy
   { DDS_Duration_t period; };
struct DDS_LatencyBudgetQosPolicy
   { DDS_Duration_t duration; };
enum DDS_OwnershipQosPolicyKind
   { DDS_SHARED_OWNERSHIP_QOS,
      DDS_EXCLUSIVE_OWNERSHIP_QOS };
struct DDS_OwnershipQosPolicy
   { DDS_OwnershipQosPolicyKind kind; };
struct DDS_OwnershipStrengthQosPolicy
   { DDS_long value; };
enum DDS_LivelinessQosPolicyKind
   { DDS_AUTOMATIC_LIVELINESS_QOS,
      DDS_MANUAL_BY_PARTICIPANT_LIVELINESS_QOS,
      DDS_MANUAL_BY_TOPIC_LIVELINESS_QOS };
struct DDS_LivelinessQosPolicy
   { DDS_LivelinessQosPolicyKind kind;
      DDS_Duration_t lease_duration; };
struct DDS_TimeBasedFilterQosPolicy
   { DDS_Duration_t minimum_separation; };
struct DDS_PartitionQosPolicy
   { DDS_StringSeq name; };
enum DDS_ReliabilityQosPolicyKind
   { DDS_BEST_EFFORT_RELIABILITY_QOS,
      DDS_RELIABLE_RELIABILITY_QOS };
struct DDS_ReliabilityQosPolicy
   { DDS_ReliabilityQosPolicyKind kind;
      DDS_Duration_t max_blocking_time;
      DDS_boolean synchronous; };
enum DDS_DestinationOrderQosPolicyKind
   { DDS_BY_RECEPTION_TIMESTAMP_DESTINATIONORDER_QOS,
      DDS_BY_SOURCE_TIMESTAMP_DESTINATIONORDER_QOS };
struct DDS_DestinationOrderQosPolicy
   { DDS_DestinationOrderQosPolicyKind kind; };
enum DDS_HistoryQosPolicyKind
   { DDS_KEEP_LAST_HISTORY_QOS,
      DDS_KEEP_ALL_HISTORY_QOS };
struct DDS_HistoryQosPolicy
   { DDS_HistoryQosPolicyKind kind;
      DDS_long depth; };
struct DDS_ResourceLimitsQosPolicy
   { DDS_long max_samples;
      DDS_long max_instances;
      DDS_long max_samples_per_instance; };
struct DDS_EntityFactoryQosPolicy
   { DDS_boolean autoenable_created_entities; };
struct DDS_WriterDataLifecycleQosPolicy
   { DDS_boolean autodispose_unregistered_instances; };
```

```
enum DDS_InvalidSampleVisibilityQosPolicyKind
   {  DDS_NO_INVALID_SAMPLES,
      DDS_MINIMUM_INVALID_SAMPLES,
      DDS_ALL_INVALID_SAMPLES };
struct DDS_InvalidSampleVisibilityQosPolicy
   {  DDS_InvalidSampleVisibilityQosPolicyKind kind; };
struct DDS_ReaderDataLifecycleQosPolicy
   { DDS_Duration_t autopurge_nowriter_samples_delay;
     DDS_Duration_t autopurge_disposed_samples_delay;
     DDS_boolean enable_invalid_samples; /* deprecated */
     DDS_InvalidSampleVisibilityQosPolicy
         invalid_sample_visibility; };
struct DurabilityServiceQosPolicy
   { DDS_Duration_t service_cleanup_delay;
     DDS_HistoryQosPolicyKind history_kind;
     DDS_long history_depth;
     DDS_long max_samples;
     DDS_long max_instances;
     DDS_long max_samples_per_instance; };
enum DDS_SchedulingClassQosPolicyKind
   { DDS_SCHEDULE_DEFAULT,
     DDS_SCHEDULE_TIMESHARING,
     DDS_SCHEDULE_REALTIME };
struct DDS_SchedulingClassQosPolicy
   { DDS_SchedulingClassQosPolicyKind kind; };
enum DDS_SchedulingPriorityQosPolicyKind
   { DDS_PRIORITY_RELATIVE,
     DDS_PRIORITY_ABSOLUTE };
struct DDS_SchedulingPriorityQosPolicy
   { DDS_SchedulingPriorityQosPolicyKind kind; };
struct DDS_SchedulingQosPolicy
   { DDS_SchedulingClassQosPolicy scheduling_class;
     DDS_SchedulingPriorityQosPolicy scheduling_priority_kind;
     DDS_long scheduling_priority; };
struct DDS_SubscriptionKeyQosPolicy
   { DDS_boolean use_key_list,
     DDS_StringSeq key_list };
struct DDS_ReaderLifespanQosPolicy
   { DDS_boolean use_lifespan,
     DDS_Duration_t duration };
struct DDS_ShareQosPolicy
   { DDS_string name,
     DDS_boolean enable };
struct DDS_ViewKeyQosPolicy
   { DDS_boolean use_key_list;
     DDS_StringSeq key_list };
/*
 * implemented API operations
 *      <no operations>
 */
```

Default attributes

The default attributes of each `QosPolicy` are listed in *Table 5:* below.

:

Table 5: QosPolicy Default Attributes

QosPolicy	Attribute	Value
user_data	value.length	0
topic_data	value.length	0
group_data	value.length	0
transport_priority	value	0
lifespan	duration	DDS_DURATION_INFINITE
durability	kind	DDS_VOLATILE_DURABILITY_QOS
presentation	access_scope	DDS_INSTANCE_PRESENTATION_QOS
	coherent_access	FALSE
	ordered_access	FALSE
deadline	period	DDS_DURATION_INFINITE
latency_budget	duration	0
ownership_strength	value	0
ownership	kind	DDS_SHARED_OWNERSHIP_QOS
liveliness	kind	DDS_AUTOMATIC_LIVELINESS_QOS
	lease_duration	DDS_DURATION_INFINITE
time_based_filter	minimum_separation	0
partition	name.length	0
reliability	kind	DDS_BEST_EFFORT_RELIABILITY_QOS
	max_blocking_time	100 ms
	synchronous	FALSE
destination_order	kind	DDS_BY_RECEPTION_ TIMESTAMP_DESTINATIONORDER_QOS
history	kind	DDS_KEEP_LAST_HISTORY_QOS
	depth	1
resource_limits	max_samples	DDS_LENGTH_UNLIMITED
	max_instances	DDS_LENGTH_UNLIMITED
	max_samples_ per_instance	DDS_LENGTH_UNLIMITED
entity_factory	autoenable_ created_entities	TRUE
writer_data_lifecycle	autodispose_unregistered_ instances	TRUE

Table 5: QosPolicy Default Attributes (continued)

QosPolicy	Attribute	Value
reader_data_lifecycle	autopurge_ nowriter_samples_delay	DDS_DURATION_INFINITE
	autopurge_ disposed_samples_delay	DDS_DURATION_INFINITE
	enable_invalid_samples	TRUE
	invalid_sample_visibility .kind	DDS_MINIMUM_INVALID_SAMPLES
durability_service	history_kind	KEEP_LAST
	history_depth	1
	max_samples	LENGTH_UNLIMITED
	max_instances	LENGTH_UNLIMITED
	max_samples_ per_instance	LENGTH_UNLIMITED
	service_cleanup_delay	0
watchdog_scheduling, listener_scheduling	scheduling_class.kind	DDS_SCHEDULE_DEFAULT
	scheduling_priority_kind. kind	DDS_PRIORITY_RELATIVE
	scheduling_priority	0
subscription_keys	use_key_list	FALSE
	key_list.length	0
reader_lifespan	use_lifespan	FALSE
	duration	DDS_DURATION_INFINITE
share	name	""
	enable	FALSE
view_keys	use_key_list	FALSE
	key_list.length	0

RxO

The `QosPolicy` settings that need to be set in a compatible manner between the publisher and subscriber ends are indicated by the setting of the “RxO” (Requested/Offered) property. The “RxO” property of each `QosPolicy` is listed in Table 6: on page 67

- A “RxO” setting of “Yes” indicates that the `QosPolicy` can be set at both ends (publishing and subscribing) and the attributes must be set in a compatible manner. In this case the compatible attributes are explicitly defined

- A “RxO” setting of “No” indicates that the `QosPolicy` can be set at both ends (publishing and subscribing) but the two settings are independent. That is, all combinations of attributes are compatible
- A “RxO” setting of “Not applicable” indicates that the `QosPolicy` can only be specified at either the publishing or the subscribing end, but not at both ends. So compatibility does not apply.

Changeable

The “changeable” property determines whether the `QosPolicy` can be changed after the `DDS_Entity` is enabled. In other words, a `QosPolicy` with “changeable” setting of “No” is considered “immutable” and can only be specified either at `DDS_Entity` creation time or prior to calling the `DDS_Entity_enable` operation on the `DDS_Entity`.

When the application tries to change a `QosPolicy` with “changeable” setting of “No”, the Data Distribution Service will notify this by returning a `DDS_RETCODE_IMMUTABLE_POLICY`.

The basic way to modify or set the `<DDS_Entity>Qos` is by using a `DDS_<Entity>_get_qos` and `DDS_<Entity>_set_qos` operation to get all `QosPolicy` settings from this `DDS_Entity` (that is the `<DDS_Entity>Qos`), modify several specific `QosPolicy` settings and put them back using an user operation to set all `QosPolicy` settings on this `DDS_Entity` (that is the `<DDS_Entity>Qos`). An example of these operations for the `DDS_DataWriter` are `DDS_DataWriter_get_qos` and `DDS_DataWriter_set_qos`, which take the `DataWriterQos` as a parameter.

The “RxO” setting and the “changeable” setting of each `QosPolicy` are listed in *Table 6:* below:

Table 6: QosPolicy Basics

QosPolicy	Concerns DDS_Entity	RxO	Changeable After Enabling

`user_data`	`DDS_DomainParticipant`
	`DDS_DataReader`
	`DDS_DataWriter`
		No	Yes

`topic_data`	`DDS_Topic`	No	Yes
`group_data`	`DDS_Publisher` `DDS_Subscriber`	No	Yes
`transport_priority`	`DDS_Topic` `DDS_DataWriter`	Not applicable	Yes

Table 6: QosPolicy Basics (continued)

QosPolicy	Concerns DDS_Entity	RxO	Changeable After Enabling
lifespan	DDS_Topic DDS_DataWriter	Not applicable	Yes
durability	DDS_Topic DDS_DataReader DDS_DataWriter	Yes	No
presentation	DDS_Publisher DDS_Subscriber	Yes	No
deadline	DDS_Topic DDS_DataReader DDS_DataWriter	Yes	Yes
latency_budget	DDS_Topic DDS_DataReader DDS_DataWriter	Yes	Yes
ownership	DDS_Topic DDS_DataReader DDS_DataWriter	Yes	No
ownership_strength	DDS_DataWriter	Not applicable	Yes
liveliness	DDS_Topic DDS_DataReader DDS_DataWriter	Yes	No
time_based_filter	DDS_DataReader	Not applicable	Yes
partition	DDS_Publisher DDS_Subscriber	No	Yes
reliability	DDS_Topic DDS_DataReader DDS_DataWriter	Yes	No
destination_order	DDS_Topic DDS_DataReader DDS_DataWriter	Yes	No
history	DDS_Topic DDS_DataReader DDS_DataWriter	No	No
resource_limits	DDS_Topic DDS_DataReader DDS_DataWriter	No	No

Table 6: QosPolicy Basics (continued)

QosPolicy	Concerns DDS_Entity	RxO	Changeable After Enabling
entity_factory	DDS_DomainParticipantFactory DDS_DomainParticipant DDS_Publisher DDS_Subscriber	No	Yes
writer_data_lifecycle	DDS_DataWriter	Not applicable	Yes
reader_data_lifecycle	DDS_DataReader	Not applicable	Yes
durability_service	DDS_Topic	No	No
scheduling	DDS_DomainParticipant	Not applicable	No
subscription_keys	DDS_DataReader	Not applicable	No
reader_lifespan	DDS_DataReader	Not applicable	Yes
share	DDS_DataReader DDS_Subscriber	Not applicable	No No
view_keys	DDS_DataReaderView	Not applicable	No

The next paragraphs describe the usage of each `QosPolicy` struct.

3.1.3.1 DDS_DeadlineQosPolicy

Synopsis

```
#include <dds_dcps.h>
       struct DDS_DeadlineQosPolicy
          { DDS_Duration_t period; };
```

Description

This `QosPolicy` defines the period within which a new sample is expected by the `DataReader` or to be written by the `DataWriter`.

Attributes

`DDS_Duration_t period` - specifies the period within which a new sample is expected or to be written.

Detailed Description

This `QosPolicy` will set the period within which a `DDS_DataReader` expects a new sample or, in case of a `DDS_DataWriter`, the period in which it expects applications to write the sample. The default value of the `period` is `DDS_DURATION_INFINITE`, indicating that there is no deadline. The `QosPolicy`

may be used to monitor the real-time behaviour, a `DDS_Listener` or a `DDS_StatusCondition` may be used to catch the event that is generated when a deadline is missed.

`DDS_DeadlineQosPolicy` is instance oriented (*i.e.* the period is monitored for each individual instance).

The exact consequences of a missed deadline depend on the `DDS_Entity` in which it occured, and the `DDS_OwnershipQosPolicy` value of that `DDS_Entity`:

- In case a `DDS_DataWriter` misses an instance deadline (regardless of its `DDS_OwnershipQosPolicy` setting), an `offered_deadline_missed_status` is raised, which can be detected by either a `DDS_Listener` or a `DDS_StatusCondition`. There are no further consequences.
- In case a `DDS_DataReader` misses an instance deadline, a `requested_deadline_missed_status` is raised, which can be detected by either a `DDS_Listener` or a `DDS_StatusCondition`. In case the `DDS_OwnershipQosPolicy` is set to `SHARED`, there are no further consequences. In case the `DDS_OwnershipQosPolicy` is set to `EXCLUSIVE`, the ownership of that instance on that particular `DDS_DataReader` is transferred to the next available highest strength `DDS_DataWriter`, but this will have no impact on the `instance_state` whatsoever. So even when a deadline is missed for an instance that has no other (lower-strength) `DDS_DataWriters` to transfer ownership to, the `instance_state` remains unchanged. See also Section 3.1.3.11, *DDS_OwnershipQosPolicy*.

This `QosPolicy` is applicable to a `DDS_DataReader`, a `DDS_DataWriter` and a `DDS_Topic`. After enabling of the concerning `DDS_Entity`, this `QosPolicy` may be changed by using the `DDS_<DDS_Entity>_set_qos` operation.

Requested/Offered

In case the Requested/Offered `QosPolicy` are incompatible, the notification `DDS_OFFERED_INCOMPATIBLE_QOS` status on the offering side and `DDS_REQUESTED_INCOMPATIBLE_QOS` status on the requesting side is raised.

Table 7: DDS_DeadlineQosPolicy

Period	Compatibility
offered period < requested period	compatible
offered period = requested period	compatible
offered period > requested period	INcompatible

Whether communication is established, is controlled by the Data Distribution Service, depending on the Requested/Offered `QosPolicy` of the `DDS_DataWriter` and `DDS_DataReader`. In other words, the communication between any `DDS_DataWriter` and `DDS_DataReader` depends on what is expected by the `DDS_DataReader`. As a consequence, a `DDS_DataWriter` that has an incompatible `QoS` with respect to what a `DDS_DataReader` specifies is not allowed to send its data to that specific `DDS_DataReader`. A `DDS_DataReader` that has an incompatible `QoS` with respect to what a `DDS_DataWriter` specifies does not get any data from that particular `DDS_DataWriter`.

Changing an existing deadline period using the `set_qos` operation on either the `DDS_DataWriter` or `DDS_DataReader` may have consequences for the connectivity between readers and writers, depending on their `RxO` values. (See also in Section 3.1.3, *Struct QosPolicy*, the paragraph entitled *Requested/Offered*.) Consider a writer with deadline period `Pw` and a reader with deadline period `Pr`, where `Pw <= Pr`. In this case a connection between that reader and that writer is established. Now suppose `Pw` is changed so that `Pw > Pr`, then the existing connection between reader and writer will be lost, and the reader will behave as if the writer unregistered all its instances, transferring the ownership of these instances when appropriate. See also Section 3.1.3.11, *DDS_OwnershipQosPolicy*.

DDS_TopicQos

This `QosPolicy` can be set on a `DDS_Topic`. The `DDS_DataWriter` and/or `DDS_DataReader` can copy this qos by using the operations `DDS_<DDS_Entity>_copy_from_topic_qos` and then `DDS_<DDS_Entity>_set_qos`. That way the application can relatively easily ensure the `QosPolicy` for the `DDS_Topic`, `DDS_DataReader` and `DDS_DataWriter` are consistent.

3.1.3.2 DDS_DestinationOrderQosPolicy

Synopsis

```
#include <dds_dcps.h>
       enum DDS_DestinationOrderQosPolicyKind
          { DDS_BY_RECEPTION_TIMESTAMP_DESTINATIONORDER_QOS,
            DDS_BY_SOURCE_TIMESTAMP_DESTINATIONORDER_QOS };
       struct DDS_DestinationOrderQosPolicy
          { DDS_DestinationOrderQosPolicyKind kind; };
```

Description

This `QosPolicy` controls the order in which the `DDS_DataReader` stores the data.

Attributes

DDS_DestinationOrderQosPolicyKind kind - controls the order in which the DDS_DataReader stores the data.

Detailed Description

This QosPolicy controls the order in which the DDS_DataReader stores the data. The order of storage is controlled by the timestamp. However a choice can be made to use the timestamp of the DDS_DataReader (time of reception) or the timestamp of the DDS_DataWriter (source timestamp).

This QosPolicy is applicable to a DDS_DataWriter, DDS_DataReader and a DDS_Topic. After enabling of the concerning DDS_Entity, this QosPolicy cannot be changed any more.

Attribute

The QosPolicy is controlled by the attribute kind which may be:

- DDS_BY_RECEPTION_TIMESTAMP_DESTINATIONORDER_QOS
- DDS_BY_SOURCE_TIMESTAMP_DESTINATIONORDER_QOS

When set to DDS_BY_RECEPTION_TIMESTAMP_DESTINATIONORDER_QOS, the order is based on the timestamp, at the moment the sample was received by the DDS_DataReader.

When set to DDS_BY_SOURCE_TIMESTAMP_DESTINATIONORDER_QOS, the order is based on the timestamp, which was set by the DDS_DataWriter. This means that the system needs some time synchronisation.

Requested/Offered

In case the Requested/Offered QosPolicy are incompatible, the notification DDS_OFFERED_INCOMPATIBLE_QOS status on the offering side and DDS_REQUESTED_INCOMPATIBLE_QOS status on the requesting side is raised.

Table 8: Requested/Offered DDS_DestinationOrderQosPolicy

Requested / Offered	BY_RECEPTION_TIMESTAMP	BY_SOURCE_TIMESTAMP
BY_RECEPTION_TIMESTAMP	compatible	INcompatible
BY_SOURCE_TIMESTAMP	compatible	compatible

Whether communication is established, is controlled by the Data Distribution Service, depending on the Requested/Offered QosPolicy of the DDS_DataWriter and DDS_DataReader. In other words, the communication between any DDS_DataWriter and DDS_DataReader depends on what is expected by the

DDS_DataReader. As a consequence, a DDS_DataWriter that has an incompatible QoS with respect to what a DDS_DataReader specified, is not allowed to send its data to that specific DDS_DataReader. A DDS_DataReader that has an incompatible QoS with respect to what a DDS_DataWriter specified, does not get any data from that particular DDS_DataWriter.

DDS_TopicQos

This QosPolicy can be set on a DDS_Topic. The DDS_DataWriter and/or DDS_DataReader can copy this qos by using the operations DDS_<DDS_Entity>_copy_from_topic_qos and then DDS_<DDS_Entity>_set_qos. That way the application can relatively easily ensure the QosPolicy for the DDS_Topic, DDS_DataReader and DDS_DataWriter are consistent.

3.1.3.3 DDS_DurabilityQosPolicy

Synopsis

```
#include <dds_dcps.h>
       enum DDS_DurabilityQosPolicyKind
          { DDS_VOLATILE_DURABILITY_QOS,
            DDS_TRANSIENT_LOCAL_DURABILITY_QOS,
            DDS_TRANSIENT_DURABILITY_QOS,
            DDS_PERSISTENT_DURABILITY_QOS };
       struct DDS_DurabilityQosPolicy
          { DDS_DurabilityQosPolicyKind kind; };
```

Description

This QosPolicy controls whether the data should be stored for late joining readers.

Attributes

DDS_DurabilityQosPolicyKind kind - specifies the type of durability from DDS_VOLATILE_DURABILITY_QOS (short life) to DDS_PERSISTENT_DURABILITY_QOS (long life).

Detailed Description

The decoupling between DDS_DataReader and DDS_DataWriter offered by the Data Distribution Service allows an application to write data even if there are no current readers on the network. Moreover, a DDS_DataReader that joins the network after some data has been written could potentially be interested in accessing the most current values of the data as well as some history. This QosPolicy controls whether the Data Distribution Service will actually make data available to late-joining DDS_DataReaders.

This `QosPolicy` is applicable to a `DDS_DataReader`, `DDS_DataWriter` and `DDS_Topic`. After enabling of the concerning `DDS_Entity`, this `QosPolicy` cannot be changed any more.

Attributes

The `QosPolicy` is controlled by the attribute `kind` which may be:

- *`DDS_VOLATILE_DURABILITY_QOS`* - the samples are not available to late-joining `DDS_DataReaders`. In other words, only `DDS_DataReaders`, which were present at the time of the writing and have subscribed to this `DDS_Topic`, will receive the sample. When a `DDS_DataReader` subscribes afterwards (late-joining), it will only be able to read the next written sample. This setting is typically used for data, which is updated quickly;
- *`DDS_TRANSIENT_LOCAL_DURABILITY_QOS`* - currently behaves identically to the `TRANSIENT_DURABILITY_QOS`, except for its RxO properties. The desired behaviour of `TRANSIENT_LOCAL_DURABILITY_QOS` can be achieved from the `TRANSIENT_DURABILITY_QOS` with the default (`TRUE`) setting of the `autodispose_unregistered_instances` flag on the `DataWriter` and the `service_cleanup_delay` set to 0 on the durability service. This is because for `TRANSIENT_LOCAL`, the data should only remain available for late-joining readers during the lifetime of its source writer, so it is not required to survive after its source writer has been deleted. Since the deletion of a writer implicitly unregisters all its instances, an `autodispose_unregistered_instances` value of `TRUE` will also dispose the affected data from the durability store, and thus prevent it from remaining available to late-joining readers.
- *`DDS_TRANSIENT_DURABILITY_QOS`* - some samples are available to late-joining `DDS_DataReaders` (stored in memory). This means that the late-joining `DDS_DataReaders` are able to read these previously written samples. The `DDS_DataReader` does not necessarily have to exist at the time of writing. Not all samples are stored (depending on `QosPolicy History` and `QosPolicy resource_limits`). The storage does not depend on the `DDS_DataWriter` and will outlive the `DDS_DataWriter`. This may be used to implement reallocation of applications because the data is saved in the Data Distribution Service (not in the `DDS_DataWriter`). This setting is typically used for state related information of an application. In this case also the `DurabilityServiceQosPolicy` settings are relevant for the behaviour of the Data Distribution Service;
- *`DDS_PERSISTENT_DURABILITY_QOS`* - the data is stored in permanent storage (*e.g.* hard disk). This means that the samples are also available after a system restart. The samples not only outlives the `DDS_DataWriters`, but even the Data Distribution Service and the system. This setting is typically used for attributes

and settings for an application or the system. In this case also the `DurabilityServiceQosPolicy` settings are relevant for the behaviour of the Data Distribution Service.

Requested/Offered

In case the Requested/Offered `QosPolicy` are incompatible, the notification `DDS_OFFERED_INCOMPATIBLE_QOS` status on the offering side and `DDS_REQUESTED_INCOMPATIBLE_QOS` status on the requesting side is raised.

Table 9: Requested/Offered DDS_DurabilityQosPolicy

Requested / Offered	VOLATILE	TRANSIENT_LOCAL	TRANSIENT	PERSISTENT
VOLATILE	compatible	INcompatible	INcompatible	INcompatible
TRANSIENT_LOCAL	compatible	compatible	INcompatible	INcompatible
TRANSIENT	compatible	compatible	compatible	INcompatible
PERSISTENT	compatible	compatible	compatible	compatible

This means that the Request/Offering mechanism is applicable between:

- the `DDS_DataWriter` and the `DDS_DataReader`: if the `QosPolicy` settings between `DDS_DataWriter` and `DDS_DataReader` are inconsistent, no communication between them is established. In addition the `DDS_DataWriter` will be informed via a `DDS_REQUESTED_INCOMPATIBLE_QOS` status change and the `DDS_DataReader` will be informed via an `DDS_OFFERED_INCOMPATIBLE_QOS` status change
- the `DDS_DataWriter` and the Data Distribution Service (as a built-in `DDS_DataReader`): if the `QosPolicy` settings between `DDS_DataWriter` and the Data Distribution Service are inconsistent, no communication between them is established. In that case data published by the `DDS_DataWriter` will not be maintained by the service and as a consequence will not be available for late joining `DDS_DataReaders`. The `QosPolicy` of the Data Distribution Service in the role of `DDS_DataReader` is specified by the `DDS_Topic QosPolicy`
- the Data Distribution Service (as a built-in `DDS_DataWriter`) and the `DDS_DataReader`: if the `QosPolicy` settings between the Data Distribution Service and the `DDS_DataReader` are inconsistent, no communication between them is established. In that case the Data Distribution Service will not publish historical data to late joining `DDS_DataReaders`. The `QosPolicy` of the Data Distribution Service in the role of `DDS_DataWriter` is specified by the `DDS_Topic QosPolicy`.

Cleanup

The DDS_DurabilityQosPolicy kind setting DDS_TRANSIENT_LOCAL_DURABILITY_QOS, DDS_TRANSIENT_DURABILITY_QOS and DDS_PERSISTENT_DURABILITY_QOS determine that the DDS_DurabilityServiceQosPolicy applies for the DDS_Topic. It controls amongst others at which time the durability service is allowed to remove all information regarding a data-instance. Information on a data-instance is maintained until the following conditions are met:

- the instance has been explicitly disposed of (instance_state = DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE),
- *and* the system detects that there are no more "live" DDS_DataWriter objects writing the instance, that is, all DDS_DataWriter either unregister_instance the instance (call DDS_DataWriter_unregister_instance operation) or lose their liveliness,
- *and* a time interval longer than service_cleanup_delay has elapsed since the moment the Data Distribution Service detected that the previous two conditions were met.

The use of the DDS_DurabilityServiceQosPolicy attribute service_cleanup_delay is apparent in the situation where an application disposes of an instance and it crashes before having a chance to complete additional tasks related to the disposition. Upon re-start the application may ask for initial data to regain its state and the delay introduced by the service_cleanup_delay allows the re-started application to receive the information on the disposed of instance and complete the interrupted tasks.

DDS_TopicQos

This QosPolicy can be set on a DDS_Topic. The DDS_DataWriter and/or DDS_DataReader can copy this qos by using the operations DDS_<DDS_Entity>_copy_from_topic_qos and then DDS_<DDS_Entity>_set_qos. That way the application can relatively easily ensure the QosPolicy for the DDS_Topic, DDS_DataReader and DDS_DataWriter are consistent.

3.1.3.4 DDS_DurabilityServiceQosPolicy

Scope

DDS

Synopsis

```
#include <dds_dcps.h>
```

```
struct DDS_DurabilityServiceQosPolicy
   { DDS_Duration_t service_cleanup_delay;
     DDS_HistoryQosPolicyKind history_kind;
     DDS_long history_depth;
     DDS_long max_samples;
     DDS_long max_instances;
     DDS_long max_samples_per_instance; };
```

Description

This `QosPolicy` controls the behaviour of the durability service regarding transient and persistent data.

Attributes

`DDS_Duration_t service_cleanup_delay` - specifies how long the durability service must wait before it is allowed to remove the information on the transient or persistent topic data-instances as a result of incoming dispose messages.

`DDS_HistoryQosPolicyKind history_kind` - specifies the type of history, which may be `DDS_KEEP_LAST_HISTORY_QOS`, or `DDS_KEEP_ALL_HISTORY_QOS` the durability service must apply for the transient or persistent topic data-instances.

`DDS_long history_depth` - specifies the number of samples of each instance of data (identified by its key) that is managed by the durability service for the transient or persistent topic data-instances. If `history_kind` is `KEEP_LAST_HISTORY_QOS`, `history_depth` must be smaller than or equal to `max_samples_per_instance` for this `QosPolicy` to be consistent.

`DDS_long max_samples` - specifies the maximum number of data samples for all instances the durability service will manage for the transient or persistent topic data-instances.

`DDS_long max_instances` - specifies the maximum number of instances the durability service will manage for the transient or persistent topic data-instances.

`DDS_long max_samples_per_instance` - specifies the maximum number of samples of any single instance the durability service will manage for the transient or persistent topic data-instances. If history_kind is `DDS_KEEP_LAST_HISTORY_QOS`, `max_samples_per_instance` must be greater than or equal to `history_depth` for this `QosPolicy` to be consistent.

Detailed Description

This `QosPolicy` controls the behaviour of the durability service regarding transient and persistent data. It controls for the transient or persistent topic; the time at which information regarding the topic may be discarded, the history policy it must set and the resource limits it must apply.

Cleanup

The setting of the `DDS_DurabilityServiceQosPolicy` only applies when `kind` of the `DDS_DurabilityQosPolicy` is either `DDS_TRANSIENT_DURABILITY_QOS` or `DDS_PERSISTENT_DURABILITY_QOS`. The `service_cleanup_delay` setting controls at which time the durability service is allowed to remove all information regarding a data-instance. Information on a data-instance is maintained until the following conditions are met:

- the instance has been explicitly disposed of (`instance_state = DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE`)
- ***and*** the system detects that there are no more "live" `DataWriter` objects writing the instance, that is, all `DataWriter` either `unregister_instance` the `instance` (call `unregister_instance` operation) or lose their `liveliness`
- ***and*** a time interval longer than `service_cleanup_delay` has elapsed since the moment the Data Distribution Service detected that the previous two conditions were met

The use of the attribute `service_cleanup_delay` is apparent in the situation where an application disposes an `instance` and it crashes before having a chance to complete additional tasks related to the disposal of the `instance`. Upon re-start the application may ask for initial data to regain its state and the delay introduced by the `service_cleanup_delay` allows the re-started application to receive the information of the disposed `instance` and complete the interrupted tasks.

History

The attributes `history_kind` and `history_depth` apply to the history settings of the durability service's internal `DDS_DataWriter` and `DDS_DataReader` managing the topic. The `DDS_HistoryQosPolicy` behaviour, as described in Section 3.1.3.7, *DDS_HistoryQosPolicy*, applies to these attributes.

Resource Limits

The attributes `max_samples`, `max_instances` and `max_samples_per_instance` apply to the resource limits of the durability service's internal `DDS_DataWriter` and `DDS_DataReader` managing the topic. The `DDS_ResourceLimitsQosPolicy` behaviour, as described in paragraph 3.1.3.17 (DDS_ResourceLimitsQosPolicy) applies to these attributes.

TopicQos

This `QosPolicy` can be set on a `DDS_Topic` only. After enabling of the concerning `DDS_Topic`, this `QosPolicy` can not be changed any more.

3.1.3.5 DDS_EntityFactoryQosPolicy

Synopsis

```
#include <dds_dcps.h>
       struct DDS_EntityFactoryQosPolicy
          { DDS_boolean autoenable_created_entities; };
```

Description

This `QosPolicy` controls the behaviour of the `Entity` as a factory for other entities.

Attributes

`DDS_boolean autoenable_created_entities` - specifies whether the entity acting as a factory automatically enables the instances it creates. If autoenable_created_entities is `TRUE` the factory will automatically enable each created `Entity`, otherwise it will not.

Detailed Description

This `QosPolicy` controls the behaviour of the `Entity` as a factory for other entities. It concerns only `DDS_DomainParticipantFactory` (as factory for `DDS_DomainParticipant`), `DDS_DomainParticipant` (as factory for `DDS_Publisher`, `DDS_Subscriber`, and `DDS_Topic`), `DDS_Publisher` (as factory for `DDS_DataWriter`), and `DDS_Subscriber` (as factory for `DDS_DataReader`).

This policy is mutable. A change in the policy affects only the entities created after the change; not the previously created entities.

The setting of `autoenable_created_entities` to `TRUE` indicates that the factory `create_<entity>` operation will automatically invoke the `enable` operation each time a new `DDS_Entity` is created. Therefore, the `DDS_Entity` returned by `create_<entity>` will already be enabled. A setting of `FALSE` indicates that the `DDS_Entity` will not be automatically enabled: the application will need to enable it explicitly by means of the `enable` operation. See Section 3.1.1.1, *DDS_Entity_enable* for a detailed description about the differences between enabled and disabled entities.

The default setting of `autoenable_created_entities` is `TRUE` meaning that by default it is not necessary to explicitly call `enable` on newly-created entities.

3.1.3.6 DDS_GroupDataQosPolicy

Synopsis

```
#include <dds_dcps.h>
       struct DDS_GroupDataQosPolicy
          { DDS_sequence_octet value; };
```

Description

This `QosPolicy` allows the application to attach additional information to a `DDS_Publisher` or `DDS_Subscriber` `DDS_Entity`. This information is distributed with the `DDS_BuiltinTopics`.

Attributes

`DDS_sequence_octet value` - a sequence of octets that holds the application group data. By default, the sequence has length 0.

Detailed Description

This `QosPolicy` allows the application to attach additional information to a `DDS_Publisher` or `DDS_Subscriber` `DDS_Entity`. This information is distributed with the `DDS_BuiltinTopic`. An application that discovers a new `DDS_Entity` of the listed kind, can use this information to add additional functionality. The `DDS_GroupDataQosPolicy` is changeable and updates of the `DDS_BuiltinTopic` instance must be expected. Note that the Data Distribution Service is not aware of the real structure of the group data (the Data Distribution System handles it as an opaque type) and that the application is responsible for correct mapping on structural types for the specific platform.

3.1.3.7 DDS_HistoryQosPolicy

Synopsis

```
#include <dds_dcps.h>
       enum DDS_HistoryQosPolicyKind
          { DDS_KEEP_LAST_HISTORY_QOS,
            DDS_KEEP_ALL_HISTORY_QOS };
       struct DDS_HistoryQosPolicy
          { DDS_HistoryQosPolicyKind kind;
            DDS_long depth; };
```

Description

This `QosPolicy` controls which samples will be stored when the value of an instance changes (one or more times) before it is finally communicated.

Attributes

DDS_HistoryQosPolicyKind kind - specifies the type of history, which may be DDS_KEEP_LAST_HISTORY_QOS or DDS_KEEP_ALL_HISTORY_QOS.

DDS_long depth - specifies the number of samples of each instance of data (identified by its key) managed by this DDS_Entity.

Detailed Description

This QosPolicy controls whether the Data Distribution Service should deliver only the most recent sample, attempt to deliver all samples, or do something in between. In other words, how the DDS_DataWriter or DDS_DataReader should store samples. Normally, only the most recent sample is available but some history can be stored.

DDS_DataWriter

On the publishing side this QosPolicy controls the samples that should be maintained by the DDS_DataWriter on behalf of existing DDS_DataReader objects. The behaviour with respect to a DDS_DataReader objects discovered after a sample is written is controlled by the DDS_DurabilityQosPolicy.

DDS_DataReader

On the subscribing side it controls the samples that should be maintained until the application "takes" them from the Data Distribution Service.

This QosPolicy is applicable to a DDS_DataReader, DDS_DataWriter and DDS_Topic. After enabling of the concerning DDS_Entity, this QosPolicy cannot be changed any more.

Attributes

The QosPolicy is controlled by the attribute kind which can be:

- *DDS_KEEP_LAST_HISTORY_QOS* - the Data Distribution Service will only attempt to keep the latest values of the instance and discard the older ones. The attribute "depth" determines how many samples in history will be stored. In other words, only the most recent samples in history are stored. On the publishing side, the Data Distribution Service will only keep the most recent "depth" samples of each instance of data (identified by its key) managed by the DDS_DataWriter. On the subscribing side, the DDS_DataReader will only keep the most recent "depth" samples received for each instance (identified by its key) until the application "takes" them via the DDS_DataReader_take operation. DDS_KEEP_LAST_HISTORY_QOS is the default kind. The default value of depth is 1, indicating that only the most recent value should be delivered. If a depth other than 1 is specified, it should be compatible with the settings of the DDS_ResourceLimitsQosPolicy max_samples_

per_instance. For these two QosPolicy settings to be compatible, they must verify that depth <= max_samples_per_instance, otherwise a DDS_RETCODE_INCONSISTENT_POLICY is generated on relevant operations;

- *DDS_KEEP_ALL_HISTORY_QOS* - all samples are stored, provided, the resources are available. On the publishing side, the Data Distribution Service will attempt to keep all samples (representing each value written) of each instance of data (identified by its key) managed by the DDS_DataWriter until they can be delivered to all subscribers. On the subscribing side, the Data Distribution Service will attempt to keep all samples of each instance of data (identified by its key) managed by the DDS_DataReader. These samples are kept until the application "takes" them from the Data Distribution Service via the DDS_DataReader_take operation. The setting of depth has no effect. Its implied value is DDS_LENGTH_UNLIMITED. The resources that the Data Distribution Service can use to keep this history are limited by the settings of the DDS_ResourceLimitsQosPolicy. If the limit is reached, the behaviour of the Data Distribution Service will depend on the DDS_ReliabilityQosPolicy. If the DDS_ReliabilityQosPolicy is DDS_BEST_EFFORT_RELIABILITY_QOS, the old values are discarded. If DDS_ReliabilityQosPolicy is DDS_RELIABLE_RELIABILITY_QOS, the Data Distribution Service will block the DDS_DataWriter until it can deliver the necessary old values to all subscribers.

On the subscribing side it controls the samples that should be maintained until the application "takes" them from the Data Distribution Service. On the publishing side this QosPolicy controls the samples that should be maintained by the DDS_DataWriter on behalf of DDS_DataReader objects. The behaviour with respect to a DDS_DataReader objects discovered after a sample is written is controlled by the DDS_DurabilityQosPolicy. In more detail, this QosPolicy specifies the behaviour of the Data Distribution Service in case the value of a sample changes (one or more times) before it can be successfully communicated to one or more DDS_Subscribers.

Requested/Offered

The setting of the QosPolicy offered is independent of the one requested, in other words they are never considered incompatible. The communication will not be rejected on account of this QosPolicy. The notification DDS_OFFERED_INCOMPATIBLE_QOS status on the offering side or DDS_REQUESTED_INCOMPATIBLE_QOS status on the requesting side will not be raised.

DDS_TopicQos

This QosPolicy can be set on a DDS_Topic. The DDS_DataWriter and/or DDS_DataReader can copy this qos by using the operations DDS_<DDS_Entity>_copy_from_topic_qos and then DDS_<DDS_Entity>_set_qos. That way the application can relatively easily ensure the QosPolicy for the DDS_Topic, DDS_DataReader and DDS_DataWriter are consistent.

3.1.3.8 DDS_LatencyBudgetQosPolicy

Synopsis

```
#include <dds_dcps.h>
      struct DDS_LatencyBudgetQosPolicy
         { DDS_Duration_t duration; };
```

Description

Specifies the maximum acceptable additional delay to the typical transport delay from the time the data is written until the data is delivered at the DDS_DataReader and the application is notified of this fact.

Attributes

DDS_Duration_t duration - specifies the maximum acceptable additional delay from the time the data is written until the data is delivered.

Detailed Description

This QosPolicy specifies the maximum acceptable additional delay to the typical transport delay from the time the data is written until the data is delivered at the DDS_DataReader and the application is notified of this fact. This QosPolicy provides a means for the application to indicate to the Data Distribution Service the “urgency” of the data-communication. By having a non-zero duration the Data Distribution Service can optimise its internal operation. The default value of the duration is zero, indicating that the delay should be minimized.

This QosPolicy is applicable to a DDS_DataReader, DDS_DataWriter and DDS_Topic. After enabling of the concerning DDS_Entity, this QosPolicy may be changed by using the DDS_<DDS_Entity>_set_qos operation.

Requested/Offered

This `QosPolicy` is considered a hint to the Data Distribution Service, which will automatically adapt its behaviour to meet the requirements of the shortest delay if possible. In case the Requested/Offered `QosPolicy` are incompatible, the notification `DDS_OFFERED_INCOMPATIBLE_QOS` status on the offering side and `DDS_REQUESTED_INCOMPATIBLE_QOS` status on the requesting side is raised.

Table 10: DDS_LatencyBudgetQosPolicy

Duration	Compatibility
`offered duration < requested duration`	compatible
`offered duration = requested duration`	compatible
`offered duration > requested duration`	INcompatible

Note that even when the offered duration is considered compatible to the requested duration, this duration is not enforced in any way: there will be no notification on any violations of the requested duration.

Changing an existing latency budget using the set_qos operation on either the `DDS_DataWriter` or `DDS_DataReader` may have consequences for the connectivity between readers and writers, depending on their `RxO` values. (See also in Section 3.1.3, *Struct QosPolicy* the paragraph entitled *Requested/Offered*.) Consider a writer with budget `Bw` and a reader with budget `Br`, where `Bw <= Br`. In this case a connection between that reader and that writer is established. Now suppose `Bw` is changed so that `Bw > Br`, then the existing connection between reader and writer will be lost, and the reader will behave as if the writer unregistered all its instances, transferring the ownership of these instances when appropriate. See also Section 3.1.3.11, *DDS_OwnershipQosPolicy*.

DDS_TopicQos

This `QosPolicy` can be set on a `DDS_Topic`. The `DDS_DataWriter` and/or `DDS_DataReader` can copy this qos by using the operations `DDS_<DDS_Entity>_copy_from_topic_qos` and then `DDS_<DDS_Entity>_set_qos`. That way the application can relatively easily ensure the `QosPolicy` for the `DDS_Topic`, `DDS_DataReader` and `DDS_DataWriter` are consistent.

3.1.3.9 DDS_LifespanQosPolicy

Synopsis

```
#include <dds_dcps.h>
       struct DDS_LifespanQosPolicy
          { DDS_Duration_t duration; };
```

Description

This `QosPolicy` specifies the duration of the validity of the data written by the `DDS_DataWriter`.

Attributes

`DDS_Duration_t duration` - specifies the length in time of the validity of the data.

Detailed Description

This `QosPolicy` specifies the duration of the validity of the data written by the `DDS_DataWriter`. When this time has expired, the data will be removed or if it has not been delivered yet, it will not be delivered at all. In other words, the `duration` is the time in which the data is still valid. This means that during this period a `DDS_DataReader` can access the data or if the data has not been delivered yet, it still will be delivered. The default value of the `duration` is `DDS_DURATION_INFINITE`, indicating that the data does not expire.

This `QosPolicy` is applicable to a `DDS_DataWriter` and a `DDS_Topic`. After enabling of the concerning `DDS_Entity`, this `QosPolicy` may be changed by using the `DDS_<DDS_Entity>_set_qos` operation.

Requested/Offered

The setting of this `QosPolicy` is only applicable to the publishing side, in other words the Requested/Offered constraints are not applicable. The communication will not be rejected on account of this `QosPolicy`. The notification `DDS_OFFERED_INCOMPATIBLE_QOS` status on the offering side will not be raised.

DDS_TopicQos

This `QosPolicy` can be set on a `DDS_Topic`. The `DDS_DataWriter` and/or `DDS_DataReader` can copy this qos by using the operations `DDS_<DDS_Entity>_copy_from_topic_qos` and then `DDS_<DDS_Entity>_set_qos`. That way the application can relatively easily ensure the `QosPolicy` for the `DDS_Topic`, `DDS_DataReader` and `DDS_DataWriter` are consistent.

3.1.3.10 DDS_LivelinessQosPolicy

Synopsis

```
#include <dds_dcps.h>
       enum DDS_LivelinessQosPolicyKind
          { DDS_AUTOMATIC_LIVELINESS_QOS,
            DDS_MANUAL_BY_PARTICIPANT_LIVELINESS_QOS,
            DDS_MANUAL_BY_TOPIC_LIVELINESS_QOS };
```

```
struct DDS_LivelinessQosPolicy
   { DDS_LivelinessQosPolicyKind kind;
     DDS_Duration_t lease_duration; };
```

Description

This `QosPolicy` controls the way the liveliness of an `DDS_Entity` is being reported.

Attributes

`DDS_LivelinessQosPolicyKind kind` - controls the way the liveliness of an `DDS_Entity` is reported.

`DDS_Duration_t lease_duration` - specifies the duration of the interval within which the liveliness must be reported.

Detailed Description

This `QosPolicy` controls the way the liveliness of an `DDS_Entity` is being determined. The liveliness must be reported periodically before the `lease_duration` expires.

This `QosPolicy` is applicable to a `DDS_DataReader`, a `DDS_DataWriter` and a `DDS_Topic`. After enabling of the concerning `DDS_Entity`, this `QosPolicy` cannot be changed any more.

Attributes

The `QosPolicy` is controlled by the attribute `kind` which can be:

- *`DDS_AUTOMATIC_LIVELINESS_QOS`* - the Data Distribution Service will take care of reporting the Liveliness automatically with a rate determined by the `lease_duration`
- *`DDS_MANUAL_BY_PARTICIPANT_LIVELINESS_QOS`* - the application must take care of reporting the liveliness before the `lease_duration` expires. If a `DDS_Entity` reports its liveliness, all `DDS_Entities` within the same `DDS_DomainParticipant` that have their liveliness kind set to `DDS_MANUAL_BY_PARTICIPANT_LIVELINESS_QOS`, can be considered alive by the Data Distribution Service. Liveliness can reported explicitly by calling the operation `DDS_DomainParticipant_assert_liveliness` or implicitly by writing some data
- *`DDS_MANUAL_BY_TOPIC_LIVELINESS_QOS`* - the application must take care of reporting the liveliness before the `lease_duration` expires. This can explicitly be done by calling the operation `DDS_DataWriter_assert_liveliness` or implicitly by writing some data

The `lease_duration` specifies the duration of the interval within which the liveliness should be reported.

Requested/Offered

In case the Requested/Offered `QosPolicy` are incompatible, the notification `DDS_OFFERED_INCOMPATIBLE_QOS` status on the offering side and `DDS_REQUESTED_INCOMPATIBLE_QOS` status on the requesting side is raised.

Table 11: DDS_LivelinessQosPolicy

Requested / Offered	AUTOMATIC	MANUAL_BY_PARTICIPANT	MANUAL_BY_TOPIC
AUTOMATIC	compatible	INcompatible	INcompatible
MANUAL_BY_PARTICIPANT	compatible	compatible	INcompatible
MANUAL_BY_TOPIC	compatible	compatible	compatible

Whether communication is established, is controlled by the Data Distribution Service, depending on the Requested/Offered `QosPolicy` of the `DDS_DataWriter` and `DDS_DataReader`. In other words, the communication between any `DDS_DataWriter` and `DDS_DataReader` depends on what is expected by the `DDS_DataReader`. As a consequence, a `DDS_DataWriter` that has an incompatible `QoS` with respect to what a `DDS_DataReader` specified is not allowed to send its data to that specific `DDS_DataReader`. A `DDS_DataReader` that has an incompatible `QoS` with respect to what a `DDS_DataWriter` specified does not get any data from that particular `DDS_DataWriter`.

DDS_TopicQos

This `QosPolicy` can be set on a `DDS_Topic`. The `DDS_DataWriter` and/or `DDS_DataReader` can copy this qos by using the operations `DDS_<DDS_Entity>_copy_from_topic_qos` and then `DDS_<DDS_Entity>_set_qos`. That way the application can relatively easily ensure the `QosPolicy` for the `DDS_Topic`, `DDS_DataReader` and `DDS_DataWriter` are consistent.

3.1.3.11 DDS_OwnershipQosPolicy

Synopsis

```
#include <dds_dcps.h>
       enum DDS_OwnershipQosPolicyKind
          { DDS_SHARED_OWNERSHIP_QOS,
            DDS_EXCLUSIVE_OWNERSHIP_QOS };
       struct DDS_OwnershipQosPolicy
          { DDS_OwnershipQosPolicyKind kind; };
```

Description

This QosPolicy specifies whether a DDS_DataWriter exclusively owns an instance.

Attributes

DDS_OwnershipQosPolicyKind kind - specifies whether a DDS_DataWriter exclusively owns an instance.

Detailed Description

This QosPolicy specifies whether a DDS_DataWriter exclusively may own an instance. In other words, whether multiple DDS_DataWriter objects can write the same instance at the same time. The DDS_DataReader objects will only read the modifications on an instance from the DDS_DataWriter owning the instance.

Exclusive ownership is on an instance-by-instance basis. That is, a DDS_Subscriber can receive values written by a lower strength DDS_DataWriter as long as they affect instances whose values have not been written or registered by a higher-strength DDS_DataWriter.

This QosPolicy is applicable to a DDS_DataReader, a DDS_DataWriter and a DDS_Topic. After enabling of the concerning DDS_Entity, this QosPolicy cannot be changed any more.

Attribute

The QosPolicy is controlled by the attribute kind which can be:

- *DDS_SHARED_OWNERSHIP_QOS* (default) - the same instance can be written by multiple DDS_DataWriter objects. All updates will be made available to the DDS_DataReader objects. In other words it does not have a specific owner
- *DDS_EXCLUSIVE_OWNERSHIP_QOS* - the instance will only be accepted from one DDS_DataWriter which is the only one whose modifications will be visible to the DDS_DataReader objects

Requested/Offered

In case the Requested/Offered QosPolicy are incompatible, the notification OFFERED_INCOMPATIBLE_QOS status on the offering side and REQUESTED_INCOMPATIBLE_QOS status on the requesting side is raised.

Table 12: Requested/Offered DDS_OwnershipQosPolicy

Requested / Offered	SHARED	EXCLUSIVE
SHARED	compatible	INcompatible
EXCLUSIVE	INcompatible	compatible

Whether communication is established, is controlled by the Data Distribution Service, depending on the Requested/Offered `QosPolicy` of the `DDS_DataWriter` and `DDS_DataReader`. The value of the `OWNERSHIP` kind offered must exactly match the one requested or else they are considered incompatible. As a consequence, a `DDS_DataWriter` that has an incompatible `QoS` with respect to what a `DDS_DataReader` specified is not allowed to send its data to that specific `DDS_DataReader`. A `DDS_DataReader` that has an incompatible `QoS` with respect to what a `DDS_DataWriter` specified does not get any data from that particular `DDS_DataWriter`.

Exclusive Ownership

The `DDS_DataWriter` with the highest `DDS_OwnershipStrengthQosPolicy value` and being alive (depending on the `DDS_LivelinessQosPolicy`) and which has not violated its `DDS_DeadlineQosPolicy` contract with respect to the instance, will be considered the owner of the instance. Consequently, the ownership can change as a result of:

- a `DDS_DataWriter` in the system with a higher value of the `DDS_OwnershipStrengthQosPolicy` modifies the instance
- a change in the `DDS_OwnershipStrengthQosPolicy value` (becomes less) of the `DDS_DataWriter` owning the instance
- a change in the liveliness (becomes not alive) of the `DDS_DataWriter` owning the instance
- a deadline with respect to the instance that is missed by the `DDS_DataWriter` that owns the instance.

Time-line

Each `DDS_DataReader` may detect the change of ownership at a different time. In other words, at a particular point in time, the `DDS_DataReader` objects do not have a consistent picture of who owns each instance for that `DDS_Topic`. Outside this grey area in time all `DDS_DataReader` objects will consider the same `DDS_DataWriter` to be the owner.

If multiple DDS_DataWriter objects with the same DDS_OwnershipStrengthQosPolicy modify the same instance, all DDS_DataReader objects will make the same choice of the particular DDS_DataWriter that is the owner. The DDS_DataReader is also notified of this via a status change that is accessible by means of the Listener or DDS_Condition mechanisms.

Ownership of an Instance

DDS_DataWriter objects are not aware whether they own a particular instance. There is no error or notification given to a DDS_DataWriter that modifies an instance it does not currently own.

TopicQos

This QosPolicy can be set on a DDS_Topic. The DDS_DataWriter and/or DDS_DataReader can copy this qos by using the operations DDS_Publisher/Subscriber_copy_from_topic_qos and then DDS_DataWriter/DataReader_set_qos. That way the application can relatively easily ensure the QosPolicy for the DDS_Topic, DDS_DataReader and DDS_DataWriter are consistent

3.1.3.12 DDS_OwnershipStrengthQosPolicy

Synopsis

```
#include <dds_dcps.h>
       struct DDS_OwnershipStrengthQosPolicy
          { DDS_long value; };
```

Description

This QosPolicy specifies the value of the ownership strength of a DDS_DataWriter used to determine the ownership of an instance.

Attributes

DDS_long value - specifies the ownership strength of the DDS_DataWriter.

Detailed Description

This QosPolicy specifies the value of the ownership strength of a DDS_DataWriter used to determine the ownership of an instance. This ownership is used to arbitrate among multiple DDS_DataWriter objects that attempt to modify the same instance. This QosPolicy only applies if the DDS_OwnershipQosPolicy is of kind DDS_EXCLUSIVE_OWNERSHIP_QOS. For more information, see DDS_OwnershipQosPolicy.

This QosPolicy is applicable to a DDS_DataWriter only. After enabling of the concerning DDS_Entity, this QosPolicy may be changed by using the DDS_DataWriter_set_qos operation. When changed, the ownership of the instances may change with it.

3.1.3.13 DDS_PartitionQosPolicy

Synopsis

```
#include <dds_dcps.h>
struct DDS_PartitionQosPolicy
   { DDS_StringSeq name; };
```

Description

This QosPolicy specifies the logical partitions in which the DDS_Subscribers and DDS_Publishers are active.

Attributes

DDS_StringSeq name - holds the sequence of strings, which specifies the partitions

Detailed Description

This QosPolicy specifies the logical partitions inside the domain in which the DDS_Subscribers and DDS_Publishers are active. This QosPolicy is particularly used to create a separate subspace, like a real domain versus a simulation domain. A DDS_Publisher and/or DDS_Subscriber can participate in more than one partition. Each string in the sequence of strings name defines a partition name. A partition name may contain wildcards. Sharing a partition means that at least one of the partition names in the sequence matches. When none of the partition names match, it is not considered an "incompatible" QoS and does not trigger any listeners or conditions. It only means that no communication is established. The default value of the attribute is an empty (zero-sized) sequence. This is treated as a special value that matches the partition.

This QosPolicy is applicable to a DDS_Publisher and DDS_Subscriber. After enabling of the concerning DDS_Entity, this QosPolicy may be changed by using the DDS_<DDS_Entity>_set_qos operation. When changed, it modifies the association of DDS_DataReader and DDS_DataWriter objects. It may establish new associations or break existing associations. By default, DDS_DataWriter and DDS_DataReader objects belonging to a DDS_Publisher or DDS_Subscriber that do not specify a DDS_PartitionQosPolicy, will participate in the default partition. In this case the partition name is "".

Requested/Offered

The offered setting of this `QosPolicy` is independent of the one requested, in other words they are never considered incompatible. The communication will not be rejected on account of this `QosPolicy`. The notification `DDS_OFFERED_INCOMPATIBLE_QOS` status on the offering side or `DDS_REQUESTED_INCOMPATIBLE_QOS` status on the requesting side will not be raised.

3.1.3.14 DDS_PresentationQosPolicy

Synopsis

```
#include <dds_dcps.h>
       enum DDS_PresentationQosPolicyAccessScopeKind
          { DDS_INSTANCE_PRESENTATION_QOS,
            DDS_TOPIC_PRESENTATION_QOS,
            DDS_GROUP_PRESENTATION_QOS };
       struct DDS_PresentationQosPolicy
          { DDS_PresentationQosPolicyAccessScopeKind access_scope;
            DDS_boolean coherent_access;
            DDS_boolean ordered_access; };
```

Description

This `QosPolicy` controls the extent to which changes to data-instances can be made dependent on each other and also the kind of dependencies that can be propagated and maintained by the Data Distribution Service.

Attributes

`PresentationQosPolicyAccessScopeKind access_scope` - specifies the granularity of the changes that needs to be preserved when communicating a set of samples. Currently only the `DDS_INSTANCE_PRESENTATION_QOS` and `DDS_TOPIC_PRESENTATION_QOS` scopes are supported.

`boolean coherent_access` - controls whether the Data Distribution Service will preserve the groupings of changes, as indicated by the `access_scope`, made by a publishing application by means of the operations `begin_coherent_change` and `end_coherent_change`.

`boolean ordered_access` - controls whether the Data Distribution Service will preserve the order of the changes, as indicated by the `access_scope`. Currently only an `ordered_access` setting of FALSE is supported.

Detailed Description

The support for 'coherent changes' enables a publishing application to change the value of several data-instances that could belong to the same or different topics and have those changes be seen 'atomically' by the readers. This is useful in cases where the values are inter-related. For example, if there are two data-instances representing the 'altitude' and 'velocity vector' of the same aircraft and both are changed, it may be useful to communicate those values in a way the reader can see both together; otherwise it may erroneously interpret that the aircraft is on a collision course.

Basically this QosPolicy allows a Publisher to group a number of samples by enclosing them within calls to `DDS_Publisher_begin_coherent_change` and `DDS_Publisher_end_coherent_change` and treat them as if they are to be communicated as a single message. That is, the receiver will only be able to access the data after all the modifications in the set are available at the receiver end.

A connectivity change may occur in the middle of a set of coherent changes; for example, the set of partitions used by the Publisher or one of its Subscribers may change, a late-joining DataReader may appear on the network, or a communication failure may occur. In the event that such a change prevents an entity from receiving the entire set of coherent changes, that entity must behave as if it had received none of the set.

This `QosPolicy` is applicable to a `Publisher` and `Subscriber`. After enabling of the concerning `Entity`, this `QosPolicy` cannot be changed any more.

Attributes

The `PresentationQosPolicy` is applicable to both `Publisher` and `Subscriber`, but behaves differently on the publishing side and the subscribing side. The setting of `coherent_access` on a `DDS_Publisher` controls whether that Publisher will preserve the coherency of changes (enclosed by calls to `DDS_Publisher_begin_coherent_change` and `end_coherent_change`), as indicated by its `DDS_Publisher_access_scope` and as made available by its embedded DataWriters. However, the Subscriber settings determine whether a coherent set of samples will actually be delivered to the subscribing application in a coherent way.

- If a Publisher or Subscriber sets `coherent_access` to `FALSE`, it indicates that it does not want to maintain coherency between the different samples in a set: a Subscriber that receives only a part of this set may still deliver this partial set of samples to its embedded DataReaders.
- If both Publisher and Subscriber set `coherent_access` to `TRUE`, they indicate that they want to maintain coherency between the different samples in a set: a Subscriber that receives only a part of this set may not deliver this partial set of

samples to its embedded DataReaders; it needs to wait for the set to become complete, and it will flush this partial set when it concludes that it will never be able to complete it.

Coherency is implemented on top of a transaction mechanism between individual DataWriters and DataReaders; completeness of a coherent set is determined by the successful completion of each of its participating transactions. The value of the `access_scope` attribute determines which combination of transactions constitute the contents of a coheren set.

The setting of `ordered_access` has no impact on the way in which a Publisher transmits its samples (although it does influence the RxO properties of this Publisher), but basically it determines whether a Subscriber will preserve the ordering of samples when the subscribing application uses its embedded DataReaders to read or take samples:

- If a Subscriber sets `ordered_access` to `FALSE`, it indicates that it does not want to maintain ordering between the different samples it receives: a subscribing application that reads or takes samples will receive these samples ordered by their key-values, which does probably not resemble the order they were written in.
- If a Subscriber sets `ordered_access` to `TRUE` (currently not supported), it indicates that it does want to maintain ordering within the specified `access_scope` between the different samples it receives: a subscribing application that reads or takes samples will receives these samples sorted by the order in which they were written..

The `access_scope` determines the maximum extent of coherent and/or ordered changes:

- If `access_scope` is set to `DDS_INSTANCE_PRESENTATION_QOS` and `coherent_access` is set to `TRUE`, then the Subscriber will behave, with respect to maintaining coherency, in a way similar to an `access_scope` that is set to `DDS_TOPIC_PRESENTATION_QOS`. This is caused by the fact that coherency is defined as the successful completion of all participating transactions. If a DataWriter writes a transaction containing samples from different instances, and a connected DataReader misses one of these samples, then the transaction failed and the coherent set is considered incomplete by the receiving DataReader. It doesn’t matter that all the other instances have received their samples successfully; an unsuccessful transaction by definition results in an incomplete coherent set. In that respect the DDS can offer no granularity that is more fine-grained with respect to coherency than that described by the `DDS_TOPIC_PRESENTATION_QOS`.

If `access_scope` is set to `DDS_INSTANCE_PRESENTATION_QOS` and `ordered_access` is set to `TRUE`, then the subscriber will maintain ordering between samples belonging to the same instance. Samples belonging to different instances will still be grouped by their key-values instead of by the order in which they were received.

- If `access_scope` is set to `DDS_TOPIC_PRESENTATION_QOS` and `coherent_access` is set to `TRUE`, then the DDS will define the scope of a coherent set on individual transactions. So a coherent set that spans samples coming from multiple DataWriters (indicated by its enclosure within calls to `DDS_Publisher_begin_coherent_change` and `DDS_Publisher_end_coherent_change` on their shared Publisher), is chopped up into separate and disjunct transactions (one for each participating DataWriter), where each transaction is processed separately. On the subscribing side this may result in the successful completion of some of these transactions, and the unsuccessful completion of some others. In such cases all DataReaders that received successful transactions will deliver the embedded content to their applications, without waiting for the completion of other transactions in other DataReaders connected to the same Subscriber.

  If `access_scope` is set to `DDS_TOPIC_PRESENTATION_QOS` and `ordered_access` is set to `TRUE` (currently not supported), then the subscriber will maintain ordering between samples belonging to the same DataReader. This means that samples belonging to the same instance in the same DataReader may no longer be received consecutively if samples belonging to different instances were written in between.

- If `access_scope` is set to `DDS_GROUP_PRESENTATION_QOS` (currently not supported) and `coherent_access` is set to `TRUE`, then the DDS will define the scope of a coherent set on the sum of all participating transactions. So a coherent set that spans samples coming from multiple DataWriters (indicated by its enclosure within calls to `DDS_Publisher_begin_coherent_change` and `DDS_Publisher_end_coherent_change` on their shared Publisher), is chopped up into separate and disjunct transactions (one for each participating DataWriter), where each transactions is processed separately. On the subscribing side this may result in the successful completion of some of these transactions, and the unsuccessful completion of some others. However, each DataReader is only allowed to deliver the embedded content when all participating transactions completed successfully. This means that DataReaders that received successful transactions will need to wait for all other DataReaders attached to the same Subscriber to also complete their transactions successfully. If one or more DataReaders conclude that they will not be able to complete their transactions successfully, then all DataReaders that participate in the original coherent set will flush the content of their transactions.

If `access_scope` is set to `DDS_GROUP_PRESENTATION_QOS` (currently not supported) and `ordered_access` is set to `TRUE` (currently not supported), then ordering is maintained between samples that are written by DataWriters attached to a common Publisher and received by DataReaders attached to a common Subscriber. This way the subscribing application can access the changes as a unit and/or in the proper order. However, this does not necessarily imply that the subscribing application will indeed access the changes as a unit and/or in the correct order. For that to occur, the subscribing application must use the proper logic in accessing its datareaders:

- Upon notification by the callback operation `on_data_on_readers` of the SubscriberListener or when triggered by the similar `DDS_DATA_ON_READERS` status of the Subscriber's `DDS_StatusCondition`, the application uses `DDS_Subscriber_begin_access` on the Subscriber to indicate it will be accessing data through the Subscriber. This will lock the embedded datareaders for any incoming messages during the coherent data access.
- Then it calls `DDS_Subscriber_get_datareaders` on the Subscriber to get the list of DataReader objects where data samples are available. Note that when `ordered_access` is `TRUE`, then the list of DataReaders may contain the same reader several times. In this manner the correct sample order can be maintained among samples in different DataReader objects.
- Following this it calls `DDS_DataReader_read` or `DDS_DataReader_take` on each DataReader in the same order returned to access all the relevant changes in the DataReader. Note that when `ordered_access` is `TRUE`, you should only read or take *one* sample at a time.
- Once it has called `read` or `take` on all the readers, it calls `DDS_Subscriber_end_access` on the Subscriber. This will unlock the embedded datareaders again.

Requested/Offered

In case the Requested/Offered `QosPolicy` are incompatible, the notification `DDS_OFFERED_INCOMPATIBLE_QOS` status on the offering side and `DDS_REQUESTED_INCOMPATIBLE_QOS` status on the requesting side is raised.

Table 13: Requested/Offered PresentationQosPolicy

Requested / Offered	INSTANCE	Topic	Group
instance	compatible	INcompatible	INcompatible
topic	compatible	compatible	INcompatible
group	compatible	compatible	compatible

The value offered is considered compatible with the value requested if and only if the following conditions are met:

1. The inequality "offered `access_scope` >= requested `access_scope`" evaluates to '`TRUE`'. For the purposes of this inequality, the values of `PRESENTATION access_scope` are considered ordered such that `INSTANCE < TOPIC < GROUP`.
2. Requested `coherent_access` is `FALSE`, or else both offered and requested `coherent_access` are `TRUE`.
3. Requested `ordered_access` is `FALSE`, or else both offered and requested `ordered_access` are `TRUE`.

In case the quality offered by the Publisher is better than the value requested by the Subscriber, the subscriber's values determine the resulting behaviour for the subscribing application. In other words, the quality specified at the Subscriber site overrules the corresponding value at the Publisher site.

Consider the following scenario:

1. A Publisher publishes coherent sets with `access_scope` is `GROUP` and `coherent_access` is `TRUE`.
2. A Subscriber subscribes to these coherent sets with `access_scope` is `TOPIC` and `coherent_access` is `TRUE`.
3. The Publisher writes a coherent set consisting of 2 samples of Topic A, and 2 samples of Topic B.
4. During transmission, the first sample of Topic B gets lost.

According to the `access_scope` of the Publisher, the coherent set is incomplete and can therefore not be delivered. However, according to the `access_scope` of the Subscriber, coherency needs to be maintained on a per Reader/Writer pair basis so the samples for Topic A will be delivered upon arrival, but the samples for Topic B will not.

Basically, when both `coherent_access` and `ordered_access` are set to `FALSE`, then the `access_scope` serves no other purpose than to determine connectivity between Publishers and Subscribers.

An `access_scope` value of `DDS_GROUP_PRESENTATION_QOS` and/or an `ordered_access` value of `TRUE` are not yet supported. Setting any of these values in your `PresentationQosPolicy` will result in a `DDS_RETCODE_NOT_SUPPORTED`.

3.1.3.15 DDS_ReaderDataLifecycleQosPolicy

Synopsis

```
#include <dds_dcps.h>
```

```
  enum DDS_InvalidSampleVisibilityQosPolicyKind
    { DDS_NO_INVALID_SAMPLES,
      DDS_MINIMUM_INVALID_SAMPLES,
      DDS_ALL_INVALID_SAMPLES };
  struct DDS_InvalidSampleVisibilityQosPolicy
    { DDS_InvalidSampleVisibilityQosPolicyKind kind; };
  struct DDS_ReaderDataLifecycleQosPolicy
    { DDS_Duration_t autopurge_nowriter_samples_delay;
      DDS_Duration_t autopurge_disposed_samples_delay;
      DDS_boolean enable_invalid_samples;
     DDS_InvalidSampleVisibilityQosPolicy invalid_sample_visibility;
};
```

Description

This `QosPolicy` specifies the maximum duration for which the `DDS_DataReader` will maintain information regarding a data instance for which the instance_state becomes either `DDS_NOT_ALIVE_NO_WRITERS_INSTANCE_STATE` or `DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE`. The policy also controls whether state changes will potentially be communicated using so-called 'invalid' samples.

Attributes

`DDS_Duration_t autopurge_nowriter_samples_delay` - specifies the duration for which the `DDS_DataReader` will maintain information regarding a data instance for which the `instance_state` becomes `DDS_NOT_ALIVE_NO_WRITERS_INSTANCE_STATE`. By default the duration value is `DDS_DURATION_INFINITE`. When the delay time has expired, the data instance is marked so that it can be purged in the next garbage collection sweep.

`DDS_Duration_t autopurge_disposed_samples_delay` - specifies the duration for which the `DDS_DataReader` will maintain information regarding a data instance for which the `instance_state` becomes `DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE`. By default the duration value is `DDS_DURATION_INFINITE`. When the delay time has expired, the data instance is marked so that it can be purged in the next garbage collection sweep.

`DDS_boolean enable_invalid_samples` - Insert dummy samples if no data sample is available to notify readers of an `instance_state` change. By default the value is `true`.

NOTE: This feature is deprecated. It is recommended that you use *`invalid_sample_visibility`* instead.

DDS_InvalidSampleVisibilityQosPolicy

invalid_sample_visibility - Insert dummy samples if no data sample is available, to notify readers of an `instance_state` change. By default the value is `DDS_MINIMUM_INVALID_SAMPLES`.

Detailed Description

This `QosPolicy` specifies the maximum duration for which the `DDS_DataReader` will maintain information regarding a data instance for which the instance_state becomes either `DDS_NOT_ALIVE_NO_WRITERS_INSTANCE_STATE` or `DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE`. The `DDS_DataReader` manages resources for instances and samples of those instances. The amount of resources managed depends on other `QosPolicies` like the `DDS_HistoryQosPolicy` and the `DDS_ResourceLimitsQosPolicy`. The `DDS_DataReader` can only release resources for data instances for which all samples have been taken and the `instance_state` has become `DDS_NOT_ALIVE_NO_WRITERS_INSTANCE_STATE` or `DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE`. If an application does not take the samples belonging to a data instance with such an `instance_state`, the `DDS_DataReader` will never be able to release the maintained resources. By means of this `QosPolicy` the application can instruct the `DDS_DataReader` to release all resources related to the relevant data instance after a specified duration.

Instance state changes are communicated to a `DDS_DataReader` by means of the `SampleInfo` accompanying a data sample. If no samples are available in the DDS_DataReader, a so-called 'invalid sample' can be injected with the sole purpose of notifying applications of the instance state. This behaviour is configured by the `DDS_InvalidSampleVisibilityQosPolicy`.

- If `invalid_sample_visibility` is set to `DDS_NO_INVALID_SAMPLES`, applications will be notified of `instance_state` changes only if there is a sample available in the `DDS_DataReader`. The `SampleInfo` belonging to this sample will contain the updated instance state.
- If `invalid_sample_visibility` is set to `DDS_MINIMUM_INVALID_SAMPLES`, the middleware will try to update the `instance_state` on available samples in the `DataReader`. If no sample is available, an invalid sample will be injected. These samples contain only the key values of the instance. The `SampleInfo` for invalid samples will have the '`valid_data`' flag disabled, and contain the updated instance state.
- If `invalid_sample_visibility` is set to `DDS_ALL_INVALID_SAMPLES`, every change in the `instance_state` will be communicated by a separate invalid sample.

NOTE: This value (`DDS_ALL_INVALID_SAMPLES`) is not yet implemented. It is scheduled for a future release.

An alternative but deprecated way to determine the visibility of state changes is to set a boolean value for the `enable_invalid_samples` field.

- When `TRUE`, the behavior is similar to the `DDS_MINIMUM_INVALID_SAMPLES` value of the `DDS_InvalidSampleVisibilityQosPolicy` field.
- When `FALSE`, the behavior is similar to the `DDS_NO_INVALID_SAMPLES` value of the `DDS_InvalidSampleVisibilityQosPolicy` field.

You cannot set both the the `enable_invalid_samples` field *AND* the `invalid_sample_visibility` field. If both deviate from their factory default, this is considered a `DDS_RETCODE_INCONSISTENT_POLICY`. If only one of the fields deviates from its factory default, then that setting will be leading. However, modifying the default value of the `enable_invalid_samples` field will automatically result in a warning message stating that you are using deprecated functionality.

This QosPolicy is applicable to a `DDS_DataReader` only. After the relevant `DDS_DataReader` is enabled, this QosPolicy can be changed using the `set_qos` operation.

3.1.3.16 DDS_ReliabilityQosPolicy

Synopsis

```
#include <dds_dcps.h>
       enum DDS_ReliabilityQosPolicyKind
          { DDS_BEST_EFFORT_RELIABILITY_QOS,
            DDS_RELIABLE_RELIABILITY_QOS };
       struct DDS_ReliabilityQosPolicy
          { DDS_ReliabilityQosPolicyKind kind;
            DDS_Duration_t max_blocking_time;
            DDS_boolean synchronous; };
```

Description

This `QosPolicy` controls the level of reliability of the data distribution offered or requested by the `DDS_DataWriters` and `DDS_DataReaders`.

Attributes

`DDS_ReliabilityQosPolicyKind kind` - specifies the type of reliability which may be `DDS_BEST_EFFORT_RELIABILITY_QOS` or `DDS_RELIABLE_RELIABILITY_QOS`.

DDS_Duration_t max_blocking_time - specifies the maximum time the DDS_DataWriter_write operation may block when the DDS_DataWriter does not have space to store the value written or when synchronous communication is specified and all expected acknowledgements are not yet received.

DDS_boolean synchronous - specifies whether a DataWriter should wait for acknowledgements by all connected DataReaders that also have set a synchronous ReliabilityQosPolicy.

Detailed Description

This QosPolicy controls the level of reliability of the data distribution requested by a DDS_DataReader or offered by a DDS_DataWriter. In other words, it controls whether data is allowed to get lost in transmission or not.

This QosPolicy is applicable to a DDS_DataReader, DDS_DataWriter and DDS_Topic. After enabling of the concerning DDS_Entity, this QosPolicy cannot be changed any more.

Attributes

The QosPolicy is controlled by the attribute kind which can be:

- *DDS_RELIABLE_RELIABILITY_QOS* - the Data Distribution Service will attempt to deliver all samples in the DDS_DataWriters history; arrival-checks are performed and data may get re-transmitted in case of lost data. In the steady-state (no modifications communicated via the DDS_DataWriter) the Data Distribution Service guarantees that all samples in the DDS_DataWriter history will eventually be delivered to the all DDS_DataReader objects. Outside the steady-state the DDS_HistoryQosPolicy and DDS_ResourceLimitsQosPolicy determine how samples become part of the history and whether samples can be discarded from it. In this case also the max_blocking_time must be set
- *DDS_BEST_EFFORT_RELIABILITY_QOS* - the Data Distribution Service will only attempt to deliver the data; no arrival-checks are being performed and any lost data is not re-transmitted (non-reliable). Presumably new values for the samples are generated often enough by the application so that it is not necessary to resent or acknowledge any samples.

The effect of the attribute max_blocking_time depends on the setting of the DDS_HistoryQosPolicy and DDS_ResourcesLimitsQosPolicy and the synchronous setting of the DDS_ReliabilityQosPolicy. In case the DDS_HistoryQosPolicy kind is set to DDS_KEEP_ALL_HISTORY_QOS, the DDS_DataWriter_write operation on the DDS_DataWriter may block if the modification would cause one of the limits specified in the

DDS_ResourceLimitsQosPolicy to be exceeded. Also in case the synchronous attribute value of the ReliabilityQosPolicy is set to TRUE on both sides of a pair of connected DataWriters and DataReaders, then the DataWriter will wait until all its connected synchronous DataReaders have acknowledged the data.

Under these circumstances, the max_blocking_time attribute of the DDS_ReliabilityQosPolicy configures the maximum duration the DDS_DataWriter_write operation may block.

Requested/Offered

In case the Requested/Offered QosPolicy are incompatible, the notification DDS_OFFERED_INCOMPATIBLE_QOS status on the offering side and DDS_REQUESTED_INCOMPATIBLE_QOS status on the requesting side is raised.

Table 14: Requested/Offered DDS_ReliabilityQosPolicy

Requested / Offered	BEST_EFFORT	RELIABLE
BEST_EFFORT	compatible	INcompatible
RELIABLE	compatible	compatible

DDS_TopicQos

This QosPolicy can be set on a DDS_Topic. The DDS_DataWriter and/or DDS_DataReader can copy this qos by using the operations DDS_<DDS_Entity>_copy_from_topic_qos and then DDS_<DDS_Entity>_set_qos. That way the application can relatively easily ensure the QosPolicy for the DDS_Topic, DDS_DataReader and DDS_DataWriter are consistent.

3.1.3.17 DDS_ResourceLimitsQosPolicy

Synopsis

```
#include <dds_dcps.h>
       struct DDS_ResourceLimitsQosPolicy
          { DDS_long max_samples;
            DDS_long max_instances;
            DDS_long max_samples_per_instance; };
```

Description

This QosPolicy will specify the maximum amount of resources, which can be used by a DDS_DataWriter or DDS_DataReader.

Attributes

DDS_long max_samples - specifies the maximum number of data samples for all instances for any single DDS_DataWriter (or DDS_DataReader). By default, DDS_LENGTH_UNLIMITED.

DDS_long max_instances - specifies the maximum number of instances for any single DDS_DataWriter (or DDS_DataReader). By default, DDS_LENGTH_UNLIMITED.

DDS_long max_samples_per_instance - specifies the maximum number of samples of any single instance for any single DDS_DataWriter (or DDS_DataReader). By default, DDS_LENGTH_UNLIMITED.

Detailed Description

This QosPolicy controls the maximum amount of resources that the Data Distribution Service can use in order to meet the requirements imposed by the application and other QosPolicy settings.

This QosPolicy is applicable to a DDS_DataReader, a DDS_DataWriter and a DDS_Topic. After enabling of the concerning DDS_Entity, this QosPolicy cannot be changed any more.

Requested/Offered

The value of the QosPolicy offered is independent of the one requested, in other words they are never considered incompatible. The communication will not be rejected on account of this QosPolicy. The notification DDS_OFFERED_INCOMPATIBLE_QOS status on the offering side or DDS_REQUESTED_INCOMPATIBLE_QOS status on the requesting side will not be raised.

Resource limits

If the DDS_DataWriter objects are publishing samples faster than they are taken by the DDS_DataReader objects, the Data Distribution Service will eventually hit against some of the QosPolicy-imposed resource limits. Note that this may occur when just a single DDS_DataReader cannot keep up with its corresponding DDS_DataWriter.

In case the DDS_HistoryQosPolicy is DDS_KEEP_LAST_HISTORY_QOS, the setting of DDS_ResourceLimitsQosPolicy max_samples_per_instance must be compatible with the DDS_HistoryQosPolicy depth. For these two QosPolicy settings to be compatible, they must verify that depth <= max_samples_per_instance.

DDS_TopicQos

This `QosPolicy` can be set on a `DDS_Topic`. The `DDS_DataWriter` and/or `DDS_DataReader` can copy this qos by using the operations `DDS_<DDS_Entity>_copy_from_topic_qos` and then `DDS_<DDS_Entity>_set_qos`. That way the application can relatively easily ensure the `QosPolicy` for the `DDS_Topic`, `DDS_DataReader` and `DDS_DataWriter` are consistent.

3.1.3.18 DDS_SchedulingQosPolicy

Scope

`DDS`

Synopsis

```
#include <dds_dcps.h>
       enum DDS_SchedulingClassQosPolicyKind
          { DDS_SCHEDULE_DEFAULT,
            DDS_SCHEDULE_TIMESHARING,
            DDS_SCHEDULE_REALTIME };
       struct DDS_SchedulingClassQosPolicy
          { DDS_SchedulingClassQosPolicyKind kind; };
       enum DDS_SchedulingPriorityQosPolicyKind
          { DDS_PRIORITY_RELATIVE,
            DDS_PRIORITY_ABSOLUTE };
       struct DDS_SchedulingPriorityQosPolicy
          { DDS_SchedulingPriorityQosPolicyKind kind; };
       struct DDS_SchedulingQosPolicy
          { DDS_SchedulingClassQosPolicy scheduling_class;
            DDS_SchedulingPriorityQosPolicy scheduling_priority_kind;
            DDS_long scheduling_priority; };
```

Description

This `QosPolicy` specifies the scheduling parameters that will be used for a thread that is spawned by the `DDS_DomainParticipant`.

Note that some scheduling parameters may not be supported by the underlying Operating System or that you may need special privileges to select particular settings.

Attributes

`DDS_SchedulingClassQosPolicyKind scheduling_class.kind` - specifies the scheduling class used by the Operating System, which may be `DDS_SCHEDULE_DEFAULT`, `DDS_SCHEDULE_TIMESHARING` or `DDS_SCHEDULE_REALTIME`. Threads can only be spawned within the scheduling classes that are supported by the underlying Operating System.

DDS_SchedulingPriorityQosPolicyKind scheduling_priority_kind.kind - specifies the priority type, which may be either DDS_PRIORITY_RELATIVE or DDS_PRIORITY_ABSOLUTE.

DDS_long scheduling_priority - specifies the priority that will be assigned to threads spawned by the DDS_DomainParticipant. Threads can only be spawned with priorities that are supported by the underlying Operating System.

Detailed Description

This QosPolicy specifies the scheduling parameters that will be used for threads spawned by the DDS_DomainParticipant. Note that some scheduling parameters may not be supported by the underlying Operating System or that you may need special privileges to select particular settings. Refer to the documentation of your OS for more details on this subject.

Although the behaviour of the scheduling_class is highly dependent on the underlying OS, in general when running in a Timesharing class your thread will need to regularly yield execution to other threads of equal priority. In a Realtime class, your thread normally runs until completion and can only be pre-empted by higher priority threads. Often, the highest range of priorities is not accessible through a Timesharing Class.

The scheduling_priority_kind determines whether the specified scheduling_priority should be interpreted as an absolute priority or whether it should be interpreted relative to the priority of its creator, in this case the priority of the thread that created the DDS_DomainParticipant.

3.1.3.19 DDS_TimeBasedFilterQosPolicy

Synopsis

```
#include <dds_dcps.h>
       struct DDS_TimeBasedFilterQosPolicy
          { DDS_Duration_t minimum_separation; };
```

Description

This QosPolicy specifies a period after receiving a sample for a particular instance during which a DataReader will drop new samples for the same instance. Effectively the DataReader will receive at most one sample per period for each instance.

Attributes

DDS_Duration_t minimum_separation - specifies the minimum period between received samples to be passed through the filter. The default value is **0**, meaning that all samples are accepted.

Detailed Description

This `QosPolicy` allows a `DataReader` to indicate that it is not interested in processing all samples for each instance. Instead it requests at most one change per `minimum_separation` period.

The filter is applied to each data-instance separately. This means that new instances will not be filtered, no matter what the `minimum_separation` period or their publication time is. The filter is only applied to samples belonging to the same instance, limiting the rate at which the `DataReader` is notified of the most current value of each instance. This can be helpful in situations where some nodes are capable of generating data much faster than others can consume it. Instance state changes are not affected by the filter, so a `DataReader` always contains the latest state of an instance.

The `minimum_separation` period must be consistent with the `DeadlineQos`. If the `minimum_separation` period is greater than the deadline period, the deadline cannot be met; therefore the two QoS policies are inconsistent. An attempt to set these policies with inconsistent values will result in a failure to create the `DataReader` or an `INCONSISTENT_POLICY` return value.

This `QosPolicy` is applicable to a `DDS_DataReader` only. After enabling the relevant `DDS_DataReader`, this `QosPolicy` can be changed using the `set_qos` operation.

3.1.3.20 DDS_TopicDataQosPolicy

Synopsis

```
#include <dds_dcps.h>
       struct DDS_TopicDataQosPolicy
          { DDS_sequence_octet value; };
```

Description

This `QosPolicy` allows the application to attach additional information to a `DDS_Topic` `DDS_Entity`. This information is distributed with the `DDS_BuiltinTopics`.

Attributes

`DDS_sequence_octet value` - a sequence of octets that holds the application topic data. By default, the sequence has length 0.

Detailed Description

This `QosPolicy` allows the application to attach additional information to a `DDS_Topic` `Entity`. This information is distributed with the `BuiltinTopic`. An application that discovers a new `DDS_Topic` entity, can use this information to add

additional functionality. The `DDS_TopicDataQosPolicy` is changeable and updates of the `BuiltinTopic` instance must be expected. Note that the Data Distribution Service is not aware of the real structure of the topic data (the Data Distribution System handles it as an opaque type) and that the application is responsible for correct mapping on structural types for the specific platform.

3.1.3.21 DDS_TransportPriorityQosPolicy

Synopsis

```
#include <dds_dcps.h>
       struct DDS_TransportPriorityQosPolicy
          { DDS_long value; };
```

Description

This `QosPolicy` specifies the priority with which the Data Distribution System can handle the data produced by the `DDS_DataWriter`.

Attributes

`DDS_long value` - specifies the priority with which the Data Distribution System can handle the data produced by the `DDS_DataWriter`.

Detailed Description

This `QosPolicy` specifies the priority with which the Data Distribution System can handle the data produced by a `DDS_DataWriter`. This `QosPolicy` is considered to be a hint to the Data Distribution Service to control the priorities of the underlying transport means. A higher value represents a higher priority and the full range of the type is supported. By default the transport priority is set to 0.

The `DDS_TransportPriorityQosPolicy` is applicable to both `DDS_Topic` and `DDS_DataWriter` entities. After enabling of the concerning `DDS_Entities`, this `QosPolicy` may be changed by using the `set_qos` operation.

TopicQos

Note that changing this `QosPolicy` for the `DDS_Topic` does not influence the behaviour of the Data Distribution System for existing `DDS_DataWriter` entities because this `QosPolicy` is only used by the operation `copy_from_topic_qos` and when specifying `DDS_DATAWRITER_QOS_USE_TOPIC_QOS` when creating the `DataWriter`.

3.1.3.22 DDS_UserDataQosPolicy

Synopsis

```
#include <dds_dcps.h>
       struct DDS_UserDataQosPolicy
```

```
        { DDS_sequence_octet value; };
```

Description

This `QosPolicy` allows the application to attach additional information to a `DDS_DomainParticipant`, `DDS_DataReader` or `DDS_DataWriter` `DDS_Entity`. This information is distributed with the Builtin Topics.

Attributes

`DDS_sequence_octet value` - is a sequence of octets that holds the application user data. By default, the sequence has length 0.

Detailed Description

This `QosPolicy` allows the application to attach additional information to a `DDS_DomainParticipant`, `DDS_DataReader` or `DDS_DataWriter` entity. This information is distributed with the Builtin Topics. An application that discovers a new `DDS_Entity` of the listed kind, can use this information to add additional functionality. The `DDS_UserDataQosPolicy` is changeable and updates of the Builtin Topic instance must be expected. Note that the Data Distribution Service is not aware of the real structure of the user data (the Data Distribution System handles it as an opaque type) and that the application is responsible for correct mapping on structural types for the specific platform.

3.1.3.23 DDS_WriterDataLifecycleQosPolicy

Synopsis

```
#include <dds_dcps.h>
      struct DDS_WriterDataLifecycleQosPolicy
         { DDS_boolean autodispose_unregistered_instances; };
```

Description

This `QosPolicy` specifies whether the Data Distribution Service should automatically dispose instances that are unregistered by the `DDS_DataWriter`.

Attributes

`DDS_boolean autodispose_unregistered_instances` - specifies whether the Data Distribution Service should automatically dispose instances that are unregistered by this `DDS_DataWriter`.

Detailed Description

This `QosPolicy` controls the behaviour of the `DDS_DataWriter` with regards to the lifecycle of the data-instances it manages, that is, the data-instances that have been registered either explicitly using one of the `register` operations or implicitly by directly writing the data using the special `DDS_HANDLE_NIL` parameter. (See also Section 3.4.2.50, *SPACE_FooDataWriter_register_instance*, on page 354).

The `autodispose_unregistered_instances` flag controls what happens when an instance gets unregistered by the `DDS_DataWriter`:

- If the `DDS_DataWriter` unregisters the instance explicitly using either `SPACE_FooDataWriter_unregister_instance` or `SPACE_FooDataWriter_unregister_instance_w_timestamp`, then the `autodispose_unregistered_instances` flag is currently ignored and the instance is never disposed automatically.
- If the `DDS_DataWriter` unregisters its instances implicitly because it is deleted or if a `DDS_DataReader` detects a loss of liveliness of a connected `DDS_DataWriter`, then the `auto_dispose_unregistered_instances` flag determines whether the concerned instances are automatically disposed (`TRUE`) or not (`FALSE`).

The default value for the `autodispose_unregistered_instances` flag is `TRUE`. For `TRANSIENT` and `PERSISTENT` topics this means that all instances that are not explicitly unregistered by the application will by default be removed from the Transient and Persistent stores when the DataWriter is deleted or when a loss of its liveliness is detected.

3.1.3.24 DDS_SubscriptionKeyQosPolicy

Synopsis

```
#include <dds_dcps.h>
   struct DDS_SubscriptionKeyQosPolicy
     { DDS_boolean use_key_list,
       DDS_StringSeq key_list };
```

Description

This QosPolicy allows the DataReader to define it's own set of keys on the data, potentially different from the keys defined on the topic.

NOTE: This is an OpenSplice-specific QosPolicy, it is *not* part of the DDS Specification.

Attributes

`DDS_boolean use_key_list` - Controls whether the alternative key list is applied on the DataReader.

DDS_StringSeq key_list - A sequence of strings with one or more names of topic fields acting as alternative keys.

Detailed Description

By using the SubscriptionKeyQosPolicy, a DataReader can force its own key-list definition on data samples. The consequences are that the DataReader will internally keep track of instances based on its own key list, instead of the key list dictated by the Topic.

Operations that operate on instances or instance handles, such as `lookup_instance` or `get_key_value`, respect the alternative key-list and work as expected. However, since the mapping of writer instances to reader instances is no longer trivial (one writer instance may now map to more than one matching reader instance and *vice versa*), a writer instance will no longer be able to fully determine the lifecycle of its matching reader instance, nor the value its `view_state` and `instance_state`.

In fact, by diverting from the conceptual 1 – 1 mapping between writer instance and reader instance, the writer can no longer keep an (empty) reader instance `ALIVE` by just refusing to unregister its matching writer instance. That means that when a reader takes all samples from a particular reader instance, that reader instance will immediately be removed from the reader's administration. Any subsequent reception of a message with the same keys will re-introduce the instance into the reader administration, setting its `view_state` back to `NEW`. Compare this to the default behaviour, where the reader instance will be kept alive as long as the writer does not unregister it. That causes the `view_state` in the reader instance to remain `NOT_NEW`, even if the reader has consumed all of its samples prior to receiving an update.

Another consequence of allowing an alternative keylist is that events that are communicated by invalid samples (*i.e.* samples that have only initialized their keyfields) may no longer be interpreted by the reader to avoid situations in which uninitialized non-keyfields are treated as keys in the alternative keylist. This effectively means that all invalid samples (*e.g.* unregister messages and both implicit and explicit dispose messages) will be skipped and can no longer affect the `instance_state`, which will therefore remain `ALIVE`. The only exceptions to this are the messages that are transmitted explicitly using the `writedispose()` call (see Section 3.4.2.29, *DDS_DataWriter_writedispose (abstract)*, on page 337), which always includes a full and valid sample and can therefore modify the `instance_state` to `NOT_ALIVE_DISPOSED`.

By default, the SubscriptionKeyQosPolicy is not used because `use_key_list` is set to `FALSE`.

This QosPolicy is applicable to a DataReader only, and cannot be changed after the DataReader is enabled.

3.1.3.25 DDS_ReaderLifespanQosPolicy

Synopsis

```
#include <dds_dcps.h>
  struct DDS_ReaderLifespanQosPolicy
   { DDS_boolean use_lifespan,
     DDS_Duration_t duration };
```

Description

Automatically remove samples from the DataReader after a specified timeout.

NOTE: This is an OpenSplice-specific QosPolicy, it is *not* part of the DDS Specification.

Attributes

`DDS_boolean use_lifespan` - Controls whether the lifespan is applied to the samples in the DataReader.

`DDS_Duration_t duration` - The duration after which data loses validity and is removed.

Detailed Description

This QosPolicy is similar to the `LifespanQosPolicy` (applicable to Topic and DataWriter), but limited to the DataReader on which the QosPolicy is applied. The data is automatically removed from the DataReader if it has not been taken yet after the lifespan duration expires. The duration of the ReaderLifespan is added to the insertion time of the data in the DataReader to determine the expiry time.

When both the `ReaderLifespanQosPolicy` and a DataWriter's `LifespanQosPolicy` are applied to the same data, only the earliest expiry time is taken into account.

By default, the ReaderLifespanQosPolicy is not used and `use_lifespan` is `FALSE`. The duration is set to `DURATION_INFINITE`.

This QosPolicy is applicable to a DataReader only, and is mutable even when the DataReader is already enabled. If modified, the new setting will only be applied to samples that are received after the modification took place.

3.1.3.26 DDS_ShareQosPolicy

Synopsis

```
#include <dds_dcps.h>
struct DDS_ShareQosPolicy
```

```
{ DDS_string name,
  DDS_boolean enable };
```

Description

Used to share a DataReader between multiple processes.

NOTE: This is an OpenSplice-specific QosPolicy, it is *not* part of the DDS Specification.

Attributes

`DDS_string name` - The label used to identify the shared Entity.

`DDS_boolean enable` - Controls whether the entity is shared.

Detailed Description

This QosPolicy allows sharing of entities by multiple processes or threads. When the policy is enabled, the data distribution service will try to look up an existing entity that matches the name supplied in the ShareQosPolicy. A new entity will only be created if a shared entity registered under the specified name doesn't exist yet.

Shared Readers can be useful for implementing algorithms like the worker pattern, where a single shared reader can contain samples representing different tasks that may be processed in parallel by separate processes. In this algorithm each processes consumes the task it is going to perform (*i.e.* it takes the sample represening that task), thus preventing other processes from consuming and therefore performing the same task.

NOTE: Entities can only be shared between processes if OpenSplice is running in federated mode, because it requires shared memory to communicate between the different processes.

By default, the ShareQosPolicy is not used and `enable` is `FALSE`. `Name` must be set to a valid string for the ShareQosPolicy to be valid when `enable` is set to `TRUE`.

This QosPolicy is applicable to DataReader and Subscriber entities, and cannot be modified after the DataReader or Subscriber is enabled. Note that a DataReader can only be shared if its Subscriber is also shared.

3.1.3.27 DDS_ViewKeyQosPolicy

Synopsis

```
#include <dds_dcps.h>
struct DDS_ViewKeyQosPolicy
   { DDS_boolean use_key_list;
     DDS_StringSeq key_list };
```

Description

Used to define a set of keys on a DataReaderView.

NOTE: This is an OpenSplice-specific QosPolicy, it is *not* part of the DDS Specification.

Detailed Description

This QosPolicy is used to set the key list of a DataReaderView. A DataReaderView allows a different view, defined by this key list, on the data set of the DataReader from which it is created.

Operations that operate on instances or instance handles, such as `lookup_instance` or `get_key_value`, respect the alternative key-list and work as expected. However, since the mapping of writer instances to reader instances is no longer trivial (one writer instance may now map to more than one matching reader instance and *vice versa*), a writer instance will no longer be able to fully determine the lifecycle of its matching reader instance, nor the value its `view_state` and `instance_state`.

In fact, the view sample will always copy the `view_state` and `instance_state` values from the reader sample to which it is slaved. If both samples preserve a 1 – 1 correspondence with respect to their originating instances (this may sometimes be the case even when an alternative keylist is provided, *i.e.* when one reader instance never maps to more than one view instance and *vice versa*) then the resulting `instance_state` and `view_state` still have a valid semantical meaning. If this 1 – 1 correspondence cannot be guaranteed, the resulting `instance_state` and `view_state` are semantically meaningless and should not be used to derive any conclusion regading the lifecycle of a view instance.

By default, the `DDS_ViewKeyQosPolicy` is disabled because `use_key_list` is set to `FALSE`.

This QosPolicy is applicable to a DataReaderView only, and cannot be changed after the DataReaderView is created.

3.1.4 DDS_Listener interface

This interface is the abstract base interface for all `Listener` interfaces. `Listeners` provide a generic mechanism for the Data Distribution Service to notify the application of relevant asynchronous status change events, such as a missed deadline, violation of a `QosPolicy` setting, etc. Each DCPS `DDS_Entity` supports its own specialized kind of `Listener`. `Listeners` are related to changes in communication status. For each `DDS_Entity` type, one specific `Listener` is derived from this interface. In the following modules, the following `Listeners` are derived from this interface:

- DDS_DomainParticipantListener
- DDS_TopicListener
- DDS_PublisherListener
- DDS_DataWriterListener
- DDS_SubscriberListener
- `DDS_DataReaderListener`.

The `DDS_Entity` type specific `Listener` interfaces are part of the application which must implement the interface operations. A user-defined class for these operations must be provided by the application which must extend from the **specific** `Listener` class. **All** `Listener` operations **must** be implemented in the user-defined class, it is up to the application whether an operation is empty or contains some functionality.

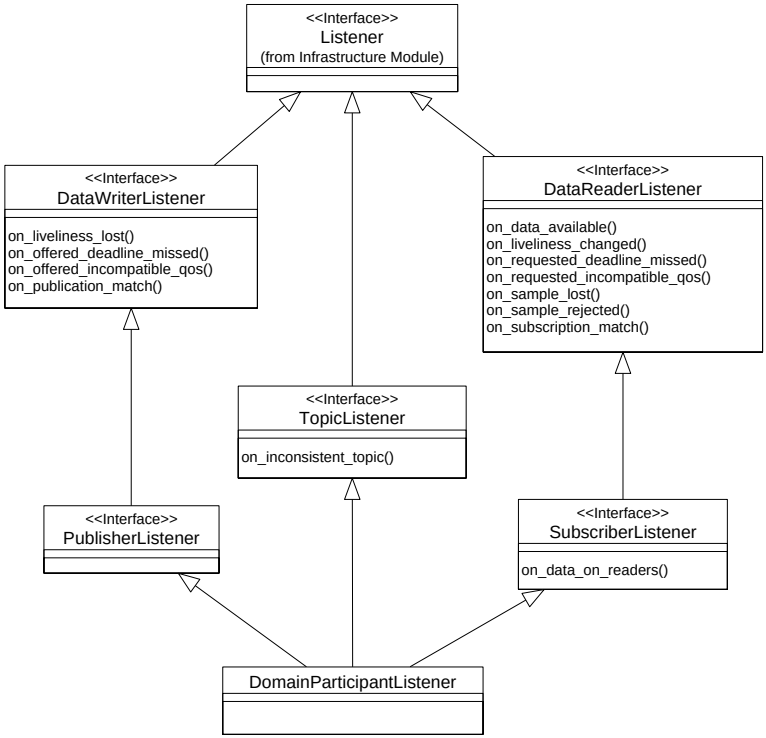

Figure 11: DCPS Listeners

The base class `DDS_Listener` does not contain any operations.

3.1.5 Struct DDS_Status

Each concrete DDS_Entity class has a set of DDS_Status attributes and for each attribute the DDS_Entity class provides an operation to read the value. Changes to DDS_Status attributes will affect associated DDS_StatusCondition and (invoked and associated) Listener objects.

The communication statuses whose changes can be communicated to the application depend on the DDS_Entity. The following table shows the relevant statuses for each DDS_Entity.

Table 15: Status Description Per DDS_Entity

DDS_Entity	Status Name	Meaning
DDS_Topic	DDS_INCONSISTENT_TOPIC_STATUS	Another DDS_Topic exists with the same name but with different characteristics.
	DDS_ALL_DATA_DISPOSED_TOPIC_STATUS	All instances of the Topic have been disposed by the dispose_all_data operation on that topic.
DDS_Subscriber	DDS_DATA_ON_READERS_STATUS	New information is available.
DDS_DataReader	DDS_SAMPLE_REJECTED_STATUS	A (received) sample has been rejected.
	DDS_LIVELINESS_CHANGED_STATUS	The liveliness of one or more DDS_DataWriter objects that were writing instances read through the DDS_DataReader has changed. Some DDS_DataWriter have become “alive” or “not alive”.
	DDS_REQUESTED_DEADLINE_MISSED_STATUS	The deadline that the DDS_DataReader was expecting through its DDS_DeadlineQosPolicy was not respected for a specific instance.
	DDS_REQUESTED_INCOMPATIBLE_QOS_STATUS	A QosPolicy setting was incompatible with what is offered.
	DDS_DATA_AVAILABLE_STATUS	New information is available.
	DDS_SAMPLE_LOST_STATUS	A sample has been lost (never received).
	DDS_SUBSCRIPTION_MATCHED_STATUS	The DDS_DataReader has found a DDS_DataWriter that matches the DDS_Topic and has compatible QoS.

Table 15: Status Description Per DDS_Entity (continued)

DDS_Entity	Status Name	Meaning
DDS_DataWriter	DDS_LIVELINESS_LOST_STATUS	The liveliness that the DDS_DataWriter has committed through its DDS_LivelinessQosPolicy was not respected; thus DDS_DataReader objects will consider the DDS_DataWriter as no longer “alive”.
	DDS_OFFERED_DEADLINE_MISSED_STATUS	The deadline that the DDS_DataWriter has committed through its DDS_DeadlineQosPolicy was not respected for a specific instance.
	DDS_OFFERED_INCOMPATIBLE_QOS_STATUS	A QosPolicy setting was incompatible with what was requested.
	DDS_PUBLICATION_MATCHED_STATUS	The DDS_DataWriter has found a DDS_DataReader that matches the DDS_Topic and has compatible QoS.

A DDS_Status attribute can be retrieved with the operation get_<status_name>_status. For example, to get the DDS_InconsistentTopicStatus value, the application must call the operation DDS_Topic_get_inconsistent_topic_status.

Conceptually associated with each DDS_Entity communication status is a logical StatusChangedFlag. This flag indicates whether that particular communication status has changed. The StatusChangedFlag is only conceptual, therefore, it is not important whether this flag actually exists.

For the plain communication DDS_Status, the StatusChangedFlag is initially set to FALSE. It becomes TRUE whenever the plain communication DDS_Status changes and it is reset to FALSE each time the application accesses the plain communication DDS_Status via the proper get_<status_name>_status operation on the DDS_Entity.

A flag set means that a change has occurred since the last time the application has read its value.

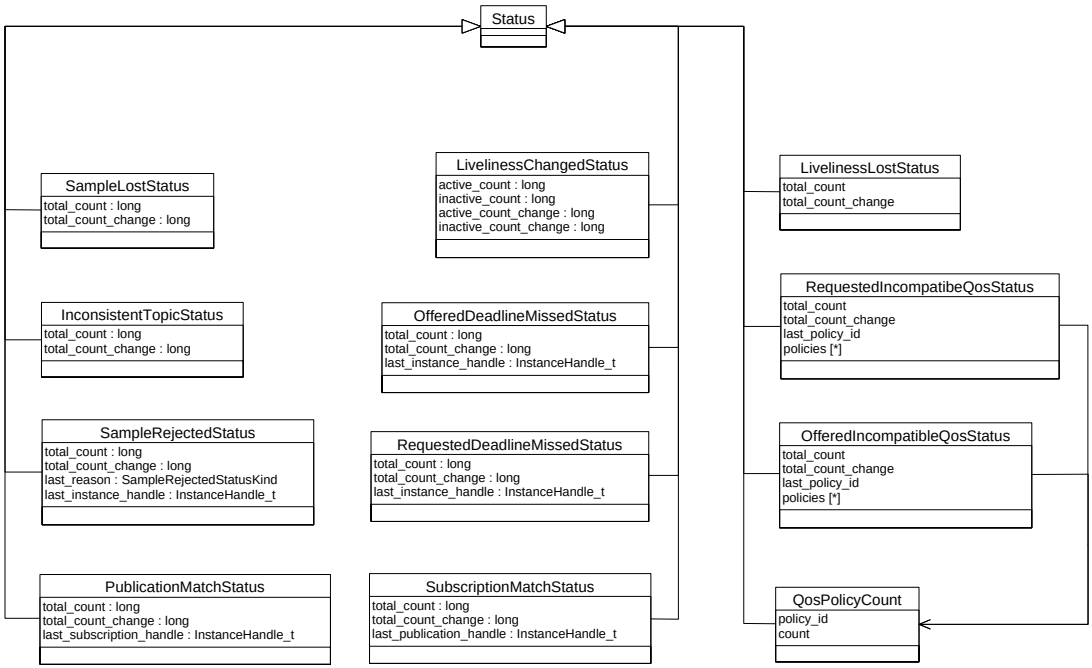

Figure 12: DCPS DDS_Status Values

Each `DDS_Status` attribute is implemented as a struct and therefore does not provide any operations. The interface description of these structs is as follows:

```
/*
 *  struct DDS_<name>Status
 */
   struct DDS_InconsistentTopicStatus
      { DDS_long total_count;
        DDS_long total_count_change; };
   struct DDS_AllDataDisposedTopicStatus
      { DDS_long total_count;
        DDS_long total_count_change; }
   struct DDS_SampleLostStatus
      { DDS_long total_count;
        DDS_long total_count_change; };
   enum DDS_SampleRejectedStatusKind
      { DDS_NOT_REJECTED,
        DDS_REJECTED_BY_INSTANCES_LIMIT,
        DDS_REJECTED_BY_SAMPLES_LIMIT,
        DDS_REJECTED_BY_SAMPLES_PER_INSTANCE_LIMIT };
   struct DDS_SampleRejectedStatus
      { DDS_long total_count;
        DDS_long total_count_change;
        DDS_SampleRejectedStatusKind last_reason;
```

```
            DDS_InstanceHandle_t last_instance_handle; };
        struct DDS_LivelinessLostStatus
           { DDS_long total_count;
             DDS_long total_count_change; };
        struct DDS_LivelinessChangedStatus
           { DDS_long alive_count;
             DDS_long not_alive_count;
             DDS_long alive_count_change;
             DDS_long not_alive_count_change;
             DDS_InstanceHandle_t last_publication_handle; };
        struct DDS_OfferedDeadlineMissedStatus
           { DDS_long total_count;
             DDS_long total_count_change;
             DDS_InstanceHandle_t last_instance_handle; };
        struct DDS_RequestedDeadlineMissedStatus
           { DDS_long total_count;
             DDS_long total_count_change;
             DDS_InstanceHandle_t last_instance_handle; };
        struct DDS_OfferedIncompatibleQosStatus
           { DDS_long total_count;
             DDS_long total_count_change;
             DDS_QosPolicyId_t last_policy_id;
             DDS_QosPolicyCountSeq policies; };
        struct DDS_RequestedIncompatibleQosStatus
           { DDS_long total_count;
             DDS_long total_count_change;
             DDS_QosPolicyId_t last_policy_id;
             DDS_QosPolicyCountSeq policies; };
        struct DDS_PublicationMatchedStatus
           { DDS_long total_count;
             DDS_long total_count_change;
             DDS_long current_count;
             DDS_long current_count_change;
             DDS_InstanceHandle_t last_subscription_handle; };
        struct DDS_SubscriptionMatchedStatus
           { DDS_long total_count;
             DDS_long total_count_change;
             DDS_long current_count;
             DDS_long current_count_change;
             DDS_InstanceHandle_t last_publication_handle; };
    /*
     * implemented API operations
     *      <no operations>
     */
```

The sections describe the usage of each DDS_<name>Status struct.

3.1.5.1 DDS_InconsistentTopicStatus

Synopsis

```
#include <dds_dcps.h>
struct DDS_InconsistentTopicStatus
          { DDS_long total_count;
            DDS_long total_count_change; };
```

Description

This struct contains the statistics about attempts to create other `DDS_Topics` with the same name but with different characteristics.

Attributes

`DDS_long total_count` - the total detected cumulative count of `DDS_Topic` creations, whose name matches the `DDS_Topic` to which this `DDS_Status` is attached and whose characteristics are inconsistent.

`DDS_long total_count_change` - the change in `total_count` since the last time the `Listener` was called or the `DDS_Status` was read.

Detailed Description

This struct contains the statistics about attempts to create other `DDS_Topics` with the same name but with different characteristics.

The attribute `total_count` holds the total cumulative count of `DDS_Topic` creations, whose name matches the `DDS_Topic` to which this `DDS_Status` is attached and whose characteristics are inconsistent.

The attribute `total_count_change` holds the incremental number of inconsistent `DDS_Topics`, since the last time the `Listener` was called or the `DDS_Status` was read.

3.1.5.2 DDS_LivelinessChangedStatus

Synopsis

```
#include <dds_dcps.h>
struct DDS_LivelinessChangedStatus
          { DDS_long alive_count;
            DDS_long not_alive_count;
            DDS_long alive_count_change;
            DDS_long not_alive_count_change;
            DDS_InstanceHandle_t last_publication_handle; };
```

Description

This struct contains the statistics about whether the liveliness of one or more connected `DDS_DataWriter` objects has changed.

Attributes

DDS_long alive_count - the total count of currently alive DDS_DataWriter objects that write the topic read by the DDS_DataReader to which this DDS_Status is attached.

DDS_long not_alive_count - the total count of currently not alive DDS_DataWriter objects that wrote the topic read by the DDS_DataReader to which this DDS_Status is attached.

DDS_long alive_count_change - the change in alive_count since the last time the Listener was called or the DDS_Status was read.

DDS_long not_alive_count_change - the change in not_alive_count since the last time the Listener was called or the DDS_Status was read.

DDS_InstanceHandle_t last_publication_handle - handle to the last DDS_DataWriter whose change in liveliness caused this status to change.

Detailed Description

This struct contains the statistics about whether the liveliness of one or more connected DDS_DataWriter objects that were writing instances read through the DDS_DataReader has changed. In other words, some DDS_DataWriters have become “alive” or “not alive”.

The attribute alive_count holds the total number of currently alive DDS_DataWriter objects that write the topic read by the DDS_DataReader to which this DDS_Status is attached. This count increases when a newly matched DDS_DataWriter asserts its liveliness for the first time or when a DDS_DataWriter previously considered to be not alive reasserts its liveliness. The count decreases when a DDS_DataWriter considered alive fails to assert its liveliness and becomes not alive, whether because it was deleted normally or for some other reason.

The attribute not_alive_count holds the total count of currently not alive DDS_DataWriters that wrote the topic read by the DDS_DataReader to which this DDS_Status is attached, and that are no longer asserting their liveliness. This count increases when a DDS_DataWriter considered alive fails to assert its liveliness and becomes not alive for some reason other than the normal deletion of that DDS_DataWriter. It decreases when a previously not alive DDS_DataWriter either reasserts its liveliness or is deleted normally.

The attribute *alive*_count_change holds the change in *alive*_count since the last time the Listener was called or the DDS_Status was read.

The attribute *not_alive*_count_change holds the change in *not_alive*_count since the last time the Listener was called or the DDS_Status was read.

The attribute `last_publication_handle` contains the instance handle to the *`DDS_PublicationBuiltinTopicData`* instance that represents the last datawriter whose change in liveliness caused this status to change. Be aware that this handle belongs to *another* datareader, the *`DDS_PublicationBuiltinTopicData`*`DataReader` in the builtin-subscriber, and has no meaning in the context of the datareader from which the `DDS_LivelinessChangedStatus` was obtained. If the builtin-subscriber has not explicitly been obtained using `DDS_DomainParticipant_get_builtin_subscriber`, then there is no *`DDS_PublicationBuiltinTopicData`*`DataReader` as well, in which case the `last_publication_handle` will be set to `DDS_HANDLE_NIL`.

3.1.5.3 DDS_LivelinessLostStatus

Synopsis

```
#include <dds_dcps.h>
struct DDS_LivelinessLostStatus
         { DDS_long total_count;
           DDS_long total_count_change; };
```

Description

This struct contains the statistics about whether the liveliness of the `DDS_DataWriter` to which this `DDS_Status` is attached has been committed through its `DDS_LivelinessQosPolicy`.

Attributes

`DDS_long total_count` - the total cumulative count of times the `DDS_DataWriter` to which this `DDS_Status` is attached failed to actively signal its liveliness within the offered liveliness period.

`DDS_long total_count_change` - the change in `total_count` since the last time the `Listener` was called or the `DDS_Status` was read.

Detailed Description

This struct contains the statistics about whether the liveliness of the `DDS_DataWriter` to which this `DDS_Status` is attached has been committed through its `DDS_LivelinessQosPolicy`. In other words, whether the `DDS_DataWriter` failed to actively signal its liveliness within the offered liveliness period. In such a case, the connected `DDS_DataReader` objects will consider the `DDS_DataWriter` as no longer “alive”.

The attribute `total_count` holds the total cumulative number of times that the previously-alive `DDS_DataWriter` became not alive due to a failure to actively signal its liveliness within its offered liveliness period. This count does not change when an already not alive `DDS_DataWriter` simply remains not alive for another liveliness period.

The attribute `total_count_change` holds the change in `total_count` since the last time the `Listener` was called or the `DDS_Status` was read.

3.1.5.4 DDS_OfferedDeadlineMissedStatus

Synopsis

```
#include <dds_dcps.h>
struct DDS_OfferedDeadlineMissedStatus
          { DDS_long total_count;
            DDS_long total_count_change;
            DDS_InstanceHandle_t last_instance_handle; };
```

Description

This struct contains the statistics about whether the deadline that the `DDS_DataWriter` to which this `DDS_Status` is attached has committed through its `DDS_DeadlineQosPolicy`, was not respected for a specific instance.

Attributes

`DDS_long total_count` - the total cumulative count of times the `DDS_DataWriter` to which this `DDS_Status` is attached failed to write within its offered deadline.

`DDS_long total_count_change` - the change in `total_count` since the last time the `Listener` was called or the `DDS_Status` was read.

`DDS_InstanceHandle_t last_instance_handle` - the handle to the last instance in the `DDS_DataWriter` to which this `DDS_Status` is attached, for which an offered deadline was missed.

Detailed Description

This struct contains the statistics about whether the deadline that the `DDS_DataWriter` to which this `DDS_Status` is attached has committed through its `DDS_DeadlineQosPolicy`, was not respected for a specific instance.

The attribute `total_count` holds the total cumulative number of offered deadline periods elapsed during which the `DDS_DataWriter` to which this `DDS_Status` is attached failed to provide data. Missed deadlines accumulate; that is, each deadline period the `total_count` will be incremented by one.

The attribute `total_count_change` holds the change in `total_count` since the last time the `Listener` was called or the `DDS_Status` was read.

The attribute `last_instance_handle` holds the handle to the last instance in the `DDS_DataWriter` to which this `DDS_Status` is attached, for which an offered deadline was missed.

3.1.5.5 DDS_OfferedIncompatibleQosStatus

Synopsis

```
#include <dds_dcps.h>
struct DDS_OfferedIncompatibleQosStatus
         { DDS_long total_count;
           DDS_long total_count_change;
           QosPolicyId_t last_policy_id;
           QosPolicyCountSeq policies; };
```

Description

This struct contains the statistics about whether an offered `QosPolicy` setting was incompatible with the requested `QosPolicy` setting.

Attributes

`DDS_long total_count` - the total cumulative count of `DDS_DataReader` objects discovered by the `DDS_DataWriter` with the same `DDS_Topic` and `Partition` and with a requested `DDS_DataReaderQos` that was incompatible with the one offered by the `DDS_DataWriter`.

`DDS_long total_count_change` - the change in `total_count` since the last time the `Listener` was called or the `DDS_Status` was read.

`QosPolicyId_t last_policy_id` - the id of one of the `QosPolicy` settings that was found to be incompatible with what was offered, the last time an incompatibility was detected.

`QosPolicyCountSeq policies` - a list containing for each `QosPolicy` the total number of times that the concerned `DDS_DataWriter` discovered a `DDS_DataReader` for the same `DDS_Topic` and a requested `DDS_DataReaderQos` that is incompatible with the one offered by the `DDS_DataWriter`.

Detailed Description

This struct contains the statistics about whether an offered `QosPolicy` setting was incompatible with the requested `QosPolicy` setting.

The Request/Offering mechanism is applicable between:

- the DDS_DataWriter and the DDS_DataReader. If the QosPolicy settings between DDS_DataWriter and DDS_DataReader are incompatible, no communication between them is established. In addition the DDS_DataWriter will be informed via a DDS_REQUESTED_INCOMPATIBLE_QOS status change and the DDS_DataReader will be informed via an DDS_OFFERED_INCOMPATIBLE_QOS status change.
- the DDS_DataWriter and the Durability Service (as a built-in DDS_DataReader). If the QosPolicy settings between DDS_DataWriter and the Durability Service are inconsistent, no communication between them is established. In that case data published by the DDS_DataWriter will not be maintained by the service and as a consequence will not be available for late joining DDS_DataReaders. The QosPolicy of the Durability Service in the role of DDS_DataReader is specified by the DDS_DurabilityServiceQosPolicy in the DDS_Topic.
- the Durability Service (as a built-in DDS_DataWriter) and the DDS_DataReader. If the QosPolicy settings between the Durability Service and the DDS_DataReader are inconsistent, no communication between them is established. In that case the Durability Service will not publish historical data to late joining DDS_DataReaders. The QosPolicy of the Durability Service in the role of DDS_DataWriter is specified by the DDS_DurabilityServiceQosPolicy in the DDS_Topic.

The attribute total_count holds the total cumulative count of DDS_DataReader objects discovered by the DDS_DataWriter with the same DDS_Topic and a requested DDS_DataReaderQos that was incompatible with the one offered by the DDS_DataWriter.

The attribute total_count_change holds the change in total_count since the last time the Listener was called or the DDS_Status was read.

The attribute last_policy_id holds the id of one of the QosPolicy settings that was found to be incompatible with what was offered, the last time an incompatibility was detected.

The attribute policies holds a list containing for each QosPolicy the total number of times that the concerned DDS_DataWriter discovered an incompatible DDS_DataReader for the same DDS_Topic. Each element in the list represents a counter for a different QosPolicy, identified by a corresponding unique index number. A named list of all index numbers is expressed as a set of constants in the API. See *Table 16:* below for an overview of all these constants.

Table 16: Overview of All Named QosPolicy Indexes

Index Name	Index Value
DDS_INVALID_QOS_POLICY_ID	0
DDS_USERDATA_QOS_POLICY_ID	1
DDS_DURABILITY_QOS_POLICY_ID	2
DDS_PRESENTATION_QOS_POLICY_ID	3
DDS_DEADLINE_QOS_POLICY_ID	4
DDS_LATENCYBUDGET_QOS_POLICY_ID	5
DDS_OWNERSHIP_QOS_POLICY_ID	6
DDS_OWNERSHIPSTRENGTH_QOS_POLICY_ID	7
DDS_LIVELINESS_QOS_POLICY_ID	8
DDS_TIMEBASEDFILTER_QOS_POLICY_ID	9
DDS_PARTITION_QOS_POLICY_ID	10
DDS_RELIABILITY_QOS_POLICY_ID	11
DDS_DESTINATIONORDER_QOS_POLICY_ID	12
DDS_HISTORY_QOS_POLICY_ID	13
DDS_RESOURCELIMITS_QOS_POLICY_ID	14
DDS_ENTITYFACTORY_QOS_POLICY_ID	15
DDS_WRITERDATALIFECYCLE_QOS_POLICY_ID	16
DDS_READERDATALIFECYCLE_QOS_POLICY_ID	17
DDS_TOPICDATA_QOS_POLICY_ID	18
DDS_GROUPDATA_QOS_POLICY_ID	19
DDS_TRANSPORTPRIORITY_QOS_POLICY_ID	20
DDS_LIFESPAN_QOS_POLICY_ID	21
DDS_DURABILITYSERVICE_QOS_POLICY_ID	22

3.1.5.6 DDS_PublicationMatchedStatus

Synopsis

```
#include <dds_dcps.h>
struct DDS_PublicationMatchedStatus
          { DDS_long total_count;
            DDS_long total_count_change;
            DDS_long current_count;
            DDS_long current_count_change;
```

```
DDS_InstanceHandle_t last_subscription_handle; };
```

Description

This struct contains the statistics about the discovered number of matching DataReaders currently connected to the owner of this status, and of the cumulative number of DataReaders that has connected to the owner of this status over time.

Attributes

`DDS_long total_count` - Total cumulative count of DataReaders compatible with the concerned DataWriter.

`DDS_long total_count_change` - The change in total_count since the last time the Status was read.

`DDS_long current_count` - Total count of DataReaders that are currently available and compatible with the DataWriter.

`DDS_long current_count_change` - The change in `current_count` since the last time the Status was read.

`DDS_InstanceHandle_t last_subscription_handle` - Handle to the last DataReader that matched the DataWriter causing the status to change.

Detailed Description

This struct contains the statistics about the discovered number of DataReaders that are compatible with the DataWriter to which the Status is attached. DataReader and DataWriter are compatible if they use the same Topic and if the QoS requested by the DataReader is compatible with that offered by the DataWriter. A DataReader will automatically connect to a matching DataWriter, but will disconnect when that DataReader is deleted, when either changes its QoS into an incompatible value, or when either puts its matching counterpart on its ignore-list using the `ignore_subscription` or `ignore_publication` operations on the DomainParticipant.

The `total_count` includes DataReaders that have already been disconnected, while in the `current_count` only the currently connected DataReaders are considered.

3.1.5.7 DDS_RequestedDeadlineMissedStatus

Synopsis

```
#include <dds_dcps.h>
struct DDS_RequestedDeadlineMissedStatus
          { DDS_long total_count;
            DDS_long total_count_change;
            DDS_InstanceHandle_t last_instance_handle; };
```

Description

This struct contains the statistics about whether the deadline that the `DDS_DataReader` to which this `DDS_Status` is attached was expecting through its `DDS_DeadlineQosPolicy`, was not respected for a specific instance.

Attributes

`DDS_long total_count` - the total cumulative count of the missed deadlines detected for any instance read by the `DDS_DataReader` to which this `DDS_Status` is attached.

`DDS_long total_count_change` - the change in `total_count` since the last time the `Listener` was called or the `DDS_Status` was read.

`DDS_InstanceHandle_t last_instance_handle` - the handle to the last instance in the `DDS_DataReader` to which this `DDS_Status` is attached for which a missed deadline was detected.

Detailed Description

This struct contains the statistics about whether the deadline that the `DDS_DataReader` to which this `DDS_Status` is attached was expecting through its `DDS_DeadlineQosPolicy`, was not respected for a specific instance. Missed deadlines accumulate, that is, each deadline period the `total_count` will be incremented by one for each instance for which data was not received.

The attribute `total_count` holds the total cumulative count of the missed deadlines detected for any instance read by the `DDS_DataReader`.

The attribute `total_count_change` holds the change in `total_count` since the last time the `Listener` was called or the `DDS_Status` was read.

The attribute `last_instance_handle` holds the handle to the last instance in the `DDS_DataReader` for which a missed deadline was detected.

3.1.5.8 DDS_RequestedIncompatibleQosStatus

Synopsis

```
#include <dds_dcps.h>
struct DDS_RequestedIncompatibleQosStatus
          { DDS_long total_count;
            DDS_long total_count_change;
            QosPolicyId_t last_policy_id;
            QosPolicyCountSeq policies; };
```

Description

This struct contains the statistics about whether a requested `QosPolicy` setting was incompatible with the offered `QosPolicy` setting.

Attributes

DDS_long total_count - holds the total cumulative count of DDS_DataWriter objects, discovered by the DDS_DataReader to which this DDS_Status is attached, with the same DDS_Topic and an offered DDS_DataWriterQos that was incompatible with the one requested by the DDS_DataReader.

DDS_long total_count_change - holds the change in total_count since the last time the Listener was called or the DDS_Status was read.

QosPolicyId_t last_policy_id - holds the DDS_<*name*>_QOS_POLICY_ID of one of the QosPolicies that was found to be incompatible with what was requested, the last time an incompatibility was detected.

QosPolicyCountSeq policies - a list containing (for each QosPolicy) the total number of times that the concerned DDS_DataReader discovered a DDS_DataWriter with the same DDS_Topic and an offered DDS_DataWriterQos that is incompatible with the one requested by the DDS_DataReader.

Detailed Description

This struct contains the statistics about whether a requested QosPolicy setting was incompatible with the offered QosPolicy setting.

The Request/Offering mechanism is applicable between:

- the DDS_DataWriter and the DDS_DataReader. If the QosPolicy settings between DDS_DataWriter and DDS_DataReader are incompatible, no communication between them is established. In addition the DDS_DataWriter will be informed via a DDS_REQUESTED_INCOMPATIBLE_QOS status change and the DDS_DataReader will be informed via an DDS_OFFERED_INCOMPATIBLE_QOS status change.
- the DDS_DataWriter and the Durability Service (as a built-in DDS_DataReader). If the QosPolicy settings between DDS_DataWriter and the Durability Service are inconsistent, no communication between them is established. In that case data published by the DDS_DataWriter will not be maintained by the service and as a consequence will not be available for late joining DDS_DataReaders. The QosPolicy of the Durability Service in the role of DDS_DataReader is specified by the DDS_DurabilityServiceQosPolicy in the DDS_Topic.
- the Durability Service (as a built-in DDS_DataWriter) and the DDS_DataReader. If the QosPolicy settings between the Durability Service and the DDS_DataReader are inconsistent, no communication between them is established. In that case the Durability Service will not publish historical data to

late joining DDS_DataReaders. The QosPolicy of the Durability Service in the role of DDS_DataWriter is specified by the DDS_DurabilityServiceQosPolicy in the DDS_Topic.

The attribute total_count holds the total cumulative count of DDS_DataWriter objects discovered by the DDS_DataReader with the same DDS_Topic and an offered DDS_DataWriterQos that was incompatible with the one requested by the DDS_DataReader.

The attribute total_count_change holds the change in total_count since the last time the Listener was called or the DDS_Status was read.

The attribute last_policy_id holds the DDS_<*name*>_QOS_POLICY_ID of one of the QosPolicies that was found to be incompatible with what was requested, the last time an incompatibility was detected.

The attribute policies holds a list containing for each QosPolicy: the total number of times that the concerned DDS_DataReader discovered an incompatible DDS_DataWriter for the same DDS_Topic. Each element in the list represents a counter for a different QosPolicy, identified by a corresponding unique index number. A named list of all index numbers is expressed as a set of constants in the API. See Table 16, *Overview of All Named QosPolicy Indexes*, on page 125 for an overview of all these constants.

3.1.5.9 DDS_SampleLostStatus

Synopsis

```
#include <dds_dcps.h>
struct DDS_SampleLostStatus
         { DDS_long total_count;
           DDS_long total_count_change; };
```

Description

This struct contains the statistics about whether a sample has been lost (never received).

Attributes

DDS_long total_count - holds the total cumulative count of all samples lost across all instances of data published under the DDS_Topic.

DDS_long total_count_change - holds the change in total_count since the last time the Listener was called or the DDS_Status was read.

Detailed Description

This struct contains the statistics about whether a sample has been lost (never received). The status is independent of the differences in instances, in other words, it includes all samples lost across all instances of data published under the `DDS_Topic`.

`total_count` holds the total cumulative count of all samples lost across all instances of data published under the `DDS_Topic`.

`total_count_change` holds the change in `total_count` since the last time the `Listener` was called or the `DDS_Status` was read.

3.1.5.10 DDS_SampleRejectedStatus

Synopsis

```
#include <dds_dcps.h>

enum DDS_SampleRejectedStatusKind
          { DDS_NOT_REJECTED,
            DDS_REJECTED_BY_INSTANCES_LIMIT,
            DDS_REJECTED_BY_SAMPLES_LIMIT,
            DDS_REJECTED_BY_SAMPLES_PER_INSTANCE_LIMIT };

struct DDS_SampleRejectedStatus
          { DDS_long total_count;
            DDS_long total_count_change;
            DDS_SampleRejectedStatusKind last_reason;
            DDS_InstanceHandle_t last_instance_handle; };
```

Description

This struct contains the statistics about samples that have been rejected.

Attributes

`DDS_long total_count` - holds the total cumulative count of samples rejected by the `DDS_DataReader` to which this `DDS_Status` is attached.

`DDS_long total_count_change` - holds the change in `total_count` since the last time the `Listener` was called or the `DDS_Status` was read.

`DDS_SampleRejectedStatusKind last_reason` - holds the reason for rejecting the last sample.

`DDS_InstanceHandle_t last_instance_handle` - holds the handle to the instance which would have updated by the last sample that was rejected.

Detailed Description

This struct contains the statistics about whether a received sample has been rejected.

The attribute `total_count` holds the total cumulative count of samples rejected by the `DDS_DataReader` to which this `DDS_Status` is attached.

The attribute `total_count_change` holds the change in `total_count` since the last time the `Listener` was called or the `DDS_Status` was read.

The attribute `last_reason` holds the reason for rejecting the last sample. The attribute can have the following values:

- *`DDS_NOT_REJECTED`* - no sample has been rejected yet.
- *`DDS_REJECTED_BY_INSTANCES_LIMIT`* - the sample was rejected because it would exceed the maximum number of instances set by the `DDS_ResourceLimitsQosPolicy`.
- *`DDS_REJECTED_BY_SAMPLES_LIMIT`* - the sample was rejected because it would exceed the maximum number of samples set by the `DDS_ResourceLimitsQosPolicy`.
- *`DDS_REJECTED_BY_SAMPLES_PER_INSTANCE_LIMIT`* - the sample was rejected because it would exceed the maximum number of samples per instance set by the `DDS_ResourceLimitsQosPolicy`.

The attribute `last_instance_handle` holds the handle to the instance which would have updated by the last sample that was rejected.

3.1.5.11 DDS_SubscriptionMatchedStatus

Synopsis

```
#include <dds_dcps.h>
struct DDS_SubscriptionMatchedStatus
          { DDS_long total_count;
            DDS_long total_count_change;
            DDS_long current_count;
            DDS_long current_count_change;
            DDS_InstanceHandle_t last_publication_handle; };
```

Description

This struct contains the statistics about the discovered number of matching DataWriters currently connected to the owner of this status, and of the cumulative number of DataWriters that has connected to the owner of this status over time.

Attributes

`DDS_long total_count` - Total cumulative count of DataWriters compatible with the concerned DataReader.

`DDS_long total_count_change` - The change in `total_count` since the last time the Status was read.

DDS_long current_count - Total count of DataWriters that are currently available and compatible with the DataWriter.

DDS_long current_count_change - The change in `current_count` since the last time the Status was read.

DDS_InstanceHandle_t last_publication_handle - Handle to the last DataWriter that matched the DataReader causing the status to change.

Detailed Description

This struct contains the statistics about the discovered number of DataWriters that are compatible with the DataReader to which the Status is attached. DataWriter and DataReader are compatible if they use the same Topic and if the QoS requested by the DataReader is compatible with that offered by the DataWriter. A DataWriter will automatically connect to a matching DataReader, but will disconnect when that DataWriter is deleted, when either changes its QoS into an incompatible value, or when either puts its matching counterpart on its ignore-list using the `ignore_subscription` or `ignore_publication` operations on the DomainParticipant.

The `total_count` includes DataWriters that have already been disconnected, while in the `current_count` only the currently connected DataWriters are considered.

3.1.5.12 DDS_AllDataDisposedTopicStatus

Synopsis

```
#include <dds_dcps.h>
struct DDS_AllDataDisposedTopicStatus
 { DDS_long total_count
   DDS_long total_count_change }
```

Description

This struct contains the statistics about the occurence of the `DDS_ALL_DATA_DISPOSED_TOPIC_STATUS` event on the Topic to which this Status is attached.

Attributes

DDS_long total_count - the total detected cumulative count of `ALL_DATA_DISPOSED_TOPIC_STATUS` events.

DDS_long total_count_change - the change in `total_count` since the last time the Status was read.

Detailed Description

This struct contains the statistics about the occurence of the `DDS_ALL_DATA_DISPOSED_TOPIC_STATUS` event on the Topic to which this Status is attached. The Status is directly related to the invocation of the `DDS_Topic_dispose_all_data()` operation. Statistics are only kept when all instances are disposed using this operation, not when instances are disposed seperately by individual dispose calls.

3.1.6 Class DDS_WaitSet

A `DDS_WaitSet` object allows an application to wait until one or more of the attached `DDS_Condition` objects evaluates to `TRUE` or until the timeout expires.

The `DDS_WaitSet` has no factory and must be created by the application. It is directly created as an object by using `DDS_WaitSet` constructors.

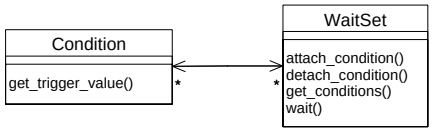

Figure 13: DCPS DDS_WaitSets

The interface description of this class is as follows:

```
/*
 * interface DDS_WaitSet
 */
/*
 * implemented API operations
 */
   DDS_WaitSet
      DDS_WaitSet__alloc
         (void);
   DDS_ReturnCode_t
      DDS_WaitSet_wait
         (DDS_WaitSet _this,
         DDS_ConditionSeq *active_conditions,
         const DDS_Duration_t *timeout);
   DDS_ReturnCode_t
      DDS_WaitSet_attach_condition
         (DDS_WaitSet _this,
         const DDS_Condition cond);
   DDS_ReturnCode_t
      DDS_WaitSet_detach_condition
         (DDS_WaitSet _this,
         const DDS_Condition cond);
   DDS_ReturnCode_t
```

```
DDS_WaitSet_get_conditions
   (DDS_WaitSet _this,
   DDS_ConditionSeq *attached_conditions);
```

The following sections describe the usage of all `DDS_WaitSet` operations.

3.1.6.1 DDS_WaitSet__alloc

Synopsis

```
#include <dds_dcps.h>
DDS_WaitSet
   DDS_WaitSet__alloc
      (void);
```

Description

This operation creates a new `DDS_WaitSet`.

Parameters

<none>

Return Value

`DDS_WaitSet` - handle to the newly-created `DDS_WaitSet`. In case of an error, a `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation creates a new `DDS_WaitSet`. The `DDS_WaitSet` must be created using this operation. In other words, the application is not allowed to declare an object of type `DDS_WaitSet`. When the application wants to release the `DDS_WaitSet` it must be released using `DDS_free`.

In case there are insufficient resources available to allocate the `DDS_WaitSet`, a `DDS_OBJECT_NIL` pointer is returned instead.

3.1.6.2 DDS_WaitSet_attach_condition

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_WaitSet_attach_condition
      (DDS_WaitSet _this,
        const DDS_Condition cond);
```

Description

This operation attaches a `DDS_Condition` to the `DDS_WaitSet`.

Parameters

in DDS_WaitSet _this - the DDS_WaitSet object on which the operation is operated.

in const DDS_Condition cond - a pointer to a DDS_Condition.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation attaches a DDS_Condition to the DDS_WaitSet. The parameter cond must be either a DDS_ReadCondition, DDS_QueryCondition, DDS_StatusCondition or DDS_GuardCondition. To get this parameter see:

- DDS_ReadCondition created by DDS_DataReader_create_readcondition
- DDS_QueryCondition created by DDS_DataReader_create_querycondition
- DDS_StatusCondition retrieved by DDS_<Entity>_get_statuscondition on an DDS_<Entity>
- DDS_GuardCondition created by the C operation DDS_GuardCondition__alloc.

When a DDS_GuardCondition is initially created, the trigger_value is FALSE.

When a DDS_Condition, whose trigger_value evaluates to TRUE, is attached to a DDS_WaitSet that is currently being waited on (using the DDS_WaitSet_wait operation), the DDS_WaitSet will unblock immediately.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the DDS_Condition is attached to the DDS_WaitSet.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter cond is not a valid DDS_Condition.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.1.6.3 DDS_WaitSet_detach_condition

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_WaitSet_detach_condition
      (DDS_WaitSet _this,
        const DDS_Condition cond)
```

Description

This operation detaches a `DDS_Condition` from the `DDS_WaitSet`.

Parameters

in DDS_WaitSet _this - the `DDS_WaitSet` object on which the operation is operated.

in const DDS_Condition cond - a pointer to a `DDS_Condition` in the `DDS_WaitSet`.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_BAD_PARAMETER`, `DDS_RETCODE_OUT_OF_RESOURCES` or `DDS_RETCODE_PRECONDITION_NOT_MET`.

Detailed Description

This operation detaches a `DDS_Condition` from the `DDS_WaitSet`. If the `DDS_Condition` was not attached to this `DDS_WaitSet`, the operation returns `DDS_RETCODE_PRECONDITION_NOT_MET`.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the `DDS_Condition` is detached from the `DDS_WaitSet`.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter `cond` is not a valid `DDS_Condition`.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

- *DDS_RETCODE_PRECONDITION_NOT_MET* - the DDS_Condition was not attached to this DDS_WaitSet.

3.1.6.4 DDS_WaitSet_get_conditions

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_WaitSet_get_conditions
      (DDS_WaitSet _this,
        DDS_ConditionSeq *attached_conditions);
```

Description

This operation retrieves the list of attached conditions.

Parameters

in DDS_WaitSet _this - the DDS_WaitSet object on which the operation is operated.

*inout DDS_ConditionSeq *attached_conditions* - the inout parameter *attached_conditions is a* sequence, which is used to pass the list of attached conditions.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation retrieves the list of attached conditions in the DDS_WaitSet. The parameter attached_conditions is a pointer to a sequence which afterwards will point to the sequence of attached conditions. The *attached_conditions* sequence and its buffer may be pre-allocated by the application and therefore must either be re-used in a subsequent invocation of the DDS_WaitSet_get_conditions operation or be released by calling DDS_free on the returned attached_conditions. If the pre-allocated sequence is not big enough to hold the number of attached DDS_Conditions, the sequence will automatically be (re-)allocated to fit the required size. The resulting sequence will either be an empty sequence, meaning there were no conditions attached, or will contain a list of DDS_ReadCondition, DDS_QueryCondition, DDS_StatusCondition and DDS_GuardCondition. These conditions previously have been attached by DDS_WaitSet_attach_condition and were created by there respective create operation:

- `DDS_ReadCondition` created by `DDS_DataReader_create_readcondition`
- `DDS_QueryCondition` created by `DDS_DataReader_create_querycondition`
- `DDS_StatusCondition` retrieved by `DDS_<Entity>_get_statuscondition` on an `DDS_<Entity>`
- `DDS_GuardCondition` created by the C operation `DDS_GuardCondition__alloc`.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the list of attached conditions is returned
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.

3.1.6.5 DDS_WaitSet_wait

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_WaitSet_wait
      (DDS_WaitSet _this,
        DDS_ConditionSeq *active_conditions,
        const DDS_Duration_t *timeout)
```

Description

This operation allows an application thread to wait for the occurrence of at least one of the conditions that is attached to the `DDS_WaitSet`.

Parameters

`in DDS_WaitSet _this` - the `DDS_WaitSet` object on which the operation is operated.

`inout DDS_ConditionSeq *active_conditions` - a sequence which is used to pass the list of all the attached conditions that have a `trigger_value` of `TRUE`.

*in const DDS_Duration_t *timeout* - the maximum duration to block for the DDS_WaitSet_wait, after which the application thread is unblocked. The special constant DDS_DURATION_INFINITE can be used when the maximum waiting time does not need to be bounded.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_TIMEOUT or DDS_RETCODE_PRECONDITION_NOT_MET.

Detailed Description

This operation allows an application thread to wait for the occurrence of at least one of the conditions to evaluate to TRUE that is attached to the DDS_WaitSet. If all of the conditions attached to the DDS_WaitSet have a trigger_value of FALSE, the DDS_WaitSet_wait operation will block the calling thread. The result of the operation is the continuation of the application thread after which the result is left in active_conditions. This is a sequence, which will contain the list of all the attached conditions that have a trigger_value of TRUE. The active_conditions sequence and its buffer may be pre-allocated by the application and therefore must either be re-used in a subsequent invocation of the DDS_WaitSet_wait operation or be released by calling DDS_free on the returned active_conditions. If the pre-allocated sequence is not big enough to hold the number of triggered DDS_Conditions, the sequence will automatically be (re-)allocated to fit the required size. The parameter timeout specifies the maximum duration for the DDS_WaitSet_wait to block the calling application thread (when none of the attached conditions has a trigger_value of TRUE). In that case the return value is DDS_RETCODE_TIMEOUT and the active_conditions sequence is left empty. Since it is not allowed for more than one application thread to be waiting on the same DDS_WaitSet, the operation returns immediately with the value DDS_RETCODE_PRECONDITION_NOT_MET when the DDS_WaitSet_wait operation is invoked on a DDS_WaitSet which already has an application thread blocking on it.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - at least one of the attached conditions has a trigger_value of TRUE.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.

- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_TIMEOUT* - the `timeout` has elapsed without any of the attached `conditions` becoming `TRUE`.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - the `DDS_WaitSet` already has an application thread blocking on it.

3.1.7 Class DDS_Condition

This class is the base class for all the conditions that may be attached to a `DDS_WaitSet`. This base class is specialized in three classes by the Data Distribution Service: `DDS_GuardCondition`, `DDS_StatusCondition` and `DDS_ReadCondition` (also there is a `DDS_QueryCondition` which is a specialized `DDS_ReadCondition`).

Each `DDS_Condition` has a `trigger_value` that can be `TRUE` or `FALSE` and is set by the Data Distribution Service (except a `DDS_GuardCondition`) depending on the evaluation of the `DDS_Condition`.

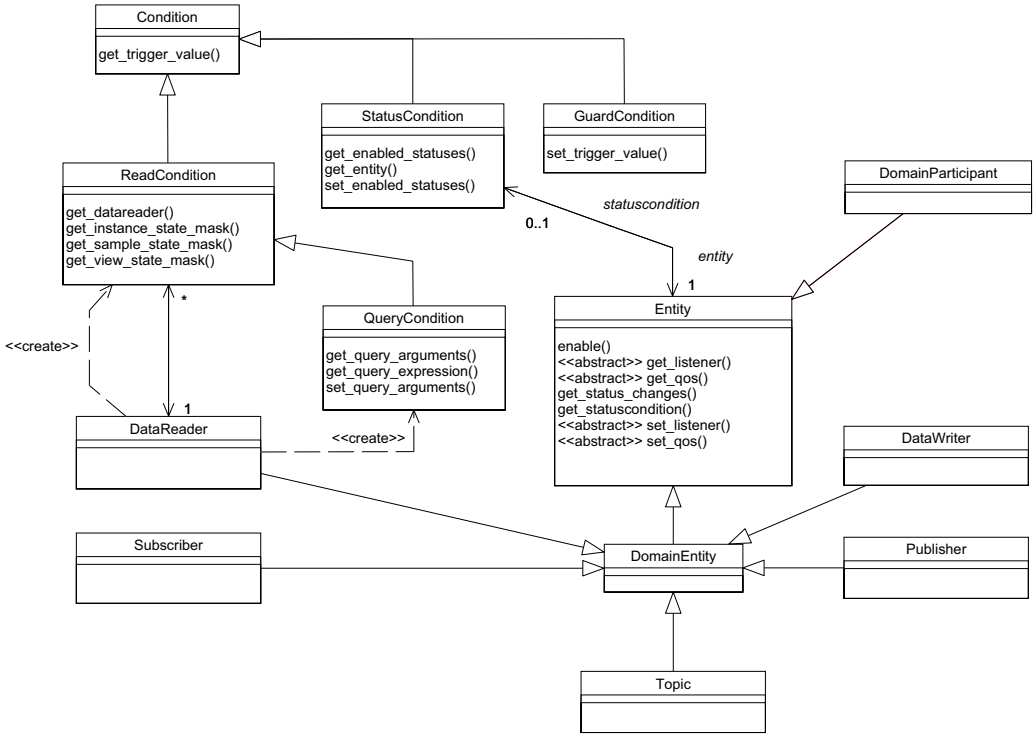

Figure 14: DCPS DDS_Conditions

The interface description of this class is as follows:

```
/*
* interface DDS_Condition
*/
/*
* implemented API operations
*/
  DDS_boolean
     DDS_Condition_get_trigger_value
        (DDS_Condition _this);
```

The next paragraph describes the usage of the `DDS_Condition` operation.

3.1.7.1 DDS_Condition_get_trigger_value

Synopsis

```
#include <dds_dcps.h>
```

```
DDS_boolean
   DDS_Condition_get_trigger_value
      (DDS_Condition _this);
```

Description

This operation returns the `trigger_value` of the `DDS_Condition`.

Parameters

`in DDS_Condition _this` - the `DDS_Condition` object on which the operation is operated.

Return Value

`DDS_boolean` - the `trigger_value`.

Detailed Description

A `DDS_Condition` has a `trigger_value` that can be `TRUE` or `FALSE` and is set by the Data Distribution Service (except a `DDS_GuardCondition`). This operation returns the `trigger_value` of the `DDS_Condition`.

3.1.8 Class DDS_GuardCondition

A `DDS_GuardCondition` object is a specific `DDS_Condition` whose `trigger_value` is completely under the control of the application. The `DDS_GuardCondition` has no factory and must be created by the application. The `DDS_GuardCondition` is directly created as an object by using the `DDS_GuardCondition` constructor. When a `DDS_GuardCondition` is initially created, the `trigger_value` is `FALSE`. The purpose of the `DDS_GuardCondition` is to provide the means for an application to manually wake up a `DDS_WaitSet`. This is accomplished by attaching the `DDS_GuardCondition` to the `Waitset` and setting the `trigger_value` by means of the `DDS_GuardCondition_set_trigger_value` operation.

The interface description of this class is as follows:

```
/*
 * interface DDS_GuardCondition
 */
/*
 * inherited from DDS_Condition
 */
/* DDS_boolean
 *    DDS_GuardCondition_get_trigger_value
 *       (DDS_GuardCondition _this);
 */
/*
 * implemented API operations
```

```
*/
   DDS_GuardCondition
      DDS_GuardCondition__alloc
         (void);
   DDS_ReturnCode_t
      DDS_GuardCondition_set_trigger_value
         (DDS_GuardCondition _this,
           const DDS_boolean value);
```

The following sections describe the usage of all `DDS_GuardCondition` operations.

The inherited operation is listed but not fully described since it is not implemented in this class. The full description of this operation is given in the class from which it is inherited. This is described in their respective paragraph.

3.1.8.1 DDS_GuardCondition__alloc

Synopsis

```
#include <dds_dcps.h>
DDS_GuardCondition
   DDS_GuardCondition__alloc
      (void);
```

Description

This operation creates a new `DDS_GuardCondition`.

Parameters

<none>

Return Value

`DDS_GuardCondition` - Return value is the handle to the newly-created `DDS_GuardCondition`. In case of an error, a `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation creates a new `DDS_GuardCondition`. The `DDS_GuardCondition` must be created using this operation. In other words, the application is not allowed to declare an object of type `DDS_GuardCondition`. When the application wants to release the `DDS_GuardCondition` it must be released using `DDS_free`.

In case there are insufficient resources available to allocate the `DDS_GuardCondition`, a `DDS_OBJECT_NIL` pointer is returned instead.

3.1.8.2 DDS_GuardCondition_get_trigger_value (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Condition` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_boolean
   DDS_GuardCondition_get_trigger_value
      (DDS_GuardCondition _this);
```

3.1.8.3 DDS_GuardCondition_set_trigger_value

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_GuardCondition_set_trigger_value
      (DDS_GuardCondition _this,
        const DDS_boolean value);
```

Description

This operation sets the `trigger_value` of the `DDS_GuardCondition`.

Parameters

`in DDS_GuardCondition _this` - the `DDS_GuardCondition` object on which the operation is operated.

`in const DDS_boolean value` - the boolean value to which the `DDS_GuardCondition` is set.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR` or `DDS_RETCODE_ILLEGAL_OPERATION`.

Detailed Description

A `DDS_GuardCondition` object is a specific `DDS_Condition` which `trigger_value` is completely under the control of the application. This operation must be used by the application to manually wake-up a `DDS_WaitSet`. This operation sets the `trigger_value` of the `DDS_GuardCondition` to the parameter `value`. The `DDS_GuardCondition` is directly created using the `DDS_GuardCondition` constructor. When a `DDS_GuardCondition` is initially created, the trigger_value is `FALSE`.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the specified trigger_value has successfully been applied
- *DDS_RETCODE_ERROR* - an internal error has occurred
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object

3.1.9 Class DDS_StatusCondition

DDS_Entity objects that have status attributes also have a DDS_StatusCondition, access is provided to the application by the DDS_<Entity>_get_statuscondition operation.

The communication statuses whose changes can be communicated to the application depend on the DDS_Entity. The following table shows the relevant statuses for each DDS_Entity.

Table 17: Status Per DDS_Entity

DDS_Entity	Status Name
DDS_Topic	DDS_INCONSISTENT_TOPIC_STATUS DDS_ALL_DATA_DISPOSED_TOPIC_STATUS
DDS_Subscriber	DDS_DATA_ON_READERS_STATUS
DDS_DataReader	DDS_SAMPLE_REJECTED_STATUS
	DDS_LIVELINESS_CHANGED_STATUS
	DDS_REQUESTED_DEADLINE_MISSED_STATUS
	DDS_REQUESTED_INCOMPATIBLE_QOS_STATUS
	DDS_DATA_AVAILABLE_STATUS
	DDS_SAMPLE_LOST_STATUS
	DDS_SUBSCRIPTION_MATCHED_STATUS
DDS_DataWriter	DDS_LIVELINESS_LOST_STATUS
	DDS_OFFERED_DEADLINE_MISSED_STATUS
	DDS_OFFERED_INCOMPATIBLE_QOS_STATUS
	DDS_PUBLICATION_MATCHED_STATUS

The trigger_value of the DDS_StatusCondition depends on the communication statuses of that DDS_Entity (*e.g.*, missed deadline) and also depends on the value of the DDS_StatusCondition attribute mask (enabled_statuses mask). A DDS_StatusCondition can be attached to a DDS_WaitSet in order to allow an application to suspend until the trigger_value has become TRUE.

The `trigger_value` of a `DDS_StatusCondition` will be `TRUE` if one of the enabled `StatusChangedFlags` is set. That is, `trigger_value==FALSE` only if all the values of the `StatusChangedFlags` are `FALSE`.

The sensitivity of the `DDS_StatusCondition` to a particular communication status is controlled by the list of `enabled_statuses` set on the condition by means of the `DDS_StatusCondition_set_enabled_statuses` operation.

When the `enabled_statuses` are not changed by the `DDS_StatusCondition_set_enabled_statuses` operation, all statuses are enabled by default.

The interface description of this class is as follows:

```
/*
 * interface DDS_StatusCondition
 */
/*
 * inherited from DDS_Condition
 */
/* DDS_boolean
 *    DDS_StatusCondition_get_trigger_value
 *       (DDS_StatusCondition _this);
 */
/*
 * implemented API operations
 */
   DDS_StatusMask
      DDS_StatusCondition_get_enabled_statuses
         (DDS_StatusCondition _this);
   DDS_ReturnCode_t
      DDS_StatusCondition_set_enabled_statuses
         (DDS_StatusCondition _this,
           const DDS_StatusMask mask);
   DDS_Entity
      DDS_StatusCondition_get_entity
         (DDS_StatusCondition _this);
```

The next paragraphs describe the usage of all `DDS_StatusCondition` operations. The inherited operations are listed but not fully described because they are not implemented in this class. The full description of these operations is given in the classes from which they are inherited.

3.1.9.1 DDS_StatusCondition_get_enabled_statuses

Synopsis

```
#include <dds_dcps.h>
DDS_StatusMask
   DDS_StatusCondition_get_enabled_statuses
      (DDS_StatusCondition _this);
```

Description

This operation returns the list of enabled communication statuses of the `DDS_StatusCondition`.

Parameters

`in DDS_StatusCondition _this` - the `DDS_StatusCondition` object on which the operation is operated.

Return Value

`DDS_StatusMask` - Result is a bit-mask in which each bit shows which status is taken into account for the `DDS_StatusCondition`.

Detailed Description

The `trigger_value` of the `DDS_StatusCondition` depends on the communication status of that `DDS_Entity` (*e.g.*, missed deadline, loss of information, etc.), 'filtered' by the set of `enabled_statuses` on the `DDS_StatusCondition`.

This operation returns the list of communication statuses that are taken into account to determine the `trigger_value` of the `DDS_StatusCondition`. This operation returns the statuses that were explicitly set on the last call to `DDS_StatusCondition_set_enabled_statuses` or, if `DDS_StatusCondition_set_enabled_statuses` was never called, the default list.

The result value is a bit-mask in which each bit shows which status is taken into account for the `DDS_StatusCondition`. The relevant bits represents one of the following statuses:

```
DDS_INCONSISTENT_TOPIC_STATUS
DDS_ALL_DATA_DISPOSED_TOPIC_STATUS
DDS_OFFERED_DEADLINE_MISSED_STATUS
DDS_REQUESTED_DEADLINE_MISSED_STATUS
DDS_OFFERED_INCOMPATIBLE_QOS_STATUS
DDS_REQUESTED_INCOMPATIBLE_QOS_STATUS
DDS_SAMPLE_LOST_STATUS
DDS_SAMPLE_REJECTED_STATUS
DDS_DATA_ON_READERS_STATUS
DDS_DATA_AVAILABLE_STATUS
DDS_LIVELINESS_LOST_STATUS
DDS_LIVELINESS_CHANGED_STATUS
DDS_PUBLICATION_MATCHED_STATUS
DDS_SUBSCRIPTION_MATCHED_STATUS.
```

Each status bit is declared as a constant and can be used in an AND operation to check the status bit against the result of type DDS_StatusMask. Not all statuses are relevant to all DDS_Entity objects. See the respective Listener objects for each DDS_Entity for more information.

3.1.9.2 DDS_StatusCondition_get_entity

Synopsis

```
#include <dds_dcps.h>
DDS_Entity
   DDS_StatusCondition_get_entity
      (DDS_StatusCondition _this);
```

Description

This operation returns the DDS_Entity associated with the DDS_StatusCondition or the DDS_OBJECT_NIL pointer.

Parameters

in DDS_StatusCondition _this - the DDS_StatusCondition object on which the operation is operated.

Return Value

DDS_Entity - a pointer to the DDS_Entity associated with the DDS_StatusCondition or the DDS_OBJECT_NIL pointer.

Detailed Description

This operation returns the DDS_Entity associated with the DDS_StatusCondition. Note that there is exactly one DDS_Entity associated with each DDS_StatusCondition. When the DDS_Entity was already deleted (there is no associated DDS_Entity any more), the DDS_OBJECT_NIL pointer is returned.

3.1.9.3 DDS_StatusCondition_get_trigger_value (inherited)

This operation is inherited and therefore not described here. See the class DDS_Condition for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_boolean
   DDS_StatusCondition_get_trigger_value
      (DDS_StatusCondition _this);
```

3.1.9.4 DDS_StatusCondition_set_enabled_statuses

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_StatusCondition_set_enabled_statuses
      (DDS_StatusCondition _this,
        const DDS_StatusMask mask);
```

Description

This operation sets the list of communication statuses that are taken into account to determine the `trigger_value` of the `DDS_StatusCondition`.

Parameters

`in DDS_StatusCondition _this` - the `DDS_StatusCondition` object on which the operation is operated.

`in const DDS_StatusMask mask` - a bit-mask in which each bit sets the status which is taken into account for the `DDS_StatusCondition`.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION` or `DDS_RETCODE_ALREADY_DELETED`.

Detailed Description

The `trigger_value` of the `DDS_StatusCondition` depends on the communication status of that `DDS_Entity` (*e.g.*, missed deadline, loss of information, etc.), 'filtered' by the set of `enabled_statuses` on the `DDS_StatusCondition`.

This operation sets the list of communication statuses that are taken into account to determine the `trigger_value` of the `DDS_StatusCondition`. This operation may change the `trigger_value` of the `DDS_StatusCondition`.

`DDS_WaitSet` objects behaviour depend on the changes of the `trigger_value` of their attached `DDS_Conditions`. Therefore, any `DDS_WaitSet` to which the `DDS_StatusCondition` is attached is potentially affected by this operation.

If this function is not invoked, the default list of `enabled_statuses` includes all the statuses.

The parameter `mask` is a bit-mask in which each bit shows which status is taken into account for the `DDS_StatusCondition`. The relevant bits represents one of the following statuses:

```
DDS_INCONSISTENT_TOPIC_STATUS
DDS_ALL_DATA_DISPOSED_TOPIC_STATUS
DDS_OFFERED_DEADLINE_MISSED_STATUS
DDS_REQUESTED_DEADLINE_MISSED_STATUS
DDS_OFFERED_INCOMPATIBLE_QOS_STATUS
DDS_REQUESTED_INCOMPATIBLE_QOS_STATUS
DDS_SAMPLE_LOST_STATUS
DDS_SAMPLE_REJECTED_STATUS
DDS_DATA_ON_READERS_STATUS
DDS_DATA_AVAILABLE_STATUS
DDS_LIVELINESS_LOST_STATUS
DDS_LIVELINESS_CHANGED_STATUS
DDS_PUBLICATION_MATCHED_STATUS
DDS_SUBSCRIPTION_MATCHED_STATUS
```

Each status bit is declared as a constant and can be used in an OR operation to set the status bit in the parameter `mask` of type `DDS_StatusMask`. Not all statuses are relevant to all `DDS_Entity` objects. See the respective `Listener` objects for each `DDS_Entity` for more information.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the list of communication statuses is set.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_StatusCondition` has already been deleted.

3.1.10 Class DDS_ErrorInfo

The *`DDS_ErrorInfo`* mechanism is an OpenSplice-specific extension to the OMG-DDS standard, that can help DDS users to get a more finegrained overview of the context of an error. The DDS specification only mandates that functions return a `DDS_ReturnCode_t` value as a broad categorization of potential types of problems (there are 12 possible `DDS_ReturnCode_t` values, of which 11 indicate some kind of error), but factory operations do not even have this mechanism at their disposal since they return the object they were requested to create.

The *`DDS_ErrorInfo`* was added to OpenSplice for the following reasons:

- It can provide context for errors that occur in factory operations (*e.g.* when `create_topic` returns `NULL`).

- It can provide a `DDS_ErrorCode_t` value, that represents a much more fine-grained error categorization than the `DDS_ReturnCode_t` (21 categories *vs.* the 11 categories provided by `DDS_ReturnCode_t`).
- It can provide an error description that can give a much more dedicated explanation of the exact circumstances of the error.
- It can provide the name of the function call/component that caused the error.
- It can provide source code location where the error occured (file name + line number).
- It can provide a stacktrace of the thread that ran into the error.

The *`DDS_ErrorInfo`* obtains its information from the API-level log messages recorded by the internal mechanisms of the data distribution service. These are messages that are, by default, also written to the `ospl-info.log` file. The application can access this information through an *`DDS_ErrorInfo`* object, and take appropriate action based on the contents of this information. The *`DDS_ErrorInfo`* has no factory and an instance of the class can be created by the application by calling its constructor.

The interface of this class is as follows:

```
DDS_ErrorInfo
   DDS_ErrorInfo__alloc
      (void);

DDS_ReturnCode_t
    DDS_ErrorInfo_update
        (DDS_ErrorInfo _this);

DDS_ReturnCode_t
    DDS_ErrorInfo_get_code
        (DDS_ErrorInfo _this,
         DDS_ErrorCode_t *code);

DDS_ReturnCode_t
    DDS_ErrorInfo_get_message
        (DDS_ErrorInfo _this,
         DDS_string *message);

DDS_ReturnCode_t
    DDS_ErrorInfo_get_location
        (DDS_ErrorInfo _this,
         DDS_string *location);

DDS_ReturnCode_t
    DDS_ErrorInfo_get_source_line
        (DDS_ErrorInfo _this,
         DDS_string* source_line);
```

```
DDS_ReturnCode_t
    DDS_ErrorInfo_get_stack_trace
        (DDS_ErrorInfo _this,
         DDS_string* stack_trace);
```

The following sections describe the usage of all *DDS_ErrorInfo* operations.

3.1.10.1 DDS_ErrorInfo__alloc

Synopsis

```
#include <dds_dcps.h>
DDS_ErrorInfo
   DDS_ErrorInfo__alloc
      (void);
```

Description

This operation creates a new `DDS_ErrorInfo`.

Parameters

<none>

Return Value

DDS_ErrorInfo - handle to the newly-created `DDS_ErrorInfo`. In case of an error, a `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation creates a new `DDS_ErrorInfo`. The `DDS_ErrorInfo` must be created using this operation. In other words, the application is not allowed to declare an object of type `DDS_ErrorInfo`. When the application wants to release the `DDS_ErrorInfo` it must be released using `DDS_free`.

If there are insufficient resources available to allocate the `DDS_ErrorInfo`, a `DDS_OBJECT_NIL` pointer is returned instead.

3.1.10.2 DDS_ErrorInfo_update

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
    DDS_ErrorInfo_update
    (DDS_ErrorInfo _this);
```

Description

This operation updates the `DDS_ErrorInfo` object with the latest available information.

Parameters

`in DDS_ErrorInfo _this` - the `DDS_ErrorInfo` object on which the operation is operated.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_NO_DATA`.

Detailed Description

This operation requests the latest error information from the data distribution service and stores it in the `DDS_ErrorInfo` object. The error information remains available in the `DDS_ErrorInfo` object until a new error occurs *and* the update operation is explicitly invoked on the `DDS_ErrorInfo` object. If the information is successfully updated, `DDS_RETCODE_OK` is returned. If no information is available because no error has occurred yet, `DDS_RETCODE_NO_DATA` is returned.

3.1.10.3 DDS_ErrorInfo_get_code

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
    DDS_ErrorInfo_get_code
        (DDS_ErrorInfo _this,
         DDS_ErrorCode_t* code);
```

NOTE: This operation is not yet consistently implemented everywhere: various kinds of errors are still categorized as '`UNDEFINED`'.

Description

This operation retrieves the error code of the last error message.

Parameters

`in DDS_ErrorInfo _this` - the `DDS_ErrorInfo` object on which the operation is operated.

`inout ErrorCode_t* code` - The `DDS_ErrorCode_t` struct in which the error code will be stored.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_NO_DATA.

Detailed Description

This operation stores the error code of the latest error in the provided DDS_ErrorCode_t struct. The DDS_ErrorCode_t type is an OpenSplice-specific equivalent to the DDS_ReturnCode_t type that is mandated by the OMG-DDS standard, but the DDS_ErrorCode_t type has a more fine-grained error categorization which uses 21 categories instead of the 11 provided by the DDS_ReturnCode_t type.

Table 18: below contains a list of all supported DDS_ErrorInfo values and their meaning.

Table 18: All DDS_ErrorInfo values

Label	Value	Meaning.
DDS_ERRORCODE_UNDEFINED	0	Error has not (yet) been categorized.
DDS_ERRORCODE_ERROR	1	Unexpected error.
DDS_ERRORCODE_OUT_OF_RESOURCES	2	Not enough resources to complete the operation.
DDS_ERRORCODE_CREATION_KERNEL_ENTITY_FAILED	3	The kernel was not able to create the entity. Probably there is not enough shared memory available.
DDS_ERRORCODE_INVALID_VALUE	4	A value is passed that is outside its valid bounds.
DDS_ERRORCODE_INVALID_DURATION	5	A Duration is passed that is outside its valid bounds or that has not been normalized properly.
DDS_DDS_ERRORCODE_INVALID_TIME	6	A Time is passed that is outside its valid bounds or that has not been normalized properly.
DDS_ERRORCODE_ENTITY_INUSE	7	Attempted to delete an entity that is still in use.
DDS_ERRORCODE_CONTAINS_ENTITIES	8	Attempted to delete a factory that still contains entities.
DDS_ERRORCODE_ENTITY_UNKNOWN	9	A pointer to an unknown entity has been passed.
DDS_ERRORCODE_HANDLE_NOT_REGISTERED	10	A handle has been passed that is no longer in use.

Table 18: All `DDS_ErrorInfo` values (continued)

Label	Value	Meaning.
DDS_ERRORCODE_HANDLE_NOT_MATCH	11	A handle has been passed to an entity to which it does not belong.
DDS_ERRORCODE_HANDLE_INVALID	12	An unknown handle has been passed.
DDS_ERRORCODE_INVALID_SEQUENCE	13	A sequence has been passed that has inconsistent variables (*e.g.* length > maximum, buffer equals `NULL` while maximum > 0, *etc.*)
DDS_ERRORCODE_UNSUPPORTED_VALUE	14	A value has been passed that is not (yet) supported.
DDS_ERRORCODE_INCONSISTENT_VALUE	15	A value has been passed that is inconsistent
DDS_ERRORCODE_IMMUTABLE_QOS_POLICY	16	Attempted to modify a QosPolicy that is immutable.
DDS_ERRORCODE_INCONSISTENT_QOS	17	Attempted to set QosPolicy values that are mutually inconsistent.
DDS_ERRORCODE_UNSUPPORTED_QOS_POLICY	18	Attempted to pass a QosPolicy setting that is not (yet) supported.
DDS_ERRORCODE_CONTAINS_CONDITIONS	19	Attempted to delete a WaitSet that still has Conditions attached to it.
DDS_ERRORCODE_CONTAINS_LOANS	20	Attempted to delete a DataReader/DataView that has unreturned loans.
DDS_ERRORCODE_INCONSISTENT_TOPIC	21	Attempted to create a topic that is inconsistent with existing topic definitions.

3.1.10.4 DDS_ErrorInfo_get_message

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
    DDS_ErrorInfo_get_message
        (DDS_ErrorInfo _this,
         DDS_string* message);
```

Description

This operation retrieves the description of the latest error.

Parameters

in DDS_ErrorInfo _this - the DDS_ErrorInfo object on which the operation is operated.

inout DDS_string message* - Reference to a string holding the latest description.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_NO_DATA.

Detailed Description

This operation stores the description of the latest error in a newly-allocated string. If the pointer supplied by the application through the message parameter already contains a string, it is freed. If no error has occurred, DDS_RETCODE_NO_DATA is returned and NULL is assigned to the message parameter.

3.1.10.5 DDS_ErrorInfo_get_location

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
    DDS_ErrorInfo_get_location
        (DDS_ErrorInfo _this,
         DDS_string* location);
```

Description

This operation retrieves the location or context of the latest error.

Parameters

in DDS_ErrorInfo _this - the DDS_ErrorInfo object on which the operation is operated.

inout DDS_string message* - Pointer to a string holding the location of the latest error.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_NO_DATA.

Detailed Description

This operation stores the context or location of the latest error in a newly-allocated string. The string may contain the name of an operation or component of the data distribution service in which the error occurred, or other descriptive information on the location of the error. If the pointer supplied by the application through the location parameter already contains a string, it is freed. If no error has occurred, `DDS_RETCODE_NO_DATA` is returned and `NULL` is assigned to the location parameter.

3.1.10.6 DDS_ErrorInfo_get_source_line

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
    DDS_ErrorInfo_get_source_line
        (DDS_ErrorInfo _this,
         DDS_string* source_line);
```

Description

This operation retrieves the location within the sourcecode of the latest error.

Parameters

in DDS_ErrorInfo _this - the `DDS_ErrorInfo` object on which the operation is operated.

inout DDS_string source_line* - Pointer to a string holding the sourcecode information of the latest error.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_NO_DATA`.

Detailed Description

This operation stores the name and line number of the source file in which the latest error occurred, seperated by a colon, in a newly-allocated string. If the pointer supplied by the application through the source_line parameter already contains a string, it is freed. If no error has occurred, `DDS_RETCODE_NO_DATA` is returned and `NULL` is assigned to the `source_line` parameter.

3.1.10.7 DDS_ErrorInfo_get_stack_trace

Synopsis

```
#include <dds_dcps.h>
```

```
DDS_ReturnCode_t
    DDS_ErrorInfoget_stack_trace
        (DDS_ErrorInfo _this,
         DDS_string* stack_trace);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.2 Domain Module

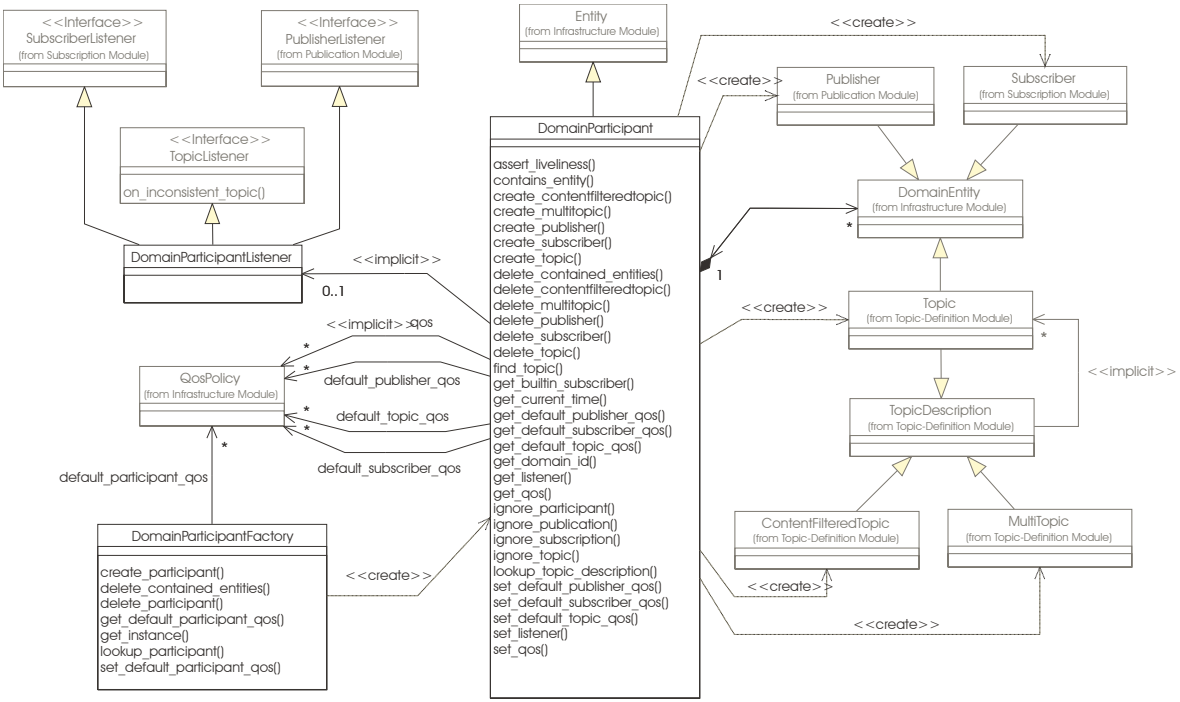

Figure 15: DCPS Domain Module's Class Model

This module contains the following classes:

```
DDS_DomainParticipant
DDS_DomainParticipantFactory
DDS_DomainParticipantListener (interface)
DDS_Domain (not depicted)
```

3.2.1 Class DDS_DomainParticipant

All the DCPS `DDS_Entity` objects are attached to a `DDS_DomainParticipant`. A `DDS_DomainParticipant` represents the local membership of the application in a `Domain`.

A `Domain` is a distributed concept that links all the applications that must be able to communicate with each other. It represents a communication plane: only the `DDS_Publishers` and the `DDS_Subscribers` attached to the same `Domain` can interact.

This class implements several functions:

- It acts as a container for all other `DDS_Entity` objects
- It acts as a factory for the `DDS_Publisher`, `DDS_Subscriber`, `DDS_Topic`, `DDS_ContentFilteredTopic` and `DDS_MultiTopic` objects
- It provides access to the built-in `DDS_Topic` objects
- It provides information about `DDS_Topic` objects
- It isolates applications within the same `Domain` (sharing the same `domainId`) from other applications in a different `Domain` on the same set of computers. In this way, several independent distributed applications can coexist in the same physical network without interfering, or even being aware of each other
- It provides administration services in the `Domain`, offering operations, which allow the application to ignore locally any information about a given `Participant`, `Publication`, `Subscription` or `Topic`.

The interface description of this class is as follows:

```
/*
 * interface DDS_DomainParticipant
 */
/*
 * inherited from class DDS_Entity
 */
/*  DDS_StatusCondition
 *     DDS_DomainParticipant_get_statuscondition
 *        (DDS_DomainParticipant _this);
 */
/*  DDS_StatusMask
 *     DDS_DomainParticipant_get_status_changes
 *        (DDS_DomainParticipant _this);
 */
/*  DDS_ReturnCode_t
 *     DDS_DomainParticipant_enable
 *        (DDS_DomainParticipant _this);
 */
/*
 * implemented API operations
 */
   DDS_Publisher
      DDS_DomainParticipant_create_publisher
         (DDS_DomainParticipant _this,
           const DDS_PublisherQos *qos,
```

```
            const struct DDS_PublisherListener *a_listener,
            const DDS_StatusMask mask);
DDS_ReturnCode_t
   DDS_DomainParticipant_delete_publisher
      (DDS_DomainParticipant _this,
        const DDS_Publisher p);
DDS_Subscriber
   DDS_DomainParticipant_create_subscriber
      (DDS_DomainParticipant _this,
        const DDS_SubscriberQos *qos,
        const struct DDS_SubscriberListener *a_listener,
        const DDS_StatusMask mask);
DDS_ReturnCode_t
   DDS_DomainParticipant_delete_subscriber
      (DDS_DomainParticipant _this,
        const DDS_Subscriber s);
DDS_Subscriber
   DDS_DomainParticipant_get_builtin_subscriber
      (DDS_DomainParticipant _this);
DDS_Topic
   DDS_DomainParticipant_create_topic
      (DDS_DomainParticipant _this,
        const DDS_char *topic_name,
        const DDS_char *type_name,
        const DDS_TopicQos *qos,
        const struct DDS_TopicListener *a_listener,
        const DDS_StatusMask mask);
DDS_ReturnCode_t
   DDS_DomainParticipant_delete_topic
      (DDS_DomainParticipant _this,
        const DDS_Topic a_topic);
DDS_Topic
   DDS_DomainParticipant_find_topic
      (DDS_DomainParticipant _this,
        const DDS_char *topic_name,
        const DDS_Duration_t *timeout);
DDS_TopicDescription
   DDS_DomainParticipant_lookup_topicdescription
      (DDS_DomainParticipant _this,
        const DDS_char *name);
DDS_ContentFilteredTopic
   DDS_DomainParticipant_create_contentfilteredtopic
      (DDS_DomainParticipant _this,
        const DDS_char *name,
        const DDS_Topic related_topic,
        const DDS_char *filter_expression,
        const DDS_StringSeq *expression_parameters);
DDS_ReturnCode_t
   DDS_DomainParticipant_delete_contentfilteredtopic
      (DDS_DomainParticipant _this,
```

```
        const DDS_ContentFilteredTopic
              a_contentfilteredtopic);
DDS_MultiTopic
   DDS_DomainParticipant_create_multitopic
      (DDS_DomainParticipant _this,
        const DDS_char *name,
        const DDS_char *type_name,
        const DDS_char *subscription_expression,
        const DDS_StringSeq *expression_parameters);
DDS_ReturnCode_t
   DDS_DomainParticipant_delete_multitopic
      (DDS_DomainParticipant _this,
        const DDS_MultiTopic a_multitopic);
DDS_ReturnCode_t
   DDS_DomainParticipant_delete_contained_entities
      (DDS_DomainParticipant _this);
DDS_ReturnCode_t
   DDS_DomainParticipant_set_qos
      (DDS_DomainParticipant _this,
        const DDS_DomainParticipantQos *qos);
DDS_ReturnCode_t
   DDS_DomainParticipant_get_qos
      (DDS_DomainParticipant _this,
        DDS_DomainParticipantQos *qos);
DDS_ReturnCode_t
   DDS_DomainParticipant_set_listener
      (DDS_DomainParticipant _this,
       const struct DDS_DomainParticipantListener *a_listener,
        const DDS_StatusMask mask);
struct DDS_DomainParticipantListener
   DDS_DomainParticipant_get_listener
      (DDS_DomainParticipant _this);
DDS_ReturnCode_t
   DDS_DomainParticipant_ignore_participant
      (DDS_DomainParticipant _this,
        const DDS_InstanceHandle_t handle);
DDS_ReturnCode_t
   DDS_DomainParticipant_ignore_topic
      (DDS_DomainParticipant _this,
        const DDS_InstanceHandle_t handle);
DDS_ReturnCode_t
   DDS_DomainParticipant_ignore_publication
      (DDS_DomainParticipant _this,
        const DDS_InstanceHandle_t handle);
DDS_ReturnCode_t
   DDS_DomainParticipant_ignore_subscription
      (DDS_DomainParticipant _this,
        const DDS_InstanceHandle_t handle);
DomainId_t
   DDS_DomainParticipant_get_domain_id
```

```
      (DDS_DomainParticipant _this);
DDS_ReturnCode_t
   DDS_DomainParticipant_get_discovered_participants
      (DDS_DomainParticipant _this,
        DDS_InstanceHandleSeq  *participant_handles);
DDS_ReturnCode_t
   DDS_DomainParticipant_get_discovered_participant_data
      (DDS_DomainParticipant _this,
        DDS_ParticipantBuiltinTopicData *participant_data,
        DDS_InstanceHandle_t handle);
DDS_ReturnCode_t
   DDS_DomainParticipant_get_discovered_topics
      (DDS_DomainParticipant _this,
        DDS_InstanceHandleSeq  *topic_handles);
DDS_ReturnCode_t
   DDS_DomainParticipant_get_discovered_topic_data
      (DDS_DomainParticipant _this,
        DDS_TopicBuiltinTopicData *topic_data,
        DDS_InstanceHandle_t handle);
DDS_ReturnCode_t
   DDS_DomainParticipant_assert_liveliness
      (DDS_DomainParticipant _this);
DDS_ReturnCode_t
   DDS_DomainParticipant_set_default_publisher_qos
      (DDS_DomainParticipant _this,
        const DDS_PublisherQos *qos);
DDS_ReturnCode_t
   DDS_DomainParticipant_get_default_publisher_qos
      (DDS_DomainParticipant _this,
        DDS_PublisherQos *qos);
DDS_ReturnCode_t
   DDS_DomainParticipant_set_default_subscriber_qos
      (DDS_DomainParticipant _this,
        const DDS_SubscriberQos *qos);
DDS_ReturnCode_t
   DDS_DomainParticipant_get_default_subscriber_qos
      (DDS_DomainParticipant _this,
        DDS_SubscriberQos *qos);
DDS_ReturnCode_t
   DDS_DomainParticipant_set_default_topic_qos
      (DDS_DomainParticipant _this,
        const DDS_TopicQos *qos);
DDS_ReturnCode_t
   DDS_DomainParticipant_get_default_topic_qos
      (DDS_DomainParticipant _this,
        DDS_TopicQos *qos);
DDS_boolean
   contains_entity
      (DDS_InstanceHandle_t a_handle);
DDS_ReturnCode_t
```

```
get_current_time
   (DDS_Time_t *current_time);
```

The following sections describe the usage of all DDS_DomainParticipant operations. The inherited operations are listed but not fully described because they are not implemented in this class. The full description of these operations is given in the classes from which they are inherited.

3.2.1.1 DDS_DomainParticipant_assert_liveliness

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_assert_liveliness
      (DDS_DomainParticipant _this);
```

Description

This operation asserts the liveliness for the DDS_DomainParticipant.

Parameters

in DDS_DomainParticipant _this - the DDS_DomainParticipant object on which the operation is operated.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES or DDS_RETCODE_NOT_ENABLED.

Detailed Description

This operation will manually assert the liveliness for the DDS_DomainParticipant. This way, the Data Distribution Service is informed that the DDS_DomainParticipant is still alive. This operation only needs to be used when the DDS_DomainParticipant contains DDS_DataWriters with the DDS_LivelinessQosPolicy set to DDS_MANUAL_BY_PARTICIPANT_LIVELINESS_QOS, and it will only affect the liveliness of those DDS_DataWriters.

Writing data via the DDS_DataWriter_write operation of a DDS_DataWriter will assert the liveliness on the DDS_DataWriter itself and its DDS_DomainParticipant. DDS_DomainParticipant_assert_liveliness subsequently is only needed when data is **not** written regularly.

The liveliness should be asserted by the application, depending on the DDS_LivelinessQosPolicy.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the liveliness of this DDS_DomainParticipant has successfully been asserted.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DomainParticipant has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the DDS_DomainParticipant is not enabled.

3.2.1.2 DDS_DomainParticipant_contains_entity

Synopsis

```
#include <dds_dcps.h>
DDS_boolean
   contains_entity
      (DDS_DomainParticipant _this,
               DDS_InstanceHandle_t a_handle);
```

Description

This operation checks whether or not the given Entity represented by a_handle is created by the DDS_DomainParticipant or any of its contained entities.

Parameters

in DDS_DomainParticipant _this - the DDS_DomainParticipant object on which the operation is operated.

in DDS_InstanceHandle_t a_handle - represents a DDS_Entity in the Data Distribution System.

Return Value

DDS_boolean - Return value is TRUE if a_handle represents a DDS_Entity that is created by the DDS_DomainParticipant or any of its contained DDS_Entites. Otherwise the return value is FALSE.

Detailed Description

This operation checks whether or not the given `Entity` represented by `a_handle` is created by the `DDS_DomainParticipant` itself (`DDS_TopicDescription`, `DDS_Publisher` or `DDS_Subscriber`) or created by any of its contained entities (`DDS_DataReader`, `DDS_ReadCondition`, `DDS_QueryCondition`, `DDS_DataWriter`, etc.).

Return value is `TRUE` if `a_handle` represents a `DDS_Entity` that is created by the `DDS_DomainParticipant` or any of its contained `DDS_Entites`. Otherwise the return value is `FALSE`.

3.2.1.3 DDS_DomainParticipant_create_contentfilteredtopic

Synopsis

```
#include <dds_dcps.h>
DDS_ContentFilteredTopic
   DDS_DomainParticipant_create_contentfilteredtopic
      (DDS_DomainParticipant _this,
        const DDS_char *name,
        const DDS_Topic related_topic,
        const DDS_char *filter_expression,
        const DDS_StringSeq *expression_parameters);
```

Description

This operation creates a `DDS_ContentFilteredTopic` for a `DDS_DomainParticipant` in order to allow `DDS_DataReaders` to subscribe to a subset of the topic content.

Parameters

in *`DDS_DomainParticipant _this`* - the `DDS_DomainParticipant` object on which the operation is operated.

in *`const DDS_char *name`* - contains the name of the `DDS_ContentFilteredTopic`.

in *`const DDS_Topic related_topic`* - the handle to the base `DDS_Topic` on which the filtering will be applied. Therefore, a filtered topic is based on an existing `DDS_Topic`.

in *`const DDS_char *filter_expression`* - holds the SQL expression (subset of SQL), which defines the filtering.

in *`const DDS_StringSeq *expression_parameters`* - the handle to a sequence of strings with the parameter value used in the SQL expression (*i.e.*, the number of %n tokens in the expression). The number of values in `expression_parameters` must be equal or greater than the highest

referenced %n token in the `filter_expression` (*e.g.* if `%1` and `%8` are used as parameter in the `filter_expression`, the `expression_parameters` should at least contain `n+1 = 9` values).

Return Value

`DDS_ContentFilteredTopic` - Return value is the handle to the newly-created `DDS_ContentFilteredTopic`. In case of an error, a `nil` pointer is returned.

Detailed Description

This operation creates a `DDS_ContentFilteredTopic` for a `DDS_DomainParticipant` in order to allow `DDS_DataReaders` to subscribe to a subset of the topic content. The base topic, which is being filtered is defined by the parameter `related_topic`. The resulting `DDS_ContentFilteredTopic` only relates to the samples published under the `related_topic`, which have been filtered according to their content. The resulting `DDS_ContentFilteredTopic` only exists at the `DDS_DataReader` side and will never be published. The samples of the `related_topic` are filtered according to the SQL expression, which is a subset of SQL as defined in the parameter `filter_expression` (see Appendix H, *DCPS Queries and Filters*).

The `filter_expression` may also contain parameters, which appear as %n tokens in the expression which must be set by the sequence of strings defined by the parameter `expression_parameters`. The number of values in `expression_parameters` must be equal or greater than the highest referenced %n token in the `filter_expression` (*e.g.* if %1 and %8 are used as parameter in the filter_expression, the `expression_parameters` should at least contain `n+1 = 9` values).

The `filter_expression` is a string that specifies the criteria to select the data samples of interest. In other words, it identifies the selection of data from the associated `DDS_Topics`. It is an SQL expression where the `WHERE` clause gives the content filter.

3.2.1.4 DDS_DomainParticipant_create_multitopic

Synopsis

```
#include <dds_dcps.h>
DDS_MultiTopic
   DDS_DomainParticipant_create_multitopic
      (DDS_DomainParticipant _this,
        const DDS_char *name,
        const DDS_char *type_name,
        const DDS_char *subscription_expression,
        const DDS_StringSeq *expression_parameters);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

Description

This operation creates a `DDS_MultiTopic` for a `DDS_DomainParticipant` in order to allow `DDS_DataReaders` to subscribe to a filtered/re-arranged combination and/or subset of the content of several `topics`.

Parameters

`in DDS_DomainParticipant _this` - the `DDS_DomainParticipant` object on which the operation is operated.

`in const DDS_char *name` - contains the name of the `DDS_MultiTopic`.

`in const DDS_char *type_name` - contains the name of the type of the `DDS_MultiTopic`. This `type_name` must have been registered using `DDS_TypeSupport_register_type` prior to calling this operation.

`in const DDS_char *subscription_expression` - the SQL expression (subset of SQL), which defines the selection, filtering, combining and re-arranging of the sample data.

`in const DDS_StringSeq *expression_parameters` - the handle to a sequence of strings with the parameter value used in the SQL expression (*i.e.*, the number of %n tokens in the expression). The number of values in `expression_parameters` must be equal or greater than the highest referenced %n token in the `subscription_expression` (*e.g.* if `%1` and `%8` are used as parameter in the `subscription_expression`, the `expression_parameters` should at least contain `n+1 = 9` values).

Return Value

`DDS_MultiTopic` - Return value is the handle to the newly-created `DDS_MultiTopic`. In case of an error, a `nil` pointer is returned.

Detailed Description

This operation creates a `DDS_MultiTopic` for a `DDS_DomainParticipant` in order to allow `DDS_DataReaders` to subscribe to a filtered/re-arranged combination and/or subset of the content of several `topics`. Before the `DDS_MultiTopic` can be created, the `type_name` of the `DDS_MultiTopic` must have been registered prior to calling this operation. Registering is done, using the `DDS_TypeSupport_register_type` operation from `DDS_TypeSupport`. The list of topics and the logic, which defines the selection, filtering, combining and re-arranging of the sample data, is defined by the SQL expression, a subset of SQL defined in `subsciption_expression`. The `subscription_expression` may also contain parameters, which appear as %n tokens in the expression. These

parameters are defined in `expression_parameters`. The number of values in `expression_parameters` must be equal or greater than the highest referenced %n token in the `subscription_expression` (*e.g.* if `%1` and `%8` are used as parameter in the `subscription_expression`, the `expression_parameters` should at least contain `n+1 = 9` values).

The `subscription_expression` is a string that specifies the criteria to select the data samples of interest. In other words, it identifies the selection and rearrangement of data from the associated `DDS_Topics`. It is an SQL expression where the `SELECT` clause provides the fields to be kept, the `FROM` part provides the names of the `DDS_Topics` that are searched for those fields, and the `WHERE` clause gives the content filter. The `DDS_Topics` combined may have different types but they are restricted in that the type of the fields used for the `NATURAL JOIN` operation must be the same.

The `DDS_DataReader`, which is associated with a `DDS_MultiTopic` only accesses information which exist locally in the `DDS_DataReader`, based on the `DDS_Topics` used in the `subscription_expression`. The actual `DDS_MultiTopic` will never be produced, only the individual `DDS_Topics`.

3.2.1.5 DDS_DomainParticipant_create_publisher

Synopsis

```
#include <dds_dcps.h>
DDS_Publisher
   DDS_DomainParticipant_create_publisher
      (DDS_DomainParticipant _this,
        const DDS_PublisherQos *qos,
        const struct DDS_PublisherListener *a_listener,
        const DDS_StatusMask mask);
```

Description

This operation creates a `DDS_Publisher` with the desired `QosPolicy` settings and if applicable, attaches the optionally specified `DDS_PublisherListener` to it.

Parameters

`in DDS_DomainParticipant _this` - the `DDS_DomainParticipant` object on which the operation is operated.

`in const DDS_PublisherQos *qos` - a collection of `QosPolicy` settings for the new `DDS_Publisher`. In case these settings are not self consistent, no `DDS_Publisher` is created.

*in const struct DDS_PublisherListener *a_listener* - a pointer to the DDS_PublisherListener instance which will be attached to the new DDS_Publisher. It is permitted to use DDS_OBJECT_NIL as the value of the listener: this behaves as a DDS_PublisherListener whose operations perform no action.

in const DDS_StatusMask mask - a bit-mask in which each bit enables the invocation of the DDS_PublisherListener for a certain status.

Return Value

DDS_Publisher - Return value is a pointer to the newly-created DDS_Publisher. In case of an error, the DDS_OBJECT_NIL pointer is returned.

Detailed Description

This operation creates a DDS_Publisher with the desired QosPolicy settings and if applicable, attaches the optionally specified DDS_PublisherListener to it. When the DDS_PublisherListener is not applicable, the DDS_OBJECT_NIL pointer must be supplied instead. To delete the DDS_Publisher the operation DDS_DomainParticipant_delete_publisher or DDS_DomainParticipant_delete_contained_entities must be used.

In case the specified QosPolicy settings are not consistent, no DDS_Publisher is created and the DDS_OBJECT_NIL pointer is returned. DDS_OBJECT_NIL can also be returned when insufficient access rights exist for the partition(s) listed in the provided QoS structure.

Default QoS

The constant DDS_PUBLISHER_QOS_DEFAULT can be used as parameter qos to create a DDS_Publisher with the default DDS_PublisherQos as set in the DDS_DomainParticipant. The effect of using DDS_PUBLISHER_QOS_DEFAULT is the same as calling the operation DDS_DomainParticipant_get_default_publisher_qos and using the resulting DDS_PublisherQos to create the DDS_Publisher.

Communication Status

For each communication status, the StatusChangedFlag flag is initially set to FALSE. It becomes TRUE whenever that communication status changes. For each communication status activated in the mask, the associated DDS_PublisherListener operation is invoked and the communication status is reset to FALSE, as the listener implicitly accesses the status which is passed as a parameter to that operation. The fact that the status is reset prior to calling the listener means that if the application calls the get_<status_name>_status from inside the listener it will see the status already reset.

The following statuses are applicable to the `DDS_PublisherListener`:

- `DDS_OFFERED_DEADLINE_MISSED_STATUS` (propagated)
- `DDS_OFFERED_INCOMPATIBLE_QOS_STATUS` (propagated)
- `DDS_LIVELINESS_LOST_STATUS` (propagated)
- `DDS_PUBLICATION_MATCHED_STATUS` (propagated).

Be aware that the `DDS_PUBLICATION_MATCHED_STATUS` is not applicable when the infrastructure does not have the information available to determine connectivity. This is the case when OpenSplice is configured not to maintain discovery information in the Networking Service. (See also the description of the `NetworkService/Discovery[@enabled] attribute in section` *4.4.1.6.1* on page 225 of the Deployment Guide.) In this case the operation will return `DDS_OBJECT_NIL`.

Status bits are declared as a constant and can be used by the application in an OR operation to create a tailored mask. The special constant `DDS_STATUS_MASK_NONE` can be used to indicate that the created entity should not respond to any of its available statuses. The DDS will therefore attempt to propagate these statuses to its factory. The special constant `DDS_STATUS_MASK_ANY_V1_2` can be used to select all applicable statuses specified in the "Data Distribution Service for Real-time Systems Version 1.2" specification.

Status Propagation

The Data Distribution Service will trigger the most specific and relevant `Listener`. In other words, in case a communication status is also activated on the `DDS_DataWriterListener` of a contained `DDS_DataWriter`, the `DDS_DataWriterListener` on that contained `DDS_DataWriter` is invoked instead of the `DDS_PublisherListener`. This means that a status change on a contained `DDS_DataWriter` only invokes the `DDS_PublisherListener` if the contained `DDS_DataWriter` itself does not handle the trigger event generated by the status change.

In case a communication status is not activated in the `mask` of the `DDS_PublisherListener`, the `DDS_DomainParticipantListener` of the containing `DDS_DomainParticipant` is invoked (if attached and activated for the status that occurred). This allows the application to set a default behaviour in the `DDS_DomainParticipantListener` of the containing `DDS_DomainParticipant` and a `DDS_Publisher` specific behaviour when needed. In case the `DDS_DomainParticipantListener` is also not attached or the communication status is not activated in its `mask`, the application is not notified of the change.

3.2.1.6 DDS_DomainParticipant_create_subscriber

Synopsis

```
#include <dds_dcps.h>
DDS_Subscriber
   DDS_DomainParticipant_create_subscriber
      (DDS_DomainParticipant _this,
        const DDS_SubscriberQos *qos,
        const struct DDS_SubscriberListener *a_listener,
        const DDS_StatusMask mask);
```

Description

This operation creates a `DDS_Subscriber` with the desired `QosPolicy` settings and if applicable, attaches the optionally specified `DDS_SubscriberListener` to it.

Parameters

`in DDS_DomainParticipant _this` - the `DDS_DomainParticipant` object on which the operation is operated.

`in const DDS_SubscriberQos *qos` - a collection of `QosPolicy` settings for the new `DDS_Subscriber`. In case these settings are not self consistent, no `DDS_Subscriber` is created.

`in const struct DDS_SubscriberListener *a_listener` - a pointer to the `DDS_SubscriberListener` instance which will be attached to the new `DDS_Subscriber`. It is permitted to use `DDS_OBJECT_NIL` as the value of the listener: this behaves as a `DDS_SubscriberListener` whose operations perform no action.

`in const DDS_StatusMask mask` - a bit-mask in which each bit enables the invocation of the `DDS_SubscriberListener` for a certain status.

Return Value

`DDS_Subscriber` - Return value is a pointer to the newly-created `DDS_Subscriber`. In case of an error, the `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation creates a `DDS_Subscriber` with the desired `QosPolicy` settings and if applicable, attaches the optionally specified `DDS_SubscriberListener` to it. When the `DDS_SubscriberListener` is not applicable, the `DDS_OBJECT_NIL` pointer must be supplied instead. To delete the `DDS_Subscriber` the operation `DDS_DomainParticipant_delete_subscriber` or `DDS_DomainParticipant_delete_contained_entities` must be used.

In case the specified `QosPolicy` settings are not consistent, no `DDS_Subscriber` is created and the `DDS_OBJECT_NIL` pointer is returned. `DDS_OBJECT_NIL` can also be returned when insufficient access rights exist for the partition(s) listed in the provided `QoS` structure.

Default QoS

The constant `DDS_SUBSCRIBER_QOS_DEFAULT` can be used as parameter `qos` to create a `DDS_Subscriber` with the default `DDS_SubscriberQos` as set in the `Domainparticipant`. The effect of using `DDS_SUBSCRIBER_QOS_DEFAULT` is the same as calling the operation `DDS_DomainParticipant_get_default_subscriber_qos` and using the resulting `DDS_SubscriberQos` to create the `DDS_Subscriber`.

Communication Status

For each communication status, the `StatusChangedFlag` flag is initially set to `FALSE`. It becomes `TRUE` whenever that communication status changes. For each communication status activated in the `mask`, the associated `DDS_SubscriberListener` operation is invoked and the communication status is reset to `FALSE`, as the listener implicitly accesses the status which is passed as a parameter to that operation. The fact that the status is reset prior to calling the listener means that if the application calls the `get_<status_name>_status` from inside the listener it will see the status already reset.

The following statuses are applicable to the `DDS_SubscriberListener`:

- `DDS_REQUESTED_DEADLINE_MISSED_STATUS` (*propagated*)
- `DDS_REQUESTED_INCOMPATIBLE_QOS_STATUS` (*propagated*)
- `DDS_SAMPLE_LOST_STATUS` (*propagated*)
- `DDS_SAMPLE_REJECTED_STATUS` (*propagated*)
- `DDS_DATA_AVAILABLE_STATUS` (*propagated*)
- `DDS_LIVELINESS_CHANGED_STATUS` (*propagated*)
- `DDS_SUBSCRIPTION_MATCHED_STATUS` (*propagated*)
- `DDS_DATA_ON_READERS_STATUS`

Be aware that the `DDS_SUBSCRIPTION_MATCHED_STATUS` is not applicable when the infrastructure does not have the information available to determine connectivity. This is the case when OpenSplice is configured not to maintain discovery information in the Networking Service. (See also the description of the `NetworkService/Discovery[@enabled] attribute in section` *4.4.1.6.1* on page 225 of the Deployment Guide.) In this case the operation will return `DDS_OBJECT_NIL`.

Status bits are declared as a constant and can be used by the application in an OR operation to create a tailored mask. The special constant DDS_STATUS_MASK_NONE can be used to indicate that the created entity should not respond to any of its available statuses. The DDS will therefore attempt to propagate these statuses to its factory. The special constant DDS_STATUS_MASK_ANY_V1_2 can be used to select all applicable statuses specified in the "Data Distribution Service for Real-time Systems Version 1.2" specification.

Status Propagation

The Data Distribution Service will trigger the most specific and relevant Listener. In other words, in case a communication status is also activated on the DDS_DataReaderListener of a contained DDS_DataReader, the DDS_DataReaderListener on that contained DDS_DataReader is invoked instead of the DDS_SubscriberListener. This means that a status change on a contained DDS_DataReader only invokes the DDS_SubscriberListener if the contained DDS_DataReader itself does not handle the trigger event generated by the status change.

In case a communication status is not activated in the mask of the DDS_SubscriberListener, the DDS_DomainParticipantListener of the containing DDS_DomainParticipant is invoked (if attached and activated for the status that occurred). This allows the application to set a default behaviour in the DDS_DomainParticipantListener of the containing DDS_DomainParticipant and a DDS_Subscriber specific behaviour when needed. In case the DDS_DomainParticipantListener is also not attached or the communication status is not activated in its mask, the application is not notified of the change.

The statuses DDS_DATA_ON_READERS_STATUS and DDS_DATA_AVAILABLE_STATUS are "Read Communication Statuses" and are an exception to all other plain communication statuses: they have no corresponding status structure that can be obtained with a get_<status_name>_status operation and they are mutually exclusive. When new information becomes available to a DataReader, the Data Distribution Service will first look in an attached and activated DDS_SubscriberListener or DDS_DomainParticipantListener (in that order) for the DDS_DATA_ON_READERS_STATUS. In case the DDS_DATA_ON_READERS_STATUS can not be handled, the Data Distribution Service will look in an attached and activated DDS_DataReaderListener, DDS_SubscriberListener or DDS_DomainParticipantListener for the DDS_DATA_AVAILABLE_STATUS (in that order).

3.2.1.7 DDS_DomainParticipant_create_topic

Synopsis

```
#include <dds_dcps.h>
DDS_Topic
   DDS_DomainParticipant_create_topic
      (DDS_DomainParticipant _this,
        const DDS_char *topic_name,
        const DDS_char *type_name,
        const DDS_TopicQos *qos,
        const struct DDS_TopicListener *a_listener,
        const DDS_StatusMask mask);
```

Description

This operation creates a pointer to a new or existing `DDS_Topic` under the given name, for a specific type, with the desired `QosPolicy` settings and if applicable, attaches the optionally specified `DDS_TopicListener` to it.

Parameters

in *`DDS_DomainParticipant _this`* - the `DDS_DomainParticipant` object on which the operation is operated.

in *`const DDS_char *topic_name`* - the name of the `DDS_Topic` to be created. A new `DDS_Topic` will only be created, when no `DDS_Topic`, with the same name, is found within the `DDS_DomainParticipant`.

in *`const DDS_char *type_name`* - a local alias of the data type, which must have been registered before creating the `DDS_Topic`.

in *`const DDS_TopicQos *qos`* - a collection of `QosPolicy` settings for the new `DDS_Topic`. In case these settings are not self consistent, no `DDS_Topic` is created.

in *`const struct DDS_TopicListener *a_listener`* - a pointer to the `DDS_TopicListener` instance which will be attached to the new `DDS_Topic`. It is permitted to use `DDS_OBJECT_NIL` as the value of the listener: this behaves as a `DDS_TopicListener` whose operations perform no action.

in *`const DDS_StatusMask mask`* - a bit-mask in which each bit enables the invocation of the `DDS_TopicListener` for a certain status.

Return Value

`DDS_Topic` - Return value is a pointer to the new or existing `DDS_Topic`. In case of an error, the `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation creates a pointer to a new or existing DDS_Topic under the given name, for a specific type, with the desired QosPolicy settings and if applicable, attaches the optionally specified DDS_TopicListener to it. When the DDS_TopicListener is not applicable, the DDS_OBJECT_NIL pointer must be supplied instead. In case the specified QosPolicy settings are not consistent, no DDS_Topic is created and the DDS_OBJECT_NIL pointer is returned. To delete the DDS_Topic the operation DDS_DomainParticipant_delete_topic or DDS_DomainParticipant_delete_contained_entities must be used.

Default QoS

The constant DDS_TOPIC_QOS_DEFAULT can be used as parameter qos to create a DDS_Topic with the default DDS_TopicQos as set in the DDS_DomainParticipant. The effect of using DDS_TOPIC_QOS_DEFAULT is the same as calling the operation DDS_DomainParticipant_get_default_topic_qos and using the resulting DDS_TopicQos to create the DDS_Topic.

The DDS_Topic is bound to the type type_name. Prior to creating the DDS_Topic, the type_name must have been registered with the Data Distribution Service. Registering the type_name is done using the data type specific DDS_TypeSupport_register_type operation.

Existing DDS_Topic name

Before creating a new DDS_Topic, this operation performs a DDS_DomainParticipant_lookup_topicdescription for the specified topic_name. When a DDS_Topic is found with the same name in the current domain, the QoS and type_name of the found DDS_Topic are matched against the parameters qos and type_name. When they are the same, no DDS_Topic is created but a new proxy of the existing DDS_Topic is returned. When they are not exactly the same, no DDS_Topic is created and the DDS_OBJECT_NIL pointer is returned.

When a DDS_Topic is obtained multiple times, it must also be deleted that same number of times using DDS_DomainParticipant_delete_topic or calling DDS_DomainParticipant_delete_contained_entities once to delete all the proxies.

Local proxy

Since a DDS_Topic is a global concept in the system, access is provided through a local proxy. In other words, the pointer returned is actually not a pointer to a DDS_Topic but to a locally created proxy. The Data Distribution Service propagates DDS_Topics and makes remotely created DDS_Topics locally

available through this proxy. For each create, a new proxy is created. Therefore the DDS_Topic must be deleted the same number of times, as the DDS_Topic was created with the same topic_name per Domain. In other words, each pointer (local proxy) must be deleted separately.

Communication Status

For each communication status, the StatusChangedFlag flag is initially set to FALSE. It becomes TRUE whenever that communication status changes. For each communication status activated in the mask, the associated DDS_TopicListener operation is invoked and the communication status is reset to FALSE, as the listener implicitly accesses the status which is passed as a parameter to that operation. The fact that the status is reset prior to calling the listener means that if the application calls the get_<status_name>_status from inside the listener it will see the status already reset.

The following statuses are applicable to the DDS_TopicListener:

- DDS_INCONSISTENT_TOPIC_STATUS

Status bits are declared as a constant and can be used by the application in an OR operation to create a tailored mask. The special constant DDS_STATUS_MASK_NONE can be used to indicate that the created entity should not respond to any of its available statuses. The DDS will therefore attempt to propagate these statuses to its factory. The special constant DDS_STATUS_MASK_ANY_V1_2 can be used to select all statuses specified in the "Data Distribution Service for Real-time Systems Version 1.2" specification.

Status Propagation

In case a communication status is not activated in the mask of the DDS_TopicListener, the DDS_DomainParticipantListener of the containing DDS_DomainParticipant is invoked (if attached and activated for the status that occurred). This allows the application to set a default behaviour in the DDS_DomainParticipantListener of the containing DDS_DomainParticipant and a DDS_Topic specific behaviour when needed. In case the DDS_DomainParticipantListener is also not attached or the communication status is not activated in its mask, the application is not notified of the change.

3.2.1.8 DDS_DomainParticipant_delete_contained_entities

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_delete_contained_entities
      (DDS_DomainParticipant _this);
```

Description

This operation deletes all of the `DDS_Entity` objects that were created on the `DDS_DomainParticipant`.

Parameters

`in DDS_DomainParticipant _this` - the `DDS_DomainParticipant` object on which the operation is performed.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_ALREADY_DELETED`, `DDS_RETCODE_OUT_OF_RESOURCES` or `DDS_RETCODE_PRECONDITION_NOT_MET`.

Detailed Description

This operation deletes all the `DDS_Entity` objects that were created on the `DDS_DomainParticipant`. In other words, it deletes all `DDS_Publisher`, `DDS_Subscriber`, `DDS_Topic`, `DDS_ContentFilteredTopic` and `DDS_MultiTopic` objects. Prior to deleting each contained `DDS_Entity`, this operation regressively calls the corresponding `DDS_<Entity>_delete_contained_entities` operation on each `DDS_Entity` (if applicable). In other words, all `DDS_Entity` objects in the `DDS_Publisher` and `DDS_Subscriber` are deleted, including the `DDS_DataWriter` and `DDS_DataReader`. Also the `DDS_QueryCondition` and `DDS_ReadCondition` objects contained by the `DDS_DataReader` are deleted.

DDS_Topic

Since a `DDS_Topic` is a global concept in the system, access is provided through a local proxy. The Data Distribution Service propagates `DDS_Topics` and makes remotely created `DDS_Topics` locally available through this proxy. Such a proxy is created by the `DDS_DomainParticipant_create_topic` or `DDS_DomainParticipant_find_topic` operation. When a pointer to the same `DDS_Topic` was created multiple times (either by `DDS_DomainParticipant_create_topic` or `DDS_DomainParticipant_find_topic`), all pointers (local proxies) are deleted. With the last proxy, the `DDS_Topic` itself is also removed from the system.

NOTE: The operation will return `DDS_PRECONDITION_NOT_MET` if the any of the contained entities is in a state where it cannot be deleted. This will occur, for example, if a contained `DDS_DataReader` cannot be deleted because the application has called a `read` or `take` operation and has not called the

corresponding `return_loan` operation to return the loaned samples. In such cases, the operation does not roll back any entity deletions performed prior to the detection of the problem.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the contained `DDS_Entity` objects are deleted and the application may delete the `DDS_DomainParticipant`.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_DomainParticipant` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_PRECONDITION_NOT_MET`* - one or more of the contained entities are in a state where they cannot be deleted.

3.2.1.9 DDS_DomainParticipant_delete_contentfilteredtopic

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_delete_contentfilteredtopic
      (DDS_DomainParticipant _this,
        const DDS_ContentFilteredTopic
             a_contentfilteredtopic);
```

Description

This operation deletes a `DDS_ContentFilteredTopic`.

Parameters

`in DDS_DomainParticipant _this` - the `DDS_DomainParticipant` object on which the operation is operated.

`in const DDS_ContentFilteredTopic a_contentfilteredtopic` - a pointer to the `DDS_ContentFilteredTopic`, which is to be deleted.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_BAD_PARAMETER`, `DDS_RETCODE_ALREADY_DELETED`, `DDS_RETCODE_OUT_OF_RESOURCES` or `DDS_RETCODE_PRECONDITION_NOT_MET`.

Detailed Description

This operation deletes a `DDS_ContentFilteredTopic`.

The deletion of a `DDS_ContentFilteredTopic` is not allowed if there are any existing `DDS_DataReader` objects that are using the `DDS_ContentFilteredTopic`.

If the `DDS_DomainParticipant_delete_contentfilteredtopic` operation is called on a `DDS_ContentFilteredTopic` with existing `DDS_DataReader` objects attached to it, it will return `PRECONDITION_NOT_MET`.

The `DDS_DomainParticipant_delete_contentfilteredtopic` operation must be called on the same `DDS_DomainParticipant` object used to create the `DDS_ContentFilteredTopic`.

If `DDS_DomainParticipant_delete_contentfilteredtopic` is called on a different `DDS_DomainParticipant` the operation will have no effect and it will return `PRECONDITION_NOT_MET`.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the `DDS_ContentFilteredTopic` is deleted.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_BAD_PARAMETER`* - the parameter `a_contentfilteredtopic` is not a valid `DDS_ContentFilteredTopic`.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_DomainParticipant` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_PRECONDITION_NOT_MET`* - the operation is called on a different `DDS_DomainParticipant`, as used when the `DDS_ContentFilteredTopic` was created, or the `DDS_ContentFilteredTopic` is being used by one or more `DDS_DataReader` objects.

3.2.1.10 DDS_DomainParticipant_delete_multitopic

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_delete_multitopic
      (DDS_DomainParticipant _this,
        const DDS_MultiTopic a_multitopic);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

Description

This operation deletes a `DDS_MultiTopic`.

Parameters

`in DDS_DomainParticipant _this` - the `DDS_DomainParticipant` object on which the operation is operated.

`in const DDS_MultiTopic a_multitopic` - a pointer to the `DDS_MultiTopic`, which is to be deleted.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_BAD_PARAMETER`, `DDS_RETCODE_ALREADY_DELETED`, `DDS_RETCODE_OUT_OF_RESOURCES` or `DDS_RETCODE_PRECONDITION_NOT_MET`.

Detailed Description

This operation deletes a `DDS_MultiTopic`.

The deletion of a `DDS_MultiTopic` is not allowed if there are any existing `DDS_DataReader` objects that are using the `DDS_MultiTopic`. If the `DDS_DomainParticipant_delete_multitopic` operation is called on a `DDS_MultiTopic` with existing `DDS_DataReader` objects attached to it, it will return `DDS_RETCODE_PRECONDITION_NOT_MET`.

The `DDS_DomainParticipant_delete_multitopic` operation must be called on the same `DDS_DomainParticipant` object used to create the `DDS_MultiTopic`. If `DDS_DomainParticipant_delete_multitopic` is called on a different `DDS_DomainParticipant` the operation will have no effect and it will return `DDS_RETCODE_PRECONDITION_NOT_MET`.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the DDS_MultiTopic is deleted.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter a_multitopic is not a valid DDS_MultiTopic.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DomainParticipant has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - the operation is called on a different DDS_DomainParticipant, as used when the DDS_MultiTopic was created, or the DDS_MultiTopic is being used by one or more DDS_DataReader objects.

3.2.1.11 DDS_DomainParticipant_delete_publisher

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_delete_publisher
      (DDS_DomainParticipant _this,
        const DDS_Publisher p);
```

Description

This operation deletes a DDS_Publisher.

Parameters

in DDS_DomainParticipant _this - the DDS_DomainParticipant object on which the operation is operated.

in const DDS_Publisher p - a pointer to the DDS_Publisher, which is to be deleted.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES or DDS_RETCODE_PRECONDITION_NOT_MET.

Detailed Description

This operation deletes a DDS_Publisher. A DDS_Publisher cannot be deleted when it has any attached DDS_DataWriter objects. When the operation is called on a DDS_Publisher with DDS_DataWriter objects, the operation returns DDS_RETCODE_PRECONDITION_NOT_MET. When the operation is called on a different DDS_DomainParticipant, as used when the DDS_Publisher was created, the operation has no effect and returns DDS_RETCODE_PRECONDITION_NOT_MET.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the DDS_Publisher is deleted.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter p is not a valid DDS_Publisher.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DomainParticipant has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - the operation is called on a different DDS_DomainParticipant, as used when the DDS_Publisher was created, or the DDS_Publisher contains one or more DDS_DataWriter objects.

3.2.1.12 DDS_DomainParticipant_delete_subscriber

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_delete_subscriber
      (DDS_DomainParticipant _this,
        const DDS_Subscriber s);
```

Description

This operation deletes a DDS_Subscriber.

Parameters

in DDS_DomainParticipant _this - the DDS_DomainParticipant object on which the operation is operated.

in const DDS_Subscriber s - a pointer to the DDS_Subscriber, which is to be deleted.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES or DDS_RETCODE_PRECONDITION_NOT_MET.

Detailed Description

This operation deletes a DDS_Subscriber. A DDS_Subscriber cannot be deleted when it has any attached DDS_DataReader objects. When the operation is called on a DDS_Subscriber with DDS_DataReader objects, the operation returns DDS_RETCODE_PRECONDITION_NOT_MET. When the operation is called on a different DDS_DomainParticipant, as used when the DDS_Subscriber was created, the operation has no effect and returns DDS_RETCODE_PRECONDITION_NOT_MET.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the DDS_Subscriber is deleted.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter s is not a valid DDS_Subscriber.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DomainParticipant has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - the operation is called on a different DDS_DomainParticipant, as used when the DDS_Subscriber was created, or the DDS_Subscriber contains one or more DDS_DataReader objects.

3.2.1.13 DDS_DomainParticipant_delete_topic

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
```

```
DDS_DomainParticipant_delete_topic
   (DDS_DomainParticipant _this,
     const DDS_Topic a_topic);
```

Description

This operation deletes a DDS_Topic.

Parameters

in DDS_DomainParticipant _this - the DDS_DomainParticipant object on which the operation is operated.

in const DDS_Topic a_topic - a pointer to the DDS_Topic, which is to be deleted.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES or DDS_RETCODE_PRECONDITION_NOT_MET.

Detailed Description

This operation deletes a DDS_Topic. A DDS_Topic cannot be deleted when there are any DDS_DataReader, DDS_DataWriter, DDS_ContentFilteredTopic or DDS_MultiTopic objects, which are using the DDS_Topic. When the operation is called on a DDS_Topic pointed to by any of these objects, the operation returns DDS_RETCODE_PRECONDITION_NOT_MET. When the operation is called on a different DDS_DomainParticipant, as used when the DDS_Topic was created, the operation has no effect and returns DDS_RETCODE_PRECONDITION_NOT_MET.

Local Proxy

Since a DDS_Topic is a global concept in the system, access is provided through a local proxy. In other words, the pointer is actually not a pointer to a DDS_Topic but to the local proxy. The Data Distribution Service propagates DDS_Topics and makes remotely created DDS_Topics locally available through this proxy. Such a proxy is created by the DDS_DomainParticipant_create_topic or DDS_DomainParticipant_find_topic operation. This operation will delete the local proxy. When a pointer to the same DDS_Topic was created multiple times (either by DDS_DomainParticipant_create_topic or DDS_DomainParticipant_find_topic), each pointer (local proxy) must be deleted separately. When this proxy is the last proxy for this DDS_Topic, the

DDS_Topic itself is also removed from the system. As mentioned, a proxy may only be deleted when there are no other entities attached to it. However, it is possible to delete a proxy while there are entities attached to a different proxy.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the DDS_Topic is deleted.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter a_topic is not a valid DDS_Topic.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DomainParticipant has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - the operation is called on a different DDS_DomainParticipant, as used when the DDS_Topic was created, or the DDS_Topic is still pointed to by other objects.

3.2.1.14 DDS_DomainParticipant_enable (inherited)

This operation is inherited and therefore not described here. See the class DDS_Entity for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_enable
      (DDS_DomainParticipant _this);
```

3.2.1.15 DDS_DomainParticipant_find_topic

Synopsis

```
#include <dds_dcps.h>
DDS_Topic
   DDS_DomainParticipant_find_topic
      (DDS_DomainParticipant _this,
        const DDS_char *topic_name,
        const DDS_Duration_t *timeout);
```

Description

This operation gives access to an existing (or ready to exist) enabled DDS_Topic, based on its topic_name.

Parameters

in DDS_DomainParticipant _this - the DDS_DomainParticipant object on which the operation is operated.

*in const DDS_char *topic_name* - the name of the DDS_Topic that the application wants access to.

*in const DDS_Duration_t *timeout* - the maximum duration to block for the DDS_DomainParticipant_find_topic, after which the application thread is unblocked. The special constant DDS_DURATION_INFINITE can be used when the maximum waiting time does not need to be bounded.

Return Value

DDS_Topic - Return value is a pointer to the DDS_Topic found.

Detailed Description

This operation gives access to an existing DDS_Topic, based on its topic_name. The operation takes as arguments the topic_name of the DDS_Topic and a timeout.

If a DDS_Topic of the same topic_name already exists, it gives access to this DDS_Topic. Otherwise it waits (blocks the caller) until another mechanism creates it. This other mechanism can be another thread, a configuration tool, or some other Data Distribution Service utility. If after the specified timeout the DDS_Topic can still not be found, the caller gets unblocked and DDS_HANDLE_NIL is returned.

A DDS_Topic obtained by means of DDS_DomainParticipant_find_topic, must also be deleted by means of DDS_DomainParticipant_delete_topic so that the local resources can be released. If a DDS_Topic is obtained multiple times it must also be deleted that same number of times using DDS_DomainParticipant_delete_topic or calling DDS_DomainParticipant_delete_contained_entities once to delete all the proxies.

A DDS_Topic that is obtained by means of DDS_DomainParticipant_find_topic in a specific DDS_DomainParticipant can only be used to create DDS_DataReaders and DDS_DataWriters in that DDS_DomainParticipant if its corresponding DDS_TypeSupport has been registered to that same DDS_DomainParticipant.

Local Proxy

Since a DDS_Topic is a global concept in the system, access is provided through a local proxy. In other words, the pointer returned is actually not a pointer to a DDS_Topic but to a locally created proxy. The Data Distribution Service propagates DDS_Topics and makes remotely created DDS_Topics locally available through this proxy. For each time this operation is called, a new proxy is created. Therefore the DDS_Topic must be deleted the same number of times, as the DDS_Topic was created with the same topic_name per Domain. In other words, each pointer (local proxy) must be deleted separately.

3.2.1.16 DDS_DomainParticipant_get_builtin_subscriber

Synopsis

```
#include <dds_dcps.h>
DDS_Subscriber
   DDS_DomainParticipant_get_builtin_subscriber
      (DDS_DomainParticipant _this);
```

Description

This operation returns the built-in DDS_Subscriber associated with the DDS_DomainParticipant.

Parameters

in DDS_DomainParticipant _this - the DDS_DomainParticipant object on which the operation is operated.

Return Value

DDS_Subscriber - Result value is a pointer to the built-in DDS_Subscriber associated with the DDS_DomainParticipant.

Detailed Description

This operation returns the built-in DDS_Subscriber associated with the DDS_DomainParticipant. Each DDS_DomainParticipant contains several built-in DDS_Topic objects. The built-in DDS_Subscriber contains the corresponding DDS_DataReader objects to access them. All these DDS_DataReader objects belong to a single built-in DDS_Subscriber. Note that there is exactly one built-in DDS_Subscriber associated with each DDS_DomainParticipant.

3.2.1.17 DDS_DomainParticipant_get_current_time

Synopsis

```
#include <dds_dcps.h>
```

```
DDS_ReturnCode_t
   get_current_time
      (DDS_DomainParticipant _this,
        DDS_Time_t *current_time);
```

Description

This operation returns the value of the current time that the Data Distribution Service uses to time-stamp written data as well as received data in `current_time`.

Parameters

`in DDS_DomainParticipant _this` - the `DDS_DomainParticipant` object on which the operation is operated.

`inout DDS_Time_t *current_time` - the value of the current time as used by the Data Distribution System. The input value of `current_time` is ignored.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_BAD_PARAMETER`, `DDS_RETCODE_ALREADY_DELETED`, `DDS_RETCODE_OUT_OF_RESOURCES` or `DDS_RETCODE_NOT_ENABLED`.

Detailed Description

This operation returns the value of the current time that the Data Distribution Service uses to time-stamp written data as well as received data in `current_time`. The input value of `current_time` is ignored by the operation.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the value of the current time is returned in `current_time`.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_BAD_PARAMETER`* - the parameter `current_time` is not a valid reference.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DomainParticipant` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_NOT_ENABLED`* - the `DDS_DomainParticipant` is not enabled.

3.2.1.18 DDS_DomainParticipant_get_default_publisher_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_get_default_publisher_qos
      (DDS_DomainParticipant _this,
        DDS_PublisherQos *qos);
```

Description

This operation gets the struct with the default `DDS_Publisher QosPolicy` settings of the `DDS_DomainParticipant`.

Parameters

`in DDS_DomainParticipant _this` - the `DDS_DomainParticipant` object on which the operation is operated.

`inout DDS_PublisherQos *qos` - a pointer to the `DDS_PublisherQos` struct (provided by the application) in which the default `QosPolicy` settings for the `DDS_Publisher` are written.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_ALREADY_DELETED`, `DDS_RETCODE_OUT_OF_RESOURCES` or `DDS_RETCODE_PRECONDITION_NOT_MET`.

Detailed Description

This operation gets the struct with the default `DDS_Publisher QosPolicy` settings of the `DDS_DomainParticipant` (that is the `DDS_PublisherQos`) which is used for newly-created `DDS_Publisher` objects, in case the constant `DDS_PUBLISHER_QOS_DEFAULT` is used. The default `DDS_PublisherQos` is only used when the constant is supplied as parameter `qos` to specify the `DDS_PublisherQos` in the `DDS_DomainParticipant_create_publisher` operation. The application must provide the `DDS_PublisherQos` struct in which the `QosPolicy` settings can be stored and pass the `qos` pointer to the operation. The operation writes the default `QosPolicy` settings to the struct pointed to by `qos`. Any settings in the struct are overwritten.

The values retrieved by this operation match the set of values specified on the last successful call to `DDS_DomainParticipant_set_default_publisher_qos`, or, if the call was never made, the default values as specified for each `QosPolicy` setting as defined in Table 5: on page 65.

NOTE: The operation will return `DDS_PRECONDITION_NOT_MET` if the any of the contained entities is in a state where it cannot be deleted. This will occur, for example, if a contained `DDS_DataReader` cannot be deleted because the application has called a `read` or `take` operation and has not called the corresponding `return_loan` operation to return the loaned samples. In such cases, the operation does not roll back any entity deletions performed prior to the detection of the problem.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the default `DDS_Publisher QosPolicy` settings of this `DDS_DomainParticipant` have successfully been copied into the specified `DDS_PublisherQos` parameter.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_DomainParticipant` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_PRECONDITION_NOT_MET`* - one or more of the contained entities are in a state where they cannot be deleted.

3.2.1.19 DDS_DomainParticipant_get_default_subscriber_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_get_default_subscriber_qos
      (DDS_DomainParticipant _this,
        DDS_SubscriberQos *qos);
```

Description

This operation gets the struct with the default `DDS_Subscriber QosPolicy` settings of the `DDS_DomainParticipant`.

Parameters

`in DDS_DomainParticipant _this` - the `DDS_DomainParticipant` object on which the operation is operated.

*inout DDS_SubscriberQos *qos* - a pointer to the QosPolicy struct (provided by the application) in which the default QosPolicy settings for the DDS_Subscriber is written.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation gets the struct with the default DDS_Subscriber QosPolicy settings of the DDS_DomainParticipant (that is the DDS_SubscriberQos) which is used for newly-created DDS_Subscriber objects, in case the constant DDS_SUBSCRIBER_QOS_DEFAULT is used. The default DDS_SubscriberQos is only used when the constant is supplied as parameter qos to specify the DDS_SubscriberQos in the DDS_DomainParticipant_create_subscriber operation. The application must provide the QoS struct in which the policy can be stored and pass the qos pointer to the operation. The operation writes the default QosPolicy to the struct pointed to by qos. Any settings in the struct are overwritten.

The values retrieved by this operation match the set of values specified on the last successful call to DDS_DomainParticipant_set_default_subscriber_qos, or, if the call was never made, the default values as specified for each QosPolicy defined in Table 5: on page 65.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the default DDS_Subscriber QosPolicy settings of this DDS_DomainParticipant have successfully been copied into the specified DDS_SubscriberQos parameter.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DomainParticipant has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.2.1.20 DDS_DomainParticipant_get_default_topic_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_get_default_topic_qos
      (DDS_DomainParticipant _this,
        DDS_TopicQos *qos);
```

Description

This operation gets the struct with the default `DDS_Topic QosPolicy` settings of the `DDS_DomainParticipant`.

Parameters

`in DDS_DomainParticipant _this` - the `DDS_DomainParticipant` object on which the operation is operated.

`inout DDS_TopicQos *qos` - a pointer to the `QosPolicy` struct (provided by the application) in which the default `QosPolicy` settings for the `DDS_Topic` is written.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_ALREADY_DELETED` or `DDS_RETCODE_OUT_OF_RESOURCES`.

Detailed Description

This operation gets the struct with the default `DDS_Topic QosPolicy` settings of the `DDS_DomainParticipant` (that is the `DDS_TopicQos`) which is used for newly-created `DDS_Topic` objects, in case the constant `DDS_TOPIC_QOS_DEFAULT` is used. The default `DDS_TopicQos` is only used when the constant is supplied as parameter `qos` to specify the `DDS_TopicQos` in the `DDS_DomainParticipant_create_topic` operation. The application must provide the QoS struct in which the policy can be stored and pass the `qos` pointer to the operation. The operation writes the default `QosPolicy` to the struct pointed to by `qos`. Any settings in the struct are overwritten.

The values retrieved by this operation match the set of values specified on the last successful call to `DDS_DomainParticipant_set_default_topic_qos`, or, if the call was never made, the default values as specified for each `QosPolicy` defined in Table 5: on page 65.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the default DDS_Topic QosPolicy settings of this DDS_DomainParticipant have successfully been copied into the specified DDS_TopicQos parameter.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DomainParticipant has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.2.1.21 DDS_DomainParticipant_get_discovered_participants

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_get_discovered_participants
      (DDS_DomainParticipant _this,
        DDS_InstanceHandleSeq  *participant_handles);
```

Description

This operation retrieves the list of DomainParticipants that have been discovered in the domain.

Parameters

in DDS_DomainParticipant _this - the DDS_DomainParticipant object on which the operation is operated.

*inout InstanceHandleSeq *participant_handles* - a sequence which is used to pass the list of all associated participants.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, or DDS_RETCODE_NOT_ENABLED.

Detailed Description

This operation retrieves the list of `DomainParticipants` that have been discovered in the domain and that the application has not indicated should be "ignored" by means of the DomainParticipant `ignore_participant` operation.

The participant_handles sequence and its buffer may be pre-allocated by the application and therefore must either be re-used in a subsequent invocation of the `DDS_DomainParticipant_get_discovered_participants` operation or be released by calling `DDS_free` on the returned `participant_handles`. If the pre-allocated sequence is not big enough to hold the number of associated participants, the sequence will automatically be (re-)allocated to fit the required size.

The handles returned in the `participant_handles` sequence are the ones that are used by the DDS implementation to locally identify the corresponding matched Participant entities. You can access more detailed information about a particular participant by passing its `participant_handle` to either the `DDS_DomainParticipant_get_discovered_participant_data` operation or to the `DDS_ParticipantBuiltinTopicDataDataReader_read_instance` operation on the built-in reader for the "`DCPSParticipant`" topic.

Be aware that since `DDS_InstanceHandle_t` is an opaque datatype, it does not necessarily mean that the handles obtained from the `DDS_DomainParticipant_get_discovered_participants` operation have the same value as the ones that appear in the `instance_handle` field of the `DDS_SampleInfo` when retrieving the participant info through corresponding "`DCPSParticipant`" built-in reader. You can't just compare two handles to determine whether they represent the same participant. If you want to know whether two handles actually do represent the same participant, use both handles to retrieve their corresponding `DDS_ParticipantBuiltinTopicData` samples and then compare the key field of both samples.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the list of associated participants has been successfully obtained.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_UNSUPPORTED`* - OpenSplice is configured not to maintain the information about "associated" participants.

- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DomainParticipant has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the DDS_DomainParticipant is not enabled.

3.2.1.22 DDS_DomainParticipant_get_discovered_participant_data

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_get_discovered_participant_data
      (DDS_DomainParticipant _this,
        DDS_ParticipantBuiltinTopicData *participant_data,
        DDS_InstanceHandle_t handle);
```

Description

This operation retrieves information on a DomainParticipant that has been discovered on the network. The participant must be in the same domain as the participant on which this operation is invoked and must not have been "ignored" by means of the DomainParticipant ignore_participant operation.

Parameters

in DDS_DomainParticipant _this - the DDS_DomainParticipant object on which the operation is operated.

*inout DDS_ParticipantBuiltinTopicData *participant_data* - a pointer to the sample in which the information about the specified partition is to be stored.

in const DDS_InstanceHandle_t participant_handle - a handle to the participant whose information needs to be retrieved.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, or DDS_RETCODE_NOT_ENABLED.

Detailed Description

This operation retrieves information on a `DomainParticipant` that has been discovered on the network. The participant must be in the same domain as the participant on which this operation is invoked and must not have been "ignored" by means of the `DomainParticipant ignore_participant` operation.

The `partition_handle` must correspond to a partition currently associated with the `DDS_DomainParticipant`, otherwise the operation will fail and return `DDS_RETCODE_ERROR`. The operation `DDS_DomainParticipant_get_discovered_participant_data` can be used to find more detailed information about a particular participant than is found with the `DDS_DomainParticipant_get_discovered_participants` operation.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the information on the specified partition has been successfully retrieved.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_UNSUPPORTED`* - OpenSplice is configured not to maintain the information about "associated" partition.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_DomainParticipant` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_NOT_ENABLED`* - the `DDS_DomainParticipant` is not enabled.

3.2.1.23 DDS_DomainParticipant_get_discovered_topics

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_get_discovered_topics
      (DDS_DomainParticipant _this,
        DDS_InstanceHandleSeq  *topic_handles);
```

Description

This operation retrieves the list of `Topics` that have been discovered in the domain.

Parameters

in DDS_DomainParticipant _this - the DDS_DomainParticipant object on which the operation is operated.

*inout InstanceHandleSeq *participant_handles* - a sequence which is used to pass the list of all associated topics.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, or DDS_RETCODE_NOT_ENABLED.

Detailed Description

This operation retrieves the list of Topics that have been discovered in the domain and that the application has not indicated should be "ignored" by means of the DomainParticipant ignore_topic operation.

The topic_handles sequence and its buffer may be pre-allocated by the application and therefore must either be re-used in a subsequent invocation of the DDS_DomainParticipant_get_discovered_topics operation or be released by calling DDS_free on the returned topic_handles. If the pre-allocated sequence is not big enough to hold the number of associated topics, the sequence will automatically be (re-)allocated to fit the required size.

The handles returned in the topic_handles sequence are the ones that are used by the DDS implementation to locally identify the corresponding matched Topic entities. You can access more detailed information about a particular topic by passing its topic_handle to either the DDS_DomainParticipant_get_discovered_topic_data operation or to the DDS_TopicBuiltinTopicDataDataReader_read_instance operation on the built-in reader for the "DCPSTopic" topic.

Be aware that since DDS_InstanceHandle_t is an opaque datatype, it does not necessarily mean that the handles obtained from the DDS_DomainParticipant_get_discovered_topics operation have the same value as the ones that appear in the instance_handle field of the DDS_SampleInfo when retrieving the participant info through corresponding "DCPSTopic" built-in reader. You can't just compare two handles to determine whether they represent the same topic. If you want to know whether two handles actually do represent the same topic, use both handles to retrieve their corresponding DDS_TopicBuiltinTopicData samples and then compare the key field of both samples.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the list of associated topics has been successfully obtained.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_UNSUPPORTED* - OpenSplice is configured not to maintain the information about "associated" topics.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DomainParticipant has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the DDS_DomainParticipant is not enabled.

3.2.1.24 DDS_DomainParticipant_get_discovered_topic_data

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_get_discovered_topic_data
      (DDS_DomainParticipant _this,
        DDS_TopicBuiltinTopicData *topic_data,
        DDS_InstanceHandle_t handle);
```

Description

This operation retrieves information on a Topic that has been discovered on the network. The topic have been created by a participant in the same domain as the participant on which this operation is invoked and must not have been "ignored" by means of the DomainParticipant ignore_topic operation.

Parameters

in DDS_DomainParticipant _this - the DDS_DomainParticipant object on which the operation is operated.

*inout DDS_ParticipantBuiltinTopicData *topic_data* - a pointer to the sample in which the information about the specified topic is to be stored.

in const DDS_InstanceHandle_t topic_handle - a handle to the topic whose information needs to be retrieved.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, or DDS_RETCODE_NOT_ENABLED.

Detailed Description

This operation retrieves information on a Topic that has been discovered on the network. The topic must have been created by a participant in the same domain as the participant on which this operation is invoked and must not have been "ignored" by means of the DomainParticipant ignore_topic operation.

The topic_handle must correspond to a topic currently associated with the DDS_DomainParticipant, otherwise the operation will fail and return DDS_RETCODE_ERROR. The operation DDS_DomainParticipant_get_discovered_topic_data can be used to find more detailed information about a particular topic than is found with the DDS_DomainParticipant_get_discovered_topics operation.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the information on the specified topic has been successfully retrieved.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_UNSUPPORTED* - OpenSplice is configured not to maintain the information about "associated" topic.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DomainParticipant has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the DDS_DomainParticipant is not enabled.

3.2.1.25 DDS_DomainParticipant_get_domain_id

Synopsis

```
#include <dds_dcps.h>
DomainId_t
   DDS_DomainParticipant_get_domain_id
```

```
      (DDS_DomainParticipant _this);
```

Description

This operation returns the `DomainId` of the `Domain` to which this `DDS_DomainParticipant` is attached.

Parameters

`in DDS_DomainParticipant _this` - the `DDS_DomainParticipant` object on which the operation is operated.

Return Value

`DomainId_t` - result is the `DomainId`.

Detailed Description

This operation returns the `DomainId` of the Domain to which this `DDS_DomainParticipant` is attached. See also the operation *DDS_DomainParticipantFactory_create_participant* (section *3.2.2.1* on page 215).

3.2.1.26 DDS_DomainParticipant_get_listener

Synopsis

```
#include <dds_dcps.h>
struct DDS_DomainParticipantListener
   DDS_DomainParticipant_get_listener
      (DDS_DomainParticipant _this);
```

Description

This operation allows access to a `DDS_DomainParticipantListener`.

Parameters

`in DDS_DomainParticipant _this` - the `DDS_DomainParticipant` object on which the operation is operated.

Return Value

`struct DDS_DomainParticipantListener` - a pointer to the `DDS_DomainParticipantListener` attached to the `DDS_DomainParticipant`.

Detailed Description

This operation allows access to a DDS_DomainParticipantListener attached to the DDS_DomainParticipant. When no DDS_DomainParticipantListener was attached to the DDS_DomainParticipant, the DDS_OBJECT_NIL pointer is returned.

3.2.1.27 DDS_DomainParticipant_get_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_get_qos
      (DDS_DomainParticipant _this,
        DDS_DomainParticipantQos *qos);
```

Description

This operation allows access to the existing set of QoS policies for a DDS_DomainParticipant.

Parameters

in DDS_DomainParticipant _this - the DDS_DomainParticipant object on which the operation is operated.

*inout DDS_DomainParticipantQos *qos* - a pointer to the destination DDS_DomainParticipantQos struct in which the QosPolicy settings will be copied.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation allows access to the existing set of QoS policies of a DDS_DomainParticipant on which this operation is used. This DDS_DomainparticipantQos is stored at the location pointed to by the qos parameter.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the existing set of QoS policy values applied to this `DDS_DomainParticipant` has successfully been copied into the specified `DDS_DomainParticipantQos` parameter.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the `DDS_DomainParticipant` has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.2.1.28 DDS_DomainParticipant_get_status_changes (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_StatusMask
   DDS_DomainParticipant_get_status_changes
      (DDS_DomainParticipant _this);
```

3.2.1.29 DDS_DomainParticipant_get_statuscondition (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_StatusCondition
   DDS_DomainParticipant_get_statuscondition
      (DDS_DomainParticipant _this);
```

3.2.1.30 DDS_DomainParticipant_ignore_participant

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_ignore_participant
      (DDS_DomainParticipant _this,
        const DDS_InstanceHandle_t handle);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.2.1.31 DDS_DomainParticipant_ignore_publication

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_ignore_publication
      (DDS_DomainParticipant _this,
        const DDS_InstanceHandle_t handle);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.2.1.32 DDS_DomainParticipant_ignore_subscription

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_ignore_subscription
      (DDS_DomainParticipant _this,
        const DDS_InstanceHandle_t handle);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.2.1.33 DDS_DomainParticipant_ignore_topic

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_ignore_topic
      (DDS_DomainParticipant _this,
        const DDS_InstanceHandle_t handle);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.2.1.34 DDS_DomainParticipant_lookup_topicdescription

Synopsis

```
#include <dds_dcps.h>
DDS_TopicDescription
   DDS_DomainParticipant_lookup_topicdescription
      (DDS_DomainParticipant _this,
        const DDS_char *name);
```

Description

This operation gives access to a locally-created `DDS_TopicDescription`, with a matching `name`.

Parameters

in DDS_DomainParticipant _this - the DDS_DomainParticipant object on which the operation is operated.

*in const DDS_char *name* - the name of the DDS_TopicDescription to look for.

Return Value

DDS_TopicDescription - Return value is a pointer to the DDS_TopicDescription found. When no such DDS_TopicDescription is found, the DDS_OBJECT_NIL pointer is returned.

Detailed Description

The operation DDS_DomainParticipant_lookup_topicdescription gives access to a locally-created DDS_TopicDescription, based on its name. The operation takes as argument the name of the DDS_TopicDescription.

If one or more local DDS_TopicDescription proxies (also see Section 3.2.1.15, *DDS_DomainParticipant_find_topic*, on page 185) of the same name already exist, a pointer to one of the already existing local proxies is returned: DDS_DomainParticipant_lookup_topicdescription will never create a new local proxy. That means that the proxy that is returned does not need to be deleted separately from its original. When no local proxy exists, it returns the DDS_OBJECT_NIL pointer. The operation never blocks.

The operation DDS_DomainParticipant_lookup_topicdescription may be used to locate any locally-created DDS_Topic, DDS_ContentFilteredTopic and DDS_MultiTopic object.

3.2.1.35 DDS_DomainParticipant_set_default_publisher_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_set_default_publisher_qos
      (DDS_DomainParticipant _this,
        const DDS_PublisherQos *qos);
```

Description

This operation sets the default DDS_PublisherQos of the DDS_DomainParticipant.

Parameters

in DDS_DomainParticipant _this - the DDS_DomainParticipant object on which the operation is operated.

*in const DDS_PublisherQos *qos* - a collection of QosPolicy settings, which contains the new default QosPolicy settings for the newly-created DDS_Publishers.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation sets the default DDS_PublisherQos of the DDS_DomainParticipant (that is the struct with the QosPolicy settings) which is used for newly-created DDS_Publisher objects, in case the constant DDS_PUBLISHER_QOS_DEFAULT is used. The default DDS_PublisherQos is only used when the constant is supplied as parameter qos to specify the DDS_PublisherQos in the DDS_DomainParticipant_create_publisher operation. The DDS_PublisherQos is always self consistent, because its policies do not depend on each other. This means this operation never returns the DDS_RETCODE_INCONSISTENT_POLICY. The values set by this operation are returned by DDS_DomainParticipant_get_default_publisher_qos.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the new default DDS_PublisherQos is set.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter qos is not a valid DDS_PublisherQos. It contains a QosPolicy setting with an enum value that is outside its legal boundaries, or a sequence that has inconsistent memory settings.
- *DDS_RETCODE_UNSUPPORTED* - one or more of the selected QosPolicy values are currently not supported by OpenSplice.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DomainParticipant has already been deleted.

- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.2.1.36 DDS_DomainParticipant_set_default_subscriber_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_set_default_subscriber_qos
      (DDS_DomainParticipant _this,
        const DDS_SubscriberQos *qos);
```

Description

This operation sets the default `DDS_SubscriberQos` of the `DDS_DomainParticipant`.

Parameters

in DDS_DomainParticipant _this - the `DDS_DomainParticipant` object on which the operation is operated.

*in const DDS_SubscriberQos *qos* - a collection of `QosPolicy` settings, which contains the new default `QosPolicy` settings for the newly-created `DDS_Subscribers`.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_BAD_PARAMETER`, `DDS_RETCODE_UNSUPPORTED`, `DDS_RETCODE_ALREADY_DELETED` or `DDS_RETCODE_OUT_OF_RESOURCES`.

Detailed Description

This operation sets the default `DDS_SubscriberQos` of the `DDS_DomainParticipant` (that is the struct with the `QosPolicy` settings) which is used for newly-created `DDS_Subscriber` objects, in case the constant `DDS_SUBSCRIBER_QOS_DEFAULT` is used. The default `DDS_SubscriberQos` is only used when the constant is supplied as parameter `qos` to specify the `DDS_SubscriberQos` in the `DDS_DomainParticipant_create_subscriber` operation. The `DDS_SubscriberQos` is always self consistent, because its policies do not depend on each other. This means this operation never returns the `DDS_RETCODE_INCONSISTENT_POLICY`. The values set by this operation are returned by `DDS_DomainParticipant_get_default_subscriber_qos`.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the new default DDS_SubscriberQos is set.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter qos is not a valid DDS_PublisherQos. It contains a QosPolicy setting with an enum value that is outside its legal boundaries, or a sequence that has inconsistent memory settings.
- *DDS_RETCODE_UNSUPPORTED* - one or more of the selected QosPolicy values are currently not supported by OpenSplice.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DomainParticipant has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.2.1.37 DDS_DomainParticipant_set_default_topic_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_set_default_topic_qos
      (DDS_DomainParticipant _this,
        const DDS_TopicQos *qos);
```

Description

This operation sets the default DDS_TopicQos of the DDS_DomainParticipant.

Parameters

in DDS_DomainParticipant _this - the DDS_DomainParticipant object on which the operation is operated.

*in const DDS_TopicQos *qos* - a collection of QosPolicy settings, which contains the new default QosPolicy settings for the newly-created DDS_Topics.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES or DDS_RETCODE_ INCONSISTENT_POLICY.

Detailed Description

This operation sets the default DDS_TopicQos of the DDS_DomainParticipant (that is the struct with the QosPolicy settings) which is used for newly-created DDS_Topic objects, in case the constant DDS_TOPIC_QOS_DEFAULT is used. The default DDS_TopicQos is only used when the constant is supplied as parameter qos to specify the DDS_TopicQos in the DDS_DomainParticipant_create_topic operation. This operation checks if the DDS_TopicQos is self consistent. If it is not, the operation has no effect and returns DDS_RETCODE_INCONSISTENT_POLICY. The values set by this operation are returned by DDS_DomainParticipant_get_default_topic_qos.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the new default DDS_TopicQos is set.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter qos is not a valid DDS_TopicQos. It contains a QosPolicy setting with an invalid DDS_Duration_t value, an enum value that is outside its legal boundaries or a sequence that has inconsistent memory settings.
- *DDS_RETCODE_UNSUPPORTED* - one or more of the selected QosPolicy values are currently not supported by OpenSplice.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DomainParticipant has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_INCONSISTENT_POLICY* - the parameter qos contains conflicting QosPolicy settings, *e.g.* a history depth that is higher than the specified resource limits.

3.2.1.38 DDS_DomainParticipant_set_listener

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_set_listener
      (DDS_DomainParticipant _this,
        const struct DDS_DomainParticipantListener
             *a_listener,
             const DDS_StatusMask mask);
```

Description

This operation attaches a `DDS_DomainParticipantListener` to the `DDS_DomainParticipant`.

Parameters

`in DDS_DomainParticipant _this` - the `DDS_DomainParticipant` object on which the operation is operated.

`in const struct DDS_DomainParticipantListener *a_listener` - a pointer to the `DDS_DomainParticipantListener` instance, which will be attached to the `DDS_DomainParticipant`.

`in const DDS_StatusMask mask` - a bit-mask in which each bit enables the invocation of the `DDS_DomainParticipantListener` for a certain status.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_UNSUPPORTED`, `DDS_RETCODE_ALREADY_DELETED` or `DDS_RETCODE_ OUT_OF_RESOURCES`.

Detailed Description

This operation attaches a `DDS_DomainParticipantListener` to the `DDS_DomainParticipant`. Only one `DDS_DomainParticipantListener` can be attached to each `DDS_DomainParticipant`. If a `DDS_DomainParticipantListener` was already attached, the operation will replace it with the new one. When `a_listener` is the `DDS_OBJECT_NIL` pointer, it represents a listener that is treated as a NOOP[1] for all statuses activated in the bitmask.

1. Short for **No-Op**eration, an instruction that peforms nothing at all.

Communication Status

For each communication status, the `StatusChangedFlag` flag is initially set to `FALSE`. It becomes `TRUE` whenever that communication status changes. For each communication status activated in the `mask`, the associated `DDS_DomainParticipantListener` operation is invoked and the communication status is reset to `FALSE`, as the listener implicitly accesses the status which is passed as a parameter to that operation. The status is reset prior to calling the listener, so if the application calls the `get_<status_name>_status` from inside the listener it will see the status already reset. An exception to this rule is the `DDS_OBJECT_NIL` listener, which does not reset the communication statuses for which it is invoked.

The following statuses are applicable to the `DDS_DomainParticipantListener`:

- `DDS_INCONSISTENT_TOPIC_STATUS` *(propagated)*
- `DDS_OFFERED_DEADLINE_MISSED_STATUS` *(propagated)*
- `DDS_REQUESTED_DEADLINE_MISSED_STATUS` *(propagated)*
- `DDS_OFFERED_INCOMPATIBLE_QOS_STATUS` *(propagated)*
- `DDS_REQUESTED_INCOMPATIBLE_QOS_STATUS` *(propagated)*
- `DDS_SAMPLE_LOST_STATUS` *(propagated)*
- `DDS_SAMPLE_REJECTED_STATUS` *(propagated)*
- `DDS_DATA_ON_READERS_STATUS` *(propagated)*
- `DDS_DATA_AVAILABLE_STATUS` *(propagated)*
- `DDS_LIVELINESS_LOST_STATUS` *(propagated)*
- `DDS_LIVELINESS_CHANGED_STATUS` *(propagated)*
- `DDS_PUBLICATION_MATCHED_STATUS` *(propagated)*
- `DDS_SUBSCRIPTION_MATCHED_STATUS` *(propagated).*

Be aware that the `DDS_PUBLICATION_MATCHED_STATUS` and `DDS_SUBSCRIPTION_MATCHED_STATUS` are not applicable when the infrastructure does not have the information available to determine connectivity. This is the case when OpenSplice is configured not to maintain discovery information in the Networking Service. (See also the description of the `NetworkService/Discovery[@enabled]` attribute in section *4.4.1.6.1* on page 225 of the Deployment Guide.) In this case the operation will return `DDS_RETCODE_UNSUPPORTED`.

Status bits are declared as a constant and can be used by the application in an OR operation to create a tailored mask. The special constant `DDS_STATUS_MASK_NONE` can be used to indicate that the created entity should not respond to any of its available statuses. The DDS will therefore attempt to propagate these statuses to its

factory. The special constant `STATUS_MASK_ANY_V1_2` can be used to select all applicable statuses specified in the "Data Distribution Service for Real-time Systems Version 1.2" specification.

Status Propagation

The Data Distribution Service will trigger the most specific and relevant `Listener`. In other words, in case a communication status is also activated on the `Listener` of a contained entity, the `Listener` on that contained entity is invoked instead of the `DDS_DomainParticipantListener`. This means that a status change on a contained entity only invokes the `DDS_DomainParticipantListener` if the contained entity itself does not handle the trigger event generated by the status change.

The statuses `DDS_DATA_ON_READERS_STATUS` and `DDS_DATA_AVAILABLE_STATUS` are "Read Communication Statuses" and are an exception to all other plain communication statuses: they have no corresponding status structure that can be obtained with a `get_<status_name>_status` operation and they are mutually exclusive. When new information becomes available to a DataReader, the Data Distribution Service will first look in an attached and activated `DDS_SubscriberListener` or `DDS_DomainParticipantListener` (in that order) for the `DDS_DATA_ON_READERS_STATUS`. In case the `DDS_DATA_ON_READERS_STATUS` can not be handled, the Data Distribution Service will look in an attached and activated `DDS_DataReaderListener`, `DDS_SubscriberListener` or `DDS_DomainParticipantListener` for the `DDS_DATA_AVAILABLE_STATUS` (in that order).

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the `DDS_DomainParticipantListener` is attached.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_UNSUPPORTED`* - a status was selected that cannot be supported because the infrastructure does not maintain the required connectivity information.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_DomainParticipant` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.

3.2.1.39 DDS_DomainParticipant_set_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipant_set_qos
      (DDS_DomainParticipant _this,
        const DDS_DomainParticipantQos *qos);
```

Description

This operation replaces the existing set of `QosPolicy` settings for a `DDS_DomainParticipant`.

Parameters

`in DDS_DomainParticipant _this` - is the `DDS_DomainParticipant` object on which the operation is operated.

`in const DDS_DomainParticipantQos *qos` - must contain the new set of `QosPolicy` settings for the `DDS_DomainParticipant`.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_BAD_PARAMETER`, `DDS_RETCODE_ALREADY_DELETED` or `DDS_RETCODE_OUT_OF_RESOURCES`.

Detailed Description

This operation replaces the existing set of `QosPolicy` settings for a `DDS_DomainParticipant`. The parameter `qos` must contain the struct with the `QosPolicy` settings which is checked for self-consistency.

The set of `QosPolicy` settings specified by the `qos` parameter are applied on top of the existing QoS, replacing the values of any policies previously set (provided, the operation returned `DDS_RETCODE_OK`).

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the new `DDS_DomainParticipantQos` is set.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.

- *DDS_RETCODE_BAD_PARAMETER* - the parameter `qos` is not a valid `DDS_DomainParticipantQos`. It contains a `QosPolicy` setting with a sequence that has inconsistent memory settings.
- *DDS_RETCODE_ALREADY_DELETED* - the `DDS_DomainParticipant` has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.2.1.40 DDS_DomainParticipant_delete_historical_data

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
    DDS_DomainParticipant_delete_historical_data
    (DDS_DomainParticipant _this,
     const DDS_string partition_expression,
     const DDS_string topic_expression);
```

Description

This operation deletes all historical TRANSIENT and PERSISTENT data that is stored by the durability service that is configured to support this DomainParticipant.

Parameters

in DDS_DomainParticipant _this - is the `DDS_DomainParticipant` object on which the operation is operated.

in const DDS_string partition_expression - An expression to define a filter on partitions.

in const DDS_string topic_expression - An expression to define a filter on topic names.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`.

Detailed Description

This operation deletes all historical TRANSIENT and PERSISTENT data that is stored by the durability service that is configured to support this DomainParticipant. It only deletes the samples stored in the transient and persistent store, samples stored in individual application DataReaders is spared and remains available to these readers. However, late-joiners will no longer be able to obtain the deleted samples.

The `partition_expression` and `topic_expression` strings can be used to specify selection criteria for the topic and/or partition in which the data will be deleted. Wildcards are supported. Note that these parameters are mandatory and cannot be empty. The "`*`" expression can be used to match all partitions and/or topics.

Only data that exists prior to this method invocationis deleted. Data that is still being inserted during this method invocationwill not be removed.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - all data matching the topic and partition expressions has been deleted.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.

3.2.2 Class DDS_DomainParticipantFactory

The purpose of this class is to allow the creation and destruction of `DDS_DomainParticipant` objects. `DDS_DomainParticipantFactory` itself has no factory. It is a pre-existing singleton object that can be accessed by means of the `DDS_DomainParticipantFactory_get_instance` operation on the `DDS_DomainParticipantFactory` class.

The pre-defined value `DDS_TheParticipantFactory` can also be used as an alias for the singleton factory returned by the operation `DDS_DomainParticipantFactory_get_instance`.

The interface description of this class is as follows:

```
/*
 * interface DDS_DomainParticipantFactory
 */
/*
 * implemented API operations
 */
   DDS_DomainParticipantFactory
      DDS_DomainParticipantFactory_get_instance
         (void);
   DDS_DomainParticipant
      DDS_DomainParticipantFactory_create_participant
         (DDS_DomainParticipantFactory _this,
         const DomainId_t domainId,
         const DDS_DomainParticipantQos *qos,
         const struct DDS_DomainParticipantListener *a_listener,
         const DDS_StatusMask mask);
   DDS_ReturnCode_t
      DDS_DomainParticipantFactory_delete_participant
         (DDS_DomainParticipantFactory _this,
```

```
            const DDS_DomainParticipant a_participant);
DDS_DomainParticipant
   DDS_DomainParticipantFactory_lookup_participant
      (DDS_DomainParticipantFactory _this,
        const DomainId_t domainId);
DDS_ReturnCode_t
   DDS_DomainParticipantFactory_set_default_participant_qos
      (DDS_DomainParticipantFactory _this,
        const DDS_DomainParticipantQos *qos);
DDS_ReturnCode_t
   DDS_DomainParticipantFactory_get_default_participant_qos
      (DDS_DomainParticipantFactory _this,
        DDS_DomainParticipantQos *qos);
DDS_ReturnCode_t
   DDS_DomainParticipantFactory_set_qos
      (DDS_DomainParticipantFactory _this,
        const DDS_DomainParticipantFactoryQos *qos);
DDS_ReturnCode_t
   DDS_DomainParticipantFactory_get_qos
      (DDS_DomainParticipantFactory _this,
        DDS_DomainParticipantFactoryQos *qos);
DDS_ReturnCode_t
   DDS_DomainParticipantFactory_delete_domain
      (DDS_DomainParticipantFactory _this,
      DDS_Domain a_domain);
DDS_Domain
   DDS_DomainParticipantFactory_lookup_domain
      (DDS_DomainParticipantFactory _this,
         const DomainId_t domainId);
DDS_ReturnCode_t
    DDS_DomainParticipantFactory_delete_contained_entities
    (DDS_DomainParticipantFactory _this);
```

The following paragraphs describe the usage of all `DDS_DomainParticipantFactory` operations.

3.2.2.1 DDS_DomainParticipantFactory_create_participant

Synopsis

```
#include <dds_dcps.h>
DDS_DomainParticipant
   DDS_DomainParticipantFactory_create_participant
      (DDS_DomainParticipantFactory _this,
        const DomainId_t domainId,
        const DDS_DomainParticipantQos *qos,
        const struct DDS_DomainParticipantListener *a_listener,
        const DDS_StatusMask mask);
```

Description

This operation creates a new `DDS_DomainParticipant` which will join the `domain` identified by `domainId`, with the desired `DDS_DomainParticipantQos` and attaches the optionally specified `DDS_DomainParticipantListener` to it.

Parameters

`in DDS_DomainParticipantFactory _this` - the `DDS_DomainParticipantFactory` object on which the operation is operated.

`in const DomainId_t domainId` - the ID of the Domain to which the `DDS_DomainParticipant` is joined. This should be the ID as specified in the configuration file. This will also be applicable for the `lookup_participant`, `lookup_domain` and `get_domain_id` operations.

`in const DDS_DomainParticipantQos *qos` - a `DDS_DomainParticipantQos` for the new `DDS_DomainParticipant`. When this set of `QosPolicy` settings is inconsistent, no `DDS_DomainParticipant` is created.

`in const struct DDS_DomainParticipantListener *a_listener` - a pointer to the `DDS_DomainParticipantListener` instance which will be attached to the new `DDS_DomainParticipant`. It is permitted to use `DDS_OBJECT_NIL` as the value of the listener: this behaves as a `DDS_DomainParticipantListener` whose operations perform no action.

`in const DDS_StatusMask mask` - a bit-mask in which each bit enables the invocation of the `DDS_DomainParticipantListener` for a certain status.

Return Value

`DDS_DomainParticipant` - Return value is a pointer to the newly-created `DDS_DomainParticipant`. In case of an error, the `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation creates a new `DDS_DomainParticipant`, with the desired `DDS_DomainParticipantQos` and attaches the optionally specified `DDS_DomainParticipantListener` to it. The `DDS_DomainParticipant` signifies that the calling application intends to join the `Domain` identified by the `domainId` argument.

If the specified `QosPolicy` settings are not consistent, the operation will fail; no `DDS_DomainParticipant` is created and the operation returns the `DDS_OBJECT_NIL` pointer. To delete the `DDS_DomainParticipant` the operation `DDS_DomainParticipantFactory_delete_participant` must be used.

Identifying the Domain

The `DDS_DomainParticipant` will attach to the Domain that is specified by the `domainId` parameter. This parameter corresponds to the integer specified in the `Id` tag in the configuration file. Note that to make multiple connections to a Domain (create multiple Participants for the same Domain) within a single process, all of the Participants must use the same identification (*i.e.* all use the same domain Id).

The constant `DDS_DOMAIN_ID_DEFAULT` can be used for this parameter. If this is done the value of `Id` tag from the configuration file specified by the environment variable called `OSPL_URI` will be used.

It is recommended to use this domain Id in conjunction with the `OSPL_URI` environment variable instead of hard-coding a domain Id into your application, since this gives you much more flexibility in the deployment phase of your product. See also Section 1.3.2.1, *The OSPL_URI environment variable*, in the Deployment Guide.

Default QoS

The constant `DDS_PARTICIPANT_QOS_DEFAULT` can be used as parameter `qos` to create a `DDS_DomainParticipant` with the default `DDS_DomainParticipantQos` as set in the `DDS_DomainParticipantfactory`. The effect of using `DDS_PARTICIPANT_QOS_DEFAULT` is the same as calling the operation `DDS_DomainParticipantFactory_get_default_participant_qos` and using the resulting `DDS_DomainParticipantQos` to create the `DDS_DomainParticipant`.

Communication Status

For each communication status, the `StatusChangedFlag` flag is initially set to `FALSE`. It becomes `TRUE` whenever that communication status changes. For each communication status activated in the `mask`, the associated `DDS_DomainParticipantListener` operation is invoked and the communication status is reset to `FALSE`, as the listener implicitly accesses the status which is passed as a parameter to that operation. The fact that the status is reset prior to calling the listener means that if the application calls the `get_<status_name>_status` from inside the listener it will see the status already reset.

The following statuses are applicable to the `DDS_DomainParticipantListener`:

- `DDS_INCONSISTENT_TOPIC_STATUS` *(propagated)*
- `DDS_OFFERED_DEADLINE_MISSED_STATUS` *(propagated)*
- `DDS_REQUESTED_DEADLINE_MISSED_STATUS` *(propagated)*

- `DDS_OFFERED_INCOMPATIBLE_QOS_STATUS` *(propagated)*
- `DDS_REQUESTED_INCOMPATIBLE_QOS_STATUS` *(propagated)*
- `DDS_SAMPLE_LOST_STATUS` *(propagated)*
- `DDS_SAMPLE_REJECTED_STATUS` *(propagated)*
- `DDS_DATA_ON_READERS_STATUS` *(propagated)*
- `DDS_DATA_AVAILABLE_STATUS` *(propagated)*
- `DDS_LIVELINESS_LOST_STATUS` *(propagated)*
- `DDS_LIVELINESS_CHANGED_STATUS` *(propagated)*
- `DDS_PUBLICATION_MATCHED_STATUS` *(propagated)*
- `DDS_SUBSCRIPTION_MATCHED_STATUS` *(propagated).*

Be aware that the `DDS_PUBLICATION_MATCHED_STATUS` and `DDS_SUBSCRIPTION_MATCHED_STATUS` are not applicable when the infrastructure does not have the information available to determine connectivity. This is the case when OpenSplice is configured not to maintain discovery information in the Networking Service. (See also the description of the `NetworkService/Discovery[@enabled] attribute in section` *4.4.1.6.1* on page 225 of the Deployment Guide.) In this case the operation will return `DDS_OBJECT_NIL`.

Status bits are declared as a constant and can be used by the application in an OR operation to create a tailored mask. The special constant `DDS_STATUS_MASK_NONE` can be used to indicate that the created entity should not respond to any of its available statuses. The DDS will therefore attempt to propagate these statuses to its factory. The special constant `STATUS_MASK_ANY_V1_2` can be used to select all applicable statuses specified in the "Data Distribution Service for Real-time Systems Version 1.2" specification.

Status Propagation

The Data Distribution Service will trigger the most specific and relevant `Listener`. In other words, in case a communication status is also activated on the `Listener` of a contained entity, the `Listener` on that contained entity is invoked instead of the `DDS_DomainParticipantListener`. This means that a status change on a contained entity only invokes the `DDS_DomainParticipantListener` if the contained entity itself does not handle the trigger event generated by the status change.

The statuses `DDS_DATA_ON_READERS_STATUS` and `DDS_DATA_AVAILABLE_STATUS` are "Read Communication Statuses" and are an exception to all other plain communication statuses: they have no corresponding status structure that can be obtained with a `get_<status_name>_status` operation and they are

mutually exclusive. When new information becomes available to a DataReader, the Data Distribution Service will first look in an attached and activated DDS_SubscriberListener or DDS_DomainParticipantListener (in that order) for the DDS_DATA_ON_READERS_STATUS. In case the DDS_DATA_ON_READERS_STATUS can not be handled, the Data Distribution Service will look in an attached and activated DDS_DataReaderListener, DDS_SubscriberListener or DDS_DomainParticipantListener for the DDS_DATA_AVAILABLE_STATUS (in that order).

3.2.2.2 DDS_DomainParticipantFactory_delete_participant

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipantFactory_delete_participant
      (DDS_DomainParticipantFactory _this,
        const DDS_DomainParticipant a_participant);
```

Description

This operation deletes a DDS_DomainParticipant.

Parameters

in DDS_DomainParticipantFactory _this - the DDS_DomainParticipantFactory object on which the operation is operated.

in const DDS_DomainParticipant a_participant - a pointer to the DDS_DomainParticipant, which is to be deleted.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_OUT_OF_RESOURCES or DDS_RETCODE_ PRECONDITION_NOT_MET.

Detailed Description

This operation deletes a DDS_DomainParticipant. A DDS_DomainParticipant cannot be deleted when it has any attached DDS_Entity objects. When the operation is called on a DDS_DomainParticipant with existing DDS_Entity objects, the operation returns DDS_RETCODE_PRECONDITION_NOT_MET.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the DDS_DomainParticipant is deleted.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter a_participant is not a valid DDS_DomainParticipant.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - the DDS_DomainParticipant contains one or more DDS_Entity objects.

3.2.2.3 DDS_DomainParticipantFactory_get_default_participant_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipantFactory_get_default_participant_qos
      (DDS_DomainParticipantFactory _this,
        DDS_DomainParticipantQos *qos);
```

Description

This operation gets the default DDS_DomainParticipantQos of the DDS_DomainParticipant.

Parameters

in DDS_DomainParticipantFactory _this - the DDS_DomainParticipantFactory object on which the operation is operated.

*inout DDS_DomainParticipantQos *qos* - a pointer to the DDS_DomainParticipantQos struct (provided by the application) in which the default DDS_DomainParticipantQos for the DDS_DomainParticipant is written.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation gets the default `DDS_DomainParticipantQos` of the `DDS_DomainParticipant` (that is the struct with the `QosPolicy` settings) which is used for newly-created `DDS_DomainParticipant` objects, in case the constant `DDS_PARTICIPANT_QOS_DEFAULT` is used. The default `DDS_DomainParticipantQos` is only used when the constant is supplied as parameter `qos` to specify the `DDS_DomainParticipantQos` in the `DDS_DomainParticipantFactory_create_participant` operation. The application must provide the `DDS_DomainParticipantQos` struct in which the `QosPolicy` settings can be stored and provide a pointer to the struct. The operation writes the default `QosPolicy` settings to the struct pointed to by `qos`. Any settings in the struct are overwritten.

The values retrieved by this operation match the set of values specified on the last successful call to `DDS_DomainParticipantFactory_set_default_participant_qos`, or, if the call was never made, the default values as specified for each `QosPolicy` setting as defined in Table 5: on page 65.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the default `DDS_DomainParticipant` `QosPolicy` settings of this `DDS_DomainParticipantFactory` have successfully been copied into the specified `DDS_DomainParticipantQos` parameter.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.

3.2.2.4 DDS_DomainParticipantFactory_get_instance

Synopsis

```
#include <dds_dcps.h>
DDS_DomainParticipantFactory
   DDS_DomainParticipantFactory_get_instance
      (void);
```

Description

This operation returns the `DDS_DomainParticipantFactory` singleton.

Parameters

<none>

Return Value

DDS_DomainParticipantFactory - return value is a pointer to the DDS_DomainParticipantFactory.

Detailed Description

This operation returns the DDS_DomainParticipantFactory singleton. The operation can be called multiple times without side-effects and it returns the same DDS_DomainParticipantFactory instance.

The pre-defined value DDS_TheParticipantFactory can also be used as an alias for the singleton factory returned by the operation DDS_DomainParticipantFactory_get_instance.

3.2.2.5 DDS_DomainParticipantFactory_get_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipantFactory_get_qos
      (DDS_DomainParticipantFactory _this,
        DDS_DomainParticipantFactoryQos *qos);
```

Description

This operation allows access to the existing set of QoS policies for a DDS_DomainParticipantFactory.

Parameters

in DDS_DomainParticipantFactory _this - the DDS_DomainParticipantFactory object on which the operation is operated.

*inout DDS_DomainParticipantFactoryQos *qos* - a pointer to the destination DDS_DomainparticipantFactoryQos struct in which the QosPolicy settings will be copied.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION or DDS_RETCODE_ OUT_OF_RESOURCES.

Detailed Description

This operation allows access to the existing set of QoS policies of a `DDS_DomainParticipantFactory` on which this operation is used. This `DDS_DomainparticipantFactoryQos` is stored at the location pointed to by the `qos` parameter.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the existing set of QoS policy values applied to this `DDS_DomainParticipantFactory` has successfully been copied into the specified `DDS_DomainParticipantFactoryQos` parameter.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.

3.2.2.6 DDS_DomainParticipantFactory_lookup_participant

Synopsis

```
#include <dds_dcps.h>
DDS_DomainParticipant
   DDS_DomainParticipantFactory_lookup_participant
      (DDS_DomainParticipantFactory _this,
        const DomainId_t domainId);
```

Description

This operation retrieves a previously created `DDS_DomainParticipant` belonging to the specified `domainId`.

Parameters

`in DDS_DomainParticipantFactory _this` - the `DDS_DomainParticipantFactory` object on which the operation is operated.

`in const DomainId_t domainId` - the ID of the Domain for which a joining `DDS_DomainParticipant` should be retrieved. This should be the ID as specified in the configuration file.

Return Value

DDS_DomainParticipant - Return value is a pointer to the DDS_DomainParticipant retrieved. When no such DDS_DomainParticipant is found, the DDS_OBJECT_NIL pointer is returned.

Detailed Description

This operation retrieves a previously created DDS_DomainParticipant belonging to the specified domainId. If no such DDS_DomainParticipant exists, the operation will return DDS_OBJECT_NIL.

The domainId used to search for a specific DDS_DomainParticipant must be identical to the domainId that was used to create that specific DDS_DomainParticipant.

If multiple DDS_DomainParticipant entities belonging to the specified domainId exist, then the operation will return one of them. It is not specified which one. See also *DDS_DomainParticipantFactory_create_participant* (section *3.2.2.1* on page 215).

3.2.2.7 DDS_DomainParticipantFactory_set_default_participant_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipantFactory_set_default_participant_qos
      (DDS_DomainParticipantFactory _this,
        const DDS_DomainParticipantQos *qos);
```

Description

This operation sets the default DDS_DomainParticipantQos of the DDS_DomainParticipant.

Parameters

in DDS_DomainParticipantFactory _this - the DDS_DomainParticipantFactory object on which the operation is operated.

*in const DDS_DomainParticipantQos *qos* - the DDS_DomainParticipantQos struct, which contains the new default DDS_DomainParticipantQos for the newly-created DDS_DomainParticipants.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation sets the default DDS_DomainParticipantQos of the DDS_DomainParticipant (that is the struct with the QosPolicy settings) which is used for newly-created DDS_DomainParticipant objects, in case the constant DDS_PARTICIPANT_QOS_DEFAULT is used. The default DDS_DomainParticipantQos is only used when the constant is supplied as parameter qos to specify the DDS_DomainParticipantQos in the DDS_DomainParticipantFactory_create_participant operation. The DDS_DomainParticipantQos is always self consistent, because its policies do not depend on each other. This means this operation never returns the DDS_RETCODE_INCONSISTENT_POLICY.

The values set by this operation are returned by DDS_DomainParticipantFactory_get_default_participant_qos.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the new default DDS_DomainParticipantQos is set.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter qos is not a valid DDS_DomainParticipantQos. It contains a QosPolicy setting with a sequence that has inconsistent memory settings.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.2.2.8 DDS_DomainParticipantFactory_set_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DomainParticipantFactory_set_qos
      (DDS_DomainParticipantFactory _this,
        const DDS_DomainParticipantFactoryQos *qos);
```

Description

This operation replaces the existing set of `QosPolicy` settings for a `DDS_DomainParticipantFactory`.

Parameters

`in DDS_DomainParticipantFactory _this` - is the `DDS_DomainParticipantFactory` object on which the operation is operated.

`in const DDS_DomainParticipantFactoryQos *qos` - must contain the new set of `QosPolicy` settings for the `DDS_DomainParticipantFactory`.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION` or `DDS_RETCODE_OUT_OF_RESOURCES`.

Detailed Description

This operation replaces the existing set of `QosPolicy` settings for a `DDS_DomainParticipantFactory`. The parameter `qos` must contain the struct with the `QosPolicy` settings.

The set of `QosPolicy` settings specified by the `qos` parameter are applied on top of the existing QoS, replacing the values of any policies previously set (provided, the operation returned `DDS_RETCODE_OK`).

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the new `DDS_DomainParticipantFactoryQos` is set.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.

3.2.2.9 DDS_DomainParticipantFactory_delete_domain

Synopsis

```
#include <dds_dcps.h>
   DDS_ReturnCode_t
      DDS_DomainParticipantFactory_delete_domain
         (DDS_DomainParticipantFactory _this,
```

```
                DDS_Domain a_domain);
```

Description

This operation deletes a DDS_Domain.

Parameters

in DDS_DomainParticipantFactory _this -
the DDS_DomainParticipantFactory object on which the operation is operated.

in DDS_Domain a_domain - a pointer to the DDS_Domain, which is to be deleted.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation deletes a DDS_Domain.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the DDS_Domain is deleted.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter a_domain is not a valid DDS_Domain.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.2.2.10 DDS_DomainParticipantFactory_lookup_domain

Synopsis

```
#include <dds_dcps.h>
   DDS_Domain
      DDS_DomainParticipantFactory_lookup_domain
         (DDS_DomainParticipantFactory _this,
            const DomainId_t domainId);
```

Description

This operation retrieves a previously created `DDS_Domain` proxy belonging to the specified `domainId` or creates a new `DDS_Domain` if no `DDS_Domain` yet exists but the `Domain` itself is available.

Parameters

in DDS_DomainParticipantFactory _this -
the `DDS_DomainParticipantFactory` object on which the operation is operated.

in const DomainId_t domainId - the ID of the `Domain` for which a `DDS_Domain` proxy should be retrieved. This should be the ID as specified in the configuration file.

Return Value

DDS_Domain - Return value is a pointer to the `DDS_Domain` proxy retrieved. When no such `DDS_Domain` proxy is found or could be created, the `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation retrieves a previously created `DDS_Domain` proxy belonging to the specified `domainId` or creates a new `DDS_Domain` proxy if no `DDS_Domain` proxy was found, but the `DomainId` does refer to a valid Domain. If no such `DDS_Domain` exists or could be created, the operation will return `DDS_OBJECT_NIL`. See also *DDS_DomainParticipantFactory_create_participant* (section *3.2.2.1* on page 215).

3.2.2.11 DDS_DomainParticipantFactory_delete_contained_entities

Synopsis

```
#include <dds_dcps.h>
   DDS_ReturnCode_t
      DDS_DomainParticipantFactory_delete_contained_entities
         (DDS_DomainParticipantFactory _this);
```

Description

This operation deletes all of the `DDS_Entity` objects that were created on the `DDS_DomainParticipantFactory`.

Parameters

in DDS_DomainParticipantFactory _this -
the `DDS_DomainParticipantFactory` object on which the operation is performed.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are:
DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_PRECONDITION_NOT_MET or DDS_RETCODE_BAD_PARAMETER.

Detailed Description

This operation deletes all of the DDS_Entity objects that were created on the DDS_DomainParticipantFactory (it deletes all contained DDS_DomainParticipant objects). Prior to deleting each contained DDS_Entity, this operation regressively calls the DDS_DomainParticipant_delete_contained_entities operation on each DDS_Participant. In other words, this operation cleans up all DDS_Entity objects in the process.

NOTE: The operation will return DDS_PRECONDITION_NOT_MET if the any of the contained entities is in a state where it cannot be deleted. This will occur, for example, if a contained DDS_DataReader cannot be deleted because the application has called a read or take operation and has not called the corresponding return_loan operation to return the loaned samples. In such cases, the operation does not roll back any entity deletions performed prior to the detection of the problem.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - all contained DDS_Entity objects are deleted.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - one or more of the contained entities are in a state where they cannot be deleted.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter _this is not a valid DDS_DomainParticipantFactory.

3.2.3 Class DDS_Domain

The purpose of this class is to represent the Domain and allow certain Domain-wide operations to be performed. In essence it is a proxy to the Domain.

A `Domain` is a distributed concept that links all the applications that must be able to communicate with each other. It represents a communication plane: only the `DDS_Publishers` and the `DDS_Subscribers` attached to the same `Domain` can interact.

This class currently implements one function:

- It allows for a snapshot to be taken of all persistent data available within this `Domain` on local node level.

The interface description of this class is as follows:

```
/*
* interface DDS_Domain
*/
DDS_ReturnCode_t
   DDS_Domain_create_persistent_snapshot(
      DDS_Domain _this,
      const DDS_char* partition_expression,
      const DDS_char* topic_expression,
      const DDS_char* URI);
```

The following sections describe the usage of all `DDS_Domain` operations.

3.2.3.1 DDS_Domain_create_persistent_snapshot

Synopsis

```
#include <dds_dcps.h>
   DDS_ReturnCode_t
      DDS_Domain_create_persistent_snapshot(
         DDS_Domain _this,
         const DDS_char* partition_expression,
         const DDS_char* topic_expression,
         const DDS_char* URI);
```

Description

This operation will create a snapshot of all persistent data matching the provided partition and topic expressions and store the snapshot at the location indicated by the URI. Only persistent data available on the local node is considered.

Parameters

in *`DDS_Domain _this`* - the `DDS_Domain` object on which the operation is operated.

in *`DDS_char* partition_expression`* - the expression of all partitions involved in the snapshot; this may contain wildcards.

in *`DDS_char* topic_expression`* - the expression of all topics involved in the snapshot; this may contain wildcards.

in DDS_char uri* - the location where to store the snapshot. Currently only directories are supported.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation will create a snapshot of all persistent data matching the provided partition and topic expressions and store the snapshot at the location indicated by the URI. Only persistent data available on the local node is considered. This operation will fire an event to trigger the snapshot creation by the durability service and then return while the durability service fulfills the snapshot request; if no durability service is available then there is no persistent data available and the operation will return OK as a snapshot of an empty store is an empty store.

The created snapshot can then be used as the persistent store for the durability service next time it starts up by configuring the location of the snapshot as the persistent store in the configuration file. The durability service will then use the snapshot as the regular store (and can thus also alter its contents).

Return Code

When the operation returns:

- *DDS_RETCODE_OK* – The persistent snapshot is (being) created.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter partition_expression, topic_expression or uri is NIL.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Domain proxy has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.2.4 DDS_DomainParticipantListener interface

Since a DDS_DomainParticipant is a DDS_Entity, it has the ability to have a Listener associated with it. In this case, the associated Listener should be of type DDS_DomainParticipantListener. This interface must be implemented by the application. A user-defined class must be provided by the application which

must extend from the `DDS_DomainParticipantListener` class. **All** `DDS_DomainParticipantListener` operations **must** be implemented in the user-defined class, it is up to the application whether an operation is empty or contains some functionality.

All operations for this interface must be implemented in the user-defined class, it is up to the application whether an operation is empty or contains some functionality.

The `DDS_DomainParticipantListener` provides a generic mechanism (actually a callback function) for the Data Distribution Service to notify the application of relevant asynchronous status change events, such as a missed deadline, violation of a `QosPolicy` setting, etc. The `DDS_DomainParticipantListener` is related to changes in communication status `DDS_StatusConditions`.

The interface description of this class is as follows:

```
/*
 * interface DDS_DomainParticipantListener
 */
/*
 * inherited from DDS_TopicListener
 */
/* void
 *    DDS_DomainParticipantListener_on_inconsistent_topic
 *       (void *listener_data,
 *         DDS_Topic the_topic,
 *         const DDS_InconsistentTopicStatus *status);
 */
/*
 * inherited from DDS_PublisherListener
 */
/* void
 * DDS_DomainParticipantListener_on_offered_deadline_missed
 *       (void *listener_data,
 *         DDS_DataWriter writer,
 *         const DDS_OfferedDeadlineMissedStatus *status);
 */

/* void
 *    DDS_DomainParticipantListener_on_offered_incompatible_qos
 *       (void *listener_data,
 *         DDS_DataWriter writer,
 *         const DDS_OfferedIncompatibleQosStatus *status);
 */

/* void
 *    DDS_DomainParticipantListener_on_liveliness_lost
 *       (void *listener_data,
```

```
 *          DDS_DataWriter writer,
 *           const DDS_LivelinessLostStatus *status);
 */

/* void
 *    DDS_DomainParticipantListener_on_publication_matched
 *       (void *listener_data,
 *         DDS_DataWriter writer,
 *        const DDS_PublicationMatchedStatus *status);
 */
/*
 * inherited from DDS_SubscriberListener
 */
/* void
 *    DDS_DomainParticipantListener_on_data_on_readers
 *       (void *listener_data,
 *         DDS_Subscriber subs);
 */
/* void
*   DDS_DomainParticipantListener_on_requested_deadline_missed
 *       (void *listener_data,
 *        DDS_DataReader reader,
 *         const DDS_RequestedDeadlineMissedStatus *status);
 */

/* void
 *    DDS_DomainParticipantListener_on_requested_incompatible_qos
 *       (void *listener_data,
 *         DDS_DataReader reader,
 *        const DDS_RequestedIncompatibleQosStatus *status);
 */

/* void
 *    DDS_DomainParticipantListener_on_sample_rejected
 *       (void *listener_data,
 *         DDS_DataReader reader,
 *       const DDS_SampleRejectedStatus *status);
 */

/* void
 *    DDS_DomainParticipantListener_on_liveliness_changed
 *       (void *listener_data,
 *         DDS_DataReader reader,
 *          const DDS_LivelinessChangedStatus *status);
 */

/* void
 *    DDS_DomainParticipantListener_on_data_available
 *       (void *listener_data,
 *         DDS_DataReader reader);
```

```
 */

/* void
 *    DDS_DomainParticipantListener_on_subscription_matched
 *       (void *listener_data,
 *         DDS_DataReader reader,
 *         const DDS_SubscriptionMatchedStatus *status);
 */

/* void
 *    DDS_DomainParticipantListener_on_sample_lost
 *       (void *listener_data,
 *         DDS_DataReader reader,
 *         const DDS_SampleLostStatus *status);
 */
/*
 * implemented API operations
 */
   struct DDS_DomainParticipantListener *
      DDS_DomainParticipantListener__alloc
         (void);
```

The next paragraphs list all `DDS_DomainParticipantListener` operations. Since these operations are all inherited, they are listed but not fully described because they are not implemented in this class. The full description of these operations is given in the classes from which they are inherited.

3.2.4.1 DDS_DomainParticipantListener__alloc

Synopsis

```
#include <dds_dcps.h>
struct DDS_DomainParticipantListener *
   DDS_DomainParticipantListener__alloc
      (void);
```

Description

This operation creates a new `DDS_DomainParticipantListener`.

Parameters

<none>

Return Value

`struct DDS_DomainParticipantListener *` - Return value is the handle to the newly-created `DDS_DomainParticipantListener`. In case of an error, a `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation creates a new `DDS_DomainParticipantListener`. The `DDS_DomainParticipantListener` must be created using this operation. In other words, the application is not allowed to declare an object of type `DDS_DomainParticipantListener`. When the application wants to release the `DDS_DomainParticipantListener` it must be released using `DDS_free`.

In case there are insufficient resources available to allocate the `DDS_DomainParticipantListener`, a `DDS_OBJECT_NIL` pointer is returned instead.

3.2.4.2 DDS_DomainParticipantListener_on_data_available (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DomainParticipantListener_on_data_available
      (void *listener_data,
        DDS_DataReader reader);
```

3.2.4.3 DDS_DomainParticipantListener_on_data_on_readers (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_SubscriberListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DomainParticipantListener_on_data_on_readers
      (void *listener_data,
        DDS_Subscriber subs);
```

3.2.4.4 DDS_DomainParticipantListener_on_inconsistent_topic (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_TopicListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DomainParticipantListener_on_inconsistent_topic
```

```
      (void *listener_data,
        DDS_Topic the_topic,
        const DDS_InconsistentTopicStatus *status);
```

3.2.4.5 DDS_DomainParticipantListener_on_liveliness_changed (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DomainParticipantListener_on_liveliness_changed
      (void *listener_data,
        DDS_DataReader reader,
        const DDS_LivelinessChangedStatus *status);
```

3.2.4.6 DDS_DomainParticipantListener_on_liveliness_lost (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataWriterListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DomainParticipantListener_on_liveliness_lost
      (void *listener_data,
        DDS_DataWriter writer,
        const DDS_LivelinessLostStatus *status);
```

3.2.4.7 DDS_DomainParticipantListener_on_offered_deadline_missed (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataWriterListener` for further explanation.

```
Synopsis
#include <dds_dcps.h>
void
   DDS_DomainParticipantListener_on_offered_deadline_missed
      (void *listener_data,
        DDS_DataWriter writer,
        const DDS_OfferedDeadlineMissedStatus *status);
```

3.2.4.8 DDS_DomainParticipantListener_on_offered_incompatible_qos

(inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataWriterListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DomainParticipantListener_on_offered_incompatible_qos
      (void *listener_data,
        DDS_DataWriter writer,
        const DDS_OfferedIncompatibleQosStatus *status);
```

3.2.4.9 DDS_DomainParticipantListener_on_publication_matched (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataWriterListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DomainParticipantListener_on_publication_matched
      (void *listener_data,
        DDS_DataWriter writer,
        const DDS_PublicationMatchedStatus *status);
```

3.2.4.10 DDS_DomainParticipantListener_on_requested_deadline_missed (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DomainParticipantListener_on_requested_deadline_missed
      (void *listener_data,
        DDS_DataReader reader,
        const DDS_RequestedDeadlineMissedStatus *status);
```

3.2.4.11 DDS_DomainParticipantListener_on_requested_incompatible_qos (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
 DDS_DomainParticipantListener_on_requested_incompatible_qos
      (void *listener_data,
        DDS_DataReader reader,
        const DDS_RequestedIncompatibleQosStatus *status);
```

3.2.4.12 DDS_DomainParticipantListener_on_sample_lost (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DomainParticipantListener_on_sample_lost
      (void *listener_data,
        DDS_DataReader reader,
        const DDS_SampleLostStatus *status);
```

3.2.4.13 DDS_DomainParticipantListener_on_sample_rejected (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DomainParticipantListener_on_sample_rejected
      (void *listener_data,
        DDS_DataReader reader,
        const DDS_SampleRejectedStatus *status);
```

3.2.4.14 DDS_DomainParticipantListener_on_subscription_matched (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DomainParticipantListener_on_subscription_matched
      (void *listener_data,
        DDS_DataReader reader,
          const DDS_SubscriptionMatchedStatus *status);
```

3.2.5 DDS_ExtDomainParticipantListener interface

The `ExtDomainParticipantListener` interface is a subtype of both `DomainParticipantListener` and `ExtTopicListener` and thereby provides an additional OpenSplice-specific callback, `on_all_disposed_data`, usable from the `DomainParticipant`.

All operations for this interface must be implemented in the user-defined class, it is up to the application whether an operation is empty or contains some functionality.

The interface description of this class is as follows:

```
/*
 * interface DDS_ExtDomainParticipantListener
 */
/*
 * inherited from DDS_TopicListener
 */
/*  void
 *     DDS_ExtDomainParticipantListener_on_inconsistent_topic
 *        (void *listener_data,
 *          DDS_Topic the_topic,
 *          const DDS_InconsistentTopicStatus *status);
 */
/*
 * inherited from DDS_ExtTopicListener
 */
/* void
 *    DDS_ExtDomainParticipantListener_on_all_data_disposed
 *       (void *listener_data,
 *         DDS_Topic the_topic);
 */
/*
 * inherited from DDS_PublisherListener
 */
/*  void
 *  DDS_ExtDomainParticipantListener_on_offered_deadline_missed
 *       (void *listener_data,
 *         DDS_DataWriter writer,
 *         const DDS_OfferedDeadlineMissedStatus *status);
 */

/*  void
 *     DDS_ExtDomainParticipantListener_on_offered_incompatible_qos
 *       (void *listener_data,
 *         DDS_DataWriter writer,
 *          const DDS_OfferedIncompatibleQosStatus *status);
 */

/*  void
```

```
 *    DDS_ExtDomainParticipantListener_on_liveliness_lost
 *       (void *listener_data,
 *         DDS_DataWriter writer,
 *          const DDS_LivelinessLostStatus *status);
 */

/* void
 *    DDS_ExtDomainParticipantListener_on_publication_matched
 *       (void *listener_data,
 *         DDS_DataWriter writer,
 *        const DDS_PublicationMatchedStatus *status);
 */
/*
 * inherited from DDS_SubscriberListener
 */
/* void
 *    DDS_ExtDomainParticipantListener_on_data_on_readers
 *       (void *listener_data,
 *         DDS_Subscriber subs);
 */
/* void
 *   DDS_ExtDomainParticipantListener_on_requested_deadline_missed
 *       (void *listener_data,
 *        DDS_DataReader reader,
 *          const DDS_RequestedDeadlineMissedStatus *status);
 */

/* void
 *    DDS_ExtDomainParticipantListener_on_requested_incompatible_qos
 *       (void *listener_data,
 *         DDS_DataReader reader,
 *        const DDS_RequestedIncompatibleQosStatus *status);
 */

/* void
 *    DDS_ExtDomainParticipantListener_on_sample_rejected
 *       (void *listener_data,
 *         DDS_DataReader reader,
 *       const DDS_SampleRejectedStatus *status);
 */

/* void
 *    DDS_ExtDomainParticipantListener_on_liveliness_changed
 *       (void *listener_data,
 *         DDS_DataReader reader,
 *          const DDS_LivelinessChangedStatus *status);
 */

/* void
 *    DDS_ExtDomainParticipantListener_on_data_available
```

```
 *       (void *listener_data,
 *         DDS_DataReader reader);
 */

/* void
 *    DDS_ExtDomainParticipantListener_on_subscription_matched
 *       (void *listener_data,
 *         DDS_DataReader reader,
 *         const DDS_SubscriptionMatchedStatus *status);
 */

/* void
 *    DDS_ExtDomainParticipantListener_on_sample_lost
 *       (void *listener_data,
 *         DDS_DataReader reader,
 *         const DDS_SampleLostStatus *status);
 */
/*
 * implemented API operations
 */
   struct DDS_ExtDomainParticipantListener *
      DDS_ExtDomainParticipantListener__alloc
         (void);
```

The following paragraphs list all `ExtDomainParticipantListener` operations. Since these operations are all inherited, they are listed but not fully described because they are not implemented in this class. The full descriptions of these operations are given in the classes from which they are inherited.

3.2.5.1 DDS_ExtDomainParticipantListener__alloc

Synopsis

```
#include <dds_dcps.h>
struct DDS_ExtDomainParticipantListener *
   DDS_ExtDomainParticipantListener__alloc
      (void);
```

Description

This operation creates a new `DDS_ExtDomainParticipantListener`.

Parameters

<none>

Return Value

`struct DDS_ExtDomainParticipantListener *` - Return value is the handle to the newly-created `DDS_ExtDomainParticipantListener`. In case of an error, a `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation creates a new `DDS_ExtDomainParticipantListener`. The `DDS_ExtDomainParticipantListener` must be created using this operation. In other words, the application is not allowed to declare an object of type `DDS_ExtDomainParticipantListener`. When the application wants to release the `DDS_ExtDomainParticipantListener` it must be released using `DDS_free`.

In case there are insufficient resources available to allocate the `DDS_ExtDomainParticipantListener`, a `DDS_OBJECT_NIL` pointer is returned instead.

3.2.5.2 DDS_ExtDomainParticipantListener_on_data_available (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_ExtDomainParticipantListener_on_data_available
      (void *listener_data,
        DDS_DataReader reader);
```

3.2.5.3 DDS_ExtDomainParticipantListener_on_data_on_readers (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_SubscriberListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_ExtDomainParticipantListener_on_data_on_readers
      (void *listener_data,
        DDS_Subscriber subs);
```

3.2.5.4 DDS_ExtDomainParticipantListener_on_inconsistent_topic (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_TopicListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
```

```
DDS_ExtDomainParticipantListener_on_inconsistent_topic
   (void *listener_data,
     DDS_Topic the_topic,
     const DDS_InconsistentTopicStatus *status);
```

3.2.5.5 DDS_ExtDomainParticipantListener_on_liveliness_changed (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_ExtDomainParticipantListener_on_liveliness_changed
      (void *listener_data,
        DDS_DataReader reader,
        const DDS_LivelinessChangedStatus *status);
```

3.2.5.6 DDS_ExtDomainParticipantListener_on_liveliness_lost (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataWriterListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_ExtDomainParticipantListener_on_liveliness_lost
      (void *listener_data,
        DDS_DataWriter writer,
        const DDS_LivelinessLostStatus *status);
```

3.2.5.7 DDS_ExtDomainParticipantListener_on_offered_deadline_missed (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataWriterListener` for further explanation.

```
Synopsis
#include <dds_dcps.h>
void
   DDS_ExtDomainParticipantListener_on_offered_deadline_missed
      (void *listener_data,
        DDS_DataWriter writer,
        const DDS_OfferedDeadlineMissedStatus *status);
```

3.2.5.8 DDS_ExtDomainParticipantListener_on_offered_incompatible_qos

(inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataWriterListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_ExtDomainParticipantListener_on_offered_incompatible_qos
      (void *listener_data,
        DDS_DataWriter writer,
        const DDS_OfferedIncompatibleQosStatus *status);
```

3.2.5.9 DDS_ExtDomainParticipantListener_on_publication_matched (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataWriterListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_ExtDomainParticipantListener_on_publication_matched
      (void *listener_data,
        DDS_DataWriter writer,
        const DDS_PublicationMatchedStatus *status);
```

3.2.5.10 DDS_ExtDomainParticipantListener_on_requested_deadline_missed (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_ExtDomainParticipantListener_on_requested_deadline_missed
      (void *listener_data,
        DDS_DataReader reader,
        const DDS_RequestedDeadlineMissedStatus *status);
```

3.2.5.11 DDS_ExtDomainParticipantListener_on_requested_incompatible_qos (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
 DDS_ExtDomainParticipantListener_on_requested_incompatible_qos
      (void *listener_data,
        DDS_DataReader reader,
        const DDS_RequestedIncompatibleQosStatus *status);
```

3.2.5.12 DDS_ExtDomainParticipantListener_on_sample_lost (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_ExtDomainParticipantListener_on_sample_lost
      (void *listener_data,
        DDS_DataReader reader,
        const DDS_SampleLostStatus *status);
```

3.2.5.13 DDS_ExtDomainParticipantListener_on_sample_rejected (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_ExtDomainParticipantListener_on_sample_rejected
      (void *listener_data,
        DDS_DataReader reader,
        const DDS_SampleRejectedStatus *status);
```

3.2.5.14 DDS_ExtDomainParticipantListener_on_subscription_matched (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_ExtDomainParticipantListener_on_subscription_matched
      (void *listener_data,
        DDS_DataReader reader,
```

```
const DDS_SubscriptionMatchedStatus *status);
```

3.2.5.15 DDS_ExtDomainParticipantListener_on_all_data_disposed (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_ExtTopicListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_ExtDomainParticipantListener_on_all_data_disposed
      (DDS_Topic the_topic);
```

3.3 Topic-Definition Module

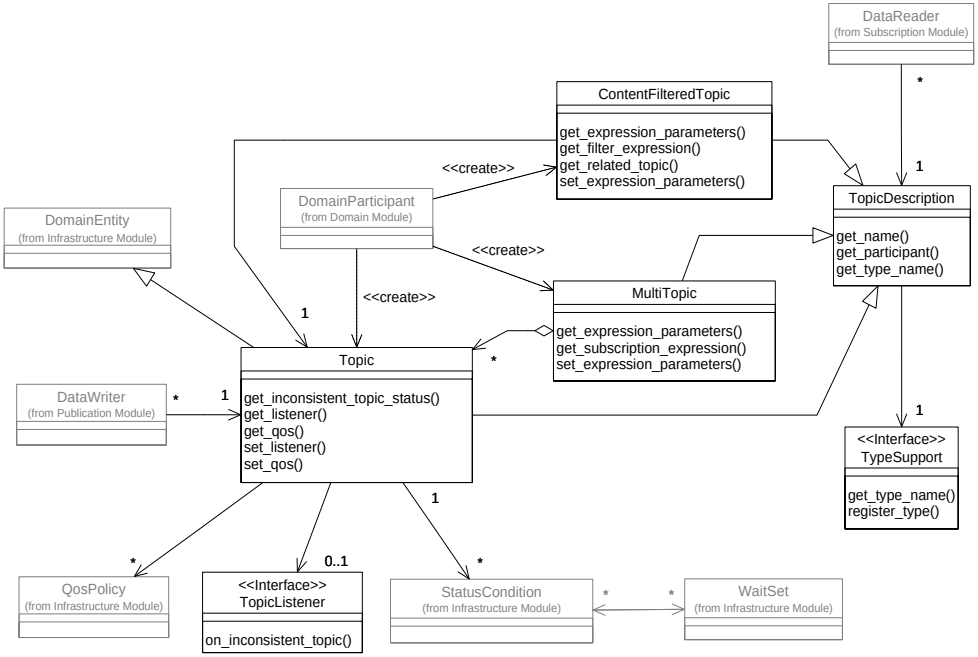

Figure 16: DCPS Topic-Definition Module Class Model

This module contains the following classes:

- `DDS_TopicDescription` (abstract)
- `DDS_Topic`
- `DDS_ContentFilteredTopic`
- `DDS_MultiTopic`

- `DDS_TopicListener` (interface)
- Topic-Definition type specific classes.

"Topic-Definition type specific classes" contains the generic class and the generated data type specific classes. For each data type, a data type specific class `<NameSpace>_<type>TypeSupport` is generated (based on IDL) by calling the pre-processor.

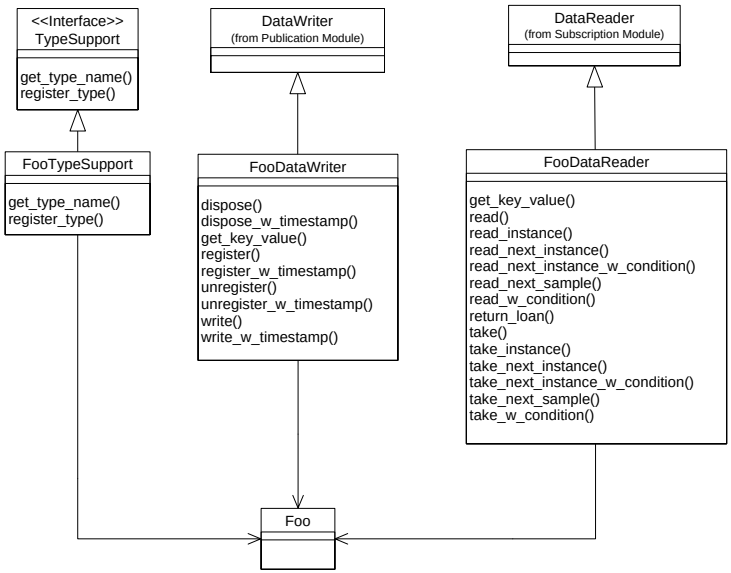

Figure 17: Pre-processor Generation of the Typed Classes for Data Type "Foo"

For instance, for the user-defined data type `Foo` (this also applies to other types), defined in the module `SPACE`; "Topic-Definition type specific classes" contains the following classes:

- `DDS_TypeSupport` (abstract)
- `SPACE_FooTypeSupport`.

`DDS_Topic` objects conceptually fit between publications and subscriptions. Publications must be known in such a way that subscriptions can refer to them unambiguously. A `DDS_Topic` is meant to fulfil that purpose: it associates a name (unique in the `Domain`), a data type, and `DDS_TopicQos` related to the data itself.

3.3.1 Class DDS_TopicDescription (abstract)

This class is an abstract class. It is the base class for `DDS_Topic`, `DDS_ContentFilteredTopic` and `DDS_MultiTopic`.

The DDS_TopicDescription attribute type_name defines an unique data type that is made available to the Data Distribution Service via the DDS_TypeSupport. DDS_TopicDescription has also a name that allows it to be retrieved locally.

The interface description of this class is as follows:

```
/*
 * interface DDS_TopicDescription
 */
/*
 * implemented API operations
 */
   DDS_string
      DDS_TopicDescription_get_type_name
         (DDS_TopicDescription _this);

   DDS_string
      DDS_TopicDescription_get_name
         (DDS_TopicDescription _this);

   DDS_DomainParticipant
      DDS_TopicDescription_get_participant
         (DDS_TopicDescription _this);
```

The next paragraphs describe the usage of all DDS_TopicDescription operations.

3.3.1.1 DDS_TopicDescription_get_name

Synopsis

```
#include <dds_dcps.h>
DDS_string
   DDS_TopicDescription_get_name
      (DDS_TopicDescription _this);
```

Description

This operation returns the name used to create the DDS_TopicDescription.

Parameters

in DDS_TopicDescription _this - the DDS_TopicDescription object on which the operation is operated.

Return Value

DDS_string - the name of the DDS_TopicDescription.

Detailed Description

This operation returns the name used to create the DDS_TopicDescription.

3.3.1.2 DDS_TopicDescription_get_participant

Synopsis

```
#include <dds_dcps.h>
DDS_DomainParticipant
   DDS_TopicDescription_get_participant
      (DDS_TopicDescription _this);
```

Description

This operation returns the `DDS_DomainParticipant` associated with the `DDS_TopicDescription` or the `DDS_OBJECT_NIL` pointer.

Parameters

in *`DDS_TopicDescription _this`* - the `DDS_TopicDescription` object on which the operation is operated.

Return Value

`DDS_DomainParticipant` - a pointer to the `DDS_DomainParticipant` associated with the `DDS_TopicDescription` or the `DDS_OBJECT_NIL` pointer.

Detailed Description

This operation returns the `DDS_DomainParticipant` associated with the `DDS_TopicDescription`. Note that there is exactly one `DDS_DomainParticipant` associated with each `DDS_TopicDescription`. When the `DDS_TopicDescription` was already deleted (there is no associated `DDS_DomainParticipant` any more), the `DDS_OBJECT_NIL` pointer is returned.

3.3.1.3 DDS_TopicDescription_get_type_name

Synopsis

```
#include <dds_dcps.h>
DDS_string
   DDS_TopicDescription_get_type_name
      (DDS_TopicDescription _this);
```

Description

This operation returns the registered name of the data type associated with the `DDS_TopicDescription`.

Parameters

in *`DDS_TopicDescription _this`* - the `DDS_TopicDescription` object on which the operation is operated.

Return Value

DDS_string - return value is the name of the data type of the DDS_TopicDescription.

Detailed Description

This operation returns the registered name of the data type associated with the DDS_TopicDescription.

3.3.2 Class DDS_Topic

DDS_Topic is the most basic description of the data to be published and subscribed.

A DDS_Topic is identified by its name, which must be unique in the whole Domain. In addition (by virtue of extending DDS_TopicDescription) it fully identifies the type of data that can be communicated when publishing or subscribing to the DDS_Topic.

DDS_Topic is the only DDS_TopicDescription that can be used for publications and therefore a specialized DDS_DataWriter is associated to the DDS_Topic.

The interface description of this class is as follows:

```
/*
 * interface DDS_Topic
 */
/*
 * inherited from class DDS_Entity
 */
/* DDS_StatusCondition
 *    DDS_Topic_get_statuscondition
 *       (DDS_Topic _this);
 */
/* DDS_StatusMask
 *    DDS_Topic_get_status_changes
 *       (DDS_Topic _this);
 */
/* DDS_ReturnCode_t
 *    DDS_Topic_enable
 *       (DDS_Topic _this);
 */
/*
 * inherited from class DDS_TopicDescription
 */
/* DDS_string
 *    DDS_Topic_get_type_name
 *       (DDS_Topic _this);
 */

/* DDS_string
 *    DDS_Topic_get_name
```

```
 *       (DDS_Topic _this);
 */

/*  DDS_DomainParticipant
 *     DDS_Topic_get_participant
 *        (DDS_Topic _this);
 */
/*
 * implemented API operations
 */
   DDS_ReturnCode_t
      DDS_Topic_set_qos
         (DDS_Topic _this,
           const DDS_TopicQos *qos);
   DDS_ReturnCode_t
      DDS_Topic_get_qos
         (DDS_Topic _this,
           DDS_TopicQos *qos);
   DDS_ReturnCode_t
      DDS_Topic_set_listener
         (DDS_Topic _this,
           const struct DDS_TopicListener *a_listener,
           const DDS_StatusMask mask);
   struct DDS_TopicListener
      DDS_Topic_get_listener
         (DDS_Topic _this);
   DDS_ReturnCode_t
      DDS_Topic_get_inconsistent_topic_status
         (DDS_Topic _this,
              DDS_InconsistentTopicStatus *a_status);
   DDS_ReturnCode_t dispose_all_data ();
```

The next paragraphs describe the usage of all `DDS_Topic` operations. The inherited operations are listed but not fully described because they are not implemented in this class. The full description of these operations is given in the classes from which they are inherited.

3.3.2.1 DDS_Topic_enable (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Topic_enable
      (DDS_Topic _this);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.3.2.2 DDS_Topic_get_inconsistent_topic_status

Synopsis

```
#include <dds_dcps.h>

DDS_ReturnCode_t
   DDS_Topic_get_inconsistent_topic_status
      (DDS_Topic _this,
        DDS_InconsistentTopicStatus *a_status);
```

Description

This operation obtains the `DDS_InconsistentTopicStatus` of the `DDS_Topic`.

Parameters

`in DDS_Topic _this` - the `DDS_Topic` object on which the operation is operated.

`inout DDS_InconsistentTopicStatus *a_status` - the contents of the `DDS_InconsistentTopicStatus` struct of the `DDS_Topic` will be copied into the location specified by `a_status`.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_ALREADY_DELETED` or `DDS_RETCODE_OUT_OF_RESOURCES`.

Detailed Description

This operation obtains the `DDS_InconsistentTopicStatus` of the `DDS_Topic`. The `DDS_InconsistentTopicStatus` can also be monitored using a `DDS_TopicListener` or by using the associated `DDS_StatusCondition`.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the current `DDS_InconsistentTopicStatus` of this `DDS_Topic` has successfully been copied into the specified `a_status` parameter.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_Topic` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.

3.3.2.3 DDS_Topic_get_listener

Synopsis

```
#include <dds_dcps.h>
struct DDS_TopicListener
   DDS_Topic_get_listener
      (DDS_Topic _this);
```

Description

This operation allows access to a `DDS_TopicListener`.

Parameters

`in DDS_Topic _this` - the `DDS_Topic` object on which the operation is operated.

Return Value

`struct DDS_TopicListener` - to the `DDS_TopicListener` attached to the `DDS_Topic`.

Detailed Description

This operation allows access to a `DDS_TopicListener` attached to the `DDS_Topic`. When no `DDS_TopicListener` was attached to the `DDS_Topic`, the `DDS_OBJECT_NIL` pointer is returned.

3.3.2.4 DDS_Topic_get_name (inherited)

This operation is inherited and therefore not described here. See the class `DDS_TopicDescription` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_string
   DDS_Topic_get_name
      (DDS_Topic _this);
```

3.3.2.5 DDS_Topic_get_participant (inherited)

This operation is inherited and therefore not described here. See the class `DDS_TopicDescription` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_DomainParticipant
   DDS_Topic_get_participant
      (DDS_Topic _this);
```

3.3.2.6 DDS_Topic_get_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Topic_get_qos
      (DDS_Topic _this,
        DDS_TopicQos *qos);
```

Description

This operation allows access to the existing set of QoS policies for a `DDS_Topic`.

Parameters

`in DDS_Topic _this` - the `DDS_Topic` object on which the operation is operated.

`inout DDS_TopicQos *qos` - a pointer to the destination `DDS_TopicQos` struct in which the `QosPolicy` settings will be copied.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_ALREADY_DELETED` or `DDS_RETCODE_OUT_OF_RESOURCES`.

Detailed Description

This operation allows access to the existing set of QoS policies of a `DDS_Topic` on which this operation is used. This `DDS_TopicQos` is stored at the location pointed to by the `qos` parameter.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the existing set of QoS policy values applied to this `DDS_Topic` has successfully been copied into the specified `DDS_TopicQos` parameter.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_Topic` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.

3.3.2.7 DDS_Topic_get_status_changes (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_StatusMask
   DDS_Topic_get_status_changes
      (DDS_Topic _this);
```

3.3.2.8 DDS_Topic_get_statuscondition (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_StatusCondition
   DDS_Topic_get_statuscondition
      (DDS_Topic _this);
```

3.3.2.9 DDS_Topic_get_type_name (inherited)

This operation is inherited and therefore not described here. See the class `DDS_TopicDescription` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_string
   DDS_Topic_get_type_name
      (DDS_Topic _this);
```

3.3.2.10 DDS_Topic_set_listener

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Topic_set_listener
      (DDS_Topic _this,
        const struct DDS_TopicListener *a_listener,
        const DDS_StatusMask mask);
```

Description

This operation attaches a `DDS_TopicListener` to the `DDS_Topic`.

Parameters

in DDS_Topic _this - the DDS_Topic object on which the operation is operated.

*in const struct DDS_TopicListener *a_listener* - a pointer to the DDS_TopicListener instance, which will be attached to the DDS_Topic.

in const DDS_StatusMask mask - a bit-mask in which each bit enables the invocation of the DDS_TopicListener for a certain status.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation attaches a DDS_TopicListener to the DDS_Topic. Only one DDS_TopicListener can be attached to each DDS_Topic. If a DDS_TopicListener was already attached, the operation will replace it with the new one. When a_listener is the DDS_OBJECT_NIL pointer, it represents a listener that is treated as a NOOP[1] for all statuses activated in the bitmask.

Communication Status

For each communication status, the StatusChangedFlag flag is initially set to FALSE. It becomes TRUE whenever that plain communication status changes. For each plain communication status activated in the mask, the associated DDS_TopicListener operation is invoked and the communication status is reset to FALSE, as the listener implicitly accesses the status which is passed as a parameter to that operation. The status is reset prior to calling the listener, so if the application calls the get_<status_name> from inside the listener it will see the status already reset. An exception to this rule is the DDS_OBJECT_NIL listener, which does not reset the communication statuses for which it is invoked.

The following statuses are applicable to the DDS_TopicListener:

- DDS_INCONSISTENT_TOPIC_STATUS.

Status bits are declared as a constant and can be used by the application in an OR operation to create a tailored mask. The special constant DDS_STATUS_MASK_NONE can be used to indicate that the created entity should not respond to any of its available statuses. The DDS will therefore attempt to propagate these statuses to its

1. Short for **No-Op**eration, an instruction that peforms nothing at all.

factory. The special constant STATUS_MASK_ANY_V1_2 can be used to select all statuses specified in the "Data Distribution Service for Real-time Systems Version 1.2" specification.

Status Propagation

In case a communication status is not activated in the mask of the DDS_TopicListener, the DDS_DomainParticipantListener of the containing DDS_DomainParticipant is invoked (if attached and activated for the status that occurred). This allows the application to set a default behaviour in the DDS_DomainParticipantListener of the containing DDS_DomainParticipant and a DDS_Topic specific behaviour when needed. In case the DDS_DomainParticipantListener is also not attached or the communication status is not activated in its mask, the application is not notified of the change.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the DDS_TopicListener is attached.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Topic has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.3.2.11 DDS_Topic_set_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Topic_set_qos
      (DDS_Topic _this,
        const DDS_TopicQos *qos);
```

Description

This operation replaces the existing set of QosPolicy settings for a DDS_Topic.

Parameters

in DDS_Topic _this - the DDS_Topic object on which the operation is operated.

*in const DDS_TopicQos *qos* - new set of QosPolicy settings for the DDS_Topic.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_IMMUTABLE_POLICY or DDS_RETCODE_INCONSISTENT_POLICY.

Detailed Description

This replaces the existing set of QosPolicy settings for a DDS_Topic. The parameter qos must contain the struct with the QosPolicy settings which is checked for self-consistency and mutability. When the application tries to change a QosPolicy setting for an enabled DDS_Topic, which can only be set before the DDS_Topic is enabled, the operation will fail and a DDS_RETCODE_IMMUTABLE_POLICY is returned. In other words, the application must provide the currently set QosPolicy settings in case of the immutable QosPolicy settings. Only the mutable QosPolicy settings can be changed. When qos contains conflicting QosPolicy settings (not self-consistent), the operation will fail and a DDS_RETCODE_INCONSISTENT_POLICY is returned.

The set of QosPolicy settings specified by the qos parameter are applied on top of the existing QoS, replacing the values of any policies previously set (provided, the operation returned DDS_RETCODE_OK).

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the new DDS_TopicQos is set.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter qos is not a valid DDS_TopicQos. It contains a QosPolicy setting with an invalid DDS_Duration_t value, an enum value that is outside its legal boundaries or a sequence that has inconsistent memory settings.
- *DDS_RETCODE_UNSUPPORTED* - one or more of the selected QosPolicy values are currently not supported by OpenSplice.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Topic has already been deleted.

- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_IMMUTABLE_POLICY* - the parameter `qos` contains an immutable `QosPolicy` setting with a different value than set during enabling of the `DDS_Topic`.
- *DDS_RETCODE_INCONSISTENT_POLICY* - the parameter `qos` contains conflicting `QosPolicy` settings, *e.g.* a history depth that is higher than the specified resource limits.

3.3.2.12 DDS_Topic_dispose_all_data

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t dispose_all_data ();
```

Description

This operation allows the application to dispose of all of the instances for a particular topic without the network overhead of using a separate `dispose` call for each instance.

Parameters

<none>

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_OUT_OF_RESOURCES`, `DDS_RETCODE_ALREADY_DELETED`, `DDS_RETCODE_NOT_ENABLED`.

DetailedDescription

This operation allows the application to dispose of all of the instances for a particular topic without the network overhead of using a separate `dispose` call for each instance. Its effect is equivalent to invoking a separate `dispose` operation for each individual instance on the `DataWriter` that owns it. (See the description of `FooDataWriter.dispose` in Section 3.4.2.33, *SPACE_FooDataWriter_dispose*, on page 342.)

This operation *only* sets the instance state of the instances concerned to `NOT_ALIVE_DISPOSED`. It does *not* unregister the instances, and so does not automatically clean up the memory that is claimed by the instances in both the `DataReaders` and `DataWriters`.

Blocking

The blocking (or nonblocking) behaviour of this call is undefined.

Concurrency

If there are subsequent calls to this function before the action has been completed (completion of the disposes on all nodes, not simply return from the function), then the behaviour is undefined.

Other notes

The effect of this call on `disposed_generation_count`, `generation_rank` and `absolute_generation_rank` is undefined.

Return Code

- *`DDS_RETCODE_OK`* - a request to dispose the topic has been sucessfully queued.
- *`DDS_RETCODE_ERROR`* - and internal error has occured.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_ALREADY_DELETED`* - the topic has already been deleted.
- *`DDS_RETCODE_NOT_ENABLED`* - the topic is not enabled.

3.3.3 Class DDS_ContentFilteredTopic

`DDS_ContentFilteredTopic` is a specialization of `DDS_TopicDescription` that allows for content based subscriptions.

`DDS_ContentFilteredTopic` describes a more sophisticated subscription that indicates the `DDS_Subscriber` does not necessarily want to see all values of each instance published under the `DDS_Topic`. Rather, it only wants to see the values whose contents satisfy certain criteria. Therefore this class must be used to request content-based subscriptions.

The selection of the content is done using the SQL based filter with parameters to adapt the filter clause.

Appendix H, *DCPS Queries and Filters* describes the syntax of the SQL based filter and the parameters.

The interface description of this class is as follows:

```
/*
 * interface DDS_ContentFilteredTopic
 */
/*
 * inherited from class DDS_TopicDescription
 */
/* DDS_string
```

```
 *     DDS_ContentFilteredTopic_get_type_name
 *        (DDS_ContentFilteredTopic _this);
  */
/*  DDS_string
 *     DDS_ContentFilteredTopic_get_name
 *        (DDS_ContentFilteredTopic _this);
 */

/*  DDS_DomainParticipant
 *     DDS_ContentFilteredTopic_get_participant
 *        (DDS_ContentFilteredTopic _this);
 */
/*
 * implemented API operations
 */
   DDS_string
      DDS_ContentFilteredTopic_get_filter_expression
         (DDS_ContentFilteredTopic _this);

   DDS_ReturnCode_t
      DDS_ContentFilteredTopic_get_expression_parameters
         (DDS_ContentFilteredTopic _this,
           DDS_StringSeq *expression_parameters);


   DDS_ReturnCode_t
      DDS_ContentFilteredTopic_set_expression_parameters
         (DDS_ContentFilteredTopic _this,
           const DDS_StringSeq *expression_parameters);


   DDS_Topic
      DDS_ContentFilteredTopic_get_related_topic
         (DDS_ContentFilteredTopic _this);
/*
```

The next paragraphs describe the usage of all `DDS_ContentFilteredTopic` operations.

3.3.3.1 DDS_ContentFilteredTopic_get_expression_parameters

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_ContentFilteredTopic_get_expression_parameters
      (DDS_ContentFilteredTopic _this,
        DDS_StringSeq *expression_parameters);
```

Description

This operation obtains the expression parameters associated with the `DDS_ContentFilteredTopic`.

Parameters

`in DDS_ContentFilteredTopic _this` - the `DDS_ContentFilteredTopic` object on which the operation is operated.

`inout DDS_StringSeq *expression_parameters` - a handle to a sequence of strings that will be used to store the parameters used in the SQL expression.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_ALREADY_DELETED` or `DDS_RETCODE_OUT_OF_RESOURCES`.

Detailed Description

This operation obtains the expression parameters associated with the `DDS_ContentFilteredTopic`. That is, the parameters specified on the last successful call to `DDS_ContentFilteredTopic_set_expression_parameters`, or if `DDS_ContentFilteredTopic_set_expression_parameters` was never called, the parameters specified when the `DDS_ContentFilteredTopic` was created.

The resulting handle contains a sequence of strings with the parameters used in the SQL expression (*i.e.*, the %n tokens in the expression). The number of parameters in the result sequence will exactly match the number of %n tokens in the filter expression associated with the `DDS_ContentFilteredTopic`.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the existing set of expression parameters applied to this `DDS_ContentFilteredTopic` has successfully been copied into the specified `expression_parameters` parameter.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_ContentFilteredTopic` has already been deleted.

- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.3.3.2 DDS_ContentFilteredTopic_get_filter_expression

Synopsis

```
#include <dds_dcps.h>
DDS_string
   DDS_ContentFilteredTopic_get_filter_expression
      (DDS_ContentFilteredTopic _this);
```

Description

This operation returns the `filter_expression` associated with the `DDS_ContentFilteredTopic`.

Parameters

in DDS_ContentFilteredTopic _this - the `DDS_ContentFilteredTopic` object on which the operation is operated.

Return Value

DDS_string - result is a handle to a string which holds the SQL filter expression.

Detailed Description

This operation returns the `filter_expression` associated with the `DDS_ContentFilteredTopic`. That is, the expression specified when the `DDS_ContentFilteredTopic` was created.

The filter expression result is a string that specifies the criteria to select the data samples of interest. It is similar to the `WHERE` clause of an SQL expression.

3.3.3.3 DDS_ContentFilteredTopic_get_name (inherited)

This operation is inherited and therefore not described here. See the class `DDS_TopicDescription` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_string
   DDS_ContentFilteredTopic_get_name
      (DDS_ContentFilteredTopic _this);
```

3.3.3.4 DDS_ContentFilteredTopic_get_participant (inherited)

This operation is inherited and therefore not described here. See the class `DDS_TopicDescription` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_DomainParticipant
   DDS_ContentFilteredTopic_get_participant
      (DDS_ContentFilteredTopic _this);
```

3.3.3.5 DDS_ContentFilteredTopic_get_related_topic

Synopsis

```
#include <dds_dcps.h>
DDS_Topic
   DDS_ContentFilteredTopic_get_related_topic
      (DDS_ContentFilteredTopic _this);
```

Description

This operation returns the `DDS_Topic` associated with the `DDS_ContentFilteredTopic`.

Parameters

in *`DDS_ContentFilteredTopic _this`* - the `DDS_ContentFilteredTopic` object on which the operation is operated.

Return Value

`DDS_Topic` - result is a handle to the base topic on which the filtering will be applied.

Detailed Description

This operation returns the `DDS_Topic` associated with the `DDS_ContentFilteredTopic`. That is, the `DDS_Topic` specified when the `DDS_ContentFilteredTopic` was created. This `DDS_Topic` is the base topic on which the filtering will be applied.

3.3.3.6 DDS_ContentFilteredTopic_get_type_name (inherited)

This operation is inherited and therefore not described here. See the class `DDS_TopicDescription` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_string
   DDS_ContentFilteredTopic_get_type_name
      (DDS_ContentFilteredTopic _this);
```

3.3.3.7 DDS_ContentFilteredTopic_set_expression_parameters

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_ContentFilteredTopic_set_expression_parameters
      (DDS_ContentFilteredTopic _this,
        const DDS_StringSeq *expression_parameters);
```

Description

This operation changes the expression parameters associated with the `DDS_ContentFilteredTopic`.

Parameters

in *`DDS_ContentFilteredTopic _this`* - the `DDS_ContentFilteredTopic` object on which the operation is operated.

in *`const DDS_StringSeq *expression_parameters`* - the handle to a sequence of strings with the parameters used in the SQL expression (*i.e.*, the number of %n tokens in the expression). The number of values in `expression_parameters` must be equal or greater than the highest referenced %n token in the `subscription_expression`.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_BAD_PARAMETER`, `DDS_RETCODE_ALREADY_DELETED` or `DDS_RETCODE_OUT_OF_RESOURCES`.

Detailed Description

This operation changes the expression parameters associated with the `DDS_ContentFilteredTopic`. The parameter `expression_parameters` is a handle to a sequence of strings with the parameters used in the SQL expression. The number of values in `expression_parameters` must be equal or greater than the highest referenced %n token in the `filter_expression` (*e.g.* if `%1` and `%8` are used as parameter in the `filter_expression`, the `expression_parameters` should at least contain `n+1 = 9` values). This is the filter expression specified when the `DDS_ContentFilteredTopic` was created.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the new expression parameters are set.

- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the number of parameters in `expression_parameters` does not match the number of "%n" tokens in the expression for this `DDS_ContentFilteredTopic` or one of the parameters is an illegal parameter.
- *DDS_RETCODE_ALREADY_DELETED* - the `DDS_ContentFilteredTopic` has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.3.4 Class DDS_MultiTopic

`DDS_MultiTopic` is a specialization of `DDS_TopicDescription` that allows subscriptions to combine, filter and/or rearrange data coming from several `DDS_Topics`.

`DDS_MultiTopic` allows a more sophisticated subscription that can select and combine data received from multiple `DDS_Topics` into a single data type (specified by the inherited `type_name`). The data will then be filtered (selection) and possibly re-arranged (aggregation and/or projection) according to an SQL expression with parameters to adapt the filter clause.

The interface description of this class is as follows:

```
 /*
  * interface DDS_MultiTopic
  */
/*
  * inherited from class DDS_TopicDescription
  */
/*  DDS_string
  *     DDS_MultiTopic_get_type_name
  *        (DDS_MultiTopic _this);
   */
/*  DDS_string
  *     DDS_MultiTopic_get_name
  *        (DDS_MultiTopic _this);
  */

/*  DDS_DomainParticipant
  *     DDS_MultiTopic_get_participant
  *        (DDS_MultiTopic _this);
  */
/*
  * implemented API operations
```

```
*/
   DDS_string
      DDS_MultiTopic_get_subscription_expression
         (DDS_MultiTopic _this);

   DDS_ReturnCode_t
      DDS_MultiTopic_get_expression_parameters
         (DDS_MultiTopic _this,
           DDS_StringSeq *expression_parameters);

   DDS_ReturnCode_t
      DDS_MultiTopic_set_expression_parameters
         (DDS_MultiTopic _this,
           const DDS_StringSeq *expression_parameters);
```

The next paragraphs describe the usage of all `DDS_MultiTopic` operations. The inherited operations are listed but not fully described because they are not implemented in this class. The full description of these operations is given in the classes from which they are inherited.

NOTE: `DDS_MultiTopic` operations have not been yet been implemented. Multitopic functionality is scheduled for a future release.

3.3.4.1 DDS_MultiTopic_get_expression_parameters

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_MultiTopic_get_expression_parameters
      (DDS_MultiTopic _this,
        DDS_StringSeq *expression_parameters);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

Description

This operation returns the expression parameters associated with the `DDS_MultiTopic`.

Parameters

in DDS_MultiTopic _this - the `DDS_MultiTopic` object on which the operation is operated.

*inout DDS_StringSeq *expression_parameters* - a handle to a sequence of strings that will be used to store the parameters used in the SQL expression.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation obtains the expression parameters associated with the DDS_MultiTopic. That is, the parameters specified on the last successful call to DDS_MultiTopic_set_expression_parameters, or if DDS_MultiTopic_set_expression_parameters was never called, the parameters specified when the DDS_MultiTopic was created.

The resulting handle contains a sequence of strings with the values of the parameters used in the SQL expression (*i.e.*, the %n tokens in the expression). The number of parameters in the result sequence will exactly match the number of %n tokens in the filter expression associated with the DDS_MultiTopic.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the existing set of expression parameters applied to this DDS_MultiTopic has successfully been copied into the specified expression_parameters parameter.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_MultiTopic has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.3.4.2 DDS_MultiTopic_get_name (inherited)

This operation is inherited and therefore not described here. See the class DDS_TopicDescription for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_string
   DDS_MultiTopic_get_name
      (DDS_MultiTopic _this);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.3.4.3 DDS_MultiTopic_get_participant (inherited)

This operation is inherited and therefore not described here. See the class `DDS_TopicDescription` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_DomainParticipant
   DDS_MultiTopic_get_participant
      (DDS_MultiTopic _this);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.3.4.4 DDS_MultiTopic_get_subscription_expression

Synopsis

```
#include <dds_dcps.h>
DDS_string
   DDS_MultiTopic_get_subscription_expression
      (DDS_MultiTopic _this);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

Description

This operation returns the subscription expression associated with the `DDS_MultiTopic`.

Parameters

`in DDS_MultiTopic _this` - is the `DDS_MultiTopic` object on which the operation is operated.

Return Value

`DDS_string` - a handle to a string which holds the SQL subscription expression.

Detailed Description

This operation returns the subscription expression associated with the `DDS_MultiTopic`. That is, the expression specified when the `DDS_MultiTopic` was created.

The subscription expression result is a string that specifies the criteria to select the data samples of interest. In other words, it identifies the selection and rearrangement of data from the associated `DDS_Topics`. It is an SQL expression where the `SELECT` clause provides the fields to be kept, the `FROM` part provides the names of the `DDS_Topics` that are searched for those fields, and the `WHERE` clause gives the

content filter. The `DDS_Topics` combined may have different types but they are restricted in that the type of the fields used for the `NATURAL JOIN` operation must be the same.

3.3.4.5 DDS_MultiTopic_get_type_name (inherited)

This operation is inherited and therefore not described here. See the class `DDS_TopicDescription` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_string
   DDS_MultiTopic_get_type_name
      (DDS_MultiTopic _this);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.3.4.6 DDS_MultiTopic_set_expression_parameters

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_MultiTopic_set_expression_parameters
      (DDS_MultiTopic _this,
        const DDS_StringSeq *expression_parameters);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

Description

This operation changes the expression parameters associated with the `DDS_MultiTopic`.

Parameters

in *`DDS_MultiTopic _this`* - the `DDS_MultiTopic` object on which the operation is operated.

in *`const DDS_StringSeq *expression_parameters`* - the handle to a sequence of strings with the parameters used in the SQL expression.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_BAD_PARAMETER`, `DDS_RETCODE_ALREADY_DELETED` or `DDS_RETCODE_OUT_OF_RESOURCES`.

Detailed Description

This operation changes the expression parameters associated with the `DDS_MultiTopic`. The parameter `expression_parameters` is a handle to a sequence of strings with the parameters used in the SQL expression. The number of parameters in `expression_parameters` must exactly match the number of %n tokens in the subscription expression associated with the `DDS_MultiTopic`. This is the subscription expression specified when the `DDS_MultiTopic` was created.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the new expression parameters are set.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_BAD_PARAMETER`* - the number of parameters in `expression_parameters` does not match the number of "%n" tokens in the expression for this `DDS_MultiTopic` or one of the parameters is an illegal parameter.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_MultiTopic` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.

3.3.5 DDS_TopicListener Interface

Since a `DDS_Topic` is a `DDS_Entity`, it has the ability to have a `Listener` associated with it. In this case, the associated `Listener` should be of type `DDS_TopicListener`. This interface must be implemented by the application. A user-defined class must be provided by the application which must extend from the `DDS_TopicListener` class. **All** `DDS_TopicListener` operations **must** be implemented in the user-defined class, it is up to the application whether an operation is empty or contains some functionality.

NOTE: All operations for this interface must be implemented in the user-defined class, it is up to the application whether an operation is empty or contains some functionality.

The `DDS_TopicListener` provides a generic mechanism (actually a callback function) for the Data Distribution Service to notify the application of relevant asynchronous status change events, such as an inconsistent `DDS_Topic`. The `DDS_TopicListener` is related to changes in communication status.

The interface description of this class is as follows:

```
/*
 * interface DDS_TopicListener
 */
/*
 * abstract external operations
 */
/* void
 *   DDS_TopicListener_on_inconsistent_topic
 *      (void *listener_data,
 *        DDS_Topic the_topic,
 *         const DDS_InconsistentTopicStatus *status);
 */
/*
 * implemented API operations
 */
   struct DDS_TopicListener *
      DDS_TopicListener__alloc
         (void);
```

The next paragraph describes the usage of the `DDS_TopicListener` operation. This abstract operation is fully described since it must be implemented by the application.

3.3.5.1 DDS_TopicListener__alloc

Synopsis

```
#include <dds_dcps.h>
struct DDS_TopicListener *
   DDS_TopicListener__alloc
      (void);
```

Description

This operation creates a new `DDS_TopicListener`.

Parameters

<none>

Return Value

`DDS_TopicListener` - the handle to the newly-created `DDS_TopicListener`. In case of an error, a `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation creates a new `DDS_TopicListener`. The `DDS_TopicListener` must be created using this operation. In other words, the application is not allowed to declare an object of type `DDS_TopicListener`. When the application wants to release the `DDS_TopicListener` it must be released using `DDS_free`.

In case there are insufficient resources available to allocate the `DDS_TopicListener`, a `DDS_OBJECT_NIL` pointer is returned instead.

3.3.5.2 DDS_TopicListener_on_inconsistent_topic (abstract)

Synopsis

```
#include <dds_dcps.h>
void
   DDS_TopicListener_on_inconsistent_topic
      (void *listener_data,
        DDS_Topic the_topic,
        const DDS_InconsistentTopicStatus *status);
```

Description

This operation must be implemented by the application and is called by the Data Distribution Service when the `DDS_InconsistentTopicStatus` changes.

Parameters

`inout void *listener_data` - a pointer to a user-defined object which may be used for identification of the `Listener`.

`in DDS_Topic the_topic` - a pointer to the `DDS_Topic` on which the conflict occurred (this is an input to the application).

`in const DDS_InconsistentTopicStatus *status` - the `DDS_InconsistentTopicStatus` struct (this is an input to the application).

Return Value

<none>

Detailed Description

This operation is the external operation (interface, which must be implemented by the application) that is called by the Data Distribution Service when the `DDS_InconsistentTopicStatus` changes. The implementation may be left empty when this functionality is not needed. This operation will only be called when the relevant `DDS_TopicListener` is installed and enabled for the

DDS_InconsistentTopicStatus. The DDS_InconsistentTopicStatus will change when another DDS_Topic exists with the same topic_name but different characteristics.

The Data Distribution Service will call the DDS_TopicListener operation with a parameter the_topic, which will contain a pointer to the DDS_Topic on which the conflict occurred and a parameter status, which will contain the DDS_InconsistentTopicStatus struct.

3.3.6 DDS_ExtTopicListener interface

The DDS_ExtTopicListener interface is a subtype of DDS_TopicListener and provides an OpenSplice-specific callback on_all_disposed_data.

All operations for this interface must be implemented in the user-defined class, it is up to the application whether an operation is empty or contains some functionality.

The interface description of this class is as follows:

```
/*
 * interface DDS_ExtTopicListener
 */
/*
 * inherited from DDS_TopicListener
 */
/* void
 *    DDS_ExtTopicListener_on_inconsistent_topic
 *       (void *listener_data,
 *         DDS_Topic the_topic,
 *         const DDS_InconsistentTopicStatus);
 */
/*
 * abstract external operations
 */
/* void
 *    DDS_ExtTopicListener_on_all_data_disposed
 *       (void *listener_data,
 *         DDS_Topic the_topic);
 */
/*
 * implemented API operations
 */
struct DDS_ExtTopicListener *
DDS_ExtTopicListener__alloc
(void);
```

3.3.6.1 DDS_ExtTopicListener_on_all_data_disposed (abstract)

Synopsis

```
#include <dds_dcps.h>
   void
      DDS_ExtTopicListener_on_all_data_disposed(void
          *listener_data, DDS_Topic the_topic);
```

Description

This operation must be implemented by the application and is called by the Data Distribution Service when the node has completed disposal of data as a result of a call to `DDS_Topic_dispose_all_data()`.

Parameters

`inout void *listener_data` - a pointer to a user-defined object which may be used for identification of the Listener.

`in DDS_Topic the_topic` - contains a pointer to the Topic which has been disposed.

Return Value

`<none>`

Detailed Description

This operation is the external operation (interface, which must be implemented by the application) that is called by the Data Distribution Service when the node has completed disposal of data as a result of a call to `DDS_Topic_dispose_all_data()`.

The implementation may be left empty when this functionality is not needed. This operation will only be called when the relevant `ExtTopicListener` is installed.

Concurrency

The threading behaviour of calls to this method are undefined, so:

- Subsequent disposal via `DDS_Topic_dispose_all_data()`, and the associated callbacks may be blocked until this method returns.
- This method may be called concurrently by OpenSplice if other `DDS_Topic_dispose_all_data()` operations complete before this method returns.

3.3.7 Topic-Definition Type Specific Classes

This paragraph describes the generic DDS_TypeSupport class and the derived application type specific <NameSpace>_<type>TypeSupport classes which together implement the application DDS_Topic interface. For each application type, used as DDS_Topic data type, the pre-processor generates a <NameSpace>_<type>DataReader class from an IDL type description. The SPACE_FooTypeSupport class that would be generated by the pre-processor for a fictional type Foo (defined in the module SPACE) describes the <NameSpace>_<type>TypeSupport classes.

3.3.7.1 Class DDS_TypeSupport (abstract)

The DDS_Topic, DDS_MultiTopic or DDS_ContentFilteredTopic is bound to a data type described by the type name argument. Prior to creating a DDS_Topic, DDS_MultiTopic or DDS_ContentFilteredTopic, the data type must have been registered with the Data Distribution Service. This is done using the data type specific DDS_TypeSupport_register_type operation on a derived class of the DDS_TypeSupport interface. A derived class is generated for each data type used by the application, by calling the pre-processor.

The interface description of this class is as follows:

```
/*
 * interface DDS_TypeSupport
 */
/*
 * abstract operations
 */
/*  DDS_TypeSupport
 *     DDS_TypeSupport__alloc
 *        (void);
 */
/*  DDS_ReturnCode_t
 *     DDS_TypeSupport_register_type
 *        (DDS_TypeSupport _this,
 *          Domainparticipant domain,
 *          DDS_string type_name);
 *
 *  DDS_string
 *     DDS_TypeSupport_get_type_name
 *        (DDS_TypeSupport _this);
 */
/*
 * implemented API operations
 *       <no operations>
 */
```

The next paragraph list the DDS_TypeSupport operation. This abstract operation is listed but not fully described since it is not implemented in this class. The full description of this operation is given in the SPACE_FooTypeSupport class (for the data type example Foo), which contains the data type specific implementation of this operation.

3.3.7.2 DDS_TypeSupport__alloc (abstract)

This abstract operation is defined as a generic operation, which is implemented by the <NameSpace>_<type>TypeSupport class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type Foo (defined in the module SPACE) derived SPACE_FooTypeSupport class.

Synopsis

```
#include <dds_dcps.h>
DDS_TypeSupport
   DDS_TypeSupport__alloc
      (void);
```

3.3.7.3 DDS_TypeSupport_get_type_name (abstract)

This abstract operation is defined as a generic operation, which is implemented by the <NameSpace>_<type>TypeSupport class. For further explanation see the description for the fictional data type Foo (defined in the module SPACE) derived SPACE_FooTypeSupport class.

Synopsis

```
#include <dds_dcps.h>
DDS_string
   DDS_TypeSupport_get_type_name
      (DDS_TypeSupport _this);
```

3.3.7.4 DDS_TypeSupport_register_type (abstract)

This abstract operation is defined as a generic operation, which is implemented by the <NameSpace>_<type>TypeSupport class. For further explanation see the description for the fictional data type Foo (defined in the module SPACE) derived SPACE_FooTypeSupport class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_TypeSupport_register_type
      (DDS_TypeSupport _this,
        Domainparticipant domain,
        DDS_string type_name);
```

3.3.7.5 Class SPACE_FooTypeSupport

The pre-processor generates from IDL type descriptions the application `<NameSpace>_<type>TypeSupport` classes. For each application data type that is used as `DDS_Topic` data type, a typed class `<NameSpace>_<type>TypeSupport` is derived from the `DDS_TypeSupport` class. In this paragraph, the class `SPACE_FooTypeSupport` describes the operations of these derived `<NameSpace>_<type>TypeSupport` classes as an example for the fictional application type `Foo` (defined in the module `SPACE`).

For instance, for an application, the definitions are located in the `Space.idl` file. The pre-processor will generate a `Space.h` include file.

The `DDS_Topic`, `DDS_MultiTopic` or `DDS_ContentFilteredTopic` is bound to a data type described by the type `type_name` argument. Prior to creating a `DDS_Topic`, `DDS_MultiTopic` or `DDS_ContentFilteredTopic`, the data type must have been registered with the Data Distribution Service. This is done using the data type specific `SPACE_FooTypeSupport_register_type` operation on the `<NameSpace>_<type>TypeSupport` class for each data type. A derived class is generated for each data type used by the application, by calling the pre-processor.

The interface description of this class is as follows:

```
/*
 * interface SPACE_FooTypeSupport
 */
/*
 * implemented API operations
 */
   SPACE_FooTypeSupport
      SPACE_FooTypeSupport__alloc
         (void);
   DDS_ReturnCode_t
      SPACE_FooTypeSupport_register_type
         (SPACE_FooTypeSupport _this,
           DDS_DomainParticipant domain,
           DDS_string type_name);
   DDS_string
      SPACE_FooTypeSupport_get_type_name
         (SPACE_FooTypeSupport _this);
```

The next paragraph describes the usage of the `SPACE_FooTypeSupport` operations.

3.3.7.6 SPACE_FooTypeSupport__alloc

Synopsis

```
#include <Space.h>
SPACE_FooTypeSupport
```

```
SPACE_FooTypeSupport__alloc
   (void);
```

Description

This operation creates a new `SPACE_FooTypeSupport`.

Parameters

<none>

Return Value

`SPACE_FooTypeSupport` - the handle to the newly-created `SPACE_FooTypeSupport`. In case of an error, a `nil` pointer is returned.

Detailed Description

This operation creates a new `SPACE_FooTypeSupport`. The `SPACE_FooTypeSupport` must be created using this operation. In other words, the application is not allowed to declare an object of type `SPACE_FooTypeSupport`. When the application wants to release the `SPACE_FooTypeSupport` it must be released using `DDS_free`.

In case there are insufficient resources available to allocate the `SPACE_FooTypeSupport`, a `nil` pointer is returned instead.

3.3.7.7 SPACE_FooTypeSupport_get_type_name

Synopsis

```
#include <Space.h>
DDS_string
   SPACE_FooTypeSupport_get_type_name
      (SPACE_FooTypeSupport _this);
```

Description

This operation returns the default name of the data type associated with the `SPACE_FooTypeSupport`.

Parameters

`in SPACE_FooTypeSupport _this` - the `SPACE_FooTypeSupport` object on which the operation is operated.

Return Value

`DDS_string` - the name of the data type of the `SPACE_FooTypeSupport`.

Detailed Description

This operation returns the default name of the data type associated with the `SPACE_FooTypeSupport`. The default name is derived from the type name as specified in the IDL definition. It is composed of the scope names and the type name, each separated by "`::`", in order of lower scope level to deeper scope level followed by the type name.

3.3.7.8 SPACE_FooTypeSupport_register_type

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooTypeSupport_register_type
      (SPACE_FooTypeSupport _this,
        DDS_DomainParticipant domain,
        DDS_string type_name);
```

Description

This operation registers a new data type name to a `DDS_DomainParticipant`.

Parameters

in *`SPACE_FooTypeSupport _this`* - the `SPACE_FooTypeSupport` object on which the operation is operated.

in *`DDS_DomainParticipant domain`* - a pointer to a `DDS_DomainParticipant` object to which the new data type is registered.

in *`DDS_string type_name`* - a local alias of the new data type to be registered.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_BAD_PARAMETER`, `DDS_RETCODE_OUT_OF_RESOURCES` or `DDS_RETCODE_PRECONDITION_NOT_MET`.

Detailed Description

This operation registers a new data type name to a `DDS_DomainParticipant`. This operation informs the Data Distribution Service, in order to allow it to manage the new registered data type. This operation also informs the Data Distribution Service about the key definition, which allows the Data Distribution Service to distinguish different instances of the same data type.

Precondition

A type_name cannot be registered with two different <NameSpace>_<type>TypeSupport classes (this means of a different data type) with the same DDS_DomainParticipant. When the operation is called on the same DDS_DomainParticipant with the same type_name for a different <NameSpace>_<type>TypeSupport class, the operation returns DDS_RETCODE_PRECONDITION_NOT_MET. However, it is possible to register the same <NameSpace>_<type>TypeSupport classes with the same DDS_DomainParticipant and the same or different type_name multiple times. All registrations return DDS_RETCODE_OK, but any subsequent registrations with the same type_name are ignored.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the SPACE_FooTypeSupport class is registered with the new data type name to the DDS_DomainParticipant or the SPACE_FooTypeSupport class was already registered.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - one or both of the parameters is invalid, the domain parameter is the DDS_OBJECT_NIL pointer, or the parameter type_name has zero length.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - this type_name is already registered with this DDS_DomainParticipant for a different <NameSpace>_<type>TypeSupport class.

3.4 Publication Module

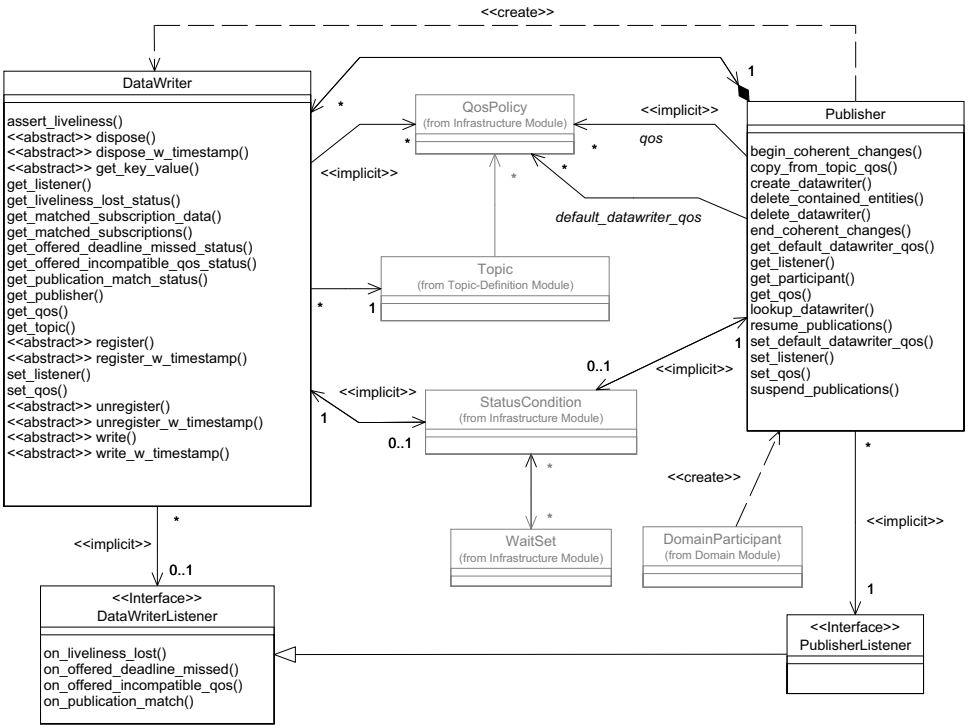

Figure 18: The DCPS Publication Module's Class Model

This module contains the following classes:

- DDS_Publisher
- Publication type specific classes
- `DDS_PublisherListener` (interface)
- `DDS_DataWriterListener` (interface).

The paragraph "Publication type specific classes" contains the generic class and the generated data type specific classes. For each data type, a data type specific class `<NameSpace>_<type>DataWriter` is generated (based on IDL) by calling the pre-processor.

For instance, for the fictional data type `Foo` (this also applies to other types), defined in the module `SPACE`; "Publication type specific classes" contains the following classes:

- `DDS_DataWriter` (abstract)

- SPACE_FooDataWriter.

A DDS_Publisher is an object responsible for data distribution. It may publish data of different data types. A DDS_DataWriter acts as a typed accessor to a DDS_Publisher. The DDS_DataWriter is the object the application must use to communicate the existence and value of data-objects of a given data type to a DDS_Publisher. When data-object values have been communicated to the DDS_Publisher through the appropriate DDS_DataWriter, it is the DDS_Publisher's responsibility to perform the distribution. The DDS_Publisher will do this according to its own DDS_PublisherQos, and the DDS_DataWriterQos attached to the corresponding DDS_DataWriter. A publication is defined by the association of a DDS_DataWriter to a DDS_Publisher. This association expresses the intent of the application to publish the data described by the DDS_DataWriter in the context provided by the DDS_Publisher.

3.4.1 Class DDS_Publisher

The DDS_Publisher acts on behalf of one or more DDS_DataWriter objects that belong to it. When it is informed of a change to the data associated with one of its DDS_DataWriter objects, it decides when it is appropriate to actually process the sample-update message. In making this decision, it considers the DDS_PublisherQos and the DDS_DataWriterQos.

The interface description of this class is as follows:

```
/*
 * interface DDS_Publisher
 */
/*
 * inherited from class DDS_Entity
 */
/* DDS_StatusCondition
 *     DDS_Publisher_get_statuscondition
 *        (DDS_Publisher _this);
 */
/* DDS_StatusMask
 *     DDS_Publisher_get_status_changes
 *        (DDS_Publisher _this);
 */
/* DDS_ReturnCode_t
 *     DDS_Publisher_enable
 *        (DDS_Publisher _this);
 */
/*
 * implemented API operations
 */
   DDS_DataWriter
      DDS_Publisher_create_datawriter
```

```
      (DDS_Publisher _this,
        const DDS_Topic a_topic,
        const DDS_DataWriterQos *qos,
        const struct DDS_DataWriterListener *a_listener,
        const DDS_StatusMask mask);

DDS_ReturnCode_t
   DDS_Publisher_delete_datawriter
      (DDS_Publisher _this,
        const DDS_DataWriter a_datawriter);

DDS_DataWriter
   DDS_Publisher_lookup_datawriter
      (DDS_Publisher _this,
        const DDS_char *topic_name);
DDS_ReturnCode_t
   DDS_Publisher_delete_contained_entities
      (DDS_Publisher _this);

DDS_ReturnCode_t
   DDS_Publisher_set_qos
      (DDS_Publisher _this,
        const DDS_PublisherQos *qos);
DDS_ReturnCode_t
   DDS_Publisher_get_qos
      (DDS_Publisher _this,
        DDS_PublisherQos *qos);
DDS_ReturnCode_t
   DDS_Publisher_set_listener
      (DDS_Publisher _this,
        const struct DDS_PublisherListener *a_listener,
        const DDS_StatusMask mask);
struct DDS_PublisherListener
   DDS_Publisher_get_listener
      (DDS_Publisher _this);
DDS_ReturnCode_t
   DDS_Publisher_suspend_publications
      (DDS_Publisher _this);

DDS_ReturnCode_t
   DDS_Publisher_resume_publications
      (DDS_Publisher _this);

DDS_ReturnCode_t
   DDS_Publisher_begin_coherent_changes
      (DDS_Publisher _this);

DDS_ReturnCode_t
   DDS_Publisher_end_coherent_changes
      (DDS_Publisher _this);
```

```
DDS_ReturnCode_t
   DDS_Publisher_wait_for_acknowledgments
      (DDS_Publisher _this,
        const DDS_Duration_t *max_wait);

DDS_DomainParticipant
   DDS_Publisher_get_participant
      (DDS_Publisher _this);

DDS_ReturnCode_t
   DDS_Publisher_set_default_datawriter_qos
      (DDS_Publisher _this,
        const DDS_DataWriterQos *qos);

DDS_ReturnCode_t
   DDS_Publisher_get_default_datawriter_qos
      (DDS_Publisher _this,
        DDS_DataWriterQos *qos);

DDS_ReturnCode_t
   DDS_Publisher_copy_from_topic_qos
      (DDS_Publisher _this,
        DDS_DataWriterQos *a_datawriter_qos,
        const DDS_TopicQos *a_topic_qos);
```

The following paragraphs describe the usage of all `DDS_Publisher` operations. The inherited operations are listed but not fully described because they are not implemented in this class. The full description of these operations is given in the classes from which they are inherited.

3.4.1.1 DDS_Publisher_begin_coherent_changes

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Publisher_begin_coherent_changes
      (DDS_Publisher _this);
```

Description

This operation requests that the application will begin a ‘coherent set’ of modifications using `DDS_DataWriter` objects attached to this `DDS_Publisher`. The ‘coherent set’ will be completed by a matching call to `DDS_Publisher_end_coherent_changes`.

Parameters

in `DDS_Publisher _this` - the `DDS_Publisher` object on which the operation is operated.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_BAD_PARAMETER`, `DDS_RETCODE_ALREADY_DELETED` or `DDS_RETCODE_PRECONDITION_NOT_MET`.

Detailed Description

This operation requests that the application will begin a 'coherent set' of modifications using `DDS_DataWriter` objects attached to this `DDS_Publisher`. The 'coherent set' will be completed by a matching call to `DDS_Publisher_end_coherent_changes`.

A 'coherent set' is a set of modifications that must be propagated in such a way that they are interpreted at the receivers' side as a consistent set of modifications; that is, the receiver will only be able to access the data after all the modifications in the set are available at the receiver end.

A precondition for making coherent changes is that the `PresentationQos` of the `DDS_Publisher` has its `coherent_access` attribute set to `TRUE`. If this is not the case, the Publisher will not accept any coherent start requests and return `DDS_RETCODE_PRECONDITION_NOT_MET`.

A connectivity change may occur in the middle of a set of coherent changes; for example, the set of partitions used by the `DDS_Publisher` or one of its connected `DDS_Subscribers` may change, a late-joining `DDS_DataReader` may appear on the network, or a communication failure may occur. In the event that such a change prevents an entity from receiving the entire set of coherent changes, that entity must behave as if it had received none of the set.

These calls can be nested. In that case, the coherent set terminates only with the last call to `DDS_Publisher_end_coherent_changes`.

The support for 'coherent changes' enables a publishing application to change the value of several data-instances that could belong to the same or different topics and have those changes be seen 'atomically' by the readers. This is useful in cases where the values are inter-related (for example, if there are two data-instances representing the 'altitude' and 'velocity vector' of the same aircraft and both are changed, it may be useful to communicate those values in a way the reader can see both together; otherwise, it may *e.g.*, erroneously interpret that the aircraft is on a collision course).

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - a new coherent change has successfully been started.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter passed to the operation is `NULL`, or is not pointing to any valid object.
- *DDS_RETCODE_ALREADY_DELETED* - the `DDS_Publisher` has already been deleted.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - the `DDS_Publisher` is not able to handle coherent changes because its `PresentationQos` has not set `coherent_access` to `TRUE`.

3.4.1.2 DDS_Publisher_copy_from_topic_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Publisher_copy_from_topic_qos
      (DDS_Publisher _this,
        DDS_DataWriterQos *a_datawriter_qos,
        const DDS_TopicQos *a_topic_qos);
```

Description

This operation will copy policies in `a_topic_qos` to the corresponding policies in `a_datawriter_qos`.

Parameters

in *DDS_Publisher _this* - the `DDS_Publisher` object on which the operation is operated.

inout *DDS_DataWriterQos *a_datawriter_qos* - the destination `DDS_DataWriterQos` struct to which the `QosPolicy` settings should be copied.

in *const DDS_TopicQos *a_topic_qos* - the source `DDS_TopicQos` struct, which should be copied.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation will copy the QosPolicy settings in a_topic_qos to the corresponding QosPolicy settings in a_datawriter_qos (replacing the values in a_datawriter_qos, if present). This will only apply to the common QosPolicy settings in each <DDS_Entity>Qos.

This is a "convenience" operation, useful in combination with the operations DDS_Publisher_get_default_datawriter_qos and DDS_Topic_get_qos. The operation DDS_Publisher_copy_from_topic_qos can be used to merge the DDS_DataWriter default QosPolicy settings with the corresponding ones on the DDS_TopicQos. The resulting DDS_DataWriterQos can then be used to create a new DDS_DataWriter, or set its DDS_DataWriterQos.

This operation does not check the resulting a_datawriter_qos for consistency. This is because the "merged" a_datawriter_qos may not be the final one, as the application can still modify some QosPolicy settings prior to applying the DDS_DataWriterQos to the DDS_DataWriter.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the QosPolicy settings have successfully been copied from the DDS_TopicQos to the DDS_DataWriterQos.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Publisher has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.4.1.3 DDS_Publisher_create_datawriter

Synopsis

```
#include <dds_dcps.h>
DDS_DataWriter
   DDS_Publisher_create_datawriter
```

```
(DDS_Publisher _this,
  const DDS_Topic a_topic,
  const DDS_DataWriterQos *qos,
  const struct DDS_DataWriterListener *a_listener,
  const DDS_StatusMask mask);
```

Description

This operation creates a `DDS_DataWriter` with the desired `DDS_DataWriterQos`, for the desired `DDS_Topic` and attaches the optionally specified `DDS_DataWriterListener` to it.

Parameters

`in DDS_Publisher _this` - the `DDS_Publisher` object on which the operation is operated.

`in const DDS_Topic a_topic` - a pointer to the `topic` for which the `DDS_DataWriter` is created.

`in const DDS_DataWriterQos *qos` - the `DDS_DataWriterQos` for the new `DDS_DataWriter`. In case these settings are not self consistent, no `DDS_DataWriter` is created.

`in const struct DDS_DataWriterListener *a_listener` - a pointer to the `DDS_DataWriterListener` instance which will be attached to the new `DDS_DataWriter`. It is permitted to use `DDS_OBJECT_NIL` as the value of the listener: this behaves as a `DDS_DataWriterListener` whose operations perform no action.

`in const DDS_StatusMask mask` - a bit-mask in which each bit enables the invocation of the `DDS_DataWriterListener` for a certain status.

Return Value

`DDS_DataWriter` - Return value is a pointer to the newly-created `DDS_DataWriter`. In case of an error, the `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation creates a `DDS_DataWriter` with the desired `DDS_DataWriterQos`, for the desired `DDS_Topic` and attaches the optionally specified `DDS_DataWriterListener` to it. The returned `DDS_DataWriter` is attached (and belongs) to the `DDS_Publisher` on which this operation is being called. To delete the `DDS_DataWriter` the operation `DDS_Publisher_delete_datawriter` or `DDS_Publisher_delete_contained_entities` must be used. If no write rights are defined for the specific topic then the creation of the `DataWriter` will fail.

Application Data Type

The DDS_DataWriter returned by this operation is an object of a derived class, specific to the data type associated with the DDS_Topic. For each application-defined data type <type> there is a class <NameSpace>_<type>DataWriter generated by calling the pre-processor. This data type specific class extends DDS_DataWriter and contains the operations to write data of data type <type>.

QosPolicy

The possible application pattern to construct the DDS_DataWriterQos for the DDS_DataWriter is to:

- Retrieve the QosPolicy settings on the associated DDS_Topic by means of the get_qos operation on the DDS_Topic.
- Retrieve the default DDS_DataWriterQos by means of the DDS_Publisher_get_default_datawriter_qos operation on the DDS_Publisher
- Combine those two lists of QosPolicy settings and selectively modify QosPolicy settings as desired
- Use the resulting DDS_DataWriterQos to construct the DDS_DataWriter.
- In case the specified QosPolicy settings are not consistent, no DDS_DataWriter is created and the DDS_OBJECT_NIL pointer is returned.

Default QoS

The constant DDS_DATAWRITER_QOS_DEFAULT can be used as parameter qos to create a DDS_DataWriter with the default DDS_DataWriterQos as set in the DDS_Publisher. The effect of using DDS_DATAWRITER_QOS_DEFAULT is the same as calling the operation DDS_Publisher_get_default_datawriter_qos and using the resulting DDS_DataWriterQos to create the DDS_DataWriter.

The special DDS_DATAWRITER_QOS_USE_TOPIC_QOS can be used to create a DDS_DataWriter with a combination of the default DDS_DataWriterQos and the DDS_TopicQos. The effect of using DDS_DATAWRITER_QOS_USE_TOPIC_QOS is the same as calling the operation DDS_Publisher_get_default_datawriter_qos and retrieving the DDS_TopicQos (by means of the operation DDS_Topic_get_qos) and then combining these two QosPolicy settings using the operation DDS_Publisher_copy_from_topic_qos, whereby any common policy that is set on the DDS_TopicQos “overrides” the corresponding policy on the default DDS_DataWriterQos. The resulting DDS_DataWriterQos is then applied to create the DDS_DataWriter.

Communication Status

For each communication status, the `StatusChangedFlag` flag is initially set to `FALSE`. It becomes `TRUE` whenever that communication status changes. For each communication status activated in the `mask`, the associated `DDS_DataWriterListener` operation is invoked and the communication status is reset to `FALSE`, as the listener implicitly accesses the status which is passed as a parameter to that operation. The fact that the status is reset prior to calling the listener means that if the application calls the `get_<status_name>_status` from inside the listener it will see the status already reset.

The following statuses are applicable to the `DDS_DataWriterListener`:

```
DDS_OFFERED_DEADLINE_MISSED_STATUS
DDS_OFFERED_INCOMPATIBLE_QOS_STATUS
DDS_LIVELINESS_LOST_STATUS
DDS_PUBLICATION_MATCHED_STATUS.
```

Be aware that the `DDS_PUBLICATION_MATCHED_STATUS` is not applicable when the infrastructure does not have the information available to determine connectivity. This is the case when OpenSplice is configured not to maintain discovery information in the Networking Service. (See also the description of the `NetworkService/Discovery[@enabled] attribute in section` *4.4.1.6.1* on page 225 of the Deployment Guide.) In this case the operation will return `DDS_OBJECT_NIL`.

Status bits are declared as a constant and can be used by the application in an OR operation to create a tailored mask. The special constant `DDS_STATUS_MASK_NONE` can be used to indicate that the created entity should not respond to any of its available statuses. The DDS will therefore attempt to propagate these statuses to its factory. The special constant `STATUS_MASK_ANY_V1_2` can be used to select all applicable statuses specified in the “Data Distribution Service for Real-time Systems Version 1.2” specification.

Status Propagation

In case a communication status is not activated in the `mask` of the `DDS_DataWriterListener`, the `DDS_PublisherListener` of the containing `DDS_Publisher` is invoked (if attached and activated for the status that occurred). This allows the application to set a default behaviour in the `DDS_PublisherListener` of the containing `DDS_Publisher` and a `DDS_DataWriter` specific behaviour when needed. In case the communication status is not activated in the `mask` of the `DDS_PublisherListener` as well, the communication status will be propagated to the `DDS_DomainParticipantListener` of the containing

DDS_DomainParticipant. In case the DDS_DomainParticipantListener is also not attached or the communication status is not activated in its mask, the application is not notified of the change.

3.4.1.4 DDS_Publisher_delete_contained_entities

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Publisher_delete_contained_entities
      (DDS_Publisher _this);
```

Description

This operation deletes all the DDS_DataWriter objects that were created by means of one of the DDS_Publisher_create_datawriter operations on the DDS_Publisher.

Parameters

in DDS_Publisher _this - the DDS_Publisher object on which the operation is operated.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES or DDS_RETCODE_PRECONDITION_NOT_MET.

Detailed Description

This operation deletes all the DDS_DataWriter objects that were created by means of one of the DDS_Publisher_create_datawriter operations on the DDS_Publisher. In other words, it deletes all contained DDS_DataWriter objects.

NOTE: The operation will return DDS_PRECONDITION_NOT_MET if the any of the contained entities is in a state where it cannot be deleted. In such cases, the operation does not roll back any entity deletions performed prior to the detection of the problem.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the contained DDS_Entity objects are deleted and the application may delete the DDS_Publisher.

- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Publisher has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - one or more of the contained entities are in a state where they cannot be deleted.

3.4.1.5 DDS_Publisher_delete_datawriter

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Publisher_delete_datawriter
      (DDS_Publisher _this,
        const DDS_DataWriter a_datawriter);
```

Description

This operation deletes a DDS_DataWriter that belongs to the DDS_Publisher.

Parameters

in DDS_Publisher _this - the DDS_Publisher object on which the operation -is operated.

in const DDS_DataWriter a_datawriter - a pointer to the DDS_DataWriter, which is to be deleted.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES or DDS_RETCODE_PRECONDITION_NOT_MET.

Detailed Description

This operation deletes a DDS_DataWriter that belongs to the DDS_Publisher. When the operation is called on a different DDS_Publisher, as used when the DDS_DataWriter was created, the operation has no effect and returns DDS_RETCODE_PRECONDITION_NOT_MET. The deletion of the DDS_DataWriter

will automatically unregister all instances. Depending on the settings of `DDS_WriterDataLifecycleQosPolicy`, the deletion of the `DDS_DataWriter` may also dispose of all instances.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the `DDS_DataWriter` is deleted.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_BAD_PARAMETER`* - the parameter `a_datawriter` is not a valid `DDS_DataWriter`.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_Publisher` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_PRECONDITION_NOT_MET`* - the operation is called on a different `DDS_Publisher`, as used when the `DDS_DataWriter` was created.

3.4.1.6 DDS_Publisher_enable (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Publisher_enable
      (DDS_Publisher _this);
```

3.4.1.7 DDS_Publisher_end_coherent_changes

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Publisher_end_coherent_changes
      (DDS_Publisher _this);
```

Description

This operation terminates the ‘coherent set’ initiated by the matching call to `DDS_Publisher_begin_coherent_changes`.

Parameters

in DDS_Publisher _this - the DDS_Publisher object on which the operation is operated.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_PRECONDITION_NOT_MET.

Detailed Description

This operation terminates the 'coherent set' initiated by the matching call to DDS_Publisher_begin_coherent_changes. If there is no matching call to DDS_Publisher_begin_coherent_changes, the operation will return the error DDS_PRECONDITION_NOT_MET.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the coherent change has successfully been closed.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter passed to the operation is NULL, or is not pointing to any valid object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Publisher has already been deleted.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - there is no matching DDS_Publisher_begin_coherent_changes call that can be closed.

3.4.1.8 DDS_Publisher_get_default_datawriter_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Publisher_get_default_datawriter_qos
      (DDS_Publisher _this,
        DDS_DataWriterQos *qos);
```

Description

This operation gets the default DDS_DataWriterQos of the DDS_Publisher.

Parameters

in DDS_Publisher _this - the DDS_Publisher object on which the operation is operated.

*inout DDS_DataWriterQos *qos* - a pointer to the DDS_DataWriterQos struct (provided by the application) in which the default DDS_DataWriterQos for the DDS_DataWriter is written.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation gets the default DDS_DataWriterQos of the DDS_Publisher (that is the struct with the QosPolicy settings) which is used for newly-created DDS_DataWriter objects, in case the constant DDS_DATAWRITER_QOS_DEFAULT is used. The default DDS_DataWriterQos is only used when the constant is supplied as parameter qos to specify the DDS_DataWriterQos in the DDS_Publisher_create_datawriter operation. The application must provide the DDS_DataWriterQos struct in which the QosPolicy settings can be stored and pass the qos pointer to the operation. The operation writes the default DDS_DataWriterQos to the struct pointed to by qos. Any settings in the struct are overwritten.

The values retrieved by this operation match the set of values specified on the last successful call to DDS_Publisher_set_default_datawriter_qos, or, if the call was never made, the default values as specified for each QosPolicy setting as defined in Table 5: on page 65.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the default DDS_DataWriter QosPolicy settings of this DDS_Publisher have successfully been copied into the specified DDS_DataWriterQos parameter.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Publisher has already been deleted.

- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.4.1.9 DDS_Publisher_get_listener

Synopsis

```
#include <dds_dcps.h>
struct DDS_PublisherListener
   DDS_Publisher_get_listener
      (DDS_Publisher _this);
```

Description

This operation allows access to a `DDS_PublisherListener`.

Parameters

in DDS_Publisher _this - the `DDS_Publisher` object on which the operation is operated.

Return Value

struct DDS_PublisherListener - a pointer to the `DDS_PublisherListener` attached to the `DDS_Publisher`.

Detailed Description

This operation allows access to a `DDS_PublisherListener` attached to the `DDS_Publisher`. When no `DDS_PublisherListener` was attached to the `DDS_Publisher`, the `DDS_OBJECT_NIL` pointer is returned.

3.4.1.10 DDS_Publisher_get_participant

Synopsis

```
#include <dds_dcps.h>
```

```
DDS_DomainParticipant
   DDS_Publisher_get_participant
      (DDS_Publisher _this);
```

Description

This operation returns the `DDS_DomainParticipant` associated with the `DDS_Publisher` or the `DDS_OBJECT_NIL` pointer.

Parameters

in DDS_Publisher _this - the `DDS_Publisher` object on which the operation is operated.

Return Value

DDS_DomainParticipant - a pointer to the DDS_DomainParticipant associated with the DDS_Publisher or the DDS_OBJECT_NIL pointer.

Detailed Description

This operation returns the DDS_DomainParticipant associated with the DDS_Publisher. Note that there is exactly one DDS_DomainParticipant associated with each DDS_Publisher. When the DDS_Publisher was already deleted (there is no associated DDS_DomainParticipant any more), the DDS_OBJECT_NIL pointer is returned.

3.4.1.11 DDS_Publisher_get_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Publisher_get_qos
      (DDS_Publisher _this,
        DDS_PublisherQos *qos);
```

Description

This operation allows access to the existing set of QoS policies for a DDS_Publisher.

Parameters

in DDS_Publisher _this - the DDS_Publisher object on which the operation is operated.

*inout DDS_PublisherQos *qos* - a pointer to the destination DDS_PublisherQos struct in which the QosPolicy settings will be copied.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation allows access to the existing set of QoS policies of a DDS_Publisher on which this operation is used. This DDS_PublisherQos is stored at the location pointed to by the qos parameter.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the existing set of QoS policy values applied to this DDS_Publisher has successfully been copied into the specified DDS_PublisherQos parameter.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Publisher has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.4.1.12 DDS_Publisher_get_status_changes (inherited)

This operation is inherited and therefore not described here. See the class DDS_Entity for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_StatusMask
   DDS_Publisher_get_status_changes
      (DDS_Publisher _this);
```

3.4.1.13 DDS_Publisher_get_statuscondition (inherited)

This operation is inherited and therefore not described here. See the class DDS_Entity for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_StatusCondition
   DDS_Publisher_get_statuscondition
      (DDS_Publisher _this);
```

3.4.1.14 DDS_Publisher_lookup_datawriter

Synopsis

```
#include <dds_dcps.h>
DDS_DataWriter
   DDS_Publisher_lookup_datawriter
      (DDS_Publisher _this,
        const DDS_char *topic_name);
```

Description

This operation returns a previously created `DDS_DataWriter` belonging to the `DDS_Publisher` which is attached to a `DDS_Topic` with the matching `topic_name`.

Parameters

in *`DDS_Publisher _this`* - the `DDS_Publisher` object on which the operation is operated.

in *`const DDS_char *topic_name`* - the name of the `DDS_Topic`, which is attached to the `DDS_DataWriter` to look for.

Return Value

`DDS_DataWriter` - Return value is a pointer to the `DDS_DataWriter` found. When no such `DDS_DataWriter` is found, the `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation returns a previously created `DDS_DataWriter` belonging to the `DDS_Publisher` which is attached to a `DDS_Topic` with the matching `topic_name`. When multiple `DDS_DataWriter` objects (which satisfy the same condition) exist, this operation will return one of them. It is not specified which one.

3.4.1.15 DDS_Publisher_resume_publications

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Publisher_resume_publications
      (DDS_Publisher _this);
```

Description

This operation resumes a previously suspended publication.

Parameters

in *`DDS_Publisher _this`* - the `DDS_Publisher` object on which the operation is operated.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED or DDS_RETCODE_PRECONDITION_NOT_MET.

Detailed Description

If the DDS_Publisher is suspended, this operation will resume the publication of all DDS_DataWriter objects contained by this DDS_Publisher. All data held in the history buffer of the DDS_DataWriter's is actively published to the consumers. When the operation returns, all DDS_DataWriter's have resumed the publication of suspended updates.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the DDS_Publisher object has been resumed.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Publisher has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the DDS_Publisher is not enabled.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - the DDS_Publisher is not suspended.

3.4.1.16 DDS_Publisher_set_default_datawriter_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Publisher_set_default_datawriter_qos
      (DDS_Publisher _this,
        const DDS_DataWriterQos *qos);
```

Description

This operation sets the default DDS_DataWriterQos of the DDS_Publisher.

Parameters

in *DDS_Publisher _this* - the DDS_Publisher object on which the operation is operated.

*in const DDS_DataWriterQos *qos* - the DDS_DataWriterQos struct, which contains the new default DDS_DataWriterQos for the newly-created DDS_DataWriters.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES or DDS_RETCODE_INCONSISTENT_POLICY.

Detailed Description

This operation sets the default DDS_DataWriterQos of the DDS_Publisher (that is the struct with the QosPolicy settings) which is used for newly-created DDS_DataWriter objects, in case the constant DDS_DATAWRITER_QOS_DEFAULT is used. The default DDS_DataWriterQos is only used when the constant is supplied as parameter qos to specify the DDS_DataWriterQos in the DDS_Publisher_create_datawriter operation.

The DDS_Publisher_set_default_datawriter_qos operation checks if the DDS_DataWriterQos is self consistent. If it is not, the operation has no effect and returns DDS_RETCODE_INCONSISTENT_POLICY.

The values set by this operation are returned by DDS_Publisher_get_default_datawriter_qos.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the new default DDS_DataWriterQos is set.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter qos is not a valid DDS_DataWriterQos. It contains a QosPolicy setting with an invalid DDS_Duration_t value, an enum value that is outside its legal boundaries or a sequence that has inconsistent memory settings.
- *DDS_RETCODE_UNSUPPORTED* - one or more of the selected QosPolicy values are currently not supported by OpenSplice.

- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Publisher has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_INCONSISTENT_POLICY* - the parameter qos contains conflicting QosPolicy settings, *e.g.* a history depth that is higher than the specified resource limits.

3.4.1.17 DDS_Publisher_set_listener

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Publisher_set_listener
      (DDS_Publisher _this,
        const struct DDS_PublisherListener *a_listener,
        const DDS_StatusMask mask);
```

Description

This operation attaches a DDS_PublisherListener to the DDS_Publisher.

Parameters

in DDS_Publisher _this - the DDS_Publisher object on which the operation is operated.

*in const struct DDS_PublisherListener *a_listener* - a pointer to the DDS_PublisherListener instance, which will be attached to the DDS_Publisher.

in const DDS_StatusMask mask - a bit-mask in which each bit enables the invocation of the DDS_PublisherListener for a certain status.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation attaches a DDS_PublisherListener to the DDS_Publisher. Only one DDS_PublisherListener can be attached to each DDS_Publisher. If a DDS_PublisherListener was already attached, the operation will replace it

with the new one. When `a_listener` is the `DDS_OBJECT_NIL` pointer, it represents a listener that is treated as a NOOP[1] for all statuses activated in the bitmask.

Communication Status

For each communication status, the `StatusChangedFlag` flag is initially set to `FALSE`. It becomes `TRUE` whenever that communication status changes. For each communication status activated in the `mask`, the associated `DDS_PublisherListener` operation is invoked and the communication status is reset to `FALSE`, as the listener implicitly accesses the status which is passed as a parameter to that operation. The status is reset prior to calling the listener, so if the application calls the `get_<status_name>_status` from inside the listener it will see the status already reset. An exception to this rule is the `DDS_OBJECT_NIL` listener, which does not reset the communication statuses for which it is invoked.

The following statuses are applicable to the `DDS_PublisherListener`:

- `DDS_OFFERED_DEADLINE_MISSED_STATUS` *(propagated)*
- `DDS_OFFERED_INCOMPATIBLE_QOS_STATUS` *(propagated)*
- `DDS_LIVELINESS_LOST_STATUS` *(propagated)*
- `DDS_PUBLICATION_MATCHED_STATUS` *(propagated)*.

Be aware that the `DDS_PUBLICATION_MATCHED_STATUS` is not applicable when the infrastructure does not have the information available to determine connectivity. This is the case when OpenSplice is configured not to maintain discovery information in the Networking Service. (See also the description of the `NetworkService/Discovery[@enabled]` attribute in section *4.4.1.6.1* on page 225 of the Deployment Guide.) In this case the operation will return `DDS_RETCODE_UNSUPPORTED`.

Status bits are declared as a constant and can be used by the application in an OR operation to create a tailored mask. The special constant `DDS_STATUS_MASK_NONE` can be used to indicate that the created entity should not respond to any of its available statuses. The DDS will therefore attempt to propagate these statuses to its factory. The special constant `STATUS_MASK_ANY_V1_2` can be used to select all applicable statuses specified in the "Data Distribution Service for Real-time Systems Version 1.2" specification.

Status Propagation

The Data Distribution Service will trigger the most specific and relevant `Listener`. In other words, in case a communication status is also activated on the `DDS_DataWriterListener` of a contained `DDS_DataWriter`, the

1. Short for **No-Op**eration, an instruction that peforms nothing at all.

DDS_DataWriterListener on that contained DDS_DataWriter is invoked instead of the DDS_PublisherListener. This means that a status change on a contained DDS_DataWriter only invokes the DDS_PublisherListener if the contained DDS_DataWriter itself does not handle the trigger event generated by the status change.

In case a status is not activated in the mask of the DDS_PublisherListener, the DDS_DomainParticipantListener of the containing DDS_DomainParticipant is invoked (if attached and activated for the status that occurred). This allows the application to set a default behaviour in the DDS_DomainParticipantListener of the containing DDS_DomainParticipant and a DDS_Publisher specific behaviour when needed. In case the DDS_DomainParticipantListener is also not attached or the communication status is not activated in its mask, the application is not notified of the change.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the DDS_PublisherListener is attached.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_UNSUPPORTED* - a status was selected that cannot be supported because the infrastructure does not maintain the required connectivity information.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Publisher has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.4.1.18 DDS_Publisher_set_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Publisher_set_qos
      (DDS_Publisher _this,
        const DDS_PublisherQos *qos);
```

Description

This operation replaces the existing set of QosPolicy settings for a DDS_Publisher.

Parameters

in DDS_Publisher _this - the DDS_Publisher object on which the operation is operated.

*in const DDS_PublisherQos *qos* - contains the new set of QosPolicy settings for the DDS_Publisher.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_IMMUTABLE_POLICY or DDS_RETCODE_PRECONDITION_NOT_MET.

Detailed Description

This operation replaces the existing set of QosPolicy settings for a DDS_Publisher. The parameter qos contains the QosPolicy settings which is checked for self-consistency and mutability. When the application tries to change a QosPolicy setting for an enabled DDS_Publisher, which can only be set before the DDS_Publisher is enabled, the operation will fail and a DDS_RETCODE_IMMUTABLE_POLICY is returned. In other words, the application must provide the currently set QosPolicy settings in case of the immutable QosPolicy settings. Only the mutable QosPolicy settings can be changed. When qos contains conflicting QosPolicy settings (not self-consistent), the operation will fail and a DDS_RETCODE_INCONSISTENT_POLICY is returned.

The set of QosPolicy settings specified by the qos parameter are applied on top of the existing QoS, replacing the values of any policies previously set (provided, the operation returned DDS_RETCODE_OK). If one or more of the partitions in the QoS structure have insufficient access rights configured then the set_qos function will fail with a DDS_RETCODE_PRECONDITION_NOT_MET error code.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the new DDS_PublisherQos is set.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter qos is not a valid DDS_PublisherQos. It contains a QosPolicy setting with an enum value that is outside its legal boundaries or a sequence that has inconsistent memory settings.

- *DDS_RETCODE_UNSUPPORTED* - one or more of the selected QosPolicy values are currently not supported by OpenSplice.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Publisher has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_IMMUTABLE_POLICY* - the parameter qos contains an immutable QosPolicy setting with a different value than set during enabling of the DDS_Publisher.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - returned when insufficient access rights exist for the partition(s) listed in the QoS structure.

3.4.1.19 DDS_Publisher_suspend_publications

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Publisher_suspend_publications
      (DDS_Publisher _this);
```

Description

This operation will suspend the dissemination of the publications by all contained *DataWriter* objects.

Parameters

in DDS_Publisher _this - the DDS_Publisher object on which the operation is operated.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES or DDS_RETCODE_NOT_ENABLED.

Detailed Description

This operation suspends the publication of all DDS_DataWriter objects contained by this DDS_Publisher. The data written, disposed or unregistered by a DDS_DataWriter is stored in the history buffer of the DDS_DataWriter and therefore, depending on its QoS settings, the following operations may block (see the operation descriptions for more information):

- DDS_DataWriter_dispose

- DDS_DataWriter_dispose_w_timestamp
- DDS_DataWriter_write
- DDS_DataWriter_write_w_timestamp
- DDS_DataWriter_writedispose
- DDS_DataWriter_writedispose_w_timestamp
- DDS_DataWriter_unregister_instance
- DDS_DataWriter_unregister_instance_w_timestamp

Subsequent calls to the DDS_Publisher_suspend_publications operation have no effect. When the DDS_Publisher is deleted before DDS_Publisher_resume_publications is called, all suspended updates are discarded.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the DDS_Publisher has been suspended.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Publisher has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the DDS_Publisher is not enabled.

3.4.1.20 DDS_Publisher_wait_for_acknowledgments

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Publisher_wait_for_acknowledgments
      (DDS_Publisher _this,
        const DDS_Duration_t *max_wait);
```

Description

This operation blocks the calling thread until either all data written by all contained DataWriters is acknowledged by the local infrastructure, or until the duration specified by max_wait parameter elapses, whichever happens first.

Parameters

in DDS_Publisher _this - the DDS_Publisher object on which the operation is operated.

*in const DDS_Duration_t *max_wait* - the maximum duration to block for the DDS_Publisher_wait_for_acknowledgments, after which the application thread is unblocked. The special constant DDS_DURATION_INFINITE can be used when the maximum waiting time does not need to be bounded.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED or DDS_RETCODE_TIMEOUT.

Detailed Description

This operation blocks the calling thread until either all data written by all contained DataWriters is acknowledged by the local infrastructure, or until the duration specified by max_wait parameter elapses, whichever happens first.

Data is acknowledged by the local infrastructure when it does not need to be stored in its DataWriter's local history. When a locally-connected subscription (including the networking service) has no more resources to store incoming samples it will start to reject these samples, resulting in their source DataWriters to store them temporarily in their own local history to be retransmitted at a later moment in time. In such scenarios, the DDS_Publisher_wait_for_acknowledgments operation will block until all contained DataWriters have retransmitted their entire history, which is therefore effectively empty, or until the max_wait timeout expires, whichever happens first. In the first case the operation will return DDS_RETCODE_OK, in the latter it will return DDS_RETCODE_TIMEOUT.

Be aware that in case the operation returns DDS_RETCODE_OK, the data has only been acknowledged by the local infrastructure: it does not mean all remote subscriptions have already received the data. However, delivering the data to remote nodes is then the sole responsibility of the networking service: even when the publishing application would terminate, all data that has not yet been received may be considered 'on-route' and will therefore eventually arrive (unless the networking service itself crashes). In contrast, if a DataWriter would still have data in its local history buffer when it terminates, this data is considered 'lost'.

This operation is intended to be used only if one or more of the contained DataWriters has its DDS_ReliabilityQosPolicyKind set to DDS_RELIABLE_RELIABILITY_QOS. Otherwise the operation will return immediately with DDS_RETCODE_OK, since best-effort DataWriters will never store rejected samples in their local history: they will just drop them and continue business as usual.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the data of all contained DataWriters has been acknowledged by the local infrastructure.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Publisher has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the DDS_Publisher is not enabled.
- *DDS_RETCODE_TIMEOUT* - not all data is acknowledged before max_wait elapsed.

3.4.2 Publication Type Specific Classes

This paragraph describes the generic DDS_DataWriter class and the derived application type specific <NameSpace>_<type>DataWriter classes which together implement the application publication interface. For each application type, used as DDS_Topic data type, the pre-processor generates a <NameSpace>_<type>DataWriter class from an IDL type description. The SPACE_FooDataWriter class that would be generated by the pre-processor for a fictional type Foo (defined in the module SPACE) describes the <NameSpace>_<type>DataWriter classes.

3.4.2.1 Class DDS_DataWriter (abstract)

DDS_DataWriter allows the application to set the value of the sample to be published under a given DDS_Topic.

A DDS_DataWriter is attached to exactly one DDS_Publisher which acts as a factory for it.

A DDS_DataWriter is bound to exactly one DDS_Topic and therefore to exactly one data type. The DDS_Topic must exist prior to the DDS_DataWriter's creation.

DDS_DataWriter is an abstract class. It must be specialized for each particular application data type. For a fictional application data type Foo (defined in the module SPACE) the specialized class would be SPACE_FooDataWriter.

The interface description of this class is as follows:

```
/*
 * interface DDS_DataWriter
 */
/*
 * inherited from class DDS_Entity
 */
/*  DDS_StatusCondition
 *     DDS_DataWriter_get_statuscondition
 *        (DDS_DataWriter _this);
 */
/*  DDS_StatusMask
 *     DDS_DataWriter_get_status_changes
 *        (DDS_DataWriter _this);
 */
/*  DDS_ReturnCode_t
 *     DDS_DataWriter_enable
 *        (DDS_DataWriter _this);
 */
/*
 *  abstract operations
 *  (implemented in the data type specific DDS_DataWriter)
 */
/*  DDS_InstanceHandle_t
 *     DDS_DataWriter_register_instance
 *        (DDS_DataWriter _this);
 *          const <data> *instance_data);
 */
/*  DDS_InstanceHandle_t
 *     DDS_DataWriter_register_instance_w_timestamp
 *        (DDS_DataWriter _this);
 *          const <data> *instance_data,
 *          const DDS_Time_t *source_timestamp);
 */
/*  DDS_ReturnCode_t
 *     DDS_DataWriter_unregister_instance
 *        (DDS_DataWriter _this);
 *          const <data> *instance_data,
 *          const DDS_InstanceHandle_t handle);
 */
/*  DDS_ReturnCode_t
```

```
 *     DDS_DataWriter_unregister_instance_w_timestamp
 *        (DDS_DataWriter _this);
 *          const <data> *instance_data,
 *          const DDS_InstanceHandle_t handle,
 *          const DDS_Time_t *source_timestamp);
 */
/*  DDS_ReturnCode_t
 *     DDS_DataWriter_write
 *        (DDS_DataWriter _this);
 *          const <data> *instance_data,
 *          const DDS_InstanceHandle_t handle);
 */
/*  DDS_ReturnCode_t
 *     DDS_DataWriter_write_w_timestamp
 *        (DDS_DataWriter _this);
 *          const <data> *instance_data,
 *          const DDS_InstanceHandle_t handle,
 *          const DDS_Time_t *source_timestamp);
 */
/*  DDS_ReturnCode_t
 *     DDS_DataWriter_dispose
 *        (DDS_DataWriter _this);
 *          const <data> *instance_data,
 *          const DDS_InstanceHandle_t instance_handle);
 */
/*  DDS_ReturnCode_t
 *     DDS_DataWriter_dispose_w_timestamp
 *        (DDS_DataWriter _this);
 *          const <data> *instance_data,
 *          const DDS_InstanceHandle_t instance_handle,
 *          const DDS_Time_t *source_timestamp);
 */
/*  DDS_ReturnCode_t
 *     DDS_DataWriter_writedispose
 *         (DDS_DataWriter _this,
 *          const <data> *instance_data,
 *          const DDS_InstanceHandle_t instance_handle);
 */
/*  DDS_ReturnCode_t
 *     DDS_DataWriter_writedispose_w_timestamp
 *         (DDS_DataWriter _this,
 *          const <data> *instance_data,
 *          const DDS_InstanceHandle_t instance_handle,
 *          const DDS_Time_t *source_timestamp);
 */
/*  DDS_ReturnCode_t
 *     DDS_DataWriter_get_key_value
 *        (DDS_DataWriter _this);
 *          <data> *key_holder,
```

```
 *          const DDS_InstanceHandle_t handle);
 */
/*  DDS_InstanceHandle_t
 *     DDS_DataWriter_lookup_instance
 */       (DDS_DataWriter _this,
 *          <data> *instance_data);
/*
/*
 * implemented API operations
 */
   DDS_ReturnCode_t
      DDS_DataWriter_set_qos
         (DDS_DataWriter this,
           const DDS_DataWriterQos *qos);

   DDS_ReturnCode_t
      DDS_DataWriter_get_qos
         (DDS_DataWriter this,
           DDS_DataWriterQos *qos);

   DDS_ReturnCode_t
      DDS_DataWriter_set_listener
         (DDS_DataWriter this,
           const struct DDS_DataWriterListener *a_listener,
            const DDS_StatusMask mask);

   struct DDS_DataWriterListener
      struct DDS_DataWriter_get_listener
         (DDS_DataWriter this);

   DDS_Topic
      DDS_DataWriter_get_topic
         (DDS_DataWriter this);

   DDS_Publisher
      DDS_DataWriter_get_publisher
         (DDS_DataWriter this);

   DDS_ReturnCode_t
      DDS_DataWriter_wait_for_acknowledgments
         (DDS_DataWriter _this,
           const DDS_Duration_t *max_wait);

   DDS_ReturnCode_t
      DDS_DataWriter_get_liveliness_lost_status
         (DDS_DataWriter this,
           DDS_LivelinessLostStatus *status);

   DDS_ReturnCode_t
      DDS_DataWriter_get_offered_deadline_missed_status
```

```
            (DDS_DataWriter this,
              DDS_OfferedDeadlineMissedStatus *status);

      DDS_ReturnCode_t
         DDS_DataWriter_get_offered_incompatible_qos_status
            (DDS_DataWriter this,
              DDS_OfferedIncompatibleQosStatus *status);

      DDS_ReturnCode_t
         DDS_DataWriter_get_publication_matched_status
            (DDS_DataWriter this,
              DDS_PublicationMatchedStatus *status);

      DDS_ReturnCode_t
         DDS_DataWriter_assert_liveliness
            (DDS_DataWriter this);

      DDS_ReturnCode_t
         DDS_DataWriter_get_matched_subscriptions
            (DDS_DataWriter this,
              DDS_InstanceHandleSeq *subscription_handles);

      DDS_ReturnCode_t
         DDS_DataWriter_get_matched_subscription_data
            (DDS_DataWriter this,
              DDS_SubscriptionBuiltinTopicData
                 *subscription_data,
                const DDS_InstanceHandle_t subscription_handle
             );
```

The following paragraphs describe the usage of all `DDS_DataWriter` operations. The inherited operations are listed but not fully described because they are not implemented in this class. The full description of these operations is given in the classes from which they are inherited. The abstract operations are listed but not fully described because they are not implemented in this specific class. The full description of these operations is located in the subclasses, which contain the data type specific implementation of these operations.

3.4.2.2 DDS_DataWriter_assert_liveliness

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataWriter_assert_liveliness
      (DDS_DataWriter _this);
```

Description

This operation asserts the liveliness for the `DDS_DataWriter`.

Parameters

in DDS_DataWriter _this - is the DDS_DataWriter object on which the operation is operated.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES or DDS_RETCODE_NOT_ENABLED.

Detailed Description

This operation will manually assert the liveliness for the DDS_DataWriter. This way, the Data Distribution Service is informed that the corresponding DDS_DataWriter is still alive. This operation is used in combination with the DDS_LivelinessQosPolicy set to DDS_MANUAL_BY_PARTICIPANT_LIVELINESS_QOS or DDS_MANUAL_BY_TOPIC_LIVELINESS_QOS. See Section 3.1.3.10, *DDS_LivelinessQosPolicy*, on page 85, for more information on LivelinessQosPolicy.

Writing data via the DDS_DataWriter_write operation of a DDS_DataWriter will assert the liveliness on the DDS_DataWriter itself and its containing DDS_DomainParticipant. Therefore, DDS_DataWriter_assert_liveliness is only needed when data is **not** written regularly.

The liveliness should be asserted by the application, depending on the DDS_LivelinessQosPolicy. Asserting the liveliness for this DDS_DataWriter can also be achieved by asserting the liveliness to the DDS_DomainParticipant.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the liveliness of this DDS_DataWriter has successfully been asserted.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DataWriter has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the DDS_DataWriter is not enabled.

3.4.2.3 DDS_DataWriter_dispose (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataWriter` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataWriter` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataWriter_dispose
      (DDS_DataWriter _this,
           const <data> *instance_data,
           const DDS_InstanceHandle_t instance_handle);
```

3.4.2.4 DDS_DataWriter_dispose_w_timestamp (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataWriter` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataWriter` class.

Synopsis

```
#include <dds_dcps.h>
       DDS_ReturnCode_t
          DDS_DataWriter_dispose_w_timestamp
              (DDS_DataWriter _this,
               const <data> *instance_data,
               const DDS_InstanceHandle_t instance_handle,
               const DDS_Time_t *source_timestamp);
```

3.4.2.5 DDS_DataWriter_enable (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataWriter_enable
      (DDS_DataWriter _this);
```

3.4.2.6 DDS_DataWriter_get_key_value (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataWriter` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataWriter` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataWriter_get_key_value
   (DDS_DataWriter _this,
       <data> *key_holder,
       const DDS_InstanceHandle_t handle);
```

3.4.2.7 DDS_DataWriter_get_listener

Synopsis

```
#include <dds_dcps.h>
struct DDS_DataWriterListener
   DDS_DataWriter_get_listener
      (DDS_DataWriter _this);
```

Description

This operation allows access to a `DDS_DataWriterListener`.

Parameters

`in DDS_DataWriter _this` - the `DDS_DataWriter` object on which the operation is operated.

Return Value

`struct DDS_DataWriterListener` - a pointer to the `DDS_DataWriterListener` attached to the `DDS_DataWriter`.

Detailed Description

This operation allows access to a `DDS_DataWriterListener` attached to the `DDS_DataWriter`. When no `DDS_DataWriterListener` was attached to the `DDS_DataWriter`, the `DDS_OBJECT_NIL` pointer is returned.

3.4.2.8 DDS_DataWriter_get_liveliness_lost_status

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
```

```
DDS_DataWriter_get_liveliness_lost_status
   (DDS_DataWriter _this,
     DDS_LivelinessLostStatus *status);
```

Description

This operation obtains the `DDS_LivelinessLostStatus` struct of the `DDS_DataWriter`.

Parameters

`in DDS_DataWriter _this` - the `DDS_DataWriter` object on which the operation is operated.

`inout DDS_LivelinessLostStatus *status` - the contents of the `DDS_LivelinessLostStatus` struct of the `DDS_DataWriter` will be copied into the location specified by `status`.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_ALREADY_DELETED` or `DDS_RETCODE_OUT_OF_RESOURCES`.

Detailed Description

This operation obtains the `DDS_LivelinessLostStatus` struct of the `DDS_DataWriter`. This struct contains the information whether the liveliness (that the `DDS_DataWriter` has committed through its `DDS_LivelinessQosPolicy`) was respected.

This means that the status represents whether the `DDS_DataWriter` failed to actively signal its liveliness within the offered liveliness period. If the liveliness is lost, the `DDS_DataReader` objects will consider the `DDS_DataWriter` as no longer “alive”.

The `DDS_LivelinessLostStatus` can also be monitored using a `DDS_DataWriterListener` or by using the associated `DDS_StatusCondition`.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the current `DDS_LivelinessLostStatus` of this `DDS_DataWriter` has successfully been copied into the specified `status` parameter.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.

- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DataWriter has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.4.2.9 DDS_DataWriter_get_matched_subscription_data

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataWriter_get_matched_subscription_data
      (DDS_DataWriter _this,
        DDS_SubscriptionBuiltinTopicData *subscription_data,
        const DDS_InstanceHandle_t subscription_handle);
```

Description

This operation retrieves information on the specified subscription that is currently "associated" with the DDS_DataWriter.

Parameters

in DDS_DataWriter _this - the DDS_DataWriter object on which the operation is operated.

*inout DDS_SubscriptionBuiltinTopicData *subscription_data* - a pointer to the sample in which the information about the specified subscription is to be stored.

in const DDS_InstanceHandle_t subscription_handle - a handle to the subscription whose information needs to be retrieved.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES or DDS_RETCODE_NOT_ENABLED.

Detailed Description

This operation retrieves information on the specified subscription that is currently "associated" with the DDS_DataWriter. That is, a subscription with a matching Topic and compatible QoS that the application has not indicated should be "ignored" by means of the DDS_DomainParticipant_ignore_subscription operation.

The `subscription_handle` must correspond to a subscription currently associated with the `DDS_DataWriter`, otherwise the operation will fail and return `DDS_RETCODE_BAD_PARAMETER`. The operation `DDS_DataWriter_get_matched_subscriptions` can be used to find the subscriptions that are currently matched with the `DDS_DataWriter`.

The operation may also fail if the infrastructure does not hold the information necessary to fill in the `subscription_data`. This is the case when OpenSplice is configured not to maintain discovery information in the Networking Service. (See also the description of the `NetworkService/Discovery[@enabled]` attribute in section *4.4.1.6.1* on page 225 of the Deployment Guide.) In this case the operation will return `DDS_RETCODE_UNSUPPORTED`.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the information on the specified subscription has been successfully retrieved.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_UNSUPPORTED`* - OpenSplice is configured not to maintain the information about “associated” subscriptions.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_DataWriter` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_NOT_ENABLED`* - the `DDS_DataWriter` is not enabled.

3.4.2.10 DDS_DataWriter_get_matched_subscriptions

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataWriter_get_matched_subscriptions
      (DDS_DataWriter _this,
        DDS_InstanceHandleSeq *subscription_handles);
```

Description

This operation retrieves the list of subscriptions currently "associated" with the `DDS_DataWriter`.

Parameters

in DDS_DataWriter _this - the DDS_DataWriter object on which the operation is operated.

*inout DDS_InstanceHandleSeq *subscription_handles* - a sequence which is used to pass the list of all associated subscribtions.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES or DDS_RETCODE_NOT_ENABLED.

Detailed Description

This operation retrieves the list of subscriptions currently "associated" with the DDS_DataWriter. That is, subscriptions that have a matching Topic and compatible QoS that the application has not indicated should be “ignored” by means of the DDS_DomainParticipant_ignore_subscription operation.

The subscription_handles sequence and its buffer may be pre-allocated by the application and therefore must either be re-used in a subsequent invocation of the DDS_DataWriter_get_matched_subscriptions operation or be released by calling DDS_free on the returned subscription_handles. If the pre-allocated sequence is not big enough to hold the number of associated subscriptions, the sequence will automatically be (re-)allocated to fit the required size.

The handles returned in the subscription_handles sequence are the ones that are used by the DDS implementation to locally identify the corresponding matched DataReader entities. You can access more detailed information about a particular subscription by passing its subscription_handle to either the DDS_DataWriter_get_matched_subscription_data operation or to the DDS_SubscriptionBuiltinTopicDataDataReader_read_instance operation on the built-in reader for the “DCPSSubscription” topic.

Be aware that since DDS_InstanceHandle_t is an opaque datatype, it does not necessarily mean that the handles obtained from the DDS_DataWriter_get_matched_subscriptions operation have the same value as the ones that appear in the instance_handle field of the DDS_SampleInfo when retrieving the subscription info through corresponding "DCPSSubscriptions" built-in reader. You can’t just compare two handles to determine whether they represent the same subscription. If you want to know whether two handles actually do represent the same subscription, use both handles to retrieve their corresponding DDS_SubscriptionBuiltinTopicData samples and then compare the key field of both samples.

The operation may fail if the infrastructure does not locally maintain the connectivity information. This is the case when OpenSplice is configured not to maintain discovery information in the Networking Service. (See also the description of the `NetworkService/Discovery[@enabled] attribute in section` *4.4.1.6.1* on page 225 of the Deployment Guide.) In this case the operation will return `DDS_RETCODE_UNSUPPORTED`.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the list of associated subscriptions has successfully been obtained.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_UNSUPPORTED`* - OpenSplice is configured not to maintain the information about "associated" subscriptions.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_DataWriter` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_NOT_ENABLED`* - the `DDS_DataWriter` is not enabled.

3.4.2.11 DDS_DataWriter_get_offered_deadline_missed_status

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataWriter_get_offered_deadline_missed_status
      (DDS_DataWriter _this,
        DDS_OfferedDeadlineMissedStatus *status);
```

Description

This operation obtains the `DDS_OfferedDeadlineMissedStatus` struct of the `DDS_DataWriter`.

Parameters

`in DDS_DataWriter _this` - the `DDS_DataWriter` object on which the operation is operated.

*inout DDS_OfferedDeadlineMissedStatus *status* - the contents of the DDS_OfferedDeadlineMissedStatus struct of the DDS_DataWriter will be copied into the location specified by status.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation obtains the DDS_OfferedDeadlineMissedStatus struct of the DDS_DataWriter. This struct contains the information whether the deadline (that the DDS_DataWriter has committed through its DDS_DeadlineQosPolicy) was respected for each instance.

The DDS_OfferedDeadlineMissedStatus can also be monitored using a DDS_DataWriterListener or by using the associated DDS_StatusCondition.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the current DDS_LivelinessLostStatus of this DDS_DataWriter has successfully been copied into the specified status parameter.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DataWriter has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.4.2.12 DDS_DataWriter_get_offered_incompatible_qos_status

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataWriter_get_offered_incompatible_qos_status
      (DDS_DataWriter _this,
        DDS_OfferedIncompatibleQosStatus *status);
```

Description

This operation obtains the `DDS_OfferedIncompatibleQosStatus` struct of the `DDS_DataWriter`.

Parameters

`in DDS_DataWriter _this` - the `DDS_DataWriter` object on which the operation is operated.

`inout DDS_OfferedIncompatibleQosStatus *status` - the contents of the `DDS_OfferedIncompatibleQosStatus` struct of the `DDS_DataWriter` will be copied into the location specified by `status`.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_ALREADY_DELETED` or `DDS_RETCODE_OUT_OF_RESOURCES`.

Detailed Description

This operation obtains the `DDS_OfferedIncompatibleQosStatus` struct of the `DDS_DataWriter`. This struct contains the information whether a `QosPolicy` setting was incompatible with the requested `QosPolicy` setting.

This means that the status represents whether a `DDS_DataReader` object has been discovered by the `DDS_DataWriter` with the same `DDS_Topic` and a requested `DDS_DataReaderQos` that was incompatible with the one offered by the `DDS_DataWriter`.

The `DDS_OfferedIncompatibleQosStatus` can also be monitored using a `DDS_DataWriterListener` or by using the associated `DDS_StatusCondition`.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the current `DDS_OfferedIncompatibleQosStatus` of this `DDS_DataWriter` has successfully been copied into the specified `status` parameter.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_DataWriter` has already been deleted.

- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.4.2.13 DDS_DataWriter_get_publication_matched_status

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataWriter_get_publication_matched_status
      (DDS_DataWriter _this,
        DDS_PublicationMatchedStatus *status);
```

Description

This operation obtains the `DDS_PublicationMatchedStatus` struct of the `DDS_DataWriter`.

Parameters

in DDS_DataWriter _this - the `DDS_DataWriter` object on which the operation is operated.

*inout DDS_PublicationMatchedStatus *status* - the contents of the `DDS_PublicationMatchedStatus` struct of the `DDS_DataWriter` will be copied into the location specified by `status`.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `RETCODE_UNSUPPORTED`, `DDS_RETCODE_ALREADY_DELETED` or `DDS_RETCODE_OUT_OF_RESOURCES`.

Detailed Description

This operation obtains the `DDS_PublicationMatchedStatus` struct of the `DDS_DataWriter`. This struct contains information about whether a new match has been discovered for the current publication, or whether an existing match has ceased to exist.

This means that the status represents that either a DataReader object has been discovered by the `DDS_DataWriter` with the same Topic and a compatible Qos, or that a previously-discovered DataReader has ceased to be matched to the current `DDS_DataWriter`. A DataReader may cease to match when it gets deleted, when it changes its Qos to a value that is incompatible with the current `DDS_DataWriter` or when either the `DDS_DataWriter` or the DataReader has chosen to put its

matching counterpart on its ignore-list using the `DDS_DomainParticipant_ignore_subcription` or `DDS_DomainParticipant_ignore_publication` operations.

The operation may fail if the infrastructure does not hold the information necessary to fill in the `DDS_PublicationMatchedStatus`. This is the case when OpenSplice is configured not to maintain discovery information in the Networking Service. (See the description for the `NetworkingService/Discovery/enabled` property in the Deployment Manual for more information about this subject.) In this case the operation will return `DDS_RETCODE_UNSUPPORTED`.

The `DDS_PublicationMatchedStatus` can also be monitored using a `DDS_DataWriterListener` or by using the associated `DDS_StatusCondition`.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the current `DDS_PublicationMatchedStatus` of this `DDS_DataWriter` has successfully been copied into the specified `status` parameter.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_UNSUPPORTED`* - OpenSplice is configured not to maintain the information about “associated” subscriptions.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_DataWriter` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.

3.4.2.14 DDS_DataWriter_get_publisher

Synopsis

```
#include <dds_dcps.h>
DDS_Publisher
   DDS_DataWriter_get_publisher
      (DDS_DataWriter _this);
```

Description

This operation returns the `DDS_Publisher` to which the `DDS_DataWriter` belongs.

Parameters

in DDS_DataWriter _this - the DDS_DataWriter object on which the operation is operated.

Return Value

DDS_Publisher - a pointer to the DDS_Publisher to which the DDS_DataWriter belongs.

Detailed Description

This operation returns the DDS_Publisher to which the DDS_DataWriter belongs, thus the DDS_Publisher that has created the DDS_DataWriter. If the DDS_DataWriter is already deleted, the DDS_OBJECT_NIL pointer is returned.

3.4.2.15 DDS_DataWriter_get_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataWriter_get_qos
      (DDS_DataWriter _this,
        DDS_DataWriterQos *qos);
```

Description

This operation allows access to the existing list of QosPolicy settings for a DDS_DataWriter.

Parameters

in DDS_DataWriter _this - the DDS_DataWriter object on which the operation is operated.

*inout DDS_DataWriterQos *qos* - a pointer to the destination DDS_DataWriterQos struct in which the QosPolicy settings will be copied.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation allows access to the existing list of QosPolicy settings of a DDS_DataWriter on which this operation is used. This DDS_DataWriterQos is stored at the location pointed to by the qos parameter.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the existing set of QoS policy values applied to this DDS_DataWriter has successfully been copied into the specified DDS_DataWriterQos parameter.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DataWriter has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.4.2.16 DDS_DataWriter_get_status_changes (inherited)

This operation is inherited and therefore not described here. See the class DDS_Entity for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_StatusMask
   DDS_DataWriter_get_status_changes
      (DDS_DataWriter _this);
```

3.4.2.17 DDS_DataWriter_get_statuscondition (inherited)

This operation is inherited and therefore not described here. See the class DDS_Entity for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_StatusCondition
   DDS_DataWriter_get_statuscondition
      (DDS_DataWriter _this);
```

3.4.2.18 DDS_DataWriter_get_topic

Synopsis

```
#include <dds_dcps.h>
DDS_Topic
   DDS_DataWriter_get_topic
      (DDS_DataWriter _this);
```

Description

This operation returns the `DDS_Topic` which is associated with the `DDS_DataWriter`.

Parameters

`in DDS_DataWriter _this` - the `DDS_DataWriter` object on which the operation is operated.

Return Value

`DDS_Topic` - Return value is a pointer to the `DDS_Topic` which is associated with the `DDS_DataWriter`.

Detailed Description

This operation returns the `DDS_Topic` which is associated with the `DDS_DataWriter`, thus the `DDS_Topic` with which the `DDS_DataWriter` is created. If the `DDS_DataWriter` is already deleted, the `DDS_OBJECT_NIL` pointer is returned.

3.4.2.19 DDS_DataWriter_lookup_instance (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataWriter` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataWriter` class.

Synopsis

```
#include <dds_dcps.h>
DDS_InstanceHandle_t
   DDS_DataWriter_lookup_instance
      (DDS_DataWriter _this,
          <data> *instance_data);
```

3.4.2.20 DDS_DataWriter_register_instance (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataWriter` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataWriter` class.

Synopsis

```
#include <dds_dcps.h>
const DDS_InstanceHandle_t
```

```
DDS_DataWriter_register_instance
   (DDS_DataWriter _this,
       const <data> *instance_data);
```

3.4.2.21 DDS_DataWriter_register_instance_w_timestamp (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataWriter` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataWriter` class.

Synopsis

```
#include <dds_dcps.h>
const DDS_InstanceHandle_t
   DDS_DataWriter_register_instance_w_timestamp
      (DDS_DataWriter _this,
          const <data> *instance_data,
          const DDS_Time_t *source_timestamp);
```

3.4.2.22 DDS_DataWriter_set_listener

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataWriter_set_listener
      (DDS_DataWriter _this,
        const struct DDS_DataWriterListener *a_listener,
        const DDS_StatusMask mask);
```

Description

This operation attaches a `DDS_DataWriterListener` to the `DDS_DataWriter`.

Parameters

in DDS_DataWriter _this - the `DDS_DataWriter` object on which the operation is operated.

*in const struct DDS_DataWriterListener *a_listener* - a pointer to the `DDS_DataWriterListener` instance, which will be attached to the `DDS_DataWriter`.

in const DDS_StatusMask mask - a bit-mask in which each bit enables the invocation of the `DDS_DataWriterListener` for a certain status.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation attaches a DDS_DataWriterListener to the DDS_DataWriter. Only one DDS_DataWriterListener can be attached to each DDS_DataWriter. If a DDS_DataWriterListener was already attached, the operation will replace it with the new one. When a_listener is the DDS_OBJECT_NIL pointer, it represents a listener that is treated as a NOOP[1] for all statuses activated in the bitmask.

Communication Status

For each communication status, the StatusChangedFlag flag is initially set to FALSE. It becomes TRUE whenever that communication status changes. For each communication status activated in the mask, the associated DDS_DataWriterListener operation is invoked and the communication status is reset to FALSE, as the listener implicitly accesses the status which is passed as a parameter to that operation. The status is reset prior to calling the listener, so if the application calls the get_<status_name>_status from inside the listener it will see the status already reset. An exception to this rule is the DDS_OBJECT_NIL listener, which does not reset the communication statuses for which it is invoked.

The following statuses are applicable to the DDS_DataWriterListener:

- DDS_OFFERED_DEADLINE_MISSED_STATUS
- DDS_OFFERED_INCOMPATIBLE_QOS_STATUS
- DDS_LIVELINESS_LOST_STATUS
- DDS_PUBLICATION_MATCHED_STATUS.

Be aware that the DDS_PUBLICATION_MATCHED_STATUS is not applicable when the infrastructure does not have the information available to determine connectivity. This is the case when OpenSplice is configured not to maintain discovery information in the Networking Service. (See also the description of the NetworkService/Discovery[@enabled] attribute in section *4.4.1.6.1* on page 225 of the Deployment Guide.) In this case the operation will return DDS_RETCODE_UNSUPPORTED.

1. Short for **No-Op**eration, an instruction that peforms nothing at all.

Status bits are declared as a constant and can be used by the application in an OR operation to create a tailored mask. The special constant `DDS_STATUS_MASK_NONE` can be used to indicate that the created entity should not respond to any of its available statuses. The DDS will therefore attempt to propagate these statuses to its factory. The special constant `STATUS_MASK_ANY_V1_2` can be used to select all applicable statuses specified in the "Data Distribution Service for Real-time Systems Version 1.2" specification.

Status Propagation

In case a communication status is not activated in the `mask` of the `DDS_DataWriterListener`, the `DDS_PublisherListener` of the containing `DDS_Publisher` is invoked (if attached and activated for the status that occurred). This allows the application to set a default behaviour in the `DDS_PublisherListener` of the containing `DDS_Publisher` and a `DDS_DataWriter` specific behaviour when needed. In case the communication status is not activated in the `mask` of the `DDS_PublisherListener` as well, the communication status will be propagated to the `DDS_DomainParticipantListener` of the containing `DDS_DomainParticipant`. In case the `DDS_DomainParticipantListener` is also not attached or the communication status is not activated in its `mask`, the application is not notified of the change.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the `DDS_DataWriterListener` is attached.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_UNSUPPORTED`* - a status was selected that cannot be supported because the infrastructure does not maintain the required connectivity information.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_DataWriter` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.

3.4.2.23 DDS_DataWriter_set_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
```

```
DDS_DataWriter_set_qos
   (DDS_DataWriter _this,
     const DDS_DataWriterQos *qos);
```

Description

This operation replaces the existing set of `QosPolicy` settings for a `DDS_DataWriter`.

Parameters

`in DDS_DataWriter _this` - the `DDS_DataWriter` object on which the operation is operated.

`in const DDS_DataWriterQos *qos` - contain the new set of `QosPolicy` settings for the `DDS_DataWriter`.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_BAD_PARAMETER`, `DDS_RETCODE_UNSUPPORTED`, `DDS_RETCODE_ALLREADY_DELETED`, `DDS_RETCODE_OUT_OF_RESOURCES`, `DDS_RETCODE_IMMUTABLE_POLICY` or `DDS_RETCODE_INCONSISTENT_POLICY`.

Detailed Description

This operation replaces the existing set of `QosPolicy` settings for a `DDS_DataWriter`. The parameter `qos` contains the struct with the `QosPolicy` settings which is checked for self-consistency and mutability. When the application tries to change a `QosPolicy` setting for an enabled `DDS_DataWriter`, which can only be set before the `DDS_DataWriter` is enabled, the operation will fail and a `DDS_RETCODE_IMMUTABLE_POLICY` is returned. In other words, the application must provide the presently set `QosPolicy` settings in case of the immutable `QosPolicy` settings. Only the mutable `QosPolicy` settings can be changed. When `qos` contains conflicting `QosPolicy` settings (not self-consistent), the operation will fail and a `DDS_RETCODE_INCONSISTENT_POLICY` is returned.

The set of `QosPolicy` settings specified by the `qos` parameter are applied on top of the existing QoS, replacing the values of any policies previously set (provided, the operation returned `DDS_RETCODE_OK`).

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the new default `DDS_DataWriterQos` is set.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.

- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter `qos` is not a valid. `DDS_DataWriterQos`. It contains a `QosPolicy` setting with an invalid `DDS_Duration_t` value, an enum value that is outside its legal boundaries or a sequence that has inconsistent memory settings.
- *DDS_RETCODE_UNSUPPORTED* - one or more of the selected QosPolicy values are currently not supported by OpenSplice.
- *DDS_RETCODE_ALREADY_DELETED* - the `DDS_DataWriter` has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_IMMUTABLE_POLICY* - the parameter `qos` contains an immutable `QosPolicy` setting with a different value than set during enabling of the `DDS_DataWriter`.
- *DDS_RETCODE_INCONSISTENT_POLICY* - the parameter `qos` contains conflicting `QosPolicy` settings, *e.g.* a history depth that is higher than the specified resource limits.

3.4.2.24 DDS_DataWriter_unregister_instance (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataWriter` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataWriter` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataWriter_unregister_instance
      (DDS_DataWriter _this,
        const <data> *instance_data,
        const DDS_InstanceHandle_t handle);
```

3.4.2.25 DDS_DataWriter_unregister_instance_w_timestamp (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataWriter` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataWriter` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataWriter_unregister_instance_w_timestamp
   (DDS_DataWriter _this,
     const <data> *instance_data,
     const DDS_InstanceHandle_t handle,
     const DDS_Time_t *source_timestamp);
```

3.4.2.26 DDS_DataWriter_wait_for_acknowledgments

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataWriter_wait_for_acknowledgments
      (DDS_DataWriter _this,
        const DDS_Duration_t *max_wait);
```

Description

This operation blocks the calling thread until either all data written by the `DDS_DataWriter` is acknowledged by the local infrastructure, or until the duration specified by `max_wait` parameter elapses, whichever happens first.

Parameters

in DDS_DataWriter _this - the `DDS_DataWriter` object on which the operation is operated.

*in const DDS_Duration_t *max_wait* - the maximum duration to block for the `DDS_DataWriter_wait_for_acknowledgments`, after which the application thread is unblocked. The special constant `DDS_DURATION_INFINITE` can be used when the maximum waiting time does not need to be bounded.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_ALREADY_DELETED`, `DDS_RETCODE_OUT_OF_RESOURCES`, `DDS_RETCODE_NOT_ENABLED` or `DDS_RETCODE_TIMEOUT`.

Detailed Description

This operation blocks the calling thread until either all data written by the `DDS_DataWriter` is acknowledged by the local infrastructure, or until the duration specified by `max_wait` parameter elapses, whichever happens first.

Data is acknowledged by the local infrastructure when it does not need to be stored in its DataWriter's local history. When a locally-connected subscription (including the networking service) has no more resources to store incoming samples it will start to reject these samples, resulting in its source DataWriter to store them temporarily in its own local history to be retransmitted at a later moment in time. In such scenarios, the `DDS_DataWriter_wait_for_acknowledgments` operation will block until the `DDS_DataWriter` has retransmitted its entire history, which is therefore effectively empty, or until the `max_wait` timeout expires, whichever happens first. In the first case the operation will return `DDS_RETCODE_OK`, in the latter it will return `DDS_RETCODE_TIMEOUT`.

Be aware that in case the operation returns `DDS_RETCODE_OK`, the data has only been acknowledged by the local infrastructure: it does not mean all remote subscriptions have already received the data. However, delivering the data to remote nodes is then the sole responsibility of the networking service: even when the publishing application would terminate, all data that has not yet been received may be considered 'on-route' and will therefore eventually arrive (unless the networking service itself crashes). In contrast, if the `DDS_DataWriter` would still have data in it's local history buffer when it terminates, this data is considered 'lost'.

This operation is intended to be used only if the `DDS_DataWriter` has its `DDS_ReliabilityQosPolicyKind` set to `DDS_RELIABLE_RELIABILITY_QOS`. Otherwise the operation will return immediately with `DDS_RETCODE_OK`, since best-effort DataWriters will never store rejected samples in their local history: they will just drop them and continue business as usual.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the data of the `DDS_DataWriter` has been acknowledged by the local infrastructure.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- `DDS_RETCODE_ILLEGAL_OPERATION` - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_DataWriter` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_NOT_ENABLED`* - the `DDS_DataWriter` is not enabled.
- *`DDS_RETCODE_TIMEOUT`* - not all data is acknowledged before `max_wait` elapsed.

3.4.2.27 DDS_DataWriter_write (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataWriter` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataWriter` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
    DDS_DataWriter_write
    (DDS_DataWriter _this,
      const <data> *instance_data,
      const DDS_InstanceHandle_t handle);
```

3.4.2.28 DDS_DataWriter_write_w_timestamp (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataWriter` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataWriter` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
    DDS_DataWriter_write_w_timestamp
        (DDS_DataWriter _this,
          const <data> *instance_data,
          const DDS_InstanceHandle_t handle,
          const DDS_Time_t *source_timestamp);
```

3.4.2.29 DDS_DataWriter_writedispose (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataWriter` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataWriter` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataWriter_writedispose
      (DDS_DataWriter _this,
           const <data> *instance_data,
```

```
                    const DDS_InstanceHandle_t instance_handle);
```

3.4.2.30 DDS_DataWriter_writedispose_w_timestamp (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataWriter` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataWriter` class.

Synopsis

```
#include <dds_dcps.h>
       DDS_ReturnCode_t
          DDS_DataWriter_writedispose_w_timestamp
              (DDS_DataWriter _this,
               const <data> *instance_data,
               const DDS_InstanceHandle_t instance_handle,
               const DDS_Time_t *source_timestamp);
```

3.4.2.31 Class SPACE_FooDataWriter

The pre-processor generates from IDL type descriptions the application `<NameSpace>_<type>DataWriter` classes. For each application data type that is used as `DDS_Topic` data type, a typed class `<NameSpace>_<type>DataWriter` is derived from the `DDS_DataWriter` class. In this paragraph, the class `SPACE_FooDataWriter` describes the operations of these derived `<NameSpace>_<type>DataWriter` classes as an example for the fictional application type `Foo` (defined in the module `SPACE`).

For instance, for an application, the definitions are located in the `Space.idl` file. The pre-processor will generate a `Space.h` include file.

A `SPACE_FooDataWriter` is attached to exactly one `DDS_Publisher` which acts as a factory for it. The `SPACE_FooDataWriter` is bound to exactly one `DDS_Topic` that has been registered to use a data type `Foo` (defined in the module `SPACE`). The `DDS_Topic` must exist prior to the `SPACE_FooDataWriter` creation.

The interface description of this class is as follows:

```
/*
 * interface SPACE_FooDataWriter
 */
/*
 * inherited from class DDS_Entity
 */
/* DDS_StatusCondition
 *    SPACE_FooDataWriter_get_statuscondition
 *       (SPACE_FooDataWriter _this);
 */
/* DDS_StatusMask
```

```
 *     SPACE_FooDataWriter_get_status_changes
 *        (SPACE_FooDataWriter _this);
 */
/*  DDS_ReturnCode_t
 *     SPACE_FooDataWriter_enable
 *        (SPACE_FooDataWriter _this);
 */
/*
 * inherited from class DDS_DataWriter
 */
/*  DDS_ReturnCode_t
 *     SPACE_FooDataWriter_set_qos
 *        (SPACE_FooDataWriter _this,
 *          const DDS_DataWriterQos *qos);
 */

/*  DDS_ReturnCode_t
 *     SPACE_FooDataWriter_get_qos
 *        (SPACE_FooDataWriter _this,
 *          SPACE_FooDataWriterQos *qos);
 */

/*  DDS_ReturnCode_t
 *     SPACE_FooDataWriter_set_listener
 *        (SPACE_FooDataWriter _this,
 *          const struct DDS_DataWriterListener *a_listener,
 *           const DDS_StatusMask mask);
 */

/*  struct SPACE_FooDataWriterListener
 *     SPACE_FooDataWriter_get_listener
 *        (SPACE_FooDataWriter _this);
 */

/*  DDS_Topic
 *     SPACE_FooDataWriter_get_topic
 *        (SPACE_FooDataWriter _this);
 */

/*  DDS_Publisher
 *     SPACE_FooDataWriter_get_publisher
 *        (SPACE_FooDataWriter _this);
 */

/*  DDS_ReturnCode_t
 *     SPACE_FooDataWriter_wait_for_acknowledgments
 *        (DDS_DataWriter _this,
 *          const DDS_Duration_t *max_wait);
 */
```

```
/*  DDS_ReturnCode_t
 *     SPACE_FooDataWriter_get_liveliness_lost_status
 *        (SPACE_FooDataWriter _this,
 *          DDS_LivelinessLostStatus *status);
 */

/*  DDS_ReturnCode_t
 *     SPACE_FooDataWriter_get_offered_deadline_missed_status
 *        (SPACE_FooDataWriter _this,
 *          DDS_OfferedDeadlineMissedStatus *status);
 */

/*  DDS_ReturnCode_t
 *     SPACE_FooDataWriter_get_offered_incompatible_qos_status
 *        (SPACE_FooDataWriter _this,
 *          DDS_OfferedIncompatibleQosStatus *status);
 */

/*  DDS_ReturnCode_t
 *     SPACE_FooDataWriter_get_publication_matched_status
 *        (SPACE_FooDataWriter _this,
 *          DDS_PublicationMatchedStatus *status);
 */

/*  DDS_ReturnCode_t
 *     SPACE_FooDataWriter_assert_liveliness
 *        (SPACE_FooDataWriter _this);
 */

/*  DDS_ReturnCode_t
 *     SPACE_FooDataWriter_get_matched_subscriptions
 *        (SPACE_FooDataWriter _this,
 *          DDS_InstanceHandleSeq *subscription_handles);
 */

/*  DDS_ReturnCode_t
 *     SPACE_FooDataWriter_get_matched_subscription_data
 *        (SPACE_FooDataWriter _this,
 *          DDS_SubscriptionBuiltinTopicData *subscription_data,
 *           const DDS_InstanceHandle_t subscription_handle);
 */
/*
 * implemented API operations
 */
   DDS_InstanceHandle_t
      SPACE_FooDataWriter_register_instance
         (SPACE_FooDataWriter _this,
           const Foo *instance_data);
   DDS_InstanceHandle_t
      SPACE_FooDataWriter_register_instance_w_timestamp
```

```
      (SPACE_FooDataWriter _this,
        const Foo *instance_data,
        const DDS_Time_t *source_timestamp);
DDS_ReturnCode_t
   SPACE_FooDataWriter_unregister_instance
      (SPACE_FooDataWriter _this,
        const Foo *instance_data,
        const DDS_InstanceHandle_t handle);
DDS_ReturnCode_t
   SPACE_FooDataWriter_unregister_instance_w_timestamp
      (SPACE_FooDataWriter _this,
        const Foo *instance_data,
        const DDS_InstanceHandle_t handle,
        const DDS_Time_t *source_timestamp);
DDS_ReturnCode_t
   SPACE_FooDataWriter_write
      (SPACE_FooDataWriter _this,
        const Foo *instance_data,
        const DDS_InstanceHandle_t handle);
DDS_ReturnCode_t
   SPACE_FooDataWriter_write_w_timestamp
      (SPACE_FooDataWriter _this,
        const Foo *instance_data,
        const DDS_InstanceHandle_t handle,
        const DDS_Time_t *source_timestamp);
DDS_ReturnCode_t
   SPACE_FooDataWriter_dispose
      (SPACE_FooDataWriter _this,
        const Foo *instance_data,
        const DDS_InstanceHandle_t instance_handle);
DDS_ReturnCode_t
   SPACE_FooDataWriter_dispose_w_timestamp
      (SPACE_FooDataWriter _this,
        const Foo *instance_data,
        const DDS_InstanceHandle_t instance_handle,
        const DDS_Time_t *source_timestamp);
DDS_ReturnCode_t
   SPACE_FooDataWriter_writedispose
       (SPACE_FooDataWriter _this,
        const Foo *instance_data,
        const DDS_InstanceHandle_t instance_handle);
DDS_ReturnCode_t
   SPACE_FooDataWriter_writedispose_w_timestamp
       (SPACE_FooDataWriter _this,
        const Foo *instance_data,
        const DDS_InstanceHandle_t instance_handle,
        const DDS_Time_t *source_timestamp);
DDS_ReturnCode_t
   SPACE_FooDataWriter_get_key_value
      (SPACE_FooDataWriter _this,
```

```
                Foo *key_holder,
                const DDS_InstanceHandle_t handle);
        DDS_InstanceHandle_t
           SPACE_FooDataWriter_lookup_instance
              (SPACE_FooDataWriter _this,
                Foo *instance_data);
```

The next paragraphs describe the usage of all `SPACE_FooDataWriter` operations. The inherited operations are listed but not fully described because they are not implemented in this class. The full description of these operations is given in the classes from which they are inherited.

3.4.2.32 SPACE_FooDataWriter_assert_liveliness (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataWriter` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataWriter_assert_liveliness
      (SPACE_FooDataWriter _this);
```

3.4.2.33 SPACE_FooDataWriter_dispose

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataWriter_dispose
      SPACE_FooDataWriter _this,
       const Foo *instance_data,
       const DDS_InstanceHandle_t instance_handle);
```

Description

This operation requests the Data Distribution Service to mark the instance for deletion.

Parameters

in SPACE_FooDataWriter _this - the `SPACE_FooDataWriter` object on which the operation is operated.

*in const Foo *instance_data* - the actual instance to be disposed of.

in const DDS_InstanceHandle_t instance_handle - the handle to the instance to be disposed of.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED, DDS_RETCODE_PRECONDITION_NOT_MET or DDS_RETCODE_TIMEOUT.

Detailed Description

This operation requests the Data Distribution Service to mark the instance for deletion. Copies of the instance and its corresponding samples, which are stored in every connected DDS_DataReader and, dependent on the QoSPolicy settings, also in the Transient and Persistent stores, will be marked for deletion by setting their DDS_InstanceStateKind to DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE.

When this operation is used, the Data Distribution Service will automatically supply the value of the source_timestamp that is made available to connected DDS_DataReader objects. This timestamp is important for the interpretation of the DDS_DestinationOrderQosPolicy.

As a side effect, this operation asserts liveliness on the DDS_DataWriter itself and on the containing DDS_DomainParticipant.

Effects on DataReaders

Actual deletion of the instance administration in a connected DDS_DataReader will be postponed until the following conditions have been met:

- the instance must be unregistered (either implicitly or explicitly) by all connected DDS_DataWriters that have previously registered it
  - A DDS_DataWriter can register an instance explicitly by using one of the special operations SPACE_FooDataWriter_register_instance or SPACE_FooDataWriter_register_instance_w_timestamp.
  - A DDS_DataWriter can register an instance implicitly by using the special constant DDS_HANDLE_NIL in any of the other DDS_DataWriter operations.
  - A DDS_DataWriter can unregister an instance explicitly by using one of the special operations SPACE_FooDataWriter_unregister_instance or SPACE_FooDataWriter_unregister_instance_w_timestamp.
  - A DDS_DataWriter will unregister all its contained instances implicitly when it is deleted.

- When a DDS_DataReader detects a loss of liveliness in one of its connected DDS_DataWriters, it will consider all instances registered by that DDS_DataWriter as being implicitly unregistered.

- ***and*** the application must have consumed all samples belonging to the instance, either implicitly or explicitly.
  - An application can consume samples explicitly by invoking the SPACE_FooDataReader_take operation, or one of its variants.
  - The DDS_DataReader can consume disposed samples implicitly when the autopurge_disposed_samples_delay of the DDS_ReaderDataLifecycleQosPolicy has expired.

The DDS_DataReader may also remove instances that haven't been disposed first: this happens when the autopurge_nowriter_samples_delay of the DDS_ReaderDataLifecycleQosPolicy has expired after the instance is considered unregistered by all connected DDS_DataWriters (*i.e.* when it has a DDS_InstanceStateKind of DDS_NOT_ALIVE_NO_WRITERS). See also Section 3.1.3.15, *DDS_ReaderDataLifecycleQosPolicy*, on page 97.

Effects on Transient/Persistent Stores

Actual deletion of the instance administration in the connected Transient and Persistent stores will be postponed until the following conditions have been met:

- the instance must be unregistered (either implicitly or explicitly) by all connected DDS_DataWriters that have previously registered it. (See above.)
- ***and*** the period of time specified by the service_cleanup_delay attribute in the DDS_DurabilityServiceQosPolicy on the DDS_Topic must have elapsed after the instance is considered unregistered by all connected DDS_DataWriters.

See also Section 3.1.3.4, *DDS_DurabilityServiceQosPolicy*, on page 76.

Instance Handle

The DDS_HANDLE_NIL handle value can be used for the parameter instance_handle. This indicates the identity of the instance is automatically deduced from the instance_data (by means of the key).

If instance_handle is any value other than DDS_HANDLE_NIL, then it must correspond to the value that was returned by either the SPACE_FooDataWriter_register_instance operation or the SPACE_FooDataWriter_register_instance_w_timestamp operation when the instance (identified by its key) was registered. If there is no correspondence, then the result of the operation is unspecified.

The sample that is passed as `instance_data` is only used to check for consistency between its `key` values and the supplied `instance_handle`: the sample itself will not actually be delivered to the connected `DDS_DataReaders`. Use the `SPACE_FooDataWriter_writedispose` operation if the sample itself should be delivered together with the dispose request.

Blocking

If the `DDS_HistoryQosPolicy` is set to `DDS_KEEP_ALL_HISTORY_QOS`, the `SPACE_FooDataWriter_dispose` operation on the `DDS_DataWriter` may block if the modification would cause data to be lost because one of the limits, specified in the `DDS_ResourceLimitsQosPolicy`, to be exceeded. Under these circumstances, the `max_blocking_time` attribute of the `ReliabilityQosPolicy` configures the maximum time the `SPACE_FooDataWriter_dispose` operation may block (waiting for space to become available). If `max_blocking_time` elapses before the `DDS_DataWriter` is able to store the modification without exceeding the limits, the `SPACE_FooDataWriter_dispose` operation will fail and returns `DDS_RETCODE_TIMEOUT`.

Sample Validation

OpenSplice DDS offers the possibility to check the sample that is passed as `instance_data` for validity. Because validity checking might reduce the overall performance, it is by default disabled. This has been done by enclosing the validity checking with conditional compiler directives like this:

```
#ifdef OSPL_BOUNDS_CHECK
    // check a specific bound.
#endif
```

i By defining a macro called `OSPL_OSPL_BOUNDS_CHECK`, the validity checking will be included. On most compilers this macro can be defined by passing an additional command line parameter called *`-DOSPL_BOUNDS_CHECK`*.

Since the `SPACE_FooDataWriter_dispose` operation only uses the sample to check for consistency between its `key` values and the supplied `instance_handle`, only those keyfields will be validated against the restrictions imposed by the IDL to C language mapping, where:

- an enum may not exceed the value of its highest label
- a string (bounded or unbounded) may not be `NULL`. (Use `""` for an empty string instead)
- the length of a bounded string may not exceed the limit specified in IDL

If any of these restrictions is violated when validity checking is enabled, then the operation will fail and return a `DDS_RETCODE_BAD_PARAMETER`. More specific information about the context of this error will be written to the error log. When validity checking is disabled, any of these violations may result in undefined behaviour.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the Data Distribution Service is informed that the instance data must be disposed of.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_BAD_PARAMETER`* - `instance_handle` is not a valid handle or `instance_data` is not a valid sample.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `SPACE_FooDataWriter` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_NOT_ENABLED`* - the `SPACE_FooDataWriter` is not enabled.
- *`DDS_RETCODE_PRECONDITION_NOT_MET`* - the `instance_handle` has not been registered with this `SPACE_FooDataWriter`.
- *`DDS_RETCODE_TIMEOUT`* - the current action overflowed the available resources as specified by the combination of the `DDS_ReliabilityQosPolicy`, `DDS_HistoryQosPolicy` and `DDS_ResourceLimitsQosPolicy`. This caused blocking of the `SPACE_FooDataWriter_dispose` operation, which could not be resolved before `max_blocking_time` of the `DDS_ReliabilityQosPolicy` elapsed.

3.4.2.34 SPACE_FooDataWriter_dispose_w_timestamp

Synopsis

```
#include <Space.h>
       DDS_ReturnCode_t
          SPACE_FooDataWriter_dispose_w_timestamp
              (SPACE_FooDataWriter _this,
               const Foo *instance_data,
               const DDS_InstanceHandle_t instance_handle,
               const DDS_Time_t *source_timestamp);
```

Description

This operation requests the Data Distribution Service to mark the instance for deletion and provides a value for the `source_timestamp` explicitly.

Parameters

`in SPACE_FooDataWriter _this` - the `SPACE_FooDataWriter` object on which the operation is operated.

`in const Foo *instance_data` - the actual instance to be disposed of.

`in const DDS_InstanceHandle_t instance_handle` - the handle to the instance to be disposed of.

`in const DDS_Time_t *source_timestamp` - the timestamp which is provided for the `DDS_DataReader`.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_BAD_PARAMETER`, `DDS_RETCODE_ALREADY_DELETED`, `DDS_RETCODE_OUT_OF_RESOURCES`, `DDS_RETCODE_NOT_ENABLED`, `DDS_RETCODE_PRECONDITION_NOT_MET` or `DDS_RETCODE_TIMEOUT`.

Detailed Description

This operation performs the same functions as `SPACE_FooDataWriter_dispose` except that the application provides the value for the `source_timestamp` that is made available to connected `DDS_DataReader` objects. This timestamp is important for the interpretation of the `DDS_DestinationOrderQosPolicy`.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the Data Distribution Service is informed that the instance data must be disposed of.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_BAD_PARAMETER`* - `instance_handle` is not a valid handle or `instance_data` is not a valid sample.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `SPACE_FooDataWriter` has already been deleted.

- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the `SPACE_FooDataWriter` is not enabled.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - the `instance_handle` has not been registered with this `SPACE_FooDataWriter`.
- *DDS_RETCODE_TIMEOUT* - the current action overflowed the available resources as specified by the combination of the `DDS_ReliabilityQosPolicy`, `DDS_HistoryQosPolicy` and `DDS_ResourceLimitsQosPolicy`. This caused blocking of the `SPACE_FooDataWriter_dispose_w_timestamp` operation, which could not be resolved before `max_blocking_time` of the `DDS_ReliabilityQosPolicy` elapsed.

3.4.2.35 SPACE_FooDataWriter_enable (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataWriter_enable
      (SPACE_FooDataWriter _this);
```

3.4.2.36 SPACE_FooDataWriter_get_key_value

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataWriter_get_key_value
      (SPACE_FooDataWriter _this,
        Foo *key_holder,
        const DDS_InstanceHandle_t handle);
```

Description

This operation retrieves the key value of a specific instance.

Parameters

in SPACE_FooDataWriter _this - the `SPACE_FooDataWriter` object on which the operation is operated.

*inout Foo *key_holder* - the sample in which the key values are stored.

in const DDS_InstanceHandle_t handle - the handle to the instance from which to get the key value.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED or DDS_RETCODE_PRECONDITION_NOT_MET.

Detailed Description

This operation retrieves the key value of the instance pointed to by instance_handle. When the operation is called with an DDS_HANDLE_NIL handle value as an instance_handle, the operation will return DDS_RETCODE_BAD_PARAMETER. The operation will only fill the fields that form the key inside the key_holder instance. This means that the non-key fields are not applicable and may contain garbage.

The operation must only be called on registered instances. Otherwise the operation returns the error DDS_RETCODE_PRECONDITION_NOT_MET.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the key_holder instance contains the key values of the instance.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - handle is not a valid handle or key_holder is not a valid pointer.
- *DDS_RETCODE_ALREADY_DELETED* - the SPACE_FooDataWriter has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the SPACE_FooDataWriter is not enabled.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - this instance is not registered.

3.4.2.37 SPACE_FooDataWriter_get_listener (inherited)

This operation is inherited and therefore not described here. See the class DDS_DataWriter for further explanation.

Synopsis

```
#include <Space.h>
```

```
struct SPACE_FooDataWriterListener
   SPACE_FooDataWriter_get_listener
      (SPACE_FooDataWriter _this);
```

3.4.2.38 SPACE_FooDataWriter_get_liveliness_lost_status (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataWriter` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataWriter_get_liveliness_lost_status
      (SPACE_FooDataWriter _this,
        DDS_LivelinessLostStatus *status);
```

3.4.2.39 SPACE_FooDataWriter_get_matched_subscription_data (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataWriter` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataWriter_get_matched_subscription_data
      (SPACE_FooDataWriter _this,
        DDS_SubscriptionBuiltinTopicData *subscription_data,
        const DDS_InstanceHandle_t subscription_handle);
```

3.4.2.40 SPACE_FooDataWriter_get_matched_subscriptions (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataWriter` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataWriter_get_matched_subscriptions
      (SPACE_FooDataWriter _this,
        DDS_InstanceHandleSeq *subscription_handles);
```

3.4.2.41 SPACE_FooDataWriter_get_offered_deadline_missed_status (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataWriter` for further explanation.

Synopsis

```
#include <Space.h>
```

```
DDS_ReturnCode_t
   SPACE_FooDataWriter_get_offered_deadline_missed_status
      (SPACE_FooDataWriter _this,
        DDS_OfferedDeadlineMissedStatus *status);
```

3.4.2.42 SPACE_FooDataWriter_get_offered_incompatible_qos_status (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataWriter` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataWriter_get_offered_incompatible_qos_status
      (SPACE_FooDataWriter _this,
        DDS_OfferedIncompatibleQosStatus *status);
```

3.4.2.43 SPACE_FooDataWriter_get_publication_matched_status (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataWriter` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataWriter_get_publication_matched_status
      (SPACE_FooDataWriter _this,
        DDS_PublicationMatchedStatus *status);
```

3.4.2.44 SPACE_FooDataWriter_get_publisher (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataWriter` for further explanation.

Synopsis

```
#include <Space.h>
DDS_Publisher
   SPACE_FooDataWriter_get_publisher
      (SPACE_FooDataWriter _this);
```

3.4.2.45 SPACE_FooDataWriter_get_qos (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataWriter` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
```

```
SPACE_FooDataWriter_get_qos
   (SPACE_FooDataWriter _this,
     SPACE_FooDataWriterQos *qos);
```

3.4.2.46 SPACE_FooDataWriter_get_status_changes (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <Space.h>
DDS_StatusMask
   SPACE_FooDataWriter_get_status_changes
      (SPACE_FooDataWriter _this);
```

3.4.2.47 SPACE_FooDataWriter_get_statuscondition (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <Space.h>
DDS_StatusCondition
   SPACE_FooDataWriter_get_statuscondition
      (SPACE_FooDataWriter _this);
```

3.4.2.48 SPACE_FooDataWriter_get_topic (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataWriter` for further explanation.

Synopsis

```
#include <Space.h>
DDS_Topic
   SPACE_FooDataWriter_get_topic
      (SPACE_FooDataWriter _this);
```

3.4.2.49 SPACE_FooDataWriter_lookup_instance

Synopsis

```
#include <Space.h>
DDS_InstanceHandle_t
   SPACE_FooDataWriter_lookup_instance
      (SPACE_FooDataWriter _this,
        Foo *instance_data);
```

Description

This operation returns the value of the instance handle which corresponds to the `instance_data`.

Parameters

`in SPACE_FooDataWriter _this` - the `SPACE_FooDataWriter` object on which the operation is operated.

`in Foo *instance_data` - the instance for which the corresponding instance handle needs to be looked up.

Return Value

`DDS_InstanceHandle_t` - Result value is the instance handle which corresponds to the `instance_data`.

Detailed Description

This operation returns the value of the instance handle which corresponds to the `instance_data`. The `instance_data` parameter is only used for the purpose of examining the fields that define the `key`. The instance handle can be used in any `write`, `dispose` or `unregister` operations (or their timestamped variants) that operate on a specific instance. Note that `DDS_DataWriter` instance handles are local, and are not interchangeable with `DDS_DataReader` instance handles nor with instance handles of an other `DDS_DataWriter`.

This operation does not register the instance in question. If the instance has not been previously registered, if the `DDS_DataWriter` is already deleted or if for any other reason the Service is unable to provide an instance handle, the Service will return the special value `DDS_HANDLE_NIL`.

Sample Validation

OpenSplice DDS offers the possibility to check the sample that is passed as `instance_data` for validity. Because validity checking might reduce the overall performance, it is by default disabled. This has been done by enclosing the validity checking with conditional compiler directives like this:

```
#ifdef OSPL_BOUNDS_CHECK
    // check a specific bound.
#endif
```

i By defining a macro called `OSPL_OSPL_BOUNDS_CHECK`, the validity checking will be included. On most compilers this macro can be defined by passing an additional command line parameter called `-DOSPL_BOUNDS_CHECK`.

Since the SPACE_FooDataWriter_lookup_instance operation merely uses the sample to determine its identity based on the uniqueness of its key values, only the keyfields will be validated against the restrictions imposed by the IDL to C language mapping, where:

- an enum may not exceed the value of its highest label
- a string (bounded or unbounded) may not be NULL. (Use "" for an empty string instead)
- the length of a bounded string may not exceed the limit specified in IDL

If any of these restrictions is violated when validity checking is enabled, then the operation will fail and return a DDS_HANDLE_NIL. More specific information about the context of this error will be written to the error log. When validity checking is disabled, any of these violations may result in undefined behaviour.

3.4.2.50 SPACE_FooDataWriter_register_instance

Synopsis

```
#include <Space.h>
       DDS_InstanceHandle_t
          SPACE_FooDataWriter_register_instance
              (SPACE_FooDataWriter _this,
               const Foo *instance_data);
```

Description

This operation informs the Data Distribution Service that the application will be modifying a particular instance.

Parameters

in SPACE_FooDataWriter _this - the SPACE_FooDataWriter object on which the operation is operated.

*in const Foo *instance_data* - the new instance, which the application writes to or disposes of.

Return Value

DDS_InstanceHandle_t - Result value is the handle to the Instance, which may be used for writing and disposing of. In case of an error, a DDS_HANDLE_NIL handle value is returned.

Detailed Description

This operation informs the Data Distribution Service that the application will be modifying a particular instance. This operation may be invoked prior to calling any operation that modifies the instance, such as SPACE_FooDataWriter_write,

SPACE_FooDataWriter_write_w_timestamp, SPACE_FooDataWriter_unregister_instance, SPACE_FooDataWriter_unregister_instance_w_timestamp, SPACE_FooDataWriter_dispose, SPACE_FooDataWriter_dispose_w_timestamp, SPACE_FooDataWriter_writedispose and SPACE_FooDataWriter_writedispose_w_timestamp. When the application does register the instance before modifying, the Data Distribution Service will handle the instance more efficiently. It takes as a parameter (instance_data) an instance (to get the key value) and returns a handle that can be used in successive DDS_DataWriter operations. In case of an error, a DDS_HANDLE_NIL handle value is returned.

The explicit use of this operation is optional as the application can directly call the SPACE_FooDataWriter_write, SPACE_FooDataWriter_write_w_timestamp, SPACE_FooDataWriter_unregister_instance, SPACE_FooDataWriter_unregister_instance_w_timestamp, SPACE_FooDataWriter_dispose, SPACE_FooDataWriter_dispose_w_timestamp, SPACE_FooDataWriter_writedispose and SPACE_FooDataWriter_writedispose_w_timestamp operations and specify a DDS_HANDLE_NIL handle value to indicate that the sample should be examined to identify the instance.

When this operation is used, the Data Distribution Service will automatically supply the value of the source_timestamp that is made available to connected DDS_DataReader objects. This timestamp is important for the interpretation of the DDS_DestinationOrderQosPolicy.

Blocking

If the DDS_HistoryQosPolicy is set to KEEP_ALL_HISTORY_QOS, the SPACE_FooDataWriter_register_instance operation on the DDS_DataWriter may block if the modification would cause data to be lost because one of the limits, specified in the DDS_ResourceLimitsQosPolicy, to be exceeded. In case the synchronous attribute value of the ReliabilityQosPolicy is set to TRUE for communicating DataWriters and DataReaders then the DataWriter will wait until all synchronous DataReaders have acknowledged the data. Under these circumstances, the max_blocking_time attribute of the ReliabilityQosPolicy configures the maximum time the SPACE_FooDataWriter_register_instance operation may block (either waiting for space to become available or data to be acknowledged). If max_blocking_time elapses before the DDS_DataWriter is able to store the modification without exceeding the limits and all expected acknowledgements are received, the SPACE_FooDataWriter_register_instance operation will fail and returns DDS_HANDLE_NIL.

Sample Validation

OpenSplice DDS offers the possibility to check the sample that is passed as `instance_data` for validity. Because validity checking might reduce the overall performance, it is by default disabled. This has been done by enclosing the validity checking with conditional compiler directives like this:

```
#ifdef OSPL_BOUNDS_CHECK
    // check a specific bound.
#endif
```

i By defining a macro called `OSPL_OSPL_BOUNDS_CHECK`, the validity checking will be included. On most compilers this macro can be defined by passing an additional command line parameter called `-DOSPL_BOUNDS_CHECK`.

Since the `SPACE_FooDataWriter_register_instance` operation merely uses the sample to determine its identity based on the uniqueness of its `key` values, only the keyfields will be validated against the restrictions imposed by the IDL to C language mapping, where:

- an enum may not exceed the value of its highest label
- a string (bounded or unbounded) may not be `NULL`. (Use `""` for an empty string instead)
- the length of a bounded string may not exceed the limit specified in IDL

If any of these restrictions is violated when validity checking is enabled, then the operation will fail and return a `DDS_HANDLE_NIL`. More specific information about the context of this error will be written to the error log. When validity checking is disabled, any of these violations may result in undefined behaviour.

Multiple Calls

If this operation is called for an already registered instance, it just returns the already allocated instance handle. This may be used to look up and retrieve the handle allocated to a given instance.

3.4.2.51 SPACE_FooDataWriter_register_instance_w_timestamp

Synopsis

```
#include <Space.h>
DDS_InstanceHandle_t
   SPACE_FooDataWriter_register_instance_w_timestamp
      (SPACE_FooDataWriter _this,
        const Foo *instance_data,
        const DDS_Time_t *source_timestamp);
```

Description

This operation will inform the Data Distribution Service that the application will be modifying a particular instance and provides a value for the `source_timestamp` explicitly.

Parameters

`in SPACE_FooDataWriter _this` - the `SPACE_FooDataWriter` object on which the operation is operated.

`in Foo *instance_data` - the instance, which the application will write to or dispose of.

`in const DDS_Time_t *source_timestamp` - the timestamp used.

Return Value

`DDS_InstanceHandle_t` - Result value is the handle to the `Instance`, which must be used for writing and disposing. In case of an error, a `DDS_HANDLE_NIL` handle value is returned.

Detailed Description

This operation performs the same functions as `SPACE_FooDataWriter_register_instance` except that the application provides the value for the `source_timestamp` that is made available to connected `DDS_DataReader` objects. This timestamp is important for the interpretation of the `DDS_DestinationOrderQosPolicy`.

Multiple Calls

If this operation is called for an already registered instance, it just returns the already allocated instance handle. This may be used to look up and retrieve the handle allocated to a given instance. The source_timestamp is ignored in that case.

3.4.2.52 SPACE_FooDataWriter_set_listener (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataWriter` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataWriter_set_listener
      (SPACE_FooDataWriter _this,
        const struct DDS_DataWriterListener *a_listener,
        const DDS_StatusMask mask);
```

3.4.2.53 SPACE_FooDataWriter_set_qos (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataWriter` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataWriter_set_qos
      (SPACE_FooDataWriter _this,
        const DDS_DataWriterQos *qos);
```

3.4.2.54 SPACE_FooDataWriter_unregister_instance

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataWriter_unregister_instance
      (SPACE_FooDataWriter _this,
        const Foo *instance_data,
        const DDS_InstanceHandle_t handle);
```

Description

This operation informs the Data Distribution Service that the application will **not** be modifying a particular instance any more.

Parameters

in *`SPACE_FooDataWriter _this`* - the `SPACE_FooDataWriter` object on which the operation is operated.

in *`const Foo *instance_data`* - the instance to which the application was writing or disposing.

in *`const DDS_InstanceHandle_t handle`* - the handle to the instance that has been used for writing and disposing.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_BAD_PARAMETER`, `DDS_RETCODE_ALREADY_DELETED`, `DDS_RETCODE_OUT_OF_RESOURCES`, `DDS_RETCODE_NOT_ENABLED`, `DDS_RETCODE_PRECONDITION_NOT_MET` or `DDS_RETCODE_TIMEOUT`.

Detailed Description

This operation informs the Data Distribution Service that the application will **not** be modifying a particular instance any more. Therefore, this operation reverses the action of `SPACE_FooDataWriter_register_instance` or `SPACE_FooDataWriter_register_instance_w_timestamp`. It should only be called on an `instance` that is currently registered. This operation should be called just once per `instance`, regardless of how many times `SPACE_FooDataWriter_register_instance` was called for that `instance`. This operation also indicates that the Data Distribution Service can locally remove all information regarding that `instance`. The application should not attempt to use the `handle`, previously allocated to that `instance`, after calling this operation.

When this operation is used, the Data Distribution Service will automatically supply the value of the `source_timestamp` that is made available to connected `DDS_DataReader` objects. This timestamp is important for the interpretation of the `DDS_DestinationOrderQosPolicy`.

Effects

If, after unregistering, the application wants to modify (`write` or `dispose`) the `instance`, it first has to `register` the instance again, or it has to use the special `handle` value `DDS_HANDLE_NIL`.

This operation does not indicate that the `instance` should be deleted (that is the purpose of `SPACE_FooDataWriter_dispose`). This operation just indicates that the `DDS_DataWriter` no longer has "anything to say" about the `instance`. If there is no other `DDS_DataWriter` that has registered the instance as well, then the `DDS_InstanceStateKind` in all connected `DDS_DataReaders` will be changed to `DDS_NOT_ALIVE_NO_WRITERS_INSTANCE_STATE`, provided this `DDS_InstanceStateKind` was not already set to `DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE`. In the last case the `DDS_InstanceStateKind` will not be effected by the `SPACE_FooDataWriter_unregister_instance` call, see also Figure 21:, *State Chart of the instance_state for a Single Instance*, on page 620.

This operation can affect the `ownership` of the data `instance`. If the `DDS_DataWriter` was the exclusive owner of the `instance`, calling this operation will release that `ownership`, meaning `ownership` may be transferred to another, possibly lower strength, `DDS_DataWriter`.

The operation must be called only on registered instances. Otherwise the operation returns the error `DDS_RETCODE_PRECONDITION_NOT_MET`.

Instance Handle

The DDS_HANDLE_NIL handle value can be used for the parameter handle. This indicates that the identity of the instance is automatically deduced from the instance_data (by means of the key).

If handle is any value other than DDS_HANDLE_NIL, then it must correspond to the value returned by SPACE_FooDataWriter_register_instance or SPACE_FooDataWriter_register_instance_w_timestamp when the instance (identified by its key) was registered. If there is no correspondence, then the result of the operation is unspecified.

The sample that is passed as instance_data is used to check for consistency between its key values and the supplied instance_handle: the sample itself will not actually be delivered to the connected DDS_DataReaders.

Blocking

If the DDS_HistoryQosPolicy is set to DDS_KEEP_ALL_HISTORY_QOS, then the SPACE_FooDataWriter_unregister_instance operation on the DDS_DataWriter may block if the modification would cause data to be lost because one of the limits, specified in the DDS_ResourceLimitsQosPolicy, to be exceeded. In case the synchronous attribute value of the ReliabilityQosPolicy is set to TRUE for communicating DataWriters and DataReaders then the DataWriter will wait until all synchronous DataReaders have acknowledged the data. Under these circumstances, the max_blocking_time attribute of the ReliabilityQosPolicy configures the maximum time the SPACE_FooDataWriter_unregister_instance operation may block (either waiting for space to become available or data to be acknowledged). If max_blocking_time elapses before the DDS_DataWriter is able to store the modification without exceeding the limits and all expected acknowledgements are received, the SPACE_FooDataWriter_unregister_instance operation will fail and returns DDS_RETCODE_TIMEOUT.

Sample Validation

OpenSplice DDS offers the possibility to check the sample that is passed as instance_data for validity. Because validity checking might reduce the overall performance, it is by default disabled. This has been done by enclosing the validity checking with conditional compiler directives like this:

```
#ifdef OSPL_BOUNDS_CHECK
    // check a specific bound.
#endif
```

i By defining a macro called `OSPL_OSPL_BOUNDS_CHECK`, the validity checking will be included. On most compilers this macro can be defined by passing an additional command line parameter called `-DOSPL_BOUNDS_CHECK`.

Since the `SPACE_FooDataWriter_unregister_instance` operation merely uses the sample to check for consistency between its `key` values and the supplied `instance_handle`, only these keyfields will be validated against the restrictions imposed by the IDL to C language mapping:

- an enum may not exceed the value of its highest label.
- a string (bounded or unbounded) may not be `NULL`. (Use `""` for an empty string instead).
- the length of a bounded string may not exceed the limit specified in IDL.

If any of these restrictions is violated when validity checking is enabled, the operation will fail and return a `DDS_RETCODE_BAD_PARAMETER`. More specific information about the context of this error will be written to the error log. When validity checking is disabled, any of these violations may result in undefined behaviour.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the Data Distribution Service is informed that the instance will not be modified any more.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_BAD_PARAMETER`* - `handle` is not a valid handle or `instance_data` is not a valid sample.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `SPACE_FooDataWriter` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_NOT_ENABLED`* - the `SPACE_FooDataWriter` is not enabled.
- *`DDS_RETCODE_PRECONDITION_NOT_MET`* - the `handle` has not been registered with this `SPACE_FooDataWriter`.
- *`DDS_RETCODE_TIMEOUT`* - either the current action overflowed the available resources as specified by the combination of the `DDS_ReliabilityQosPolicy`, `DDS_HistoryQosPolicy` and `DDS_ResourceLimitsQosPolicy`, or the current action was waiting for data delivery acknowledgement by synchronous `DataReaders`. This caused blocking of the

SPACE_FooDataWriter_unregister_instance_w_timestamp operation, which could not be resolved before max_blocking_time of the DDS_ReliabilityQosPolicy elapsed.

3.4.2.55 SPACE_FooDataWriter_unregister_instance_w_timestamp

Synopsis

```
#include <Space.h>
       DDS_ReturnCode_t
          SPACE_FooDataWriter_unregister_instance_w_timestamp
              (SPACE_FooDataWriter _this,
               const Foo *instance_data,
               const DDS_InstanceHandle_t handle,
               const DDS_Time_t *source_timestamp);
```

Description

This operation will inform the Data Distribution Service that the application will **not** be modifying a particular instance any more and provides a value for the source_timestamp explicitly.

Parameters

in SPACE_FooDataWriter _this - the SPACE_FooDataWriter object on which the operation is operated.

*in Foo *instance_data* - the instance to which the application was writing or disposing.

in const DDS_InstanceHandle_t handle - the handle to the instance that has been used for writing and disposing.

*in const DDS_Time_t *source_timestamp* - the timestamp used.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED, DDS_RETCODE_PRECONDITION_NOT_MET or DDS_RETCODE_TIMEOUT.

Detailed Description

This operation performs the same functions as `SPACE_FooDataWriter_unregister_instance` except that the application provides the value for the `source_timestamp` that is made available to connected `DDS_DataReader` objects. This timestamp is important for the interpretation of the `DDS_DestinationOrderQosPolicy`.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the Data Distribution Service is informed that the instance will not be modified any more.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_BAD_PARAMETER`* - `handle` is not a valid handle or `instance_data` is not a valid sample.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `SPACE_FooDataWriter` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_NOT_ENABLED`* - the `SPACE_FooDataWriter` is not enabled.
- *`DDS_RETCODE_PRECONDITION_NOT_MET`* - the `handle` has not been registered with this `SPACE_FooDataWriter`.
- *`DDS_RETCODE_TIMEOUT`* - the current action overflowed the available resources as specified by the combination of the `DDS_ReliabilityQosPolicy`, `DDS_HistoryQosPolicy` and `DDS_ResourceLimitsQosPolicy`. This caused blocking of the `SPACE_FooDataWriter_unregister_instance_w_timestamp` operation, which could not be resolved before `max_blocking_time` of the `DDS_ReliabilityQosPolicy` elapsed.

3.4.2.56 SPACE_FooDataWriter_wait_for_acknowledgments (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataWriter` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   SPACE_FooDataWriter_wait_for_acknowledgments
      (SPACE_FooDataWriter _this,
```

```
                const DDS_Duration_t *max_wait);
```

3.4.2.57 SPACE_FooDataWriter_write

Synopsis

```
#include <Space.h>
       DDS_ReturnCode_t
          SPACE_FooDataWriter_write
              (SPACE_FooDataWriter _this,
               const Foo *instance_data,
               const DDS_InstanceHandle_t handle);
```

Description

This operation modifies the value of a data instance.

Parameters

in SPACE_FooDataWriter _this - the SPACE_FooDataWriter object on which the operation is operated.

*in const Foo *instance_data* - the data to be written.

in const DDS_InstanceHandle_t handle - the handle to the instance as supplied by SPACE_FooDataWriter_register_instance.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED, DDS_RETCODE_PRECONDITION_NOT_MET or DDS_RETCODE_TIMEOUT.

Detailed Description

This operation modifies the value of a data instance. When this operation is used, the Data Distribution Service will automatically supply the value of the source_timestamp that is made available to connected DDS_DataReader objects. This timestamp is important for the interpretation of the DDS_DestinationOrderQosPolicy.

As a side effect, this operation asserts liveliness on the DDS_DataWriter itself and on the containing DDS_DomainParticipant.

Before writing data to an instance, the instance may be registered with the SPACE_FooDataWriter_register_instance or SPACE_FooDataWriter_register_instance_w_timestamp operation. The handle returned by one of the SPACE_FooDataWriter_register_instance

operations can be supplied to the parameter `handle` of the `SPACE_FooDataWriter_write` operation. However, it is also possible to supply the special `DDS_HANDLE_NIL` handle value, which means that the identity of the `instance` is automatically deduced from the `instance_data` (identified by the `key`).

Instance Handle

The `DDS_HANDLE_NIL` handle value can be used for the parameter `handle`. This indicates the identity of the `instance` is automatically deduced from the `instance_data` (by means of the `key`).

If `handle` is any value other than `DDS_HANDLE_NIL`, it must correspond to the value returned by `SPACE_FooDataWriter_register_instance` or `SPACE_FooDataWriter_register_instance_w_timestamp` when the `instance` (identified by its `key`) was registered. Passing such a registered `handle` helps the Data Distribution Service to process the sample more efficiently. If there is no correspondence between handle and sample, the result of the operation is unspecified.

Blocking

If the `DDS_HistoryQosPolicy` is set to `DDS_KEEP_ALL_HISTORY_QOS`, the `SPACE_FooDataWriter_write` operation on the `DDS_DataWriter` may block if the modification would cause data to be lost because one of the limits, specified in the `DDS_ResourceLimitsQosPolicy`, is exceeded. In case the `synchronous` attribute value of the `ReliabilityQosPolicy` is set to `TRUE` for communicating `DataWriters` and `DataReaders` then the `DataWriter` will wait until all synchronous `DataReaders` have acknowledged the data. Under these circumstances, the `max_blocking_time` attribute of the `ReliabilityQosPolicy` configures the maximum time the `SPACE_FooDataWriter_write` operation may block (either waiting for space to become available or data to be acknowledged). If `max_blocking_time` elapses before the `DDS_DataWriter` is able to store the modification without exceeding the limits and all expected acknowledgements are received, the `SPACE_FooDataWriter_write` operation will fail and returns `DDS_RETCODE_TIMEOUT`.

Sample Validation

OpenSplice DDS offers the possibility to check the sample that is passed as `instance_data` for validity. Because validity checking might reduce the overall performance, it is by default disabled. This has been done by enclosing the validity checking with conditional compiler directives like this:

```
#ifdef OSPL_BOUNDS_CHECK
    // check a specific bound.
```

```
#endif
```

By defining a macro called `OSPL_OSPL_BOUNDS_CHECK`, the validity checking will be included. On most compilers this macro can be defined by passing an additional command line parameter called `-DOSPL_BOUNDS_CHECK`.

Before the sample is accepted by the DataWriter, it is validated against the restrictions imposed by the IDL to C language mapping:

- an enum may not exceed the value of its highest label.
- a string (bounded or unbounded) may not be `NULL`. (Use `""` for an empty string instead).
- the length of a bounded string may not exceed the limit specified in IDL.
- the length of a bounded sequence may not exceed the limit specified in IDL.

If any of these restrictions is violated when validity checking is enabled, the operation will fail and return a `DDS_RETCODE_BAD_PARAMETER`. More specific information about the context of this error will be written to the error log. When validity checking is disabled, any of these violations may result in undefined behaviour.

Be aware that it is not possible for the middleware to determine whether a union is correctly initialized, since according to the IDL-C language mapping a union just returns its current contents in the format of the requested branch without performing any checks. It is therefore the responsibility of the application programmer to make sure that the requested branch actually corresponds to the currently active branch. Not doing so may result in undefined behaviour as well.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the value of a data instance is modified.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_BAD_PARAMETER`* - `handle` is not a valid handle or `instance_data` is not a valid sample.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `SPACE_FooDataWriter` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_NOT_ENABLED`* - the `SPACE_FooDataWriter` is not enabled.

- *DDS_RETCODE_PRECONDITION_NOT_MET* - the `handle` has not been registered with this `SPACE_FooDataWriter`.
- *DDS_RETCODE_TIMEOUT* - either the current action overflowed the available resources as specified by the combination of the `DDS_ReliabilityQosPolicy`, `DDS_HistoryQosPolicy` and `DDS_ResourceLimitsQosPolicy`, or the current action was waiting for data delivery acknowledgement by synchronous `DataReaders`. This caused blocking of the `SPACE_FooDataWriter_write` operation, which could not be resolved before `max_blocking_time` of the `DDS_ReliabilityQosPolicy` elapsed.

3.4.2.58 SPACE_FooDataWriter_write_w_timestamp

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataWriter_write_w_timestamp
      (SPACE_FooDataWriter _this,
        const Foo *instance_data,
        const DDS_InstanceHandle_t handle,
        const DDS_Time_t *source_timestamp);
```

Description

This operation modifies the value of a data instance and provides a value for the `source_timestamp` explicitly.

Parameters

in SPACE_FooDataWriter _this - the `SPACE_FooDataWriter` object on which the operation is operated.

*in const Foo *instance_data* - the data to be written.

in const DDS_InstanceHandle_t handle - the handle to the instance as supplied by `SPACE_FooDataWriter_register_instance`.

*in const DDS_Time_t *source_timestamp* - the timestamp used.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_BAD_PARAMETER`, `DDS_RETCODE_ALREADY_DELETED`, `DDS_RETCODE_OUT_OF_RESOURCES`, `DDS_RETCODE_NOT_ENABLED`, `DDS_RETCODE_PRECONDITION_NOT_MET` or `DDS_RETCODE_TIMEOUT`.

Detailed Description

This operation performs the same functions as `SPACE_FooDataWriter_write` except that the application provides the value for the `source_timestamp` that is made available to connected `DDS_DataReader` objects. This timestamp is important for the interpretation of the `DDS_DestinationOrderQosPolicy`.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the value of a data instance is modified.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_BAD_PARAMETER`* - `handle` is not a valid handle or `instance_data` is not a valid sample.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `SPACE_FooDataWriter` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_NOT_ENABLED`* - the `SPACE_FooDataWriter` is not enabled.
- *`DDS_RETCODE_PRECONDITION_NOT_MET`* - the `instance_data` does not correspond to the `handle` that should have been obtained from this `SPACE_FooDataWriter`.
- *`DDS_RETCODE_TIMEOUT`* - either the current action overflowed the available resources as specified by the combination of the `DDS_ReliabilityQosPolicy`, `DDS_HistoryQosPolicy` and `DDS_ResourceLimitsQosPolicy`, or the current action was waiting for data delivery acknowledgement by synchronous `DataReaders`. This caused blocking of the `SPACE_FooDataWriter_register_instance_w_timestamp` operation, which could not be resolved before `max_blocking_time` of the `DDS_ReliabilityQosPolicy` elapsed.

3.4.2.59 SPACE_FooDataWriter_writedispose

Synopsis

```
#include <Space.h>
       DDS_ReturnCode_t
          SPACE_FooDataWriter_writedispose
              (SPACE_FooDataWriter _this,
               const Foo *instance_data,
               const DDS_InstanceHandle_t handle);
```

Description

This operation modifies and disposes a data instance.

Parameters

in SPACE_FooDataWriter _this - the SPACE_FooDataWriter object on which the operation is operated.

*in const Foo *instance_data* - the data to be written and disposed.

in const DDS_InstanceHandle_t instance - the handle to the instance as supplied by SPACE_FooDataWriter_register_instance.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED, DDS_RETCODE_PRECONDITION_NOT_MET or DDS_RETCODE_TIMEOUT.

Detailed Description

This operation requests the Data Distribution Service to modify the instance and mark it for deletion. Copies of the instance and its corresponding samples, which are stored in every connected DDS_DataReader and, dependent on the QoSPolicy settings, also in the Transient and Persistent stores, will be modified and marked for deletion by setting their DDS_InstanceStateKind to DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE.

When this operation is used, the Data Distribution Service will automatically supply the value of the source_timestamp that is made available to connected DDS_DataReader objects. This timestamp is important for the interpretation of the DDS_DestinationOrderQosPolicy.

As a side effect, this operation asserts liveliness on the DDS_DataWriter itself and on the containing DDS_DomainParticipant.

Effects on DataReaders

Actual deletion of the instance administration in a connected DDS_DataReader will be postponed until the following conditions have been met:

- the instance must be unregistered (either implicitly or explicitly) by all connected DDS_DataWriters that have previously registered it.

- A DDS_DataWriter can register an instance explicitly by using one of the special operations SPACE_FooDataWriter_register_instance or SPACE_FooDataWriter_register_instance_w_timestamp.
- A DDS_DataWriter can register an instance implicitly by using the special constant DDS_HANDLE_NIL in any of the other DDS_DataWriter operations.
- A DDS_DataWriter can unregister an instance explicitly by using one of the special operations SPACE_FooDataWriter_unregister_instance or SPACE_FooDataWriter_unregister_ instance_w_timestamp.
- A DDS_DataWriter will unregister all its contained instances implicitly when it is deleted.
- When a DDS_DataReader detects a loss of liveliness in one of its connected DDS_DataWriters, it will consider all instances registered by that DDS_DataWriter as being implicitly unregistered.

• ***and*** the application must have consumed all samples belonging to the instance, either implicitly or explicitly.

- An application can consume samples explicitly by invoking the SPACE_FooDataReader_take operation, or one of its variants.
- The DDS_DataReader can consume disposed samples implicitly when the autopurge_disposed_samples_delay of the DDS_ReaderData LifecycleQosPolicy has expired.

The DDS_DataReader may also remove instances that haven't been disposed first: this happens when the autopurge_nowriter_samples_delay of the DDS_ReaderDataLifecycleQosPolicy has expired after the instance is considered unregistered by all connected DDS_DataWriters (*i.e.* when it has a DDS_InstanceStateKind of DDS_NOT_ALIVE_NO_WRITERS). See also Section 3.1.3.15, *DDS_ReaderDataLifecycleQosPolicy*, on page 97.

Effects on Transient/Persistent Stores

Actual deletion of the instance administration in the connected Transient and Persistent stores will be postponed until the following conditions have been met:

• the instance must be unregistered (either implicitly or explicitly) by all connected DDS_DataWriters that have previously registered it. (See above.)

• ***and*** the period of time specified by the service_cleanup_delay attribute in the DDS_DurabilityServiceQosPolicy on the DDS_Topic must have elapsed after the instance is considered unregistered by all connected DDS_DataWriters.

See also Section 3.1.3.4, *DDS_DurabilityServiceQosPolicy*, on page 76.

Instance Handle

The DDS_HANDLE_NIL handle value can be used for the parameter handle. This indicates the identity of the instance is automatically deduced from the instance_data (by means of the key).

If handle is any value other than DDS_HANDLE_NIL, it must correspond to the value returned by SPACE_FooDataWriter_register_instance or SPACE_FooDataWriter_register_instance_w_timestamp when the instance (identified by its key) was registered. Passing such a registered handle helps the Data Distribution Service to process the sample more efficiently. If there is no correspondence between handle and sample, the result of the operation is unspecified.

The sample that is passed as instance_data will actually be delivered to the connected DDS_DataReaders, but will immediately be marked for deletion.

Blocking

If the DDS_HistoryQosPolicy is set to DDS_KEEP_ALL_HISTORY_QOS, the SPACE_FooDataWriter_writedispose operation on the DDS_DataWriter may block if the modification would cause data to be lost because one of the limits, specified in the DDS_ResourceLimitsQosPolicy, to be exceeded. In case the synchronous attribute value of the ReliabilityQosPolicy is set to TRUE for communicating DataWriters and DataReaders then the DataWriter will wait until all synchronous DataReaders have acknowledged the data. Under these circumstances, the max_blocking_time attribute of the ReliabilityQosPolicy configures the maximum time the SPACE_FooDataWriter_writedispose operation may block (either waiting for space to become available or data to be acknowledged). If max_blocking_time elapses before the DDS_DataWriter is able to store the modification without exceeding the limits and all expected acknowledgements are received, the SPACE_FooDataWriter_writedispose operation will fail and returns DDS_RETCODE_TIMEOUT.

Sample Validation

OpenSplice DDS offers the possibility to check the sample that is passed as instance_data for validity. Because validity checking might reduce the overall performance, it is by default disabled. This has been done by enclosing the validity checking with conditional compiler directives like this:

```
#ifdef OSPL_BOUNDS_CHECK
    // check a specific bound.
#endif
```

By defining a macro called `OSPL_OSPL_BOUNDS_CHECK`, the validity checking will be included. On most compilers this macro can be defined by passing an additional command line parameter called `-DOSPL_BOUNDS_CHECK`.

Before the sample is accepted by the DataWriter, it is validated against the restrictions imposed by the IDL to C language mapping, where:

- an enum may not exceed the value of its highest label
- a string (bounded or unbounded) may not be `NULL`. (Use `""` for an empty string instead)
- the length of a bounded string may not exceed the limit specified in IDL
- the length of a bounded sequence may not exceed the limit specified in IDL

If any of these restrictions is violated when validity checking is enabled, the operation will fail and return a `DDS_RETCODE_BAD_PARAMETER`. More specific information about the context of this error will be written to the error log. When validity checking is disabled, any of these violations may result in undefined behaviour.

Be aware that it is not possible for the middleware to determine whether a union is correctly initialized, since according to the IDL-C language mapping a union just returns its current contents in the format of the requested branch without performing any checks. It is therefore the responsibility of the application programmer to make sure that the requested branch actually corresponds to the currently active branch. Not doing so may result in undefined behaviour as well.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the Data Distribution Service has modified the instance and marked it for deletion.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_BAD_PARAMETER`* - `instance_handle` is not a valid handle or `instance_data` is not a valid sample.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `SPACE_FooDataWriter` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_NOT_ENABLED`* - the `SPACE_FooDataWriter` is not enabled.

- *DDS_RETCODE_PRECONDITION_NOT_MET* - the instance_handle has not been registered with this SPACE_FooDataWriter.
- *DDS_RETCODE_TIMEOUT* - either the current action overflowed the available resources as specified by the combination of the DDS_ReliabilityQosPolicy, DDS_HistoryQosPolicy and DDS_ResourceLimitsQosPolicy, or the current action was waiting for data delivery acknowledgement by synchronous DataReaders. This caused blocking of the SPACE_FooDataWriter_writedispose operation, which could not be resolved before max_blocking_time of the DDS_ReliabilityQosPolicy elapsed.

3.4.2.60 SPACE_FooDataWriter_writedispose_w_timestamp

Synopsis

```
#include <Space.h>
       DDS_ReturnCode_t
          SPACE_FooDataWriter_writedispose_w_timestamp
              (SPACE_FooDataWriter _this,
               const Foo *instance_data,
               const DDS_InstanceHandle_t handle,
               const DDS_Time_t *source_timestamp);
```

Description

This operation requests the Data Distribution Service to modify the instance and mark it for deletion, and provides a value for the source_timestamp explicitly.

Parameters

in SPACE_FooDataWriter _this - the SPACE_FooDataWriter object on which the operation is operated.

*in const Foo *instance_data* - the data to be written and disposed.

in const DDS_InstanceHandle_t handle - the handle to the instance as supplied by SPACE_FooDataWriter_register_instance.

*in const DDS_Time_t *source_timestamp* - the timestamp used.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED, DDS_RETCODE_PRECONDITION_NOT_MET or DDS_RETCODE_TIMEOUT.

Detailed Description

This operation performs the same functions as `SPACE_FooDataWriter_writedispose` except that the application provides the value for the `source_timestamp` that is made available to connected `DDS_DataReader` objects. This timestamp is important for the interpretation of the `DDS_DestinationOrderQosPolicy`.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the Data Distribution Service has modified the instance and marked it for deletion.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_BAD_PARAMETER`* - `handle` is not a valid handle or `instance_data` is not a valid sample.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `SPACE_FooDataWriter` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_NOT_ENABLED`* - the `SPACE_FooDataWriter` is not enabled.
- *`DDS_RETCODE_PRECONDITION_NOT_MET`* - the `handle` has not been registered with this `SPACE_FooDataWriter`.
- *`DDS_RETCODE_TIMEOUT`* - either the current action overflowed the available resources as specified by the combination of the `DDS_ReliabilityQosPolicy`, `DDS_HistoryQosPolicy` and `DDS_ResourceLimitsQosPolicy`, or the current action was waiting for data delivery acknowledgement by synchronous `DataReaders`. This caused blocking of the `SPACE_FooDataWriter_writedispose_w_timestamp` operation, which could not be resolved before `max_blocking_time` of the `DDS_ReliabilityQosPolicy` elapsed.

3.4.3 DDS_PublisherListener interface

Since a `DDS_Publisher` is a `DDS_Entity`, it has the ability to have a `Listener` associated with it. In this case, the associated `Listener` should be of type `DDS_PublisherListener`. This interface must be implemented by the application. A user-defined class must be provided by the application which must

extend from the `DDS_PublisherListener` class. **All** `DDS_PublisherListener` operations **must** be implemented in the user-defined class, it is up to the application whether an operation is empty or contains some functionality.

All operations for this interface must be implemented in the user-defined class, it is up to the application whether an operation is empty or contains some functionality.

The `DDS_PublisherListener` provides a generic mechanism (actually a callback function) for the Data Distribution Service to notify the application of relevant asynchronous status change events, such as a missed deadline, violation of a `QosPolicy` setting, etc. The `DDS_PublisherListener` is related to changes in communication status.

The interface description of this class is as follows:

```
/*
 * interface DDS_PublisherListener
 */
/*
 * inherited from DDS_DataWriterListener
 */
/*  void
 *     DDS_PublisherListener_on_offered_deadline_missed
 *        (void *listener_data,
 *          DDS_DataWriter writer,
 *         const DDS_OfferedDeadlineMissedStatus *status);
  */
/*  void
 *     DDS_PublisherListener_on_offered_incompatible_qos
 *        (void *listener_data,
 *          DDS_DataWriter writer,
 *         const DDS_OfferedIncompatibleQosStatus *status);
 */

/*  void
 *     DDS_PublisherListener_on_liveliness_lost
 *        (void *listener_data,
 *          DDS_DataWriter writer,
 *         const DDS_LivelinessLostStatus *status);
 */

/*  void
 *     DDS_PublisherListener_on_publication_matched
 *        (void *listener_data,
 *          DDS_DataWriter writer,
 *         const DDS_PublicationMatchedStatus *status);
 */
/*
 * implemented API operations
```

```
*/
  struct DDS_PublisherListener *
     DDS_PublisherListener__alloc
        (void);
```

The next paragraphs list all `DDS_PublisherListener` operations. Since these operations are all inherited, they are listed but not fully described because they are not implemented in this class. The full description of these operations is given in the classes from which they are inherited.

3.4.3.1 DDS_PublisherListener__alloc

Synopsis

```
#include <dds_dcps.h>
struct DDS_PublisherListener *
   DDS_PublisherListener__alloc
      (void);
```

Description

This operation creates a new `DDS_PublisherListener`.

Parameters

<none>

Return Value

`struct DDS_PublisherListener *` - the handle to the newly-created `DDS_PublisherListener`. In case of an error, a `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation creates a new `DDS_PublisherListener`. The `DDS_PublisherListener` must be created using this operation. In other words, the application is not allowed to declare an object of type `DDS_PublisherListener`. When the application wants to release the `DDS_PublisherListener` it must be released using `DDS_free`.

In case there are insufficient resources available to allocate the `DDS_PublisherListener`, a `DDS_OBJECT_NIL` pointer is returned instead.

3.4.3.2 DDS_PublisherListener_on_liveliness_lost (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataWriterListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
```

```
void
   DDS_PublisherListener_on_liveliness_lost
      (void *listener_data,
        DDS_DataWriter writer,
        const DDS_LivelinessLostStatus *status);
```

3.4.3.3 DDS_PublisherListener_on_offered_deadline_missed (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataWriterListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_PublisherListener_on_offered_deadline_missed
      (void *listener_data,
        DDS_DataWriter writer,
        const DDS_OfferedDeadlineMissedStatus *status);
```

3.4.3.4 DDS_PublisherListener_on_offered_incompatible_qos (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataWriterListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_PublisherListener_on_offered_incompatible_qos
      (void *listener_data,
        DDS_DataWriter writer,
        const DDS_OfferedIncompatibleQosStatus *status);
```

3.4.3.5 DDS_PublisherListener_on_publication_matched (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataWriterListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_PublisherListener_on_publication_matched
      (void *listener_data,
        DDS_DataWriter writer,
        const DDS_PublicationMatchedStatus *status);
```

3.4.4 DDS_DataWriterListener interface

Since a `DDS_DataWriter` is a `DDS_Entity`, it has the ability to have a `Listener` associated with it. In this case, the associated `Listener` should be of type `DDS_DataWriterListener`. This interface must be implemented by the application. A user-defined class must be provided by the application which must extend from the `DDS_DataWriterListener` class. **All** `DDS_DataWriterListener` operations **must** be implemented in the user-defined class, it is up to the application whether an operation is empty or contains some functionality.

NOTE: All operations for this interface must be implemented in the user-defined class; it is up to the application whether an operation is empty or contains some functionality.

The `DDS_DataWriterListener` provides a generic mechanism (actually a callback function) for the Data Distribution Service to notify the application of relevant asynchronous status change events, such as a missed deadline, violation of a `QosPolicy` setting, etc. The `DDS_DataWriterListener` is related to changes in communication status.

The interface description of this class is as follows:

```
/*
 * interface DDS_DataWriterListener
 */
/*
 * abstract external operations
 */
   void
      DDS_DataWriterListener_on_offered_deadline_missed
         (void *listener_data,
           DDS_DataWriter writer,
           const DDS_OfferedDeadlineMissedStatus *status);

   void
      DDS_DataWriterListener_on_offered_incompatible_qos
         (void *listener_data,
           DDS_DataWriter writer,
           const DDS_OfferedIncompatibleQosStatus *status);

   void
      DDS_DataWriterListener_on_liveliness_lost
         (void *listener_data,
           DDS_DataWriter writer,
           const DDS_LivelinessLostStatus *status);

   void
```

```
            DDS_DataWriterListener_on_publication_matched
               (void *listener_data,
                 DDS_DataWriter writer,
                  const DDS_PublicationMatchedStatus *status);
   /*
    * implemented API operations
    */
      struct DDS_DataWriterListener *
         DDS_DataWriterListener__alloc
            (void);
```

The next paragraphs describe the usage of all `DDS_DataWriterListener` operations. These abstract operations are fully described because they must be implemented by the application.

3.4.4.1 DDS_DataWriterListener__alloc

Synopsis

```
#include <dds_dcps.h>
struct DDS_DataWriterListener *
   DDS_DataWriterListener__alloc
      (void);
```

Description

This operation creates a new `DDS_DataWriterListener`.

Parameters

<none>

Return Value

`struct DDS_DataWriterListener *` - the handle to the newly-created `DDS_DataWriterListener`. In case of an error, a `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation creates a new `DDS_DataWriterListener`. The `DDS_DataWriterListener` must be created using this operation. In other words, the application is not allowed to declare an object of type `DDS_DataWriterListener`. When the application wants to release the `DDS_DataWriterListener` it must be released using `DDS_free`.

In case there are insufficient resources available to allocate the `DDS_DataWriterListener`, a `DDS_OBJECT_NIL` pointer is returned instead.

3.4.4.2 DDS_DataWriterListener_on_liveliness_lost (abstract)

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DataWriterListener_on_liveliness_lost
      (void *listener_data,
        DDS_DataWriter writer,
        const DDS_LivelinessLostStatus *status);
```

Description

This operation must be implemented by the application and is called by the Data Distribution Service when the `DDS_LivelinessLostStatus` changes.

Parameters

`inout void *listener_data` - a pointer to a user-defined object which may be used for identification of the `Listener`.

`in DDS_DataWriter writer` - contain a pointer to the `DDS_DataWriter` on which the `DDS_LivelinessLostStatus` has changed (this is an input to the application).

`in const DDS_LivelinessLostStatus *status` - contain the `DDS_LivelinessLostStatus` struct (this is an input to the application).

Return Value

<none>

Detailed Description

This operation is the external operation (interface, which must be implemented by the application) that is called by the Data Distribution Service when the `DDS_LivelinessLostStatus` changes. The implementation may be left empty when this functionality is not needed. This operation will only be called when the relevant `DDS_DataWriterListener` is installed and enabled for the liveliness lost status. The liveliness lost status will change when the liveliness that the `DDS_DataWriter` has committed through its `DDS_LivelinessQosPolicy` was not respected. In other words, the `DDS_DataWriter` failed to actively signal its liveliness within the offered liveliness period. As a result, the `DDS_DataReader` objects will consider the `DDS_DataWriter` as no longer “alive”.

The Data Distribution Service will call the `DDS_DataWriterListener` operation with a parameter `writer`, which will contain a pointer to the `DDS_DataWriter` on which the conflict occurred and a parameter `status`, which will contain the `DDS_LivelinessLostStatus` struct.

3.4.4.3 DDS_DataWriterListener_on_offered_deadline_missed (abstract)

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DataWriterListener_on_offered_deadline_missed
      (void *listener_data,
        DDS_DataWriter writer,
        const DDS_OfferedDeadlineMissedStatus *status);
```

Description

This operation must be implemented by the application and is called by the Data Distribution Service when the `DDS_OfferedDeadlineMissedStatus` changes.

Parameters

`inout void *listener_data` - a pointer to a user-defined object which may be used for identification of the `Listener`.

`in DDS_DataWriter writer` - contains a pointer to the `DDS_DataWriter` on which the `DDS_OfferedDeadlineMissedStatus` has changed (this is an input to the application).

`in const DDS_OfferedDeadlineMissedStatus *status` - contains the `DDS_OfferedDeadlineMissedStatus` struct (this is an input to the application).

Return Value

<none>

Detailed Description

This operation is the external operation (interface, which must be implemented by the application) that is called by the Data Distribution Service when the `DDS_OfferedDeadlineMissedStatus` changes. The implementation may be left empty when this functionality is not needed. This operation will only be called when the relevant `DDS_DataWriterListener` is installed and enabled for the offered deadline missed status. The offered deadline missed status will change when the deadline that the `DDS_DataWriter` has committed through its `DDS_DeadlineQosPolicy` was not respected for a specific instance.

The Data Distribution Service will call the `DDS_DataWriterListener` operation with a parameter `writer`, which will contain a pointer to the `DDS_DataWriter` on which the conflict occurred and a parameter `status`, which will contain the `DDS_OfferedDeadlineMissedStatus` struct.

3.4.4.4 DDS_DataWriterListener_on_offered_incompatible_qos (abstract)

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DataWriterListener_on_offered_incompatible_qos
      (void *listener_data,
        DDS_DataWriter writer,
        const DDS_OfferedIncompatibleQosStatus *status);
```

Description

This operation must be implemented by the application and is called by the Data Distribution Service when the `DDS_OFFERED_INCOMPATIBLE_QOS_STATUS` changes.

Parameters

`inout void *listener_data` - a pointer to a user-defined object which may be used for identification of the `Listener`.

`in DDS_DataWriter writer` - contain a pointer to the `DDS_DataWriter` on which the `DDS_OFFERED_INCOMPATIBLE_QOS_STATUS` has changed (this is an input to the application).

`in const DDS_OfferedIncompatibleQosStatus *status` - contain the `DDS_OfferedIncompatibleQosStatus` struct (this is an input to the application).

Return Value

<none>

Detailed Description

This operation is the external operation (interface, which must be implemented by the application) that is called by the Data Distribution Service when the `DDS_OFFERED_INCOMPATIBLE_QOS_STATUS` changes. The implementation may be left empty when this functionality is not needed. This operation will only be called when the relevant `DDS_DataWriterListener` is installed and enabled for the `DDS_OFFERED_INCOMPATIBLE_QOS_STATUS`. The incompatible `Qos` status will change when a `DDS_DataReader` object has been discovered by the `DDS_DataWriter` with the same `DDS_Topic` and a requested `DDS_DataReaderQos` that was incompatible with the one offered by the `DDS_DataWriter`.

The Data Distribution Service will call the `DDS_DataWriterListener` operation with a parameter `writer`, which will contain a pointer to the `DDS_DataWriter` on which the conflict occurred and a parameter `status`, which will contain the `DDS_OfferedIncompatibleQosStatus` struct.

3.4.4.5 DDS_DataWriterListener_on_publication_matched (abstract)

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DataWriterListener_on_publication_matched
      (DDS_DataWritervoid *listener_data,
        DDS_DataWriter writer,
        const DDS_PublicationMatchedStatus *status);
```

Description

This operation must be implemented by the application and is called by the Data Distribution Service when a new match has been discovered for the current publication, or when an existing match has ceased to exist.

Parameters

`inout void *listener_data` - a pointer to a user-defined object which may be used for identification of the `Listener`.

`in DDS_DataWriter writer` - contains a pointer to the `DDS_DataWriter` for which a match has been discovered (this is an input to the application provided by the Data Distribution Service).

`in const DDS_PublicationMatchedStatus *status` - contains the `DDS_PublicationMatchedStatus` struct (this is an input to the application provided by the Data Distribution Service).

Return Value

<none>

Detailed Description

This operation must be implemented by the application and is called by the Data Distribution Service when a new match has been discovered for the current publication, or when an existing match has ceased to exist. Usually this means that a new DataReader that matches the Topic and that has compatible Qos as the current `DDS_DataWriter` has either been discovered, or that a previously discovered DataReader has ceased to be matched to the current `DDS_DataWriter`. A DataReader may cease to match when it gets deleted, when it changes its Qos to a value that is incompatible with the current `DDS_DataWriter` or when either the

`DDS_DataWriter` or the DataReader has chosen to put its matching counterpart on its ignore-list using the `DDS_DomainParticipant_ignore_subcription` or `DDS_DomainParticipant_ignore_publication` operations.

The implementation of this Listener operation may be left empty when this functionality is not needed: it will only be called when the relevant `DDS_DataWriterListener` is installed and enabled for the `DDS_PUBLICATION_MATCHED_STATUS`.

The Data Distribution Service will provide a pointer to the `DDS_DataWriter` in the parameter `writer` and the `DDS_PublicationMatchedStatus` struct in the parameter `status` for use by the application.

3.5 Subscription Module

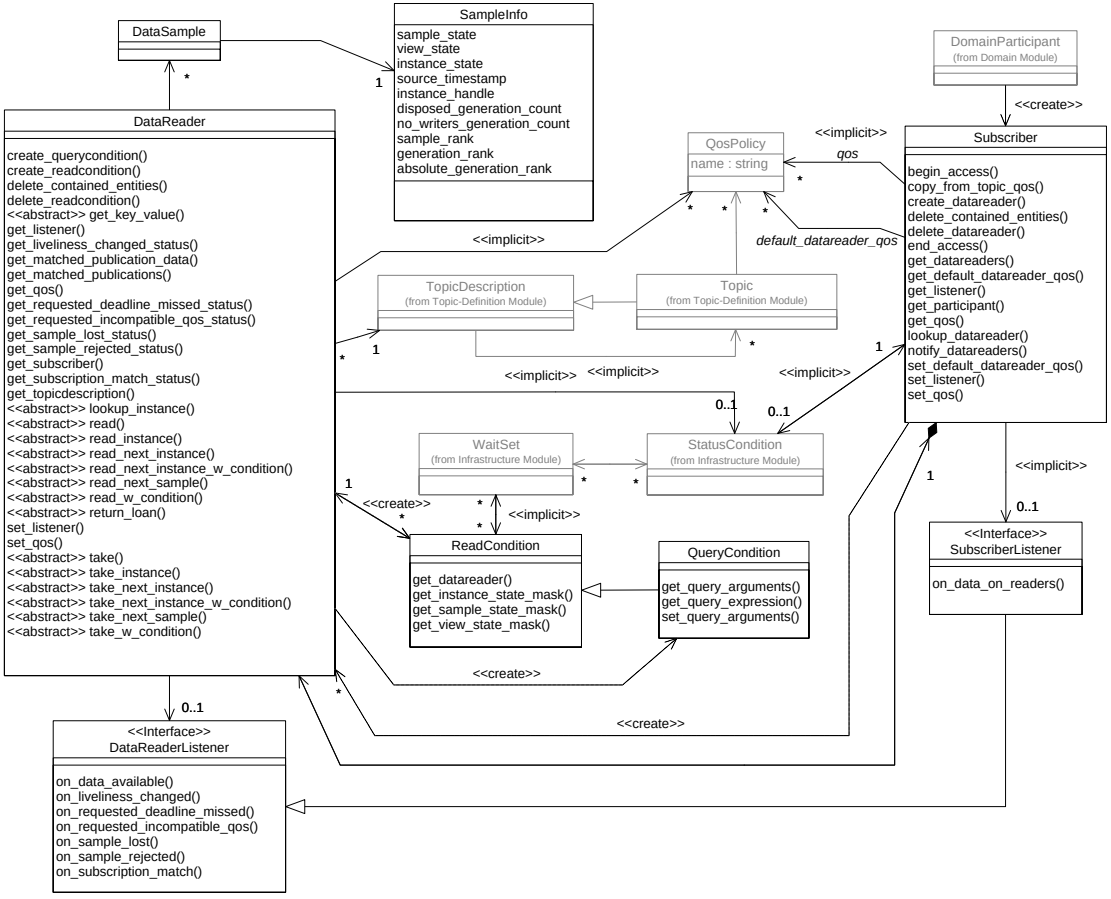

Figure 19: The DCPS Subscription Module's Class Model

This module contains the following classes:

- DDS_Subscriber
- Subscription type specific classes
- DDS_DataSample
- DDS_SampleInfo (struct)
- DDS_SubscriberListener (interface)
- DDS_DataReaderListener (interface)
- DDS_ReadCondition
- DDS_QueryCondition

"Subscription type specific classes" contains the generic class and the generated data type specific classes. For each data type, a data type specific class <NameSpace>_<type>DataReader is generated (based on IDL) by calling the pre-processor.

For instance, for the fictional data type Foo (this also applies to other types), defined in the module SPACE; "Subscription type specific classes" contains the following classes:

- DDS_DataReader (abstract)
- SPACE_FooDataReader
- DDS_DataReaderView (abstract)
- SPACE_FooDataReaderView

A DDS_Subscriber is an object responsible for receiving published data and making it available (according to the DDS_SubscriberQos) to the application. It may receive and dispatch DDS_Topic with data of different specified data types. To access the received data, the application must use a typed DDS_DataReader attached to the DDS_Subscriber. Thus, a subscription is defined by the association of a DDS_DataReader with a DDS_Subscriber. This association expresses the intent of the application to subscribe to the data described by the DDS_DataReader in the context provided by the DDS_Subscriber.

3.5.1 Class DDS_Subscriber

A DDS_Subscriber is the object responsible for the actual reception of the data resulting from its subscriptions.

A DDS_Subscriber acts on behalf of one or more DDS_DataReader objects that are related to it. When it receives data (from the other parts of the system), it indicates to the application that data is available through its DDS_DataReaderListener and by enabling related DDS_Conditions. The

application can access the list of concerned `DDS_DataReader` objects through the operation `DDS_Subscriber_get_datareaders` and then access the data available through operations on the `DDS_DataReader`.

The interface description of this class is as follows:

```
/*
 * interface DDS_Subscriber
 */
/*
 * inherited from class DDS_Entity
 */
/*  DDS_StatusCondition
 *     DDS_Subscriber_get_statuscondition
 *        (DDS_Subscriber _this)
 */
/*  DDS_StatusMask
 *     DDS_Subscriber_get_status_changes
 *        (DDS_Subscriber _this);
 */
/*  DDS_ReturnCode_t
 *     DDS_Subscriber_enable
 *        (DDS_Subscriber _this);
 */
/*
 * implemented API operations
 */
   DDS_DataReader
      DDS_Subscriber_create_datareader
         (DDS_Subscriber _this,
           const DDS_TopicDescription a_topic,
           const DDS_DataReaderQos *qos,
           const struct DDS_DataReaderListener *a_listener,
           const DDS_StatusMask mask);

   DDS_ReturnCode_t
      DDS_Subscriber_delete_datareader
         (DDS_Subscriber _this,
           const DDS_DataReader a_datareader);

   DDS_ReturnCode_t
      DDS_Subscriber_delete_contained_entities
         (DDS_Subscriber _this);

   DDS_DataReader
      DDS_Subscriber_lookup_datareader
         (DDS_Subscriber _this,
           const DDS_char *topic_name);

   DDS_ReturnCode_t
```

```
   DDS_Subscriber_get_datareaders
      (DDS_Subscriber _this,
        DDS_DataReaderSeq *readers,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states);

DDS_ReturnCode_t
   DDS_Subscriber_notify_datareaders
      (DDS_Subscriber _this);

DDS_ReturnCode_t
   DDS_Subscriber_set_qos
      (DDS_Subscriber _this,
        const DDS_SubscriberQos *qos);

DDS_ReturnCode_t
   DDS_Subscriber_get_qos
      (DDS_Subscriber _this,
        DDS_SubscriberQos *qos);
DDS_ReturnCode_t
   DDS_Subscriber_set_listener
      (DDS_Subscriber _this,
        const struct DDS_SubscriberListener *a_listener,
        const DDS_StatusMask mask);

struct DDS_SubscriberListener
   DDS_Subscriber_get_listener
      (DDS_Subscriber _this);

DDS_ReturnCode_t
   DDS_Subscriber_begin_access
      (DDS_Subscriber _this);

DDS_ReturnCode_t
   DDS_Subscriber_end_access
      (DDS_Subscriber _this);

DDS_DomainParticipant
   DDS_Subscriber_get_participant
      (DDS_Subscriber _this);

DDS_ReturnCode_t
   DDS_Subscriber_set_default_datareader_qos
      (DDS_Subscriber _this,
        const DDS_DataReaderQos *qos);

DDS_ReturnCode_t
   DDS_Subscriber_get_default_datareader_qos
      (DDS_Subscriber _this,
```

```
                DDS_DataReaderQos *qos);

        DDS_ReturnCode_t
           DDS_Subscriber_copy_from_topic_qos
              (DDS_Subscriber _this,
                DDS_DataReaderQos *a_datareader_qos,
                const DDS_TopicQos *a_topic_qos);
```

The next paragraphs describe the usage of all `DDS_Subscriber` operations. The inherited operations are listed but not fully described because they are not implemented in this class. The full description of these operations is given in the classes from which they are inherited.

3.5.1.1 DDS_Subscriber_begin_access

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Subscriber_begin_access
      (DDS_Subscriber _this);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.5.1.2 DDS_Subscriber_copy_from_topic_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Subscriber_copy_from_topic_qos
      (DDS_Subscriber _this,
        DDS_DataReaderQos *a_datareader_qos,
        const DDS_TopicQos *a_topic_qos);
```

Description

This operation will copy the policies in `a_topic_qos` to the corresponding policies in `a_datareader_qos`.

Parameters

in `DDS_Subscriber _this` - the `DDS_Subscriber` object on which the operation is operated.

inout `DDS_DataReaderQos *a_datareader_qos` - the destination `DDS_DataReaderQos` struct to which the `QosPolicy` settings will be copied.

in `const DDS_TopicQos *a_topic_qos` - the source `DDS_TopicQos`, which will be copied.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation will copy the QosPolicy settings in a_topic_qos to the corresponding QosPolicy settings in a_datareader_qos (replacing the values in a_datareader_qos, if present).

This is a "convenience" operation, useful in combination with the operations DDS_Publisher_get_default_datawriter_qos and DDS_Topic_get_qos. The operation DDS_Subscriber_copy_from_topic_qos can be used to merge the DDS_DataReader default QosPolicy settings with the corresponding ones on the DDS_Topic. The resulting DDS_DataReaderQos can then be used to create a new DDS_DataReader, or set its DDS_DataReaderQos.

This operation does not check the resulting a_datareader_qos for self consistency. This is because the "merged" a_datareader_qos may not be the final one, as the application can still modify some QosPolicy settings prior to applying the DDS_DataReaderQos to the DDS_DataReader.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the QosPolicy settings have successfully been copied from the DDS_TopicQos to the DDS_DataReaderQos.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Subscriber has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.5.1.3 DDS_Subscriber_create_datareader

```
Synopsis
#include <dds_dcps.h>
DDS_DataReader
   DDS_Subscriber_create_datareader
      (DDS_Subscriber _this,
        const DDS_TopicDescription a_topic,
```

```
const DDS_DataReaderQos *qos,
const struct DDS_DataReaderListener *a_listener,
const DDS_StatusMask mask);
```

Description

This operation creates a `DDS_DataReader` with the desired `QosPolicy` settings, for the desired `DDS_TopicDescription` and attaches the optionally specified `DDS_DataWriterListener` to it.

Parameters

`in DDS_Subscriber _this` - the `DDS_Subscriber` object on which the operation is operated.

`in const DDS_TopicDescription a_topic` - a pointer to the `DDS_TopicDescription` for which the `DDS_DataReader` is created. This may be a `DDS_Topic`, `DDS_MultiTopic` or `DDS_ContentFilteredTopic`.

`in const DDS_DataReaderQos *qos` - the struct with the `QosPolicy` settings for the new `DDS_DataReader`, when these `QosPolicy` settings are not self consistent, no `DDS_DataReader` is created.

`in const struct DDS_DataReaderListener *a_listener` - a pointer to the `DDS_DataReaderListener` instance which will be attached to the new `DDS_DataReader`. It is permitted to use `DDS_OBJECT_NIL` as the value of the listener: this behaves as a `DDS_DataWriterListener` whose operations perform no action.

`in const DDS_StatusMask mask` - a bit-mask in which each bit enables the invocation of the `DDS_DataReaderListener` for a certain status.

Return Value

`DDS_DataReader` - Return value is a pointer to the newly-created `DDS_DataReader`. In case of an error, the `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation creates a `DDS_DataReader` with the desired `QosPolicy` settings, for the desired `DDS_TopicDescription` and attaches the optionally specified `DDS_DataReaderListener` to it. The `DDS_TopicDescription` may be a `DDS_Topic`, `DDS_MultiTopic` or `DDS_ContentFilteredTopic`. The returned `DDS_DataReader` is attached (and belongs) to the `DDS_Subscriber`. To delete the `DDS_DataReader` the operation `DDS_Subscriber_delete_datareader` or `DDS_Subscriber_delete_contained_entities` must be used. If no read rights are defined for the specific topic then the creation of the `DataReader` will fail.

Application Data Type

The DDS_DataReader returned by this operation is an object of a derived class, specific to the data type associated with the DDS_TopicDescription. For each application-defined data type <type> there is a class <NameSpace>_<type>DataReader generated by calling the pre-processor. This data type specific class extends DDS_DataReader and contains the operations to read data of data type <type>.

Because the DDS_DataReader may read a DDS_Topic, DDS_ContentFilteredTopic or DDS_MultiTopic, the DDS_DataReader is associated with the DDS_TopicDescription. The DDS_DataWriter can only write a DDS_Topic, **not** a DDS_ContentFilteredTopic or DDS_MultiTopic, because these two are constructed at the DDS_Subscriber side.

QosPolicy

The common application pattern to construct the QosPolicy settings for the DDS_DataReader is to:

- Retrieve the QosPolicy settings on the associated DDS_TopicDescription by means of the DDS_Topic_get_qos operation on the DDS_TopicDescription
- Retrieve the default DDS_DataReaderQos by means of the DDS_Subscriber_get_default_datareader_qos operation on the DDS_Subscriber
- Combine those two QosPolicy settings and selectively modify policies as desired (DDS_Subscriber_copy_from_topic_qos)
- Use the resulting QosPolicy settings to construct the DDS_DataReader.
- In case the specified QosPolicy settings are not self consistent, no DDS_DataReader is created and the DDS_OBJECT_NIL pointer is returned.

Default QoS

The constant DDS_DATAREADER_QOS_DEFAULT can be used as parameter qos to create a DDS_DataReader with the default DDS_DataReaderQos as set in the DDS_Subscriber. The effect of using DDS_DATAREADER_QOS_DEFAULT is the same as calling the operation DDS_Subscriber_get_default_datareader_qos and using the resulting DDS_DataReaderQos to create the DDS_DataReader.

The special DDS_DATAREADER_QOS_USE_TOPIC_QOS can be used to create a DDS_DataReader with a combination of the default DDS_DataReaderQos and the DDS_TopicQos. The effect of using DDS_DATAREADER_QOS_USE_TOPIC_QOS is the same as calling the operation

DDS_Subscriber_get_default_datareader_qos and retrieving the DDS_TopicQos (by means of the operation DDS_Topic_get_qos) and then combining these two QosPolicy settings using the operation DDS_Subscriber_copy_from_topic_qos, whereby any common policy that is set on the DDS_TopicQos "overrides" the corresponding policy on the default DDS_DataReaderQos. The resulting DDS_DataReaderQos is then applied to create the DDS_DataReader.

Communication Status

For each communication status, the StatusChangedFlag flag is initially set to FALSE. It becomes TRUE whenever that communication status changes. For each communication status activated in the mask, the associated DDS_DataReaderListener operation is invoked and the communication status is reset to FALSE, as the listener implicitly accesses the status which is passed as a parameter to that operation. The fact that the status is reset prior to calling the listener means that if the application calls the get_<status_name>_status from inside the listener it will see the status already reset.

The following statuses are applicable to the DDS_DataReaderListener:

```
DDS_REQUESTED_DEADLINE_MISSED_STATUS
DDS_REQUESTED_INCOMPATIBLE_QOS_STATUS
DDS_SAMPLE_LOST_STATUS
DDS_SAMPLE_REJECTED_STATUS
DDS_DATA_AVAILABLE_STATUS
DDS_LIVELINESS_CHANGED_STATUS
DDS_SUBSCRIPTION_MATCHED_STATUS.
```

Be aware that the DDS_SUBSCRIPTION_MATCHED_STATUS is not applicable when the infrastructure does not have the information available to determine connectivity. This is the case when OpenSplice is configured not to maintain discovery information in the Networking Service. (See also the description of the NetworkService/Discovery[@enabled] attribute in section *4.4.1.6.1* on page 225 of the Deployment Guide.) In this case the operation will return DDS_OBJECT_NIL.

Status bits are declared as a constant and can be used by the application in an OR operation to create a tailored mask. The special constant DDS_STATUS_MASK_NONE can be used to indicate that the created entity should not respond to any of its available statuses. The DDS will therefore attempt to propagate these statuses to its factory. The special constant STATUS_MASK_ANY_V1_2 can be used to select all applicable statuses specified in the "Data Distribution Service for Real-time Systems Version 1.2" specification.

Status Propagation

In case a communication status is not activated in the `mask` of the `DDS_DataReaderListener`, the `DDS_SubscriberListener` of the containing `DDS_Subscriber` is invoked (if attached and activated for the status that occurred). This allows the application to set a default behaviour in the `DDS_SubscriberListener` of the containing `DDS_Subscriber` and a `DDS_DataReader` specific behaviour when needed. In case the communication status is not activated in the `mask` of the `DDS_SubscriberListener` as well, the communication status will be propagated to the `DDS_DomainParticipantListener` of the containing `DDS_DomainParticipant`. In case the `DDS_DomainParticipantListener` is also not attached or the communication status is not activated in its `mask`, the application is not notified of the change.

3.5.1.4 DDS_Subscriber_delete_contained_entities

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Subscriber_delete_contained_entities
      (DDS_Subscriber _this);
```

Description

This operation deletes all the `DDS_DataReader` objects that were created by means of the `DDS_Subscriber_create_datareader` operation on the `DDS_Subscriber`.

Parameters

`in DDS_Subscriber _this` - the `DDS_Subscriber` object on which the operation is operated.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_ALREADY_DELETED`, `DDS_RETCODE_OUT_OF_RESOURCES` or `DDS_RETCODE_PRECONDITION_NOT_MET`.

Detailed Description

This operation deletes all the `DDS_DataReader` objects that were created by means of the `DDS_Subscriber_create_datareader` operation on the `DDS_Subscriber`. In other words, it deletes all contained `DDS_DataReader` objects. Prior to deleting each `DDS_DataReader`, this operation recursively calls

the corresponding `DDS_DataReader_delete_contained_entities` operation on each `DDS_DataReader`. In other words, all `DDS_DataReader` objects in the `DDS_Subscriber` are deleted, including the `DDS_QueryCondition` and `DDS_ReadCondition` objects contained by the `DDS_DataReader`.

NOTE: The operation will return `DDS_PRECONDITION_NOT_MET` if the any of the contained entities is in a state where it cannot be deleted. This will occur, for example, if a contained `DDS_DataReader` cannot be deleted because the application has called a `read` or `take` operation and has not called the corresponding `return_loan` operation to return the loaned samples. In such cases, the operation does not roll back any entity deletions performed prior to the detection of the problem.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the contained `DDS_Entity` objects are deleted and the application may delete the `DDS_Subscriber`.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_Subscriber` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_PRECONDITION_NOT_MET`* - one or more of the contained entities are in a state where they cannot be deleted.

3.5.1.5 DDS_Subscriber_delete_datareader

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Subscriber_delete_datareader
      (DDS_Subscriber _this,
        const DDS_DataReader a_datareader);
```

Description

This operation deletes a `DDS_DataReader` that belongs to the `DDS_Subscriber`.

Parameters

in DDS_Subscriber _this - the DDS_Subscriber object on which the operation is operated.

in const DDS_DataReader a_datareader - a pointer to the DDS_DataReader, which is to be deleted.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES or DDS_RETCODE_PRECONDITION_NOT_MET.

Detailed Description

This operation deletes a DDS_DataReader that belongs to the DDS_Subscriber. When the operation is called on a different DDS_Subscriber as used when the DDS_DataReader was created, the operation has no effect and returns DDS_RETCODE_PRECONDITION_NOT_MET. The deletion of the DDS_DataReader is not allowed if there are any DDS_ReadCondition or DDS_QueryCondition objects that are attached to the DDS_DataReader, or when the DDS_DataReader still contains unreturned loans. In those cases the operation also returns DDS_RETCODE_PRECONDITION_NOT_MET.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the DDS_DataReader is deleted.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter a_datareader is not a valid DDS_DataReader.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Subscriber has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

- *DDS_RETCODE_PRECONDITION_NOT_MET* - the operation is called on a different DDS_Subscriber as used when the DDS_DataReader was created, the DDS_DataReader contains one or more DDS_ReadCondition or DDS_QueryCondition objects or the DDS_DataReader still contains unreturned loans.

3.5.1.6 DDS_Subscriber_enable (inherited)

This operation is inherited and therefore not described here. See the class DDS_Entity for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Subscriber_enable
      (DDS_Subscriber _this);
```

3.5.1.7 DDS_Subscriber_end_access

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Subscriber_end_access
      (DDS_Subscriber _this);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.5.1.8 DDS_Subscriber_get_datareaders

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Subscriber_get_datareaders
      (DDS_Subscriber _this,
        DDS_DataReaderSeq *readers,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.5.1.9 DDS_Subscriber_get_default_datareader_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Subscriber_get_default_datareader_qos
      (DDS_Subscriber _this,
```

```
DDS_DataReaderQos *qos);
```

Description

This operation gets the default `QosPolicy` settings of the `DDS_DataReader`.

Parameters

`in DDS_Subscriber _this` - the `DDS_Subscriber` object on which the operation is operated.

`inout DDS_DataReaderQos *qos` - a pointer to the `DDS_DataReaderQos` struct (provided by the application) in which the default `QosPolicy` settings for the `DDS_DataReader` are written.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_ALREADY_DELETED` or `DDS_RETCODE_OUT_OF_RESOURCES`.

Detailed Description

This operation gets the default `QosPolicy` settings of the `DDS_DataReader` (that is the `DDS_DataReaderQos`) which is used for newly-created `DDS_DataReader` objects, in case the constant `DDS_DATAREADER_QOS_DEFAULT` is used. The default `DDS_DataReaderQos` is only used when the constant is supplied as parameter `qos` to specify the `DDS_DataReaderQos` in the `DDS_Subscriber_create_datareader` operation. The application must provide the `DDS_DataReaderQos` struct in which the `QosPolicy` settings can be stored and pass the `qos` pointer to the operation. The operation writes the default `QosPolicy` settings to the struct pointed to by `qos`. Any settings in the struct are overwritten.

The values retrieved by this operation match the values specified on the last successful call to `DDS_Subscriber_set_default_datareader_qos`, or, if the call was never made, the default values as specified for each `QosPolicy` setting as defined in Table 5: on page 65.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the default `DDS_DataReader` `QosPolicy` settings of this `DDS_Subscriber` have successfully been copied into the specified `DDS_DataReaderQos` parameter.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.

- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Subscriber has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.5.1.10 DDS_Subscriber_get_listener

Synopsis

```
#include <dds_dcps.h>
struct DDS_SubscriberListener
   DDS_Subscriber_get_listener
      (DDS_Subscriber _this);
```

Description

This operation allows access to a DDS_SubscriberListener.

Parameters

in DDS_Subscriber _this - the DDS_Subscriber object on which the operation is operated.

Return Value

struct DDS_SubscriberListener - result is a pointer to the DDS_SubscriberListener attached to the DDS_Subscriber.

Detailed Description

This operation allows access to a DDS_SubscriberListener attached to the DDS_Subscriber. When no DDS_SubscriberListener was attached to the DDS_Subscriber, the DDS_OBJECT_NIL pointer is returned.

3.5.1.11 DDS_Subscriber_get_participant

Synopsis

```
#include <dds_dcps.h>
DDS_DomainParticipant
   DDS_Subscriber_get_participant
      (DDS_Subscriber _this);
```

Description

This operation returns the DDS_DomainParticipant associated with the DDS_Subscriber or the DDS_OBJECT_NIL pointer.

Parameters

in DDS_Subscriber _this - the DDS_Subscriber object on which the operation is operated.

Return Value

DDS_DomainParticipant - a pointer to the DDS_DomainParticipant associated with the DDS_Subscriber or the DDS_OBJECT_NIL pointer.

Detailed Description

This operation returns the DDS_DomainParticipant associated with the DDS_Subscriber. Note that there is exactly one DDS_DomainParticipant associated with each DDS_Subscriber. When the DDS_Subscriber was already deleted (there is no associated DDS_DomainParticipant any more), the DDS_OBJECT_NIL pointer is returned.

3.5.1.12 DDS_Subscriber_get_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Subscriber_get_qos
      (DDS_Subscriber _this,
        DDS_SubscriberQos *qos);
```

Description

This operation allows access to the existing set of QoS policies for a DDS_Subscriber.

Parameters

in DDS_Subscriber _this - the DDS_Subscriber object on which the operation is operated.

*inout DDS_SubscriberQos *qos* - a pointer to the destination DDS_SubscriberQos struct in which the QosPolicy settings will be copied.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation allows access to the existing set of QoS policies of a `DDS_Subscriber` on which this operation is used. This `DDS_SubscriberQos` is stored at the location pointed to by the `qos` parameter.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the existing set of QoS policy values applied to this `DDS_Subscriber` has successfully been copied into the specified `DDS_SubscriberQos` parameter.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_Subscriber` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.

3.5.1.13 DDS_Subscriber_get_status_changes (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_StatusMask
   DDS_Subscriber_get_status_changes
      (DDS_Subscriber _this);
```

3.5.1.14 DDS_Subscriber_get_statuscondition (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_StatusCondition
   DDS_Subscriber_get_statuscondition
      (DDS_Subscriber _this);
```

3.5.1.15 DDS_Subscriber_lookup_datareader

Synopsis

```
#include <dds_dcps.h>
DDS_DataReader
   DDS_Subscriber_lookup_datareader
      (DDS_Subscriber _this,
        const DDS_char *topic_name);
```

Description

This operation returns a previously created `DDS_DataReader` belonging to the `DDS_Subscriber` which is attached to a `DDS_Topic` with the matching `topic_name`.

Parameters

`in DDS_Subscriber _this` - the `DDS_Subscriber` object on which the operation is operated.

`in const DDS_char *topic_name` - the name of the `DDS_Topic`, which is attached to the `DDS_DataReader` to look for.

Return Value

`DDS_DataReader` - Return value is a pointer to the `DDS_DataReader` found. When no such `DDS_DataReader` is found, the `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation returns a previously created `DDS_DataReader` belonging to the `DDS_Subscriber` which is attached to a `DDS_Topic` with the matching `topic_name`. When multiple `DDS_DataReader` objects (which satisfy the same condition) exist, this operation will return one of them. It is not specified which one.

This operation may be used on the built-in `DDS_Subscriber`, which returns the built-in `DDS_DataReader` objects for the built-in `DDS_Topics`.

3.5.1.16 DDS_Subscriber_notify_datareaders

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Subscriber_notify_datareaders
      (DDS_Subscriber _this);
```

Description

This operation invokes the `DDS_DataReaderListener_on_data_available` operation on `DDS_DataReaderListener` objects which are attached to the contained `DDS_DataReader` entities having new, available data.

Parameters

in *`DDS_Subscriber _this`* - the `DDS_Subscriber` object on which the operation is operated.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_ALREADY_DELETED` or `DDS_RETCODE_OUT_OF_RESOURCES`.

Detailed Description

This operation invokes the `DDS_DataReaderListener_on_data_available` operation on the `DDS_DataReaderListener` objects attached to contained `DDS_DataReader` entities that have received information, but which have not yet been processed by those `DDS_DataReaders`.

The `DDS_Subscriber_notify_datareaders` operation ignores the bit mask value of the individual `DDS_DataReaderListener` objects, even when the `DDS_DATA_AVAILABLE_STATUS` bit has not been set on a `DDS_DataReader` that which has new, available data. The `DDS_DataReaderListener_on_data_available` operation will still be invoked, when the `DATA_AVAILABLE_STATUS` bit has not been set on a `DataReader`, but will not propagate to the `DDS_DomainParticipantListener`.

When the `DDS_DataReader` has attached a `NULL` listener, the event will be consumed and will not propagate to the `DDS_DomainParticipantListener`. (Remember that a `NULL` listener is regarded as a listener that handles all its events as a `NOOP`).

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - all appropriate listeners have been invoked
- *`DDS_RETCODE_ERROR`* - an internal error has occurred
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object

- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Subscriber has already been deleted
- *DDS_RETCODE_OUT_OF_RESOURCES* - there are insufficient Data Distribution Service resources to complete this operation

3.5.1.17 DDS_Subscriber_set_default_datareader_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Subscriber_set_default_datareader_qos
      (DDS_Subscriber _this,
        const DDS_DataReaderQos *qos);
```

Description

This operation sets the default DDS_DataReaderQos of the DDS_DataReader.

Parameters

in DDS_Subscriber _this - the DDS_Subscriber object on which the operation is operated.

*in const DDS_DataReaderQos *qos* - the DDS_DataReaderQos struct, which contains the new default QosPolicy settings for the newly-created DDS_DataReaders.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES or DDS_RETCODE_INCONSISTENT_POLICY.

Detailed Description

This operation sets the default DDS_DataReaderQos of the DDS_DataReader (that is the struct with the QosPolicy settings). This QosPolicy is used for newly-created DDS_DataReader objects in case the constant DDS_DATAREADER_QOS_DEFAULT is used as parameter qos to specify the DDS_DataReaderQos in the DDS_Subscriber_create_datareader operation. This operation checks if the DDS_DataReaderQos is self consistent. If it is not, the operation has no effect and returns DDS_RETCODE_INCONSISTENT_POLICY.

The values set by this operation are returned by DDS_Subscriber_get_default_datareader_qos.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the new default DDS_DataReaderQos is set.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter qos is not a valid DDS_DataReaderQos. It contains a QosPolicy setting with an invalid DDS_Duration_t value, an enum value that is outside its legal boundaries or a sequence that has inconsistent memory settings.
- *DDS_RETCODE_UNSUPPORTED* - one or more of the selected QosPolicy values are currently not supported by OpenSplice.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Subscriber has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_INCONSISTENT_POLICY* - the parameter qos contains conflicting QosPolicy settings, *e.g.* a history depth that is higher than the specified resource limits.

3.5.1.18 DDS_Subscriber_set_listener

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Subscriber_set_listener
      (DDS_Subscriber _this,
        const struct DDS_SubscriberListener *a_listener,
        const DDS_StatusMask mask);
```

Description

This operation attaches a DDS_SubscriberListener to the DDS_Subscriber.

Parameters

in DDS_Subscriber _this - the DDS_Subscriber object on which the operation is operated.

*in const struct DDS_SubscriberListener *a_listener* - a pointer to the DDS_SubscriberListener instance, which will be attached to the DDS_Subscriber.

in const DDS_StatusMask mask - a bit-mask in which each bit enables the invocation of the DDS_SubscriberListener for a certain status.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation attaches a DDS_SubscriberListener to the DDS_Subscriber. Only one DDS_SubscriberListener can be attached to each DDS_Subscriber. If a DDS_SubscriberListener was already attached, the operation will replace it with the new one. When a_listener is the DDS_OBJECT_NIL pointer, it represents a listener that is treated as a NOOP[1] for all statuses activated in the bitmask.

Communication Status

For each communication status, the StatusChangedFlag flag is initially set to FALSE. It becomes TRUE whenever that communication status changes. For each communication status activated in the mask, the associated DDS_SubscriberListener operation is invoked and the communication status is reset to FALSE, as the listener implicitly accesses the status which is passed as a parameter to that operation. The status is reset prior to calling the listener, so if the application calls the get_<status_name>_status from inside the listener it will see the status already reset. An exception to this rule is the DDS_OBJECT_NIL listener, which does not reset the communication statuses for which it is invoked.

The following statuses are applicable to the DDS_SubscriberListener:

- DDS_REQUESTED_DEADLINE_MISSED_STATUS *(propagated)*
- DDS_REQUESTED_INCOMPATIBLE_QOS_STATUS *(propagated)*
- DDS_SAMPLE_LOST_STATUS *(propagated)*
- DDS_SAMPLE_REJECTED_STATUS *(propagated)*
- DDS_DATA_AVAILABLE_STATUS *(propagated)*
- DDS_LIVELINESS_CHANGED_STATUS *(propagated)*
- DDS_SUBSCRIPTION_MATCHED_STATUS *(propagated)*.
- DDS_DATA_ON_READERS_STATUS.

1. Short for **No-Op**eration, an instruction that peforms nothing at all.

Be aware that the DDS_SUBSCRIPTION_MATCHED_STATUS is not applicable when the infrastructure does not have the information available to determine connectivity. This is the case when OpenSplice is configured not to maintain discovery information in the Networking Service. (See also the description of the NetworkService/Discovery[@enabled] attribute in section *4.4.1.6.1* on page 225 of the Deployment Guide.) In this case the operation will return DDS_RETCODE_UNSUPPORTED.

Status bits are declared as a constant and can be used by the application in an OR operation to create a tailored mask. The special constant DDS_STATUS_MASK_NONE can be used to indicate that the created entity should not respond to any of its available statuses. The DDS will therefore attempt to propagate these statuses to its factory. The special constant STATUS_MASK_ANY_V1_2 can be used to select all applicable statuses specified in the "Data Distribution Service for Real-time Systems Version 1.2" specification.

Status Propagation

The Data Distribution Service will trigger the most specific and relevant Listener. In other words, in case a communication status is also activated on the DDS_DataReaderListener of a contained DDS_DataReader, the DDS_DataReaderListener on that contained DDS_DataReader is invoked instead of the DDS_SubscriberListener. This means that a status change on a contained DDS_DataReader only invokes the DDS_SubscriberListener if the contained DDS_DataReader itself does not handle the trigger event generated by the status change.

In case a communication status is not activated in the mask of the DDS_SubscriberListener, the DDS_DomainParticipantListener of the containing DDS_DomainParticipant is invoked (if attached and activated for the status that occurred). This allows the application to set a default behaviour in the DDS_DomainParticipantListener of the containing DDS_DomainParticipant and a DDS_Subscriber specific behaviour when needed. In case the DDS_DomainParticipantListener is also not attached or the communication status is not activated in its mask, the application is not notified of the change.

The statuses DDS_DATA_ON_READERS_STATUS and DDS_DATA_AVAILABLE_STATUS are "Read Communication Statuses" and are an exception to all other plain communication statuses: they have no corresponding status structure that can be obtained with a get_<status_name>_status operation and they are mutually exclusive. When new information becomes available to a DataReader, the Data Distribution Service will first look in an attached and activated DDS_SubscriberListener or DDS_DomainParticipantListener (in that order) for the DDS_DATA_ON_READERS_STATUS. In case the

DDS_DATA_ON_READERS_STATUS can not be handled, the Data Distribution Service will look in an attached and activated DDS_DataReaderListener, DDS_SubscriberListener or DDS_DomainParticipantListener for the DDS_DATA_AVAILABLE_STATUS (in that order).

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the DDS_SubscriberListener is attached.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_UNSUPPORTED* - a status was selected that cannot be supported because the infrastructure does not maintain the required connectivity information.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Subscriber has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.5.1.19 DDS_Subscriber_set_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_Subscriber_set_qos
      (DDS_Subscriber _this,
        const DDS_SubscriberQos *qos);
```

Description

This operation replaces the existing set of QosPolicy settings for a DDS_Subscriber.

Parameters

in DDS_Subscriber _this - the DDS_Subscriber object on which the operation is operated.

*in const DDS_SubscriberQos *qos* - contain the new set of QosPolicy settings for the DDS_Subscriber.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_ IMMUTABLE_POLICY or DDS_RETCODE_PRECONDITION_NOT_MET.

Detailed Description

This operation replaces the existing set of QosPolicy settings for a DDS_Subscriber. The parameter qos must contain the QosPolicy settings which is checked for self-consistency and mutability. When the application tries to change a QosPolicy setting for an enabled DDS_Subscriber, which can only be set before the DDS_Subscriber is enabled, the operation will fail and a DDS_RETCODE_IMMUTABLE_POLICY is returned. In other words, the application must provide the presently set QosPolicy settings in case of the immutable QosPolicy settings. Only the mutable QosPolicy settings can be changed. When qos contains conflicting QosPolicy settings (not self-consistent), the operation will fail and a RETCODE_INCONSISTENT_POLICY is returned.

The set of QosPolicy settings specified by the qos parameter are applied on top of the existing QoS, replacing the values of any policies previously set (provided, the operation returned DDS_RETCODE_OK). If one or more of the partitions in the QoS structure have insufficient access rights configured then the set_qos function will fail with a DDS_RETCODE_PRECONDITION_NOT_MET error code.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the new DDS_SubscriberQos is set.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter qos is not a valid DDS_SubscriberQos. It contains a QosPolicy setting with an enum value that is outside its legal boundaries or a sequence that has inconsistent memory settings.
- *DDS_RETCODE_UNSUPPORTED* - one or more of the selected QosPolicy values are currently not supported by OpenSplice.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_Subscriber has already been deleted.

- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_IMMUTABLE_POLICY* - the parameter qos contains an immutable QosPolicy setting with a different value than set during enabling of the DDS_Subscriber.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - returned when insufficient access rights exist for the partition(s) listed in the QoS structure.

3.5.2 Subscription Type Specific Classes

"Subscription type specific classes" contains the generic class and the generated data type specific classes. For each data type, a data type specific class <NameSpace>_<type>DataReader is generated (based on IDL) by calling the pre-processor. In case of data type Foo (this also applies to other types), defined in the module SPACE; "Subscription type specific classes" contains the following classes:

This paragraph describes the generic DDS_DataReader class and the derived application type specific <NameSpace>_<type>DataReader classes which together implement the application subscription interface. For each application type, used as DDS_Topic data type, the pre-processor generates a <NameSpace>_<type>DataReader class from an IDL type description. The SPACE_FooDataReader class that would be generated by the pre-processor for a fictional type Foo (defined in the module SPACE) describes the <NameSpace>_<type>DataReader classes.

3.5.2.1 Class DDS_DataReader (abstract)

A DDS_DataReader allows the application:

- to declare data it wishes to receive (*i.e.*, make a subscription)
- to access data received by the associated DDS_Subscriber.

A DDS_DataReader refers to exactly one DDS_TopicDescription (either a DDS_Topic, a DDS_ContentFilteredTopic or a DDS_MultiTopic) that identifies the samples to be read. The DDS_DataReader may give access to several instances of the data type, which are distinguished from each other by their key.

DDS_DataReader is an abstract class. It is specialized for each particular application data type. For a fictional application data type "Foo" the specialized class would be SPACE_FooDataReader.

The interface description of this class is as follows:

```
/*
 * interface DDS_DataReader
 */
/*
```

```
 * inherited from class DDS_Entity
 */
/* DDS_StatusCondition
 *    DDS_DataReader_get_statuscondition
 *       (DDS_DataReader _this);
 */
/* DDS_StatusMask
 *    DDS_DataReader_get_status_changes
 *       (DDS_DataReader _this);
 */
/* DDS_ReturnCode_t
 *    DDS_DataReader_enable
 *       (DDS_DataReader _this);
 */
/*
 * abstract operations
 * (implemented in the data type specific DDS_DataReader)
 */
/* DDS_ReturnCode_t
 *    DDS_DataReader_read
 *       (DDS_DataReader _this,
 *         DDS_sequence_<data> *data_values,
 *         DDS_SampleInfoSeq *info_seq,
 *         const DDS_long max_samples,
 *         const DDS_SampleStateMask sample_states,
 *         const DDS_ViewStateMask view_states,
 *         const DDS_InstanceStateMask instance_states);
 */
/* DDS_ReturnCode_t
 *    DDS_DataReader_take
 *       (DDS_DataReader _this,
 *         DDS_sequence_<data> *data_values,
 *         DDS_SampleInfoSeq *info_seq,
 *         const DDS_long max_samples,
 *         const DDS_SampleStateMask sample_states,
 *         const DDS_ViewStateMask view_states,
 *         const DDS_InstanceStateMask instance_states);
 */
/* DDS_ReturnCode_t
 *    DDS_DataReader_read_w_condition
 *       (DDS_DataReader _this,
 *         DDS_sequence_<data> *data_values,
 *         DDS_SampleInfoSeq *info_seq,
 *         const DDS_long max_samples,
 *         const DDS_ReadCondition a_condition);
 */
/* DDS_ReturnCode_t
 *    DDS_DataReader_take_w_condition
 *       (DDS_DataReader _this,
 *         DDS_sequence_<data> *data_values,
```

```
 *         DDS_SampleInfoSeq *info_seq,
 *         const DDS_long max_samples,
 *         const DDS_ReadCondition a_condition);
 */
/* DDS_ReturnCode_t
 *    DDS_DataReader_read_next_sample
 *       (DDS_DataReader _this,
 *         <data> *data_values,
 *         DDS_SampleInfo *sample_info);
 */
/* DDS_ReturnCode_t
 *    DDS_DataReader_take_next_sample
 *       (DDS_DataReader _this,
 *         <data> *data_values,
 *         DDS_SampleInfo *sample_info);
 */
/* DDS_ReturnCode_t
 *    DDS_DataReader_read_instance
 *       (DDS_DataReader _this,
 *         DDS_sequence_<data> *data_values,
 *         DDS_SampleInfoSeq *info_seq,
 *         const DDS_long max_samples,
 *         const DDS_InstanceHandle_t a_handle,
 *         const DDS_SampleStateMask sample_states,
 *         const DDS_ViewStateMask view_states,
 *         const DDS_InstanceStateMask instance_states);
 */
/* DDS_ReturnCode_t
 *    DDS_DataReader_take_instance
 *       (DDS_DataReader _this,
 *         DDS_sequence_<data> *data_values,
 *         DDS_SampleInfoSeq *info_seq,
 *         const DDS_long max_samples,
 *         const DDS_InstanceHandle_t a_handle,
 *         const DDS_SampleStateMask sample_states,
 *         const DDS_ViewStateMask view_states,
 *         const DDS_InstanceStateMask instance_states);
 */
/* DDS_ReturnCode_t
 *    DDS_DataReader_read_next_instance
 *       (DDS_DataReader _this,
 *         DDS_sequence_<data> *data_values,
 *         DDS_SampleInfoSeq *info_seq,
 *         const DDS_long max_samples,
 *         const DDS_InstanceHandle_t a_handle,
 *         const DDS_SampleStateMask sample_states,
 *         const DDS_ViewStateMask view_states,
 *         const DDS_InstanceStateMask instance_states);
 */
/* DDS_ReturnCode_t
```

```
 *     DDS_DataReader_take_next_instance
 *        (DDS_DataReader _this,
 *          DDS_sequence_<data> *data_values,
 *          DDS_SampleInfoSeq *info_seq,
 *          const DDS_long max_samples,
 *          const DDS_InstanceHandle_t a_handle,
 *          const DDS_SampleStateMask sample_states,
 *          const DDS_ViewStateMask view_states,
 *          const DDS_InstanceStateMask instance_states);
 */
/*  DDS_ReturnCode_t
 *     DDS_DataReader_read_next_instance_w_condition
 *        (DDS_DataReader _this,
 *          DDS_sequence_<data> *data_values,
 *          DDS_SampleInfoSeq *info_seq,
 *          const DDS_long max_samples,
 *          const DDS_InstanceHandle_t a_handle,
 *          const DDS_ReadCondition a_condition);
 */
/*  DDS_ReturnCode_t
 *     DDS_DataReader_take_next_instance_w_condition
 *        (DDS_DataReader _this,
 *          DDS_sequence_<data> *data_values,
 *          DDS_SampleInfoSeq *info_seq,
 *          const DDS_long max_samples,
 *          const DDS_InstanceHandle_t a_handle,
 *          const DDS_ReadCondition a_condition);
 */
/*  DDS_ReturnCode_t
 *     DDS_DataReader_return_loan
 *        (DDS_DataReader _this,
 *          DDS_sequence_<data> *data_values,
 *          DDS_SampleInfoSeq *info_seq);
 */
/*  DDS_ReturnCode_t
 *     DDS_DataReader_get_key_value
 *        (DDS_DataReader _this,
 *          <data> *key_holder,
 *          const DDS_InstanceHandle_t handle);
 */
/*  DDS_InstanceHandle_t
 *     DDS_DataReader_lookup_instance
 */       (DDS_DataReader _this,
 *          <data> *instance_data);
/*
 * implemented API operations
 */
   DDS_ReadCondition
      DDS_DataReader_create_readcondition
         (DDS_DataReader _this,
```

```
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states);

DDS_QueryCondition
   DDS_DataReader_create_querycondition
      (DDS_DataReader _this,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states,
        const DDS_char *query_expression,
        const DDS_StringSeq *query_parameters);

DDS_ReturnCode_t
   DDS_DataReader_delete_readcondition
      (DDS_DataReader _this,
        const DDS_ReadCondition a_condition);

DDS_ReturnCode_t
   DDS_DataReader_delete_contained_entities
      (DDS_DataReader _this);

DDS_ReturnCode_t
   DDS_DataReader_set_qos
      (DDS_DataReader _this,
        const DDS_DataReaderQos *qos);

DDS_ReturnCode_t
   DDS_DataReader_get_qos
      (DDS_DataReader _this,
        DDS_DataReaderQos *qos);

DDS_ReturnCode_t
   DDS_DataReader_set_listener
      (DDS_DataReader _this,
        const struct DDS_DataReaderListener *a_listener,
        const DDS_StatusMask mask);

struct DDS_DataReaderListener
   DDS_DataReader_get_listener
      (DDS_DataReader _this);

DDS_TopicDescription
   DDS_DataReader_get_topicdescription
      (DDS_DataReader _this);

DDS_Subscriber
   DDS_DataReader_get_subscriber
      (DDS_DataReader _this);
```

```
DDS_ReturnCode_t
   DDS_DataReader_get_sample_rejected_status
      (DDS_DataReader _this,
        DDS_SampleRejectedStatus *status);

DDS_ReturnCode_t
   DDS_DataReader_get_liveliness_changed_status
      (DDS_DataReader _this,
        DDS_LivelinessChangedStatus *status);

DDS_ReturnCode_t
   DDS_DataReader_get_requested_deadline_missed_status
      (DDS_DataReader _this,
        DDS_RequestedDeadlineMissedStatus *status);

DDS_ReturnCode_t
   DDS_DataReader_get_requested_incompatible_qos_status
      (DDS_DataReader _this,
        DDS_RequestedIncompatibleQosStatus *status);

DDS_ReturnCode_t
   DDS_DataReader_get_subscription_matched_status
      (DDS_DataReader _this,
        DDS_SubscriptionMatchedStatus *status);

DDS_ReturnCode_t
   DDS_DataReader_get_sample_lost_status
      (DDS_DataReader _this,
        DDS_SampleLostStatus *status);

DDS_ReturnCode_t
   DDS_DataReader_wait_for_historical_data
      (DDS_DataReader _this,
        const DDS_Duration_t *max_wait);

DDS_ReturnCode_t
   DDS_DataReader_get_matched_publications
      (DDS_DataReader _this,
        DDS_InstanceHandleSeq *publication_handles);

DDS_ReturnCode_t
   DDS_DataReader_get_matched_publication_data
      (DDS_DataReader _this,
        DDS_PublicationBuiltinTopicData *publication_data,
        const DDS_InstanceHandle_t publication_handle);

DDS_DataReaderView
   DDS_DataReader_create_view
     (DDS_DataReader _this
      const DDS_DataReaderViewQos* qos);
```

```
DDS_ReturnCode_t
   DDS_DataReader_delete_view
     (DDS_DataReader _this,
       const DDS_DataReaderView a_view);

DDS_ReturnCode_t
   DDS_DataReader_get_default_datareaderview_qos
      (DDS_DataReader _this,
        DDS_DataReaderViewQos* qos);

DDS_ReturnCode_t
   DDS_DataReader_set_default_datareaderview_qos
     (DDS_DataReader _this,
       DDS_DataReaderViewQos* qos);
```

The following paragraphs describe the usage of all `DDS_DataReader` operations. The inherited operations are listed but not fully described because they are not implemented in this class. The full description of these operations is given in the classes from which they are inherited. The abstract operations are listed but not fully described because they are not implemented in this specific class. The full description of these operations is located in the subclasses that contain the data type specific implementation of these operations.

3.5.2.2 DDS_DataReader_create_querycondition

Synopsis

```
#include <dds_dcps.h>
DDS_QueryCondition
   DDS_DataReader_create_querycondition
      (DDS_DataReader _this,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states,
        const DDS_char *query_expression,
        const DDS_StringSeq *query_parameters);
```

Description

This operation creates a new `DDS_QueryCondition` for the `DDS_DataReader`.

Parameters

in *`DDS_DataReader _this`* - the `DDS_DataReader` object on which the operation is operated.

in *`const DDS_SampleStateMask sample_states`* - a mask, which selects only those samples with the desired sample states.

in const DDS_ViewStateMask view_states - a mask, which selects only those samples with the desired view states.

in const DDS_InstanceStateMask instance_states - a mask, which selects only those samples with the desired instance states.

*in const DDS_char *query_expression* - the query string, which must be a subset of the SQL query language as specified in Appendix H, *DCPS Queries and Filters*.

*in const DDS_StringSeq *query_parameters* - a sequence of strings which are the parameters used in the SQL query string (*i.e.*, the "%n" tokens in the expression). The number of values in `query_parameters` must be equal or greater than the highest referenced %n token in the `query_expression` (*e.g.* if `%1` and `%8` are used as parameter in the query_expression, the query_parameters should at least contain `n+1 = 9` values).

Return Value

DDS_QueryCondition - Result value is a pointer to the `DDS_QueryCondition`. When the operation fails, the `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation creates a new `DDS_QueryCondition` for the `DDS_DataReader`. The returned `DDS_QueryCondition` is attached (and belongs) to the `DDS_DataReader`. When the operation fails, the `DDS_OBJECT_NIL` pointer is returned. To delete the `DDS_QueryCondition` the operation `DDS_DataReader_delete_readcondition` or `DDS_DataReader_delete_contained_entities` must be used.

State Masks

The result of the `DDS_QueryCondition` also depends on the selection of samples determined by three masks:

- `sample_states` is the mask, which selects only those samples with the desired sample states `DDS_READ_SAMPLE_STATE`, `DDS_NOT_READ_SAMPLE_STATE` or both
- `view_states` is the mask, which selects only those samples with the desired view states `DDS_NEW_VIEW_STATE`, `DDS_NOT_NEW_VIEW_STATE` or both
- `instance_states` is the mask, which selects only those samples with the desired instance states `DDS_ALIVE_INSTANCE_STATE`, `DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE`, `DDS_NOT_ALIVE_NO_WRITERS_INSTANCE_STATE` or a combination of these.

SQL expression

The SQL query string is set by `query_expression` which must be a subset of the SQL query language. In this query expression, parameters may be used, which must be set in the sequence of strings defined by the parameter `query_parameters`. A parameter is a string which can define an integer, float, string or enumeration. The number of values in `query_parameters` must be equal or greater than the highest referenced `%n` token in the `query_expression` (*e.g.* if `%1` and `%8` are used as parameter in the `query_expression`, the `query_parameters` should at least contain `n+1 = 9` values).

3.5.2.3 DDS_DataReader_create_readcondition

Synopsis

```
#include <dds_dcps.h>
DDS_ReadCondition
   DDS_DataReader_create_readcondition
      (DDS_DataReader _this,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states);
```

Description

This operation creates a new `DDS_ReadCondition` for the `DDS_DataReader`.

Parameters

`in DDS_DataReader _this` - the `DDS_DataReader` object on which the operation is operated.

`in const DDS_SampleStateMask sample_states` - a mask, which selects only those samples with the desired sample states.

`in const DDS_ViewStateMask view_states` - a mask, which selects only those samples with the desired view states.

`in const DDS_InstanceStateMask instance_states` - a mask, which selects only those samples with the desired instance states.

Return Value

`DDS_ReadCondition` - Result value is a pointer to the `DDS_ReadCondition`. When the operation fails, the `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation creates a new `DDS_ReadCondition` for the `DDS_DataReader`. The returned `DDS_ReadCondition` is attached (and belongs) to the `DDS_DataReader`. When the operation fails, the `DDS_OBJECT_NIL` pointer is returned. To delete the

DDS_ReadCondition the operation DDS_DataReader_delete_readcondition or DDS_DataReader_delete_contained_entities must be used.

State Masks

The result of the DDS_ReadCondition depends on the selection of samples determined by three masks:

- sample_states is the mask, which selects only those samples with the desired sample states DDS_READ_SAMPLE_STATE, DDS_NOT_READ_SAMPLE_STATE or both
- view_states is the mask, which selects only those samples with the desired view states DDS_NEW_VIEW_STATE, DDS_NOT_NEW_VIEW_STATE or both
- instance_states is the mask, which selects only those samples with the desired instance states DDS_ALIVE_INSTANCE_STATE, DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE, DDS_NOT_ALIVE_NO_WRITERS_INSTANCE_STATE or a combination of these.

3.5.2.4 DDS_DataReader_create_view

Synopsis

```
#include <dds_dcps.h>
DDS_DataReaderView
    DDS_DataReader_create_view
        (DDS_DataReader _this,
         const DDS_DataReaderViewQos* qos);
```

Description

This operation creates a DataReaderView with the desired QosPolicy settings.

Parameters

in DDS_DataReader _this - the DDS_DataReader object on which the operation is operated.

in const DDS_DataReaderViewQos qos* - the QosPolicy settings for the DataReaderView.

Return Value

DDS_DataReaderView - Pointer to the newly-created DataReaderView. In case of error, the NULL pointer is returned.

Detailed Description

This operation creates a DataReaderView with the desired QosPolicy settings. In case the QosPolicy is invalid, a `NULL` pointer is returned. The convenience macro `DDS_DATAREADERVIEW_QOS_DEFAULT` can be used as parameter `qos`, to create a DataReaderView with the default DataReaderViewQos as set in the DataReader.

Application Data Type

The DataReaderView returned by this operation is an object of a derived class, specific to the data type associated with the Topic. For each application-defined data type `<type>` there is a class `<type>DataReaderView` generated by calling the pre-processor. This data type specific class extends DataReaderView and contains the operations to read and take data of data type `<type>`.

The typed operations of a DataReaderView exactly mimic those of the DataReader from which it is created.

3.5.2.5 DDS_DataReader_delete_contained_entities

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReader_delete_contained_entities
      (DDS_DataReader _this);
```

Description

This operation deletes all the `DDS_Entity` objects that were created by means of one of the "`create_`" operations on the `DDS_DataReader`.

Parameters

`in DDS_DataReader _this` - the `DDS_DataReader` object on which the operation is operated.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_ALREADY_DELETED`, `DDS_RETCODE_OUT_OF_RESOURCES` or `DDS_RETCODE_PRECONDITION_NOT_MET`.

Detailed Description

This operation deletes all the `DDS_Entity` objects that were created by means of one of the "`create_`" operations on the `DDS_DataReader`. In other words, it deletes all `DDS_QueryCondition` and `DDS_ReadCondition` objects contained by the `DDS_DataReader`.

NOTE: The operation will return `DDS_PRECONDITION_NOT_MET` if the any of the contained entities is in a state where it cannot be deleted. In such cases, the operation does not roll back any entity deletions performed prior to the detection of the problem.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the contained `DDS_Entity` objects are deleted and the application may delete the `DDS_DataReader`.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_DataReader` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_PRECONDITION_NOT_MET`* - one or more of the contained entities are in a state where they cannot be deleted.

3.5.2.6 DDS_DataReader_delete_readcondition

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReader_delete_readcondition
      (DDS_DataReader _this,
        const DDS_ReadCondition a_condition);
```

Description

This operation deletes a `DDS_ReadCondition` or `DDS_QueryCondition` which is attached to the `DDS_DataReader`.

Parameters

`in DDS_DataReader _this` - the `DDS_DataReader` object on which the operation is operated.

`in const DDS_ReadCondition a_condition` - a pointer to the `DDS_ReadCondition` or `DDS_QueryCondition` which is to be deleted.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES or DDS_RETCODE_PRECONDITION_NOT_MET.

Detailed Description

This operation deletes a DDS_ReadCondition or DDS_QueryCondition which is attached to the DDS_DataReader. Since a DDS_QueryCondition is a specialized DDS_ReadCondition, the operation can also be used to delete a DDS_QueryCondition. A DDS_ReadCondition or DDS_QueryCondition cannot be deleted when it is not attached to this DDS_DataReader. When the operation is called on a DDS_ReadCondition or DDS_QueryCondition which was not attached to this DDS_DataReader, the operation returns DDS_RETCODE_PRECONDITION_NOT_MET.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the DDS_ReadCondition or DDS_QueryCondition is deleted.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter a_condition is not a valid DDS_ReadCondition.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DataReader has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - the operation is called on a different DDS_DataReader, as used when the DDS_ReadCondition or DDS_QueryCondition was created.

3.5.2.7 DDS_DataReader_delete_view

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
    DDS_DataReader_delete_view
```

```
(DDS_DataReader _this,
 DDS_DataReaderView a_view);
```

Description

This operation deletes a DataReaderView that belongs to the DataReader.

Parameters

in DDS_DataReader _this - the `DDS_DataReader` object on which the operation is operated.

in DDS_DataReaderView a_view - a pointer to the DataReaderView which is to be deleted.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_BAD_PARAMETER`, `DDS_RETCODE_ALREADY_DELETED`, `DDS_RETCODE_OUT_OF_RESOURCES`, `DDS_RETCODE_PRECONDITION_NOT_MET`.

Detailed Description

This operation deletes the DataReaderView from the DataReader.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the DataReaderView is deleted.
- *DDS_RETCODE_ERROR* - an internal error occurred.
- *DDS_RETCODE_BAD_PARAMETER* - the DataReaderView parameter is invalid.
- *DDS_RETCODE_ALREADY_DELETED* - the DataReader has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the data distribution service ran out of resources to complete this operation.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - the DataReaderView is not associated with this DataReader, or the DataReaderView still contains one or more ReadCondition or QueryCondition objects or an unreturned loan.

3.5.2.8 DDS_DataReader_enable (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <dds_dcps.h>
   DDS_ReturnCode_t
```

```
DDS_DataReader_enable
(DDS_DataReader _this);
```

3.5.2.9 DDS_DataReader_get_default_datareaderview_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
    DDS_DataReader_get_default_datareaderview_qos
    (DDS_DataReader _this,
     DDS_DataReaderViewQos* qos);
```

Description

This operation gets the default QosPolicy settings of the DataReaderView.

Parameters

in DDS_DataReader _this - the DDS_DataReader object on which the operation is operated.

inout DataReaderViewQos qos* - a reference to the DDS_DataReaderViewQos struct in which the default QosPolicy settings will be stored.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are:
DDS_RETCODE_OK, DDS_RETCODE_ERROR,
DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation gets the default QosPolicy settings of the DDS_DataReaderView, which are used for newly-created DDS_DataReaderView objects in case the constant DDS_DATAREADERVIEW_QOS_DEFAULT is used.

The values retrieved by this call match the values specified on the last successful call to DDS_DataReader_set_default_datareaderview_qos, or, if this call was never made, the default values as specified in *Table 5:* on page 65.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the default DDS_DataReaderViewQosPolicy settings of this DDS_DataReader have successfully been copied into the provided DDS_DataReaderViewQos parameter.
- *DDS_RETCODE_ERROR* - an internal error has occurred.

- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DataReader has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the data distribution service ran out of resources to complete this operation.

3.5.2.10 DDS_DataReader_get_key_value (abstract)

This abstract operation is defined as a generic operation, which is implemented by the <NameSpace>_<type>DataReader class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type Foo (defined in the module SPACE) derived SPACE_FooDataReader class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReader_get_key_value
      (DDS_DataReader _this,
         <data> *key_holder,
         const DDS_InstanceHandle_t handle);
```

3.5.2.11 DDS_DataReader_get_listener

Synopsis

```
#include <dds_dcps.h>
struct DDS_DataReaderListener
   DDS_DataReader_get_listener
      (DDS_DataReader _this);
```

Description

This operation allows access to a DDS_DataReaderListener.

Parameters

in DDS_DataReader _this - the DDS_DataReader object on which the operation is operated.

Return Value

struct DDS_DataReaderListener - result is a pointer to the DDS_DataReaderListener attached to the DDS_DataReader.

Detailed Description

This operation allows access to a DDS_DataReaderListener attached to the DDS_DataReader. When no DDS_DataReaderListener was attached to the DDS_DataReader, the DDS_OBJECT_NIL pointer is returned.

3.5.2.12 DDS_DataReader_get_liveliness_changed_status

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReader_get_liveliness_changed_status
      (DDS_DataReader _this,
        DDS_LivelinessChangedStatus *status);
```

Description

This operation obtains the `DDS_LivelinessChangedStatus` struct of the `DDS_DataReader`.

Parameters

`in DDS_DataReader _this` - the `DDS_DataReader` object on which the operation is operated.

`inout DDS_LivelinessChangedStatus *status` - the contents of the `DDS_LivelinessChangedStatus` struct of the `DDS_DataReader` will be copied into the location specified by `status`.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_ALREADY_DELETED` or `DDS_RETCODE_OUT_OF_RESOURCES`.

Detailed Description

This operation obtains the `DDS_LivelinessChangedStatus` struct of the `DDS_DataReader`. This struct contains the information whether the liveliness of one or more `DDS_DataWriter` objects that were writing instances read by the `DDS_DataReader` has changed. In other words, some `DDS_DataWriter` have become “alive” or “not alive”.

The `DDS_LivelinessChangedStatus` can also be monitored using a `DDS_DataReaderListener` or by using the associated `DDS_StatusCondition`.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the current `DDS_LivelinessChangedStatus` of this `DDS_DataReader` has successfully been copied into the specified `status` parameter.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.

- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DataReader has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.5.2.13 DDS_DataReader_get_matched_publication_data

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReader_get_matched_publication_data
      (DDS_DataReader _this,
        DDS_PublicationBuiltinTopicData *publication_data,
        const DDS_InstanceHandle_t publication_handle);
```

Description

This operation retrieves information on the specified publication that is currently "associated" with the DDS_DataReader.

Parameters

in DDS_DataReader _this - the DDS_DataReader object on which the operation is operated.

*inout DDS_PublicationBuiltinTopicData *publication_data* - a pointer to the sample in which the information about the specified publication is to be stored.

in const DDS_InstanceHandle_t publication_handle - a handle to the publication whose information needs to be retrieved.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES or DDS_RETCODE_NOT_ENABLED.

Detailed Description

This operation retrieves information on the specified publication that is currently "associated" with the DDS_DataReader. That is, a publication with a matching Topic and compatible QoS that the application has not indicated should be "ignored" by means of the DDS_DomainParticipant_ignore_publication operation.

The `publication_handle` must correspond to a publication currently associated with the `DDS_DataReader`, otherwise the operation will fail and return `DDS_RETCODE_BAD_PARAMETER`. The operation `DDS_DataReader_get_matched_publications` can be used to find the publications that are currently matched with the `DDS_DataReader`.

The operation may also fail if the infrastructure does not hold the information necessary to fill in the `publication_data`. This is the case when OpenSplice is configured not to maintain discovery information in the Networking Service. (See also the description of the `NetworkService/Discovery[@enabled]` attribute in section *4.4.1.6.1* on page 225 of the Deployment Guide.) In this case the operation will return `DDS_RETCODE_UNSUPPORTED`.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the information on the specified publication has successfully been retrieved.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_UNSUPPORTED`* - OpenSplice is configured not to maintain the information about “associated” publications.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_DataReader` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_NOT_ENABLED`* - the `DDS_DataReader` is not enabled.

3.5.2.14 DDS_DataReader_get_matched_publications

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReader_get_matched_publications
      (DDS_DataReader _this,
        DDS_InstanceHandleSeq *publication_handles);
```

Description

This operation retrieves the list of publications currently "associated" with the `DDS_DataReader`.

Parameters

in DDS_DataReader _this - the DDS_DataReader object on which the operation is operated.

*inout DDS_InstanceHandleSeq *publication_handles* - a sequence which is used to pass the list of all associated publications.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES or DDS_RETCODE_NOT_ENABLED.

Detailed Description

This operation retrieves the list of publications currently "associated" with the DDS_DataReader. That is, subscriptions that have a matching Topic and compatible QoS that the application has not indicated should be “ignored” by means of the DDS_DomainParticipant_ignore_publication operation.

The publication_handles sequence and its buffer may be pre-allocated by the application and therefore must either be re-used in a subsequent invocation of the DDS_DataReader_get_matched_publications operation or be released by calling DDS_free on the returned publication_handles. If the pre-allocated sequence is not big enough to hold the number of associated publications, the sequence will automatically be (re-)allocated to fit the required size.

The handles returned in the publication_handles sequence are the ones that are used by the DDS implementation to locally identify the corresponding matched DataWriter entities. You can access more detailed information about a particular publication by passing its publication_handle to either the DDS_DataReader_get_matched_publication_data operation or to the DDS_PublicationBuiltinTopicDataDataReader_read_instance operation on the built-in reader for the “DCPSPublication” topic.

Be aware that since DDS_InstanceHandle_t is an opaque datatype, it does not necessarily mean that the handles obtained from the DDS_DataReader_get_matched_publications operation have the same value as the ones that appear in the instance_handle field of the DDS_SampleInfo when retrieving the publication info through corresponding "DCPSPublication" built-in reader. You can’t just compare two handles to determine whether they represent the same publication. If you want to know whether two handles actually do represent the same publication, use both handles to retrieve their corresponding DDS_PublicationBuiltinTopicData samples and then compare the key field of both samples.

The operation may fail if the infrastructure does not locally maintain the connectivity information. This is the case when OpenSplice is configured not to maintain discovery information in the Networking Service. (See also the description of the `NetworkService/Discovery[@enabled] attribute in section` *4.4.1.6.1* on page 225 of the Deployment Guide.) In this case the operation will return `DDS_RETCODE_UNSUPPORTED`.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the list of associated publications has successfully been obtained.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_UNSUPPORTED`* - OpenSplice is configured not to maintain the information about "associated" publications.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_DataReader` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_NOT_ENABLED`* - the `DDS_DataReader` is not enabled.

3.5.2.15 DDS_DataReader_get_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReader_get_qos
      (DDS_DataReader _this,
        DDS_DataReaderQos *qos);
```

Description

This operation allows access to the existing set of QoS policies for a `DDS_DataReader`.

Parameters

`in DDS_DataReader _this` - the `DDS_DataReader` object on which the operation is operated.

`inout DDS_DataReaderQos *qos` - a reference to the destination `DDS_DataReaderQos` struct in which the `QosPolicy` settings will be copied.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation allows access to the existing set of QoS policies of a DDS_DataReader on which this operation is used. This DDS_DataReaderQos is stored at the location pointed to by the qos parameter.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the existing set of QoS policy values applied to this DDS_DataReader has successfully been copied into the specified DDS_DataReaderQos parameter.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DataReader has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.5.2.16 DDS_DataReader_get_requested_deadline_missed_status

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReader_get_requested_deadline_missed_status
      (DDS_DataReader _this,
        DDS_RequestedDeadlineMissedStatus *status);
```

Description

This operation obtains the DDS_RequestedDeadlineMissedStatus struct of the DDS_DataReader.

Parameters

in DDS_DataReader _this - the DDS_DataReader object on which the operation is operated.

*inout DDS_RequestedDeadlineMissedStatus *status* - the contents of the DDS_RequestedDeadlineMissedStatus struct of the DDS_DataReader will be copied into the location specified by status.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation obtains the DDS_RequestedDeadlineMissedStatus struct of the DDS_DataReader. This struct contains the information whether the deadline that the DDS_DataReader was expecting through its DDS_DeadlineQosPolicy was not respected for a specific instance.

The DDS_RequestedDeadlineMissedStatus can also be monitored using a DDS_DataReaderListener or by using the associated DDS_StatusCondition.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the current DDS_RequestedDeadlineMissedStatus of this DDS_DataReader has successfully been copied into the specified status parameter.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DataReader has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.5.2.17 DDS_DataReader_get_requested_incompatible_qos_status

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReader_get_requested_incompatible_qos_status
      (DDS_DataReader _this,
        DDS_RequestedIncompatibleQosStatus *status);
```

Description

This operation obtains the DDS_RequestedIncompatibleQosStatus struct of the DDS_DataReader.

Parameters

in DDS_DataReader _this - the DDS_DataReader object on which the operation is operated.

*inout DDS_RequestedIncompatibleQosStatus *status* - the contents of the DDS_RequestedIncompatibleQosStatus struct of the DDS_DataReader will be copied into the location specified by status.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation obtains the DDS_RequestedIncompatibleQosStatus struct of the DDS_DataReader. This struct contains the information whether a QosPolicy setting was incompatible with the offered QosPolicy setting.

The Request/Offering mechanism is applicable between the DDS_DataWriter and the DDS_DataReader. If the QosPolicy settings between DDS_DataWriter and DDS_DataReader are inconsistent, no communication between them is established. In addition the DDS_DataWriter will be informed via a DDS_REQUESTED_INCOMPATIBLE_QOS status change and the DDS_DataReader will be informed via an DDS_OFFERED_INCOMPATIBLE_QOS status change.

The DDS_RequestedIncompatibleQosStatus can also be monitored using a DDS_DataReaderListener or by using the associated DDS_StatusCondition.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the current DDS_RequestedIncompatibleQosStatus of this DDS_DataReader has successfully been copied into the specified status parameter.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.

- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DataReader has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.5.2.18 DDS_DataReader_get_sample_lost_status

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReader_get_sample_lost_status
      (DDS_DataReader _this,
        DDS_SampleLostStatus *status);
```

Description

This operation obtains the DDS_SampleLostStatus struct of the DDS_DataReader.

Parameters

in DDS_DataReader _this - the DDS_DataReader object on which the operation is operated.

*inout DDS_SampleLostStatus *status* - the contents of the DDS_SampleLostStatus struct of the DDS_DataReader will be copied into the location specified by status.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation obtains the DDS_SampleLostStatus struct of the DDS_DataReader. This struct contains the information whether a sample have been lost. This only applies when the DDS_ReliabilityQosPolicy is set to DDS_RELIABLE. If the DDS_ReliabilityQosPolicy is set to DDS_BEST_EFFORT the Data Distribution Service will not report the loss of samples.

The DDS_SampleLostStatus can also be monitored using a DDS_DataReaderListener or by using the associated DDS_StatusCondition.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the current DDS_SampleLostStatus of this DDS_DataReader has successfully been copied into the specified status parameter.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DataReader has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.5.2.19 DDS_DataReader_get_sample_rejected_status

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReader_get_sample_rejected_status
      (DDS_DataReader _this,
        DDS_SampleRejectedStatus *status);
```

Detailed Description

This operation obtains the DDS_SampleRejectedStatus struct of the DDS_DataReader.

Parameters

in DDS_DataReader _this - the DDS_DataReader object on which the operation is operated.

*inout DDS_SampleRejectedStatus *status* - the contents of the DDS_SampleRejectedStatus struct of the DDS_DataReader will be copied into the location specified by status.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation obtains the `DDS_SampleRejectedStatus` struct of the `DDS_DataReader`. This struct contains the information whether a received sample has been rejected. Samples may be rejected by the `DDS_DataReader` when it runs out of `resource_limits` to store incoming samples. Ususally this means that old samples need to be 'consumed' (for example by 'taking' them instead of 'reading' them) to make room for newly incoming samples.

The `DDS_SampleRejectedStatus` can also be monitored using a `DDS_DataReaderListener` or by using the associated `DDS_StatusCondition`.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the current `DDS_SampleRejectedStatus` of this `DDS_DataReader` has successfully been copied into the specified `status` parameter.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `DDS_DataReader` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.

3.5.2.20 DDS_DataReader_get_status_changes (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_StatusMask
   DDS_DataReader_get_status_changes
      (DDS_DataReader _this);
```

3.5.2.21 DDS_DataReader_get_statuscondition (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_StatusCondition
   DDS_DataReader_get_statuscondition
```

```
(DDS_DataReader _this);
```

3.5.2.22 DDS_DataReader_get_subscriber

Synopsis

```
#include <dds_dcps.h>
DDS_Subscriber
   DDS_DataReader_get_subscriber
      (DDS_DataReader _this);
```

Description

This operation returns the `DDS_Subscriber` to which the `DDS_DataReader` belongs.

Parameters

in *`DDS_DataReader _this`* - the `DDS_DataReader` object on which the operation is operated.

Return Value

`DDS_Subscriber` - Return value is a pointer to the `DDS_Subscriber` to which the `DDS_DataReader` belongs.

Detailed Description

This operation returns the `DDS_Subscriber` to which the `DDS_DataReader` belongs, thus the `DDS_Subscriber` that has created the `DDS_DataReader`. If the `DDS_DataReader` is already deleted, the `DDS_OBJECT_NIL` pointer is returned.

3.5.2.23 DDS_DataReader_get_subscription_matched_status

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReader_get_subscription_matched_status
      (DDS_DataReader _this,
        DDS_SubscriptionMatchedStatus *status);
```

Description

This operation obtains the `DDS_SubscriptionMatchedStatus` struct of the `DDS_DataReader`.

Parameters

in *`DDS_DataReader _this`* - the `DDS_DataReader` object on which the operation is operated.

*inout DDS_SubscriptionMatchedStatus *status* - the contents of the DDS_SubscriptionMatchedStatus struct of the DDS_DataReader will be copied into the location specified by status.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation obtains the DDS_SubscriptionMatchedStatus struct of the DDS_DataReader. This struct contains the information whether a new match has been discovered for the current subscription, or whether an existing match has ceased to exist.

This means that the status represents that either a DataWriter object has been discovered by the DDS_DataReader with the same Topic and a compatible Qos, or that a previously-discovered DataWriter has ceased to be matched to the current DDS_DataReader. A DataWriter may cease to match when it gets deleted, when it changes its Qos to a value that is incompatible with the current DDS_DataReader or when either the **DDS_DataReader** or the DataWriter has chosen to put its matching counterpart on its ignore-list using the DDS_DomainParticipant_ignore_publication or DDS_DomainParticipant_ignore_subscription operations.

The operation may fail if the infrastructure does not hold the information necessary to fill in the DDS_SubscriptionMatchedStatus. This is the case when OpenSplice is configured not to maintain discovery information in the Networking Service. (See the description for the NetworkingService/Discovery/enabled property in the Deployment Manual for more information about this subject.) In this case the operation will return DDS_RETCODE_UNSUPPORTED.

The DDS_SubscriptionMatchedStatus can also be monitored using a DDS_DataReaderListener or by using the associated DDS_StatusCondition.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the current DDS_SubscriptionMatchedStatus of this DDS_DataReader has successfully been copied into the specified status parameter.
- *DDS_RETCODE_ERROR* - an internal error has occurred.

- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_UNSUPPORTED* - OpenSplice is configured not to maintain the information about "associated" publications.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DataReader has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.5.2.24 DDS_DataReader_get_topicdescription

Synopsis

```
#include <dds_dcps.h>
DDS_TopicDescription
   DDS_DataReader_get_topicdescription
      (DDS_DataReader _this);
```

Description

This operation returns the DDS_TopicDescription which is associated with the DDS_DataReader.

Parameters

in DDS_DataReader _this - the DDS_DataReader object on which the operation is operated.

Return Value

DDS_TopicDescription - a pointer to the DDS_TopicDescription which is associated with the DDS_DataReader.

Detailed Description

This operation returns the DDS_TopicDescription which is associated with the DDS_DataReader, thus the DDS_TopicDescription with which the DDS_DataReader is created. If the DDS_DataReader is already deleted, the DDS_OBJECT_NIL pointer is returned.

3.5.2.25 DDS_DataReader_lookup_instance (abstract)

This abstract operation is defined as a generic operation, which is implemented by the <NameSpace>_<type>DataReader class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type Foo (defined in the module SPACE) derived SPACE_FooDataReader class.

Synopsis

```
#include <dds_dcps.h>
DDS_InstanceHandle_t
   DDS_DataReader_lookup_instance
      (DDS_DataReader _this,
          <data> *instance_data);
```

3.5.2.26 DDS_DataReader_read (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReader` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReader` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReader_read
       (DDS_DataReader _this,
           DDS_sequence_<data> *data_values,
          DDS_SampleInfoSeq *info_seq,
          const DDS_long max_samples,
          const DDS_SampleStateMask sample_states,
          const DDS_ViewStateMask view_states,
          const DDS_InstanceStateMask instance_states);
```

3.5.2.27 DDS_DataReader_read_instance (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReader` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReader` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReader_read_instance
      (DDS_DataReader _this,
          DDS_sequence_<data> *data_values,
          DDS_SampleInfoSeq *info_seq,
          const DDS_long max_samples,
          const DDS_InstanceHandle_t a_handle,
          const DDS_SampleStateMask sample_states,
          const DDS_ViewStateMask view_states,
          const DDS_InstanceStateMask instance_states);
```

3.5.2.28 DDS_DataReader_read_next_instance (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReader` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReader` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReader_read_next_instance
      (DDS_DataReader _this,
          DDS_sequence_<data> *data_values,
          DDS_SampleInfoSeq *info_seq,
          const DDS_long max_samples,
          const DDS_InstanceHandle_t a_handle,
          const DDS_SampleStateMask sample_states,
          const DDS_ViewStateMask view_states,
          const DDS_InstanceStateMask instance_states);
```

3.5.2.29 DDS_DataReader_read_next_instance_w_condition (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReader` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReader` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReader_read_next_instance_w_condition
       (DDS_DataReader _this,
          DDS_sequence_<data> *data_values,
          DDS_SampleInfoSeq *info_seq,
          const DDS_long max_samples,
          const DDS_InstanceHandle_t a_handle,
          const DDS_ReadCondition a_condition);
```

3.5.2.30 DDS_DataReader_read_next_sample (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReader` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReader` class.

Synopsis

```
#include <dds_dcps.h>
       DDS_ReturnCode_t
          DDS_DataReader_read_next_sample
           (DDS_DataReader _this,
                <data> *data_values,
                DDS_SampleInfo *sample_info);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.5.2.31 DDS_DataReader_read_w_condition (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReader` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReader` class.

Synopsis

```
#include <dds_dcps.h>
       DDS_ReturnCode_t
          DDS_DataReader_read_w_condition
              (DDS_DataReader _this,
               DDS_sequence_<data> *data_values,
               DDS_SampleInfoSeq *info_seq,
               const DDS_long max_samples,
               const DDS_ReadCondition a_condition);
```

3.5.2.32 DDS_DataReader_return_loan (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReader` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReader` class.

Synopsis

```
#include <dds_dcps.h>
       DDS_ReturnCode_t
          DDS_DataReader_return_loan
              (DDS_DataReader _this,
               DDS_sequence_<data> *data_values,
               DDS_SampleInfoSeq *info_seq);
```

3.5.2.33 DDS_DataReader_set_default_datareaderview_qos

Synopsis

```
#include <dds_dcps.h>
```

```
DDS_ReturnCode_t
    DDS_DataReader_set_default_datareaderview_qos
    (DDS_DataReader _this,
     DDS_DataReaderViewQos* qos);
```

Description

This operation sets the default `DDS_DataReaderViewQos` of the DDS_DataReader.

Parameters

`in DDS_DataReader _this` - the `DDS_DataReader` object on which the operation is operated.

`in const DDS_DataReaderViewQos* qos` - the `DDS_DataReaderViewQos` struct which contains the default QosPolicy settings for newly-created `DDS_DataReaderView` objects.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_BAD_PARAMETER`, `DDS_RETCODE_OUT_OF_RESOURCES`.

Detailed Description

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the new default DataReaderViewQos is set.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_BAD_PARAMETER`* - the `DataReaderViewQos` parameter is invalid.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the data distribution service ran out of resources to complete this operation.

3.5.2.34 DDS_DataReader_set_listener

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReader_set_listener
      (DDS_DataReader _this,
        const struct DDS_DataReaderListener *a_listener,
        const DDS_StatusMask mask);
```

Description

This operation attaches a DDS_DataReaderListener to the DDS_DataReader.

Parameters

in DDS_DataReader _this - the DDS_DataReader object on which the operation is operated.

*in const struct DDS_DataReaderListener *a_listener* - a pointer to the DDS_DataReaderListener instance, which will be attached to the DDS_DataReader.

in const DDS_StatusMask mask - a bit-mask in which each bit enables the invocation of the DDS_DataReaderListener for a certain status.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation attaches a DDS_DataReaderListener to the DDS_DataReader. Only one DDS_DataReaderListener can be attached to each DDS_DataReader. If a DDS_DataReaderListener was already attached, the operation will replace it with the new one. When a_listener is the DDS_OBJECT_NIL pointer, it represents a listener that is treated as a NOOP[1] for all statuses activated in the bitmask.

Communication Status

For each communication status, the StatusChangedFlag flag is initially set to FALSE. It becomes TRUE whenever that communication status changes. For each communication status activated in the mask, the associated DDS_DataReaderListener operation is invoked and the communication status is reset to FALSE, as the listener implicitly accesses the status which is passed as a parameter to that operation. The status is reset prior to calling the listener, so if the application calls the get_<status_name>_status from inside the listener it will see the status already reset. An exception to this rule is the DDS_OBJECT_NIL listener, which does not reset the communication statuses for which it is invoked.

The following statuses are applicable to the DDS_DataReaderListener:

```
DDS_REQUESTED_DEADLINE_MISSED_STATUS
DDS_REQUESTED_INCOMPATIBLE_QOS_STATUS
```

1. Short for **No-Op**eration, an instruction that peforms nothing at all.

```
DDS_SAMPLE_LOST_STATUS
DDS_SAMPLE_REJECTED_STATUS
DDS_DATA_AVAILABLE_STATUS
DDS_LIVELINESS_CHANGED_STATUS
DDS_SUBSCRIPTION_MATCHED_STATUS.
```

Be aware that the `DDS_SUBSCRIPTION_MATCHED_STATUS` is not applicable when the infrastructure does not have the information available to determine connectivity. This is the case when OpenSplice is configured not to maintain discovery information in the Networking Service. (See also the description of the `NetworkService/Discovery[@enabled] attribute in section` *4.4.1.6.1* on page 225 of the Deployment Guide.) In this case the operation will return `DDS_RETCODE_UNSUPPORTED`.

Status bits are declared as a constant and can be used by the application in an OR operation to create a tailored mask. The special constant `DDS_STATUS_MASK_NONE` can be used to indicate that the created entity should not respond to any of its available statuses. The DDS will therefore attempt to propagate these statuses to its factory. The special constant `STATUS_MASK_ANY_V1_2` can be used to select all applicable statuses specified in the "Data Distribution Service for Real-time Systems Version 1.2" specification.

Status Propagation

In case a communication status is not activated in the `mask` of the `DDS_DataReaderListener`, the `DDS_SubscriberListener` of the containing `DDS_Subscriber` is invoked (if attached and activated for the status that occurred). This allows the application to set a default behaviour in the `DDS_SubscriberListener` of the containing `DDS_Subscriber` and a `DDS_DataReader` specific behaviour when needed. In case the communication status is not activated in the `mask` of the `DDS_SubscriberListener` as well, the communication status will be propagated to the `DDS_DomainParticipantListener` of the containing `DDS_DomainParticipant`. In case the `DDS_DomainParticipantListener` is also not attached or the communication status is not activated in its `mask`, the application is not notified of the change.

The statuses `DDS_DATA_ON_READERS_STATUS` and `DDS_DATA_AVAILABLE_STATUS` are "Read Communication Statuses" and are an exception to all other plain communication statuses: they have no corresponding status structure that can be obtained with a `get_<status_name>_status` operation and they are mutually exclusive. When new information becomes available to a DataReader, the Data Distribution Service will first look in an attached and activated `DDS_SubscriberListener` or `DDS_DomainParticipantListener` (in that order) for the `DDS_DATA_ON_READERS_STATUS`. In case the

DDS_DATA_ON_READERS_STATUS can not be handled, the Data Distribution Service will look in an attached and activated DDS_DataReaderListener, DDS_SubscriberListener or DDS_DomainParticipantListener for the DDS_DATA_AVAILABLE_STATUS (in that order).

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the DDS_DataReaderListener is attached.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_UNSUPPORTED* - a status was selected that cannot be supported because the infrastructure does not maintain the required connectivity information.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DataReader has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.5.2.35 DDS_DataReader_set_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReader_set_qos
      (DDS_DataReader _this,
        const DDS_DataReaderQos *qos);
```

Description

This operation replaces the existing set of QosPolicy settings for a DDS_DataReader.

Parameters

in DDS_DataReader _this - the DDS_DataReader object on which the operation is operated.

*in const DDS_DataReaderQos *qos* - the new set of QosPolicy settings for the DDS_DataReader.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_UNSUPPORTED, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_IMMUTABLE_POLICY or DDS_RETCODE_INCONSISTENT_POLICY.

Detailed Description

This operation replaces the existing set of QosPolicy settings for a DDS_DataReader. The parameter qos contains the QosPolicy settings which is checked for self-consistency and mutability. When the application tries to change a QosPolicy setting for an enabled DDS_DataReader, which can only be set before the DDS_DataReader is enabled, the operation will fail and a DDS_RETCODE_IMMUTABLE_POLICY is returned. In other words, the application must provide the presently set QosPolicy settings in case of the immutable QosPolicy settings. Only the mutable QosPolicy settings can be changed. When qos contains conflicting QosPolicy settings (not self-consistent), the operation will fail and a DDS_RETCODE_INCONSISTENT_POLICY is returned.

The set of QosPolicy settings specified by the qos parameter are applied on top of the existing QoS, replacing the values of any policies previously set (provided, the operation returned DDS_RETCODE_OK).

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the new DDS_DataReaderQos is set.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the parameter qos is not a valid DDS_DataReaderQos. It contains a QosPolicy setting with an invalid DDS_Duration_t value, an enum value that is outside its legal boundaries or a sequence that has inconsistent memory settings.
- *DDS_RETCODE_UNSUPPORTED* - one or more of the selected QosPolicy values are currently not supported by OpenSplice.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DataReader has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

- *DDS_RETCODE_IMMUTABLE_POLICY* - the parameter `qos` contains an immutable `QosPolicy` setting with a different value than set during enabling of the `DDS_DataReader`.
- *DDS_RETCODE_INCONSISTENT_POLICY* - the parameter `qos` contains conflicting `QosPolicy` settings, *e.g.* a history depth that is higher than the specified resource limits.

3.5.2.36 DDS_DataReader_take (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReader` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReader` class.

Synopsis

```
#include <dds_dcps.h>
       DDS_ReturnCode_t
          DDS_DataReader_take
              (DDS_DataReader _this,
               DDS_sequence_<data> *data_values,
               DDS_SampleInfoSeq *info_seq,
               const DDS_long max_samples,
               const DDS_SampleStateMask sample_states,
               const DDS_ViewStateMask view_states,
               const DDS_InstanceStateMask instance_states);
```

3.5.2.37 DDS_DataReader_take_instance (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReader` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReader` class.

Synopsis

```
#include <dds_dcps.h>
       DDS_ReturnCode_t
          DDS_DataReader_take_instance
              (DDS_DataReader _this,
               DDS_sequence_<data> *data_values,
               DDS_SampleInfoSeq *info_seq,
               const DDS_long max_samples,
               const DDS_InstanceHandle_t a_handle,
               const DDS_SampleStateMask sample_states,
               const DDS_ViewStateMask view_states,
               const DDS_InstanceStateMask instance_states);
```

3.5.2.38 DDS_DataReader_take_next_instance (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReader` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReader` class.

Synopsis

```
#include <dds_dcps.h>
       DDS_ReturnCode_t
          DDS_DataReader_take_next_instance
            (DDS_DataReader _this,
               DDS_sequence_<data> *data_values,
               DDS_SampleInfoSeq *info_seq,
               const DDS_long max_samples,
               const DDS_InstanceHandle_t a_handle,
               const DDS_SampleStateMask sample_states,
               const DDS_ViewStateMask view_states,
               const DDS_InstanceStateMask instance_states);
```

3.5.2.39 DDS_DataReader_take_next_instance_w_condition (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReader` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReader` class.

Synopsis

```
#include <dds_dcps.h>
       DDS_ReturnCode_t
          DDS_DataReader_take_next_instance_w_condition
           (DDS_DataReader _this,
               DDS_sequence_<data> *data_values,
               DDS_SampleInfoSeq *info_seq,
               const DDS_long max_samples,
               const DDS_InstanceHandle_t a_handle,
               const DDS_ReadCondition a_condition);
```

3.5.2.40 DDS_DataReader_take_next_sample (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReader` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReader` class.

Synopsis

```
#include <dds_dcps.h>
       DDS_ReturnCode_t
          DDS_DataReader_take_next_sample
             (DDS_DataReader _this,
                <data> *data_values,
                DDS_SampleInfo *sample_info);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.5.2.41 DDS_DataReader_take_w_condition (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReader` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReader` class.

Synopsis

```
#include <dds_dcps.h>
       DDS_ReturnCode_t
          DDS_DataReader_take_w_condition
             (DDS_DataReader _this,
                DDS_sequence_<data> *data_values,
                DDS_SampleInfoSeq *info_seq,
                const DDS_long max_samples,
                const DDS_ReadCondition a_condition);
```

3.5.2.42 DDS_DataReader_wait_for_historical_data

Synopsis

```
#include <dds_dcps.h>
       DDS_ReturnCode_t
          DDS_DataReader_wait_for_historical_data
             (DDS_DataReader _this,
                const DDS_Duration_t *max_wait);
```

Description

This operation will block the application thread until all “historical” data is received.

Parameters

in *`DDS_DataReader _this`* - the `DDS_DataReader` object on which the operation is operated.

*in const DDS_Duration_t *max_wait* - the maximum duration to block for the DDS_DataReader_wait_for_historical_data, after which the application thread is unblocked. The special constant DDS_DURATION_INFINITE can be used when the maximum waiting time does not need to be bounded.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED or DDS_RETCODE_TIMEOUT.

Detailed Description

This operation behaves differently for DDS_DataReader objects which have a non-DDS_VOLATILE_DURABILITY_QOS DDS_DurabilityQosPolicy and for DDS_DataReader objects which have a DDS_VOLATILE_DURABILITY_QOS DDS_DurabilityQosPolicy.

As soon as an application enables a non-DDS_VOLATILE_DURABILITY_QOS DDS_DataReader it will start receiving both "historical" data, *i.e.* the data that was written prior to the time the DDS_DataReader joined the domain, as well as any new data written by the DDS_DataWriter objects. There are situations where the application logic may require the application to wait until all "historical" data is received. This is the purpose of the DDS_DataReader_wait_for_historical_data operation.

As soon as an application enables a DDS_VOLATILE_DURABILITY_QOS DataReader it will not start receiving "historical" data but only new data written by the DDS_DataWriter objects. By calling DDS_DataReader_wait_for_historical_data the DDS_DataReader explicitly requests the Data Distribution Service to start receiving also the "historical" data and to wait until either all "historical" data is received, or the duration specified by the max_wait parameter has elapsed, whichever happens first.

Thread blocking

The operation DDS_DataReader_wait_for_historical_data blocks the calling thread until either all "historical" data is received, or the duration specified by the max_wait parameter elapses, whichever happens first. A return value of DDS_RETCODE_OK indicates that all the "historical" data was received; a return value of DDS_RETCODE_TIMEOUT indicates that max_wait elapsed before all the data was received.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the "historical" data is received.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the `DDS_DataReader` has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the `DDS_DataReader` is not enabled.
- *DDS_RETCODE_TIMEOUT* - not all data is received before `max_wait` elapsed.

3.5.2.43 DDS_DataReader_wait_for_historical_data_w_condition

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
    DDS_DataReader_wait_for_historical_data_w_condition
        (DDS_DataReader _this
         const DDS_string filter_expression,
         const DDS_StringSeq* filter_parameters,
         const DDS_Time_t* min_source_timestamp,
         const DDS_Time_t* max_source_timestamp
         const DDS_ResourceLimitsQosPolicy* resource_limits,
         const DDS_Duration_t* max_wait)
```

Description

This operation will block the application thread until all historical data that matches the supplied conditions is received.

NOTE: This operation only makes sense when the receiving node has configured its durability service as an On_Request alignee. (See also the description of the `OpenSplice/DurabilityService/NameSpaces/Policy[@alignee]` attribute in the *Deployment Guide*.) Otherwise the Durability Service will not distinguish between separate reader requests and still inject the full historical data set in each reader.

Additionally, when creating the DataReader, the DurabilityQos.kind of the DataReaderQos needs to be set to VOLATILE, to ensure that historical data that potentially is available already at creation time is not immediately delivered to the DataReader at that time.

Parameters

in DDS_DataReader _this - the DDS_DataReader object on which the operation is operated.

in const DDS_string filter_expression* - the SQL expression (subset of SQL), which defines the filtering criteria (NULL when no SQL filtering is needed).

in const DDS_StringSeq filter_parameters* – sequence of strings with the parameter values used in the SQL expression (*i.e.*, the number of %n tokens in the expression). The number of values in expression_parameters must be equal to or greater than the highest referenced %n token in the filter_expression (*e.g.* if %1 and %8 are used as parameters in the filter_expression, the expression_parameters should contain at least $n + 1 = 9$ values).

in const DDS_Time_t min_source_timestamp* - Filter out all data published before this time. The special constant DDS_TIMESTAMP_INVALID can be used when no minimum filter is needed. The value of min_source_timestamp.sec must be less than 0x7fffffff otherwise it will be recognized as TIMESTAMP_INVALID_SEC.

in const DDS_Time_t max_source_timestamp* - Filter out all data published after this time. The special constant DDS_TIMESTAMP_INVALID can be used when no maximum filter is needed. The value of max_source_timestamp.sec must be less than 0x7fffffff otherwise it will be recognized as TIMESTAMP_INVALID_SEC.

in const DDS_ResourceLimitsQosPolicy resource_limits* - Specifies limits on the maximum amount of historical data that may be received.

in const DDS_Duration_t max_wait* - The maximum duration the application thread is blocked during this operation.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_PRECONDITION_NOT_MET, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_NOT_ENABLED, DDS_RETCODE_TIMEOUT.

Detailed Description

This operation is similar to the *DDS_DataReader_wait_for_historical_data* operation, but instead of inserting all historical data into the DataReader, only data that matches the conditions expressed by the parameters to this opération is inserted. For more information about historical data please refer to section *3.5.2.42* on page 449.

By using `filter_expression` and `filter_parameters`, data can be selected or discarded based on content. The `filter_expression` must adhere to SQL syntax of the *WHERE* clause as described in Appendix H, *DCPS Queries and Filters*. Constraints on the age of data can be set by using the `min_source_timestamp` and `max_source_timestamp` parameters. Only data published within this timeframe will be selected. Note that `DDS_TIMESTAMP_INVALID` is also accepted as a lower or upper timeframe limit. The amount of selected data can be further reduced by the `resource_limits` parameter. This QosPolicy allows to set a limit on the number of samples, instances and samples per instance that are to be received.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the historical data is received.
- *DDS_RETCODE_ERROR* - an internal error occurred.
- *DDS_RETCODE_BAD_PARAMETER* - any of the parameters is invalid, including `resource_limits` that do not meet constraints set on the DataReader.
- *RETCODE_PRECONDITION_NOT_MET* - No Durability service is available or a different request for historical data is already being processed.
- *DDS_RETCODE_ALREADY_DELETED* - the DataReader is already deleted.
- *DDS_RETCODE_NOT_ENABLED* - the DataReader is not enabled.
- *DDS_RETCODE_TIMEOUT* - not all data is received before `max_wait` elapsed.

3.5.2.44 Class SPACE_FooDataReader

The pre-processor generates from IDL type descriptions the application `<NameSpace>_<type>DataReader` classes. For each application data type that is used as `DDS_Topic` data type, a typed class `<NameSpace>_<type>DataReader` is derived from the `DDS_DataReader` class. In this paragraph, the class `SPACE_FooDataReader` describes the operations of these derived `<NameSpace>_<type>DataReader` classes as an example for the fictional application type `Foo` (defined in the module `SPACE`).

For instance, for an application, the definitions are located in the `Space.idl` file. The pre-processor will generate a `Space.h` include file.

State masks

A SPACE_FooDataReader refers to exactly one DDS_TopicDescription (either a DDS_Topic, a DDS_ContentFilteredTopic or a DDS_MultiTopic) that identifies the data to be read. Therefore it refers to exactly one data type. The DDS_Topic must exist prior to the SPACE_FooDataReader creation. The SPACE_FooDataReader may give access to several instances of the data type, which are distinguished from each other by their key. The SPACE_FooDataReader is attached to exactly one DDS_Subscriber which acts as a factory for it.

The interface description of this class is as follows:

```
/*
 * interface SPACE_FooDataReader
 */
/*
 * inherited from class DDS_Entity
 */
/*  DDS_StatusCondition
 *     SPACE_FooDataReader_get_statuscondition
 *        (SPACE_FooDataReader _this);
 */
/*  DDS_StatusMask
 *     SPACE_FooDataReader_get_status_changes
 *        (SPACE_FooDataReader _this);
 */
/*  DDS_ReturnCode_t
 *     SPACE_FooDataReader_enable
 *        (SPACE_FooDataReader _this);
 */
/*
 * inherited from class DDS_DataReader
 */
/*  DDS_ReadCondition
 *     SPACE_FooDataReader_create_readcondition
 *        (SPACE_FooDataReader _this,
 *          const DDS_SampleStateMask sample_states,
 *          const DDS_ViewStateMask view_states,
 *          const DDS_InstanceStateMask instance_states);
 */

/*  DDS_QueryCondition
 *     SPACE_FooDataReader_create_querycondition
 *        (SPACE_FooDataReader _this,
 *          const DDS_SampleStateMask sample_states,
 *          const DDS_ViewStateMask view_states,
 *          const DDS_InstanceStateMask instance_states,
 *          const DDS_char *query_expression,
 *         const DDS_StringSeq *query_parameters);
```

```
 */

/* DDS_ReturnCode_t
 *    SPACE_FooDataReader_delete_readcondition
 *       (SPACE_FooDataReader _this,
 *         const DDS_ReadCondition a_condition);
 */

/* DDS_ReturnCode_t
 *    SPACE_FooDataReader_delete_contained_entities
 *       (SPACE_FooDataReader _this);
 */

/* DDS_ReturnCode_t
 *    SPACE_FooDataReader_set_qos
 *       (SPACE_FooDataReader _this,
 *         const DDS_DataReaderQos *qos);
 */

/* DDS_ReturnCode_t
 *    SPACE_FooDataReader_get_qos
 *       (SPACE_FooDataReader _this,
 *         SPACE_FooDataReaderQos *qos);
 */

/* DDS_ReturnCode_t
 *    SPACE_FooDataReader_set_listener
 *       (SPACE_FooDataReader _this,
 *         const struct DDS_DataReaderListener *a_listener,
 *         const DDS_StatusMask mask);
 */

/* struct SPACE_FooDataReaderListener
 *    SPACE_FooDataReader_get_listener
 *       (SPACE_FooDataReader _this);
 */

/* DDS_TopicDescription
 *    SPACE_FooDataReader_get_topicdescription
 *       (SPACE_FooDataReader _this);
 */

/* DDS_Subscriber
 *    SPACE_FooDataReader_get_subscriber
 *       (SPACE_FooDataReader _this);
 */

/* DDS_ReturnCode_t
 *    SPACE_FooDataReader_get_sample_rejected_status
 *       (SPACE_FooDataReader _this,
```

```
 *         DDS_SampleRejectedStatus *status);
 */

/* DDS_ReturnCode_t
 *    SPACE_FooDataReader_get_liveliness_changed_status
 *       (SPACE_FooDataReader _this,
 *         DDS_LivelinessChangedStatus *status);
 */

/* DDS_ReturnCode_t
 *    SPACE_FooDataReader_get_requested_deadline_missed_status
 *       (SPACE_FooDataReader _this,
 *         DDS_RequestedDeadlineMissedStatus *status);
 */

/* DDS_ReturnCode_t
 *    SPACE_FooDataReader_get_requested_incompatible_qos_status
 *       (SPACE_FooDataReader _this,
 *         DDS_RequestedIncompatibleQosStatus *status);
 */

/* DDS_ReturnCode_t
 *    SPACE_FooDataReader_get_subscription_matched_status
 *       (SPACE_FooDataReader _this,
 *         DDS_SubscriptionMatchedStatus *status);
 */

/* DDS_ReturnCode_t
 *    SPACE_FooDataReader_get_sample_lost_status
 *       (SPACE_FooDataReader _this,
 *         DDS_SampleLostStatus *status);
 */

/* DDS_ReturnCode_t
 *    SPACE_FooDataReader_wait_for_historical_data
 *       (SPACE_FooDataReader _this,
 *         const DDS_Duration_t *max_wait);
 */

/* DDS_ReturnCode_t
 *    SPACE_FooDataReader_get_matched_publications
 *       (SPACE_FooDataReader _this,
 *         DDS_InstanceHandleSeq *publication_handles);
 */

/* DDS_ReturnCode_t
 *    SPACE_FooDataReader_get_matched_publication_data
 *       (SPACE_FooDataReader _this,
 *         DDS_PublicationBuiltinTopicData *publication_data,
 *          const DDS_InstanceHandle_t publication_handle);
```

```
 */
/*
 * implemented API operations
 */
   DDS_ReturnCode_t
      SPACE_FooDataReader_read
         (SPACE_FooDataReader _this,
           DDS_sequence_Foo *data_values,
           DDS_SampleInfoSeq *info_seq,
           const DDS_long max_samples,
           const DDS_SampleStateMask sample_states,
           const DDS_ViewStateMask view_states,
           const DDS_InstanceStateMask instance_states);
   DDS_ReturnCode_t
      SPACE_FooDataReader_take
         (SPACE_FooDataReader _this,
           DDS_sequence_Foo *data_values,
           DDS_SampleInfoSeq *info_seq,
           const DDS_long max_samples,
           const DDS_SampleStateMask sample_states,
           const DDS_ViewStateMask view_states,
           const DDS_InstanceStateMask instance_states);
   DDS_ReturnCode_t
      SPACE_FooDataReader_read_w_condition
         (SPACE_FooDataReader _this,
           DDS_sequence_Foo *data_values,
           DDS_SampleInfoSeq *info_seq,
           const DDS_long max_samples,
           const DDS_ReadCondition a_condition);
   DDS_ReturnCode_t
      SPACE_FooDataReader_take_w_condition
         (SPACE_FooDataReader _this,
           DDS_sequence_Foo *data_values,
           DDS_SampleInfoSeq *info_seq,
           const DDS_long max_samples,
           const DDS_ReadCondition a_condition);
   DDS_ReturnCode_t
      SPACE_FooDataReader_read_next_sample
         (SPACE_FooDataReader _this,
           Foo *data_values,
           DDS_SampleInfo *sample_info);
   DDS_ReturnCode_t
      SPACE_FooDataReader_take_next_sample
         (SPACE_FooDataReader _this,
           Foo *data_values,
           DDS_SampleInfo *sample_info);
   DDS_ReturnCode_t
      SPACE_FooDataReader_read_instance
         (SPACE_FooDataReader _this,
           DDS_sequence_Foo *data_values,
```

```
            DDS_SampleInfoSeq *info_seq,
            const DDS_long max_samples,
            const DDS_InstanceHandle_t a_handle,
            const DDS_SampleStateMask sample_states,
            const DDS_ViewStateMask view_states,
            const DDS_InstanceStateMask instance_states);
DDS_ReturnCode_t
   SPACE_FooDataReader_take_instance
      (SPACE_FooDataReader _this,
            DDS_sequence_Foo *data_values,
            DDS_SampleInfoSeq *info_seq,
            const DDS_long max_samples,
            const DDS_InstanceHandle_t a_handle,
            const DDS_SampleStateMask sample_states,
            const DDS_ViewStateMask view_states,
            const DDS_InstanceStateMask instance_states);
DDS_ReturnCode_t
   SPACE_FooDataReader_read_next_instance
      (SPACE_FooDataReader _this,
            DDS_sequence_Foo *data_values,
            DDS_SampleInfoSeq *info_seq,
            const DDS_long max_samples,
            const DDS_InstanceHandle_t a_handle,
            const DDS_SampleStateMask sample_states,
            const DDS_ViewStateMask view_states,
            const DDS_InstanceStateMask instance_states);
DDS_ReturnCode_t
   SPACE_FooDataReader_take_next_instance
      (SPACE_FooDataReader _this,
            DDS_sequence_Foo *data_values,
            DDS_SampleInfoSeq *info_seq,
            const DDS_long max_samples,
            const DDS_InstanceHandle_t a_handle,
            const DDS_SampleStateMask sample_states,
            const DDS_ViewStateMask view_states,
            const DDS_InstanceStateMask instance_states);
DDS_ReturnCode_t
   SPACE_FooDataReader_read_next_instance_w_condition
      (SPACE_FooDataReader _this,
            DDS_sequence_Foo *data_values,
            DDS_SampleInfoSeq *info_seq,
            const DDS_long max_samples,
            const DDS_InstanceHandle_t a_handle,
            const DDS_ReadCondition a_condition);
DDS_ReturnCode_t
   SPACE_FooDataReader_take_next_instance_w_condition
      (SPACE_FooDataReader _this,
            DDS_sequence_Foo *data_values,
            DDS_SampleInfoSeq *info_seq,
            const DDS_long max_samples,
```

```
                const DDS_InstanceHandle_t a_handle,
                const DDS_ReadCondition a_condition);
        DDS_ReturnCode_t
           SPACE_FooDataReader_return_loan
              (SPACE_FooDataReader _this,
                DDS_sequence_Foo *data_values,
                DDS_SampleInfoSeq *info_seq);
        DDS_ReturnCode_t
           SPACE_FooDataReader_get_key_value
              (SPACE_FooDataReader _this,
                Foo *key_holder,
                const DDS_InstanceHandle_t handle);
        DDS_InstanceHandle_t
           SPACE_FooDataReader_lookup_instance
              (SPACE_FooDataReader _this,
                Foo *instance_data);
```

The next paragraphs describe the usage of all `SPACE_FooDataReader` operations. The inherited operations are listed but not fully described because they are not implemented in this class. The full description of these operations is given in the classes from which they are inherited.

3.5.2.45 SPACE_FooDataReader_create_querycondition (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataReader` for further explanation.

Synopsis

```
#include <Space.h>
DDS_QueryCondition
   SPACE_FooDataReader_create_querycondition
      (SPACE_FooDataReader _this,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states,
        const DDS_char *query_expression,
        const DDS_StringSeq *query_parameters);
```

3.5.2.46 SPACE_FooDataReader_create_readcondition (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataReader` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReadCondition
   SPACE_FooDataReader_create_readcondition
      (SPACE_FooDataReader _this,
        const DDS_SampleStateMask sample_states,
```

```
                    const DDS_ViewStateMask view_states,
                    const DDS_InstanceStateMask instance_states);
```

3.5.2.47 SPACE_FooDataReader_delete_contained_entities (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataReader` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReader_delete_contained_entities
      (SPACE_FooDataReader _this);
```

3.5.2.48 SPACE_FooDataReader_delete_readcondition (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataReader` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReader_delete_readcondition
      (SPACE_FooDataReader _this,
        const DDS_ReadCondition a_condition);
```

3.5.2.49 SPACE_FooDataReader_enable (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReader_enable
      (SPACE_FooDataReader _this);
```

3.5.2.50 SPACE_FooDataReader_get_key_value

Synopsis

```
#include <Space.h>
   DDS_ReturnCode_t
      SPACE_FooDataReader_get_key_value
         (SPACE_FooDataReader _this,
              Foo *key_holder,
              const DDS_InstanceHandle_t handle);
```

Description

This operation retrieves the key value of a specific instance.

Parameters

in SPACE_FooDataReader _this - the SPACE_FooDataReader object on which the operation is operated.

*inout Foo *key_holder* - the sample in which the key values are stored.

in const DDS_InstanceHandle_t handle - the handle to the instance from which to get the key value.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED or DDS_RETCODE_PRECONDITION_NOT_MET.

Detailed Description

This operation retrieves the key value of the instance pointed to by instance_handle. When the operation is called with an DDS_HANDLE_NIL handle value as an instance_handle, the operation will return DDS_RETCODE_BAD_PARAMETER. The operation will only fill the fields that form the key inside the key_holder instance. This means that the non-key fields are not applicable and may contain garbage.

The operation must only be called on registered instances. Otherwise the operation returns the error DDS_RETCODE_PRECONDITION_NOT_MET.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the key_holder instance contains the key values of the instance.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - handle is not a valid handle or key_holder is not a valid pointer.
- *DDS_RETCODE_ALREADY_DELETED* - the SPACE_FooDataReader has already been deleted.

- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the SPACE_FooDataReader is not enabled.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - this instance is not registered.

3.5.2.51 SPACE_FooDataReader_get_listener (inherited)

This operation is inherited and therefore not described here. See the class DDS_DataReader for further explanation.

Synopsis

```
#include <Space.h>
struct SPACE_FooDataReaderListener
   SPACE_FooDataReader_get_listener
      (SPACE_FooDataReader _this);
```

3.5.2.52 SPACE_FooDataReader_get_liveliness_changed_status (inherited)

This operation is inherited and therefore not described here. See the class DDS_DataReader for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReader_get_liveliness_changed_status
      (SPACE_FooDataReader _this,
        DDS_LivelinessChangedStatus *status);
```

3.5.2.53 SPACE_FooDataReader_get_matched_publication_data (inherited)

This operation is inherited and therefore not described here. See the class DDS_DataReader for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReader_get_matched_publication_data
      (SPACE_FooDataReader _this,
        DDS_PublicationBuiltinTopicData *publication_data,
        const DDS_InstanceHandle_t publication_handle);
```

3.5.2.54 SPACE_FooDataReader_get_matched_publications (inherited)

This operation is inherited and therefore not described here. See the class DDS_DataReader for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReader_get_matched_publications
      (SPACE_FooDataReader _this,
        DDS_InstanceHandleSeq *publication_handles);
```

3.5.2.55 SPACE_FooDataReader_get_qos (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataReader` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReader_get_qos
      (SPACE_FooDataReader _this,
        DDS_DataReaderQos *qos);
```

3.5.2.56 SPACE_FooDataReader_get_requested_deadline_missed_status (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataReader` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReader_get_requested_deadline_missed_status
      (SPACE_FooDataReader _this,
        DDS_RequestedDeadlineMissedStatus *status);
```

3.5.2.57 SPACE_FooDataReader_get_requested_incompatible_qos_status (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataReader` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReader_get_requested_incompatible_qos_status
      (SPACE_FooDataReader _this,
        DDS_RequestedIncompatibleQosStatus *status);
```

3.5.2.58 SPACE_FooDataReader_get_sample_lost_status (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataReader` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReader_get_sample_lost_status
      (SPACE_FooDataReader _this,
        DDS_SampleLostStatus *status);
```

3.5.2.59 SPACE_FooDataReader_get_sample_rejected_status (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataReader` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReader_get_sample_rejected_status
      (SPACE_FooDataReader _this,
        DDS_SampleRejectedStatus *status);
```

3.5.2.60 SPACE_FooDataReader_get_status_changes (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <Space.h>
DDS_StatusMask
   SPACE_FooDataReader_get_status_changes
      (SPACE_FooDataReader _this);
```

3.5.2.61 SPACE_FooDataReader_get_statuscondition (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <Space.h>
DDS_StatusCondition
   SPACE_FooDataReader_get_statuscondition
      (SPACE_FooDataReader _this);
```

3.5.2.62 SPACE_FooDataReader_get_subscriber (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataReader` for further explanation.

Synopsis

```
#include <Space.h>
DDS_Subscriber
   SPACE_FooDataReader_get_subscriber
      (SPACE_FooDataReader _this);
```

3.5.2.63 SPACE_FooDataReader_get_subscription_matched_status (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataReader` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReader_get_subscription_matched_status
      (SPACE_FooDataReader _this,
        DDS_SubscriptionMatchedStatus *status);
```

3.5.2.64 SPACE_FooDataReader_get_topicdescription (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataReader` for further explanation.

Synopsis

```
#include <Space.h>
DDS_TopicDescription
   SPACE_FooDataReader_get_topicdescription
      (SPACE_FooDataReader _this);
```

3.5.2.65 SPACE_FooDataReader_lookup_instance

Synopsis

```
#include <Space.h>
DDS_InstanceHandle_t
   SPACE_FooDataReader_lookup_instance
      (SPACE_FooDataReader _this,
         Foo *instance_data);
```

Description

This operation returns the value of the instance handle which corresponds to the `instance_data`.

Parameters

in SPACE_FooDataReader _this - the SPACE_FooDataReader object on which the operation is operated.

*in Foo *instance_data* - the instance for which the corresponding instance handle needs to be looked up.

Return Value

DDS_InstanceHandle_t - Result value is the instance handle which corresponds to the instance_data.

Detailed Description

This operation returns the value of the instance handle which corresponds to the instance_data. The instance handle can be used in read operations that operate on a specific instance. Note that DDS_DataReader instance handles are local, and are not interchangeable with DDS_DataWriter instance handles nor with instance handles of an other DDS_DataReader. If the DDS_DataReader is already deleted, the handle value DDS_HANDLE_NIL is returned.

3.5.2.66 SPACE_FooDataReader_read

Synopsis

```
#include <Space.h>
       DDS_ReturnCode_t
          SPACE_FooDataReader_read
            (SPACE_FooDataReader _this,
                DDS_sequence_Foo *data_values,
                DDS_SampleInfoSeq *info_seq,
                const DDS_long max_samples,
                const DDS_SampleStateMask sample_states,
                const DDS_ViewStateMask view_states,
                const DDS_InstanceStateMask instance_states);
```

Description

This operation reads a sequence of Foo samples from the SPACE_FooDataReader.

Parameters

in SPACE_FooDataReader _this - the SPACE_FooDataReader object on which the operation is operated.

*inout DDS_sequence_Foo *data_values* - the returned sample data sequence. data_values is also used as an input to control the behaviour of this operation.

*inout DDS_SampleInfoSeq *info_seq* - the returned DDS_SampleInfo structure sequence. info_seq is also used as an input to control the behaviour of this operation.

in const DDS_long max_samples - the maximum number of samples that is returned.

in const DDS_SampleStateMask sample_states - a mask, which selects only those samples with the desired sample states.

in const DDS_ViewStateMask view_states - a mask, which selects only those samples with the desired view states.

in const DDS_InstanceStateMask instance_states - a mask, which selects only those samples with the desired instance states.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED, DDS_RETCODE_PRECONDITION_NOT_MET or DDS_RETCODE_NO_DATA.

Detailed Description

This operation reads a sequence of Foo samples from the SPACE_FooDataReader. The data is returned by the parameters data_values and info_seq. The number of samples that is returned is limited by the parameter max_samples. This operation is part of the specialized class which is generated for the particular application data type (in this case type Foo) that is being read. If the SPACE_FooDataReader has no samples that meet the constraints, the return value is DDS_RETCODE_NO_DATA.

State masks

The SPACE_FooDataReader_read operation depends on a selection of the samples by using three masks:

- sample_states is the mask, which selects only those samples with the desired sample states DDS_READ_SAMPLE_STATE, DDS_NOT_READ_SAMPLE_STATE or both
- view_states is the mask, which selects only those samples with the desired view states DDS_NEW_VIEW_STATE, DDS_NOT_NEW_VIEW_STATE or both

- instance_states is the mask, which selects only those samples with the desired instance states DDS_ALIVE_INSTANCE_STATE, DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE, DDS_NOT_ALIVE_NO_WRITERS_INSTANCE_STATE or a combination of these.

Destination Order

In any case, the relative order between the samples of one instance is consistent with the DDS_DestinationOrderQosPolicy of the DDS_Subscriber.

When the DDS_DestinationOrderQosPolicy kind is DDS_BY_RECEPTION_TIMESTAMP_DESTINATIONORDER_QOS, the samples belonging to the same instances will appear in the relative order in which they were received (FIFO)

When the DDS_DestinationOrderQosPolicy kind is DDS_BY_SOURCE_TIMESTAMP_DESTINATIONORDER_QOS, the samples belonging to the same instances will appear in the relative order implied by the source_timestamp.

Data sample

In addition to the sample sequence (data_values), the operation also returns a sequence of DDS_SampleInfo structures with the parameter info_seq. The info_seq structures and data_values also determine the behaviour of this operation.

Resource control

The initial (input) properties of the data_values and info_seq sequences determine the precise behaviour of the SPACE_FooDataReader_read operation. The sequences are modelled as having three properties: the current-length (_length), the maximum length (_maximum), and whether or not the sequence container owns the memory of the elements within (_release).

The initial (input) values of the _length, _maximum, and _release properties for the data_values and info_seq sequences govern the behaviour of the SPACE_FooDataReader_read operation as specified by the following rules:

- The values of _length, _maximum, and _release for the two sequences must be identical. Otherwise SPACE_FooDataReader_read returns DDS_RETCODE_PRECONDITION_NOT_MET
- On successful output, the values of _length, _maximum, and _release are the same for both sequences
- If the input _maximum==0, the data_values and info_seq sequences are filled with elements that are “loaned” by the SPACE_FooDataReader. On output, _release is FALSE, _length is set to the number of values returned,

and _maximum is set to a value verifying _maximum>=_length. In this case the application will need to "return the loan" to the Data Distribution Service using the SPACE_FooDataReader_return_loan operation

- If the input _maximum>0 and the input _release==FALSE, the SPACE_FooDataReader_read operation will fail and returns DDS_RETCODE_PRECONDITION_NOT_MET. This avoids the potential hard-to-detect memory leaks caused by an application forgetting to "return the loan"
- If input _maximum>0 and the input _release==TRUE, the SPACE_FooDataReader_read operation will copy the Foo samples and info_seq values into the elements already inside the sequences. On output, _release is TRUE, _length is set to the number of values copied, and _maximum will remain unchanged. The application can control where the copy is placed and the application does not need to "return the loan". The number of samples copied depends on the relative values of _maximum and max_samples:
  - If _maximum==DDS_LENGTH_UNLIMITED, at most _maximum values are copied. The use of this variant lets the application limit the number of samples returned to what the sequence can accommodate;
  - If max_samples<=_maximum, at most max_samples values are copied. The use of this variant lets the application limit the number of samples returned to fewer than what the sequence can accommodate;
  - If max_samples>_maximum, the SPACE_FooDataReader_read operation will fail and returns DDS_RETCODE_PRECONDITION_NOT_MET. This avoids the potential confusion where the application expects to be able to access up to max_samples, but that number can never be returned, even if they are available in the SPACE_FooDataReader, because the output sequence cannot accommodate them.

Buffer Loan

As described above, upon return the data_values and info_seq sequences may contain elements "loaned" from the Data Distribution Service. If this is the case, the application will need to use the SPACE_FooDataReader_return_loan operation to return the "loan" once it is no longer using the data in the sequence. Upon return from SPACE_FooDataReader_return_loan, the sequence has _maximum==0 and _release==FALSE.

The application can determine whether it is necessary to "return the loan" or not, based on the state of the sequences, when the SPACE_FooDataReader_read operation was called, or by accessing the "_release" property. However, in many

cases it may be simpler to always call `SPACE_FooDataReader_return_loan`, as this operation is harmless (*i.e.* leaves all elements unchanged) if the sequence does not have a loan.

To avoid potential memory leaks, it is not allowed to change the length of the `data_values` and `info_seq` structures for which `_release==FALSE`. Furthermore, deleting a sequence for which `_release==FALSE` is considered to be an error except when the sequence is empty.

Data Sequence

On output, the sequence of data values and the sequence of `DDS_SampleInfo` structures are of the same length and are in an one-to-one correspondence. Each `DDS_SampleInfo` structures provides information, such as the `source_timestamp`, the `sample_state`, `view_state`, and `instance_state`, etc., about the matching sample.

Some elements in the returned sequence may not have valid data: the `valid_data` field in the `DDS_SampleInfo` indicates whether the corresponding data value contains any meaningful data. If not, the data value is just a 'dummy' sample for which only the keyfields have been assigned. It is used to accompany the `DDS_SampleInfo` that communicates a change in the `instance_state` of an instance for which there is no 'real' sample available.

For example, when an application always 'takes' all available samples of a particular instance, there is no sample available to report the disposal of that instance. In such a case the `DDS_DataReader` will insert a dummy sample into the `data_values` sequence to accompany the `DDS_SampleInfo` element in the `info_seq` sequence that communicates the disposal of the instance.

The act of reading a sample sets its `sample_state` to `DDS_READ_SAMPLE_STATE`. If the sample belongs to the most recent generation of the instance, it also sets the `view_state` of the instance to `DDS_NOT_NEW_VIEW_STATE`. It does not affect the `instance_state` of the instance.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - a sequence of data values is available.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_BAD_PARAMETER`* - either or both of `data_values` or `info_seq` is an invalid pointer.

- *DDS_RETCODE_ALREADY_DELETED* - the SPACE_FooDataReader has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the SPACE_FooDataReader is not enabled.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - one of the following is true:
  - the max_samples>_maximum and max_samples is not DDS_LENGTH_UNLIMITED.
  - one or more values of _length, _maximum, and _release for the two sequences are not identical.
  - the _maximum>0 and the _release==FALSE.
- *DDS_RETCODE_NO_DATA* - no samples that meet the constraints are available.

3.5.2.67 SPACE_FooDataReader_read_instance

Synopsis

```
#include <Space.h>
       DDS_ReturnCode_t
          SPACE_FooDataReader_read_instance
            (SPACE_FooDataReader _this,
                DDS_sequence_Foo *data_values,
                DDS_SampleInfoSeq *info_seq,
                const DDS_long max_samples,
                const DDS_InstanceHandle_t a_handle,
                const DDS_SampleStateMask sample_states,
                const DDS_ViewStateMask view_states,
                const DDS_InstanceStateMask instance_states);
```

Description

This operation reads a sequence of Foo samples of a single instance from the SPACE_FooDataReader.

Parameters

in SPACE_FooDataReader _this - the SPACE_FooDataReader object on which the operation is operated.

*inout DDS_sequence_Foo *data_values* - the returned sample data sequence. data_values is also used as an input to control the behaviour of this operation.

*inout DDS_SampleInfoSeq *info_seq* - the returned DDS_SampleInfo structure sequence. info_seq is also used as an input to control the behaviour of this operation.

in const DDS_long max_samples - the maximum number of samples that is returned.

in const DDS_InstanceHandle_t a_handle - the single instance, the samples belong to.

in const DDS_SampleStateMask sample_states - a mask, which selects only those samples with the desired sample states.

in const DDS_ViewStateMask view_states - a mask, which selects only those samples with the desired view states.

in const DDS_InstanceStateMask instance_states - a mask, which selects only those samples with the desired instance states.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED, DDS_RETCODE_PRECONDITION_NOT_MET or DDS_RETCODE_NO_DATA.

Detailed Description

This operation reads a sequence of Foo samples of a single instance from the SPACE_FooDataReader. The behaviour is identical to SPACE_FooDataReader_read except for that all samples returned belong to the single specified instance whose handle is a_handle. Upon successful return, the data collection will contain samples all belonging to the same instance. The data is returned by the parameters data_values and info_seq. The corresponding DDS_SampleInfo.instance_handle in info_seq will have the value of a_handle. The DDS_DataReader will check that each sample belongs to the specified instance (indicated by a_handle) otherwise it will not place the sample in the returned collection.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - a sequence of data values is available.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - either or both of data_values or info_seq is an invalid pointer or a_handle is not a valid handle.

- *DDS_RETCODE_ALREADY_DELETED* - the SPACE_FooDataReader has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the SPACE_FooDataReader is not enabled.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - one of the following is true:
  - the max_samples>_maximum and max_samples is not DDS_LENGTH_UNLIMITED.
  - one or more values of _length, _maximum, and _release for the two sequences are not identical.
  - the _maximum>0 and the _release==FALSE.
  - the handle ==DDS_HANDLE_NIL.
  - the handle has not been registered with this DataReader.
- DDS_RETCODE_NO_DATA - no samples that meet the constraints are available.

3.5.2.68 SPACE_FooDataReader_read_next_instance

Synopsis

```
#include <Space.h>
       DDS_ReturnCode_t
          SPACE_FooDataReader_read_next_instance
            (SPACE_FooDataReader _this,
               DDS_sequence_Foo *data_values,
               DDS_SampleInfoSeq *info_seq,
               const DDS_long max_samples,
               const DDS_InstanceHandle_t a_handle,
               const DDS_SampleStateMask sample_states,
               const DDS_ViewStateMask view_states,
               const DDS_InstanceStateMask instance_states);
```

Description

This operation reads a sequence of Foo samples of the next single instance from the SPACE_FooDataReader.

Parameters

in SPACE_FooDataReader _this - the SPACE_FooDataReader object on which the operation is operated.

*inout DDS_sequence_Foo *data_values* - the returned sample data sequence. data_values is also used as an input to control the behaviour of this operation.

*inout DDS_SampleInfoSeq *info_seq* - the returned DDS_SampleInfo structure sequence. info_seq is also used as an input to control the behaviour of this operation.

in const DDS_long max_samples - the maximum number of samples that is returned.

in const DDS_InstanceHandle_t a_handle - the current single instance, the returned samples belong to the next single instance.

in const DDS_SampleStateMask sample_states - a mask, which selects only those samples with the desired sample states.

in const DDS_ViewStateMask view_states - a mask, which selects only those samples with the desired view states.

in const DDS_InstanceStateMask instance_states - a mask, which selects only those samples with the desired instance states.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED, DDS_RETCODE_PRECONDITION_NOT_MET or DDS_RETCODE_NO_DATA.

Detailed Description

This operation reads a sequence of Foo samples of a single instance from the SPACE_FooDataReader. The behaviour is similar to SPACE_FooDataReader_read_instance (all samples returned belong to a single instance) except that the actual instance is not directly specified. Rather the samples will all belong to the 'next' instance with instance_handle 'greater' (according to some internal-defined order) than a_handle, that has available samples. The data is returned by the parameters data_values and info_seq. The corresponding DDS_SampleInfo.instance_handle in info_seq will has the value of the next instance with respect to a_handle.

Instance Order

The internal-defined order is not important and is implementation specific. The important thing is that, according to the Data Distribution Service, all instances are ordered relative to each other. This ordering is between the instances, that is, it does not depend on the actual samples received. For the purposes of this explanation it is *'as if'* each instance handle was represented as a unique integer.

The behaviour of `SPACE_FooDataReader_read_next_instance` is *'as if'* the `DDS_DataReader` invoked `SPACE_FooDataReader_read_instance` passing the smallest `instance_handle` among all the ones that:

- are greater than `a_handle`
- have available samples (*i.e.* samples that meet the constraints imposed by the specified states).

The special value `DDS_HANDLE_NIL` is guaranteed to be 'less than' any valid `instance_handle`. So the use of the parameter value `a_handle==DDS_HANDLE_NIL` will return the samples for the instance which has the smallest `instance_handle` among all the instances that contains available samples.

Typical use

The operation `SPACE_FooDataReader_read_next_instance` is intended to be used in an application-driven iteration where the application starts by passing `a_handle==DDS_HANDLE_NIL`, examines the samples returned, and then uses the `instance_handle` returned in the `DDS_SampleInfo` as the value of `a_handle` argument to the next call to `SPACE_FooDataReader_read_next_instance`. The iteration continues until `SPACE_FooDataReader_read_next_instance` returns the return value `DDS_RETCODE_NO_DATA`.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - a sequence of data values is available.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_BAD_PARAMETER`* - either or both of `data_values` or `info_seq` is an invalid pointer or `a_handle` is not a valid handle.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `SPACE_FooDataReader` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_NOT_ENABLED`* - the `SPACE_FooDataReader` is not enabled.
- *`DDS_RETCODE_PRECONDITION_NOT_MET`* - one of the following is true:
  - the `max_samples>_maximum` and `max_samples` is not `DDS_LENGTH_UNLIMITED`.

- one or more values of `_length`, `_maximum`, and `_release` for the two sequences are not identical.
- the `_maximum>0` and the `_release==FALSE`.
- the handle has not been registered with this DataReader.

- *`DDS_RETCODE_NO_DATA`* - no samples that meet the constraints are available.

3.5.2.69 SPACE_FooDataReader_read_next_instance_w_condition

Synopsis

```
#include <Space.h>
       DDS_ReturnCode_t
          SPACE_FooDataReader_read_next_instance_w_condition
           (SPACE_FooDataReader _this,
               DDS_sequence_Foo *data_values,
               DDS_SampleInfoSeq *info_seq,
               const DDS_long max_samples,
               const DDS_InstanceHandle_t a_handle,
               const DDS_ReadCondition a_condition);
```

Description

This operation reads a sequence of `Foo` samples of the next single instance from the `SPACE_FooDataReader`.

Parameters

`in SPACE_FooDataReader _this` - the `SPACE_FooDataReader` object on which the operation is operated.

`inout DDS_sequence_Foo *data_values` - the returned sample data sequence. `data_values` is also used as an input to control the behaviour of this operation.

`inout DDS_SampleInfoSeq *info_seq` - the returned `DDS_SampleInfo` structure sequence. `info_seq` is also used as an input to control the behaviour of this operation.

`in const DDS_long max_samples` - the maximum number of samples that is returned.

`in const DDS_InstanceHandle_t a_handle` - the current single instance, the returned samples belong to the next single instance.

`in const DDS_ReadCondition a_condition` - a pointer to a `DDS_ReadCondition` or `DDS_QueryCondition` which filters the data before it is returned by the read operation.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED, DDS_RETCODE_PRECONDITION_NOT_MET or DDS_RETCODE_NO_DATA.

Detailed Description

This operation reads a sequence of Foo samples of a single instance from the SPACE_FooDataReader, filtered by a DDS_ReadCondition or DDS_QueryCondition. The behaviour is identical to SPACE_FooDataReader_read_next_instance except for that the samples are filtered by a DDS_ReadCondition or DDS_QueryCondition. When using a DDS_ReadCondition, the result is the same as the SPACE_FooDataReader_read_next_instance operation with the same state parameters filled in as for the DDS_create_readcondition. In this way, the application can avoid repeating the same parameters, specified when creating the DDS_ReadCondition. When using a DDS_QueryCondition, a content based filtering can be done. When either using a DDS_ReadCondition or DDS_QueryCondition, the condition must be created by this SPACE_FooDataReader. Otherwise the operation will fail and returns DDS_RETCODE_PRECONDITION_NOT_MET.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - a sequence of data values is available.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - one or more of the data_values, or info_seq and a_condition parameters is an invalid pointer or a_handle is not a valid handle.
- *DDS_RETCODE_ALREADY_DELETED* - the SPACE_FooDataReader has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the SPACE_FooDataReader is not enabled.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - one of the following is true:

- the DDS_ReadCondition or DDS_QueryCondition is not attached to this SPACE_FooDataReader.
- the max_samples>_maximum and max_samples is not DDS_LENGTH_UNLIMITED.
- one or more values of _length, _maximum, and _release for the two sequences are not identical.
- the _maximum>0 and the _release==FALSE.
- the handle has not been registered with this DataReader.

• *DDS_RETCODE_NO_DATA* - no samples that meet the constraints are available.

3.5.2.70 SPACE_FooDataReader_read_next_sample

Synopsis

```
#include <Space.h>
       DDS_ReturnCode_t
          SPACE_FooDataReader_read_next_sample
           (SPACE_FooDataReader _this,
               Foo *data_values,
               DDS_SampleInfo *sample_info);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.5.2.71 SPACE_FooDataReader_read_w_condition

Synopsis

```
#include <Space.h>
       DDS_ReturnCode_t
          SPACE_FooDataReader_read_w_condition
            (SPACE_FooDataReader _this,
               DDS_sequence_Foo *data_values,
               DDS_SampleInfoSeq *info_seq,
               const DDS_long max_samples,
               const DDS_ReadCondition a_condition);
```

Description

This operation reads a sequence of Foo samples from the SPACE_FooDataReader, filtered by a DDS_ReadCondition or DDS_QueryCondition.

Parameters

in SPACE_FooDataReader _this - the SPACE_FooDataReader object on which the operation is operated.

*inout DDS_sequence_Foo *data_values* - the returned sample data sequence. data_values is also used as an input to control the behaviour of this operation.

*inout DDS_SampleInfoSeq *info_seq* - the returned DDS_SampleInfo structure sequence. info_seq is also used as an input to control the behaviour of this operation.

in const DDS_long max_samples - the maximum number of samples that is returned.

in const DDS_ReadCondition a_condition - a pointer to a DDS_ReadCondition or DDS_QueryCondition which filters the data before it is returned by the SPACE_FooDataReader_read operation.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED, DDS_RETCODE_PRECONDITION_NOT_MET or DDS_RETCODE_NO_DATA.

Detailed Description

This operation reads a sequence of Foo samples from the SPACE_FooDataReader, filtered by a DDS_ReadCondition or DDS_QueryCondition. The condition pointer from both SPACE_FooDataReader_create_readcondition or SPACE_FooDataReader_create_querycondition may be used. The behaviour is identical to SPACE_FooDataReader_read except for that the samples are filtered by a DDS_ReadCondition or DDS_QueryCondition. When using a DDS_ReadCondition, the result is the same as the SPACE_FooDataReader_read operation with the same state parameters filled in as for the SPACE_FooDataReader_create_readcondition. In this way, the application can avoid repeating the same parameters, specified when creating the DDS_ReadCondition. When using a DDS_QueryCondition, a content based filtering can be done. When either using a DDS_ReadCondition or DDS_QueryCondition, the condition must be created by this SPACE_FooDataReader. Otherwise the operation will fail and returns DDS_RETCODE_PRECONDITION_NOT_MET.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - a sequence of data values is available.

- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - one or more of the `data_values`, or `info_seq` and `a_condition` parameters is an invalid pointer.
- *DDS_RETCODE_ALREADY_DELETED* - the `SPACE_FooDataReader` has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the `SPACE_FooDataReader` is not enabled.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - one of the following is true:
  - the `DDS_ReadCondition` or `DDS_QueryCondition` is not attached to this `SPACE_FooDataReader`.
  - the `max_samples>_maximum` and `max_samples` is not `DDS_LENGTH_UNLIMITED`.
  - one or more values of `_length`, `_maximum`, and `_release` for the two sequences are not identical.
  - the `_maximum>0` and the `_release==FALSE`.
- *DDS_RETCODE_NO_DATA* - no samples that meet the constraints are available.

3.5.2.72 SPACE_FooDataReader_return_loan

Synopsis

```
#include <Space.h>
       DDS_ReturnCode_t
          SPACE_FooDataReader_return_loan
              (SPACE_FooDataReader _this,
                   DDS_sequence_Foo *data_values,
                   DDS_SampleInfoSeq *info_seq);
```

Description

This operation indicates to the `DDS_DataReader` that the application is done accessing the sequence of `data_values` and `info_seq`.

Parameters

in SPACE_FooDataReader _this - the `SPACE_FooDataReader` object on which the operation is operated.

*inout DDS_sequence_Foo *data_values* - the sample data sequence which was loaned from the `DDS_DataReader`.

*inout DDS_SampleInfoSeq *info_seq* - the DDS_SampleInfo structure sequence which was loaned from the DDS_DataReader.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED or DDS_RETCODE_PRECONDITION_NOT_MET.

Detailed Description

This operation indicates to the SPACE_FooDataReader that the application is done accessing the sequence of data_values and info_seq obtained by some earlier invocation of the operation SPACE_FooDataReader_read or SPACE_FooDataReader_take (or any of the similar operations) on the SPACE_FooDataReader.

The data_values and info_seq must belong to a single related pair; that is, they should correspond to a pair returned from a single call to the operation SPACE_FooDataReader_read or SPACE_FooDataReader_take. The data_values and info_seq must also have been obtained from the same DDS_DataReader to which they are returned. If either of these conditions is not met the operation will fail and returns DDS_RETCODE_PRECONDITION_NOT_MET.

Buffer Loan

The operation SPACE_FooDataReader_return_loan allows implementations of the SPACE_FooDataReader_read and SPACE_FooDataReader_take operations to “loan” buffers from the Data Distribution Service to the application and in this manner provide “zero-copy” access to the data. During the loan, the Data Distribution Service will guarantee that the data_values and info_seq are not modified.

It is not necessary for an application to return the loans immediately after calling the operation SPACE_FooDataReader_read or SPACE_FooDataReader_take. However, as these buffers correspond to internal resources inside the DDS_DataReader, the application should not retain them indefinitely.

Calling SPACE_FooDataReader_return_loan

The use of the SPACE_FooDataReader_return_loan operation is only necessary if the call to the operation SPACE_FooDataReader_read or SPACE_FooDataReader_take “loaned” buffers to the application. This only occurs if the data_values and info_seq sequences had _maximum=0 at the time the operation SPACE_FooDataReader_read or SPACE_FooDataReader_take

was called. The application may also examine the '`_release`' property of the collection to determine where there is an outstanding loan. However, calling the operation `SPACE_FooDataReader_return_loan` on a pair of sequences that does not have a loan is safe and has no side effects.

If the pair of sequences had a loan, upon return from the operation `SPACE_FooDataReader_return_loan` the pair of sequences has `_maximum=0`.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the `DDS_DataReader` is informed that the sequences will not be used any more.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.
- *`DDS_RETCODE_ILLEGAL_OPERATION`* - the operation is invoked on an inappropriate object.
- *`DDS_RETCODE_BAD_PARAMETER`* - either or both of `data_values` or `info_seq` is an invalid pointer.
- *`DDS_RETCODE_ALREADY_DELETED`* - the `SPACE_FooDataReader` has already been deleted.
- *`DDS_RETCODE_OUT_OF_RESOURCES`* - the Data Distribution Service ran out of resources to complete this operation.
- *`DDS_RETCODE_NOT_ENABLED`* - the `SPACE_FooDataReader` is not enabled.
- *`DDS_RETCODE_PRECONDITION_NOT_MET`* - one of the following is true:
  - the `data_values` and `info_seq` do not belong to a single related pair.
  - the `data_values` and `info_seq` were not obtained from this `SPACE_FooDataReader`.

3.5.2.73 SPACE_FooDataReader_set_listener (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataReader` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReader_set_listener
      (SPACE_FooDataReader _this,
        const struct DDS_DataReaderListener *a_listener,
        const DDS_StatusMask mask);
```

3.5.2.74 SPACE_FooDataReader_set_qos (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataReader` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReader_set_qos
      (SPACE_FooDataReader _this,
        const DDS_DataReaderQos *qos);
```

3.5.2.75 SPACE_FooDataReader_take

Synopsis

```
#include <Space.h>
       DDS_ReturnCode_t
          SPACE_FooDataReader_take
              (SPACE_FooDataReader _this,
                DDS_sequence_Foo *data_values,
               DDS_SampleInfoSeq *info_seq,
               const DDS_long max_samples,
               const DDS_SampleStateMask sample_states,
               const DDS_ViewStateMask view_states,
               const DDS_InstanceStateMask instance_states);
```

Description

This operation reads a sequence of `Foo` samples from the `SPACE_FooDataReader` and by doing so, removes the data from the `SPACE_FooDataReader`.

Parameters

`in SPACE_FooDataReader _this` - the `SPACE_FooDataReader` object on which the operation is operated.

`inout DDS_sequence_Foo *data_values` - the returned sample data sequence. `data_values` is also used as an input to control the behaviour of this operation.

`inout DDS_SampleInfoSeq *info_seq` - the returned `DDS_SampleInfo` structure sequence. `info_seq` is also used as an input to control the behaviour of this operation.

`in const DDS_long max_samples` - the maximum number of samples that is returned.

`in const DDS_SampleStateMask sample_states` - a mask, which selects only those samples with the desired sample states.

in const DDS_ViewStateMask view_states - a mask, which selects only those samples with the desired view states.

in const DDS_InstanceStateMask instance_states - a mask, which selects only those samples with the desired instance states.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED, DDS_RETCODE_PRECONDITION_NOT_MET or DDS_RETCODE_NO_DATA.

Detailed Description

This operation reads a sequence of Foo samples from the SPACE_FooDataReader and by doing so, removes the data from the SPACE_FooDataReader, so it can not be read or taken again. The behaviour is identical to SPACE_FooDataReader_read except for that the samples are removed from the SPACE_FooDataReader.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - a sequence of data values is available and removed from the SPACE_FooDataReader.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - either or both of data_values or info_seq is an invalid pointer.
- *DDS_RETCODE_ALREADY_DELETED* - the SPACE_FooDataReader has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the SPACE_FooDataReader is not enabled.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - one of the following is true:
  - the max_samples>_maximum and max_samples is not DDS_LENGTH_UNLIMITED.

- one or more values of `_length`, `_maximum`, and `_release` for the two sequences are not identical.
- the `_maximum>0` and the `_release==FALSE`.

- *`DDS_RETCODE_NO_DATA`* - no samples that meet the constraints are available.

3.5.2.76 SPACE_FooDataReader_take_instance

Synopsis

```
#include <Space.h>
       DDS_ReturnCode_t
          SPACE_FooDataReader_take_instance
            (SPACE_FooDataReader _this,
              DDS_sequence_Foo *data_values,
              DDS_SampleInfoSeq *info_seq,
              const DDS_long max_samples,
              const DDS_InstanceHandle_t a_handle,
              const DDS_SampleStateMask sample_states,
              const DDS_ViewStateMask view_states,
              const DDS_InstanceStateMask instance_states);
```

Description

This operation reads a sequence of `Foo` samples of a single instance from the `SPACE_FooDataReader` and by doing so, removes the data from the `SPACE_FooDataReader`.

Parameters

`in SPACE_FooDataReader _this` - the `SPACE_FooDataReader` object on which the operation is operated.

`inout DDS_sequence_Foo *data_values` - the returned sample data sequence. `data_values` is also used as an input to control the behaviour of this operation.

`inout DDS_SampleInfoSeq *info_seq` - the returned `DDS_SampleInfo` structure sequence. `info_seq` is also used as an input to control the behaviour of this operation.

`in const DDS_long max_samples` - the maximum number of samples that is returned.

`in const DDS_InstanceHandle_t a_handle` - the single instance, the samples belong to.

`in const DDS_SampleStateMask sample_states` - a mask, which selects only those samples with the desired sample states.

in const DDS_ViewStateMask view_states - a mask, which selects only those samples with the desired view states.

in const DDS_InstanceStateMask instance_states - a mask, which selects only those samples with the desired instance states.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED, DDS_RETCODE_PRECONDITION_NOT_MET or DDS_RETCODE_NO_DATA.

Detailed Description

This operation reads a sequence of Foo samples of a single instance from the SPACE_FooDataReader and by doing so, removes the data from the SPACE_FooDataReader, so it can not be read or taken again. The behaviour is identical to SPACE_FooDataReader_read_instance except for that the samples are removed from the SPACE_FooDataReader.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - a sequence of data values is available and removed from the SPACE_FooDataReader.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - either or both of data_values or info_seq is an invalid pointer or a_handle is not a valid handle.
- *DDS_RETCODE_ALREADY_DELETED* - the SPACE_FooDataReader has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the SPACE_FooDataReader is not enabled.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - one of the following is true:
  - the max_samples>_maximum and max_samples is not DDS_LENGTH_UNLIMITED.

- one or more values of `_length`, `_maximum`, and `_release` for the two sequences are not identical.
- the `_maximum>0` and the `_release==FALSE`.
- the handle `==DDS_HANDLE_NIL`.
- the handle has not been registered with this DataReader.

- *`DDS_RETCODE_NO_DATA`* - no samples that meet the constraints are available.

3.5.2.77 SPACE_FooDataReader_take_next_instance

Synopsis

```
#include <Space.h>
       DDS_ReturnCode_t
          SPACE_FooDataReader_take_next_instance
           (SPACE_FooDataReader _this,
               DDS_sequence_Foo *data_values,
               DDS_SampleInfoSeq *info_seq,
               const DDS_long max_samples,
               const DDS_InstanceHandle_t a_handle,
               const DDS_SampleStateMask sample_states,
               const DDS_ViewStateMask view_states,
               const DDS_InstanceStateMask instance_states);
```

Description

This operation reads a sequence of `Foo` samples of the next single instance from the `SPACE_FooDataReader` and by doing so, removes the data from the `SPACE_FooDataReader`.

Parameters

`in SPACE_FooDataReader _this` - the `SPACE_FooDataReader` object on which the operation is operated.

`inout DDS_sequence_Foo *data_values` - the returned sample data sequence. `data_values` is also used as an input to control the behaviour of this operation.

`inout DDS_SampleInfoSeq *info_seq` - the returned `DDS_SampleInfo` structure sequence. `info_seq` is also used as an input to control the behaviour of this operation.

`in const DDS_long max_samples` - the maximum number of samples that is returned.

`in const DDS_InstanceHandle_t a_handle` - the current single instance, the returned samples belong to the next single instance.

in const DDS_SampleStateMask sample_states - a mask, which selects only those samples with the desired sample states.

in const DDS_ViewStateMask view_states - a mask, which selects only those samples with the desired view states.

in const DDS_InstanceStateMask instance_states - a mask, which selects only those samples with the desired instance states.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED, DDS_RETCODE_PRECONDITION_NOT_MET or DDS_RETCODE_NO_DATA.

Detailed Description

This operation reads a sequence of Foo samples of a single instance from the SPACE_FooDataReader and by doing so, removes the data from the SPACE_FooDataReader, so it can not be read or taken again. The behaviour is identical to SPACE_FooDataReader_read_next_instance except for that the samples are removed from the SPACE_FooDataReader.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - a sequence of data values is available and removed from the SPACE_FooDataReader.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - either or both of data_values or info_seq is an invalid pointer or a_handle is not a valid handle.
- *DDS_RETCODE_ALREADY_DELETED* - the SPACE_FooDataReader has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the SPACE_FooDataReader is not enabled.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - one of the following is true:

- the `max_samples>_maximum` and `max_samples` is not `DDS_LENGTH_UNLIMITED`.
- one or more values of `_length`, `_maximum`, and `_release` for the two sequences are not identical.
- the `_maximum>0` and the `_release==FALSE`.
- the handle has not been registered with this DataReader.

• *`DDS_RETCODE_NO_DATA`* - no samples that meet the constraints are available.

3.5.2.78 SPACE_FooDataReader_take_next_instance_w_condition

Synopsis

```
#include <Space.h>
       DDS_ReturnCode_t
          SPACE_FooDataReader_take_next_instance_w_condition
      (SPACE_FooDataReader _this,
              DDS_sequence_Foo *data_values,
              DDS_SampleInfoSeq *info_seq,
              const DDS_long max_samples,
              const DDS_InstanceHandle_t a_handle,
              const DDS_ReadCondition a_condition);
```

Description

This operation reads a sequence of `Foo` samples of the next single instance from the `SPACE_FooDataReader` and by doing so, removes the data from the `SPACE_FooDataReader`.

Parameters

`in SPACE_FooDataReader _this` - the `SPACE_FooDataReader` object on which the operation is operated.

`inout DDS_sequence_Foo *data_values` - the returned sample data sequence. `data_values` is also used as an input to control the behaviour of this operation.

`inout DDS_SampleInfoSeq *info_seq` - the returned `DDS_SampleInfo` structure sequence. `info_seq` is also used as an input to control the behaviour of this operation.

`in const DDS_long max_samples` - the maximum number of samples that is returned.

`in const DDS_InstanceHandle_t a_handle` - the current single instance, the returned samples belong to the next single instance.

in const DDS_ReadCondition a_condition - a pointer to a DDS_ReadCondition or DDS_QueryCondition which filters the data before it is returned by the read operation.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED, DDS_RETCODE_PRECONDITION_NOT_MET or DDS_RETCODE_NO_DATA.

Detailed Description

This operation reads a sequence of Foo samples of a single instance from the SPACE_FooDataReader, filtered by a DDS_ReadCondition or DDS_QueryCondition and by doing so, removes the data from the SPACE_FooDataReader, so it can not be read or taken again. The behaviour is identical to SPACE_FooDataReader_read_next_instance_w_condition except for that the samples are removed from the SPACE_FooDataReader.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - a sequence of data values is available and removed from the SPACE_FooDataReader.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - one or more of the data_values, info_seq and a_condition parameters is an invalid pointer or a_handle is not a valid handle.
- *DDS_RETCODE_ALREADY_DELETED* - the SPACE_FooDataReader has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the SPACE_FooDataReader is not enabled.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - one of the following is true:
  - the DDS_ReadCondition or DDS_QueryCondition is not attached to this SPACE_FooDataReader.

- the `max_samples>_maximum` and `max_samples` is not `DDS_LENGTH_UNLIMITED`.
- one or more values of `_length`, `_maximum`, and `_release` for the two sequences are not identical.
- the `_maximum>0` and the `_release==FALSE`.
- the handle has not been registered with this DataReader.

• *`DDS_RETCODE_NO_DATA`* - no samples that meet the constraints are available.

3.5.2.79 SPACE_FooDataReader_take_next_sample

Synopsis

```
#include <Space.h>
       DDS_ReturnCode_t
          SPACE_FooDataReader_take_next_sample
            (SPACE_FooDataReader _this,
               Foo *data_values,
               DDS_SampleInfo *sample_info);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.5.2.80 SPACE_FooDataReader_take_w_condition

Synopsis

```
#include <Space.h>
       DDS_ReturnCode_t
          SPACE_FooDataReader_take_w_condition
           (SPACE_FooDataReader _this,
               DDS_sequence_Foo *data_values,
               DDS_SampleInfoSeq *info_seq,
               const DDS_long max_samples,
               const DDS_ReadCondition a_condition);
```

Description

This operation reads a sequence of `Foo` samples from the `SPACE_FooDataReader`, filtered by a `DDS_ReadCondition` or `DDS_QueryCondition` and by doing so, removes the data from the `SPACE_FooDataReader`.

Parameters

`in SPACE_FooDataReader _this` - the `SPACE_FooDataReader` object on which the operation is operated.

`inout DDS_sequence_Foo *data_values` - the returned sample data sequence. `data_values` is also used as an input to control the behaviour of this operation.

*inout DDS_SampleInfoSeq *info_seq* - the returned DDS_SampleInfo structure sequence. info_seq is also used as an input to control the behaviour of this operation.

in const DDS_long max_samples - the maximum number of samples that is returned.

in const DDS_ReadCondition a_condition - a pointer to a DDS_ReadCondition or DDS_QueryCondition which filters the data before it is returned by the SPACE_FooDataReader_read operation.

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED, DDS_RETCODE_OUT_OF_RESOURCES, DDS_RETCODE_NOT_ENABLED, DDS_RETCODE_PRECONDITION_NOT_MET or DDS_RETCODE_NO_DATA.

Detailed Description

This operation reads a sequence of Foo samples from the SPACE_FooDataReader, filtered by a DDS_ReadCondition or DDS_QueryCondition and by doing so, removes the data from the SPACE_FooDataReader, so it can not be read or taken again. The behaviour is identical to SPACE_FooDataReader_read_w_condition except for that the samples are removed from the SPACE_FooDataReader.

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - a sequence of data values is available and removed from the SPACE_FooDataReader.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - one or more of the data_values, or info_seq and a_condition parameters is an invalid pointer.
- *DDS_RETCODE_ALREADY_DELETED* - the SPACE_FooDataReader has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *DDS_RETCODE_NOT_ENABLED* - the SPACE_FooDataReader is not enabled.

- *DDS_RETCODE_PRECONDITION_NOT_MET* - one of the following is true:
  - the DDS_ReadCondition or DDS_QueryCondition is not attached to this SPACE_FooDataReader.
  - the max_samples>_maximum and max_samples is not DDS_LENGTH_UNLIMITED.
  - one or more values of _length, _maximum, and _release for the two sequences are not identical.
  - the _maximum>0 and the _release==FALSE.
- *DDS_RETCODE_NO_DATA* - no samples that meet the constraints are available.

3.5.2.81 SPACE_FooDataReader_wait_for_historical_data (inherited)

This operation is inherited and therefore not described here. See the class DDS_DataReader for further explanation.

Synopsis

```
#include <Space.h>
       DDS_ReturnCode_t
          SPACE_FooDataReader_wait_for_historical_data
      (SPACE_FooDataReader _this,
              const DDS_Duration_t *max_wait);
```

3.5.2.82 SPACE_FooDataReader_wait_for_historical_data_w_condition (inherited)

This operation is inherited and therefore not described here. See the class DataReader for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
    SPACE_FooDataReader_wait_for_historical_data_w_condition
        (Space_FooDataReader _this,
         const DDS_string filter_expression,
         const DDS_StringSeq* filter_parameters,
         const DDS_Time_t* min_source_timestamp,
         const DDS_Time_t* max_source_timestamp
         const DDS_ResourceLimitsQosPolicy* resource_limits,
         const DDS_Duration_t* max_wait)
```

3.5.3 Class DDS_DataSample

A DDS_DataSample represents an atom of data information (*i.e.* one value for an instance) as returned by the DDS_DataReader's DDS_DataReader_read/SPACE_FooDataReader_take operations. It consists

of two parts: A `DDS_SampleInfo` and the `Data` itself. The `Data` part is the data as produced by a `DDS_Publisher`. The `DDS_SampleInfo` part contains additional information related to the data provided by the Data Distribution Service.

3.5.4 Struct DDS_SampleInfo

The struct `DDS_SampleInfo` represents the additional information that accompanies the data in each sample that is read or taken.

The interface description of this struct is as follows:

```
struct DDS_SampleInfo
{
   DDS_SampleStateKind sample_state;
   DDS_ViewStateKind view_state;
   DDS_InstanceStateKind instance_state;
   DDS_Time_t source_timestamp;
   DDS_InstanceHandle_t instance_handle;
   DDS_InstanceHandle_t publication_handle;
   DDS_long disposed_generation_count;
   DDS_long no_writers_generation_count;
   DDS_long sample_rank;
   DDS_long generation_rank;
   DDS_long absolute_generation_rank;
   DDS_boolean valid_data;
   DDS_Time_t reception_timestamp;
};
/*
 * implemented API operations
 *       <no operations>
 */
```

The next paragraph describes the usage of the `DDS_SampleInfo` struct.

3.5.4.1 DDS_SampleInfo

Synopsis

```
#include <dds_dcps.h>
struct DDS_SampleInfo
   {
     DDS_SampleStateKind sample_state;
     DDS_ViewStateKind view_state;
     DDS_InstanceStateKind instance_state;
     DDS_Time_t source_timestamp;
     DDS_InstanceHandle_t instance_handle;
     DDS_InstanceHandle_t publication_handle;
     DDS_long disposed_generation_count;
     DDS_long no_writers_generation_count;
     DDS_long sample_rank;
     DDS_long generation_rank;
     DDS_long absolute_generation_rank;
```

```
    DDS_boolean valid_data;
    DDS_Time_t reception_timestamp;
  };
```

Description

The struct `DDS_SampleInfo` represents the additional information that accompanies the data in each sample that is read or taken.

Attributes

`DDS_SampleStateKind sample_state` - whether or not the corresponding data sample has already been read.

`DDS_ViewStateKind view_state` - whether the `DDS_DataReader` has already seen samples of the most-current generation of the related instance.

`DDS_InstanceStateKind instance_state` - whether the instance is alive, has no writers or is disposed of.

`DDS_Time_t source_timestamp` - the time provided by the `DDS_DataWriter` when the sample was written.

`DDS_InstanceHandle_t instance_handle` - the handle that identifies locally the corresponding instance.

`DDS_InstanceHandle_t publication_handle` - the handle that identifies locally the `DDS_DataWriter` that modified the instance. In fact it is an `instance_handle` of the built-in `DCPSPublication` sample that describes this `DDS_DataWriter`. It can be used as a parameter to the `DDS_DataReader_get_matched_publication_data` operation to obtain this built-in `DCPSPublication` sample.

`DDS_long disposed_generation_count` - the number of times the instance has become alive after it was disposed of explicitly by a `DDS_DataWriter`.

`DDS_long no_writers_generation_count` - the number of times the instance has become alive after it was disposed of because there were no `DDS_DataWriter` objects.

`DDS_long sample_rank` - the number of samples related to the same instance that are found in the collection returned by a `DDS_DataReader_read` or `DDS_DataReader_take` operation.

`DDS_long generation_rank` - the generation difference between the time the sample was received and the time the most recent sample in the collection was received.

`DDS_long absolute_generation_rank` - the generation difference between the time the sample was received and the time the most recent sample was received.

DDS_boolean valid_data - whether the DataSample contains any meanigful data. If not, the sample is only used to communicate a change in the instance_state of the instance.

DDS_Time_t reception_timestamp - the time provided by the DataReader when the sample was received.

Detailed Description

The struct DDS_SampleInfo represents the additional information that accompanies the data in each sample that is read or taken.

Sample Information

The struct DDS_SampleInfo represents the additional information that accompanies the data in each sample that is read or taken.

Generations

A generation is defined as: 'the number of times an instance has become alive (with instance_state==DDS_ALIVE_INSTANCE_STATE) at the time the sample was received'. Note that the generation counters are initialized to zero when a Reader first detects a never-seen-before instance.

Two types of generations are distinguished: disposed_generation_count and no_writers_generation_count.

After a DDS_DataWriter disposes an instance, the disposed_generation_count for all Readers that already knew that instance will be incremented the next time the instance is written again.

If the DDS_DataReader detects that there are no live DDS_DataWriter entities, the instance_state of the sample_info will change from DDS_ALIVE_INSTANCE_STATE to DDS_NOT_ALIVE_NO_WRITERS_INSTANCE_STATE. The next time the instance is written, no_writers_generation_count will be incremented.

Sample Information

DDS_SampleInfo is the additional information that accompanies the data in each sample that is read or taken. It contains the following information:

- sample_state (DDS_READ_SAMPLE_STATE or DDS_NOT_READ_SAMPLE_STATE) indicates whether or not the corresponding data sample has already been read
- view_state, (DDS_NEW_VIEW_STATE, or DDS_NOT_NEW_VIEW_STATE) indicates whether the DDS_DataReader has already seen samples of the most-current generation of the related instance

- `instance_state` (`DDS_ALIVE_INSTANCE_STATE`, `DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE`, or `DDS_NOT_ALIVE_NO_WRITERS_INSTANCE_STATE`) indicates whether the instance is alive, has no writers or if it has been disposed of:
  - `DDS_ALIVE_INSTANCE_STATE` if this instance is currently in existence
  - `DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE` if this instance was disposed of by a `DDS_DataWriter`
  - `DDS_NOT_ALIVE_NO_WRITERS_INSTANCE_STATE` none of the `DDS_DataWriter` objects currently "alive" (according to the `DDS_LivelinessQosPolicy`) are writing the instance.
- `source_timestamp` indicates the time provided by the `DDS_DataWriter` when the sample was written
- `instance_handle` indicates locally the corresponding instance
- `publication_handle` is used by the DDS implementation to locally identify the corresponding source DataWriter. You can access more detailed information about this particular publication by passing its `publication_handle` to either the `DDS_DataReader_get_matched_publication_data` operation or to the `DDS_PublicationBuiltinTopicDataDataReader_read_instance` operation on the built-in reader for the "DCPSPublication" topic.

  Be aware that since `DDS_InstanceHandle_t` is an opaque datatype, it does not necessarily mean that the handle obtained from the `publication_handle` has the same value as the one that appears in the `instance_handle` field of the `DDS_SampleInfo` when retrieving the publication info through corresponding "DCPSPublication" built-in reader. You can't just compare two handles to determine whether they represent the same publication. If you want to know whether two handles actually do represent the same publication, use both handles to retrieve their corresponding `DDS_PublicationBuiltinTopicData` samples and then compare the `key` field of both samples.
- `disposed_generation_count` indicates the number of times the instance has become alive after it was disposed of explicitly by a `DDS_DataWriter`, at the time the sample was received
- `no_writers_generation_count` indicates the number of times the instance has become alive after its `instance_state` has been `DDS_NOT_ALIVE_NO_WRITERS_INSTANCE_STATE`, at the time the sample was received
- `sample_rank` indicates the number of samples related to the same instance that follow in the collection returned by a `DDS_DataReader_read` or `DDS_DataReader_take` operation

- `generation_rank` indicates the generation difference (number of times the instance was disposed of and become alive again) between the time the sample was received and the time the most recent sample in the collection (related to the same instance) was received
- `absolute_generation_rank` indicates the generation difference (number of times the instance was disposed of and become alive again) between the time the sample was received and the time the most recent sample (which may not be in the returned collection), related to the same instance, was received.
- `valid_data` indicates whether the corresponding data value contains any meaningful data. If not, the data value is just a 'dummy' sample for which only the keyfields have been assigned. It is used to accompany the `DDS_SampleInfo` that communicates a change in the `instance_state` of an instance for which there is no 'real' sample available.
- `reception_timestamp` indicates the time provided by the `DDS_DataReader` when the sample was inserted.

NOTE: This is an OpenSplice-specific extension to the `DDS_SampleInfo` struct and is *not* part of the DDS Specification.

3.5.5 DDS_SubscriberListener Interface

Since a `DDS_Subscriber` is a kind of `DDS_Entity`, it has the ability to have a `Listener` associated with it. In this case, the associated `Listener` should be of type `DDS_SubscriberListener`. This interface must be implemented by the application. A user-defined class must be provided by the application which must extend from the `DDS_SubscriberListener` class. **All** `DDS_SubscriberListener` operations **must** be implemented in the user-defined class, it is up to the application whether an operation is empty or contains some functionality.

All operations for this interface must be implemented in the user-defined class, it is up to the application whether an operation is empty or contains some functionality.

The `DDS_SubscriberListener` provides a generic mechanism (actually a callback function) for the Data Distribution Service to notify the application of relevant asynchronous status change events, such as a missed deadline, violation of a `QosPolicy` setting, etc. The `DDS_SubscriberListener` is related to changes in communication status.

The interface description of this class is as follows:

```
/*
 * interface DDS_SubscriberListener
 */
/*
 * inherited from class DDS_DataReaderListener
```

```
 */
/* void
 *    DDS_SubscriberListener_on_requested_deadline_missed
 *       (void *listener_data,
 *         DDS_DataReader reader,
 *       const DDS_RequestedDeadlineMissedStatus *status);
 */
/* void
 *    DDS_SubscriberListener_on_requested_incompatible_qos
 *       (void *listener_data,
 *         DDS_DataReader reader,
 *       const DDS_RequestedIncompatibleQosStatus *status);
 */

/* void
 *    DDS_SubscriberListener_on_sample_rejected
 *       (void *listener_data,
 *         DDS_DataReader reader,
 *       const DDS_SampleRejectedStatus *status);
 */

/* void
 *    DDS_SubscriberListener_on_liveliness_changed
 *       (void *listener_data,
 *         DDS_DataReader reader,
 *       const DDS_LivelinessChangedStatus *status);
 */

/* void
 *    DDS_SubscriberListener_on_data_available
 *       (void *listener_data,
 *         DDS_DataReader reader);
 */

/* void
 *    DDS_SubscriberListener_on_subscription_matched
 *       (void *listener_data,
 *         DDS_DataReader reader,
 *       const DDS_SubscriptionMatchedStatus *status);
 */

/* void
 *    DDS_SubscriberListener_on_sample_lost
 *       (void *listener_data,
 *         DDS_DataReader reader,
 *       const DDS_SampleLostStatus *status);
 */
/*
 * abstract external operations
 */
```

```
      void
         DDS_SubscriberListener_on_data_on_readers
            (void *listener_data,
              DDS_Subscriber subs);
/*
 * implemented API operations
 */
      struct DDS_SubscriberListener *
         DDS_SubscriberListener__alloc
            (void);
```

The next paragraphs list all `DDS_SubscriberListener` operations. The inherited operations are listed but not fully described because they are not implemented in this class. The full description of these operations is given in the classes from which they are inherited. The abstract operation is fully described since it must be implemented by the application.

3.5.5.1 DDS_SubscriberListener__alloc

Synopsis

```
#include <dds_dcps.h>
struct DDS_SubscriberListener *
   DDS_SubscriberListener__alloc
      (void);
```

Description

This operation creates a new `DDS_SubscriberListener`.

Parameters

<none>

Return Value

`struct DDS_SubscriberListener *` - Return value is the handle to the newly-created `DDS_SubscriberListener`. In case of an error, a `DDS_OBJECT_NIL` pointer is returned.

Detailed Description

This operation creates a new `DDS_SubscriberListener`. The `DDS_SubscriberListener` must be created using this operation. In other words, the application is not allowed to declare an object of type `DDS_SubscriberListener`. When the application wants to release the `DDS_SubscriberListener` it must be released using `DDS_free`.

In case there are insufficient resources available to allocate the `DDS_SubscriberListener`, a `DDS_OBJECT_NIL` pointer is returned instead.

3.5.5.2 DDS_SubscriberListener_on_data_available (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_SubscriberListener_on_data_available
      (void *listener_data,
        DDS_DataReader reader);
```

3.5.5.3 DDS_SubscriberListener_on_data_on_readers (abstract)

Synopsis

```
#include <dds_dcps.h>
void
   DDS_SubscriberListener_on_data_on_readers
      (void *listener_data,
        DDS_Subscriber subs);
```

Description

This operation must be implemented by the application and is called by the Data Distribution Service when new data is available.

Parameters

`inout void *listener_data` - a pointer to a user-defined object which may be used for identification of the `Listener`.

`in DDS_Subscriber subs` - contain a pointer to the `DDS_Subscriber` for which data is available (this is an input to the application provided by the Data Distribution Service).

Return Value

<none>

Detailed Description

This operation is the external operation (interface, which must be implemented by the application) that is called by the Data Distribution Service when new data is available for this `DDS_Subscriber`. The implementation may be left empty when this functionality is not needed. This operation will only be called when the relevant `DDS_SubscriberListener` is installed and enabled for the `DDS_DATA_ON_READERS_STATUS`.

The Data Distribution Service will provide a pointer to the DDS_Subscriber in the parameter subs for use by the application.

The statuses DDS_DATA_ON_READERS_STATUS and DDS_DATA_AVAILABLE_STATUS will occur together. In case these status changes occur, the Data Distribution Service will look for an attached and activated DDS_SubscriberListener or DDS_DomainParticipantListener (in that order) for the DDS_DATA_ON_READERS_STATUS. In case the DDS_DATA_ON_READERS_STATUS can not be handled, the Data Distribution Service will look for an attached and activated DDS_DataReaderListener, DDS_SubscriberListener or DDS_DomainParticipantListener for the DDS_DATA_AVAILABLE_STATUS (in that order).

Note that if DDS_SubscriberListener_on_data_on_readers is called, then the Data Distribution Service will not try to call DDS_SubscriberListener_on_data_available, however, the application can force a call to the callback function on_data_available of DDS_DataReaderListener objects that have data by means of the notify_datareaders operation.

3.5.5.4 DDS_SubscriberListener_on_liveliness_changed (inherited, abstract)

This operation is inherited and therefore not described here. See the class DDS_DataReaderListener for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_SubscriberListener_on_liveliness_changed
      (void *listener_data,
        DDS_DataReader reader,
        const DDS_LivelinessChangedStatus *status);
```

3.5.5.5 DDS_SubscriberListener_on_requested_deadline_missed (inherited, abstract)

This operation is inherited and therefore not described here. See the class DDS_DataReaderListener for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_SubscriberListener_on_requested_deadline_missed
      (void *listener_data,
        DDS_DataReader reader,
        const DDS_RequestedDeadlineMissedStatus *status);
```

3.5.5.6 DDS_SubscriberListener_on_requested_incompatible_qos (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_SubscriberListener_on_requested_incompatible_qos
      (void *listener_data,
        DDS_DataReader reader,
        const DDS_RequestedIncompatibleQosStatus *status) =0;
```

3.5.5.7 DDS_SubscriberListener_on_sample_lost (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_SubscriberListener_on_sample_lost
      (void *listener_data,
        DDS_DataReader reader,
        const DDS_SampleLostStatus *status);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.5.5.8 DDS_SubscriberListener_on_sample_rejected (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_SubscriberListener_on_sample_rejected
      (void *listener_data,
        DDS_DataReader reader,
        const DDS_SampleRejectedStatus *status);
```

3.5.5.9 DDS_SubscriberListener_on_subscription_matched (inherited, abstract)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderListener` for further explanation.

Synopsis

```
#include <dds_dcps.h>
void
   DDS_SubscriberListener_on_subscription_matched
      (void *listener_data,
        DDS_DataReader reader,
        const DDS_SubscriptionMatchedStatus *status);
```

3.5.6 DDS_DataReaderListener interface

Since a `DDS_DataReader` is a kind of `DDS_Entity`, it has the ability to have a `Listener` associated with it. In this case, the associated `Listener` should be of type `DDS_DataReaderListener`. This interface must be implemented by the application. A user-defined class must be provided by the application which must extend from the `DDS_DataReaderListener` class. **All** `DDS_DataReaderListener` operations **must** be implemented in the user-defined class, it is up to the application whether an operation is empty or contains some functionality.

All operations for this interface must be implemented in the user-defined class, it is up to the application whether an operation is empty or contains some functionality.

The `DDS_DataReaderListener` provides a generic mechanism (actually a callback function) for the Data Distribution Service to notify the application of relevant asynchronous status change events, such as a missed deadline, violation of a `QosPolicy` setting, etc. The `DDS_DataReaderListener` is related to changes in communication status.

The interface description of this class is as follows:

```
/*
 * interface DDS_DataReaderListener
 */
/*
 * abstract external operations
 */
   void
      DDS_DataReaderListener_on_requested_deadline_missed
         (void *listener_data,
           DDS_DataReader reader,
           const DDS_RequestedDeadlineMissedStatus *status);
   void
      DDS_DataReaderListener_on_requested_incompatible_qos
         (void *listener_data,
           DDS_DataReader reader,
           const DDS_RequestedIncompatibleQosStatus *status);

   void
```

```
            DDS_DataReaderListener_on_sample_rejected
               (void *listener_data,
                 DDS_DataReader reader,
                 const DDS_SampleRejectedStatus *status);

         void
            DDS_DataReaderListener_on_liveliness_changed
               (void *listener_data,
                 DDS_DataReader reader,
                 const DDS_LivelinessChangedStatus *status);

         void
            DDS_DataReaderListener_on_data_available
               (void *listener_data,
                 DDS_DataReader reader);

         void
            DDS_DataReaderListener_on_subscription_matched
               (void *listener_data,
                 DDS_DataReader reader,
                 const DDS_SubscriptionMatchedStatus *status);

         void
            DDS_DataReaderListener_on_sample_lost
               (void *listener_data,
                 DDS_DataReader reader,
                 const DDS_SampleLostStatus *status);
      /*
       * implemented API operations
       */
         struct DDS_DataReaderListener *
            DDS_DataReaderListener__alloc
               (void);
```

The next paragraphs describe the usage of all `DDS_DataReaderListener` operations. These abstract operations are fully described because they must be implemented by the application.

3.5.6.1 DDS_DataReaderListener__alloc

Synopsis

```
#include <dds_dcps.h>
struct DDS_DataReaderListener *
   DDS_DataReaderListener__alloc
      (void);
```

Description

This operation creates a new `DDS_DataReaderListener`.

Parameters

<none>

Return Value

*struct DDS_DataReaderListener **- Return value is the handle to the newly-created DDS_DataReaderListener. In case of an error, a DDS_OBJECT_NIL pointer is returned.

Detailed Description

This operation creates a new DDS_DataReaderListener. The DDS_DataReaderListener must be created using this operation. In other words, the application is not allowed to declare an object of type DDS_DataReaderListener. When the application wants to release the DDS_DataReaderListener it must be released using DDS_free.

In case there are insufficient resources available to allocate the DDS_DataReaderListener, a DDS_OBJECT_NIL pointer is returned instead.

3.5.6.2 DDS_DataReaderListener_on_data_available (abstract)

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DataReaderListener_on_data_available
      (void *listener_data,
        DDS_DataReader reader);
```

Description

This operation must be implemented by the application and is called by the Data Distribution Service when new data is available.

Parameters

*inout void *listener_data* - a pointer to a user-defined object which may be used for identification of the Listener.

in DDS_DataReader reader - contain a pointer to the DDS_DataReader for which data is available (this is an input to the application provided by the Data Distribution Service).

Return Value

<none>

Detailed Description

This operation is the external operation (interface, which must be implemented by the application) that is called by the Data Distribution Service when new data is available for this DDS_DataReader. The implementation may be left empty when this functionality is not needed. This operation will only be called when the relevant DDS_DataReaderListener is installed and enabled for the DDS_DATA_AVAILABLE_STATUS.

The Data Distribution Service will provide a pointer to the DDS_DataReader in the parameter reader for use by the application.

The statuses DDS_DATA_ON_READERS_STATUS and DDS_DATA_AVAILABLE_STATUS will occur together. In case these status changes occur, the Data Distribution Service will look for an attached and activated DDS_SubscriberListener or DDS_DomainParticipantListener (in that order) for the DDS_DATA_ON_READERS_STATUS. In case the DDS_DATA_ON_READERS_STATUS can not be handled, the Data Distribution Service will look for an attached and activated DDS_DataReaderListener, DDS_SubscriberListener or DDS_DomainParticipantListener for the DDS_DATA_AVAILABLE_STATUS (in that order).

Note that if DDS_SubscriberListener_on_data_on_readers is called, then the Data Distribution Service will not try to call DDS_DataReaderListener_on_data_available, however, the application can force a call to the DDS_DataReader objects that have data by means of the DDS_Subscriber_notify_datareaders operation.

3.5.6.3 DDS_DataReaderListener_on_liveliness_changed (abstract)

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DataReaderListener_on_liveliness_changed
      (void *listener_data,
        DDS_DataReader reader,
        const DDS_LivelinessChangedStatus *status);
```

Description

This operation must be implemented by the application and is called by the Data Distribution Service when the liveliness of one or more DDS_DataWriter objects that were writing instances read through this DDS_DataReader has changed.

Parameters

*inout void *listener_data* - a pointer to a user-defined object which may be used for identification of the Listener.

in DDS_DataReader reader - contain a pointer to the `DDS_DataReader` for which the liveliness of one or more `DDS_DataWriter` objects has changed (this is an input to the application provided by the Data Distribution Service).

*in const DDS_LivelinessChangedStatus *status* - contain the `DDS_LivelinessChangedStatus` struct (this is an input to the application provided by the Data Distribution Service).

Return Value

<none>

Detailed Description

This operation is the external operation (interface, which must be implemented by the application) that is called by the Data Distribution Service when the liveliness of one or more `DDS_DataWriter` objects that were writing instances read through this `DDS_DataReader` has changed. In other words, some `DDS_DataWriter` have become "alive" or "not alive". The implementation may be left empty when this functionality is not needed. This operation will only be called when the relevant `DDS_DataReaderListener` is installed and enabled for the `DDS_LIVELINESS_CHANGED_STATUS`.

The Data Distribution Service will provide a pointer to the `DDS_DataReader` in the parameter `reader` and the `DDS_LivelinessChangedStatus` struct for use by the application.

3.5.6.4 DDS_DataReaderListener_on_requested_deadline_missed (abstract)

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DataReaderListener_on_requested_deadline_missed
      (void *listener_data,
        DDS_DataReader reader,
        const DDS_RequestedDeadlineMissedStatus *status);
```

Description

This operation must be implemented by the application and is called by the Data Distribution Service when the deadline that the `DDS_DataReader` was expecting through its `DDS_DeadlineQosPolicy` was not respected.

Parameters

*inout void *listener_data* - a pointer to a user-defined object which may be used for identification of the `Listener`.

in DDS_DataReader reader - contain a pointer to the `DDS_DataReader` for which the deadline was missed (this is an input to the application provided by the Data Distribution Service).

*in const DDS_RequestedDeadlineMissedStatus *status* - contain the `DDS_RequestedDeadlineMissedStatus` struct (this is an input to the application provided by the Data Distribution Service).

Return Value

<none>

Detailed Description

This operation is the external operation (interface, which must be implemented by the application) that is called by the Data Distribution Service when the deadline that the `DDS_DataReader` was expecting through its `DDS_DeadlineQosPolicy` was not respected for a specific instance. The implementation may be left empty when this functionality is not needed. This operation will only be called when the relevant `DDS_DataReaderListener` is installed and enabled for the `DDS_REQUESTED_DEADLINE_MISSED_STATUS`.

The Data Distribution Service will provide a pointer to the `DDS_DataReader` in the parameter `reader` and the `DDS_RequestedDeadlineMissedStatus` struct in the parameter `status` for use by the application.

3.5.6.5 DDS_DataReaderListener_on_requested_incompatible_qos (abstract)

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DataReaderListener_on_requested_incompatible_qos
      (void *listener_data,
        DDS_DataReader reader,
        const DDS_RequestedIncompatibleQosStatus *status);
```

Description

This operation must be implemented by the application and is called by the Data Distribution Service when the `DDS_REQUESTED_INCOMPATIBLE_QOS_STATUS` changes.

Parameters

*inout void *listener_data* - a pointer to a user-defined object which may be used for identification of the `Listener`.

in DDS_DataReader reader - a pointer to the `DDS_DataReader` provided by the Data Distribution Service.

*in const DDS_RequestedIncompatibleQosStatus *status* - the DDS_REQUESTED_INCOMPATIBLE_QOS_STATUS struct provided by the Data Distribution Service.

Return Value

<none>

Detailed Description

This operation is the external operation (interface, which must be implemented by the application) that is called by the Data Distribution Service when the DDS_REQUESTED_INCOMPATIBLE_QOS_STATUS changes. The implementation may be left empty when this functionality is not needed. This operation will only be called when the relevant DDS_DataReaderListener is installed and enabled for the DDS_REQUESTED_INCOMPATIBLE_QOS_STATUS.

The Data Distribution Service will provide a pointer to the DDS_DataReader in the parameter reader and the DDS_REQUESTED_INCOMPATIBLE_QOS_STATUS struct in the parameter status, for use by the application.

The application can use this operation as a callback function implementing a proper response to the status change. This operation is enabled by setting the DDS_REQUESTED_INCOMPATIBLE_QOS_STATUS in the mask in the call to DDS_DataReader_set_listener. When the DDS_DataReaderListener on the DDS_DataReader is not enabled for the DDS_REQUESTED_INCOMPATIBLE_QOS_STATUS, the status change will propagate to the DDS_SubscriberListener of the DDS_Subscriber (if enabled) or to the DDS_DomainParticipantListener of the DDS_DomainParticipant (if enabled).

3.5.6.6 DDS_DataReaderListener_on_sample_lost (abstract)

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DataReaderListener_on_sample_lost
      (void *listener_data,
        DDS_DataReader reader,
        const DDS_SampleLostStatus *status);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.5.6.7 DDS_DataReaderListener_on_sample_rejected (abstract)

Synopsis

```
#include <dds_dcps.h>
void
```

```
DDS_DataReaderListener_on_sample_rejected
   (void *listener_data,
     DDS_DataReader reader,
     const DDS_SampleRejectedStatus *status);
```

Description

This operation must be implemented by the application and is called by the Data Distribution Service when a sample has been rejected.

Parameters

*inout void *listener_data* - a pointer to a user-defined object which may be used for identification of the `Listener`.

in DDS_DataReader reader - contain a pointer to the `DDS_DataReader` for which a sample has been rejected (this is an input to the application provided by the Data Distribution Service).

*in const DDS_SampleRejectedStatus *status* - contain the `DDS_SampleRejectedStatus` struct (this is an input to the application provided by the Data Distribution Service).

Return Value

<none>

Detailed Description

This operation is the external operation (interface, which must be implemented by the application) that is called by the Data Distribution Service when a (received) sample has been rejected. Samples may be rejected by the `DDS_DataReader` when it runs out of `resource_limits` to store incoming samples. Ususally this means that old samples need to be 'consumed' (for example by 'taking' them instead of 'reading' them) to make room for newly incoming samples.

The implementation may be left empty when this functionality is not needed. This operation will only be called when the relevant `DDS_DataReaderListener` is installed and enabled for the `DDS_SAMPLE_REJECTED_STATUS`.

The Data Distribution Service will provide a pointer to the `DDS_DataReader` in the parameter `reader` and the `DDS_SampleRejectedStatus` struct in the parameter `status` for use by the application.

3.5.6.8 DDS_DataReaderListener_on_subscription_matched (abstract)

Synopsis

```
#include <dds_dcps.h>
void
   DDS_DataReaderListener_on_subscription_matched
```

```
(void *listener_data,
  DDS_DataReader reader,
  const DDS_SubscriptionMatchedStatus *status);
```

Description

This operation must be implemented by the application and is called by the Data Distribution Service when a new match has been discovered for the current subscription, or when an existing match has ceased to exist.

Parameters

*inout void *listener_data* - a pointer to a user-defined object which may be used for identification of the `Listener`.

in DDS_DataReader reader - contains a pointer to the `DDS_DataReader` for which a match has been discovered (this is an input to the application provided by the Data Distribution Service).

*in const SubscriptionMatchedStatus *status* - contains the *SubscriptionMatchedStatus* struct (this is an input to the application provided by the Data Distribution Service).

Return Value

<none>

Detailed Description

This operation must be implemented by the application and is called by the Data Distribution Service when a new match has been discovered for the current subscription, or when an existing match has ceased to exist. Usually this means that a new DataWriter that matches the Topic and that has compatible Qos as the current `DDS_DataReader` has either been discovered, or that a previously discovered DataWriter has ceased to be matched to the current `DDS_DataReader`. A DataWriter may cease to match when it gets deleted, when it changes its Qos to a value that is incompatible with the current `DDS_DataReader` or when either the `DDS_DataReader` or the DataWriter has chosen to put its matching counterpart on its ignore-list using the `DDS_DomainParticipant_ignore_publication` or `DDS_DomainParticipant_ignore_subcription` operations.

The implementation of this Listener operation may be left empty when this functionality is not needed: it will only be called when the relevant `DDS_DataReaderListener` is installed and enabled for the `DDS_SUBSCRIPTION_MATCHED_STATUS`.

The Data Distribution Service will provide a pointer to the `DDS_DataReader` in the parameter `reader` and the `DDS_SubscriptionMatchedStatus` struct in the parameter `status` for use by the application.

3.5.7 Class DDS_ReadCondition

The DDS_DataReader objects can create a set of DDS_ReadCondition (and DDS_StatusCondition) objects which provide support (in conjunction with DDS_WaitSet objects) for an alternative communication style between the Data Distribution Service and the application (*i.e.*, wait-based rather than notification-based).

DDS_ReadCondition objects allow an DDS_DataReader to specify the data samples it is interested in (by specifying the desired sample-states, view-states, and instance-states); see the parameter definitions for DDS_DataReader's DDS_DataReader_create_readcondition operation. This allows the Data Distribution Service to trigger the condition only when suitable information is available. DDS_ReadCondition objects are to be used in conjunction with a DDS_WaitSet. More than one DDS_ReadCondition may be attached to the same DDS_DataReader.

The interface description of this class is as follows:

```
/*
 * interface DDS_ReadCondition
 */
/*
 * inherited from DDS_Condition
 */
/*  DDS_boolean
 *     DDS_ReadCondition_get_trigger_value
 *        (DDS_ReadCondition _this);
 */
/*
 * implemented API operations
 */
   DDS_SampleStateMask
      DDS_ReadCondition_get_sample_state_mask
         (DDS_ReadCondition _this);

   DDS_ViewStateMask
      DDS_ReadCondition_get_view_state_mask
         (DDS_ReadCondition _this);

   DDS_InstanceStateMask
      DDS_ReadCondition_get_instance_state_mask
         (DDS_ReadCondition _this);

   DDS_DataReader
      DDS_ReadCondition_get_datareader
         (DDS_ReadCondition _this);
```

The next paragraphs describe the usage of all DDS_ReadCondition operations. The inherited operations are listed but not fully described because they are not implemented in this class. The full description of these operations is given in the classes from which they are inherited.

3.5.7.1 DDS_ReadCondition_get_datareader

Synopsis

```
#include <dds_dcps.h>
DDS_DataReader
   DDS_ReadCondition_get_datareader
      (DDS_ReadCondition _this);
```

Description

This operation returns the DDS_DataReader associated with the DDS_ReadCondition.

Parameters

in DDS_ReadCondition _this - the DDS_ReadCondition object on which the operation is operated.

Return Value

DDS_DataReader - Result value is a pointer to the DDS_DataReader.

Detailed Description

This operation returns the DDS_DataReader associated with the DDS_ReadCondition. Note that there is exactly one DDS_DataReader associated with each DDS_ReadCondition (*i.e.* the DDS_DataReader that created the DDS_ReadCondition object).

3.5.7.2 DDS_ReadCondition_get_instance_state_mask

Synopsis

```
#include <dds_dcps.h>
DDS_InstanceStateMask
   DDS_ReadCondition_get_instance_state_mask
      (DDS_ReadCondition _this);
```

Description

This operation returns the set of instance_states that are taken into account to determine the trigger_value of the DDS_ReadCondition.

Parameters

in DDS_ReadCondition _this - the DDS_ReadCondition object on which the operation is operated.

Return Value

DDS_InstanceStateMask - Result value are the instance_states specified when the DDS_ReadCondition was created.

Detailed Description

This operation returns the set of instance_states that are taken into account to determine the trigger_value of the DDS_ReadCondition.

The instance_states returned are the instance_states specified when the DDS_ReadCondition was created. instance_states can be DDS_ALIVE_INSTANCE_STATE, DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE, DDS_NOT_ALIVE_NO_WRITERS_INSTANCE_STATE or a combination of these.

3.5.7.3 DDS_ReadCondition_get_sample_state_mask

Synopsis

```
#include <dds_dcps.h>
DDS_SampleStateMask
   DDS_ReadCondition_get_sample_state_mask
      (DDS_ReadCondition _this);
```

Description

This operation returns the set of sample_states that are taken into account to determine the trigger_value of the DDS_ReadCondition.

Parameters

in DDS_ReadCondition _this - the DDS_ReadCondition object on which the operation is operated.

Return Value

DDS_SampleStateMask - Result value are the sample_states specified when the DDS_ReadCondition was created.

Detailed Description

This operation returns the set of sample_states that are taken into account to determine the trigger_value of the DDS_ReadCondition.

The `sample_states` returned are the `sample_states` specified when the `DDS_ReadCondition` was created. `sample_states` can be `DDS_READ_SAMPLE_STATE`, `DDS_NOT_READ_SAMPLE_STATE` or both.

3.5.7.4 DDS_ReadCondition_get_trigger_value (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Condition` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_boolean
   DDS_ReadCondition_get_trigger_value
      (DDS_ReadCondition _this);
```

3.5.7.5 DDS_ReadCondition_get_view_state_mask

Synopsis

```
#include <dds_dcps.h>
DDS_ViewStateMask
   DDS_ReadCondition_get_view_state_mask
      (DDS_ReadCondition _this);
```

Description

This operation returns the set of `view_states` that are taken into account to determine the `trigger_value` of the `DDS_ReadCondition`.

Parameters

`in DDS_ReadCondition _this` - the `DDS_ReadCondition` object on which the operation is operated.

Return Value

`DDS_ViewStateMask` - Result value are the `view_states` specified when the `DDS_ReadCondition` was created.

Detailed Description

This operation returns the set of `view_states` that are taken into account to determine the `trigger_value` of the `DDS_ReadCondition`.

The `view_states` returned are the `view_states` specified when the `DDS_ReadCondition` was created. `view_states` can be `DDS_NEW_VIEW_STATE`, `DDS_NOT_NEW_VIEW_STATE` or both.

3.5.8 Class DDS_QueryCondition

DDS_QueryCondition objects are specialized DDS_ReadCondition objects that allow the application to specify a filter on the locally available data. The DDS_DataReader objects accept a set of DDS_QueryCondition objects for the DDS_DataReader and provide support (in conjunction with DDS_WaitSet objects) for an alternative communication style between the Data Distribution Service and the application (*i.e.*, wait-based rather than notification-based).

Query Function

DDS_QueryCondition objects allow an application to specify the data samples it is interested in (by specifying the desired sample-states, view-states, instance-states and query expression); see the parameter definitions for DDS_DataReader's DDS_DataReader_read/DDS_DataReader_take operations. This allows the Data Distribution Service to trigger the condition only when suitable information is available. DDS_QueryCondition objects are to be used in conjunction with a DDS_WaitSet. More than one DDS_QueryCondition may be attached to the same DDS_DataReader.

The query (query_expression) is similar to an SQL WHERE clause and can be parameterized by arguments that are dynamically changeable with the DDS_QueryCondition_set_query_arguments operation.

The interface description of this class is as follows:

```
/*
 * interface DDS_QueryCondition
 */
/*
 * inherited from DDS_ReadCondition
 */
/*  DDS_SampleStateMask
 *     DDS_QueryCondition_get_sample_state_mask
 *        (DDS_QueryCondition _this);
  */
/*  DDS_ViewStateMask
 *     DDS_QueryCondition_get_view_state_mask
 *        (DDS_QueryCondition _this);
 */

/*  DDS_InstanceStateMask
 *     DDS_QueryCondition_get_instance_state_mask
 *        (DDS_QueryCondition _this);
 */

/*  DDS_DataReader
 *     DDS_QueryCondition_get_datareader
 *        (DDS_QueryCondition _this);
```

```
 */
/* DDS_boolean
 *     DDS_QueryCondition_get_trigger_value
 *        (DDS_QueryCondition _this);
 */
/*
 * implemented API operations
 */
   DDS_string
      DDS_QueryCondition_get_query_expression
         (DDS_QueryCondition _this);

   DDS_ReturnCode_t
      DDS_QueryCondition_get_query_parameters
         (DDS_QueryCondition _this,
           DDS_StringSeq *query_parameters);

   DDS_ReturnCode_t
      DDS_QueryCondition_set_query_parameters
         (DDS_QueryCondition _this,
           const DDS_StringSeq *query_parameters);
```

The next paragraphs describe the usage of all `DDS_QueryCondition` operations. The inherited operations are listed but not fully described because they are not implemented in this class. The full description of these operations is given in the classes from which they are inherited.

3.5.8.1 DDS_QueryCondition_get_datareader (inherited)

This operation is inherited and therefore not described here. See the class `DDS_ReadCondition` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_DataReader
   DDS_QueryCondition_get_datareader
      (DDS_QueryCondition _this);
```

3.5.8.2 DDS_QueryCondition_get_instance_state_mask (inherited)

This operation is inherited and therefore not described here. See the class `DDS_ReadCondition` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_InstanceStateMask
   DDS_QueryCondition_get_instance_state_mask
      (DDS_QueryCondition _this);
```

3.5.8.3 DDS_QueryCondition_get_query_parameters

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_QueryCondition_get_query_parameters
      (DDS_QueryCondition _this,
        DDS_StringSeq *query_parameters);
```

Description

This operation returns the `query_parameters` associated with the `DDS_QueryCondition`.

Parameters

`in DDS_QueryCondition _this` - the `DDS_QueryCondition` object on which the operation is operated.

`inout DDS_StringSeq *query_parameters` - a handle to a sequence of strings that will be used to store the parameters used in the SQL expression.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_ALREADY_DELETED` or `DDS_RETCODE_OUT_OF_RESOURCES`.

Detailed Description

This operation obtains the `query_parameters` associated with the `DDS_QueryCondition`. That is, the parameters specified on the last successful call to `DDS_QueryCondition_set_query_arguments` or, if `DDS_QueryCondition_set_query_arguments` was never called, the arguments specified when the `DDS_QueryCondition` were created. The resulting handle contains a sequence of strings with the parameters used in the SQL expression (*i.e.*, the %n tokens in the expression). The number of parameters in the result sequence will exactly match the number of %n tokens in the query expression associated with the `DDS_QueryCondition`.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the existing set of query parameters applied to this `DDS_QueryCondition` has successfully been copied into the specified `query_parameters` parameter.

- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_QueryCondition has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.5.8.4 DDS_QueryCondition_get_query_expression

Synopsis

```
#include <dds_dcps.h>
DDS_string
   DDS_QueryCondition_get_query_expression
      (DDS_QueryCondition _this);
```

Description

This operation returns the query expression associated with the DDS_QueryCondition.

Parameters

in DDS_QueryCondition _this - the DDS_QueryCondition object on which the operation is operated.

Return Value

DDS_string - Result value is a pointer to the query expression associated with the DDS_QueryCondition.

Detailed Description

This operation returns the query expression associated with the DDS_QueryCondition. That is, the expression specified when the DDS_QueryCondition was created. The operation will return DDS_OBJECT_NIL when there was an internal error or when the DDS_QueryCondition was already deleted. If there were no parameters, an empty sequence is returned.

It is the applications responsibility to free the allocated memory for the DDS_StringSeq.

3.5.8.5 DDS_QueryCondition_get_sample_state_mask (inherited)

This operation is inherited and therefore not described here. See the class DDS_ReadCondition for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_SampleStateMask
   DDS_QueryCondition_get_sample_state_mask
      (DDS_QueryCondition _this);
```

3.5.8.6 DDS_QueryCondition_get_trigger_value (inherited)

This operation is inherited and therefore not described here. See the class `DDS_ReadCondition` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_boolean
   DDS_QueryCondition_get_trigger_value
      (DDS_QueryCondition _this);
```

3.5.8.7 DDS_QueryCondition_get_view_state_mask (inherited)

This operation is inherited and therefore not described here. See the class `DDS_ReadCondition` for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_ViewStateMask
   DDS_QueryCondition_get_view_state_mask
      (DDS_QueryCondition _this);
```

3.5.8.8 DDS_QueryCondition_set_query_parameters

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_QueryCondition_set_query_parameters
      (DDS_QueryCondition _this,
        const DDS_StringSeq *query_parameters);
```

Description

This operation changes the query parameters associated with the DDS_QueryCondition.

Parameters

in *`DDS_QueryCondition _this`* - the `DDS_QueryCondition` object on which the operation is operated.

*in const DDS_StringSeq *query_parameters* - a sequence of strings which are the parameters used in the SQL query string (*i.e.*, the "%n" tokens in the expression).

Return Value

DDS_ReturnCode_t - Possible return codes of the operation are: DDS_RETCODE_OK, DDS_RETCODE_ERROR, DDS_RETCODE_ILLEGAL_OPERATION, DDS_RETCODE_BAD_PARAMETER, DDS_RETCODE_ALREADY_DELETED or DDS_RETCODE_OUT_OF_RESOURCES.

Detailed Description

This operation changes the query parameters associated with the DDS_QueryCondition. The parameter query_parameters is a sequence of strings which are the parameters values used in the SQL query string (*i.e.*, the "%n" tokens in the expression). The number of values in query_parameters must be equal or greater than the highest referenced %n token in the query_expression (*e.g.* if %1 and %8 are used as parameter in the query_expression, the query_parameters should at least contain n+1 = 9 values).

Return Code

When the operation returns:

- *DDS_RETCODE_OK* - the query parameters associated with the DDS_QueryCondition are changed.
- *DDS_RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_BAD_PARAMETER* - the number of parameters in query_parameters does not match the number of "%n" tokens in the expression for this DDS_QueryCondition or one of the parameters is an illegal parameter.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_QueryCondition has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.5.9 Class DDS_DataReaderView (abstract)

A DataReaderView allows the application to create an additional view on the dataset stored in a DataReader. The view is expressed by an (optional) alternative key list specified in the DDS_DataReaderViewQos, which allows it to specify an alternative storage spectrum. Applications might prefer such an alternative storage

spectrum (for example by adding or removing key-fields) because it may help them to process the samples in a different order/cohesion than what they will have when they use the original key-list.

A DataReaderView has the following properties:

- Any `DDS_DataReaderView` belongs to exactly one `DDS_DataReader`.
- A `DDS_DataReader` can have zero to many `DDS_DataReaderViews` attached (all with their own key_list definitions).
- The `DDS_DataReaderView` has the same interface as the `DDS_DataReader` with its read and take variants, including w_condition and next_instance, next_sample, etc. It also supports `DDS_ReadConditions` and `DDS_QueryConditions` like a `DDS_DataReader` does.
- Any sample that is inserted into the DataReader will introduce a corresponding DataViewSample in all its attached DataReaderViews in a ViewInstance as defined by the keys specified in the DataReaderView Qos `key_list` when the view was created.
- Like samples in a DataReader, DataViewSamples in a DataReaderView belong to exactly one ViewInstance. Instances in the dataReaderView do not have any instance state information though. The instance state information found in the SampleInfo for each DataReaderView sample is copied from the corresponding DataReader sample.
- Whenever a sample is taken from the DataReader, its corresponding samples in all attached DataReaderViews will be removed as well. The same goes for samples that are pushed out of the DataReader instance history (in case of a `KEEP_LAST` HistoryQosPolicy) or for samples whose lifespan expired.
- A ViewInstance always has an infinite history depth; samples can not be pushed out of the view.
- Whenever a sample is taken from a DataReaderView, it is removed from that DataReaderView but not from the DataReader, nor from any of its other views. If all samples in a ViewInstance are taken, then that ViewInstance is destroyed.

`DDS_DataReaderView` is an abstract class. It is specialized for each particular application data type. For a fictional application data type "`Foo`" (defined in the module `SPACE`) the specialized class would be `SPACE_FooDataReaderView`.

The interface description of this class is as follows:

```
/*
 * interface DDS_DataReaderView
 */
/*
 * inherited from class DDS_Entity
 */
```

```
/* DDS_StatusCondition
 *    DDS_DataReaderView_get_statuscondition
 *      (DDS_DataReaderView _this);
 */
/*
 * DDS_StatusMask
 *    DDS_DataReaderView_get_status_changes
 *       (DDS_DataReaderView _this);
 */
/*
 * DDS_ReturnCode_t
 *    DDS_DataReaderView_enable
 *       (DDS_DataReaderView _this);
 */
/*
 * abstract operations
 * (implemented in the data type specific DDS_DataReaderView)
 */
/*
 * DDS_ReturnCode_t
 *    DDS_DataReaderView_get_key_value
 *       (DDS_DataReaderView _this,
 *         <data> *key_holder,
 *         const DDS_InstanceHandle_t handle);
 */
/*
/* DDS_InstanceHandle_t
 *    DDS_DataReaderView_lookup_instance
 *       (DDS_DataReaderView _this,
 *         const <data> *instance_data);
 */
/*
 * DDS_ReturnCode_t
 *    DDS_DataReaderView_read
 *       (DDS_DataReaderView _this,
 *         DDS_sequence_<data> *data_values,
 *         SampleInfoSeq *info_seq,
 *         const DDS_long max_samples,
 *         const DDS_SampleStateMask sample_states,
 *         const DDS_ViewStateMask view_states,
 *         const DDS_InstanceStateMask instance_states);
 */
/*
 * DDS_ReturnCode_t
 *    DDS_DataReaderView_read_instance
 *       (DDS_DataReaderView _this,
 *         DDS_sequence_<data> *data_values,
 *         SampleInfoSeq *info_seq,
 *         const DDS_long max_samples,
 *         const DDS_InstanceHandle_t a_handle,
```

```
 *         const DDS_SampleStateMask sample_states,
 *         const DDS_ViewStateMask view_states,
 *         const DDS_InstanceStateMask instance_states);
 */
/*
 * DDS_ReturnCode_t
 *    DDS_DataReaderView_read_next_instance
 *       (DDS_DataReaderView _this,
 *         DDS_sequence_<data> *data_values,
 *         SampleInfoSeq *info_seq,
 *         const DDS_long max_samples,
 *         const DDS_InstanceHandle_t a_handle,
 *         const DDS_SampleStateMask sample_states,
 *         const DDS_ViewStateMask view_states,
 *         const DDS_InstanceStateMask instance_states);
 */
/*
 * DDS_ReturnCode_t
 *    DDS_DataReaderView_read_next_instance_w_condition
 *       (DDS_DataReaderView _this,
 *         DDS_sequence_<data> *data_values,
 *         SampleInfoSeq *info_seq,
 *         const DDS_long max_samples,
 *         const DDS_InstanceHandle_t a_handle,
 *         const DDS_ReadCondition a_condition);
 */
/*
 * DDS_ReturnCode_t
 *    DDS_DataReaderView_read_next_sample
 *       (DDS_DataReaderView _this,
 *         <data> *received_data,
 *         DDS_SampleInfo *sample_info);
 */
/*
 * DDS_ReturnCode_t
 *    DDS_DataReaderView_read_w_condition
 *       (DDS_DataReaderView _this,
 *         DDS_sequence_<data> *data_values,
 *         SampleInfoSeq *info_seq,
 *         const DDS_long max_samples,
 *         const DDS_ReadCondition a_condition);
 */
/*
 * DDS_ReturnCode_t
 *    DDS_DataReaderView_return_loan
 *       (DDS_DataReaderView _this,
 *         DDS_sequence_<data> *data_values,
 *         SampleInfoSeq *info_seq);
 */
/*
```

```
 * DDS_ReturnCode_t
 *    DDS_DataReaderView_take
 *       (DDS_DataReaderView _this,
 *         DDS_sequence_<data> *data_values,
 *         SampleInfoSeq *info_seq,
 *         const DDS_long max_samples,
 *         const DDS_SampleStateMask sample_states,
 *         const DDS_ViewStateMask view_states,
 *         const DDS_InstanceStateMask instance_states);
 */
/*
 * DDS_ReturnCode_t
 *    DDS_DataReaderView_take_instance
 *       (DDS_DataReaderView _this,
 *         DDS_sequence_<data> *data_values,
 *         SampleInfoSeq *info_seq,
 *         const DDS_long max_samples,
 *         const DDS_InstanceHandle_t a_handle,
 *         const DDS_SampleStateMask sample_states,
 *         const DDS_ViewStateMask view_states,
 *         const DDS_InstanceStateMask instance_states);
 */
/*
 * DDS_ReturnCode_t
 *    DDS_DataReaderView_take_next_instance
 *       (DDS_DataReaderView _this,
 *         DDS_sequence_<data> *data_values,
 *         SampleInfoSeq *info_seq,
 *         const DDS_long max_samples,
 *         const DDS_InstanceHandle_t a_handle,
 *         const DDS_SampleStateMask sample_states,
 *         const DDS_ViewStateMask view_states,
 *         const DDS_InstanceStateMask instance_states);
 */
/*
 * DDS_ReturnCode_t
 *    DDS_DataReaderView_take_next_instance_w_condition
 *       (DDS_DataReaderView _this,
 *         DDS_sequence_<data> *data_values,
 *         SampleInfoSeq *info_seq,
 *         const DDS_long max_samples,
 *         const DDS_InstanceHandle_t a_handle,
 *         const DDS_ReadCondition a_condition);
 */
/*
 * DDS_ReturnCode_t
 *    DDS_DataReaderView_take_next_sample
 *       (DDS_DataReaderView _this,
 *         <data> *received_data,
 *         DDS_SampleInfo *sample_info);
```

```
 */
/*
 * DDS_ReturnCode_t
 *    DDS_DataReaderView_take_w_condition
 *       (DDS_DataReaderView _this,
 *         DDS_sequence_<data> *data_values,
 *         SampleInfoSeq *info_seq,
 *         const DDS_long max_samples,
 *         const DDS_ReadCondition a_condition);
 */
/*
 * implemented API operations
 */

  DDS_QueryCondition
     DDS_DataReaderView_create_querycondition
        (DDS_DataReaderView _this,
          const DDS_SampleStateMask sample_states,
          const DDS_ViewStateMask view_states,
          const DDS_InstanceStateMask instance_states,
          const DDS_char *query_expression,
          const DDS_StringSeq *query_parameters);

  DDS_ReadCondition
     DDS_DataReaderView_create_readcondition
        (DDS_DataReaderView _this,
          const DDS_SampleStateMask sample_states,
          const DDS_ViewStateMask view_states,
          const DDS_InstanceStateMask instance_states);

  DDS_ReturnCode_t
     DDS_DataReaderView_delete_contained_entities
        (DDS_DataReaderView _this);

  DDS_ReturnCode_t
     DDS_DataReaderView_delete_readcondition
        (DDS_DataReaderView _this,
          const DDS_ReadCondition a_condition);

  DDS_DataReader
     DDS_DataReaderView_get_datareader
        (DDS_DataReaderView _this);

  DDS_ReturnCode_t
     DDS_DataReaderView_get_qos
        (DDS_DataReaderView _this,
          DDS_DataReaderViewQos *qos);

  DDS_ReturnCode_t
     DDS_DataReaderView_set_qos
```

```
(DDS_DataReaderView _this,
  const DDS_DataReaderViewQos *qos);
```

The next paragraphs describe the usage of all DataReaderView operations. The inherited and abstract operations are listed but not fully described because they are not implemented in this class. The full description of these operations is given in the classes from which they are inherited and in the data type specific classes in which they are implemented.

Because the DataReaderView closely follows DataReader semantics, a lot of operations are identical. In those cases where the operation on the DataReaderView is identical to the one on the DataReader, no full description is given but the operation on the DataReader or its respective type specific class is referenced.

3.5.9.1 DDS_DataReaderView_create_querycondition

Synopsis

```
#include <dds_dcps.h>
DDS_QueryCondition
   DDS_DataReaderView_create_querycondition
      (DDS_DataReaderView _this,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states,
        const DDS_char *query_expression,
        const DDS_StringSeq *query_parameters);
```

Description

This operation creates a new QueryCondition for the DataReaderView. For a full description please refer to Section 3.5.2.2, *DDS_DataReader_create_querycondition*, on page 415, which describes this operation in detail for the DataReader class.

3.5.9.2 DDS_DataReaderView_create_readcondition

Synopsis

```
#include <dds_dcps.h>
DDS_ReadCondition
   DDS_DataReaderView_create_readcondition
      (DDS_DataReaderView _this,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states);
```

Description

This operation creates a new ReadCondition for the DataReaderView. For a full description please refer to Section 3.5.2.3, *DDS_DataReader_create_readcondition*, on page 417, which describes this operation in detail for the DataReader class.

3.5.9.3 DDS_DataReaderView_delete_contained_entities

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReaderView_delete_contained_entities
      (DDS_DataReaderView _this);
```

Description

This operation deletes all the entities that were created by means of one of the "`create_`" operations on the DataReaderView. For a full description please refer to Section 3.5.2.5, *DDS_DataReader_delete_contained_entities*, on page 419, which describes this operation in detail for the DataReader class.

3.5.9.4 DDS_DataReaderView_delete_readcondition

Synopsis

```
#include <dds_dcps.h>

DDS_ReturnCode_t
   DDS_DataReaderView_delete_readcondition
      (DDS_DataReaderView _this,
        DDS_ReadCondition a_condition);
```

Description

This operation deletes a ReadCondition or QueryCondition which is attached to the DataReaderView. For a full description please refer to Section 3.5.2.5, *DDS_DataReader_delete_contained_entities*, on page 419, which describes this operation in detail for the DataReader class.

3.5.9.5 DDS_DataReaderView_enable (inherited)

This operation is inherited and therefore not described here. See the class Entity for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReaderView_enable
      (DDS_DataReaderView _this);
```

3.5.9.6 DDS_DataReaderView_get_datareader

Synopsis

```
#include <dds_dcps.h>
DDS_DataReader
   DDS_DataReaderView_get_datareader
      (DDS_DataReaderView _this);
```

Description

Retrieves the DataReader to which this DataReaderView is attached.

Parameters

in DDS_DataReaderView - the `DDS_DataReaderView` object on which the operation is operated.

Return Value

DDS_DataReader - Return value is a pointer to the `DDS_DataReader` to which the `DDS_DataReaderView` belongs.

Detailed Description

This operation returns a pointer to the `DDS_DataReader` from which the `DDS_DataReaderView` was originally created. If the `DDS_DataReaderView` is already deleted, the `DDS_OBJECT_NIL` pointer is returned.

3.5.9.7 DDS_DataReaderView_get_key_value (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReaderView` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReaderView` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReaderView_get_key_value
      (DDS_DataReaderView _this,
        <data> *key_holder,
        const DDS_InstanceHandle_t handle);
```

3.5.9.8 DDS_DataReaderView_get_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReaderView_get_qos
      (DDS_DataReaderView _this,
        DDS_DataReaderViewQos *qos);
```

Description

This operation allows access to the existing set of QoS policies of a `DDS_DataReaderView` on which this operation is used. This `DDS_DataReaderViewQos` is stored at the location pointed to by the `qos` parameter.

Parameters

`in DDS_DataReaderView` - the `DDS_DataReaderView` object on which the operation is operated.

`inout DataReaderViewQos *qos` - a pointer to the destination `DDS_DataReaderViewQos` struct in which the QosPolicy settings will be copied.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_ALREADY_DELETED` or `DDS_RETCODE_OUT_OF_RESOURCES`.

Detailed Description

This operation allows access to the existing set of QoS policies of a `DDS_DataReaderView` on which this operation is used. This `DDS_DataReaderViewQos` is stored at the location pointed to by the `qos` parameter.

Return Code

When the operation returns:

- *`DDS_RETCODE_OK`* - the existing set of QoSPolicy values applied to this `DDS_DataReaderView` has successfully been copied into the specified `DDS_DataReaderViewQos` parameter.
- *`DDS_RETCODE_ERROR`* - an internal error has occurred.

- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *DDS_RETCODE_ALREADY_DELETED* - the DDS_DataReaderView has already been deleted.
- *DDS_RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.

3.5.9.9 DDS_DataReaderView_get_status_changes (inherited)

This operation is inherited and therefore not described here. See the class Entity for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_StatusMask
   DDS_DataReaderView_get_status_changes
      (DDS_DataReaderView _this);
```

3.5.9.10 DDS_DataReaderView_get_statuscondition (inherited)

This operation is inherited and therefore not described here. See the class Entity for further explanation.

Synopsis

```
#include <dds_dcps.h>
DDS_StatusCondition
   DDS_DataReaderView_get_statuscondition
      (DDS_DataReaderView _this);
```

3.5.9.11 DDS_DataReaderView_lookup_instance (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReaderView` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReaderView` class.

Synopsis

```
#include <dds_dcps.h>
DDS_InstanceHandle_t
   DDS_DataReaderView_lookup_instance
      (DDS_DataReaderView _this,
        const <data> *instance_data);
```

3.5.9.12 DDS_DataReaderView_read (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReaderView` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReaderView` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReaderView_read
      (DDS_DataReaderView _this,
        DDS_sequence_<data> *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states);
```

3.5.9.13 DDS_DataReaderView_read_instance (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReaderView` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReaderView` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReaderView_read_instance
      (DDS_DataReaderView _this,
        DDS_sequence_<data> *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_InstanceHandle_t a_handle,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states);
```

3.5.9.14 DDS_DataReaderView_read_next_instance (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReaderView` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective

derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReaderView` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReaderView_read_next_instance
      (DDS_DataReaderView _this,
        DDS_sequence_<data> *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_InstanceHandle_t a_handle,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states);
```

3.5.9.15 DDS_DataReaderView_read_next_instance_w_condition (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReaderView` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReaderView` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReaderView_read_next_instance_w_condition
      (DDS_DataReaderView _this,
        DDS_sequence_<data> *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_InstanceHandle_t a_handle,
        const DDS_ReadCondition a_condition);
```

3.5.9.16 DDS_DataReaderView_read_next_sample (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReaderView` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReaderView` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReaderView_read_next_sample
      (DDS_DataReaderView _this,
        <data> *data_values,
        DDS_SampleInfo *sample_info);
```

3.5.9.17 DDS_DataReaderView_read_w_condition (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReaderView` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReaderView` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReaderView_read_w_condition
      (DDS_DataReaderView _this,
        DDS_sequence_<data> *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_ReadCondition a_condition);
```

3.5.9.18 DDS_DataReaderView_return_loan (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReaderView` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReaderView` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReaderView_return_loan
      (DDS_DataReaderView _this,
        DDS_sequence_<data> *data_values,
        SampleInfoSeq *info_seq);
```

3.5.9.19 DDS_DataReaderView_set_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReaderView_set_qos
      (DDS_DataReaderView _this,
        const DDS_DataReaderViewQos *qos);
```

Description

This operation replaces the existing set of QosPolicy settings for a `DDS_DataReaderView`.

Parameters

`in DDS_DataReaderView` - the `DDS_DataReaderView` object on which the operation is operated.

`in const DDS_DataReaderViewQos *qos` - the new set of QosPolicy settings for the `DDS_DataReaderView`.

Return Value

`DDS_ReturnCode_t` - Possible return codes of the operation are: `DDS_RETCODE_OK`, `DDS_RETCODE_ERROR`, `DDS_RETCODE_ILLEGAL_OPERATION`, `DDS_RETCODE_BAD_PARAMETER`, `DDS_RETCODE_ALREADY_DELETED`, `DDS_RETCODE_OUT_OF_RESOURCES` or `DDS_RETCODE_IMMUTABLE_POLICY`.

Detailed Description

This operation replaces the existing set of QosPolicy settings for a `DDS_DataReaderView`.

The parameter `qos` contains the QosPolicy settings which is checked for self-consistency and mutability. When the application tries to change a QosPolicy setting for an enabled `DDS_DataReaderView`, which can only be set before the `DDS_DataReaderView` is enabled, the operation will fail and a `DDS_RETCODE_IMMUTABLE_POLICY` is returned. In other words, the application must provide the presently set QosPolicy settings in case of the immutable QosPolicy settings. Only the mutable QosPolicy settings can be changed.

The set of QosPolicy settings specified by the `qos` parameter are applied on top of the existing QoS, replacing the values of any policies previously set (provided that the operation returned `DDS_RETCODE_OK`).

Return Code

When the operation returns:

- *RETCODE_OK* - the new DataReaderViewQos is set.
- *RETCODE_ERROR* - an internal error has occurred.
- *DDS_RETCODE_ILLEGAL_OPERATION* - the operation is invoked on an inappropriate object.
- *RETCODE_BAD_PARAMETER* - the parameter qos is not a valid DataReaderViewQos. It contains NULL pointer strings or strings that do not represent accessible attributes of the datatype.
- *RETCODE_ALREADY_DELETED* - the DDS_DataReaderView has already been deleted.
- *RETCODE_OUT_OF_RESOURCES* - the Data Distribution Service ran out of resources to complete this operation.
- *RETCODE_IMMUTABLE_POLICY* - the parameter qos contains an immutable QosPolicy setting with a value different from the one set during enabling of the DataReader.

3.5.9.20 DDS_DataReaderView_take (abstract)

This abstract operation is defined as a generic operation, which is implemented by the <NameSpace>_<type>DataReaderView class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type Foo (defined in the module SPACE) derived SPACE_FooDataReaderView class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReaderView_take
      (DDS_DataReaderView _this,
        DDS_sequence_<data> *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states);
```

3.5.9.21 DDS_DataReaderView_take_instance (abstract)

This abstract operation is defined as a generic operation, which is implemented by the <NameSpace>_<type>DataReaderView class. Therefore, to use this operation, the data type specific implementation of this operation in its respective

derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReaderView` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReaderView_take_instance
      (DDS_DataReaderView _this,
        DDS_sequence_<data> *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_InstanceHandle_t a_handle,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states);
```

3.5.9.22 DDS_DataReaderView_take_next_instance (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReaderView` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReaderView` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReaderView_take_next_instance
      (DDS_DataReaderView _this,
        DDS_sequence_<data> *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_InstanceHandle_t a_handle,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states);
```

3.5.9.23 DDS_DataReaderView_take_next_instance_w_condition (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReaderView` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReaderView` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReaderView_take_next_instance_w_condition
      (DDS_DataReaderView _this,
        DDS_sequence_<data> *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_InstanceHandle_t a_handle,
        const DDS_ReadCondition a_condition);
```

3.5.9.24 DDS_DataReaderView_take_next_sample (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReaderView` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReaderView` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReaderView_take_next_sample
      (DDS_DataReaderView _this,
        <data> *data_values,
        DDS_SampleInfo *sample_info);
```

3.5.9.25 DDS_DataReaderView_take_w_condition (abstract)

This abstract operation is defined as a generic operation, which is implemented by the `<NameSpace>_<type>DataReaderView` class. Therefore, to use this operation, the data type specific implementation of this operation in its respective derived class must be used. For further explanation see the description for the fictional data type `Foo` (defined in the module `SPACE`) derived `SPACE_FooDataReaderView` class.

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
   DDS_DataReaderView_take_w_condition
      (DDS_DataReaderView _this,
        DDS_sequence_<data> *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_ReadCondition a_condition);
```

3.5.10 Class SPACE_FooDataReaderView

The preprocessor generates from IDL type descriptions the `<NameSpace>_<type>DataReaderView` classes. For each application data type which is used as Topic data type, a typed class `<NameSpace>_<type>DataReaderView` is derived from the `DDS_DataReaderView` class. In this paragraph, the class `SPACE_FooDataReaderView` describes the operations of these derived `<NameSpace>_<type>DataReaderView` classes as an example for the fictional application type `Foo` (defined in the module `SPACE`).

For instance, for an application, the definitions are located in the `Space.idl` file.

The pre-processor will generate a `Space.h` include file.

The interface description of this class is as follows:

```
/*
 * interface SPACE_FooDataReaderView
 */
/*
 * inherited from class DDS_Entity
 */
/* DDS_StatusCondition
 *    SPACE_FooDataReaderView_get_statuscondition
 *       (SPACE_FooDataReaderView _this);
 */
/*
 * DDS_StatusMask
 *    SPACE_FooDataReaderView_get_status_changes
 *       (SPACE_FooDataReaderView _this);
 */
/*
 * DDS_ReturnCode_t
 *    SPACE_FooDataReaderView_enable
 *       (SPACE_FooDataReaderView _this);
 */
/*
 * inherited from class DDS_DataReaderView
 */
/*
 * DDS_QueryCondition
 *    SPACE_FooDataReaderView_create_querycondition
 *       (SPACE_FooDataReaderView _this,
 *         const DDS_SampleStateMask sample_states,
 *         const DDS_ViewStateMask view_states,
 *         const DDS_InstanceStateMask instance_states,
 *         const DDS_char *query_expression,
 *         const DDS_StringSeq *query_parameters);
 */
/*
```

```
 * DDS_ReadCondition
 *    SPACE_FooDataReaderView_create_readcondition
 *       (SPACE_FooDataReaderView _this,
 *         const DDS_SampleStateMask sample_states,
 *         const DDS_ViewStateMask view_states,
 *         const DDS_InstanceStateMask instance_states);
 */
/*
 * DDS_ReturnCode_t
 *    SPACE_FooDataReaderView_delete_contained_entities
 *       (SPACE_FooDataReaderView _this);
 */
/*
 * DDS_ReturnCode_t
 *    SPACE_FooDataReaderView_delete_readcondition
 *       (SPACE_FooDataReaderView _this,
 *         const DDS_ReadCondition a_condition);
 */
/*
 * DDS_DataReader
 *    SPACE_FooDataReaderView_get_datareader
 *       (SPACE_FooDataReaderView _this);
 */
/*
 * DDS_ReturnCode_t
 *    SPACE_FooDataReaderView_get_qos
 *       (SPACE_FooDataReaderView _this,
 *         DDS_DataReaderViewQos *qos);
 */
/*
 * DDS_ReturnCode_t
 *    SPACE_FooDataReaderView_set_qos
 *       (SPACE_FooDataReaderView _this,
 *         const DDS_DataReaderViewQos *qos);

 */
/*
 * implemented API operations
 */
   DDS_ReturnCode_t
      SPACE_FooDataReaderView_get_key_value
         (SPACE_FooDataReaderView _this,
           Foo *key_holder,
           const DDS_InstanceHandle_t handle);

   DDS_InstanceHandle_t
      SPACE_FooDataReaderView_lookup_instance
         (SPACE_FooDataReaderView _this,
           const Foo *instance_data);
```

```
DDS_ReturnCode_t
   SPACE_FooDataReaderView_read
      (SPACE_FooDataReaderView _this,
        DDS_sequence_Foo *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states);

DDS_ReturnCode_t
   SPACE_FooDataReaderView_read_instance
      (SPACE_FooDataReaderView _this,
        DDS_sequence_Foo *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_InstanceHandle_t a_handle,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states);

DDS_ReturnCode_t
   SPACE_FooDataReaderView_read_next_instance
      (SPACE_FooDataReaderView _this,
        DDS_sequence_Foo *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_InstanceHandle_t a_handle,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states);

DDS_ReturnCode_t
   SPACE_FooDataReaderView_read_next_instance_w_condition
      (SPACE_FooDataReaderView _this,
        DDS_sequence_Foo *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_InstanceHandle_t a_handle,
        const DDS_ReadCondition a_condition);

DDS_ReturnCode_t
   SPACE_FooDataReaderView_read_next_sample
      (SPACE_FooDataReaderView _this,
        Foo *received_data,
        DDS_SampleInfo *sample_info);

DDS_ReturnCode_t
   SPACE_FooDataReaderView_read_w_condition
      (SPACE_FooDataReaderView _this,
```

```
            DDS_sequence_Foo *data_values,
            SampleInfoSeq *info_seq,
            const DDS_long max_samples,
            const DDS_ReadCondition a_condition);

DDS_ReturnCode_t
   SPACE_FooDataReaderView_return_loan
      (SPACE_FooDataReaderView _this,
            DDS_sequence_Foo *data_values,
            SampleInfoSeq *info_seq);

DDS_ReturnCode_t
   SPACE_FooDataReaderView_take
      (SPACE_FooDataReaderView _this,
            DDS_sequence_Foo *data_values,
            SampleInfoSeq *info_seq,
            const DDS_long max_samples,
            const DDS_SampleStateMask sample_states,
            const DDS_ViewStateMask view_states,
            const DDS_InstanceStateMask instance_states);

DDS_ReturnCode_t
   SPACE_FooDataReaderView_take_instance
      (SPACE_FooDataReaderView _this,
            DDS_sequence_Foo *data_values,
            SampleInfoSeq *info_seq,
            const DDS_long max_samples,
            const DDS_InstanceHandle_t a_handle,
            const DDS_SampleStateMask sample_states,
            const DDS_ViewStateMask view_states,
            const DDS_InstanceStateMask instance_states);

DDS_ReturnCode_t
   SPACE_FooDataReaderView_take_next_instance
      (SPACE_FooDataReaderView _this,
            DDS_sequence_Foo *data_values,
            SampleInfoSeq *info_seq,
            const DDS_long max_samples,
            const DDS_InstanceHandle_t a_handle,
            const DDS_SampleStateMask sample_states,
            const DDS_ViewStateMask view_states,
            const DDS_InstanceStateMask instance_states);

DDS_ReturnCode_t
   SPACE_FooDataReaderView_take_next_instance_w_condition
      (SPACE_FooDataReaderView _this,
            DDS_sequence_Foo *data_values,
            SampleInfoSeq *info_seq,
            const DDS_long max_samples,
            const DDS_InstanceHandle_t a_handle,
```

```
                const DDS_ReadCondition a_condition);

DDS_ReturnCode_t
   SPACE_FooDataReaderView_take_next_sample
      (SPACE_FooDataReaderView _this,
        Foo *received_data,
        DDS_SampleInfo *sample_info);

DDS_ReturnCode_t
   SPACE_FooDataReaderView_take_w_condition
      (SPACE_FooDataReaderView _this,
        DDS_sequence_Foo *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_ReadCondition a_condition);
```

The next paragraphs describe the usage of all `SPACE_FooDataReaderView` operations. The inherited operations are listed but not fully described because they are not implemented in this class. The full description of these operations is given in the classes from which they are inherited.

3.5.10.1 SPACE_FooDataReaderView_create_querycondition (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderView` for further explanation.

Synopsis

```
#include <Space.h>
DDS_QueryCondition
   SPACE_FooDataReaderView_create_querycondition
      (SPACE_FooDataReaderView _this,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states,
        const DDS_char *query_expression,
        const DDS_StringSeq *query_parameters);
```

3.5.10.2 SPACE_FooDataReaderView_create_readcondition (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderView` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReadCondition
   SPACE_FooDataReaderView_create_readcondition
      (SPACE_FooDataReaderView _this,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states);
```

3.5.10.3 SPACE_FooDataReaderView_delete_contained_entities

This operation is inherited and therefore not described here. See the class `DDS_DataReaderView` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReaderView_delete_contained_entities
      (SPACE_FooDataReaderView _this);
```

3.5.10.4 SPACE_FooDataReaderView_delete_readcondition (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderView` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReaderView_delete_readcondition
      (SPACE_FooDataReaderView _this,
        const DDS_ReadCondition a_condition);
```

3.5.10.5 SPACE_FooDataReaderView_enable (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReaderView_enable
      (SPACE_FooDataReaderView _this);
```

3.5.10.6 SPACE_FooDataReaderView_get_datareader (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderView` for further explanation

Synopsis

```
#include <Space.h>
DDS_DataReader
   SPACE_FooDataReaderView_get_datareader
      (SPACE_FooDataReaderView _this);
```

3.5.10.7 SPACE_FooDataReaderView_get_key_value

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReaderView_get_key_value
      (SPACE_FooDataReaderView _this,
        Foo *key_holder,
        const DDS_InstanceHandle_t handle);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.5.10.8 SPACE_FooDataReaderView_get_qos (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderView` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReaderView_get_qos
      (SPACE_FooDataReaderView _this,
        DDS_DataReaderViewQos *qos);
```

3.5.10.9 SPACE_FooDataReaderView_get_status_changes (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <Space.h>
DDS_StatusMask
   SPACE_FooDataReaderView_get_status_changes
      (SPACE_FooDataReaderView _this);
```

3.5.10.10 SPACE_FooDataReaderView_get_statuscondition (inherited)

This operation is inherited and therefore not described here. See the class `DDS_Entity` for further explanation.

Synopsis

```
#include <Space.h>
DDS_StatusCondition
   SPACE_FooDataReaderView_get_statuscondition
      (SPACE_FooDataReaderView _this);
```

3.5.10.11 SPACE_FooDataReaderView_lookup_instance

Synopsis

```
#include <Space.h>
DDS_InstanceHandle_t
   SPACE_FooDataReaderView_lookup_instance
      (SPACE_FooDataReaderView _this,
        const Foo* instance_data)
```

Description

This operation returns the value of the instance handle which corresponds to the `instance_data`. For a full description please refer to paragraph '3.5.2.60 lookup_instance' which describes this operation in detail for the `SPACE_FooDataReader` class. Note that instances in the `SPACE_FooDataReaderView` are not defined by the keys of the `DDS_TopicDescription` but by the key list in the `DDS_DataReaderView` QosPolicy.

3.5.10.12 SPACE_FooDataReaderView_read

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReaderView_read
      (SPACE_FooDataReaderView _this,
        DDS_sequence_Foo *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states);
```

Description

This operation reads a sequence of Foo samples from the `SPACE_FooDataReaderView`. For a full description please refer to Section 3.5.2.66, *SPACE_FooDataReader_read*, on page 466, which describes this operation in detail for the `SPACE_FooDataReader` class.

3.5.10.13 SPACE_FooDataReaderView_read_instance

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReaderView_read_instance
      (SPACE_FooDataReaderView _this,
```

```
        DDS_sequence_Foo *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_InstanceHandle_t a_handle,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states);
```

Description

This operation reads a sequence of Foo samples of a single instance from the `SPACE_FooDataReaderView`. For a full description please refer to Section 3.5.2.67, *SPACE_FooDataReader_read_instance*, on page 471, which describes this operation in detail for the `SPACE_FooDataReader` class.

3.5.10.14 SPACE_FooDataReaderView_read_next_instance

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReaderView_read_next_instance
      (SPACE_FooDataReaderView _this,
        DDS_sequence_Foo *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_InstanceHandle_t a_handle,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states);
```

Description

This operation reads a sequence of Foo samples of the next single instance from the `SPACE_FooDataReaderView`. For a full description please refer to Section 3.5.2.68, *SPACE_FooDataReader_read_next_instance*, on page 473, which describes this operation in detail for the `SPACE_FooDataReader` class.

3.5.10.15 SPACE_FooDataReaderView_read_next_instance_w_condition

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReaderView_read_next_instance_w_condition
      (SPACE_FooDataReaderView _this,
        DDS_sequence_Foo *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_InstanceHandle_t a_handle,
```

```
        const DDS_ReadCondition a_condition);
```

Description

This operation reads a sequence of Foo samples of the next single instance from the `SPACE_FooDataReaderView`, filtered by a `DDS_ReadCondition` or `DDS_QueryCondition`. For a full description please refer to Section 3.5.2.69, *SPACE_FooDataReader_read_next_instance_w_condition*, on page 476, which describes this operation in detail for the `SPACE_FooDataReader` class.

3.5.10.16 SPACE_FooDataReaderView_read_next_sample

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReaderView_read_next_sample
      (SPACE_FooDataReaderView _this,
        Foo *data_values,
        DDS_SampleInfo *sample_info);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.5.10.17 SPACE_FooDataReaderView_read_w_condition

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReaderView_read_w_condition
      (SPACE_FooDataReaderView _this,
        DDS_sequence_Foo *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_ReadCondition a_condition);
```

Description

This operation reads a sequence of Foo samples from the `SPACE_FooDataReaderView`, filtered by a `DDS_ReadCondition` or `DDS_QueryCondition`. For a full description please refer to Section 3.5.2.71, *SPACE_FooDataReader_read_w_condition*, on page 478, which describes this operation in detail for the `SPACE_FooDataReader` class.

3.5.10.18 SPACE_FooDataReaderView_return_loan

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReaderView_return_loan
```

```
(SPACE_FooDataReaderView _this,
  DDS_sequence_Foo *data_values,
  SampleInfoSeq *info_seq);
```

Description

This operation indicates to the `SPACE_FooDataReaderView` that the application is done accessing the sequence of `data_values` and `info_seq`. For a full description please refer to Section 3.5.2.72, *SPACE_FooDataReader_return_loan*, on page 480, which describes this operation in detail for the `SPACE_FooDataReader` class.

3.5.10.19 SPACE_FooDataReaderView_set_qos (inherited)

This operation is inherited and therefore not described here. See the class `DDS_DataReaderView` for further explanation.

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReaderView_set_qos
      (SPACE_FooDataReaderView _this,
        const DDS_DataReaderViewQos *qos);
```

3.5.10.20 SPACE_FooDataReaderView_take

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReaderView_take
      (SPACE_FooDataReaderView _this,
        DDS_sequence_Foo *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states);
```

Description

This operation reads a sequence of Foo samples from the `SPACE_FooDataReaderView` and by doing so, removes the data from the `SPACE_FooDataReaderView`, but not from the `SPACE_FooDataReader` that it belongs to. For a full description please refer to Section 3.5.2.75, *SPACE_FooDataReader_take*, on page 483, which describes this operation in detail for the `SPACE_FooDataReader` class.

3.5.10.21 SPACE_FooDataReaderView_take_instance

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReaderView_take_instance
      (SPACE_FooDataReaderView _this,
        DDS_sequence_Foo *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_InstanceHandle_t a_handle,
        const DDS_SampleStateMask sample_states,
        const DDS_ViewStateMask view_states,
        const DDS_InstanceStateMask instance_states);
```

Description

This operation reads a sequence of Foo samples of a single instance from the `SPACE_FooDataReaderView` and by doing so, removes the data from the `SPACE_FooDataReaderView`, but not from the `SPACE_FooDataReader` that it belongs to. For a full description please refer to Section 3.5.2.76, *SPACE_FooDataReader_take_instance*, on page 485, which describes this operation in detail for the `SPACE_FooDataReader` class.

3.5.10.22 SPACE_FooDataReaderView_take_next_instance

Synopsis

```
#include <Space.h>
ReturnCode_t
  take_next_instance
    (FooSeq *data_values,
     SampleInfoSeq *info_seq,
     DDS_long max_samples,
     InstanceHandle_t a_handle,
     SampleStateMask sample_states,
     ViewStateMask view_states,
     InstanceStateMask instance_states);
```

Description

This operation reads a sequence of Foo samples of the next single instance from the `SPACE_FooDataReaderView` and by doing so, removes the data from the `SPACE_FooDataReaderView`, but not from the `SPACE_FooDataReader` that it belongs to. For a full description please refer to Section 3.5.2.77, *SPACE_FooDataReader_take_next_instance*, on page 487, which describes this operation in detail for the `SPACE_FooDataReader` class.

3.5.10.23 SPACE_FooDataReaderView_take_next_instance_w_condition

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReaderView_take_next_instance_w_condition
      (SPACE_FooDataReaderView _this,
        DDS_sequence_Foo *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_InstanceHandle_t a_handle,
        const DDS_ReadCondition a_condition);
```

Description

This operation reads a sequence of Foo samples of the next single instance from the `SPACE_FooDataReaderView`, filtered by a `DDS_ReadCondition` or `DDS_QueryCondition` and by doing so, removes the data from the `SPACE_FooDataReaderView`, but not from the `SPACE_FooDataReader` that it belongs to. For a full description please refer to Section 3.5.2.78, *SPACE_FooDataReader_take_next_instance_w_condition*, on page 489, which describes this operation in detail for the `SPACE_FooDataReader` class.

3.5.10.24 SPACE_FooDataReaderView_take_next_sample

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReaderView_take_next_sample
      (SPACE_FooDataReaderView _this,
        Foo *data_values,
        DDS_SampleInfo *sample_info);
```

NOTE: This operation is not yet implemented. It is scheduled for a future release.

3.5.10.25 SPACE_FooDataReaderView_take_w_condition

Synopsis

```
#include <Space.h>
DDS_ReturnCode_t
   SPACE_FooDataReaderView_take_w_condition
      (SPACE_FooDataReaderView _this,
        DDS_sequence_Foo *data_values,
        SampleInfoSeq *info_seq,
        const DDS_long max_samples,
        const DDS_ReadCondition a_condition);
```

Description

This operation reads a sequence of Foo samples from the `SPACE_FooDataReaderView`, filtered by a `DDS_ReadCondition` or `DDS_QueryCondition` and by doing so, removes the data from the `SPACE_FooDataReaderView`, but not from the `SPACE_FooDataReader` that it belongs to. For a full description please refer to Section 3.5.2.80, *SPACE_FooDataReader_take_w_condition*, on page 491, which describes this operation in detail for the `SPACE_FooDataReader` class.

3.6 QosProvider

The QosProvider API allows users to specify the QoS settings of their DCPS entities outside of application code in XML. The QosProvider is delivered as part of the DCPS API of OpenSplice DDS and has no factory. It is not associated with a `DDS_DomainParticipant`, so it can be be obtained by a normal allocation.

3.6.1 Class DDS_QosProvider

The `DDS_QosProvider` class provides access to the QoS settings that are specified in an XML file. The interface is as follows:

```
/* Allocator */
DDS_QosProvider
    DDS_QosProvider__alloc (
        const char *uri,
        const char *profile);

/* API operations */
DDS_ReturnCode_t
    DDS_QosProvider_get_participant_qos(
        DDS_QosProvider _this,
        DDS_DomainParticipantQos *qos,
        const char *id);

DDS_ReturnCode_t
    DDS_QosProvider_get_topic_qos(
        DDS_QosProvider _this,
        DDS_TopicQos *qos,
        const char *id);

DDS_ReturnCode_t
    DDS_QosProvider_get_subscriber_qos(
        DDS_QosProvider _this,
        DDS_SubscriberQos *qos,
        const char *id);

DDS_ReturnCode_t
    DDS_QosProvider_get_datareader_qos(
```

```
            DDS_QosProvider _this,
            DDS_DataReaderQos *qos,
            const char *id);

    DDS_ReturnCode_t
        DDS_QosProvider_get_publisher_qos(
            DDS_QosProvider _this,
            DDS_PublisherQos *qos,
            const char *id);

    DDS_ReturnCode_t
        DDS_QosProvider_get_datawriter_qos(
            DDS_QosProvider _this,
            DDS_DataWriterQos *qos,
            const char *id);
```

3.6.1.1 DDS_QosProvider__alloc

Synopsis

```
#include <dds_dcps.h>
DDS_QosProvider
    DDS_QosProvider__alloc (
        const char *uri,
        const char *profile);
```

Description

Constructs a new `DDS_QosProvider` based on the provided `uri` and `profile`.

Parameters

`in char * uri` - A Uniform Resource Identifier (URI) that points to the location where the QoS profile needs to be loaded from. Currently only URI's with a 'file' scheme that point to an XML file are supported. If profiles and/or QoS settings are not uniquely identifiable by name within the resource pointed to by `uri`, a random one of them will be stored.

`in char * profile` - The name of the QoS profile that serves as the default QoS profile for the `DDS_QosProvider_get_*_qos(...)` operations.

Return Value

A `DDS_QosProvider` instance that is instantiated with all profiles and/or QoS's loaded from the location specified by the provided `uri`.

Construction of the `DDS_QosProvider` will fail under the following conditions:

— No `uri` is provided.
— The resource pointed to by `uri` cannot be found.

– The content of the resource pointed to by `uri` is malformed (*e.g.*, malformed XML).

3.6.1.2 DDS_QosProvider_get_participant_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
    DDS_QosProvider_get_participant_qos(
        DDS_QosProvider _this,
        DDS_DomainParticipantQos *qos,
        const char *id);
```

Description

Resolves the `DDS_DomainParticipantQos` identified by the `id` from the `uri` the `DDS_QosProvider _this` is associated with.

Parameters

`in DDS_QosProvider _this` - The DDS_QosProvider on which the operation is performed.

`inout DDS_DomainParticipantQos * qos` - A pointer to the destination `DDS_DomainParticipantQos` in which the QoS policy settings will be copied.

`in char * id` - The fully-qualified name that identifies a QoS within the `uri` associated with the `DDS_QosProvider` or a name that identifies a QoS within the `uri` associated with the `DDS_QosProvider` instance relative to its default QoS profile. `Id`'s starting with '`::`' are interpreted as fully-qualified names and all others are interpreted as names relative to the default QoS profile of the `DDS_QosProvider` instance. When `id` is *`NULL`* it is interpreted as a non-named QoS within the default QoS profile associated with the `DDS_QosProvider`.

Return Value

The operation may return:

- *`DDS_RETCODE_OK`* - If `qos` has been initialized successfully.
- *`DDS_RETCODE_NO_DATA`* - If no `DDS_DomainParticipantQos` that matches the provided `id` can be found within the `uri` associated with the `DDS_QosProvider`.
- *`DDS_RETCODE_BAD_PARAMETER`* - If `_this` and/or `qos` is *`NULL`*.
- *`DDS_RETCODE_PRECONDITION_NOT_MET`* - If the `DDS_QosProvider` instance is not properly initialized.

- *DDS_RETCODE_OUT_OF_RESOURCES* - If not enough memory is available to perform the operation.
- *DDS_RETCODE_ERROR* - If an internal error occurred.

3.6.1.3 DDS_QosProvider_get_topic_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
    DDS_QosProvider_get_topic_qos(
        DDS_QosProvider _this,
        DDS_TopicQos *qos,
        const char *id);
```

Description

Resolves the `DDS_TopicQos` identified by the `id` from the `uri` the `DDS_QosProvider _this` is associated with.

Parameters

in DDS_QosProvider _this - The `DDS_QosProvider` on which the operation is performed.

*inout DDS_TopicQos * qos* - A pointer to the destination `DDS_TopicQos` in which the QoS policy settings will be copied.

*in char * id* - The fully-qualified name that identifies a QoS within the uri associated with the `DDS_QosProvider` or a name that identifies a QoS within the `uri` associated with the `DDS_QosProvider` instance relative to its default QoS profile. `Id`'s starting with '`::`' are interpreted as fully-qualified names and all others are interpreted as names relative to the default QoS profile of the `DDS_QosProvider` instance. When `id` is *NULL* it is interpreted as a non-named QoS within the default QoS profile associated with the `DDS_QosProvider`.

Return Value

The operation may return:

- *DDS_RETCODE_OK* - If `qos` has been initialized successfully.
- *DDS_RETCODE_NO_DATA* - If no `DDS_TopicQos` that matches the provided `id` can be found within the `uri` associated with the `DDS_QosProvider`.
- *DDS_RETCODE_BAD_PARAMETER* - If `_this` and/or `qos` is *NULL*.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - If the `DDS_QosProvider` instance is not properly initialized.

- *DDS_RETCODE_OUT_OF_RESOURCES* - If not enough memory is available to perform the operation.
- *DDS_RETCODE_ERROR* - If an internal error occurred.

3.6.1.4 DDS_QosProvider_get_subscriber_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
    DDS_QosProvider_get_subscriber_qos(
        DDS_QosProvider _this,
        DDS_SubscriberQos *qos,
        const char *id);
```

Description

Resolves the `DDS_SubscriberQos` identified by the `id` from the `uri` the `DDS_QosProvider _this` is associated with.

Parameters

in DDS_QosProvider _this - The `DDS_QosProvider` on which the operation is performed.

*inout DDS_SubscriberQos * qos* - A pointer to the destination `DDS_SubscriberQos` in which the QoS policy settings will be copied.

*in char * id* - The fully-qualified name that identifies a QoS within the `uri` associated with the `DDS_QosProvider` or a name that identifies a QoS within the `uri` associated with the `DDS_QosProvider` instance relative to its default QoS profile. `Id`'s starting with '`::`' are interpreted as fully-qualified names and all others are interpreted as names relative to the default QoS profile of the `DDS_QosProvider` instance. When `id` is *NULL* it is interpreted as a non-named QoS within the default QoS profile associated with the `DDS_QosProvider`.

Return Value

The operation may return:

- *DDS_RETCODE_OK* - If `qos` has been initialized successfully.
- *DDS_RETCODE_NO_DATA* - If no `DDS_SubscriberQos` that matches the provided `id` can be found within the `uri` associated with the `DDS_QosProvider`.
- *DDS_RETCODE_BAD_PARAMETER* - If `_this` and/or `qos` is *NULL*.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - If the `DDS_QosProvider` instance is not properly initialized.

- *DDS_RETCODE_OUT_OF_RESOURCES* - If not enough memory is available to perform the operation.
- *DDS_RETCODE_ERROR* - If an internal error occurred.

3.6.1.5 DDS_QosProvider_get_datareader_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
    DDS_QosProvider_get_datareader_qos(
        DDS_QosProvider _this,
        DDS_DataReaderQos *qos,
        const char *id);
```

Description

Resolves the `DDS_DataReaderQos` identified by the `id` from the `uri` the `DDS_QosProvider _this` is associated with.

Parameters

in DDS_QosProvider _this - The `DDS_QosProvider` on which the operation is performed.

*inout DDS_DataReaderQos * qos* - A pointer to the destination `DDS_DataReaderQos` in which the QoS policy settings will be copied.

*in char * id* - The fully-qualified name that identifies a QoS within the uri associated with the `DDS_QosProvider` or a name that identifies a QoS within the `uri` associated with the `DDS_QosProvider` instance relative to its default QoS profile. `Id`'s starting with '`::`' are interpreted as fully-qualified names and all others are interpreted as names relative to the default QoS profile of the `DDS_QosProvider` instance. When `id` is *NULL* it is interpreted as a non-named QoS within the default QoS profile associated with the `DDS_QosProvider`.

Return Value

The operation may return:

- *DDS_RETCODE_OK* - If `qos` has been initialized successfully.
- *DDS_RETCODE_NO_DATA* - If no `DDS_DataReaderQos` that matches the provided `id` can be found within the `uri` associated with the `DDS_QosProvider`.
- *DDS_RETCODE_BAD_PARAMETER* - If `_this` and/or `qos` is *NULL*.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - If the `DDS_QosProvider` instance is not properly initialized.

- *DDS_RETCODE_OUT_OF_RESOURCES* - If not enough memory is available to perform the operation.
- *DDS_RETCODE_ERROR* - If an internal error occurred.

3.6.1.6 DDS_QosProvider_get_publisher_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
    DDS_QosProvider_get_publisher_qos(
        DDS_QosProvider _this,
        DDS_PublisherQos *qos,
        const char *id);
```

Description

Resolves the `DDS_PublisherQos` identified by the `id` from the `uri` the `DDS_QosProvider _this` is associated with.

Parameters

in DDS_QosProvider _this - The `DDS_QosProvider` on which the operation is performed.

*inout DDS_PublisherQos * qos* - A pointer to the destination `DDS_PublisherQos` in which the QoS policy settings will be copied.

*in char * id* - The fully-qualified name that identifies a QoS within the `uri` associated with the `DDS_QosProvider` or a name that identifies a QoS within the `uri` associated with the `DDS_QosProvider` instance relative to its default QoS profile. `Id`'s starting with '`::`' are interpreted as fully-qualified names and all others are interpreted as names relative to the default QoS profile of the `DDS_QosProvider` instance. When `id` is *NULL* it is interpreted as a non-named QoS within the default QoS profile associated with the `DDS_QosProvider`.

Return Value

The operation may return:

- *DDS_RETCODE_OK* - If `qos` has been initialized successfully.
- *DDS_RETCODE_NO_DATA* - If no `DDS_PublisherQos` that matches the provided `id` can be found within the `uri` associated with the `DDS_QosProvider`.
- *DDS_RETCODE_BAD_PARAMETER* - If `_this` and/or `qos` is *NULL*.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - If the `DDS_QosProvider` instance is not properly initialized.

- *DDS_RETCODE_OUT_OF_RESOURCES* - If not enough memory is available to perform the operation.
- *DDS_RETCODE_ERROR* - If an internal error occurred.

3.6.1.7 DDS_QosProvider_get_datawriter_qos

Synopsis

```
#include <dds_dcps.h>
DDS_ReturnCode_t
    DDS_QosProvider_get_datawriter_qos(
        DDS_QosProvider _this,
        DDS_DataWriterQos *qos,
        const char *id);
```

Description

Resolves the `DDS_DataWriterQos` identified by the `id` from the `uri` the `DDS_QosProvider _this` is associated with.

Parameters

in DDS_QosProvider _this - The `DDS_QosProvider` on which the operation is performed.

*inout DDS_DataWriterQos * qos* - A pointer to the destination `DDS_DataWriterQos` in which the QoS policy settings will be copied.

*in char * id* - The fully-qualified name that identifies a QoS within the `uri` associated with the `DDS_QosProvider` or a name that identifies a QoS within the `uri` associated with the `DDS_QosProvider` instance relative to its default QoS profile. `Id`'s starting with '`::`' are interpreted as fully-qualified names and all others are interpreted as names relative to the default QoS profile of the `DDS_QosProvider` instance. When `id` is *NULL* it is interpreted as a non-named QoS within the default QoS profile associated with the `DDS_QosProvider`.

Return Value

The operation may return:

- *DDS_RETCODE_OK* - If `qos` has been initialized successfully.
- *DDS_RETCODE_NO_DATA* - If no `DDS_DataWriterQos` that matches the provided `id` can be found within the `uri` associated with the `DDS_QosProvider`.
- *DDS_RETCODE_BAD_PARAMETER* - If `_this` and/or `qos` is *NULL*.
- *DDS_RETCODE_PRECONDITION_NOT_MET* - If the `DDS_QosProvider` instance is not properly initialized.

- *DDS_RETCODE_OUT_OF_RESOURCES* - If not enough memory is available to perform the operation.
- *DDS_RETCODE_ERROR* - If an internal error occurred.

Appendices

Appendix

A Quality Of Service

Each DDS_Entity is accompanied by an <DDS_Entity>Qos structure that implements the basic mechanism for an application to specify Quality of Service attributes. This structure consists of DDS_Entity specific QosPolicy attributes. QosPolicy attributes are structured types where each type specifies the information that controls an DDS_Entity related (configurable) attribute of the Data Distribution Service.

Affected Entities

Each DDS_Entity can be configured with a set of QosPolicy settings. However, any DDS_Entity cannot support any QosPolicy. For instance, a DDS_DomainParticipant supports different QosPolicy settings than a DDS_Topic or a DDS_Publisher. The set of QosPolicy settings is implemented as a struct of QosPolicy structs, identified as <DDS_Entity>Qos. Each <DDS_Entity>Qos struct only contains those QosPolicy structs relevant to the specific DDS_Entity. The <DDS_Entity>Qos struct serves as the parameter to operations which require a Qos. <DDS_Entity>Qos struct is the API implementation of the QoS. Depending on the specific <DDS_Entity>Qos, it controls the behaviour of a DDS_Topic, DDS_DataWriter, DDS_DataReader, DDS_Publisher, DDS_Subscriber, DDS_DomainParticipant or DDS_DomainParticipantFactory[1].

Basic Usage

The basic way to modify or set the <DDS_Entity>Qos is by using an DDS_<Entity>_get_qos operation to get all QosPolicy settings from this DDS_Entity (that is the <DDS_Entity>Qos), modify several specific QosPolicy settings and put them back using an DDS_<DDS_Entity>_set_qos operation to set all QosPolicy settings on this DDS_Entity (that is the <DDS_Entity>Qos). An example of these operations for the DDS_DataWriterQos are

1. Note that the DDS_DomainParticipantFactory is a special kind of entity: it does not inherit from DDS_Entity, nor does it have a DDS_Listener or DDS_StatusCondition, but its behaviour can be controlled by its own set of QosPolicies.

`DDS_Publisher_get_default_datawriter_qos` and `DDS_Publisher_set_default_datawriter_qos`, which take the `DDS_DataWriterQos` as a parameter.

The interface description of this struct is as follows:

```
/*
 *  struct <name>QosPolicy
 *     see appendix
 */
/*
 *  struct <DDS_Entity>Qos
 */
    struct DDS_DomainParticipantFactoryQos
       { DDS_EntityFactoryQosPolicy       entity_factory; };
    struct DDS_DomainParticipantQos
       { DDS_UserDataQosPolicy            user_data;
         DDS_EntityFactoryQosPolicy       entity_factory;
         DDS_SchedulingQosPolicy          watchdog_scheduling;
         DDS_SchedulingQosPolicy          listener_scheduling; };
    struct DDS_TopicQos
       { DDS_TopicDataQosPolicy           topic_data;
         DDS_DurabilityQosPolicy          durability;
         DDS_DurabilityServiceQosPolicy   durability_service;
         DDS_DeadlineQosPolicy            deadline;
         DDS_LatencyBudgetQosPolicy       latency_budget;
         DDS_LivelinessQosPolicy          liveliness;
         DDS_ReliabilityQosPolicy         reliability;
         DDS_DestinationOrderQosPolicy    destination_order;
         DDS_HistoryQosPolicy             history;
         DDS_ResourceLimitsQosPolicy      resource_limits;
         DDS_TransportPriorityQosPolicy   transport_priority;
         DDS_LifespanQosPolicy            lifespan;
         DDS_OwnershipQosPolicy           ownership; };
    struct DDS_DataWriterQos
       { DDS_DurabilityQosPolicy          durability;
         DDS_DeadlineQosPolicy            deadline;
         DDS_LatencyBudgetQosPolicy       latency_budget;
         DDS_LivelinessQosPolicy          liveliness;
         DDS_ReliabilityQosPolicy         reliability;
         DDS_DestinationOrderQosPolicy    destination_order;
         DDS_HistoryQosPolicy             history;
         DDS_ResourceLimitsQosPolicy      resource_limits;
         DDS_TransportPriorityQosPolicy   transport_priority;
         DDS_LifespanQosPolicy            lifespan;
         DDS_UserDataQosPolicy            user_data;
         DDS_OwnershipQosPolicy           ownership;
         DDS_OwnershipStrengthQosPolicy   ownership_strength;
         DDS_WriterDataLifecycleQosPolicy writer_data_lifecycle;};
    struct DDS_PublisherQos
```

```
        { DDS_PresentationQosPolicy        presentation;
          DDS_PartitionQosPolicy           partition;
          DDS_GroupDataQosPolicy           group_data;
          DDS_EntityFactoryQosPolicy       entity_factory; };
    struct DDS_DataReaderQos
        { DDS_DurabilityQosPolicy          durability;
          DDS_DeadlineQosPolicy            deadline;
          DDS_LatencyBudgetQosPolicy       latency_budget;
          DDS_LivelinessQosPolicy          liveliness;
          DDS_ReliabilityQosPolicy         reliability;
          DDS_DestinationOrderQosPolicy    destination_order;
          DDS_HistoryQosPolicy             history;
          DDS_ResourceLimitsQosPolicy      resource_limits;
          DDS_UserDataQosPolicy            user_data;
          DDS_OwnershipQosPolicy           ownership;
          DDS_TimeBasedFilterQosPolicy     time_based_filter;
         DDS_ReaderDataLifecycleQosPolicy reader_data_lifecycle;};
    struct DDS_SubscriberQos
        { DDS_PresentationQosPolicy        presentation;
          DDS_PartitionQosPolicy           partition;
          DDS_GroupDataQosPolicy           group_data;
          DDS_EntityFactoryQosPolicy       entity_factory; };
/*
 *  define <DDS_Entity>_QOS_DEFAULT
 */
    #define DDS_PARTICIPANT_QOS_DEFAULT
    #define DDS_TOPIC_QOS_DEFAULT
    #define DDS_DATAWRITER_QOS_DEFAULT
    #define DDS_PUBLISHER_QOS_DEFAULT
    #define DDS_DATAREADER_QOS_DEFAULT
    #define DDS_SUBSCRIBER_QOS_DEFAULT
    #define DDS_DATAWRITER_QOS_USE_TOPIC_QOS
    #define DDS_DATAREADER_QOS_USE_TOPIC_QOS
/*
 *  implemented API operations
 *      <no operations>
 */
```

The next paragraphs describe the usage of each `<DDS_Entity>Qos` struct.

DDS_DataReaderQos

Synopsis

```
#include <dds_dcps.h>
```

```
struct DDS_DataReaderQos
        { DDS_DurabilityQosPolicy          durability;
          DDS_DeadlineQosPolicy            deadline;
          DDS_LatencyBudgetQosPolicy       latency_budget;
```

```
DDS_LivelinessQosPolicy          liveliness;
DDS_ReliabilityQosPolicy         reliability;
DDS_DestinationOrderQosPolicy    destination_order;
DDS_HistoryQosPolicy             history;
DDS_ResourceLimitsQosPolicy      resource_limits;
DDS_UserDataQosPolicy            user_data;
DDS_OwnershipQosPolicy           ownership;
DDS_TimeBasedFilterQosPolicy     time_based_filter;
DDS_ReaderDataLifecycleQosPolicy reader_data_lifecycle;};
```

Description

This struct provides the basic mechanism for an application to specify Quality of Service attributes for a `DDS_DataReader`.

Attributes

`DDS_DurabilityQosPolicy durability` - whether the data should be stored for late joining readers. See Section 3.1.3.3 on page 73 for more detailed information about these settings.

`DDS_DeadlineQosPolicy deadline` - the period within which a new sample is expected. See Section 3.1.3.1 on page 69 for more detailed information about these settings.

`DDS_LatencyBudgetQosPolicy latency_budget` - used by the Data Distribution Service for optimization. See Section 3.1.3.8 on page 83 for more detailed information about these settings.

`DDS_LivelinessQosPolicy liveliness` - the way the liveliness of the `DDS_DataReader` is asserted to the Data Distribution Service. See Section 3.1.3.10 on page 85 for more detailed information about these settings.

`DDS_ReliabilityQosPolicy reliability` - the reliability of the data distribution. See Section 3.1.3.16 on page 100 for more detailed information about these settings.

`DDS_DestinationOrderQosPolicy destination_order` - the order in which the `DDS_DataReader` timely orders the data. See Section 3.1.3.2 on page 71 for more detailed information about these settings.

`DDS_HistoryQosPolicy history` - how samples should be stored. See Section 3.1.3.7 on page 80 for more detailed information about these settings.

`DDS_ResourceLimitsQosPolicy resource_limits` - the maximum amount of resources to be used. See Section 3.1.3.17 on page 102 for more detailed information about these settings.

`DDS_UserDataQosPolicy user_data` - used to attach additional information to the `DDS_DataReader`. See Section 3.1.3.22 on page 107 for more detailed information about these settings.

DDS_OwnershipQosPolicy ownership - whether a DataWriter exclusively owns an instance. See Section 3.1.3.11 on page 87 for more detailed information about these settings.

DDS_TimeBasedFilterQosPolicy time_based_filter - the maximum data rate at which the DDS_DataReader will receive changes. See Section 3.1.3.19 on page 105 for more detailed information about these settings.

DDS_ReaderDataLifecycleQosPolicy reader_data_lifecycle - determines whether instance state changes (either DDS_NOT_ALIVE_NO_WRITERS_INSTANCE_STATE or DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE) are presented to the user when no corresponding samples are available to communicate them. Also it determines how long an instance state change remains available to a user that does not explicitly consume them. See Section 3.1.3.15 on page 97 for more detailed information about these settings.

Detailed Description

A QosPolicy can be set when the DDS_DataReader is created with the DDS_Subscriber_create_datareader operation (or modified with the DDS_DataReader_set_qos operation). Both operations take the DDS_DataReaderQos struct as a parameter. There may be cases where several policies are in conflict. Consistency checking is performed each time the policies are modified when they are being created and, in case they are already enabled, via the DDS_DataReader_set_qos operation.

Some QosPolicy have “immutable” semantics meaning that they can only be specified either at DDS_DataReader creation time or prior to calling the DDS_DataReader_enable operation on the DDS_DataReader.

See *Struct QosPolicy* on page 59 for a list of all <name>QosPolicy settings, their meaning, characteristics and possible values, as well as if it applies to a DDS_DataReader.

The initial value of the default DDS_DataReaderQos in the DDS_Subscriber are given in the following table:

Table 19: DDS_DATAREADER_QOS_DEFAULT

QosPolicy	Attribute	Value
durability	kind	DDS_VOLATILE_DURABILITY_QOS
deadline	period	DDS_DURATION_INFINITE
latency_budget	duration	0

Table 19: DDS_DATAREADER_QOS_DEFAULT

QosPolicy	Attribute	Value
liveliness	kind	DDS_AUTOMATIC_LIVELINESS_QOS
	lease_duration	DDS_DURATION_INFINITE
reliability	kind	DDS_BEST_EFFORT_RELIABILITY_QOS
	max_blocking_time	100 ms
	synchronous	FALSE
destination_order	kind	DDS_BY_RECEPTION_ TIMESTAMP_DESTINATIONORDER_QOS
history	kind	DDS_KEEP_LAST_HISTORY_QOS
	depth	1
resource_limits	max_samples	DDS_LENGTH_UNLIMITED
	max_instances	DDS_LENGTH_UNLIMITED
	max_samples_ per_instance	DDS_LENGTH_UNLIMITED
user_data	value.length	0
ownership	kind	DDS_SHARED_OWNERSHIP_QOS
time_based_filter	minimum_separation	0
reader_data_lifecycle	autopurge_ nowriter_samples_delay	DDS_DURATION_INFINITE
	autopurge_ disposed_samples_delay	DDS_DURATION_INFINITE
	enable_invalid_samples	TRUE
	invalid_sample_visibilit y.kind	DDS_MINIMUM_INVALID_SAMPLES

DDS_DataWriterQos

Synopsis

```
#include <dds_dcps.h>
struct DDS_DataWriterQos
         { DDS_DurabilityQosPolicy          durability;
           DDS_DeadlineQosPolicy            deadline;
           DDS_LatencyBudgetQosPolicy       latency_budget;
           DDS_LivelinessQosPolicy          liveliness;
           DDS_ReliabilityQosPolicy         reliability;
           DDS_DestinationOrderQosPolicy    destination_order;
           DDS_HistoryQosPolicy             history;
           DDS_ResourceLimitsQosPolicy      resource_limits;
           DDS_TransportPriorityQosPolicy   transport_priority;
           DDS_LifespanQosPolicy            lifespan;
           DDS_UserDataQosPolicy            user_data;
```

```
DDS_OwnershipQosPolicy           ownership;
DDS_OwnershipStrengthQosPolicy   ownership_strength;
DDS_WriterDataLifecycleQosPolicy writer_data_lifecycle;};
```

Description

This struct provides the basic mechanism for an application to specify Quality of Service attributes for a `DDS_DataWriter`.

Attributes

`DDS_DurabilityQosPolicy durability` - whether the data should be stored for late joining readers. See Section 3.1.3.3 on page 73 for more detailed information about these settings.

`DDS_DeadlineQosPolicy deadline` - the period within which a new sample is written. See Section 3.1.3.1 on page 69 for more detailed information about these settings.

`DDS_LatencyBudgetQosPolicy latency_budget` - used by the Data Distribution Service for optimization. See Section 3.1.3.8 on page 83 for more detailed information about these settings.

`DDS_LivelinessQosPolicy liveliness` - the way the liveliness of the `DDS_DataWriter` is asserted to the Data Distribution Service. See Section 3.1.3.10 on page 85 for more detailed information about these settings.

`DDS_ReliabilityQosPolicy reliability` - the reliability of the data distribution. See Section 3.1.3.16 on page 100 for more detailed information about these settings.

`DDS_DestinationOrderQosPolicy destination_order` - the order in which the `DDS_DataReader` timely orders the data. See Section 3.1.3.2 on page 71 for more detailed information about these settings.

`DDS_HistoryQosPolicy history` - how samples should be stored. See Section 3.1.3.7 on page 80 for more detailed information about these settings.

`DDS_ResourceLimitsQosPolicy resource_limits` - the maximum amount of resources to be used. See Section 3.1.3.17 on page 102 for more detailed information about these settings.

`DDS_TransportPriorityQosPolicy transport_priority` - a priority hint for the underlying transport layer. See Section 3.1.3.21 on page 107 for more detailed information about these settings.

`DDS_LifespanQosPolicy lifespan` - the maximum duration of validity of the data written by the `DDS_DataWriter`. See Section 3.1.3.9 on page 84 for more detailed information about these settings.

DDS_UserDataQosPolicy user_data - used to attach additional information to the DDS_DataWriter. See Section 3.1.3.22 on page 107 for more detailed information about these settings.

DDS_OwnershipQosPolicy ownership - whether a DataWriter exclusively owns an instance. See Section 3.1.3.11 on page 87 for more detailed information about these settings.

DDS_OwnershipStrengthQosPolicy ownership_strength - the strength to determine the ownership. See Section 3.1.3.12 on page 90 for more detailed information about these settings.

DDS_WriterDataLifecycleQosPolicy writer_data_lifecycle - whether unregistered instances are disposed of automatically or not. See Section 3.1.3.23 on page 108 for more detailed information about these settings.

Detailed Description

A QosPolicy can be set when the DDS_DataWriter is created with the DDS_Publisher_create_datawriter operation (or modified with the DDS_DataWriter_set_qos operation). Both operations take the DDS_DataWriterQos struct as a parameter. There may be cases where several policies are in conflict. Consistency checking is performed each time the policies are modified when they are being created and, in case they are already enabled, via the DDS_DataWriter_set_qos operation.

Some QosPolicy have “immutable” semantics meaning that they can only be specified either at DDS_DataWriter creation time or prior to calling the DDS_DataWriter_enable operation on the DDS_DataWriter.

The *Struct QosPolicy* provides the list of all <name>QosPolicy settings, their meaning, characteristics and possible values, as well as if it applies to a DDS_DataWriter.

The initial value of the default DDS_DataWriterQos in the DDS_Publisher are given in the following table:

Table 20: DDS_DATAWRITER_QOS_DEFAULT

QosPolicy	Attribute	Value
durability	kind	DDS_VOLATILE_DURABILITY_QOS
deadline	period	DDS_DURATION_INFINITE
latency_budget	duration	0
liveliness	kind	DDS_AUTOMATIC_LIVELINESS_QOS
	lease_duration	DDS_DURATION_INFINITE

Table 20: DDS_DATAWRITER_QOS_DEFAULT (Continued)

QosPolicy	Attribute	Value
reliability	kind	DDS_BEST_EFFORT_RELIABILITY_QOS
	max_blocking_time	100 ms
	synchronous	FALSE
destination_order	kind	DDS_BY_RECEPTION_ TIMESTAMP_DESTINATIONORDER_QOS
history	kind	DDS_KEEP_LAST_HISTORY_QOS
	depth	1
resource_limits	max_samples	DDS_LENGTH_UNLIMITED
	max_instances	DDS_LENGTH_UNLIMITED
	max_samples_ per_instance	DDS_LENGTH_UNLIMITED
transport_priority	value	0
lifespan	duration	DDS_DURATION_INFINITE
user_data	value.length	0
ownership	kind	DDS_SHARED_OWNERSHIP_QOS
ownership_strength	value	0
writer_data_lifecycle	autodispose_ unregistered_instances	TRUE

DDS_DomainParticipantFactoryQos

Synopsis

```
#include <dds_dcps.h>
struct DDS_DomainParticipantFactoryQos
          { DDS_EntityFactoryQosPolicy entity_factory; };
```

Description

This struct provides the basic mechanism for an application to specify Quality of Service attributes for a `DDS_DomainParticipantFactory`.

Attributes

`DDS_EntityFactoryQosPolicy entity_factory` - whether a just created `DomainParticipant` should be enabled. See Section 3.1.3.5 on page 79 for more detailed information about these settings.

Detailed Description

The `QosPolicy` cannot be set at creation time, since the `DDS_DomainParticipantFactory` is a pre-existing object that can only be obtained with the `DDS_DomainParticipantFactory_get_instance` operation or its alias `DDS_TheParticipantFactory`. Therefore its `QosPolicy` is initialized to a default value according to *Table 21:*:

Table 21: Default Values for DDS_DomainParticipantFactoryQos

QosPolicy	Attribute	Value
`entity_factory`	`autoenable_created_entities`	`TRUE`

After creation the `QosPolicy` can be modified with the `DDS_DomainParticipantFactory_set_qos` operation, which takes the `DDS_DomainParticipantFactoryQos` struct as a parameter.

DDS_DomainParticipantQos

Synopsis

```
#include <dds_dcps.h>
struct DDS_DomainParticipantQos
          { DDS_UserDataQosPolicy user_data;
            DDS_EntityFactoryQosPolicy entity_factory;
            DDS_SchedulingQosPolicy    watchdog_scheduling;
            DDS_SchedulingQosPolicy    listener_scheduling; };
```

Description

This struct provides the basic mechanism for an application to specify Quality of Service attributes for a `DDS_DomainParticipant`.

Attributes

`DDS_UserDataQosPolicy user_data` - used to attach additional information to the `DDS_DomainParticipant`. See Section 3.1.3.22 on page 107 for more detailed information about these settings.

`DDS_EntityFactoryQosPolicy entity_factory` - whether a just created `DDS_Entity` should be enabled. See Section 3.1.3.5 on page 79 for more detailed information about these settings.

`DDS_SchedulingQosPolicy watchdog_scheduling` - the scheduling parameters used to create the watchdog thread. See Section 3.1.3.18 on page 104 for more detailed information about these settings.

DDS_SchedulingQosPolicy listener_scheduling - the scheduling parameters used to create the listener thread. See Section 3.1.3.18 on page 104 for more detailed information about these settings.

Detailed Description

A DDS_DomainParticipant will spawn different threads for different purposes:

- A listener thread is spawned to perform the callbacks to all DDS_Listener objects attached to the various DDS_Entities contained in the DDS_DomainParticipant. The scheduling parameters for this thread can be specified in the listener_scheduling field of the DDS_DomainParticipantQos.
- A watchdog thread is spawned to report the the Liveliness of all DDS_Entities contained in the DDS_DomainParticipant whose DDS_LivelinessQosPolicyKind in their DDS_LivelinessQosPolicy is set to DDS_AUTOMATIC_LIVELINESS_QOS. The scheduling parameters for this thread can be specified in the watchdog_scheduling field of the DDS_DomainParticipantQos.

A QosPolicy can be set when the DDS_DomainParticipant is created with the DDS_DomainParticipantFactory_create_participant operation (or modified with the DDS_DomainParticipant_set_qos operation). Both operations take the DDS_DomainParticipantQos struct as a parameter. There may be cases where several policies are in conflict. Consistency checking is performed each time the policies are modified when they are being created and, in case they are already enabled, via the DDS_DomainParticipant_set_qos operation.

Some QosPolicy have “immutable” semantics meaning that they can only be specified either at DDS_DomainParticipant creation time or prior to calling the DDS_DomainParticipant_enable operation on the DDS_DomainParticipant.

The initial value of the default DDS_DomainParticipantQos in the DDS_DomainParticipantFactory are given in the following table:

Table 22: DDS_PARTICIPANT_QOS_DEFAULT

QosPolicy	Attribute	Value
user_data	value.length	0
entity_factory	autoenable_created_entities	TRUE
watchdog_scheduling	scheduling_class.kind	SCHEDULE_DEFAULT
	scheduling_priority_kind.kind	PRIORITY_RELATIVE
	scheduling_priority	0

Table 22: DDS_PARTICIPANT_QOS_DEFAULT

QosPolicy	Attribute	Value
listener_scheduling	scheduling_class.kind	SCHEDULE_DEFAULT
	scheduling_priority_kind.kind	PRIORITY_RELATIVE
	scheduling_priority	0

DDS_PublisherQos

Synopsis

```
#include <dds_dcps.h>
struct DDS_PublisherQos
          { DDS_PresentationQosPolicy    presentation;
            DDS_PartitionQosPolicy       partition;
            DDS_GroupDataQosPolicy       group_data;
            DDS_EntityFactoryQosPolicy   entity_factory; };
```

Description

This struct provides the basic mechanism for an application to specify Quality of Service attributes for a `DDS_Publisher`.

Attributes

`DDS_PresentationQosPolicy presentation` - the dependency of changes to data-instances. See Section 3.1.3.14 on page 92 for more detailed information about these settings.

`DDS_PartitionQosPolicy partition` - the partitions in which the `DDS_Publisher` is active. See Section 3.1.3.13 on page 91 for more detailed information about these settings.

`DDS_GroupDataQosPolicy group_data` - used to attach additional information to the `DDS_Publisher`. See Section 3.1.3.6 on page 80 for more detailed information about these settings.

`DDS_EntityFactoryQosPolicy entity_factory` - whether a just created `DDS_DataWriter` should be enabled. See Section 3.1.3.5 on page 79 for more detailed information about these settings.

Detailed Description

A `QosPolicy` can be set when the `DDS_Publisher` is created with the `DDS_DomainParticipant_create_publisher` operation (or modified with the `DDS_Publisher_set_qos` operation). Both operations take the `DDS_PublisherQos` struct as a parameter. There may be cases where several

policies are in conflict. Consistency checking is performed each time the policies are modified when they are being created and, in case they are already enabled, via the `DDS_Publisher_set_qos` operation.

Some `QosPolicy` have "immutable" semantics meaning that they can only be specified either at `DDS_Publisher` creation time or prior to calling the `DDS_Publisher_enable` operation on the `DDS_Publisher`.

The initial value of the default `DDS_PublisherQos` in the `DDS_DomainParticipant` are given in the following table:

Table 23: DDS_PUBLISHER_QOS_DEFAULT

QosPolicy	Attribute	Value
presentation	access_scope	DDS_INSTANCE_PRESENTATION_QOS
	coherent_access	FALSE
	ordered_access	FALSE
partition	name.length	0
group_data	value.length	0
entity_factory	autoenable_created_entities	TRUE

DDS_SubscriberQos

Synopsis

```
#include <dds_dcps.h>
struct DDS_SubscriberQos
          { DDS_PresentationQosPolicy        presentation;
            DDS_PartitionQosPolicy           partition;
            DDS_GroupDataQosPolicy           group_data;
            DDS_EntityFactoryQosPolicy       entity_factory; };
```

Description

This struct provides the basic mechanism for an application to specify Quality of Service attributes for a `DDS_Subscriber`.

Attributes

`DDS_PresentationQosPolicy presentation` - the dependency of changes to data-instances. See Section 3.1.3.14 on page 92 for more detailed information about these settings.

`DDS_PartitionQosPolicy partition` - the partitions in which the `DDS_Subscriber` is active. See Section 3.1.3.13 on page 91 for more detailed information about these settings.

DDS_GroupDataQosPolicy group_data - used to attach additional information to the DDS_Subscriber. See Section 3.1.3.6 on page 80 for more detailed information about these settings.

DDS_EntityFactoryQosPolicy entity_factory - whether a just created DDS_DataReader should be enabled. See Section 3.1.3.5 on page 79 for more detailed information about these settings.

Detailed Description

A QosPolicy can be set when the DDS_Subscriber is created with the DDS_DomainParticipant_create_subscriber operation (or modified with the DDS_Subscriber_set_qos operation). Both operations take the DDS_SubscriberQos struct as a parameter. There may be cases where several policies are in conflict. Consistency checking is performed each time the policies are modified when they are being created and, in case they are already enabled, via the DDS_Subscriber_set_qos operation.

Some QosPolicy have “immutable” semantics meaning that they can only be specified either at DDS_Subscriber creation time or prior to calling the DDS_Subscriber_enable operation on the DDS_Subscriber.

The initial value of the default DDS_SubscriberQos in the DDS_DomainParticipant are given in the following table:

Table 24: DDS_SUBSCRIBER_QOS_DEFAULT

QosPolicy	Attribute	Value
presentation	access_scope	DDS_INSTANCE_PRESENTATION_QOS
	coherent_access	FALSE
	ordered_access	FALSE
partition	name.length	0
group_data	value.length	0
entity_factory	autoenable_created_entities	TRUE

DDS_TopicQos

Synopsis

```
#include <dds_dcps.h>
struct DDS_TopicQos
         { DDS_TopicDataQosPolicy           topic_data;
           DDS_DurabilityQosPolicy          durability;
           DDS_DurabilityServiceQosPolicy   durability_service;
```

```
DDS_DeadlineQosPolicy            deadline;
DDS_LatencyBudgetQosPolicy       latency_budget;
DDS_LivelinessQosPolicy          liveliness;
DDS_ReliabilityQosPolicy         reliability;
DDS_DestinationOrderQosPolicy    destination_order;
DDS_HistoryQosPolicy             history;
DDS_ResourceLimitsQosPolicy      resource_limits;
DDS_TransportPriorityQosPolicy   transport_priority;
DDS_LifespanQosPolicy            lifespan;
DDS_OwnershipQosPolicy           ownership; };
```

Description

This struct provides the basic mechanism for an application to specify Quality of Service attributes for a `DDS_Topic`.

Attributes

`DDS_TopicDataQosPolicy topic_data` - used to attach additional information to the `DDS_Topic`. See Section 3.1.3.20 on page 106 for more detailed information about these settings.

`DDS_DurabilityQosPolicy durability` - whether the data should be stored for late joining readers. See Section 3.1.3.3 on page 73 for more detailed information about these settings.

`DDS_DurabilityServiceQosPolicy durability_service` - the behaviour of the “transient/persistent service” of the Data Distribution System regarding Transient and Persistent `DDS_Topic` instances. See Section 3.1.3.4 on page 76 for more detailed information about these settings.

`DDS_DeadlineQosPolicy deadline` - the period within which a new sample is expected or written. See Section 3.1.3.1 on page 69 for more detailed information about these settings.

`DDS_LatencyBudgetQosPolicy latency_budget` - used by the Data Distribution Service for optimization. See Section 3.1.3.8 on page 83 for more detailed information about these settings.

`DDS_LivelinessQosPolicy liveliness` - the way the liveliness of the `DDS_Topic` is asserted to the Data Distribution Service. See Section 3.1.3.10 on page 85 for more detailed information about these settings.

`DDS_ReliabilityQosPolicy reliability` - the reliability of the data distribution. See Section 3.1.3.16 on page 100 for more detailed information about these settings.

`DDS_DestinationOrderQosPolicy destination_order` - the order in which the `DDS_DataReader` timely orders the data. See Section 3.1.3.2 on page 71 for more detailed information about these settings.

DDS_HistoryQosPolicy history - how samples should be stored. See Section 3.1.3.7 on page 80 for more detailed information about these settings.

DDS_ResourceLimitsQosPolicy resource_limits - the maximum amount of resources to be used. See Section 3.1.3.17 on page 102 for more detailed information about these settings.

DDS_TransportPriorityQosPolicy transport_priority - a priority hint for the underlying transport layer. See Section 3.1.3.21 on page 107 for more detailed information about these settings.

DDS_LifespanQosPolicy lifespan - the maximum duration of validity of the data written by a `DDS_DataWriter`. See Section 3.1.3.9 on page 84 for more detailed information about these settings.

DDS_OwnershipQosPolicy ownership - whether a `DDS_DataWriter` exclusively owns an instance. See Section 3.1.3.11 on page 87 for more detailed information about these settings.

Detailed Description

A `QosPolicy` can be set when the `DDS_Topic` is created with the `DDS_DomainParticipant_create_topic` operation (or modified with the `DDS_Topic_set_qos` operation). Both operations take the `DDS_TopicQos` struct as a parameter. There may be cases where several policies are in conflict. Consistency checking is performed each time the policies are modified when they are being created and, in case they are already enabled, via the `DDS_Topic_set_qos` operation.

Some `QosPolicy` have “immutable” semantics meaning that they can only be specified either at `DDS_Topic` creation time or prior to calling the `DDS_Topic_enable` operation on the `DDS_Topic`.

The initial value of the default `DDS_TopicQos` in the `DDS_DomainParticipant` are given in the following table:

Table 25: DDS_TOPIC_QOS_DEFAULT

QosPolicy	Attribute	Value
topic_data	value.length	0
durability	kind	DDS_VOLATILE_DURABILITY_QOS

Table 25: DDS_TOPIC_QOS_DEFAULT (Continued)

QosPolicy	Attribute	Value
durability_service	service_cleanup_delay	0
	history_kind	DDS_KEEP_LAST_HISTORY_QOS
	history_depth	1
	max_samples	DDS_LENGTH_UNLIMITED
	max_instances	DDS_LENGTH_UNLIMITED
	max_samples_per_instance	DDS_LENGTH_UNLIMITED
deadline	period	DDS_DURATION_INFINITE
latency_budget	duration	0
liveliness	kind	DDS_AUTOMATIC_LIVELINESS_QOS
	lease_duration	DDS_DURATION_INFINITE
reliability	kind	DDS_BEST_EFFORT_RELIABILITY_QOS
	max_blocking_time	100 ms
	synchronous	FALSE
destination_order	kind	DDS_BY_RECEPTION_ TIMESTAMP_DESTINATIONORDER_QOS
history	kind	DDS_KEEP_LAST_HISTORY_QOS
	depth	1
resource_limits	max_samples	DDS_LENGTH_UNLIMITED
	max_instances	DDS_LENGTH_UNLIMITED
	max_samples_per_instance	DDS_LENGTH_UNLIMITED
transport_priority	value	0
lifespan	duration	DDS_DURATION_INFINITE
ownership	kind	DDS_SHARED_OWNERSHIP_QOS

Appendix

B API Constants and Types

These constants and types are taken from the `dds_dcps.h` include file.

```
/*  Duration and Time
*/
  struct DDS_Duration_t
  {
    DDS_long sec;
    DDS_unsigned_long nanosec;
  };

  #define DDS_DURATION_INFINITE_SEC                0x7fffffff
  #define DDS_DURATION_INFINITE_NSEC               0x7fffffffU
  #define DDS_DURATION_ZERO_SEC                     0
  #define DDS_DURATION_ZERO_NSEC                    0U
  #define DDS_DURATION_INFINITE                    {
              DDS_DURATION_INFINITE_SEC,
              DDS_DURATION_INFINITE_NSEC }
  #define DDS_DURATION_ZERO                        {
              DDS_DURATION_ZERO_SEC,
              DDS_DURATION_ZERO_NSEC }

  struct DDS_Time_t
  {
    DDS_long sec;
    DDS_unsigned_long nanosec;
  };

/*
 * Pre-defined values
 *
*/
  #define DDS_HANDLE_NIL                          DDS_HANDLE_NIL_NATIVE
  #define DDS_LENGTH_UNLIMITED                     -1
  #define DDS_TIMESTAMP_INVALID_SEC                -1
  #define DDS_TIMESTAMP_INVALID_NSEC               4294967295U
  #define DDS_TIMESTAMP_INVALID                    {
              DDS_TIMESTAMP_INVALID_SEC,
              DDS_TIMESTAMP_INVALID_NSEC }

/* -----
 * Return codes
 * ----- */
  #define DDS_RETCODE_OK                           0
```

```
  #define DDS_RETCODE_ERROR                       1
  #define DDS_RETCODE_UNSUPPORTED                 2
  #define DDS_RETCODE_BAD_PARAMETER               3
  #define DDS_RETCODE_PRECONDITION_NOT_MET        4
  #define DDS_RETCODE_OUT_OF_RESOURCES            5
  #define DDS_RETCODE_NOT_ENABLED                 6
  #define DDS_RETCODE_IMMUTABLE_POLICY            7
  #define DDS_RETCODE_INCONSISTENT_POLICY         8
  #define DDS_RETCODE_ALREADY_DELETED             9
  #define DDS_RETCODE_TIMEOUT                     10
  #define DDS_RETCODE_NO_DATA                     11
  #define DDS_RETCODE_ILLEGAL_OPERATION           12


/* -----
 * DDS_Status to support listeners and conditions
 * ----- */
  #define DDS_INCONSISTENT_TOPIC_STATUS                      1U
  #define DDS_OFFERED_DEADLINE_MISSED_STATUS                 2U
  #define DDS_REQUESTED_DEADLINE_MISSED_STATUS               4U
  #define DDS_OFFERED_INCOMPATIBLE_QOS_STATUS               32U
  #define DDS_REQUESTED_INCOMPATIBLE_QOS_STATUS             64U
  #define DDS_SAMPLE_LOST_STATUS                           128U
  #define DDS_SAMPLE_REJECTED_STATUS                       256U
  #define DDS_DATA_ON_READERS_STATUS                       512U
  #define DDS_DATA_AVAILABLE_STATUS                       1024U
  #define DDS_LIVELINESS_LOST_STATUS                      2048U
  #define DDS_LIVELINESS_CHANGED_STATUS                   4096U
  #define DDS_PUBLICATION_MATCHED_STATUS                  8192U
  #define DDS_SUBSCRIPTION_MATCHED_STATUS                16384U

  #define DDS_ANY_STATUS                                 0x7FE7
  #define DDS_STATUS_MASK_ANY_V1_2                       0x7FE7
  #define DDS_STATUS_MASK_NONE                              0x0

/*
 * States
 *  */
/*
 * Sample states to support reads
 */
  #define DDS_READ_SAMPLE_STATE                          1U
  #define DDS_NOT_READ_SAMPLE_STATE                      2U
/*
 * This is a bit-mask DDS_SampleStateKind
 */
  #define DDS_ANY_SAMPLE_STATE                           65535U

/*
```

```
 * View states to support reads
 */
  #define DDS_NEW_VIEW_STATE                              1U
  #define DDS_NOT_NEW_VIEW_STATE                          2U
/*
 * This is a bit-mask DDS_ViewStateKind
 */
  #define DDS_ANY_VIEW_STATE                              65535U

/*
 * Instance states to support reads
 */
  #define DDS_ALIVE_INSTANCE_STATE                        1U
  #define DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE           2U
  #define DDS_NOT_ALIVE_NO_WRITERS_INSTANCE_STATE         4U

/*
 * This is a bit-mask DDS_InstanceStateKind
 */
  #define DDS_ANY_INSTANCE_STATE                          65535U
  #define DDS_NOT_ALIVE_INSTANCE_STATE                    6U

/*
 * Participant Factory define
 */
  #define TheParticipantFactory
          (DDS_DomainParticipantFactory_get_instance())

/*
 * Qos defines
 *  */
#define DDS_PARTICIPANT_QOS_DEFAULT        NULL
#define DDS_TOPIC_QOS_DEFAULT              NULL
#define DDS_PUBLISHER_QOS_DEFAULT          NULL
#define DDS_SUBSCRIBER_QOS_DEFAULT         NULL
#define DDS_DATAREADER_QOS_DEFAULT         NULL
#define DDS_DATAWRITER_QOS_DEFAULT         NULL
#define DDS_DATAWRITER_QOS_USE_TOPIC_QOS   ((DDS_DataWriterQos *)-1)
#define DDS_DATAREADER_QOS_USE_TOPIC_QOS   ((DDS_DataReaderQos *)-1)

/* QosPolicy
 * /
  #define DDS_USERDATA_QOS_POLICY_NAME          "UserData"
  #define DDS_DURABILITY_QOS_POLICY_NAME        "Durability"
  #define DDS_PRESENTATION_QOS_POLICY_NAME      "Presentation"
  #define DDS_DEADLINE_QOS_POLICY_NAME          "Deadline"
  #define DDS_LATENCYBUDGET_QOS_POLICY_NAME     "LatencyBudget"
  #define DDS_OWNERSHIP_QOS_POLICY_NAME         "Ownership"
  #define DDS_OWNERSHIPSTRENGTH_QOS_POLICY_NAME "OwnershipStrength"
```

```
#define DDS_LIVELINESS_QOS_POLICY_NAME        "Liveliness"
#define DDS_TIMEBASEDFILTER_QOS_POLICY_NAME   "TimeBasedFilter"
#define DDS_PARTITION_QOS_POLICY_NAME         "Partition"
#define DDS_RELIABILITY_QOS_POLICY_NAME       "Reliability"
#define DDS_DESTINATIONORDER_QOS_POLICY_NAME  "DestinationOrder"
#define DDS_HISTORY_QOS_POLICY_NAME           "History"
#define DDS_RESOURCELIMITS_QOS_POLICY_NAME    "ResourceLimits"
#define DDS_ENTITYFACTORY_QOS_POLICY_NAME     "EntityFactory"
#define DDS_WRITERDATALIFECYCLE_QOS_POLICY_NAME
     "WriterDataLifecycle"
#define DDS_READERDATALIFECYCLE_QOS_POLICY_NAME
     "ReaderDataLifecycle"
#define DDS_TOPICDATA_QOS_POLICY_NAME          "TopicData"
#define DDS_GROUPDATA_QOS_POLICY_NAME          "GroupData"
#define DDS_TRANSPORTPRIORITY_QOS_POLICY_NAME  "TransportPriority"
#define DDS_LIFESPAN_QOS_POLICY_NAME           "Lifespan"
#define DDS_DURABILITYSERVICE_QOS_POLICY_NAME  "DurabilityService"

#define DDS_INVALID_QOS_POLICY_ID                          0
#define DDS_USERDATA_QOS_POLICY_ID                     1
#define DDS_DURABILITY_QOS_POLICY_ID                   2
#define DDS_PRESENTATION_QOS_POLICY_ID                 3
#define DDS_DEADLINE_QOS_POLICY_ID                     4
#define DDS_LATENCYBUDGET_QOS_POLICY_ID                5
#define DDS_OWNERSHIP_QOS_POLICY_ID                    6
#define DDS_OWNERSHIPSTRENGTH_QOS_POLICY_ID            7
#define DDS_LIVELINESS_QOS_POLICY_ID                   8
#define DDS_TIMEBASEDFILTER_QOS_POLICY_ID              9
#define DDS_PARTITION_QOS_POLICY_ID                    10
#define DDS_RELIABILITY_QOS_POLICY_ID                  11
#define DDS_DESTINATIONORDER_QOS_POLICY_ID             12
#define DDS_HISTORY_QOS_POLICY_ID                      13
#define DDS_RESOURCELIMITS_QOS_POLICY_ID               14
#define DDS_ENTITYFACTORY_QOS_POLICY_ID                15
#define DDS_WRITERDATALIFECYCLE_QOS_POLICY_ID          16
#define DDS_READERDATALIFECYCLE_QOS_POLICY_ID          17
#define DDS_TOPICDATA_QOS_POLICY_ID                    18
#define DDS_GROUPDATA_QOS_POLICY_ID                    19
#define DDS_TRANSPORTPRIORITY_QOS_POLICY_ID            20
#define DDS_LIFESPAN_QOS_POLICY_ID                     21
#define DDS_DURABILITYSERVICE_QOS_POLICY_ID            22
```

Appendix

C Platform Specific IDL Interface

The IDL code in the next paragraphs are taken from the *OMG C Language Mapping Specification*.

dds_dcps.idl

```
#define DOMAINID_TYPE_NATIVE long
#define HANDLE_TYPE_NATIVElong long
#define HANDLE_NIL_NATIVE0
#define BUILTIN_TOPIC_KEY_TYPE_NATIVElong
#define TheParticipantFactory
#define PARTICIPANT_QOS_DEFAULT
#define TOPIC_QOS_DEFAULT
#define PUBLISHER_QOS_DEFAULT
#define SUBSCRIBER_QOS_DEFAULT
#define DATAWRITER_QOS_DEFAULT
#define DATAREADER_QOS_DEFAULT
#define DATAWRITER_QOS_USE_TOPIC_QOS
#define DATAREADER_QOS_USE_TOPIC_QOS
module DDS {
    typedef DOMAINID_TYPE_NATIVE DomainId_t;
    typedef HANDLE_TYPE_NATIVE InstanceHandle_t;
    typedef BUILTIN_TOPIC_KEY_TYPE_NATIVE BuiltinTopicKey_t[3];
    typedef sequence<InstanceHandle_t> InstanceHandleSeq;
    typedef long ReturnCode_t;
    typedef long QosPolicyId_t;
    typedef sequence<string> StringSeq;
    struct Duration_t {
   long sec;
   unsigned long nanosec;
    };
    struct Time_t {
   long sec;
   unsigned long nanosec;
    };
    //
    // Pre-defined values
    //
    const InstanceHandle_t HANDLE_NIL= HANDLE_NIL_NATIVE;
    const long LENGTH_UNLIMITED= -1;
    const long DURATION_INFINITE_SEC= 0x7fffffff;
    const unsigned long DURATION_INFINITE_NSEC= 0x7fffffff;
    const long DURATION_ZERO_SEC= 0;
```

```
const unsigned long DURATION_ZERO_NSEC= 0;
const long TIMESTAMP_INVALID_SEC= -1;
const unsigned long TIMESTAMP_INVALID_NSEC= 0xffffffff;
const DomainId_t DOMAIN_ID_DEFAULT= 0x7fffffff;
//
// Return codes
//
const ReturnCode_t RETCODE_OK                    = 0;
const ReturnCode_t RETCODE_ERROR                 = 1;
const ReturnCode_t RETCODE_UNSUPPORTED           = 2;
const ReturnCode_t RETCODE_BAD_PARAMETER         = 3;
const ReturnCode_t RETCODE_PRECONDITION_NOT_MET  = 4;
const ReturnCode_t RETCODE_OUT_OF_RESOURCES      = 5;
const ReturnCode_t RETCODE_NOT_ENABLED           = 6;
const ReturnCode_t RETCODE_IMMUTABLE_POLICY      = 7;
const ReturnCode_t RETCODE_INCONSISTENT_POLICY   = 8;
const ReturnCode_t RETCODE_ALREADY_DELETED       = 9;
const ReturnCode_t RETCODE_TIMEOUT               = 10;
const ReturnCode_t RETCODE_NO_DATA               = 11;
const ReturnCode_t RETCODE_ILLEGAL_OPERATION     = 12;

//
// Status to support listeners and conditions
//
typedef unsigned long StatusKind;
typedef unsigned long StatusMask; // bit-mask StatusKind
const StatusKind INCONSISTENT_TOPIC_STATUS       = 0x0001 << 0;
const StatusKind OFFERED_DEADLINE_MISSED_STATUS  = 0x0001 << 1;
const StatusKind REQUESTED_DEADLINE_MISSED_STATUS= 0x0001 << 2;
const StatusKind OFFERED_INCOMPATIBLE_QOS_STATUS = 0x0001 << 5;
const StatusKind REQUESTED_INCOMPATIBLE_QOS_STATUS= 0x0001 << 6;
const StatusKind SAMPLE_LOST_STATUS              = 0x0001 << 7;
const StatusKind SAMPLE_REJECTED_STATUS          = 0x0001 << 8;
const StatusKind DATA_ON_READERS_STATUS          = 0x0001 << 9;
const StatusKind DATA_AVAILABLE_STATUS           = 0x0001 << 10;
const StatusKind LIVELINESS_LOST_STATUS          = 0x0001 << 11;
const StatusKind LIVELINESS_CHANGED_STATUS       = 0x0001 << 12;
const StatusKind PUBLICATION_MATCHED_STATUS      = 0x0001 << 13;
const StatusKind SUBSCRIPTION_MATCHED_STATUS     = 0x0001 << 14;
struct InconsistentTopicStatus {
   long total_count;
   long total_count_change;
};
struct SampleLostStatus {
   long total_count;
   long total_count_change;
};
enum SampleRejectedStatusKind {
   NOT_REJECTED,
   REJECTED_BY_INSTANCE_LIMIT,
```

```
   REJECTED_BY_SAMPLES_LIMIT,
   REJECTED_BY_SAMPLES_PER_INSTANCE_LIMIT
};
struct SampleRejectedStatus {
   long total_count;
   long total_count_change;
   SampleRejectedStatusKind last_reason;
   InstanceHandle_t last_instance_handle;
};
struct LivelinessLostStatus {
   long total_count;
   long total_count_change;
};
struct LivelinessChangedStatus {
   long alive_count;
   long not_alive_count;
   long alive_count_change;
   long not_alive_count_change;
   InstanceHandle_t last_publication_handle;
};
struct OfferedDeadlineMissedStatus {
   long total_count;
   long total_count_change;
   InstanceHandle_t last_instance_handle;
};
struct RequestedDeadlineMissedStatus {
   long total_count;
   long total_count_change;
   InstanceHandle_t last_instance_handle;
};
struct QosPolicyCount {
   QosPolicyId_t policy_id;
   long count;
};
typedef sequence<QosPolicyCount> QosPolicyCountSeq;
struct OfferedIncompatibleQosStatus {
   long total_count;
   long total_count_change;
   QosPolicyId_t last_policy_id;
   QosPolicyCountSeq policies;
};
struct RequestedIncompatibleQosStatus {
   long total_count;
   long total_count_change;
   QosPolicyId_t last_policy_id;
   QosPolicyCountSeq policies;
};
struct PublicationMatchedStatus {
   long total_count;
   long total_count_change;
```

```
   long current_count;
   long current_count_change;
   InstanceHandle_t last_subscription_handle;
};
struct SubscriptionMatchedStatus {
   long total_count;
   long total_count_change;
   long current_count;
   long current_count_change;
   InstanceHandle_t last_publication_handle;
};
//
// Listeners
//
interface Listener;
interface Entity;
interface TopicDescription;
interface Topic;
interface ContentFilteredTopic;
interface MultiTopic;
interface DataWriter;
interface DataReader;
interface Subscriber;
interface Publisher;
typedef sequence<Topic> TopicSeq;
typedef sequence<DataReader> DataReaderSeq;
interface Listener {
};
interface TopicListener : Listener {
void
   on_inconsistent_topic(
       in Topic the_topic,
       in InconsistentTopicStatus status);
};
interface DataWriterListener : Listener {
void
   on_offered_deadline_missed(
       in DataWriter writer,
       in OfferedDeadlineMissedStatus status);
void
   on_offered_incompatible_qos(
       in DataWriter writer,
       in OfferedIncompatibleQosStatus status);
void
   on_liveliness_lost(
       in DataWriter writer,
       in LivelinessLostStatus status);
void
   on_publication_matched(
       in DataWriter writer,
```

```
        in PublicationMatchedStatus status);
 };
 interface PublisherListener : DataWriterListener {
 };
 interface DataReaderListener : Listener {
void
   on_requested_deadline_missed(
        in DataReader reader,
        in RequestedDeadlineMissedStatus status);
void
   on_requested_incompatible_qos(
        in DataReader reader,
        in RequestedIncompatibleQosStatus status);
void
   on_sample_rejected(
        in DataReader reader,
        in SampleRejectedStatus status);
void
   on_liveliness_changed(
        in DataReader reader,
        in LivelinessChangedStatus status);
void
   on_data_available(
        in DataReader reader);
void
   on_subscription_matched(
        in DataReader reader,
        in SubscriptionMatchedStatus status);
void
   on_sample_lost(
        in DataReader reader,
        in SampleLostStatus status);
 };
 interface SubscriberListener : DataReaderListener {
void
   on_data_on_readers(
        in Subscriber subs);
 };
 interface DomainParticipantListener : TopicListener,
                       PublisherListener,
                       SubscriberListener {
 };
 //
 // Conditions
 //
 interface Condition {
boolean
get_trigger_value();
 };
 typedef sequence<Condition> ConditionSeq;
```

```
 interface WaitSet {
ReturnCode_t
wait(
    inout ConditionSeq active_conditions,
    in Duration_t timeout);
ReturnCode_t
attach_condition(
    in Condition cond);
ReturnCode_t
detach_condition(
    in Condition cond);
ReturnCode_t
get_conditions(
    inout ConditionSeq attached_conditions);
 };
 interface GuardCondition : Condition {
ReturnCode_t
set_trigger_value(
    in boolean value);
 };
 interface StatusCondition : Condition {
StatusMask
get_enabled_statuses();
ReturnCode_t
set_enabled_statuses(
    in StatusMask mask);
Entity
get_entity();
 };
 // Sample states to support reads
 typedef unsigned long SampleStateKind;
 typedef sequence <SampleStateKind> SampleStateSeq;
 const SampleStateKind READ_SAMPLE_STATE = 0x0001 << 0;
 const SampleStateKind NOT_READ_SAMPLE_STATE = 0x0001 << 1;
 // This is a bit-mask SampleStateKind
 typedef unsigned long SampleStateMask;
 const SampleStateMask ANY_SAMPLE_STATE = 0xffff;
 // View states to support reads
 typedef unsigned long ViewStateKind;
 typedef sequence<ViewStateKind> ViewStateSeq;
 const ViewStateKind NEW_VIEW_STATE = 0x0001 << 0;
 const ViewStateKind NOT_NEW_VIEW_STATE = 0x0001 << 1;
 // This is a bit-mask ViewStateKind
 typedef unsigned long ViewStateMask;
 const ViewStateMask ANY_VIEW_STATE = 0xffff;
 // Instance states to support reads
 typedef unsigned long InstanceStateKind;
 typedef sequence<InstanceStateKind> InstanceStateSeq;
 const InstanceStateKind ALIVE_INSTANCE_STATE = 0x0001 << 0;
```

```
const InstanceStateKind NOT_ALIVE_DISPOSED_INSTANCE_STATE = 0x0001
        << 1;
 const InstanceStateKind NOT_ALIVE_NO_WRITERS_INSTANCE_STATE =
        0x0001 << 2;
 // This is a bit-mask InstanceStateKind
 typedef unsigned long InstanceStateMask;
 const InstanceStateMask ANY_INSTANCE_STATE = 0xffff;
 const InstanceStateMask NOT_ALIVE_INSTANCE_STATE = 0x006;
 interface ReadCondition : Condition {
SampleStateMask
get_sample_state_mask();
ViewStateMask
get_view_state_mask();
InstanceStateMask
get_instance_state_mask();
DataReader
get_datareader();
 };
 interface QueryCondition : ReadCondition {
string
get_query_expression();
ReturnCode_t
get_query_parameters(
    inout StringSeq query_parameters);
ReturnCode_t
set_query_parameters(
    in StringSeq query_parameters);
 };
 //
 // Qos
 //
 const string USERDATA_QOS_POLICY_NAME         = "UserData";
 const string DURABILITY_QOS_POLICY_NAME       = "Durability";
 const string PRESENTATION_QOS_POLICY_NAME     = "Presentation";
 const string DEADLINE_QOS_POLICY_NAME         = "Deadline";
 const string LATENCYBUDGET_QOS_POLICY_NAME    = "LatencyBudget";
 const string OWNERSHIP_QOS_POLICY_NAME        = "Ownership";
 const string OWNERSHIPSTRENGTH_QOS_POLICY_NAME=
        "OwnershipStrength";
 const string LIVELINESS_QOS_POLICY_NAME       = "Liveliness";
 const string TIMEBASEDFILTER_QOS_POLICY_NAME= "TimeBasedFilter";
 const string PARTITION_QOS_POLICY_NAME        = "Partition";
 const string RELIABILITY_QOS_POLICY_NAME      = "Reliability";
 const string DESTINATIONORDER_QOS_POLICY_NAME =
        "DestinationOrder";
 const string HISTORY_QOS_POLICY_NAME          = "History";
 const string RESOURCELIMITS_QOS_POLICY_NAME= "ResourceLimits";
 const string ENTITYFACTORY_QOS_POLICY_NAME    = "EntityFactory";
 const string WRITERDATALIFECYCLE_QOS_POLICY_NAM=
        "WriterDataLifecycle";
```

```
const string READERDATALIFECYCLE_QOS_POLICY_NAM=
       "ReaderDataLifecycle";
const string TOPICDATA_QOS_POLICY_NAME        = "TopicData";
const string GROUPDATA_QOS_POLICY_NAME        = "GroupData";
const string TRANSPORTPRIORITY_QOS_POLICY_NAME=
       "TransportPriority";
const string LIFESPAN_QOS_POLICY_NAME         = "Lifespan";
const string DURABILITYSERVICE_QOS_POLICY_NAME=
       "DurabilityService";
const QosPolicyId_t INVALID_QOS_POLICY_ID            = 0;
const QosPolicyId_t USERDATA_QOS_POLICY_ID           = 1;
const QosPolicyId_t DURABILITY_QOS_POLICY_ID         = 2;
const QosPolicyId_t PRESENTATION_QOS_POLICY_ID       = 3;
const QosPolicyId_t DEADLINE_QOS_POLICY_ID           = 4;
const QosPolicyId_t LATENCYBUDGET_QOS_POLICY_ID      = 5;
const QosPolicyId_t OWNERSHIP_QOS_POLICY_ID          = 6;
const QosPolicyId_t OWNERSHIPSTRENGTH_QOS_POLICY_ID  = 7;
const QosPolicyId_t LIVELINESS_QOS_POLICY_ID         = 8;
const QosPolicyId_t TIMEBASEDFILTER_QOS_POLICY_ID    = 9;
const QosPolicyId_t PARTITION_QOS_POLICY_ID          = 10;
const QosPolicyId_t RELIABILITY_QOS_POLICY_ID        = 11;
const QosPolicyId_t DESTINATIONORDER_QOS_POLICY_ID   = 12;
const QosPolicyId_t HISTORY_QOS_POLICY_ID            = 13;
const QosPolicyId_t RESOURCELIMITS_QOS_POLICY_ID     = 14;
const QosPolicyId_t ENTITYFACTORY_QOS_POLICY_ID      = 15;
const QosPolicyId_t WRITERDATALIFECYCLE_QOS_POLICY_ID= 16;
const QosPolicyId_t READERDATALIFECYCLE_QOS_POLICY_ID= 17;
const QosPolicyId_t TOPICDATA_QOS_POLICY_ID          = 18;
const QosPolicyId_t GROUPDATA_QOS_POLICY_ID          = 19;
const QosPolicyId_t TRANSPORTPRIORITY_QOS_POLICY_ID  = 20;
const QosPolicyId_t LIFESPAN_QOS_POLICY_ID           = 21;
const QosPolicyId_t DURABILITYSERVICE_QOS_POLICY_ID  = 22;
struct UserDataQosPolicy {
sequence<octet> value;
};
struct TopicDataQosPolicy {
sequence<octet> value;
};
struct GroupDataQosPolicy {
sequence<octet> value;
};
struct TransportPriorityQosPolicy {
long value;
};
struct LifespanQosPolicy {
Duration_t duration;
};
enum DurabilityQosPolicyKind {
VOLATILE_DURABILITY_QOS,
TRANSIENT_LOCAL_DURABILITY_QOS,
```

```
TRANSIENT_DURABILITY_QOS,
PERSISTENT_DURABILITY_QOS
 };
 struct DurabilityQosPolicy {
DurabilityQosPolicyKind kind;
 };
 enum PresentationQosPolicyAccessScopeKind {
INSTANCE_PRESENTATION_QOS,
TOPIC_PRESENTATION_QOS,
GROUP_PRESENTATION_QOS
 };
 struct PresentationQosPolicy {
    PresentationQosPolicyAccessScopeKind access_scope;
    boolean coherent_access;
    boolean ordered_access;
 };
 struct DeadlineQosPolicy {
    Duration_t period;
 };
 struct LatencyBudgetQosPolicy {
    Duration_t duration;
 };
 enum OwnershipQosPolicyKind {
    SHARED_OWNERSHIP_QOS,
    EXCLUSIVE_OWNERSHIP_QOS
 };
 struct OwnershipQosPolicy {
    OwnershipQosPolicyKind kind;
 };
 struct OwnershipStrengthQosPolicy {
    long value;
 };
 enum LivelinessQosPolicyKind {
    AUTOMATIC_LIVELINESS_QOS,
    MANUAL_BY_PARTICIPANT_LIVELINESS_QOS,
    MANUAL_BY_TOPIC_LIVELINESS_QOS
 };
 struct LivelinessQosPolicy {
    LivelinessQosPolicyKind kind;
    Duration_t lease_duration;
 };
 struct TimeBasedFilterQosPolicy {
    Duration_t minimum_separation;
 };
 struct PartitionQosPolicy {
    StringSeq name;
 };
 enum ReliabilityQosPolicyKind {
    BEST_EFFORT_RELIABILITY_QOS,
    RELIABLE_RELIABILITY_QOS
```

```
};
struct ReliabilityQosPolicy {
   ReliabilityQosPolicyKind kind;
   Duration_t max_blocking_time;
   boolean synchronous;
};
enum DestinationOrderQosPolicyKind {
   BY_RECEPTION_TIMESTAMP_DESTINATIONORDER_QOS,
   BY_SOURCE_TIMESTAMP_DESTINATIONORDER_QOS
};
struct DestinationOrderQosPolicy {
   DestinationOrderQosPolicyKind kind;
};
enum HistoryQosPolicyKind {
   KEEP_LAST_HISTORY_QOS,
   KEEP_ALL_HISTORY_QOS
};
struct HistoryQosPolicy {
   HistoryQosPolicyKind kind;
   long depth;
};
struct ResourceLimitsQosPolicy {
   long max_samples;
   long max_instances;
   long max_samples_per_instance;
};
struct EntityFactoryQosPolicy {
   boolean autoenable_created_entities;
};
struct WriterDataLifecycleQosPolicy {
   boolean autodispose_unregistered_instances;
};
enum DDS_InvalidSampleVisibilityQosPolicyKind {
  DDS_NO_INVALID_SAMPLES,
  DDS_MINIMUM_INVALID_SAMPLES,
  DDS_ALL_INVALID_SAMPLES
}
struct DDS_InvalidSampleVisibilityQosPolicy {
  DDS_InvalidSampleVisibilityQosPolicyKind kind;
}
struct DDS_ReaderDataLifecycleQosPolicy {
  DDS_Duration_t autopurge_nowriter_samples_delay;
  DDS_Duration_t autopurge_disposed_samples_delay;
  DDS_boolean enable_invalid_samples; /* deprecated */
  DDS_InvalidSampleVisibilityQosPolicy invalid_sample_visibility;
}
struct DurabilityServiceQosPolicy {
    Duration_t service_cleanup_delay;
    HistoryQosPolicyKind history_kind;
    long history_depth;
```

```
    long max_samples;
    long max_instances;
    long max_samples_per_instance;
};
struct DomainParticipantFactoryQos {
    EntityFactoryQosPolicy entity_factory;
};
struct DomainParticipantQos {
   UserDataQosPolicy user_data;
   EntityFactoryQosPolicy entity_factory;
};
struct TopicQos {
   TopicDataQosPolicy topic_data;
   DurabilityQosPolicy durability;
   DurabilityServiceQosPolicy durability_service;
   DeadlineQosPolicy deadline;
   LatencyBudgetQosPolicy latency_budget;
   LivelinessQosPolicy liveliness;
   ReliabilityQosPolicy reliability;
   DestinationOrderQosPolicy destination_order;
   HistoryQosPolicy history;
   ResourceLimitsQosPolicy resource_limits;
   TransportPriorityQosPolicy transport_priority;
   LifespanQosPolicy lifespan;
   OwnershipQosPolicy ownership;
};
struct DataWriterQos {
   DurabilityQosPolicy durability;
   DeadlineQosPolicy deadline;
   LatencyBudgetQosPolicy latency_budget;
   LivelinessQosPolicy liveliness;
   ReliabilityQosPolicy reliability;
   DestinationOrderQosPolicy destination_order;
   HistoryQosPolicy history;
   ResourceLimitsQosPolicy resource_limits;
   TransportPriorityQosPolicy transport_priority;
   LifespanQosPolicy lifespan;
   UserDataQosPolicy user_data;
   DDS_OwnershipQosPolicy ownership;
   OwnershipStrengthQosPolicy ownership_strength;
   WriterDataLifecycleQosPolicy writer_data_lifecycle;
};
struct PublisherQos {
   PresentationQosPolicy presentation;
   PartitionQosPolicy partition;
   GroupDataQosPolicy group_data;
   EntityFactoryQosPolicy entity_factory;
};
struct DataReaderQos {
   DurabilityQosPolicy durability;
```

```
   DeadlineQosPolicy deadline;
   LatencyBudgetQosPolicy latency_budget;
   LivelinessQosPolicy liveliness;
   ReliabilityQosPolicy reliability;
   DestinationOrderQosPolicy destination_order;
   HistoryQosPolicy history;
   ResourceLimitsQosPolicy resource_limits;
   UserDataQosPolicy user_data;
   DDS_OwnershipQosPolicy ownership;
   TimeBasedFilterQosPolicy time_based_filter;
   ReaderDataLifecycleQosPolicy reader_data_lifecycle;
};
struct SubscriberQos {
   PresentationQosPolicy presentation;
   PartitionQosPolicy partition;
   GroupDataQosPolicy group_data;
   EntityFactoryQosPolicy entity_factory;
};
//
struct ParticipantBuiltinTopicData {
   BuiltinTopicKey_t key;
   UserDataQosPolicy user_data;
};
struct TopicBuiltinTopicData {
   BuiltinTopicKey_t key;
   string name;
   string type_name;
   DurabilityQosPolicy durability;
   DeadlineQosPolicy deadline;
   LatencyBudgetQosPolicy latency_budget;
   LivelinessQosPolicy liveliness;
   ReliabilityQosPolicy reliability;
   TransportPriorityQosPolicy transport_priority;
   LifespanQosPolicy lifespan;
   DestinationOrderQosPolicy destination_order;
   HistoryQosPolicy history;
   ResourceLimitsQosPolicy resource_limits;
   OwnershipQosPolicy ownership;
   TopicDataQosPolicy topic_data;
};
struct PublicationBuiltinTopicData {
   BuiltinTopicKey_t key;
   BuiltinTopicKey_t participant_key;
   string topic_name;
   string type_name;
   DurabilityQosPolicy durability;
   DeadlineQosPolicy deadline;
   LatencyBudgetQosPolicy latency_budget;
   LivelinessQosPolicy liveliness;
   ReliabilityQosPolicy reliability;
```

```
   LifespanQosPolicy lifespan;
   UserDataQosPolicy user_data;
   OwnershipStrengthQosPolicy ownership_strength;
   PresentationQosPolicy presentation;
   PartitionQosPolicy partition;
   TopicDataQosPolicy topic_data;
   GroupDataQosPolicy group_data;
};
struct SubscriptionBuiltinTopicData {
   BuiltinTopicKey_t key;
   BuiltinTopicKey_t participant_key;
   string topic_name;
   string type_name;
   DurabilityQosPolicy durability;
   DeadlineQosPolicy deadline;
   LatencyBudgetQosPolicy latency_budget;
   LivelinessQosPolicy liveliness;
   ReliabilityQosPolicy reliability;
   DestinationOrderQosPolicy destination_order;
   UserDataQosPolicy user_data;
   TimeBasedFilterQosPolicy time_based_filter;
   PresentationQosPolicy presentation;
   PartitionQosPolicy partition;
   TopicDataQosPolicy topic_data;
   GroupDataQosPolicy group_data;
};
//
interface Entity {
//  ReturnCode_t
//  set_qos(
//      in EntityQos qos);
//
//  ReturnCode_t
//  get_qos(
//      inout EntityQos qos);
//
//  ReturnCode_t
//  set_listener(
//      in Listener l,
//      in StatusMask mask);
//
//  Listener
//  get_listener();
ReturnCode_t
enable();
StatusCondition
get_statuscondition();
StatusMask
get_status_changes();
};
```

```
 //
 interface DomainParticipant : Entity {
     // Factory interfaces
Publisher
create_publisher(
    in PublisherQos qos,
    in PublisherListener a_listener,
    in StatusMask mask);
ReturnCode_t
delete_publisher(
    in Publisher p);
Subscriber
create_subscriber(
    in SubscriberQos qos,
    in SubscriberListener a_listener,
    in StatusMask mask);
ReturnCode_t
delete_subscriber(
    in Subscriber s);
Subscriber
get_builtin_subscriber();
Topic
create_topic(
    in string topic_name,
    in string type_name,
    in TopicQos qos,
    in TopicListener a_listener,
    in StatusMask mask);
ReturnCode_t
delete_topic(
    in Topic a_topic);
Topic
find_topic(
    in string topic_name,
    in Duration_t timeout);
TopicDescription
lookup_topicdescription(
    in string name);
ContentFilteredTopic
create_contentfilteredtopic(
    in string name,
    in Topic related_topic,
    in string filter_expression,
    in StringSeq expression_parameters);
ReturnCode_t
delete_contentfilteredtopic(
    in ContentFilteredTopic a_contentfilteredtopic);
MultiTopic
create_multitopic(
    in string name,
```

```
    in string type_name,
    in string subscription_expression,
    in StringSeq expression_parameters);
ReturnCode_t
delete_multitopic(
    in MultiTopic a_multitopic);
ReturnCode_t
delete_contained_entities();
ReturnCode_t
set_qos(
    in DomainParticipantQos qos);
ReturnCode_t
get_qos(
    inout DomainParticipantQos qos);
ReturnCode_t
set_listener(
    in DomainParticipantListener a_listener,
    in StatusMask mask);
DomainParticipantListener
get_listener();
ReturnCode_t
ignore_participant(
    in InstanceHandle_t handle);
ReturnCode_t
ignore_topic(
    in InstanceHandle_t handle);
ReturnCode_t
ignore_publication(
    in InstanceHandle_t handle);
ReturnCode_t
ignore_subscription(
    in InstanceHandle_t handle);
DomainId_t
get_domain_id();
ReturnCode_t
assert_liveliness();
ReturnCode_t
set_default_publisher_qos(
    in PublisherQos qos);
ReturnCode_t
get_default_publisher_qos(
    inout PublisherQos qos);
ReturnCode_t
set_default_subscriber_qos(
    in SubscriberQos qos);
ReturnCode_t
get_default_subscriber_qos(
    inout SubscriberQos qos);
ReturnCode_t
set_default_topic_qos(
```

```
    in TopicQos qos);
ReturnCode_t
get_default_topic_qos(
    inout TopicQos qos);
boolean
contains_entity(
    in InstanceHandle_t a_handle);
ReturnCode_t
get_current_time(
    inout Time_t current_time);
 };
 interface DomainParticipantFactory {
 //
 //  DomainParticipantFactory
 //  get_instance();
 //
DomainParticipant
create_participant(
    in DomainId_t domainId,
    in DomainParticipantQos qos,
    in DomainParticipantListener a_listener,
    in StatusMask mask);
ReturnCode_t
delete_participant(
    in DomainParticipant a_participant);
DomainParticipant
lookup_participant(
    in DomainId_t domainId);
ReturnCode_t
set_default_participant_qos(
    in DomainParticipantQos qos);
ReturnCode_t
get_default_participant_qos(
    inout DomainParticipantQos qos);

ReturnCode_t
set_qos(
    in DomainParticipantFactoryQos qos);
ReturnCode_t
get_qos(
    inout DomainParticipantFactoryQos qos);
ReturnCode_t
delete_domain
   (in Domain a_domain);
Domain
lookup_domain
   (in DomainId_t domainId);
ReturnCode_t
   create_persistent_snapshot(
      in string partition_expression,
```

```
      in string topic_expression,
      in string URI);
ReturnCode_t
   delete_contained_entities();
 };
 interface TypeSupport {
 //  ReturnCode_t
 //  register_type(
 //      in DomainParticipant domain,
 //      in string type_name);
 //
 //  string
 //  get_type_name();
 };
 //
 interface TopicDescription {
string
   get_type_name();
string
   get_name();
DomainParticipant
       get_participant();
 };
 interface Topic : Entity, TopicDescription {
ReturnCode_t
set_qos(
    in TopicQos qos);
ReturnCode_t
   get_qos(
    inout TopicQos qos);
ReturnCode_t
   set_listener(
    in TopicListener a_listener,
    in StatusMask mask);
TopicListener_ptr
get_listener();
// Access the status
ReturnCode_t
get_inconsistent_topic_status(
    inout InconsistentTopicStatus a_status);
 };
 interface ContentFilteredTopic : TopicDescription {
string
get_filter_expression();
ReturnCode_t
get_expression_parameters(
    inout StringSeq expression_parameters);
ReturnCode_t
set_expression_parameters(
    in StringSeq expression_parameters);
```

```
Topic
get_related_topic();
 };
 interface MultiTopic : TopicDescription {
string
get_subscription_expression();
ReturnCode_t
get_expression_parameters(
    inout StringSeq expression_parameters);
ReturnCode_t
set_expression_parameters(
    in StringSeq expression_parameters);
 };
 //
 interface Publisher : Entity {
DataWriter
create_datawriter(
    in Topic a_topic,
    in DataWriterQos qos,
    in DataWriterListener a_listener,
    in StatusMask mask);
ReturnCode_t
delete_datawriter(
    in DataWriter a_datawriter);
DataWriter
lookup_datawriter(
    in string topic_name);
ReturnCode_t
delete_contained_entities();
ReturnCode_t
set_qos(
    in PublisherQos qos);
ReturnCode_t
get_qos(
    inout PublisherQos qos);
ReturnCode_t
set_listener(
    in PublisherListener a_listener,
    in StatusMask mask);
PublisherListener
get_listener();
ReturnCode_t
suspend_publications();
ReturnCode_t
resume_publications();
ReturnCode_t
begin_coherent_changes();
ReturnCode_t
end_coherent_changes();
ReturnCode_t
```

```
wait_for_acknowledgments(
    in Duration_t max_wait);
DomainParticipant
get_participant();
ReturnCode_t
set_default_datawriter_qos(
    in DataWriterQos qos);
ReturnCode_t
get_default_datawriter_qos(
    inout DataWriterQos qos);
ReturnCode_t
copy_from_topic_qos(
    inout DataWriterQos a_datawriter_qos,
    in TopicQos a_topic_qos);
};
interface DataWriter : Entity {
//  InstanceHandle_t
//  register_instance(
//      in Data instance_data);
//
//  InstanceHandle_t
//  register_instance_w_timestamp(
//      in Data instance_data,
//      in Time_t source_timestamp);
//
//  ReturnCode_t
//  unregister_instance(
//      in Data instance_data,
//      in InstanceHandle_t handle);
//
//  ReturnCode_t
//  unregister_instance_w_timestamp(
//      in Data instance_data,
//      in InstanceHandle_t handle,
//      in Time_t source_timestamp);
//
//  ReturnCode_t
//  write(
//      in Data instance_data,
//      in InstanceHandle_t handle);
//
//  ReturnCode_t
//  write_w_timestamp(
//      in Data instance_data,
//      in InstanceHandle_t handle,
//      in Time_t source_timestamp);
//
//  ReturnCode_t
//  dispose(
//      in Data instance_data,
```

```
//      in InstanceHandle_t instance_handle);
//
//  ReturnCode_t
//  dispose_w_timestamp(
//      in Data instance_data,
//      in InstanceHandle_t instance_handle,
//      in Time_t source_timestamp);
//
//  ReturnCode_t
//  get_key_value(
//      inout Data key_holder,
//      in InstanceHandle_t handle);
//
//  InstanceHandle_t lookup_instance(
//      in Data instance_data);
ReturnCode_t
set_qos(
    in DataWriterQos qos);
ReturnCode_t
get_qos(
    inout DataWriterQos qos);
ReturnCode_t
set_listener(
    in DataWriterListener a_listener,
    in StatusMask mask);
DataWriterListener
get_listener();
Topic
get_topic();
Publisher
get_publisher();
ReturnCode_t
wait_for_acknowledgments(
    in Duration_t max_wait);
// Access the status
ReturnCode_t
get_liveliness_lost_status(
    inout LivelinessLostStatus status);
ReturnCode_t
get_offered_deadline_missed_status(
    inout OfferedDeadlineMissedStatus status);
ReturnCode_t
get_offered_incompatible_qos_status(
    inout OfferedIncompatibleQosStatus status);
ReturnCode_t
get_publication_matched_status(
    inout PublicationMatchedStatus status);
ReturnCode_t
   assert_liveliness();
ReturnCode_t
```

```
    get_matched_subscriptions(
     inout InstanceHandleSeq subscription_handles);
ReturnCode_t
    get_matched_subscription_data(
     inout SubscriptionBuiltinTopicData subscription_data,
     in InstanceHandle_t subscription_handle);
 };
 //
 interface Subscriber : Entity {
DataReader
create_datareader(
     in TopicDescription a_topic,
     in DataReaderQos qos,
     in DataReaderListener a_listener,
     in StatusMask mask);
ReturnCode_t
delete_datareader(
     in DataReader a_datareader);
ReturnCode_t
delete_contained_entities();
DataReader
lookup_datareader(
     in string topic_name);
ReturnCode_t
get_datareaders(
     inout DataReaderSeq readers,
     in SampleStateMask sample_states,
     in ViewStateMask view_states,
     in InstanceStateMask instance_states);
ReturnCode_t
notify_datareaders();
ReturnCode_t
    set_qos(
     in SubscriberQos qos);
ReturnCode_t
    get_qos(
     inout SubscriberQos qos);
ReturnCode_t
set_listener(
     in SubscriberListener a_listener,
     in StatusMask mask);
SubscriberListener
get_listener();
ReturnCode_t
begin_access();
ReturnCode_t
end_access();
DomainParticipant
get_participant();
ReturnCode_t
```

```
set_default_datareader_qos(
    in DataReaderQos qos);
ReturnCode_t
get_default_datareader_qos(
    inout DataReaderQos qos);
ReturnCode_t
copy_from_topic_qos(
    inout DataReaderQos a_datareader_qos,
    in TopicQos a_topic_qos);
};
interface DataReader : Entity {
//  ReturnCode_t
//  read(
//      inout DataSeq data_values,
//      inout SampleInfoSeq info_seq,
//      in long max_samples,
//      in SampleStateMask sample_states,
//      in ViewStateMask view_states,
//      in InstanceStateMask instance_states);
//
//  ReturnCode_t
//  take(
//      inout DataSeq data_values,
//      inout SampleInfoSeq info_seq,
//      in long max_samples,
//      in SampleStateMask sample_states,
//      in ViewStateMask view_states,
//      in InstanceStateMask instance_states);
//
//  ReturnCode_t
//  read_w_condition(
//      inout DataSeq data_values,
//      inout SampleInfoSeq info_seq,
//      in long max_samples,
//      in ReadCondition a_condition);
//
//  ReturnCode_t
//  take_w_condition(
//      inout DataSeq data_values,
//      inout SampleInfoSeq info_seq,
//      in long max_samples,
//      in ReadCondition a_condition);
//
//  ReturnCode_t
//  read_next_sample(
//      inout Data data_values,
//      inout SampleInfo sample_info);
//
//  ReturnCode_t
//  take_next_sample(
```

```
//      inout Data data_values,
//      inout SampleInfo sample_info);
//
//  ReturnCode_t
//  read_instance(
//      inout DataSeq data_values,
//      inout SampleInfoSeq info_seq,
//      in long max_samples,
//      in InstanceHandle_t a_handle,
//      in SampleStateMask sample_states,
//      in ViewStateMask view_states,
//      in InstanceStateMask instance_states);
//
//  ReturnCode_t
//  take_instance(
//      inout DataSeq data_values,
//      inout SampleInfoSeq info_seq,
//      in long max_samples,
//      in InstanceHandle_t a_handle,
//      in SampleStateMask sample_states,
//      in ViewStateMask view_states,
//      in InstanceStateMask instance_states);
//
//  ReturnCode_t
//  read_next_instance(
//      inout DataSeq data_values,
//      inout SampleInfoSeq info_seq,
//      in long max_samples,
//      in InstanceHandle_t a_handle,
//      in SampleStateMask sample_states,
//      in ViewStateMask view_states,
//      in InstanceStateMask instance_states);
//
//  ReturnCode_t
//  take_next_instance(
//      inout DataSeq data_values,
//      inout SampleInfoSeq info_seq,
//      in long max_samples,
//      in InstanceHandle_t a_handle,
//      in SampleStateMask sample_states,
//      in ViewStateMask view_states,
//      in InstanceStateMask instance_states);
//
//  ReturnCode_t
//  read_next_instance_w_condition(
//      inout DataSeq data_values,
//      inout SampleInfoSeq info_seq,
//      in long max_samples,
//      in InstanceHandle_t a_handle,
//      in ReadCondition a_condition);
```

```
//
//  ReturnCode_t
//  take_next_instance_w_condition(
//      inout DataSeq data_values,
//      inout SampleInfoSeq info_seq,
//      in long max_samples,
//      in InstanceHandle_t a_handle,
//      in ReadCondition a_condition);
//
//  ReturnCode_t
//  return_loan(
//      inout DataSeq data_values,
//      inout SampleInfoSeq info_seq);
//
//  ReturnCode_t
//  get_key_value(
//      inout Data key_holder,
//      in InstanceHandle_t handle);
//
//  InstanceHandle_t
//  lookup_instance(
//      in Data instance);
ReadCondition
create_readcondition(
    in SampleStateMask sample_states,
    in ViewStateMask view_states,
    in InstanceStateMask instance_states);
QueryCondition
create_querycondition(
    in SampleStateMask sample_states,
    in ViewStateMask view_states,
    in InstanceStateMask instance_states,
    in string query_expression,
    in StringSeq query_parameters);
ReturnCode_t
delete_readcondition(
    in ReadCondition a_condition);
ReturnCode_t
delete_contained_entities();
ReturnCode_t
set_qos(
    in DataReaderQos qos);
ReturnCode_t
get_qos(
    inout DataReaderQos qos);
ReturnCode_t
set_listener(
    in DataReaderListener a_listener,
    in StatusMask mask);
DataReaderListener
```

```
        get_listener();
        TopicDescription
        get_topicdescription();
        Subscriber
        get_subscriber();
        ReturnCode_t
        get_sample_rejected_status(
            inout SampleRejectedStatus status);
        ReturnCode_t
        get_liveliness_changed_status(
            inout LivelinessChangedStatus status);
        ReturnCode_t
        get_requested_deadline_missed_status(
            inout RequestedDeadlineMissedStatus status);
        ReturnCode_t
        get_requested_incompatible_qos_status(
            inout RequestedIncompatibleQosStatus status);
        ReturnCode_t
        get_subscription_matched_status(
            inout SubscriptionMatchedStatus status);
        ReturnCode_t
        get_sample_lost_status(
            inout SampleLostStatus status);
        ReturnCode_t
        wait_for_historical_data(
            in Duration_t max_wait);
        ReturnCode_t
        get_matched_publications(
            inout InstanceHandleSeq publication_handles);
        ReturnCode_t
        get_matched_publication_data(
            inout PublicationBuiltinTopicData publication_data,
            in InstanceHandle_t publication_handle);
         };
         struct SampleInfo {
        SampleStateKind sample_state;
        ViewStateKind view_state;
        InstanceStateKind instance_state;
        Time_t source_timestamp;
        InstanceHandle_t instance_handle;
        BuiltinTopicKey_t publication_handle;
        long disposed_generation_count;
        long no_writers_generation_count;
        long sample_rank;
        long generation_rank;
        long absolute_generation_rank;
        boolean valid_data;
         };
         typedef sequence<SampleInfo> SampleInfoSeq;
    };
```

```
Foo.idl
    // Implied IDL for type "Foo"
    // Example user defined structure
    struct Foo {
    long dummy;
    };
    typedef sequence<Foo> FooSeq;
    #include "dds_dcps.idl"
    interface FooTypeSupport : DDS::TypeSupport {
    DDS::ReturnCode_t
    register_type(
        in DDS::DomainParticipant participant,
        in string type_name);
    string
    get_type_name();
    };
    interface FooDataWriter : DDS::DataWriter {
    DDS::InstanceHandle_t
    register_instance(
        in Foo instance_data);
    DDS::InstanceHandle_t
    register_instance_w_timestamp(
        in Foo instance_data,
        in DDS::InstanceHandle_t handle,
        in DDS::Time_t source_timestamp);
    DDS::ReturnCode_t
    unregister_instance(
        in Foo instance_data,
        in DDS::InstanceHandle_t handle);
    DDS::ReturnCode_t
    unregister_instance_w_timestamp(
        in Foo instance_data,
        in DDS::InstanceHandle_t handle,
        in DDS::Time_t source_timestamp);
    DDS::ReturnCode_t
    write(
        in Foo instance_data,
        in DDS::InstanceHandle_t handle);
    DDS::ReturnCode_t
    write_w_timestamp(
        in Foo instance_data,
        in DDS::InstanceHandle_t handle,
        in DDS::Time_t source_timestamp);
    DDS::ReturnCode_t
    dispose(
        in Foo instance_data,
        in DDS::InstanceHandle_t instance_handle);
    DDS::ReturnCode_t
    dispose_w_timestamp(
        in Foo instance_data,
```

```
    in DDS::InstanceHandle_t instance_handle,
    in DDS::Time_t source_timestamp);
DDS::ReturnCode_t
get_key_value(
    inout Foo key_holder,
    in DDS::InstanceHandle_t handle);
DDS::InstanceHandle_t
lookup_instance(
    in Foo instance_data);
 };
 interface FooDataReader : DDS::DataReader {
DDS::ReturnCode_t
read(
    inout FooSeq data_values,
    inout DDS::SampleInfoSeq info_seq,
    in long max_samples,
    in DDS::SampleStateMask sample_states,
    in DDS::ViewStateMask view_states,
    in DDS::InstanceStateMask instance_states);
DDS::ReturnCode_t
take(
    inout FooSeq data_values,
    inout DDS::SampleInfoSeq info_seq,
    in long max_samples,
    in DDS::SampleStateMask sample_states,
    in DDS::ViewStateMask view_states,
    in DDS::InstanceStateMask instance_states);
DDS::ReturnCode_t
read_w_condition(
    inout FooSeq data_values,
    inout DDS::SampleInfoSeq info_seq,
    in long max_samples,
    in DDS::ReadCondition a_condition);
DDS::ReturnCode_t
take_w_condition(
    inout FooSeq data_values,
    inout DDS::SampleInfoSeq info_seq,
    in long max_samples,
    in DDS::ReadCondition a_condition);
DDS::ReturnCode_t
read_next_sample(
    inout Foo data_values,
    inout DDS::SampleInfo sample_info);
DDS::ReturnCode_t
take_next_sample(
    inout Foo data_values,
    inout DDS::SampleInfo sample_info);
DDS::ReturnCode_t
read_instance(
    inout FooSeq data_values,
```

```
        inout DDS::SampleInfoSeq info_seq,
        in long max_samples,
        in DDS::InstanceHandle_t a_handle,
        in DDS::SampleStateMask sample_states,
        in DDS::ViewStateMask view_states,
        in DDS::InstanceStateMask instance_states);
    DDS::ReturnCode_t
    take_instance(
        inout FooSeq data_values,
        inout DDS::SampleInfoSeq info_seq,
        in long max_samples,
        in DDS::InstanceHandle_t a_handle,
        in DDS::SampleStateMask sample_states,
        in DDS::ViewStateMask view_states,
        in DDS::InstanceStateMask instance_states);
    DDS::ReturnCode_t
    read_next_instance(
        inout FooSeq data_values,
        inout DDS::SampleInfoSeq info_seq,
        in long max_samples,
        in DDS::InstanceHandle_t a_handle,
        in DDS::SampleStateMask sample_states,
        in DDS::ViewStateMask view_states,
        in DDS::InstanceStateMask instance_states);
    DDS::ReturnCode_t
    take_next_instance(
        inout FooSeq data_values,
        inout DDS::SampleInfoSeq info_seq,
        in long max_samples,
        in DDS::InstanceHandle_t a_handle,
        in DDS::SampleStateMask sample_states,
        in DDS::ViewStateMask view_states,
        in DDS::InstanceStateMask instance_states);
    DDS::ReturnCode_t
    read_next_instance_w_condition(
        inout FooSeq data_values,
        inout DDS::SampleInfoSeq info_seq,
        in long max_samples,
        in DDS::InstanceHandle_t a_handle,
        in DDS::ReadCondition a_condition);
    DDS::ReturnCode_t
    take_next_instance_w_condition(
        inout FooSeq data_values,
        inout DDS::SampleInfoSeq info_seq,
        in long max_samples,
        in DDS::InstanceHandle_t a_handle,
        in DDS::ReadCondition a_condition);
    DDS::ReturnCode_t
    return_loan(
        inout FooSeq data_values,
```

```
    inout DDS::SampleInfoSeq info_seq);
DDS::ReturnCode_t
get_key_value(
    inout Foo key_holder,
    in DDS::InstanceHandle_t handle);
DDS::InstanceHandle_t
lookup_instance(
    in Foo instance);
 };
```

Appendix

D SampleStates, ViewStates and InstanceStates

Data is made available to the application by the following operations on `DDS_DataReader` objects: `DDS_DataReader_read` and `DDS_DataReader_take` operations. The general semantics of the `DDS_DataReader_read` operations is that the application only gets access to the matching data; the data remain available in the Data Distribution Services and can be read again. The semantics of the `DDS_DataReader_take` operations is that the data is not available in the Data Distribution Service; that data will no longer be accessible to the `DDS_DataReader`. Consequently, it is possible for a `DDS_DataReader` to access the same sample multiple times but only if all previous accesses were `DDS_DataReader_read` operations.

Each of these operations returns an ordered collection of `Data` values and associated `DDS_SampleInfo` objects. Each data value represents an atom of data information (*i.e.*, a value for one instance). This collection may contain samples related to the same or different instances (identified by the `key`). Multiple samples can refer to the same instance if the settings of the `DDS_HistoryQosPolicy` allow for it.

SampleInfo Class

`DDS_SampleInfo` is the information that accompanies each sample that is ‘read’ or ‘taken’. It contains, among others, the following information:

- The `sample_state` (`DDS_READ_SAMPLE_STATE` or `DDS_NOT_READ_SAMPLE_STATE`);
- The `view_state`, (`DDS_NEW_VIEW_STATE` or `DDS_NOT_NEW_VIEW_STATE`);
- The `instance_state` (`DDS_ALIVE_INSTANCE_STATE`, `DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE` or `DDS_NOT_ALIVE_NO_WRITERS_INSTANCE_STATE`).

sample_state

For each sample, the Data Distribution Service internally maintains a `sample_state` specific to each `DDS_DataReader`. The `sample_state` can either be `DDS_READ_SAMPLE_STATE` or `DDS_NOT_READ_SAMPLE_STATE`.

- `DDS_READ_SAMPLE_STATE` indicates that the `DDS_DataReader` has already accessed that sample by means of `DDS_DataReader_read`. Had the sample been accessed by `DDS_DataReader_take` it would no longer be available to the `DDS_DataReader`;
- `DDS_NOT_READ_SAMPLE_STATE` indicates that the `DDS_DataReader` has not accessed that sample before.

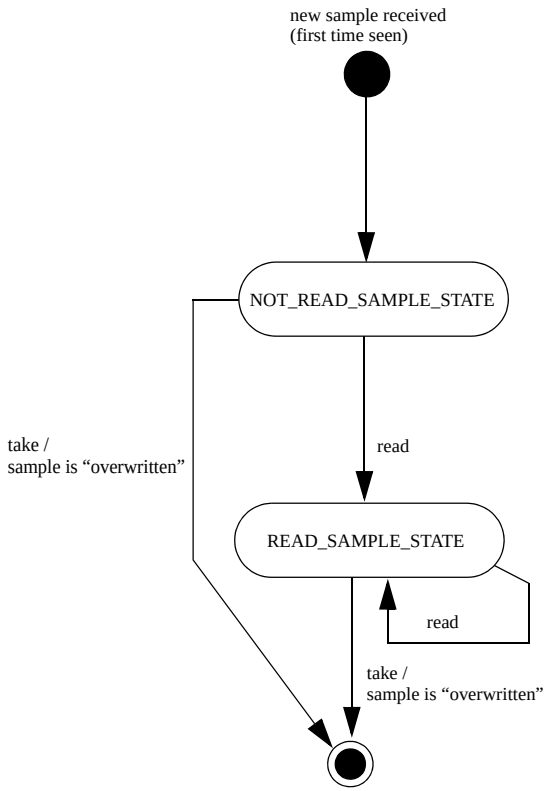

Figure 20: State Chart of the sample_state for a Single Sample

State per Sample

The `sample_state` available in the `DDS_SampleInfo` reflect the `sample_state` of each sample. The `sample_state` can be different for all samples in the returned collection that refer to the same instance.

instance_state

For each instance the Data Distribution Service internally maintains an `instance_state`**.** The `instance_state` can be:

- `DDS_ALIVE_INSTANCE_STATE` indicates that:
  - samples have been received for the instance
  - there are live DDS_DataWriter objects writing the instance
  - the instance has not been explicitly disposed of (or else samples have been received after it was disposed of)
- `DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE` indicates the instance was disposed of by a `DDS_DataWriter` either explicitly by means of the `DDS_DataWriter_dispose` operation or implicitly in case the `autodispose_unregistered_instances` field of the `WriterDataLyfecycleQosPolicy` equals `TRUE` when the instance gets unregistered (see Section 3.1.3.23, *DDS_WriterDataLifecycleQosPolicy*), and no new samples for that instance have been written afterwards.
- `DDS_NOT_ALIVE_NO_WRITERS_INSTANCE_STATE` indicates the instance has been declared as not-alive by the `DDS_DataReader` because it detected that there are no live `DDS_DataWriter` objects writing that instance.

DDS_OwnershipQosPolicy

The precise events that cause the `instance_state` to change depends on the setting of the `DDS_OwnershipQosPolicy`:

- If `DDS_OwnershipQosPolicy` is set to `DDS_EXCLUSIVE_OWNERSHIP_QOS`, then the `instance_state` becomes `DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE` only if the `DDS_DataWriter` that “owns” the instance explicitly disposes of it. The `instance_state` becomes `DDS_ALIVE_INSTANCE_STATE` again only if the `DDS_DataWriter` that owns the instance writes it;
- If `DDS_OwnershipQosPolicy` is set to `DDS_SHARED_OWNERSHIP_QOS`, then the `instance_state` becomes `DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE` if any `DDS_DataWriter` explicitly disposes of the instance. The `instance_state` becomes `DDS_ALIVE_INSTANCE_STATE` as soon as any `DDS_DataWriter` writes the instance again.

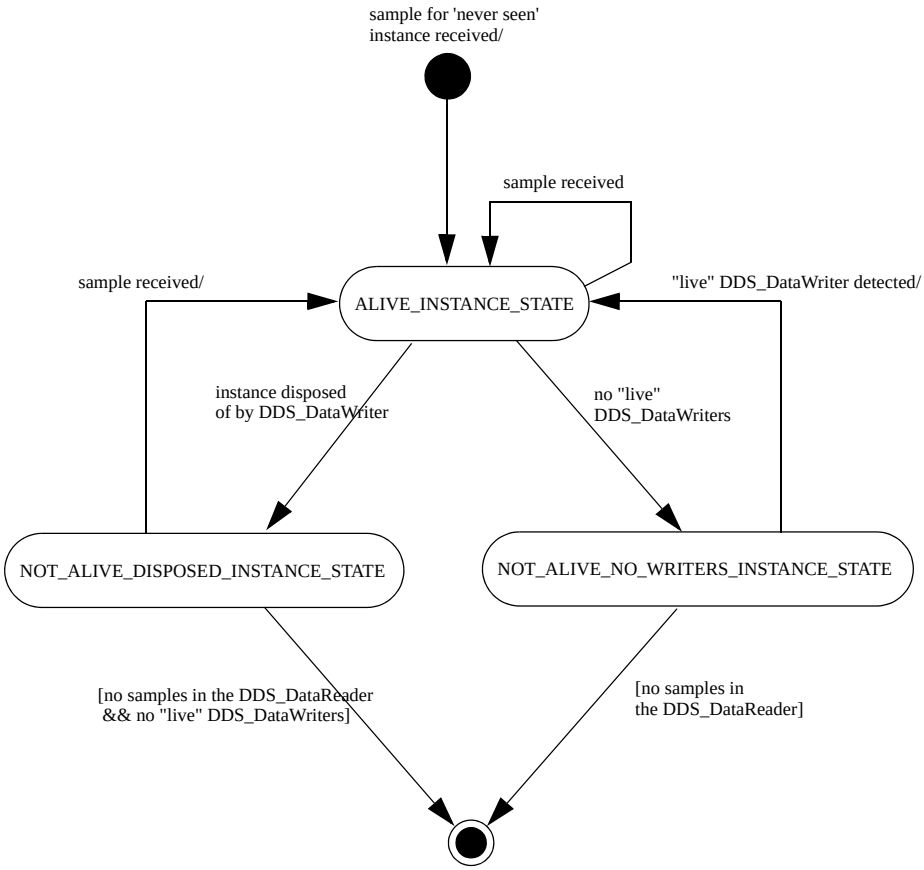

Figure 21: State Chart of the instance_state for a Single Instance

Snapshot

The `instance_state` available in the `DDS_SampleInfo` is a snapshot of the `instance_state` of the instance at the time the collection was obtained (*i.e.* at the time `DDS_DataReader_read` or `DDS_DataReader_take` was called). The `instance_state` is therefore the same for all samples in the returned collection that refer to the same instance.

view_state

For each instance (identified by the `key`), the Data Distribution Service internally maintains a `view_state` relative to each `DDS_DataReader`. The `view_state` can either be `DDS_NEW_VIEW_STATE` or `DDS_NOT_NEW_VIEW_STATE`.

- `DDS_NEW_VIEW_STATE` indicates that either this is the first time that the `DDS_DataReader` has ever accessed samples of that instance, or else that the `DDS_DataReader` has accessed previous samples of the instance, but the instance has since been reborn (*i.e.* becomes not-alive and then alive again);
- `DDS_NOT_NEW_VIEW_STATE` indicates that the `DDS_DataReader` has already accessed samples of the same instance and that the instance has not been reborn since.

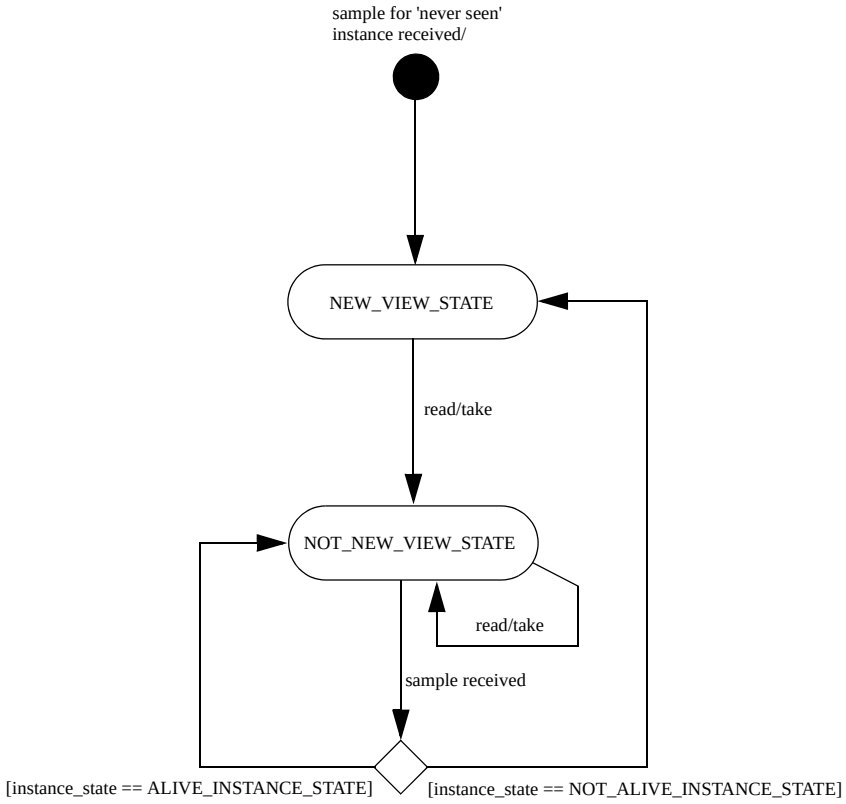

Figure 22: State Chart of the view_state for a Single Instance

Snapshot

The `view_state` available in the `DDS_SampleInfo` is a snapshot of `view_state` of the instance relative to the `DDS_DataReader` used to access the samples at the time the collection was obtained (*i.e.* at the time `DDS_DataReader_read` or `DDS_DataReader_take` was called). The `view_state` is therefore the same for all samples in the returned collection that refer to the same instance.

State Masks

State Definitions

All states are available as a constant. These convenience constants can be used to create a bit-mask (*e.g.* to be used as operation parameters) by performing an AND or OR operation. They can also be used for testing whether a state is set.

The sample state definitions indicates whether or not the matching data sample has already been read:

- `DDS_READ_SAMPLE_STATE`: sample has already been read;
- `DDS_NOT_READ_SAMPLE_STATE`: sample has not been read.

The view state definitions indicates whether the `DDS_DataReader` has already seen samples for the most-current generation of the related instance:

- `DDS_NEW_VIEW_STATE`: all samples of this instance are new;
- `DDS_NOT_NEW_VIEW_STATE`: some or all samples of this instance are not new.

The instance state definitions indicates whether the instance is currently in existence or, if it has been disposed of, the reason why it was disposed of:

- `DDS_ALIVE_INSTANCE_STATE`: this instance is currently in existence;
- `DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE`: this instance was disposed of by a `DDS_DataWriter`;
- `DDS_NOT_ALIVE_NO_WRITERS_INSTANCE_STATE`: the instance has been disposed of by the `DDS_DataReader` because none of the `DDS_DataWriter` objects currently "alive" (according to the `DDS_LivelinessQosPolicy`) are writing the instance.

Pre-defined Bit Mask Definitions

For convenience, some pre-defined bit-masks are available as a constant definition. These bit-mask constants can be used where a state bit-mask is required. They can also be used for testing whether certain bits are set.

The sample state bit-mask definition selects both sample states:

- `DDS_ANY_SAMPLE_STATE`: either the sample has already been read or not read;

The view state bit-mask definition selects both view states:

- `DDS_ANY_VIEW_STATE`: either the sample has already been seen or not seen;

The instance state bit-mask definitions selects a combination of instance states:

- `DDS_NOT_ALIVE_INSTANCE_STATE`: this instance was disposed of by a `DDS_DataWriter` or the `DDS_DataReader`;
- `DDS_ANY_INSTANCE_STATE`: this instance is either in existence or not in existence.

Operations Concerning States

The application accesses data by means of the operations DDS_DataReader_read or DDS_DataReader_take on the DDS_DataReader. These operations return an ordered collection of DDS_DataSamples consisting of a DDS_SampleInfo part and a Data part. The way the Data Distribution Service builds this collection (*i.e.*, the data-samples that are parts of the list as well as their order) depends on QosPolicy settings set on the DDS_DataReader and the DDS_Subscriber, as well as the source timestamp of the samples and the parameters passed to the DDS_DataReader_read/DDS_DataReader_take operations, namely:

- the desired sample states (*i.e.*, DDS_READ_SAMPLE_STATE, DDS_NOT_READ_SAMPLE_STATE, or DDS_ANY_SAMPLE_STATE);
- the desired view states (*i.e.*, DDS_NEW_VIEW_STATE, DDS_NOT_NEW_VIEW_STATE, or DDS_ANY_VIEW_STATE);
- the desired instance states (DDS_ALIVE_INSTANCE_STATE, DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE, DDS_NOT_ALIVE_NO_WRITERS_INSTANCE_STATE, DDS_NOT_ALIVE_INSTANCE_STATE, or DDS_ANY_INSTANCE_STATE).

The DDS_DataReader_read and DDS_DataReader_take operations are non-blocking and just deliver what is currently available that matches the specified states.

On output, the collection of Data values and the collection of DDS_SampleInfo structures are of the same length and are in a one-to-one correspondence. Each DDS_SampleInfo provides information, such as the source_timestamp, the sample_state, view_state, and instance_state, etc., about the matching sample.

Some elements in the returned collection may not have valid data. If the instance_state in the DDS_SampleInfo is DDS_NOT_ALIVE_DISPOSED_INSTANCE_STATE or DDS_NOT_ALIVE_NO_WRITERS_INSTANCE_STATE, then the last sample for that instance in the collection, that is, the one whose DDS_SampleInfo has sample_rank==0 does not contain valid data. Samples that contain no data do not count towards the limits imposed by the DDS_ResourceLimitsQosPolicy.

read

The act of reading a sample sets its sample_state to DDS_READ_SAMPLE_STATE. If the sample belongs to the most recent generation of the instance, it will also set the view_state of the instance to DDS_NOT_NEW_VIEW_STATE. It will not affect the instance_state of the instance.

take

The act of taking a sample removes it from the DDS_DataReader so it cannot be 'read' or 'taken' again. If the sample belongs to the most recent generation of the instance, it will also set the view_state of the instance to DDS_NOT_NEW_VIEW_STATE. It will not affect the instance_state of the instance.

read_w_condition

In case the DDS_ReadCondition is a 'plain' DDS_ReadCondition and not the specialized DDS_QueryCondition, the operation is equivalent to calling DDS_DataReader_read and passing as sample_states, view_states and instance_states the value of the corresponding attributes in the DDS_ReadCondition. Using this operation the application can avoid repeating the same parameters specified when creating the DDS_ReadCondition.

take_w_condition

The act of taking a sample removes it from the DDS_DataReader so it cannot be 'read' or 'taken' again. If the sample belongs to the most recent generation of the instance, it will also set the view_state of the instance to DDS_NOT_NEW_VIEW_STATE. It will not affect the instance_state of the instance.

In case the DDS_ReadCondition is a 'plain' DDS_ReadCondition and not the specialized DDS_QueryCondition, the operation is equivalent to calling DDS_DataReader_take and passing as sample_states, view_states and instance_states the value of the corresponding attributes in the DDS_ReadCondition. Using this operation the application can avoid repeating the same parameters specified when creating the DDS_ReadCondition.

read_next_sample

The DDS_DataReader_read_next_sample operation is semantically equivalent to the DDS_DataReader_read operation where the input Data sequence has max_len=1, the sample_states=DDS_NOT_READ_SAMPLE_STATE, the view_states=DDS_ANY_VIEW_STATE, and the instance_states=DDS_ANY_INSTANCE_STATE.

take_next_sample

The DDS_DataReader_take_next_sample operation is semantically equivalent to the DDS_DataReader_take operation where the input sequence has max_len=1, the sample_states=DDS_NOT_READ_SAMPLE_STATE, the view_states=DDS_ANY_VIEW_STATE, and the instance_states=DDS_ANY_INSTANCE_STATE.

read_instance

The act of reading a sample sets its `sample_state` to `DDS_READ_SAMPLE_STATE`. If the sample belongs to the most recent generation of the instance, it will also set the `view_state` of the instance to `DDS_NOT_NEW_VIEW_STATE`. It will not affect the `instance_state` of the instance.

take_instance

The act of taking a sample removes it from the `DDS_DataReader` so it cannot be 'read' or 'taken' again. If the sample belongs to the most recent generation of the instance, it will also set the `view_state` of the instance to `DDS_NOT_NEW_VIEW_STATE`. It will not affect the `instance_state` of the instance.

Appendix

E Class Inheritance

This appendix gives an overview of the inheritance relations of the DCPS classes.

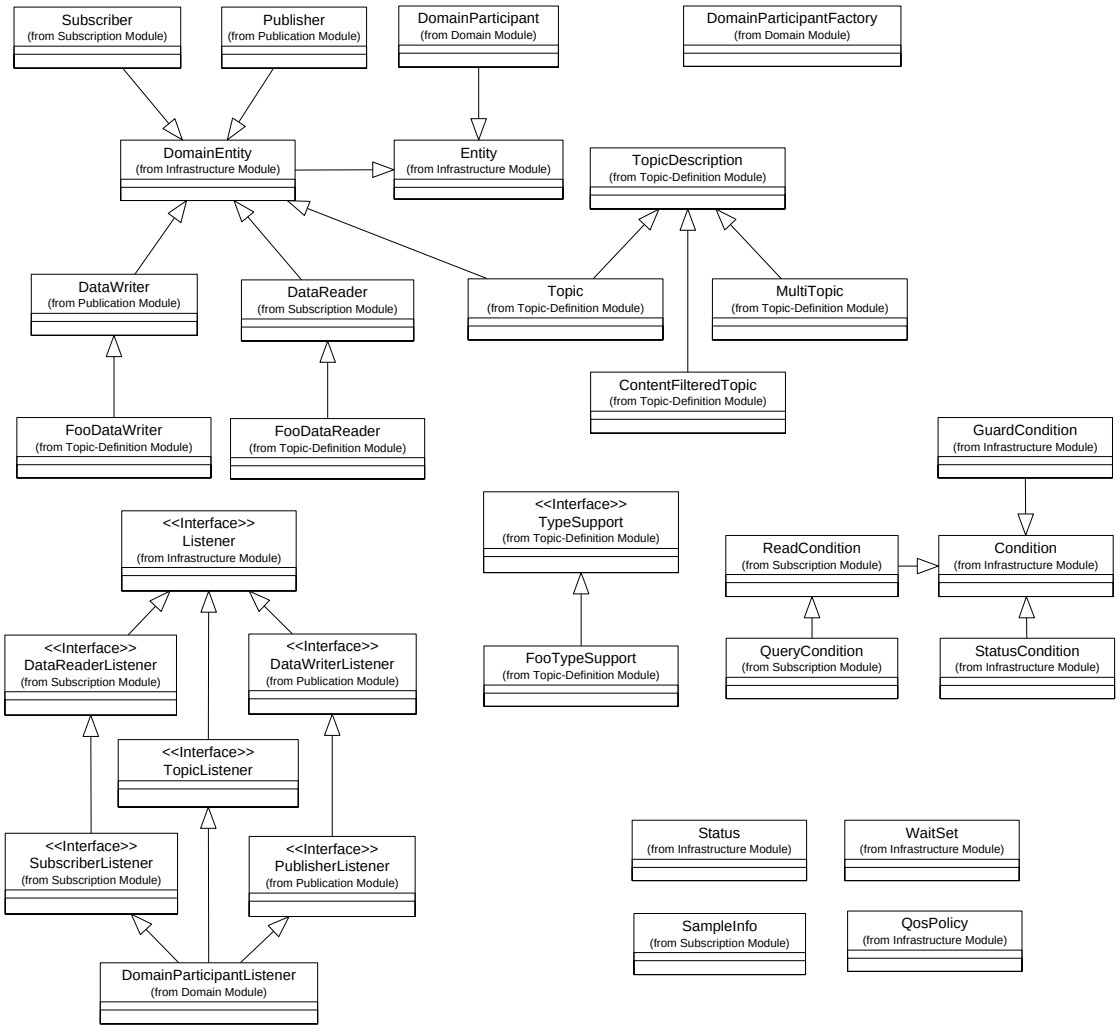

Figure 23: DCPS Inheritance

Appendix

F Listeners, Conditions and Waitsets

`Listeners` and `DDS_Conditions` (`DDS_Conditions` in conjunction with `DDS_WaitSets`) are two mechanisms that allow the application to be made aware of changes in the communication status. `Listeners` provide an event-based mechanism for the Data Distribution Service to asynchronously alert the application of the occurrence of relevant status changes. `DDS_Conditions` in conjunction with `DDS_WaitSets` provide a state-based mechanism for the Data Distribution Service to synchronously communicate the relevant status changes to the application.

Both mechanisms are based on the communication statuses associated with an `DDS_Entity` object. Not all statuses are applicable to all `DDS_Entity` objects. Which status is applicable to which `DDS_Entity` object is listed in the next table:

Table 26: Communication Status

DDS_Entity	Status Name	Description
`DDS_Topic`	`DDS_INCONSISTENT_TOPIC_STATUS`	Another `DDS_Topic` exists with the same name but with different characteristics.
`DDS_Subscriber`	`DDS_DATA_ON_READERS_STATUS`	New information is available.

Table 26: Communication Status (Continued)

DDS_Entity	Status Name	Description
DDS_DataReader	DDS_SAMPLE_REJECTED_STATUS	A (received) sample has been rejected.
	DDS_LIVELINESS_CHANGED_STATUS	The liveliness of one or more DDS_DataWriter objects, that were writing instances read through the DDS_DataReader objects has changed. Some DDS_DataWriter object have become “alive” or “not alive”.
	DDS_REQUESTED_ DEADLINE_MISSED_STATUS	The deadline that the DDS_DataReader was expecting through its DDS_DeadlineQosPolicy was not respected for a specific instance.
	DDS_REQUESTED_ INCOMPATIBLE_QOS_STATUS	A QosPolicy setting was incompatible with what is offered.
	DDS_DATA_AVAILABLE_STATUS	New information is available.
	DDS_SAMPLE_LOST_STATUS	A sample has been lost (never received).
	DDS_SUBSCRIPTION_ MATCHED_STATUS	The DDS_DataReader has found a DDS_DataWriter that matches the ZWDDS_Topic and has compatible QoS.
DDS_DataWriter	DDS_LIVELINESS_LOST_STATUS	The liveliness that the DDS_DataWriter has committed through its DDS_LivelinessQosPolicy was not respected; thus DDS_DataReader objects will consider the DDS_DataWriter as no longer “alive”.
	DDS_OFFERED_ DEADLINE_MISSED_STATUS	The deadline that the DDS_DataWriter has committed through its DDS_DeadlineQosPolicy was not respected for a specific instance.
	DDS_OFFERED_ INCOMPATIBLE_QOS_STATUS	A QosPolicy setting was incompatible with what was requested.
	DDS_PUBLICATION_ MATCHED_STATUS	The DDS_DataWriter has found DDS_DataReader that matches the DDS_Topic and has compatible QoS.

The statuses may be classified in:

- *read communication statuses*: *i.e.*, those that are related to arrival of data, namely DDS_DATA_ON_READERS and DDS_DATA_AVAILABLE
- *plain communication statuses*: *i.e.*, all the others.

For each plain communication status, there is a corresponding status struct. The information from this struct can be retrieved with the operations `get_<status_name>_status`. For example, to get the `DDS_INCONSISTENT_TOPIC` status (which information is stored in the `DDS_InconsistentTopicStatus` struct), the application must call the operation `DDS_Topic_get_inconsistent_topic_status`. A plain communication status can only be read from the `DDS_Entity` on which it is applicable. For the read communication statuses there is no struct available to the application.

Communication Status Event

Conceptually associated with each `DDS_Entity` communication status is a logical `StatusChangedFlag`. This flag indicates whether that particular communication status has changed since the last time the status was *'read'* by the application (there is no actual read-operation to read the `StatusChangedFlag`). The `StatusChangedFlag` is only conceptually needed to explain the behaviour of a `Listener`, therefore, it is not important whether this flag actually exists. A `Listener` will only be activated when the `StatusChangedFlag` changes from `FALSE` to `TRUE` (provided the `Listener` is attached and enabled for this particular status). The conditions which cause the `StatusChangedFlag` to change is slightly different for the plain communication status and the read communication status.

For the plain communication status, the `StatusChangedFlag` flag is initially set to `FALSE`. It becomes `TRUE` whenever the plain communication status changes and it is reset to `FALSE` each time the application accesses the plain communication status via the proper `get_<status_name>_status` operation on the `DDS_Entity`.

The communication status is also reset to `FALSE` whenever the associated `Listener` operation is called as the `Listener` implicitly accesses the status which is passed as a parameter to the operation. The fact that the status is reset prior to calling the listener means that if the application calls the `get_<status_name>_status` from inside the listener it will see the status already reset.

An exception to this rule is when the associated `Listener` is the ***`nil`*** listener, in other word, a listener with value `DDS_OBJECT_NIL`. Such a listener is treated as a NOOP[1] for all statuses activated in its bitmask and the act of calling this 'nil' listener does not reset the corresponding communication statuses.

1. Short for **No-Op**eration, an instruction that peforms nothing at all.

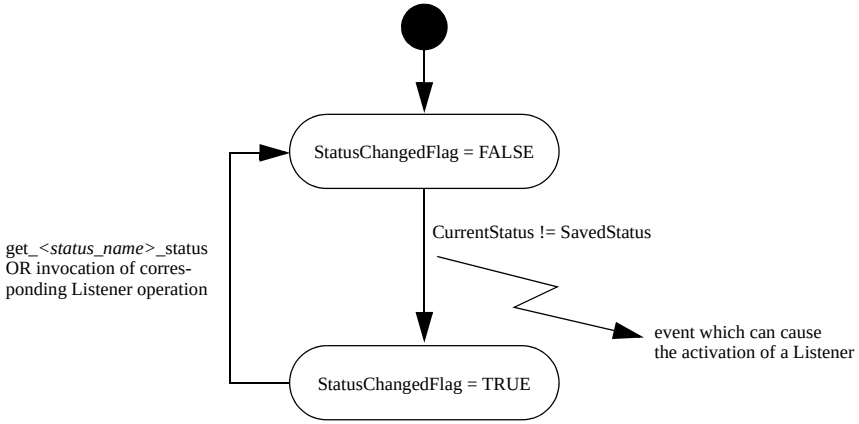

Figure 24: Plain Communication Status State Chart

For example, the value of the `StatusChangedFlag` associated with the `DDS_RequestedDeadlineMissedStatus` will become `TRUE` each time a new deadline passes (which increases the total_count field within `DDS_RequestedDeadlineMissedStatus`). The value changes to `FALSE` when the application accesses the status via the corresponding `DDS_DataReader_get_requested_deadline_missed_status` operation on the proper `DDS_Entity`, or when the the `on_requested_deadline_missed` operation on the `Listener` attached to this `DDS_Entity` or one its containing entities is invoked.

For the read communication status, the `StatusChangedFlag` flag is initially set to `FALSE`. It becomes `TRUE` when data arrives, or when the `InstanceState` of a contained instance changes. This can be caused by either:

- The arrival of the notification that an instance has been disposed by:
  - the `DDS_DataWriter` that owns it if its `OwnershipQosPolicyKind` = `DDS_EXCLUSIVE_OWNERSHIP_QOS`
  - or by any `DDS_DataWriter` if its `OwnershipQosPolicyKind` = `DDS_SHARED_OWNERSHIP_QOS`.
- The loss of liveliness of the `DDS_DataWriter` of an instance for which there is no other `DDS_DataWriter`.
- The arrival of the notification that an instance has been unregistered by the only `DDS_DataWriter` that is known to be writing the instance.

The read communication statuses are reset to `FALSE` again in the following circumstances:

- The status flag of the `DDS_DATA_AVAILABLE_STATUS` becomes `FALSE` when either the corresponding listener operation (`on_data_available`) is called, or the `read` or `take` operation (or any of its variants) is called on the associated `DDS_DataReader`.

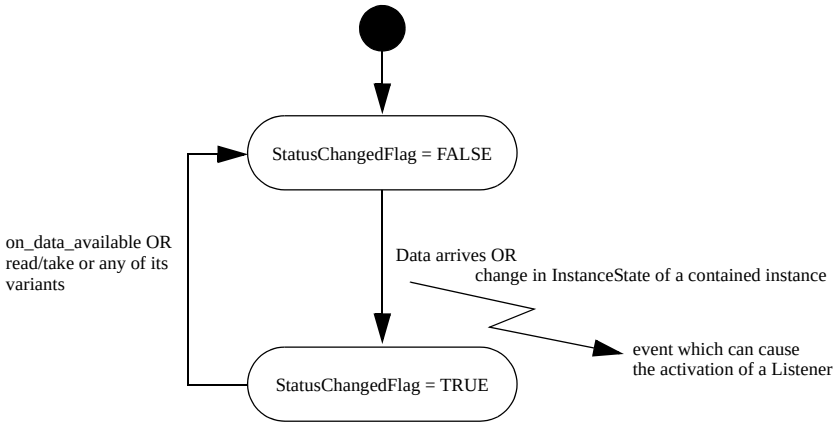

Figure 25: Read Communication Status DDS_DataReader Statecraft

- The status flag of the `DDS_DATA_ON_READERS_STATUS` becomes `FALSE` when any of the following events occurs:
  - The corresponding listener operation (`on_data_on_readers`) is called on the corresponding `DDS_Subscriber`.
  - The `on_data_available` listener operation is called on any `DDS_DataReader` belonging to the `DDS_Subscriber`.
  - The `read` or `take` operation (or any of its variants) is called on any `DDS_DataReader` belonging to the `DDS_Subscriber`.

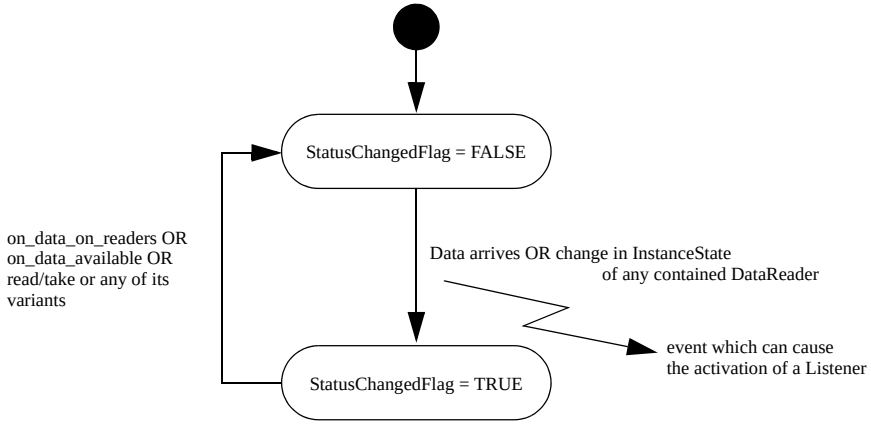

Figure 26: DDS_Subscriber Statecraft for a Read Communication Status

Listeners

The `Listeners` provide for an event-based mechanism to asynchronously inform the application of a status change event. `Listeners` are applicable for both the read communication statuses and the plain communication statuses. When one of these status change events occur, the associated `Listener` is activated, provided some pre-conditions are satisfied. When the `Listener` is activated, it will call the corresponding `on_<status_name>` operation of that `Listener`. Each `on_<status_name>` operation available in the `Listener` of an `DDS_Entity` is also available in the `Listener` of the factory of the `DDS_Entity`.

For both the read communication statuses and the plain communication statuses a `Listener` is only activated when a `Listener` is attached to this particular `DDS_Entity` and enabled for this particular status. Statuses are enabled according to the `DDS_StatusKindMask` parameter that was passed at creation time of the `DDS_Entity`, or that was passed to the `DDS_<DDS_Entity>_set_listener` operation .

When an event occurs for a particular `DDS_Entity` and for a particular status, but the applicable `Listener` is not activated for this status, the status is propagated up to the factory of this `DDS_Entity`. For this factory, the same propagation rules apply. When even the `DDS_DomainParticipantListener` is not attached or enabled for this status, the application will not be notified about this event. This means that a status change on a contained `DDS_Entity` only invokes the `Listener` of its factory if the `Listener` of the contained `DDS_Entity` itself does not handle the trigger event generated by the status change.

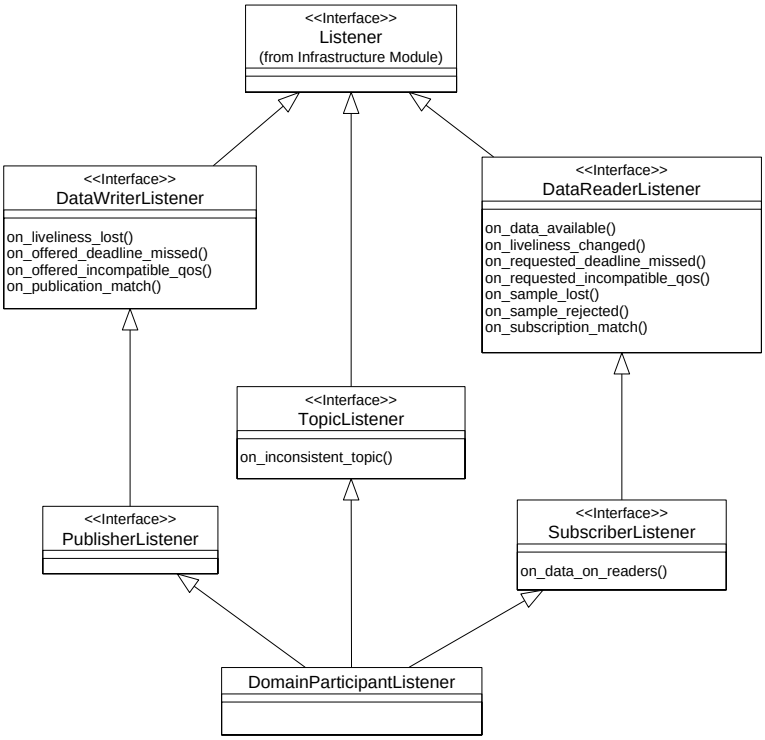

Figure 27: DCPS Listeners

The event propagation is also applicable to the read communication statuses. However, since the event here is the arrival of data, both the `DDS_DATA_ON_READERS` and `DDS_DATA_AVAILABLE` status are `TRUE`. The Data Distribution Service will first attempt to handle the `DDS_DATA_ON_READERS` status and try to activate the `DDS_SubscriberListener`. When this `Listener` is not activated for this status, the event will propagate to the `DDS_DomainParticipantListener`. Only when the `DDS_DATA_ON_READERS` status can not be handled, the Data Distribution Service will attempt to handle the `DDS_DATA_AVAILABLE` status and try to activate the `DDS_DataReaderListener`. In case this `Listener` is not activated for this status, the event will follow the propagation rules as described above.

Conditions and Waitsets

The `DDS_Conditions` in conjunction with `DDS_WaitSets` provide for a wait-based mechanism to synchronously inform the application of status changes. A `DDS_Condition` can be either a `DDS_ReadCondition`, `DDS_QueryCondition`, `DDS_StatusCondition` or `DDS_GuardCondition`. To create a `DDS_Condition` one of the following operations can be used:

- DDS_ReadCondition created by DDS_DataReader_create_readcondition
- DDS_QueryCondition created by DDS_DataReader_create_querycondition
- DDS_StatusCondition retrieved by DDS_<Entity>_get_statuscondition on an DDS_<Entity>
- DDS_GuardCondition created by the C operation DDS_GuardCondition__alloc

Note that the DDS_QueryCondition is a specialized DDS_ReadCondition. The DDS_GuardCondition is a different kind of DDS_Condition since it is not controlled by a status but directly by the application (when a DDS_GuardCondition is initially created, the trigger_value is FALSE). The DDS_StatusCondition is present by default with each DDS_Entity, therefore, it does not have to be created.

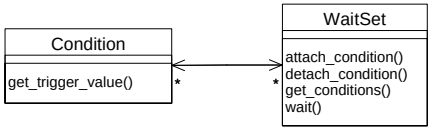

Figure 28: DCPS DDS_WaitSets

A DDS_WaitSet may have one or several DDS_Conditions attached to it. An application thread may block execution (blocking may be limited by a timeout) by waiting on a DDS_WaitSet until the trigger_value of one or more of the DDS_Conditions become TRUE. When a DDS_Condition, whose trigger_value evaluates to TRUE, is attached to a DDS_WaitSet that is currently being waited on (using the DDS_WaitSet_wait operation), the DDS_WaitSet will unblock immediately.

This (wait-based) mechanism is generally used as follows:

- The application creates a DDS_WaitSet
- The application indicates which relevant information it wants to be notified of, by creating or retrieving DDS_Condition objects (DDS_StatusCondition, DDS_ReadCondition, DDS_QueryCondition or DDS_GuardCondition) and attach them to a DDS_WaitSet
- It then waits on that DDS_WaitSet (using DDS_WaitSet_wait) until the trigger_value of one or several DDS_Condition objects (in the DDS_WaitSet) become TRUE

- When the thread is unblocked, the application uses the result of the `DDS_WaitSet_wait` (*i.e.*, the list of `DDS_Condition` objects with `trigger_value==TRUE`) to actually get the information:
  - if the condition is a `DDS_StatusCondition` and the status changes refer to a plain communication status, by calling `get_status_changes` and then `get_<communication_status>` on the relevant `DDS_Entity`
  - if the condition is a `DDS_StatusCondition` and the status changes refer to the read communication status:

    `DDS_DATA_ON_READERS`, by calling `get_status_changes` and then `DDS_Subscriber_get_datareaders` on the relevant `DDS_Subscriber` and then `DDS_DataReader_read`/`DDS_DataReader_take` on the returned `DDS_DataReader` objects

    `DDS_DATA_AVAILABLE`, by calling `get_status_changes` and then `DDS_DataReader_read`/`DDS_DataReader_take` on the relevant `DDS_DataReader`.
  - if it is a `DDS_ReadCondition` or a `DDS_QueryCondition`, by calling directly `DDS_DataReader_read_w_condition` / `DDS_DataReader_take_w_condition` on the `DDS_DataReader` with the `DDS_Condition` as a parameter.

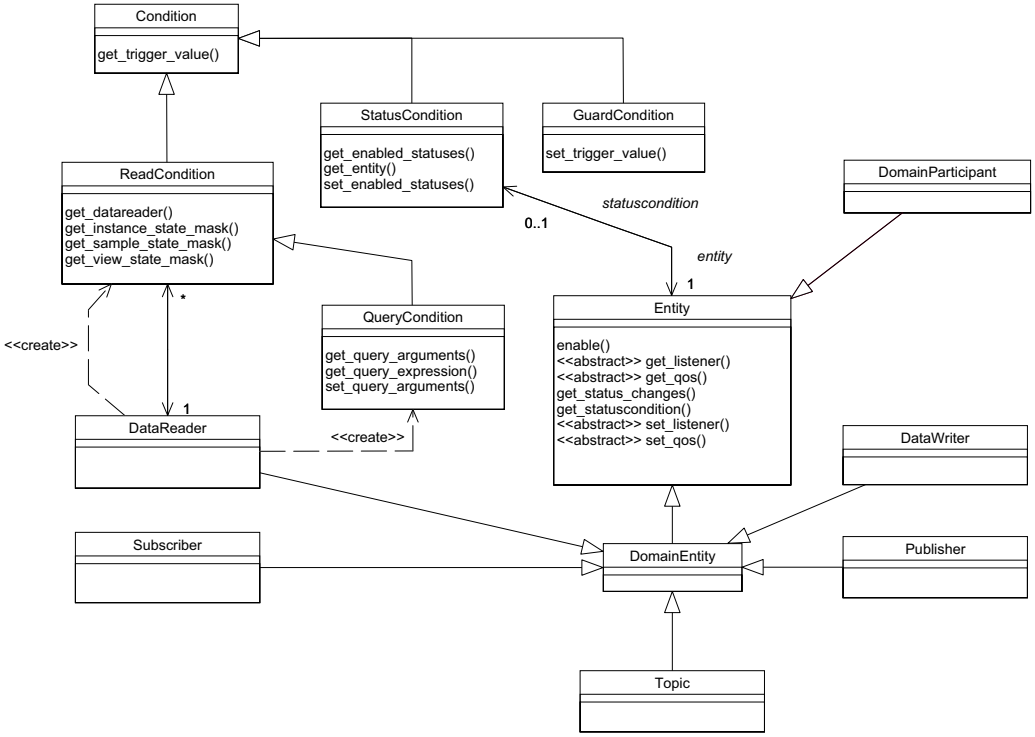

Figure 29: DCPS DDS_Conditions

No extra information is passed from the Data Distribution Service to the application when a `DDS_WaitSet_wait` returns only the list of triggered `DDS_Condition` objects. Therefore, it is the application responsibility to investigate which `DDS_Condition` objects have triggered the `DDS_WaitSet`.

Blocking Behaviour

The result of a `DDS_WaitSet_wait` operation depends on the state of the `DDS_WaitSet`, which in turn depends on whether at least one attached `DDS_Condition` has a `trigger_value` of `TRUE`. If the `DDS_WaitSet_wait` operation is called on `DDS_WaitSet` with state BLOCKED it will block the calling thread. If `DDS_WaitSet_wait` is called on a `DDS_WaitSet` with state UNBLOCKED it will return immediately. In addition, when the `DDS_WaitSet` transitions from state BLOCKED to state UNBLOCKED it wakes up the thread (if any) that had called `DDS_WaitSet_wait` on it. Note that there can only be one thread waiting on a single `DDS_WaitSet`.

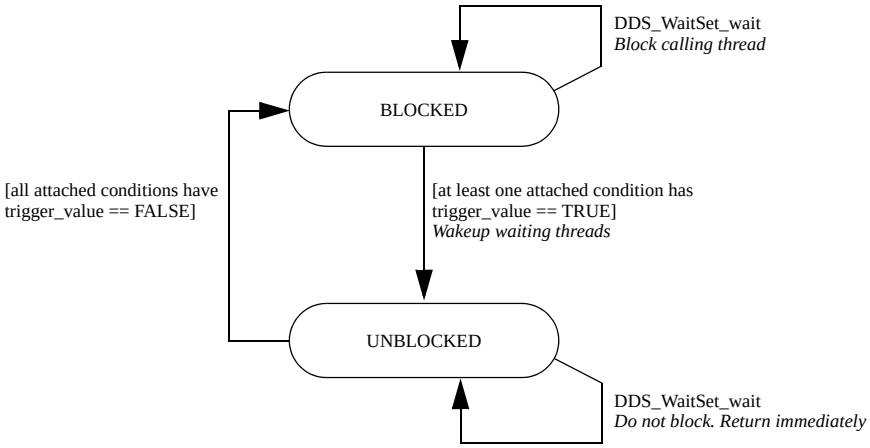

Figure 30: Blocking Behaviour of a Waitset State Chart

DDS_StatusCondition Trigger State

The `trigger_value` of a `DDS_StatusCondition` is the boolean OR of the `StatusChangedFlag` of all the communication statuses to which it is sensitive. That is, `trigger_value==FALSE` only if all the values of the `StatusChangedFlags` are FALSE.

The sensitivity of the `DDS_StatusCondition` to a particular communication status is controlled by the bit-mask of `enabled_statuses` set on the `DDS_Condition` by means of the`DDS_StatusCondition_set_enabled_statuses` operation.

DDS_ReadCondition and DDS_QueryCondition Trigger State

Similar to the `DDS_StatusCondition`, a `DDS_ReadCondition` also has a `trigger_value` that determines whether the attached `DDS_WaitSet` is BLOCKED or UNBLOCKED. However, unlike the `DDS_StatusCondition`, the `trigger_value` of the `DDS_ReadCondition` is tied to the presence of at least one sample managed by the Data Distribution Service with `SampleState`, `ViewState`, and `InstanceState` matching those of the `DDS_ReadCondition`. Additionally, for the `DDS_QueryCondition`, the data associated with the sample, must be such that the `query_expression` evaluates to `TRUE`.

The fact that the trigger_value of a `DDS_ReadCondition` is dependent on the presence of samples on the associated `DDS_DataReader` implies that a single `DDS_DataReader_take` operation can potentially change the `trigger_value` of several `DDS_ReadCondition` or `DDS_QueryCondition` objects. For example, if all samples are taken, any `DDS_ReadCondition` or `DDS_QueryCondition`

objects associated with the DDS_DataReader that had their trigger_value==TRUE before will see the trigger_value change to FALSE. Note that this does not guarantee that DDS_WaitSet objects, that had those DDS_Condition objects separately attached to, will not be woken up. Once we have trigger_value==TRUE on a DDS_Condition it may wake up the DDS_WaitSet it was attached to, the condition transitions to trigger_value==FALSE does not 'un-wake up' the DDS_WaitSet as 'un-wakening' is not possible. The consequence is that an application blocked on a DDS_WaitSet may return from the wait with a list of DDS_Condition objects some of which are no longer “active”. This is unavoidable if multiple threads are concurrently waiting on separate DDS_WaitSet objects and taking data associated with the same DDS_DataReader DDS_Entity. In other words, a DDS_WaitSet_wait may return with a list of DDS_Condition objects which all have a trigger_value==FALSE. This only means that at some point one or more of the DDS_Condition objects have had a trigger_value==TRUE but no longer do.

DDS_GuardCondition Trigger State

The trigger_value of a DDS_GuardCondition is completely controlled by the application via the operation DDS_GuardCondition_set_trigger_value. This DDS_Condition can be used to implement an application-defined wake-up of the blocked thread.

Appendix

G DDS_Topic Definitions

The Data Distribution Service distributes its data in structured data types, called topics. The first step when using the Data Distribution Service consists of defining these topics. Since the Data Distribution Service supports using several programming languages, OMG IDL is used for this purpose. This appendix describes how to define the topics.

DDS_Topic Definition Example

All data distributed using the Data Distribution Service has to be defined as a topic. A topic is a structured data type, like a C-struct with several members. Whenever the application needs to read or write data, it will be reading or writing topics. The definition of each topic it will be using has to be written in (a subset of) OMG IDL. For example:

```
module SPACE {
    struct Foo {
        long      userID;  // owner of message
        long long index;   // message index per owner
        string    content; // message body
    };
#pragma keylist Foo
};
```

This is the definition of a topic called `Foo`, used for sending and receiving messages (as an example). Even though the topic is defined using IDL, the Data Distribution Service will be using an equivalent C-struct which is accessed by the application using the type specific operations. Generation of the typed classes is achieved by invoking the Data Distribution Service IDL pre-processor: `idlpp -l c -S <idl_filename>.idl`, a tool which translates the IDL topic definition into an equivalent C definition. The `-l C` option indicates that C-code has to be generated, the -S option indicates that this C code should be StandAlone C code, *i.e.* it must not have any dependency on external ORB libraries. In this example, the pre-processor will generate the classes `SPACE_FooTypeSupport`, `SPACE_FooDataWriter` and `SPACE_FooDataReader` which contain the type specific operations.

The prefix `SPACE_` is generated from the IDL-module-name. The types of the fields are prescribed by the IDL-to-C mapping. After the Data Distribution Service IDL-pre-processor is run, the application will use the generated code.

Complex Topics

The `Foo` topic is relatively simple, but the Data Distribution Service is capable of distributing more complex topics as well. In fact, any definition following the OpenSplice IDL subset is allowed. For a reference of this subset, see the BNF-notation in Appendix , *Data Distribution Service IDL Subset in BNF Notation*. It is important to know that the pre-processor accepts all IDL constructs but only the subset is being processed.

Apart from the trivial data types, the Data Distribution Service is capable of handling fixed-length arrays, bounded and unbounded sequences, union types and enumerations. Types can be nested, *e.g.* a struct can contain a struct field or an array of structs, or a sequence of strings or an array of sequences containing structs. For more information regarding the IDL to C mapping.

IDL Pre-processor

This section contains the specification of the subset of OMG IDL that can be used to define the topics.

IDL to Host Language Mapping

The Data Distribution Service IDL pre-processor translates the IDL-definition of the topics into language specific code. This translation is executed according to the OMG IDL mappings. Since the Data Distribution Service uses data-structures only, not all IDL-features are implemented by the pre-processor. Usually, the IDL definition consists of a module defining several structs and typedefs.

Data Distribution Service IDL Keywords

The identifiers listed in this appendix are reserved for use as keywords in IDL and may not be used otherwise, unless escaped with a leading underscore.

abstract	exception	inout	provides	truncatable
any	emits	interface	public	typedef
attribute	enum	local	publishes	typeid
boolean	eventtype	long	raises	typeprefix
case	factory	module	readonly	unsigned
char	FALSE	multiple	setraises	union
component	finder	native	sequence	uses
const	fixed	Object	short	ValueBase
consumes	float	octet	string	valuetype
context	getraises	oneway	struct	void

custom	home	out	supports	wchar
default	import	primarykey	switch	wstring
double	in	private	TRUE	

Keywords must be written exactly as shown in the above list. Identifiers that collide with keywords are illegal. For example, `boolean` is a valid keyword; `Boolean` and `BOOLEAN` are illegal identifiers.

Data Distribution Service IDL Pragma Keylist

To define a topic, the content must either be a struct or a union. The pre-processor will only generate the type specific classes when topic definition is accompanied by a *<pragmakeylist>*. When the *<pragmakeylist>* has no *<field_id>*, the topic is available but no key is set. To define the keylist the definition, written in BNF-notation, is as follows:

```
   <pragmakeylist>::= “#pragma keylist” <type_id>
<field_id>*
   <type_id>::= <struct_type_identifier>
        | <union_type_identifier>
   <field_id>::= <member_declarator>
        | <element_spec_declarator>
```

In case of a struct, *<type_id>* is a *<struct_type_identifier>*. In case of a union, *<type_id>* is a *<union_type_identifier>*. The *<struct_type_identifier>* is the identifier used in the struct declaration. The *<union_type_identifier>* is the identifier used in the union declaration. The *<field_id>* is the identifier of a field in the struct or union identified by *<type_id>*. In case of a struct, *<field_id>* is a *<member_declarator>* which is one of the declarators used in the struct member. In case of a union, *<field_id>* is a *<element_spec_declarator>* which is one of the declarators used in the element specification in a case of the union.

For example, for the `Foo` example in Appendix , *DDS_Topic Definition Example* the next pragma must be used to have the pre-processor generate the typed classes (`SPACE_FooTypeSupport`, `SPACE_FooDataWriter` and `SPACE_FooDataReader`).

```
#pragma keylist Foo userID index
```

Note that in this example the `userID` and the `index` are used as a key.

Data Distribution Service IDL Subset in BNF Notation

Only a subset is used by the pre-processor. A description of the Data Distribution Service IDL subset, written in BNF-notation, is as follows:

```
<definition>::= <type_dcl> “;”
     | <const_dcl> “;”
```

```
      | <module> ";"
<module>::= "module" <identifier> "{" <definition>+ "}"
<scoped_name>::= <identifier>
      | "::" <identifier>
      | <scoped_name> "::" <identifier>
<const_dcl>::= "const" <const_type>
        <identifier> "=" <const_exp>
<const_type>::= <integer_type>
      | <char_type>
      | <boolean_type>
      | <floating_pt_type>
      | <string_type>
      | <scoped_name>
      | <octet_type>
<const_exp>::= <or_expr>
<or_expr>::= <xor_expr>
      | <or_expr> "|" <xor_expr>
<xor_expr>::= <and_expr>
      | <xor_expr> "^" <and_expr>
<and_expr>::= <shift_expr>
      | <and_expr> "&" <shift_expr>
<shift_expr>::= <add_expr>
      | <shift_expr> ">>" <add_expr>
      | <shift_expr> "<<" <add_expr>
<add_expr>::= <mult_expr>
      | <add_expr> "+" <mult_expr>
      | <add_expr> "-" <mult_expr>
<mult_expr>::= <unary_expr>
      | <mult_expr> "*" <unary_expr>
      | <mult_expr> "/" <unary_expr>
      | <mult_expr> "%" <unary_expr>
<unary_expr>::= <unary_operator> <primary_expr>
      | <primary_expr>
<unary_operator>::= "-"
      | "+"
      | "~"
<primary_expr>::= <scoped_name>
      | <literal>
      | "(" <const_exp> ")"
<literal>::= <integer_literal>
      | <string_literal>
      | <character_literal>
      | <floating_pt_literal>
      | <boolean_literal>
<boolean_literal>::= "TRUE"
      | "FALSE"
<positive_int_const>::= <const_exp>
<type_dcl>::= "typedef" <type_declarator>
      | <struct_type>
      | <union_type>
```

```
      | <enum_type>
<type_declarator>::= <type_spec> <declarators>
<type_spec>::= <simple_type_spec>
      | <constr_type_spec>
<simple_type_spec>::= <base_type_spec>
      | <template_type_spec>
      | <scoped_name>
<base_type_spec>::= <floating_pt_type>
      | <integer_type>
      | <char_type>
      | <boolean_type>
      | <octet_type>
<template_type_spec>::= <sequence_type>
      | <string_type>
<constr_type_spec>::= <struct_type>
      | <union_type>
      | <enum_type>
<declarators>::= <declarator> { “,” <declarator> }*
<declarator>::= <simple_declarator>
      | <complex_declarator>
<simple_declarator>::= <identifier>
<complex_declarator>::= <array_declarator>
<floating_pt_type>::= “float”
      | “double”
<integer_type>::= <signed_int>
      | <unsigned_int>
<signed_int>::= <signed_short_int>
      | <signed_long_int>
      | <signed_longlong_int>
<signed_short_int>::= “short”
<signed_long_int>::= “long”
<signed_longlong_int>::= “long” “long”
<unsigned_int>::= <unsigned_short_int>
      | <unsigned_long_int>
      | <unsigned_longlong_int>
<unsigned_short_int>::= “unsigned” “short”
<unsigned_long_int>::= “unsigned” “long”
<unsigned_longlong_int>::= “unsigned” “long” “long”
<char_type>::= “char”
<boolean_type>::= “boolean”
<octet_type>::= “octet”
<struct_type>::= “struct” <identifier> “{” <member_list> “}”
<member_list>::= <member>+
<member>::= <type_spec> <declarators> “;”
<union_type>::= “union” <identifier> “switch”
       “(” <switch_type_spec> “)”
       “{” <switch_body> “}”
<switch_type_spec>::= <integer_type>
      | <char_type>
      | <boolean_type>
```

```
      | <enum_type>
      | <scoped_name>
<switch_body>::= <case>+
<case>::= <case_label>+ <element_spec> “;”
<case_label>::= “case” <const_exp> “:”
      | “default” “:”
<element_spec>::= <type_spec> <declarator>
<enum_type>::= “enum” <identifier>
        “{” <enumerator> { “,” <enumerator> }* “}”
<enumerator>::= <identifier>
<sequence_type>::= “sequence” “<” <simple_type_spec> “,”
        <positive_int_const> “>”
      | “sequence” “<” <simple_type_spec> “>”
<string_type>::= “string” “<” <positive_int_const> “>”
      | “string”
<array_declarator>::= <identifier> <fixed_array_size>+
<fixed_array_size>::= “[” <positive_int_const> “]”
```

Appendix

H DCPS Queries and Filters

A subset of SQL syntax is used in several parts of OpenSplice:

- the `filter_expression` in the `DDS_ContentFilteredTopic`
- the `topic_expression` in the `DDS_MultiTopic`
- the `query_expression` in the `DDS_QueryReadCondition`.

Those expressions may use a subset of SQL, extended with the possibility to use program variables in the SQL expression. The allowed SQL expressions are defined with the BNF-grammar below. The following notational conventions are made:

- the `NonTerminals` are typeset in italics
- the `'Terminals'` are quoted and typeset in a fixed width font
- the `TOKENS` are typeset in small caps
- the notation *(element // ‘,’)* represents a non-empty comma-separated list of *elements*.

SQL Grammar in BNF

```
Expression::= FilterExpression
      | TopicExpression
      | QueryExpression
FilterExpression::= Condition
TopicExpression::= SelectFrom {Where } ‘;’
QueryExpression::= {Condition}{‘ORDER BY’ (FIELDNAME // ‘,’) }
SelectFrom::= ‘SELECT’ Aggregation ‘FROM’ Selection
Aggregation::= ‘*’
      | (SubjectFieldSpec // ‘,’)
SubjectFieldSpec::= FIELDNAME
      | FIELDNAME ‘AS’ FIELDNAME
      | FIELDNAME FIELDNAME
Selection::= TOPICNAME
      | TOPICTNAME NaturalJoin JoinItem
JoinItem::= TOPICNAME
      | TOPICNAME NaturalJoin JoinItem
      | ‘(’ TOPICNAME NaturalJoin JoinItem ‘)’
NaturalJoin::= ‘INNER NATURAL JOIN’
      | ‘NATURAL JOIN’
      | ‘NATURAL INNER JOIN’
Where::= ‘WHERE’ Condition
Condition::= Predicate
      | Condition ‘AND’ Condition
```

```
        | Condition 'OR' Condition
        | 'NOT' Condition
        | '(' Condition ')'
Predicate::= ComparisonPredicate
        | BetweenPredicate
ComparisonPredicate::= FIELDNAME RelOp Parameter
        | Parameter RelOp FIELDNAME

BetweenPredicate::= FIELDNAME 'BETWEEN' Range
        | FIELDNAME 'NOT BETWEEN' Range
RelOp::= '=' | '>' | '>=' | '<' | '<=' | '<>' | like
Range::= Parameter 'AND' Parameter
Parameter::= INTEGERVALUE
        | FLOATVALUE
        | STRING
        | ENUMERATEDVALUE
        | PARAMETER
```

Note: `INNER NATURAL JOIN`, `NATURAL JOIN`, and `NATURAL INNER JOIN` are all aliases, in the sense that they have the same semantics. The aliases are all supported because they all are part of the SQL standard.

SQL Token Expression

The syntax and meaning of the tokens used in the SQL grammar is described as follows:

`FIELDNAME` - A fieldname is a reference to a field in the data-structure. The dot `'.'` is used to navigate through nested structures. The number of dots that may be used in a fieldname is unlimited. The field-name can refer to fields at any depth in the data structure. The names of the field are those specified in the IDL definition of the corresponding structure, which may or may not match the field names that appear on the C mapping of the structure

`TOPICNAME` - A topic name is an identifier for a topic, and is defined as any series of characters `'a'`, ..., `'z'`, `'A'`, ..., `'Z'`, `'0'`, ..., `'9'`, `'-'`, `'_'` but may not start with a digit

`INTEGERVALUE` - Any series of digits, optionally preceded by a plus or minus sign, representing a decimal integer value within the range of the system. A hexadecimal number is preceded by `0x` and must be a valid hexadecimal expression

`FLOATVALUE` - Any series of digits, optionally preceded by a plus or minus sign and optionally including a floating point (`'.'`). A power-of-ten expression may be post-fixed, which has the syntax `en`, where `n` is a number, optionally preceded by a plus or minus sign

STRING - Any series of characters encapsulated in single quotes, except a new-line character or a right quote. A string starts with a left or right quote, but ends with a right quote

ENUMERATEDVALUE - An enumerated value is a reference to a value declared within an enumeration. The name of the value must correspond to the names specified in the IDL definition of the enumeration, and must be encapsulated in single quotes. An enum value starts with a left or right quote, but ends with a right quote.

PARAMETER - A parameter is of the form %*n*, where *n* represents a natural number (zero included) smaller than 100. It refers to the $n + 1^{th}$ argument in the given context.

Note: when `RelOp` is `'like'`, Unix filename wildcards must be used for strings instead of the normal SQL wildcards. This means any one character is `'?'`, any zero or more characters is `'*'`

SQL Examples

Assuming Topic "Location" has as an associated type a structure with fields "flight_name, x, y, z", and Topic "FlightPlan" has as fields "flight_id, source, destination". The following are examples of using these expressions.

Example of a ***topic_expression***:

> "SELECT flight_name, x, y, z AS height FROM 'Location' NATURAL JOIN 'FlightPlan' WHERE height < 1000 AND x <23".

Example of a ***query_expression*** or a ***filter_expression***:

> "height < 1000 AND x <23".

Appendix

I Built-in Topics

As part of its operation, the middleware must discover and possibly keep track of the presence of remote entities such as a new participant in the domain. This information may also be important to the application, which may want to react to this discovery, or else access it on demand.

To make this information accessible to the application, the DCPS specification introduces a set of built-in topics and corresponding DataReader objects that can then be used by the application. The information is then accessed as normal application data. This approach avoids introducing a new API to access this information and allows the application to become aware of any changes in those values by means of any of the mechanisms presented in Appendix F, *Listeners, Conditions and Waitsets*.

The built-in data-readers all belong to a built-in Subscriber. This subscriber can be retrieved by using the method `get_builtin_subscriber` provided by the `DomainParticipant` (for details, see Section 3.2.1.16, *DDS_DomainParticipant_get_builtin_subscriber*, on page 187). The built-in DataReader objects can be retrieved by using the operation `lookup_datareader`, with the Subscriber and the topic name as parameter (for details, see Section 3.5.1.15, *DDS_Subscriber_lookup_datareader*, on page 401).

The QoS of the built-in Subscriber and DataReader objects is given by the following table:

Table 27: Built-in Subscriber and DataReader QoS

USER_DATA	<empty>
TOPIC_DATA	<empty>
GROUP_DATA	<empty>
DURABILITY	TRANSIENT
DURABILITY_SERVICE	service_cleanup_delay = 0 history_kind = KEEP_LAST history_depth = 1 max_samples = LENGTH_UNLIMITED max_instances = LENGTH_UNLIMITED max_samples_per_instance = LENGTH_UNLIMITED

Table 27: Built-in Subscriber and DataReader QoS (continued)

PRESENTATION	access_scope = TOPIC coherent_access = FALSE ordered_access = FALSE
DEADLINE	Period = infinite
LATENCY_BUDGET	duration = 0
OWNERSHIP	SHARED
LIVELINESS	kind = AUTOMATIC lease_duration = 0
TIME_BASED_FILTER	minimum_separation = 0
PARTITION	__BUILT-IN PARTITION__
RELIABILITY	kind = RELIABLE max_blocking_time = 100 milliseconds synchronous = FALSE
DESTINATION_ORDER	BY_RECEPTION_TIMESTAMP
HISTORY	kind = KEEP_LAST depth = 1
RESOURCE_LIMITS	max_samples = LENGTH_UNLIMITED max_instances = LENGTH_UNLIMITED max_samples_per_instance = LENGTH_UNLIMITED
READER_DATA_LIFECYCLE	autopurge_nowriter_samples_delay = INFINITE autopurge_disposed_samples_delay = INFINITE invalid_sample_visibility = MINIMUM_INVALID_SAMPLES
ENTITY_FACTORY	autoenable_created_entities = TRUE
SHARE	enable = FALSE name = NULL
READER_DATA_LIFESPAN	used = FALSE duration = INFINITE
USER_KEY	enable = FALSE expression = NULL

Built-in entities have default listener settings as well. The built-in Subscriber and all of its built-in Topics have nil listeners with all statuses appearing in their listener masks. The built-in DataReaders have nil listeners with no statuses in their masks.

The information that is accessible about the remote entities by means of the built-in topics includes all the QoS policies that apply to the corresponding remote Entity. The QoS policies appear as normal `'data'` fields inside the data read by means of the built-in Topic. Additional information is provided to identify the Entity and facilitate the application logic.

The tables below list the built-in topics, their names, and the additional information (beyond the QoS policies that apply to the remote entity) that appears in the data associated with the built-in topic.

ParticipantBuiltinTopicData

The *DCPSParticipant* topic communicates the existence of DomainParticipants by means of the ParticipantBuiltinTopicData datatype. Each ParticipantBuiltinTopicData sample in a Domain represents a DomainParticipant that participates in that Domain: a new ParticipantBuiltinTopicData instance is created when a newly added DomainParticipant is enabled, and it is disposed when that DomainParticipant is deleted. An updated ParticipantBuiltinTopicData sample is written each time the DomainParticipant modifies its UserDataQosPolicy.

Table 28: ParticipantBuiltinTopicData Members

Name	Type	Description
key	BuiltinTopicKey_t	Globally unique identifier of the participant
user_data	UserDataQosPolicy	User-defined data attached to the participant via a QosPolicy

TopicBuiltinTopicData

The *DCPSTopic* topic communicates the existence of topics by means of the TopicBuiltinTopicData datatype. Each TopicBuiltinTopicData sample in a Domain represents a Topic in that Domain: a new TopicBuiltinTopicData instance is created when a newly added Topic is enabled. However, the instance is not disposed when a Topic is deleted by its participant because a topic lifecycle is tied to the lifecycle of a Domain, not to the lifecycle of an individual participant. (See also Section 3.2.1.13, *DDS_DomainParticipant_delete_topic*, on page 183, which explains that a DomainParticipant can only delete its local proxy to the real Topic). An updated TopicBuiltinTopicData sample is written each time a Topic modifies one or more of its QosPolicy values.

Information published in the *DCPSTopicTopic* is critical to the data distribution service, therefore it cannot be disabled by means of the Domain/BuiltinTopics element in the configuration file.

Table 29: TopicBuiltinTopicData Members

Name	Type	Description
key	`BuiltinTopicKey_t`	Global unique identifier of the Topic
name	`String`	Name of the Topic
type_name	`String`	Type name of the Topic (*i.e.* the fully scoped IDL name)
durability	`DurabilityQosPolicy`	QosPolicy attached to the Topic
durability_service	`DurabilityServiceQosPolicy`	QosPolicy attached to the Topic
deadline	`DeadlineQosPolicy`	QosPolicy attached to the Topic
latency_budget	`LatencyBudgetQosPolicy`	QosPolicy attached to the Topic
liveliness	`LivelinessQosPolicy`	QosPolicy attached to the Topic
reliability	`ReliabilityQosPolicy`	QosPolicy attached to the Topic
transport_priority	`TransportPriorityQosPolicy`	QosPolicy attached to the Topic
lifespan	`LifespanQosPolicy`	QosPolicy attached to the Topic
destination_order	`DestinationOrderQosPolicy`	QosPolicy attached to the Topic
history	`HistoryQosPolicy`	QosPolicy attached to the Topic
resource_limits	`ResourceLimitsQosPolicy`	QosPolicy attached to the Topic
ownership	`OwnershipQosPolicy`	QosPolicy attached to the Topic
topic_data	`TopicDataQosPolicy`	QosPolicy attached to the Topic

PublicationBuiltinTopicData

The *`DCPSPublication`* topic communicates the existence of datawriters by means of the `PublicationBuiltinTopicData` datatype. Each `PublicationBuiltinTopicData` sample in a Domain represents a datawriter in that Domain: a new `PublicationBuiltinTopicData` instance is created when a newly added DataWriter is enabled, and it is disposed when that DataWriter is deleted. An updated `PublicationBuiltinTopicData` sample is written each time the DataWriter (or the Publisher to which it belongs) modifies a QosPolicy that applies to the entities connected to it. Also will it be updated when the writer looses or regains its liveliness.

The `PublicationBuiltinTopicData` Topic is also used to return data through the `get_matched_publication_data` operation on the DataReader as described in Section 3.5.2.13, *DDS_DataReader_get_matched_publication_data*, on page 426.

Table 30: PublicationBuiltinTopicData Members

Name	Type	Description
key	BuiltinTopicKey_t	Global unique identifier of the DataWriter
participant_key	BuiltinTopicKey_t	Global unique identifier of the Participant to which the DataWriter belongs
topic_name	String	Name of the Topic used by the DataWriter
type_name	String	Type name of the Topic used by the DataWriter
durability	DurabilityQosPolicy	QosPolicy attached to the DataWriter
deadline	DeadlineQosPolicy	QosPolicy attached to the DataWriter
latency_budget	LatencyBudgetQosPolicy	QosPolicy attached to the DataWriter
liveliness	LivelinessQosPolicy	QosPolicy attached to the DataWriter
reliability	ReliabilityQosPolicy	QosPolicy attached to the DataWriter
lifespan	LifespanQosPolicy	QosPolicy attached to the DataWriter
destination_order	DestinationOrderQosPolicy	QosPolicy attached to the DataWriter
user_data	UserDataQosPolicy	QosPolicy attached to the DataWriter
ownership	OwnershipQosPolicy	QosPolicy attached to the DataWriter
ownership_strength	OwnershipStrengthQosPolicy	QosPolicy attached to the DataWriter
presentation	PresentationQosPolicy	QosPolicy attached to the Publisher to which the DataWriter belongs
partition	PartitionQosPolicy	QosPolicy attached to the Publisher to which the DataWriter belongs
topic_data	TopicDataQosPolicy	QosPolicy attached to the Topic used by the DataWriter
group_data	GroupDataQosPolicy	QosPolicy attached to the Publisher to which the DataWriter belongs

SubscriptionBuiltinTopicData

The *DCPSSubscription* topic communicates the existence of datareaders by means of the SubscriptionBuiltinTopicData datatype. Each SubscriptionBuiltinTopicData sample in a Domain represents a datareader in that Domain: a new SubscriptionBuiltinTopicData instance is created when a newly added DataReader is enabled, and it is disposed when that

DataReader is deleted. An updated `SubscriptionBuiltinTopicData` sample is written each time the DataReader (or the Subscriber to which it belongs) modifies a QosPolicy that applies to the entities connected to it.

The *`SubscriptionBuiltinTopicData`* Topic is also used to return data through the `get_matched_subscription_data` operation on the DataWriter as described in Section 3.4.2.9, *DDS_DataWriter_get_matched_subscription_data*, on page 319.

Table 31: SubscriptionBuiltinTopicData Members

Name	Type	Description
key	`BuiltinTopicKey_t`	Global unique identifier of the DataReader
participant_key	`BuiltinTopicKey_t`	Global unique identifier of the Participant to which the DataReader belongs
topic_name	`String`	Name of the Topic used by the DataReader
type_name	`String`	Type name of the Topic used by the DataReader
durability	`DurabilityQosPolicy`	QosPolicy attached to the DataReader
deadline	`DeadlineQosPolicy`	QosPolicy attached to the DataReader
latency_budget	`LatencyBudgetQosPolicy`	QosPolicy attached to the DataReader
liveliness	`LivelinessQosPolicy`	QosPolicy attached to the DataReader
reliability	`ReliabilityQosPolicy`	QosPolicy attached to the DataReader
ownership	`LifespanQosPolicy`	QosPolicy attached to the DataReader
destination_order	`DestinationOrderQosPolicy`	QosPolicy attached to the DataReader
user_data	`UserDataQosPolicy`	QosPolicy attached to the DataReader
time_based_filter	`TimeBasedFilterQosPolicy`	QosPolicy attached to the DataReader
presentation	`PresentationQosPolicy`	QosPolicy attached to the Subscriber to which the DataReader belongs
partition	`PartitionQosPolicy`	QosPolicy attached to the Subscriber to which the DataReader belongs
topic_data	`TopicDataQosPolicy`	QosPolicy attached to the Topic used by the DataReader
group_data	`GroupDataQosPolicy`	QosPolicy attached to the Subscriber to which the DataReader belongs

Other builtin topics

There are a number of other built-in topics that have not been mentioned. These topics (*e.g.* `DCPSDelivery`, `DCPSHeartbeat` and potentially some others) are proprietary and for internal use only. Users are discouraged from doing anything with these topics, so as not to interfere with internal mechanisms that rely on them. The structure of these topics may change without notification.

Bibliography

Bibliography

[1] *OMG Data Distribution Service Revised Final Adopted Specification ptc/04-03-07*, Object Management Group

[2] *OMG C Language Mapping Specification formal/99-07-35*, Object Management Group (OMG)

[3] *OMG The Common Object Request Broker: Architecture and Specification*, Version 3.0, formal/02-06-01, Object Management Group

Glossary

Glossary

Acronyms

Acronym	Meaning
CORBA	Common Object Request Broker Architecture
DCPS	Data Centric Publish/Subscribe
DDS	Data Distribution Service
IDL	Interface Definition Language
OMG	Object Management Group
ORB	Object Request Broker
QoS	Quality of Service
SPLICE	Subscription Paradigm for the Logical Interconnection of Concurrent Engines

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