



# VORTEX OPENSPLICE

**Tuner Guide**

*Release 6.x*

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## 1.1 About The Vortex OpenSplice Tuner Guide

The *Tuner Guide* describes the Vortex OpenSplice Tuner features and how they should be used. The Vortex OpenSplice Tuner is included with the OpenSplice product.

The Vortex OpenSplice Tuner provides facilities for monitoring and controlling OpenSplice and the applications that use Vortex OpenSplice for the distribution of data.

## 1.2 Intended Audience

The *Tuner Guide* is intended to be used by all Vortex OpenSplice users, including programmers, testers, system designers and system integrators.

## 1.3 Organisation










This *Guide* is organised in two parts.

The *Introduction* provides a brief, high-level description of the OpenSplice Tuner.

The main section, *Using the OpenSplice Tuner*, describes how to use the OpenSplice Tuner.

## 1.4 Conventions

The icons shown below are used in the Vortex product documentation to help readers to quickly identify information relevant to their specific use of Vortex OpenSplice.

<i>Icon</i>	<i>Meaning</i>
	Item of special significance or where caution needs to be taken.
	Item contains helpful hint or special information.
	Information applies to Windows ( <i>e.g.</i> XP, 2003, Windows 7) only.
	Information applies to Unix-based systems ( <i>e.g.</i> Solaris) only.
	Information applies to Linux-based systems ( <i>e.g.</i> Ubuntu) only.
	C language specific.
	C++ language specific.
	C# language specific.
	Java language specific.

## INTRODUCTION

*This section describes the Vortex OpenSplice Tuner.*

### 2.1 General Description

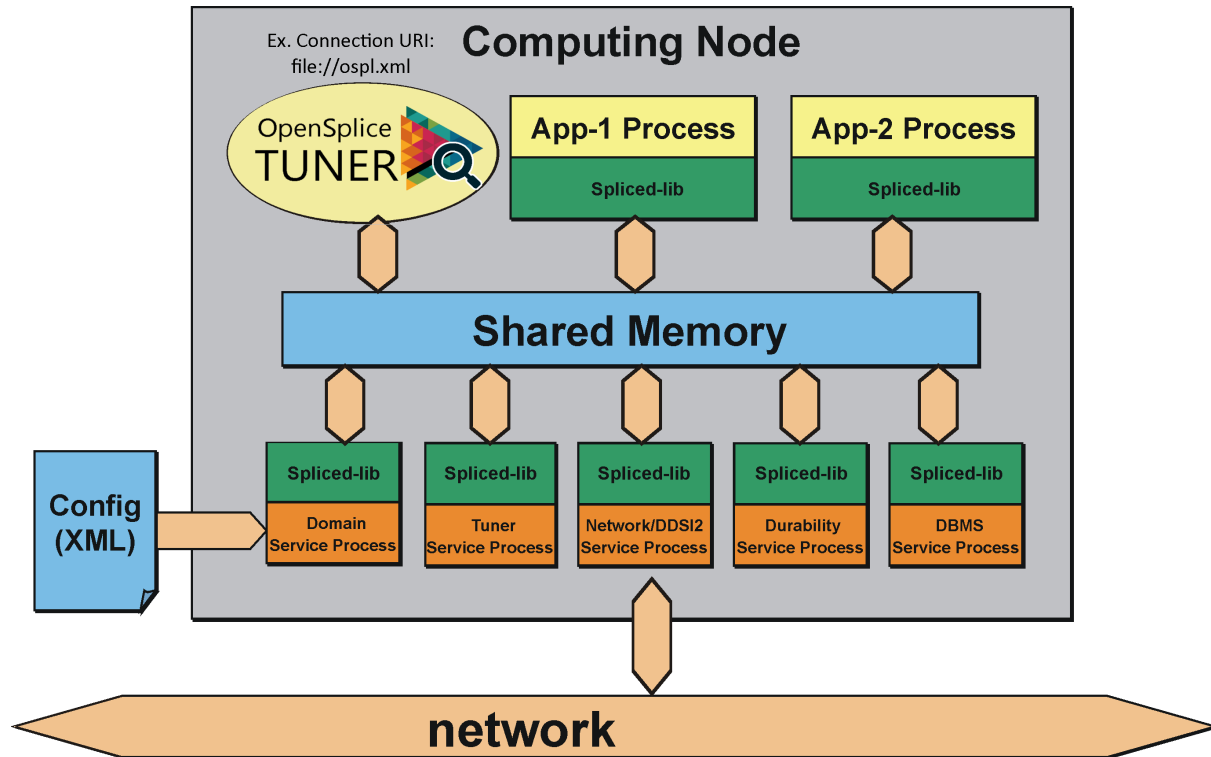
Vortex OpenSplice Tuner has been implemented in the Java language. It is possible to use it on every platform where a Java Virtual Machine (JVM) implementation is available. That means that Vortex OpenSplice Tuner does not require OpenSplice to be available on the local system.

Vortex OpenSplice Tuner is able to connect to one specific OpenSplice DDS domain at one specific node, both locally and remotely. It is possible to simultaneously connect one or more Vortex OpenSplice Tuners to a specific domain and node.

The diagram below shows an overview of a Vortex OpenSplice Tuner process connecting locally to a Vortex OpenSplice federation (shared memory deployment) on one computing node. (Typically, there are many nodes within a system.)

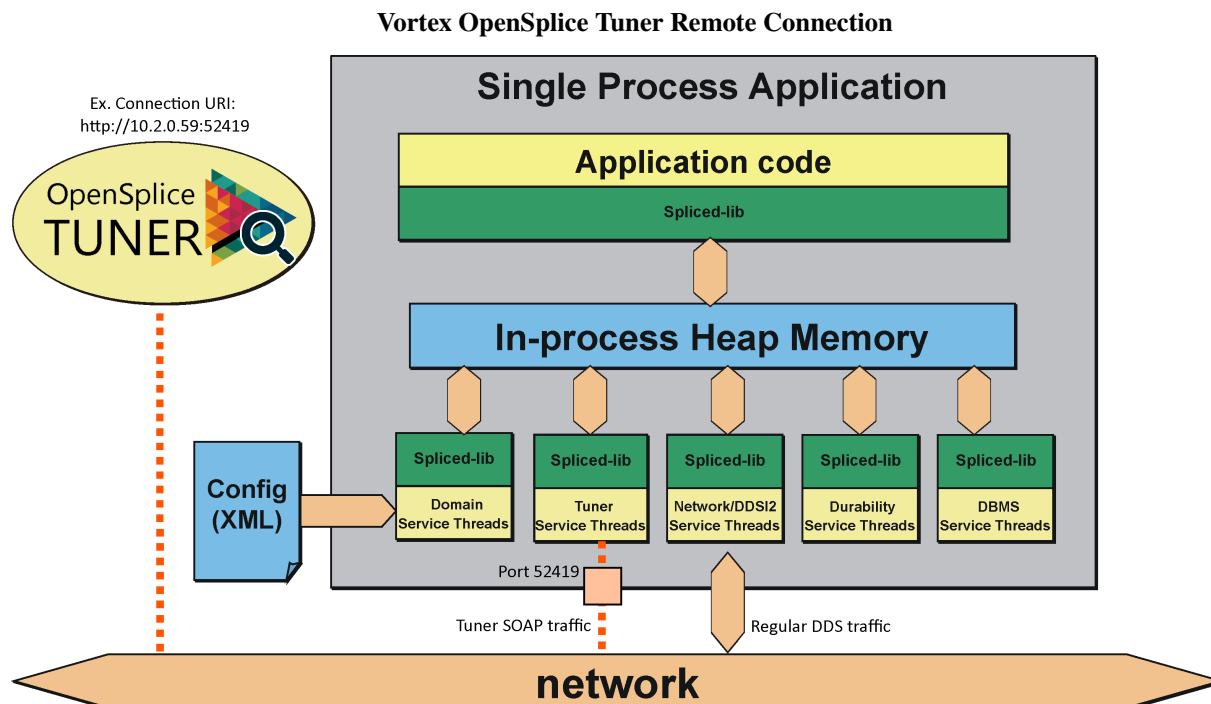
Vortex OpenSplice Tuner Local Connection:

#### **Vortex OpenSplice Tuner Local Connection**



The diagram below shows an overview of a Vortex OpenSplice Tuner process connecting remotely to a Vortex OpenSplice application (single process deployment). The Tuner service (aka the SOAP service) must be enabled in the Vortex OpenSplice configuration file to allow remote connection for tools.

Vortex OpenSplice Tuner Remote Connection:



While the figure details a remote connection to a single process deployment, one can also use the remote connection capability to connect to a shared memory deployment in the exact same way.



## USING THE VORTEX OPENSPLICE TUNER

*This section describes how to use the Vortex OpenSplice Tuner, including how to start, stop, perform connection management, manage entities and data, and perform other related tasks.*

### 3.1 Starting and Stopping the Tuner

Vortex OpenSplice Tuner has been implemented in the Java language. The supported platforms for the Tuner are listed in the *Release Notes* in the section ‘Supported Platforms’. The Tuner will work on all platforms that support JAVA (SAJ) SDK.

#### 3.1.1 Starting Tuner Using Launcher

The Vortex OpenSplice Launcher application provides easy access to the Vortex OpenSplice tools, configurations, documentation and examples.

Vortex OpenSplice Tuner can be quickly started using the Vortex OpenSplice Launcher application.

Instructions for starting Launcher can be found in the ‘Launcher’ section of the *OpenSplice\_GettingStartedGuide.pdf* document.

In Launcher, select the *Tools* tab, and select the *Tuner* button. This will open the Tuner application.

#### 3.1.2 Starting Tuner Using Command Line

The Vortex OpenSplice Tuner provides a command line instruction for specifying the domain config file that the tuner needs to connect to.

The option is

```
-uri=<URI>
```

An example command:

```
% ospltun -uri=$OSPL_URI
```

The following subsections provide the startup procedures for the verified operating systems.

### 3.1.2.1 Solaris and Linux

#### Linux

Before starting Vortex OpenSplice Tuner, the Vortex OpenSplice environment must be set correctly. This can be realized by starting a shell and executing the `release.com` application located in the root directory of the OpenSplice installation (from now on referred to by `<OSPL_HOME>`):

```
% . <OSPL_HOME>/release.com
```

Once the environment has been initialized correctly, the Vortex OpenSplice Tuner can be started by typing the following command in the shell:

```
% ospltun
```

When Vortex OpenSplice Tuner is started, the main window is presented to the user. (See the illustration *The Main Tuner Window*.)

### 3.1.2.2 Windows

#### Windows

The Vortex OpenSplice environment must be set correctly before starting the Vortex OpenSplice Tuner. This is done by opening a command prompt and executing the `release.bat` file which is located in the root directory of the Vortex OpenSplice installation (herein referred to by `<OSPL_HOME>`).

```
% . <OSPL_HOME>/release.bat
```

The Vortex OpenSplice Tuner can be started by typing the following command in the command prompt after the environment has been initialized correctly:

```
% ospltun
```

The tuner's main window is displayed when the Vortex OpenSplice Tuner is started (see *The Main Tuner Window*).

## 3.1.3 Graphical User Interface Conventions

Some conventions are used for all graphical components of the Vortex OpenSplice Tuner. Each window of Vortex OpenSplice Tuner provides a menu bar. Each menu bar has three menus:

**File** - The *File* menu always provides an option to close the window (*File > Close*).

**Edit** - The *Edit* menu provides facilities to interact with the OpenSplice system.

**View** - The *View* menu provides options to modify the view on data in the window.

The *View* menu also provides an option to look up the main window. This can be achieved by choosing *View > Show main window* in the menu bar. This results in the displaying and focusing of the main window.

All windows are also equipped with a *status bar*. This status bar is used by Vortex OpenSplice Tuner to provide the user with information about the status or to report feedback about actions taken by the user. The status bar is colored *yellow* when a warning message is displayed and colored *red* when an error message is displayed.

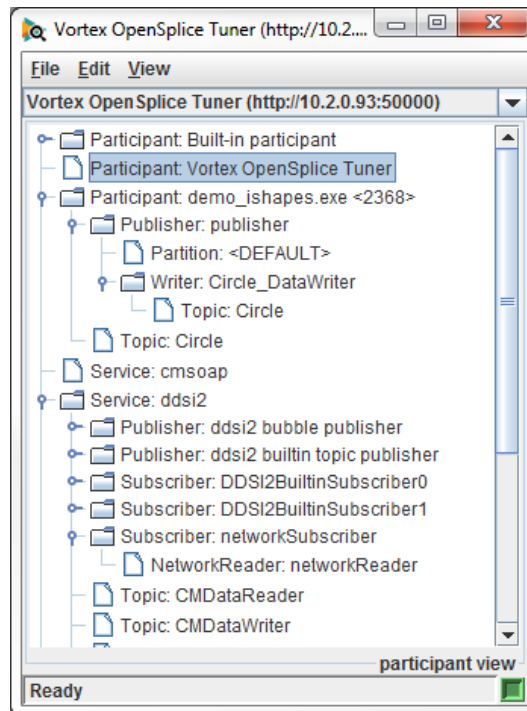
Sometimes a status bar also contains a 'light', which is located in the right corner of the status bar. This light provides information about the availability of the entities where the window depends on. If these entities are available, the light is colored *green*. If not, then it is colored *red*.

A lot of menu items in the menus of several windows of OpenSplice Tuner can also be triggered using a combination of keyboard keys (short-cut). If such a keyboard shortcut is available for a specific menu item, it is displayed at the right side of the menu item in *blue*. The specific keyboard shortcuts are not discussed in this manual.

### 3.1.4 Main Window

When Vortex OpenSplice Tuner is started the main window appears.

**The Main Tuner Window**

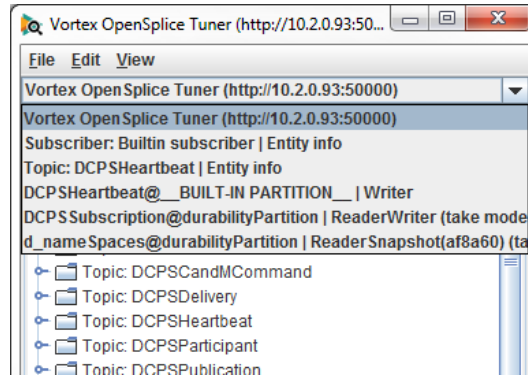


The title bar displays *Vortex OpenSplice Tuner (<connected\_domain\_uri>)*.

The entity tree in the main window displays the entities in OpenSplice as well as their relationships. The selected view determines which relationships are displayed (see *Entity Relationships*). The current view name is displayed in the bottom right corner of the entity tree.

The status bar provides information about the status of the window or about the action that is currently being executed. The status bar of the main window is equipped with a 'light' (located at the right corner of the status bar). This 'light' provides information about the connection. If OpenSplice Tuner is currently connected to an OpenSplice domain, it is colored *green* (as in the illustration above). If not, it is colored *red*.

#### The Window List



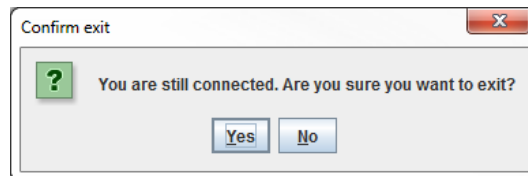
The window list of the main window is a pull-down menu, which contains all OpenSplice Tuner windows. The values in the window list match the titles of the windows. If an entry in the list is selected, the associated window is opened and it receives the focus. When a new window is opened, it is added to the window list; it is removed from this list when the window is closed again.

### 3.1.5 Shutdown

OpenSplice Tuner can be exited at any time by choosing *File > Exit* in the menu bar of the main window or by clicking the 'close' (X) icon at the top-right corner of the main window.

When OpenSplice Tuner is currently connected to a specific OpenSplice domain (see *Connection Management*), it asks for confirmation to close that connection.

#### The Confirm Exit Dialog



## 3.2 Connection Management

To be able to monitor and control the OpenSplice system, OpenSplice Tuner needs access to a specific domain. This section describes the various connection types that are supported by OpenSplice Tuner, including how a connection to a specific OpenSplice domain and node can be opened and how a connection can be closed.

### 3.2.1 Connection Types

OpenSplice Tuner offers the possibility to connect to a specific domain on a specific node in two different ways:

**Local** - OpenSplice Tuner connects to a specific domain that is available on the same *node* as where it is started. For local connections, OpenSplice Tuner connects to an OpenSplice domain using the Java Native Interface (JNI). This is the default connection type.

**Remote** - OpenSplice connects to a specific domain that is available on a node in the same *network* as the node where it started. For remote connections, OpenSplice Tuner connects to a OpenSplice domain using the Simple Object Access Protocol (SOAP).

The Tuner determines the connection type based on the given domain URI/URL in the connection dialog (see *Open a Connection*).

**i** A local connection is preferred over a remote connection because communication with OpenSplice is faster and does not cause any network traffic. It is therefore less intrusive than a remote connection and it improves the performance of OpenSplice Tuner.

**i** By using a remote connection, OpenSplice Tuner also supports monitoring and controlling OpenSplice on embedded platforms that do not provide a graphical user interface (VxWorks for example)

### 3.2.2 Open a Connection

OpenSplice Tuner can only open a connection when it is not currently connected.

To open a connection, choose *File > Connect* in the menu bar. This action opens a dialog that asks the user to provide a domain URI.

This domain URI can represent any of the following values:

- a*: Integer Domain ID (e.g. 1)
- b*: Domain URI (e.g. `file:///home/ADLINK/ospl.xml`)
- c*: SOAP service URL (e.g. `http://192.168.1.20:8000`)

Value *b* can be selected from a file chooser. Click the *Browse* button to open a file chooser.

- Values *a* and *b* imply a *local* connection type.
- Value *c* implies a *remote* connection type.

When value *c* is used, make sure that the OpenSplice Control & Monitoring SOAP (CMSOAP) service is running at the supplied SOAP service URL.

When the *OK* button is clicked, OpenSplice Tuner tries to open a connection to the domain that is associated with the supplied domain URI. If the domain exists, OpenSplice Tuner connects to that domain. If it does not exist, the message ‘Supplied URI not available’ appears in the status bar of the dialog window.

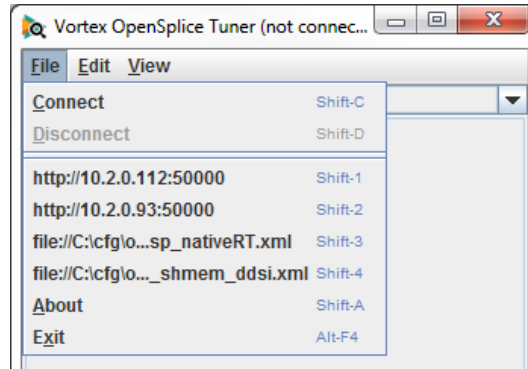
When domain URI value *c* is used and the CMSOAP service and/or OpenSplice is not running at the specified node URL, the message ‘IOException: Connection refused’ appears in the status bar of the dialog window.

The Connect operation can be cancelled by clicking the *Cancel* button. This makes the dialog window close. OpenSplice Tuner is still disconnected afterwards.

#### 3.2.2.1 Connection History

OpenSplice Tuner keeps a history of connections. It remembers four connections per connection at most. The connection history is located in the *File* menu between the *Disconnect* and *Exit* menu items.

#### Connection History



When a specific connection is displayed in the history in the *File* menu it does *NOT* mean that it is currently connectable.

A connection in the history list can be opened by clicking *File* > <connection> in the menu bar. If the connection is available, it is opened. The result of the action is displayed in the status bar of the main window.

### 3.2.3 Close a Connection

Once a connection is opened, it can be closed again. This can be achieved by clicking *File* > *Disconnect* in the menu bar. The result of the disconnect action is displayed in the status bar of the main window.

## 3.3 Entity Information

To be able to use the OpenSplice system for the distribution of data, applications need to create all kinds of entities. Entities are, for instance: domain participants, subscribers and publishers. The OpenSplice system administers these entities. Each entity type has its own characteristics (attributes, status, QoS policies, data type) and relations to other entities. OpenSplice Tuner provides facilities to observe entities in the OpenSplice system and browse over their (mutual) relationships using different views (see *Entity Relationships*).

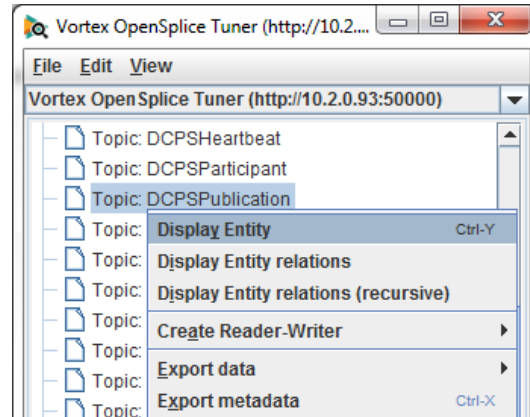
OpenSplice Tuner displays internal OpenSplice entities. Most entities map on a DCPS entity, but some entities do not. The table below provides an overview of OpenSplice entities that can be shown by OpenSplice Tuner as well as how they map on DCPS entities.

### Mapping of OpenSplice Entities on DCPS Entities

DCPS Entity	OpenSplice Entity	Description
DomainParticipant	Participant	A DCPS DomainParticipant is presented as a Participant in OpenSplice.
Service		Represents a service of OpenSplice. A service is a special OpenSplice application that adds functionality to OpenSplice. Services that are currently available are: <i>Networking</i> - Realizes the communication between separate OpenSplice nodes. <i>Durability</i> - Realizes the durable properties of data in a OpenSplice system. <i>CMSOAP</i> - service that allows a remote connection of OpenSplice Tuner to the current OpenSplice node.
Topic	Topic	A DCPS Topic is also presented as a Topic in OpenSplice.
Partition	Partition	DCPS does not specify a Partition as an Entity, but as a policy in the quality of service of a Publisher and a Subscriber. In OpenSplice, however, it is presented as a Partition entity.
Subscriber	Subscriber	A DCPS Subscriber is also presented as a Subscriber in OpenSplice.
Publisher	Publisher	A DCPS Publisher is also presented as a Publisher in OpenSplice.
	Reader	OpenSplice specifies a Reader as an abstract base Entity for a DataReader and Query.
DataReader	DataReader	A DCPS DataReader is also presented as a DataReader in OpenSplice.
ReadCondition	Query	A DCPS ReadCondition is presented as a Query in OpenSplice.
	NetworkReader	Internal Reader type for the networking service.
DataWriter	Writer	A DCPS DataWriter is presented as a Writer in OpenSplice.
ContentFilteredTopic	View + Topic + Query	A DCPS ContentFilteredTopic is presented as a combination of a View, Topic and a Query.
MultiTopic	View + Join + Topics (+ Query)	A DCPS MultiTopic is presented as a combination of a View, Join, multiple Topics and possibly a Query.
	WaitSet	Represents an internal WaitSet object

To observe entity information, right-click on a specific entity in the entity tree of the main window. This will trigger a popup menu that displays the possible actions for that entity. Choose *Display Entity* to observe the selected entity.

### Display Entity Information

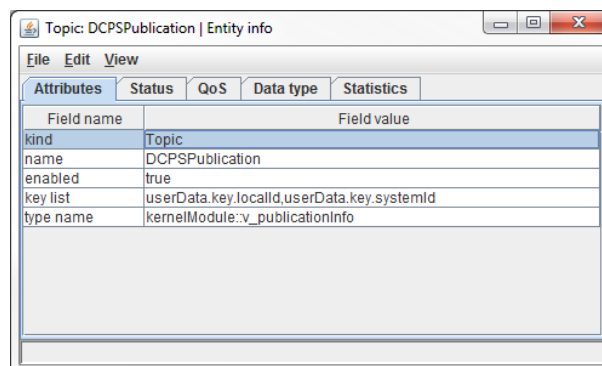


This action will create a new window with entity information. This new window consists of a menu bar and a certain number of tabs. These tabs will be explained in the following sections.

### 3.3.1 Attributes

This tab is available for all entities. Each entity type has its own attributes. Some of them are available for all entity types, others only for that specific entity type.

#### Entity Attributes



Attributes that are available for every entity type are:

- Kind* - the entity type
- Name* - the entity name
- Handle index and serial* - the internal identification of the entity
- Address* - the heap memory address of the entity
- Enabled* - shows the state of the entity

Both *handle index and serial* as well as *address* are considered as internals and therefore are only displayed when the *Display internals* configuration option in the OpenSplice Tuner preferences is set to `true` (see [Preferences](#)).

The illustration above shows the attributes for a Topic entity. Besides the default attributes, a Topic entity contains two extra attributes:

- Key list* - represents the key list of the Topic (comma separated)
- Type name* - represents the type name of the Topic



### 3.3.2 Status

Some entity types have a status. As the name says, it provides information about the communication status of the entity. Entity types that have a communication status are:

- Subscriber
- Topic
- DataReader
- Writer

The status attributes depend on the type of the entity. The status of a specific entity can be resolved by clicking the Status tab in the entity information window. The illustration below shows the status attributes of a Topic entity.

**Entity Status**

Name	Field	Value
STATE		0
INCONSISTENT_TOPIC	total_count	0
INCONSISTENT_TOPIC	total_count_change	0

The status information can be updated automatically. This can be achieved by setting the *Auto update entity information* configuration option in the OpenSplice Tuner preferences.

### 3.3.3 QoS

OpenSplice relies on the use of Quality of Service (QoS). A QoS is a set of characteristics that controls some aspects of the behaviour of OpenSplice.

QoS is comprised of individual QoS policies and is associated with a specific entity. The QoS policies depend on the type of the entity. Entity types that are equipped with a QoS are:

- Participant
- Topic
- Subscriber
- Publisher
- DataReader
- Writer

The following subsections describe how the QoS of a specific entity can be inspected and how to modify a QoS.

### 3.3.3.1 Inspect QoS

The illustration below shows the Quality of Service (QoS) of a specific Topic in OpenSplice. The QoS of a specific entity is displayed in the *QoS* tab of the entity information window. The QoS of the entity can be inspected by clicking the *QoS* tab in the entity information window. To refresh the QoS of the entity, the *Get* button (located at the bottom-left corner of the *QoS* tab) can be clicked when the *QoS* tab is selected.

Entity QoS

Name	Field	Value
TOPIC_DATA	value	null
DURABILITY	kind	TRANSIENT
DURABILITY_SERVICE	service_cleanup_delay	0.0
DURABILITY_SERVICE	history_kind	KEEPLAST
DURABILITY_SERVICE	history_depth	1
DURABILITY_SERVICE	max_samples	-1
DURABILITY_SERVICE	max_instances	-1
DURABILITY_SERVICE	max_samples_per_instance	-1
DEADLINE	period	2147483647.2147483647
LATENCY_BUDGET	duration	20.0
LIVELINESS	kind	AUTOMATIC
LIVELINESS	lease_duration	2147483647.2147483647
RELIABILITY	kind	RELIABLE
RELIABILITY	max_blocking_time	0.1
RELIABILITY	synchronous	false
DESTINATION_ORDER	kind	BY_RECEPTION_TIMESTAMP
HISTORY	kind	KEEPALL
HISTORY	depth	-1
RESOURCE_LIMITS	max_samples	-1
RESOURCE_LIMITS	max_instances	-1
RESOURCE_LIMITS	max_samples_per_instance	-1
TRANSPORT_PRIORITY	value	0
LIFESPAN	duration	2147483647.2147483647
OWNERSHIP	kind	SHARED

### 3.3.3.2 Modify QoS

It is possible to modify the Quality of Service (QoS) settings of a specific entity. OpenSplice Tuner allows modification of the QoS settings when the *QoS* tab of the entity information window is selected. Once an entity is enabled, not all QoS policies can be modified any more. The values of the QoS policies that are *not* editable are colored *gray*. When clicking on a value of a QoS policy that is currently editable (one of the cells located in the *Value* column), the contents of that cell can be edited. During the editing, the contents of the cell are constantly validated. If the current input is valid, the cell is colored *orange* and if not, it is colored *red*. To confirm the input, press *Enter*. The cell is then colored *white* again. If the current input is not valid, it cannot be confirmed. To cancel the editing of the cell, press the *Esc* key. The content of cell is reset to the value it had before the cell was edited and the cell is colored *white* again.

When all QoS policies have the desired value, the QoS can be applied to the entity by clicking the *Set* button (located at the bottom-right corner of the *QoS* tab). The result of the action is displayed in the status bar of the window.

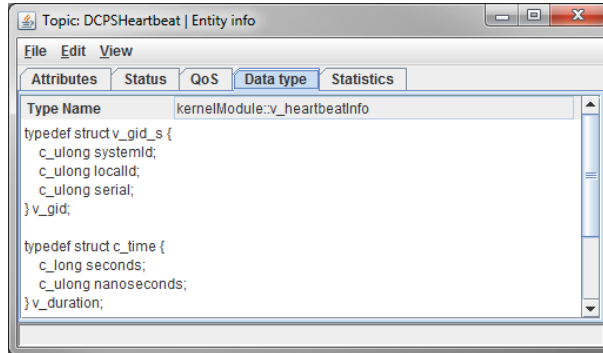


The modification of a specific Quality of Service influences the behaviour of the entity it belongs to.

### 3.3.4 Data Type

Some entity types have a data type or relate to one. The data type can be observed when the Data type tab is selected in the entity information window.

#### Entity Data Type

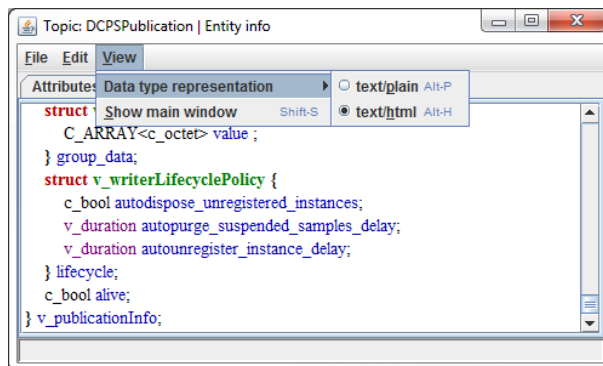


Entity types that provide a data type are:

- Topic
- Writer
- DataReader

This tab displays the data type name, and the data type definition in plain text format. To make the text more readable, the data type representation can be changed to HTML text format. This can be achieved by choosing *View > Data type representation > <Representation>* in the Menu Bar.

#### Entity Data Type Representation



The default value of the data type representation can be modified. This can be achieved by setting the Datatype content type configuration option in the OpenSplice Tuner *Preferences*.

**i** Plain text takes less processing time than HTML, but the HTML version is easier to read.

### 3.3.5 Statistics

Some entity types keep track of statistical information. This information can be monitored in OpenSplice Tuner by selecting the *Statistics* tab in the entity information window. The statistical information can be updated automatically. This can be achieved by setting the *Auto update entity information* configuration option in the OpenSplice Tuner preferences.

The following entities have statistics:

- Reader
- Writer
- Durability
- Networking
- CMSOAP

#### Entity Statistics

Name	Field	Value
	lastReset	0s. 0 ns.(Wed Dec 31 19:00:00 EST 1969)
maxConnectedClients	value	3
maxConnectedClients	lastUpdate	1453824373s. 700109400 ns.(Tue Jan 26...
maxClientThreads	value	2
maxClientThreads	lastUpdate	1453824373s. 700109400 ns.(Tue Jan 26...
connectedClients		3
clientThreads		1
requestsHandled		22

As well as monitoring statistical information, OpenSplice Tuner also provides facilities to reset (parts of) this information. When right-clicking on a specific row in the table of the *Statistics* tab, a popup menu with two options appears (see illustration above). The first option results in a reset of the selected counter. The second option results in a reset of *all* statistical information of the entity.

## 3.4 Entity Relationships

To be able to observe how entities work together, it is necessary to observe their (mutual) relationships. OpenSplice Tuner provides three different approaches to observe these relationships:

**Participant view** - Displays participant entities of the local node as top-level entities

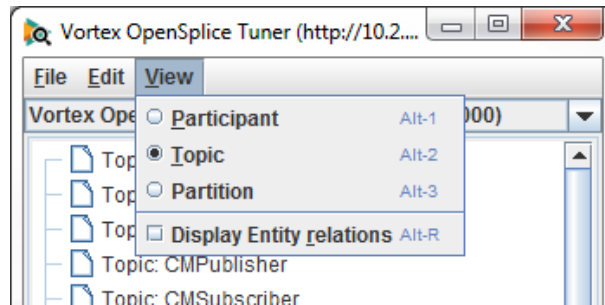
**Topic view** - Displays topic entities as top-level entities

**Partition view** - Displays partition entities of the local node as top-level entities

Each view consists of a tree of entities. The layout of the entity tree in the main window is determined by the selected view and the available entities in OpenSplice.

To change the view on entity relations, choose *View > <View type>* in the menu bar. The default view on startup is determined by the *Default entity tree type* configuration option in the OpenSplice Tuner *Preferences*.

#### Choose Entity View

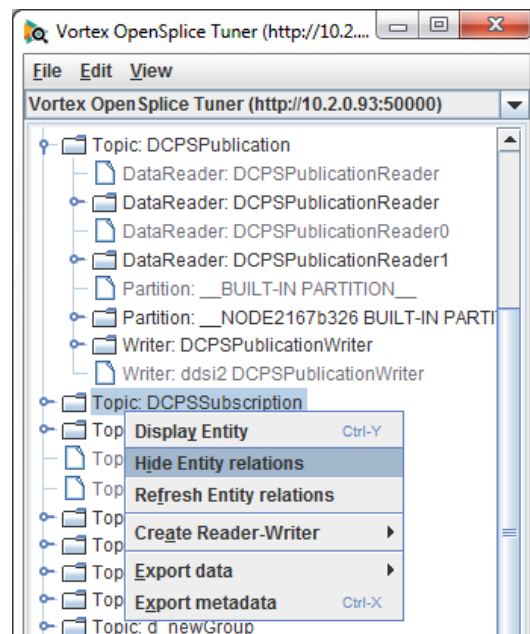


### 3.4.1 Enable and Disable Displaying Relationships

By default, only top-level entities are displayed in a view. This means, for instance, that the topic view only displays topic entities. It is also possible to observe all relationships of the top-level entities to other entities. When all relationships need to be displayed, choose *View > Display Entity relations* in the menu bar (see *Choose Entity View*).

Besides enabling or disabling the displaying of all entity relations, it is also possible to enable or disable these relations on entity level. This can be done by right-clicking on an entity in the entity tree and then choosing *Hide Entity relations* to disable display and *Display Entity relations* to enable display.

#### Enable and Disable Entity Relations



When the *Display Entity relations* check box is enabled in the *View* menu (see *Choose Entity View*), *all* entity relations are displayed. By selecting *Hide Entity relations* on a specific entity, the displaying of relations can be disabled for that specific entity. That will color the concerning entity *gray* in the entity tree.

The other way around is also possible. When the *Display Entity relations* check box is unchecked in the *View* menu, *no* entity relations are displayed. By selecting *Display Entity relations* on a specific entity, the displaying of the relations is enabled for that specific entity. That will color the concerning entity *green* in the entity tree.

**i** Disabling entity relations and only enabling the relations that need to be observed makes OpenSplice Tuner less intrusive for OpenSplice.

### 3.4.2 Refresh Relationships

Once the relationships have been resolved, by default they are *not* kept up to date.

Updates can be applied in two ways.

- By choosing *Edit > Refresh entity tree* in the menu bar the entire tree is refreshed.
- By right-clicking on an entity in the tree and choosing *Refresh Entity relations* the relations of that specific entity can be refreshed (*Enable and Disable Entity Relations*).

**i** Refreshing entity relations on entity level rather than a complete refresh of the tree takes less processing time and is less intrusive for OpenSplice.

Entity relations can also be updated automatically. This can be achieved by setting the *Auto update entity tree* configuration option in the OpenSplice Tuner *Preferences*.

## 3.5 Data Injection and Consumption

OpenSplice Tuner provides facilities for data injection and consumption. Data injection can be accomplished in several ways:

- using an existing writer
- using a self-created writer
- using a self-created reader-writer

Creating a writer to inject data can be realized by creating a publisher followed by creating a writer or by creating a reader-writer (see *Data Injection and Consumption*).

For consuming data, the following options are available:

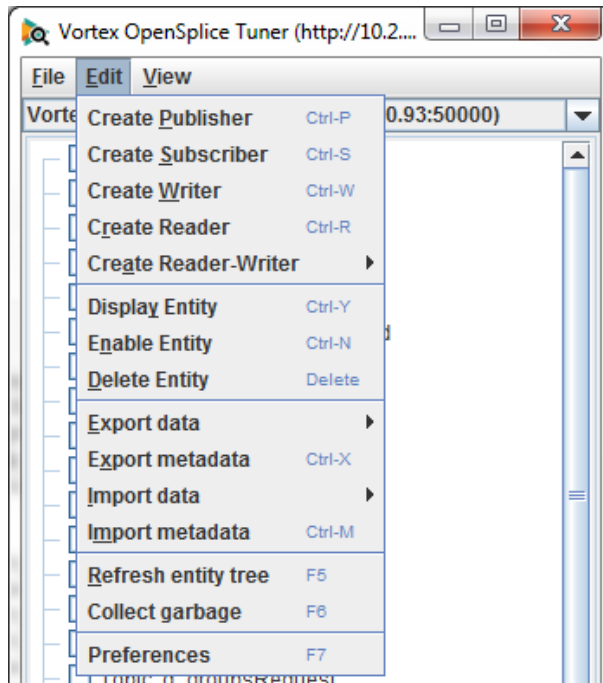
- using an existing reader
- using a self-created reader
- using a self-created reader-writer
- inspecting the data in an existing reader database (consume data by making a snapshot of an existing reader)
- inspecting the history cache of an existing writer (consume data by making a snapshot of the history of an existing writer)

The following sections describe how to perform these tasks.

### 3.5.1 Creating a Publisher

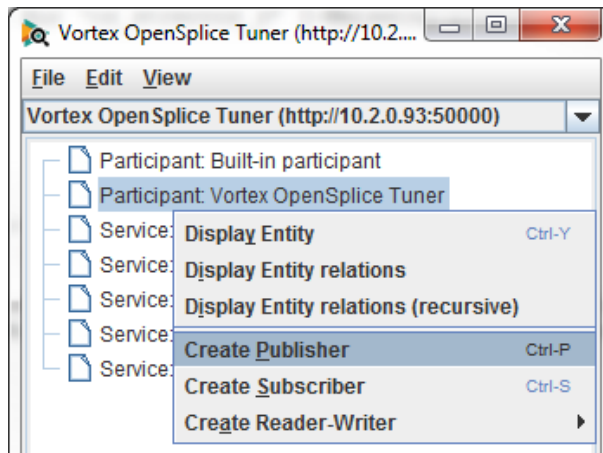
One way to inject data in OpenSplice is to create a publisher and writer. A publisher can be attached to one or more partitions in the domain where OpenSplice Tuner is currently participating.

#### Main Window Edit Menu



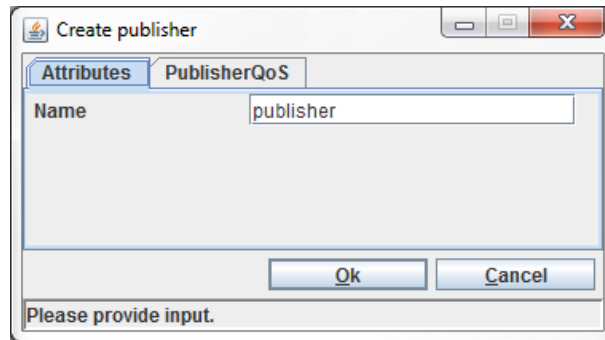
To create a publisher, choose *Edit > Create Publisher* in the menu bar of the main window (shown above), or right-click on the OpenSplice Tuner participant in the entity tree and then select the *Create Publisher* item (see illustration below).

#### OpenSplice Tuner Participant Actions



Both of these actions will result in the display of the *Create Publisher* dialog.

#### Create Publisher dialog



The value provided in the *Name* field becomes the name of the publisher (as displayed in the entity tree).

The Qos settings of the publisher can be set on the *PublisherQoS* tab.

The *Partition name* field on the *PublisherQoS* tab determines the publisher's partition(s).

To attach the publisher to multiple partitions, the comma (,) can be used as a separator and the asterisk (\*) can be used as a wild card. Partitions that do not already exist are created in OpenSplice, except for parts of the expression that contain a wild card.

For example, the name `part*, abc` makes the publisher publish in all available partitions that start with `part` including `part` itself and also in partition `abc` (the partition `abc` will be created if it does not already exist in the connected OpenSplice domain).

The *Presentation* fields on the *PublisherQoS* tab determines the publisher's Presentation policy setting. This policy is also an RxO policy, thus it affects QoS compatibility matching for readers and writers.

Additionally, Tuner supports coherent and ordered access. So if *coherent\_access* is true, and the *access\_scope* is *TOPIC* or *GROUP*, then the option to publish coherent sets will be available when selecting the publisher. See [Publishing Coherent Sets](#).

When the *OK* button is clicked, the input is validated. If the input is correct, the publisher is created. The newly-created publisher will appear in the entity tree (when entity relations are enabled; see [Enable and Disable Displaying Relationships](#)). If the input is not correct, an error message will appear in the status bar of the dialog box.

The Create publisher action can be cancelled by clicking the *Cancel* button. In this case, no publisher will be created.

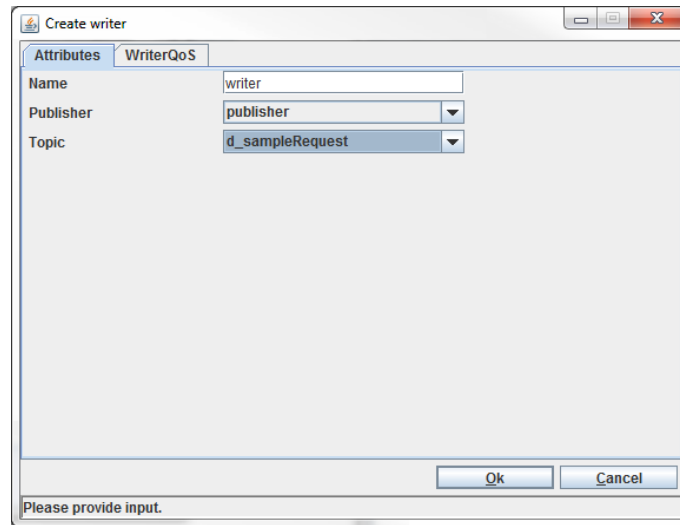
### 3.5.2 Creating a Writer

A writer can only be created if one or more publishers have already been created. A writer can be created by choosing *Edit > Create Writer* in the menu bar (see [Main Window Edit Menu](#)) or right-clicking on a created publisher entity in the tree then choosing the *Create Writer* item.

Both of these actions will result in the display of the dialog box shown below.

#### Create Writer dialog





The *Name* field determines the name of the writer (as displayed in the entity tree). The *Publisher* field determines to which publisher the writer will be attached (determines the partition(s) the writer will write its data in). The *Topic* field determines which topic the writer will be able to write.

By default the QoS settings of the Writer are copied from the Topic it writes. However, it is also possible to override these settings by specifying its own QoS settings/profile (see *QoS Profiles*) in the *WriterQoS* tab.

When the *OK* button is clicked, the input is validated. If the input is correct, the writer is created. The newly-created writer will appear in the entity tree (when entity relations are enabled; see *Enable and Disable Displaying Relationships*).

If the input is *not* correct, an error message will appear in the status bar of the dialog window.

The Create writer action can be cancelled by clicking the *Cancel* button. In this case, no writer will be created.

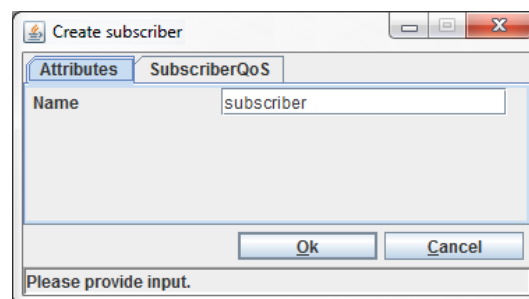
### 3.5.3 Creating a subscriber

One way to consume data from OpenSplice is to create a subscriber and a data reader. A subscriber can be attached to one or more partitions in the domain where OpenSplice Tuner is currently participating.

To create a subscriber, choose *Edit > Create Subscriber* in the menu bar of the main window (see *Main Window Edit Menu*) or right-click the Vortex OpenSplice Tuner participant in the entity tree then choose the *Create Subscriber* item.

Both of these actions will result in the display of the dialog box shown below.

**Create Subscriber dialog**



The value provided in the *Name* field becomes the name of the subscriber (as displayed in the entity tree). The QoS settings of the subscriber can be set on the *SubscriberQoS* tab. The *Partition name* field in the *SubscriberQoS* tab determines the subscriber's partition(s).

To attach the subscriber to multiple partitions, the comma (,) can be used as a separator and the asterisk (\*) can be used as a wild card. Partitions that do not already exist are created in OpenSplice, except for parts of the expression that contain a wild card.

The *Presentation* fields on the *PublisherQos* tab determines the publisher's Presentation policy setting. This policy is also an RxO policy, thus it affects QoS compatibility matching for readers and writers.

Additionally, Tuner supports coherent and ordered access. So if *coherent\_access* is true, and the *access\_scope* is *TOPIC* or *GROUP*, then the option to read available data on all the subscriber's readers will be available when selecting the subscriber. See [Access Data On Readers](#).

When the *OK* button is clicked, the input is validated. If the input is correct, the subscriber is created. The newly-created subscriber will appear in the entity tree (when entity relations are enabled; see [Enable and Disable Displaying Relationships](#)).

If the input is not correct, an error message will appear in the status bar of the dialog box.

The Create subscriber action can be cancelled by clicking the *Cancel* button. In this case, no subscriber will be created.

**i** If the subscriber was created with *coherent\_access* and *GROUP access\_scope*, then it will be created in the disabled state, regardless of the value of the entity factory policy of the parent participant. For group coherent subscribers, data readers can only be created while it is disabled. When the subscriber is explicitly enabled, then the contained readers can begin their access to the data. After the subscriber is enabled, no further data readers can be created under it.

### 3.5.4 Creating a Reader

A reader can only be created if one or more subscribers have already been created.

A reader can be created by choosing *Edit > Create Reader* in the menu bar (see [Main Window Edit Menu](#)) or by right-clicking on a created subscriber entity in the tree then choosing the *Create Reader* item.

Both of these actions will result in the display of the dialog box shown below.

**Create Reader Dialog**

The *Name* field determines the name of the reader (as displayed in the entity tree).

The *Subscriber* field determines to which subscriber the reader will be attached (determines the partition(s) the reader will consume data from).

The *Topic* field determines which topic the reader will be able to consume.

The *Query* field can be used to specify a query for the reader so only data that matches the query will be consumed.

The *WaitForHistoricalData* field determines whether the Reader will wait for historical data to arrive during creation (maximum of 30 seconds). In this case the Reader will still receive historical data.

By default the QoS settings of the Reader are copied from the Topic it reads. However, it is also possible to override these settings by specifying its own QoS settings/profile (see *QoS Profiles*) in the *ReaderQoS* tab.

When the *OK* button is clicked, the input is validated. If the input is correct, the reader is created. The newly-created reader will appear in the entity tree (when entity relations are enabled; see *Enable and Disable Displaying Relationships*).

If the input is not correct, an error message will appear in the status bar of the dialog window.

The Create reader action can be cancelled by clicking the *Cancel* button. In this case, no reader will be created.

### 3.5.5 Creating a ReaderWriter

The creation of a publisher, writer, subscriber and reader can be simplified by directly creating a reader-writer. This action creates a publisher, writer, subscriber and reader in one action.

There are two possible ways of creating a reader-writer. The reader-writer can be created by using a partition expression *or* by using a single partition. In both cases a window will appear where the reader-writer attributes and QoS settings of the publisher, writer, subscriber and reader can be changed.

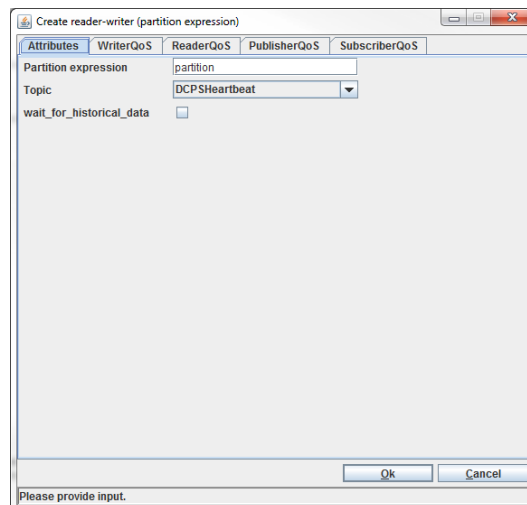
#### 3.5.5.1 Partition Expression

The creation of a reader-writer by using a partition expression allows a reader-writer to inject and consume in multiple partitions.

To create such a reader-writer, choose *Edit > Create Reader-Writer > Partition expression* in the menu bar of the main window (see *Main Window Edit Menu*) *or* right-click on the Vortex OpenSplice Tuner participant in the entity tree then choose the *Create Reader-Writer > Partition expression* item.

Both of these actions will result in the display of the dialog box shown below.

**Create Reader-Writer (Partition expression) dialog**



The value provided in the *Partition expression* field determines the publisher and subscriber partition(s). To attach them to multiple partitions, the comma (,) can be used as separation and the asterisk (\*) can be used as wild card. Partitions that do not exist are created in OpenSplice, except for parts of the expression that contain a wild card.

The *Topic* field determines the topic the reader-writer will read and write.

The *WaitForHistoricalData* field determines whether the Reader will wait for historical data to arrive during creation (maximum of 30 seconds). In this case the Reader will still receive historical data.

By default the QoS settings of the Reader/Writer are copied from the Topic it reads/writes. However, it is also possible to override these settings by specifying its own QoS settings/profile (see *QoS Profiles*) in the *WriterQoS* and *ReaderQoS* tabs.

When the *OK* button is clicked, the input is validated. If the input is correct, the reader-writer is created. The newly-created publisher, writer, subscriber and reader will appear in the entity tree (when entity relations are enabled; see *Enable and Disable Displaying Relationships*).

The reader-writer window is also presented. If the input is not correct, an error message will appear in the status bar of the dialog window.

The Create action can be cancelled by clicking the *Cancel* button. In this case, no publisher, subscriber, reader and writer will be created.

See also *Consuming Data Using a Reader-Writer*.

The dialog window for creating a reader-writer using a partition expression can also be summoned by right-clicking a topic entity in the entity tree and choosing *Create Reader-Writer > Partition expression*). There is one difference between the two actions mentioned above: the *Topic* field will only contain the selected topic in the entity tree instead of all topics in the domain.

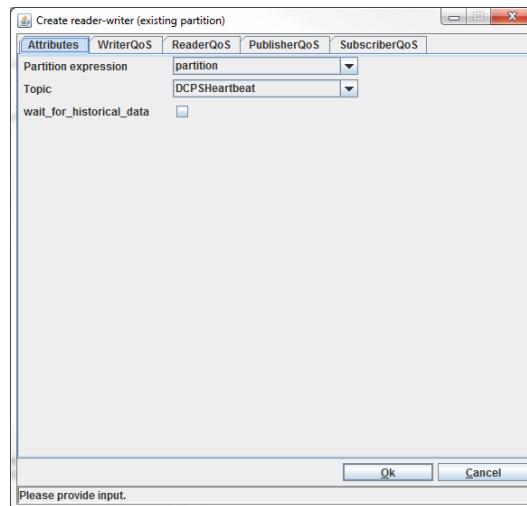
### 3.5.5.2 Existing Partition

The creation of a reader-writer by using a single partition allows a reader-writer to inject and consume in one already existing partition.

To create such a reader-writer, choose *Edit > Create Reader-Writer > Existing Partition* in the menu bar of the main window (*Main Window Edit Menu*) or right-click on the Vortex OpenSplice Tuner participant in the entity tree then choose the *Create Reader-Writer > Existing Partition* item.

Both of these actions will result in the display of the dialog box shown below.

**Create Reader-Writer (existing partition) dialog**



The value provided in the *Partition* field determines the publisher and subscriber partition.

The *Topic* field determines the topic the reader-writer will read and write.

The *WaitForHistoricalData* field determines whether the Reader will wait for historical data to arrive during creation (maximum of 30 seconds). In this case the Reader will still receive historical data.

By default the QoS settings of the Reader/Writer are copied from the Topic it reads/writes. However, it is also possible to override these settings by specifying its own QoS settings/profile (see *QoS Profiles*) in the *WriterQoS* and *ReaderQoS* tabs.

When the *OK* button is clicked, the input is validated. If the input is correct, the reader-writer is created. The newly-created publisher, writer, subscriber and reader will appear in the entity tree (when entity relations are enabled; see *Enable and Disable Displaying Relationships*). The reader-writer window is presented to the user. If the input is not correct, an error message will appear in the status bar of the dialog window.

The Create action can be cancelled by clicking the *Cancel* button. In this case, no publisher, subscriber, reader and writer will be created.

The dialog for creating a reader-writer for a single partition can also be summoned in two other ways.

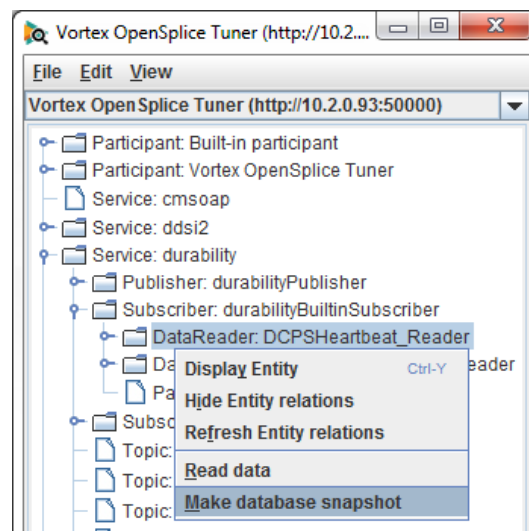
The first one is right-clicking a topic entity in the entity tree and choosing *Create Reader-Writer > Existing Partition*. (Note that the *Topic* field will only contain the selected topic in the entity tree instead of all topics in the domain.)

The second one is right-clicking a partition entity in the entity tree and choosing *Create Reader-Writer > Existing Partition*. (Note that the *Partition* field in the dialog window will only contain the selected partition in the entity tree instead of all partitions in the domain.)

### 3.5.6 Creating a Snapshot of a Reader Database

OpenSplice Tuner also provides facilities to browse through data in an existing application reader database without influencing it. This can be achieved by making a ‘snapshot’ of that database. Create a snapshot by right-clicking on the reader that needs to be examined then choosing *Make database snapshot*.

#### Create Reader Snapshot

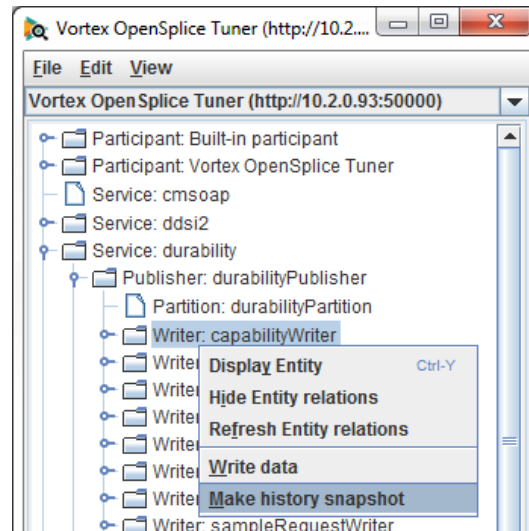


The *Make database snapshot* action makes OpenSplice Tuner create a snapshot of the contents of that specific database and open a reader snapshot window that allows browsing through the contents of the database.

### 3.5.7 Creating a Snapshot of Writer History Cache

OpenSplice Tuner also provides facilities to browse through data in the history cache of an existing application writer without influencing it. This can be achieved by making a ‘snapshot’ of the history of the writer. Create a snapshot by right-clicking on the writer that needs to be examined then choosing *Make history snapshot*.

#### Create Writer Snapshot



The *Make history snapshot* action makes OpenSplice Tuner create a snapshot of the history of that specific writer and open a writer snapshot window.



Whether or not there is a history available for a specific writer depends on the Quality of Service settings of that writer.

### 3.5.8 Delete Entity

Self-created entities can also be deleted. This can be achieved by right-clicking the entity to delete in the entity tree followed by selecting the *Delete Entity* item in the popup menu that appears, or by choosing *Edit > Delete Entity* in the menu bar.

When the entity is deleted, it is also removed from the entity tree. If the entity could not be deleted, the reason is displayed in the status bar of the main window.

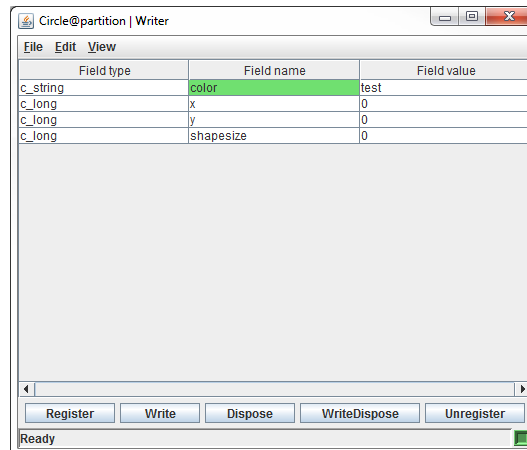
### 3.5.9 Injecting Data

If the correct entities are available, data can be injected into OpenSplice. The methods to do this are explained in the following subsections.

### 3.5.9.1 Injecting Data Using a Writer

Data can be injected using an existing application writer or a self-created writer. To create or modify and inject data, OpenSplice Tuner offers a writer window. Such a window can be opened by right-clicking a writer entity in the entity tree followed by choosing the *Write data* item.

**The Writer Window**



The window consists of:

**Title Bar** - Displays the title. Its format is: `<topic_name>@<partition(s)> > Writer`.

**Menu Bar** - Contains the *File*, *Edit* and *View* menus.

**User Data View** - View that consists of a table that displays the data the writer can write.

**Button Panel** - Contains buttons to register, unregister, write and dispose data in OpenSplice.


**Status Bar** - Displays the current action as well as the status of the writer.

The user data view displays all fields in the data, which depend on the data type of the topic that the writer is able to write. It consists of three columns.

The first column displays the type of a field in the data.

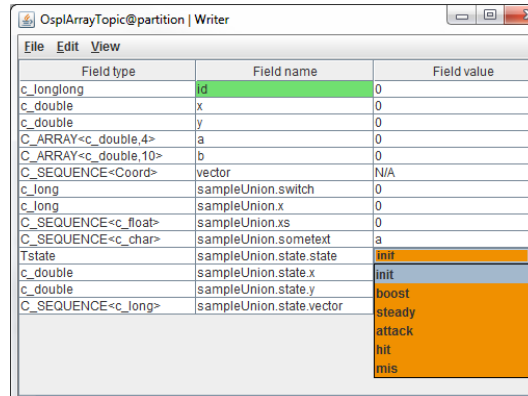
The second column displays the name of a field in the data. Nested fields in the data are separated by a dot. The fields that are part of the key of the topic are colored green.

The third column displays the current value of the field. When the window is opened, they have the default value (the default value depends on the type of the field).

 The field type names are *not* the same as how they have been specified in IDL. They are displayed as internal OpenSplice types. This means (in most cases) that a prefix `c_` is added and `unsigned` is transformed in `u`. For example: the type `long` in IDL becomes `c_long` and `unsigned long` becomes `c_ulong`.

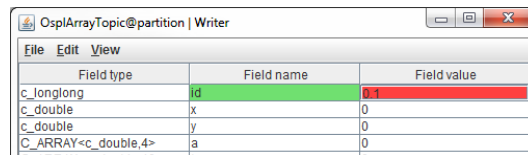
To edit the value of a field, click the *Field value* of that field. The field is colored *orange* while editing (see illustration). The writer window starts an editor when a specific field value is clicked. The editor type depends on the Field type. For primitive types like `long` and `float` as well as for strings, a simple text field is created. To confirm the input in a text field, simply press the *Enter* key. For enumeration and boolean types, a pull-down menu with the possible options appears. The input in a pull-down menu does not have to be confirmed.

#### Writer Window Edit Field Value



During the editing, the value is constantly validated. When the current value of the Field value is not valid, the field is colored *red* (see illustration) and the input cannot be confirmed. To cancel the editing, press the *Esc* key. The value of the field is reset to the value it had before the editing began.

### Writer Window Input Error



When all fields are set to the desired value, the data can be injected into OpenSplice.

The *Register* button in the button panel (in *The Writer Window*) or *Edit > Register instance* in the menu bar will inform OpenSplice that the particular instance will be modified, meaning that OpenSplice will handle the instance more efficiently.

To undo this the *Unregister* button can be clicked or *Edit > Unregister instance* in the menu bar. This will inform OpenSplice that the particular instance will not be modified any more.

Data can be injected by clicking the *Write* button in the button panel or by choosing *Edit > Write* in the menu bar. When the current input is not valid as shown in *Writer Window Input Error*, the data cannot be written. A write action will result in the error message in the status bar of the writer window: 'Data could not be written, because input is not valid'.

When a field value has not been confirmed, but the current input is valid, the write action will result in a confirmation of the input followed by a write action.

If data was successfully written, the message 'Data written' appears in the status bar.

Besides writing data, it can also be disposed. Data in OpenSplice can be disposed by clicking the *Dispose* button in the button panel or by choosing *Edit > Dispose* in the menu bar. The mechanism of the dispose is the same as the one for the write action.

The write and dispose action can also be combined. This can be done by clicking the *WriteDispose* button or *Edit > WriteDispose* in the menu bar. This will first write the data and then dispose it.



Data that is injected will also arrive at data readers of other running OpenSplice applications that are subscribed to this data. This also applies to disposing of data.

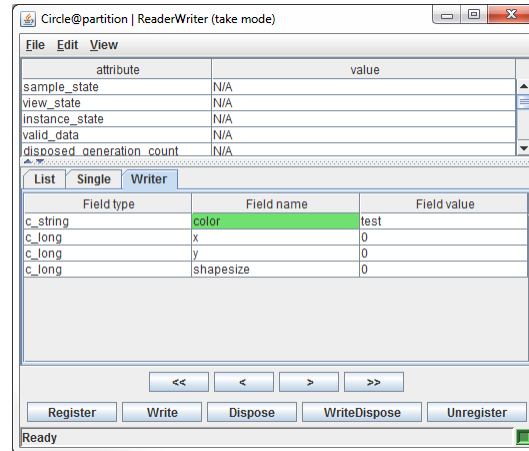
The Entity information of the Writer associated with the Writer window can be resolved by choosing *File > Show Writer info*.



### 3.5.9.2 Injecting Data Using a Reader-Writer

The creation of a reader-writer results in the popup of a reader-writer window. The reader-writer window is a combination of a reader window and a writer window.

**The Reader-Writer Window**



The reader-writer window provides facilities for both injecting and consuming data. It consists of:

**Title Bar** - Displays the title of the window. The format is `<topic_name>@<partition(s)> | Reader-Writer (<mode>)`

**Menu Bar** - The menu bar for the window.

**Sample information Table** - Displays sample information of a specific sample.

**Data Table** - Consists of three tabs. The reader and writer are combined using these three tabs. The *List* and *Single* tabs belong to the reader and the *Writer* tab belongs to the writer.

**Button Panel** - Contains a combination of reader and writer window buttons.

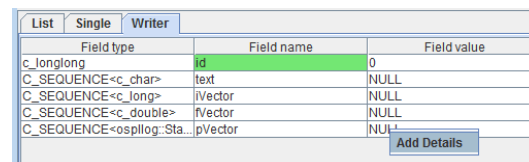
**Status Bar** - Displays information about the current action and the state of the reader-writer.

The *Writer* tab of the user data view is selected in *The Reader-Writer Window*. It looks the same as the user data view of the writer window in *The Writer Window*, but for collection types a right-click menu is available.

When you right-click on a field value cell which contains collection type data and then choose the *Add Details*, a new window will open (see *Detailed Writer tab*), which looks the same as the writer window (which is described in *Injecting Data Using a Writer*) except that the *Write* and *Dispose* buttons are replaced by a single *Save* button.

The illustration below shows a sample with five elements: *id* and four sequence fields named *text*, *iVector*, *fVector* and *pVector*.

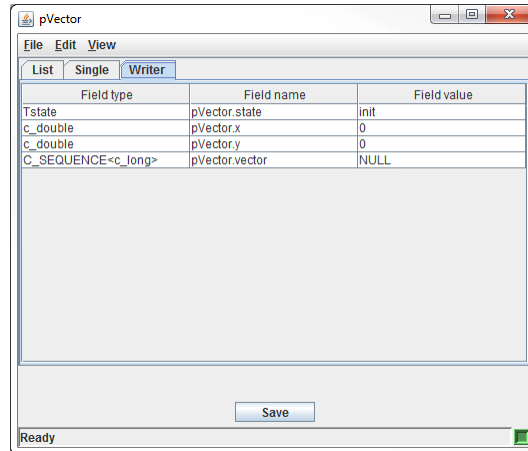
**Add Details menu item for collection types**



It is only possible in the *Writer* tab to edit primitive elements. For collection types use the right-click menu item *Add Details*. In the illustration, only the field name *id* can be edited in this window; for all other types use the *Add Details* item, which opens a new window with the content of the selected field type.

The next illustration shows the detailed information from the *pVector* element.

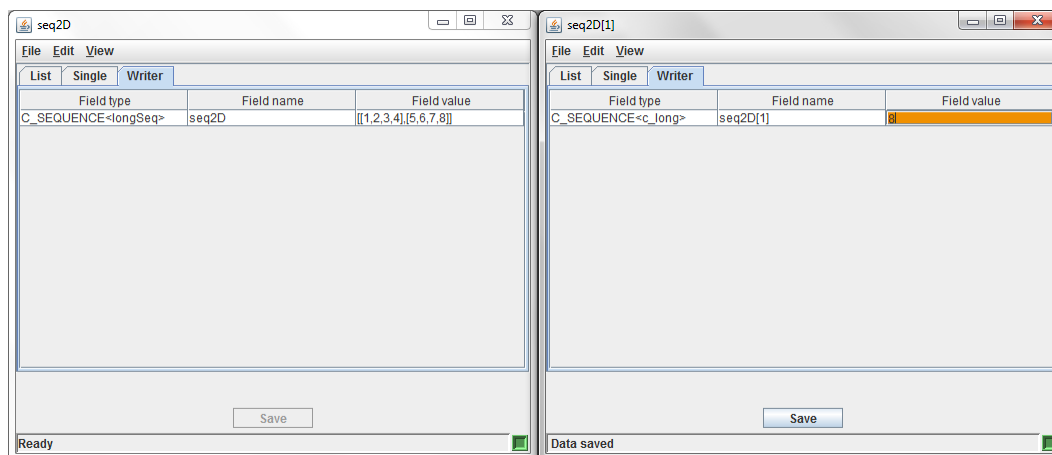
**Detailed Writer tab**



This element again has a collection type vector and thus the *Add Details* item is available to edit the content of this element. The rest of the types can be edited in the current window. When the *Save* button is clicked all filled-in data in the current window will be saved and in the main reader-writer window the field value of the edited field type will be updated.

For data types containing a two dimensional sequence, the process is similar. The next illustration shows the field *seq2D*, which is a sequence of a sequence of longs.

#### Detailed Writer tab



When editing two dimensional sequences such as this, *Add details* is first selected in the main reader-writer window and the detail view of the first order sequence is displayed. *Add details* must then be selected in this window's writer tab to access the detail window of the second order sequence, of the first order's first index.

This second order sequence, *seq2D[0]* can then be filled in by typing in a value in the editing cell on the writer tab, and clicking *Save* the value to an index of the second order sequence. Index selection is done by clicking on a row in the *List* tab. If no row is selected, *Save* will add a new index to the sequence.

When done editing the second order sequence, the window can be closed, and the next index of the first order collection can be edited by selecting *Add details* again. This will bring up the details window for *seq2D[1]*.

Continuing in this fashion, the two dimensional sequence can be filled in. The current table row in the *List* tab can be deselected by clicking outside of the table or by pressing the *Esc* key.

To delete the contents of a collection, in the main reader-writer window, right click on the collection in the writer tab, and select *Clear details*.



**NOTE:** You *must* click the *Write* button in the parent reader-writer window for any changes made in the *Writer* tab to be written to the system.


The facilities of the *List* and *Single* tabs of the user data view and the Sample information view is the same as for the reader window.

The buttons in the button panel are a combination of the buttons in a reader window and a writer window.

The <<, <, > and >> buttons are described in *Consuming Data Using a Reader-Writer*.

Information about the *Register*, *Write*, *WriteDispose* and *Unregister* buttons can be found in *Injecting Data Using a Writer*.

In contrast to a reader window and writer window, the closing of a reader-writer window (this can be done by clicking the 'close' (X) icon in the top-right corner of the window or by choosing *File > Close* in the menu bar), will result in the automatic deletion of all entities that concern the reader-writer (a publisher, writer, subscriber and a reader).

 Data that is injected will also arrive at data readers of other running OpenSplice applications that are subscribed to this data.

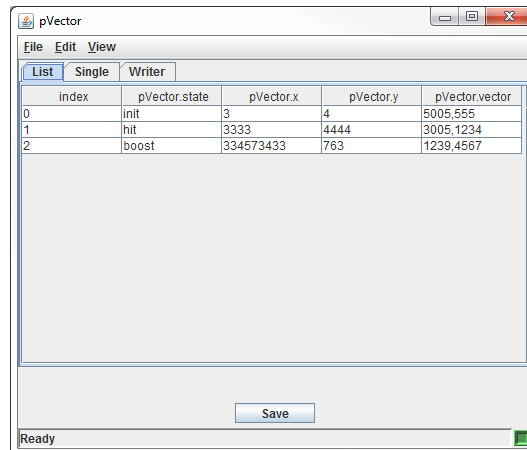
This also applies to disposing of data.

The Entity information of the Reader and Writer associated with the ReaderWriter window can be resolved by choosing respectively *File > Show Reader info* or *File > Show Writer info*.

### 3.5.9.3 Detailed Reader-Writer window

The detailed reader-writer window is combination of a reader window and a writer window.

#### Detailed Reader-Writer window



The detailed reader-writer window provides facilities for both injecting and consuming data. It consists of:

**Title Bar** - Displays the title of the window, which is the name of the column from which the right-click was done that created the window.

**Menu Bar** - The menu bar for the window.

**Data Table** - Consists of three tabs. The reader and writer are combined using these three tabs. The *List* and *Single* tabs belong to the reader and the *Writer* tab belongs to the writer.

**Button Panel** - Contains a *Save* button.

**Status Bar** - Displays information about the current action and the state of the reader-writer.

The *List* tab of the user data view is selected in the illustration. It looks almost the same as the user data view from the reader-writer window except that the *List* tab user data always starts with an index column displaying the index of that element inside the collection. In this case the *pVector* element consists of three sub-elements each having *state*, *x*, *y*, and *vector* fields. The *vector* field is again a collection type and can thus be viewed in detail.

The facilities of the *List* and *Single* tabs of the user data view are the same as for the reader-writer window.

### 3.5.10 Consuming Data

If the correct entities are available, data can be consumed from OpenSplice. The methods to do this are explained in the subsections below.

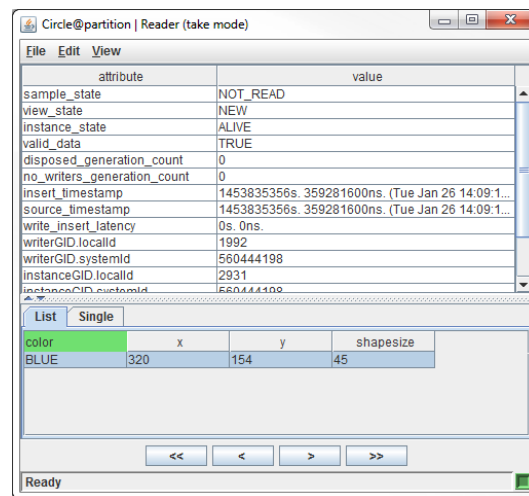
#### 3.5.10.1 Consuming Data Using a Reader

Data can be consumed using an existing application reader or a self-created reader. To consume data, OpenSplice Tuner offers a reader window.

Such a window can be opened by right-clicking an entity in the entity tree in the main window followed by selecting the Read data item. If a reader has been created with a query specified, select the reader query entity in the **Participant View**.

A reader window is shown below.

**The Reader Window**



The window consists of:

**Title Bar** - Displays the title. Format is: *<topic\_name>@<partition(s)> | Reader (<mode>)*.

**Menu Bar** - Consists of *File*, *Edit* and *View* menus.

**Sample information View** - Displays the sample information of one specific sample.

**User Data View** - Displays the user data of the samples that have been consumed by OpenSplice Tuner.

**Button Panel** - Contains buttons to consume data from OpenSplice.

**Status Bar** - Displays the current action as well as the status of the reader.

Multiple views on consumed data are available in the window. Without interaction, no data is consumed by OpenSplice Tuner. The buttons on the button panel enable browsing through the data in the reader database.

The > button (or *Edit > Next* in the menu bar) selects the next sample that has been consumed in the *List* and *Single* tabs of the User data view as well as the Sample information view. If the last consumed sample is selected, a new sample is consumed from the reader database. If no more samples are available in the reader database, the notification 'No more data available' will appear in the status bar.

The < button (or *Edit > Previous*) selects the previous sample in the view. If the first one is selected, the notification 'No more previous data' is displayed in the status bar. This action does not trigger OpenSplice Tuner to consume data.

The >> button (or *Edit > Next 50*) selects the 50th sample counted from the currently-selected one. The samples are consumed from the reader database if fewer samples are available in the user data view. If no more samples are available, the notification 'No more data available' is displayed in the status bar.

The << button (or *Edit > Previous 50*) selects 50 samples back, counted from the currently-selected one. If the first one is currently selected, the notification 'No more previous data available' is displayed in the status bar. If there are *some* previous samples, but fewer than 50, the first sample is selected. This action does not trigger OpenSplice Tuner to consume data.



Data that is consumed by OpenSplice Tuner from an application data reader cannot be consumed any more by the application that created that specific data reader.

The Entity information of the Reader associated with the Reader window can be resolved by choosing *File > Show Reader info*.

### 3.5.10.1.1 Sample Information View

The sample information view displays information about the currently selected sample in the user data view. When an application injects data, OpenSplice adds information to it. This information is called *sample information* in OpenSplice Tuner. It is displayed in the sample information view. This information consists of:

**sample\_state** - Indicates whether or not the sample has already been read.

**view\_state** - Indicates whether the DataReader has already seen samples for the most current generation of the related instance.

**instance\_state** - Indicates whether the instance is currently in existence, or if it has been disposed, the reason why it was disposed.

**valid\_data** - Indicates whether the read data is valid or not.

**disposed\_generation\_count** - Indicates the number of times the instances has become alive after it was disposed explicitly by a Writer, at the time the sample was received.

**no\_writers\_generation\_count** - Indicates the number of times the instance has become alive after it was disposed because there were no writers, at the time the sample was received.

**insert\_timestamp** - The time the sample was inserted in the reader database.

**source\_timestamp** - The time the message was written.

**write\_insert\_latency** - The time between write and insert.

**writerGID** - Identification of the writer that wrote the message.

**instanceGID** - Identification of the instance of the sample.

**sampleSequenceNumber** - Sequence number of the sample.

**qos** - The Quality of Service of the message (not implemented yet).

The selection in the User data view determines the information in the Sample information view. OpenSplice Tuner automatically displays the sample information that is associated with the user data that is selected in User data view.

### 3.5.10.1.2 User Data View

The user data view contains two tables that both offer a different view: *List table* and *Single table*.

The *Single table* is capable of displaying one specific instance of user data. This view displays all fields in the data, which depend on the data type of the topic that the reader is able to consume. It consists of three columns. The first column displays the type of a field in the data. The second column displays the name of a field in the data. Nested fields in the data are separated by a dot. The fields that are part of the key of the topic are colored green. The third column displays the current value of the field. When the window is opened, they have the value N/A.

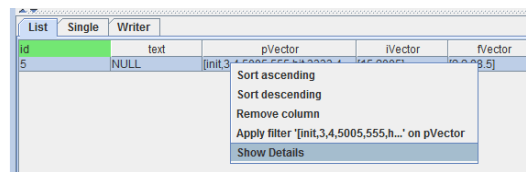
The *List table* is capable of displaying multiple samples in a table.

The list view is selected in *The Reader Window*. Each row represents one instance of user data from a sample that is consumed from OpenSplice. Each column represents a field in the data. Key fields are colored *green*.

### 3.5.10.1.3 Show details of data that contains a collection type

When you right-click on a cell which contains collection type data and then choose the *Show Details* item (see the illustration below), a new window will open, which is similar to the reader-writer window (described in *Detailed Reader-Writer window*); the new window shows the details of the chosen collection type.

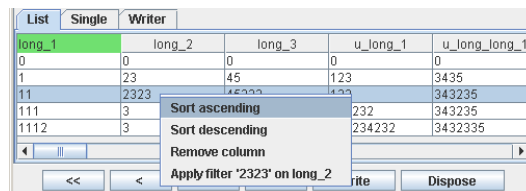
Show Details item



### 3.5.10.1.4 Sorting Data

Data in the *List* table of the User data view can be sorted by column. This can be achieved by right-clicking any cell in the column that needs to be sorted followed by selecting the *Sort ascending* item to sort the column in ascending order or the *Sort descending* item to sort the column in descending order.

List View actions



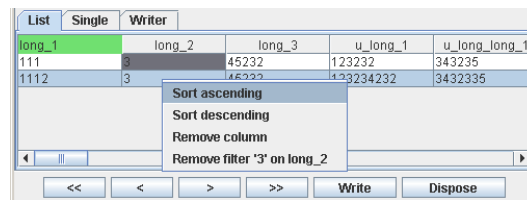
### 3.5.10.1.5 Filters

It is possible to apply one or more filters on data in the List table of the user data view. Data in the table that does not match one or more of these filters is hidden.

To apply a filter, right-click on a specific cell in the table followed by selecting the *Apply filter '<value>' on <field\_name>* item.

The illustration *List View actions* above shows the application of the filter "23" on the field "long\_2". This means that data that does not have the value 23 for the field long\_2 will be hidden. The illustration below shows the data in the table from after the filter shown above is applied. Multiple filters can be applied altogether.

### Remove a Filter



Once a filter has been applied, it can also be removed again. This will result in the display of the data that was hidden because it did not match that filter. Removing a filter can be achieved by right-clicking on a cell in the column where the filter was applied and selecting the *Remove filter* '*<value>*' on *<field\_name>* item or by selecting *Edit > Remove filter > <field\_name>:<value>* in the menu bar.

#### 3.5.10.1.6 Reordering Columns

A column in the *List* table of the User data view can be moved to another location by left-clicking the column header and dragging it to the new location in the view.

#### 3.5.10.1.7 Removing Columns

Sometimes not all fields in the data are interesting. These fields can be removed from the *List* table in the User data view. This can be done by right-clicking the relevant column and choosing *Remove column* from the popup menu. The column will be removed from the *List* table, and it cannot be displayed again in that specific window.

#### 3.5.10.1.8 Consumption Mode

The reader window supports two modes for data consumption. The first mode is the take mode. This is the default mode. In this mode, each consumed sample is removed from the database after it has been read.

The second mode is the read mode. In this mode, a consumed sample is only marked as read in the database after it is read, but not removed. The consumption mode can be changed by choosing *Edit > Take mode* in the menu bar to select the take mode or by choosing *Edit > Read mode* to select the read mode.

#### 3.5.10.1.9 Monitoring

The reader window supports monitoring the reader database. This means it consumes samples from the database and displays them right after they become available. Monitoring is possible in both read mode and take mode. To enable monitoring, choose *Edit > Start monitoring* in the menu bar. This will disable all actions for the reader window until monitoring is stopped. Monitoring can be stopped by choosing *Edit > Stop monitoring* in the menu bar.



Monitoring increases the intrusiveness of OpenSplice Tuner on OpenSplice.

### 3.5.10.1.10 Clear Data

The data in the List table of the User data view can be removed from the view. There are two ways to do it.

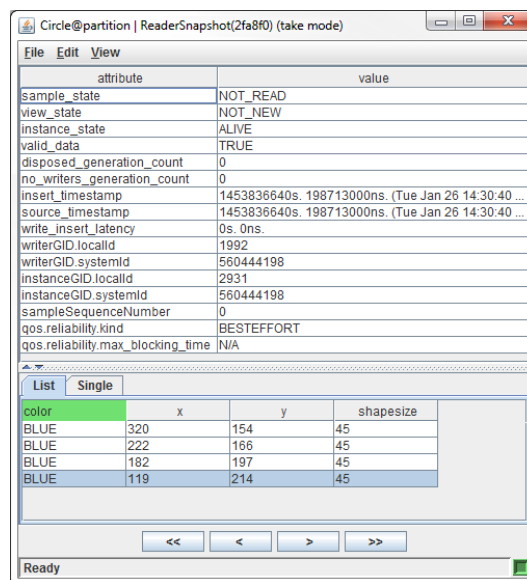
The first way is to remove only the selected sample. This can be done by choosing *Edit > Clear selection* in the menu bar.

The second way is to remove all data in the table. This can be done by choosing *Edit > Clear list* in the menu bar.

### 3.5.10.2 Inspecting Data in a Reader Database Snapshot

The creation of a snapshot of a reader database results in the popup of a reader snapshot window. Such a reader snapshot window is shown below.

**Reader Snapshot Window**



This window consists of:

**Title Bar** - Displays information about the snapshot. The format of the title is: *<topic\_name>@<partition(s)> | ReaderSnapshot (<heap address>)(<mode>)*.

**Menu Bar** - Contains three menus that provide several facilities for accessing and modifying the snapshot as well as the view on the data.

**Sample information View** - Displays the sample information of the sample that is associated with the currently selected instance of user data in the User data view.

**User Data View** - Provides different views for displaying the instances of user data in the snapshot.

**Button Panel** - Offers facilities to browse through the data in the snapshot.

**Status Bar** - Provides information about the status of the snapshot or actions that are currently being executed.

The facilities for browsing through the data in the snapshot and for modifying the view are equal to the facilities that are available for a writer snapshot window, reader window and a reader-writer window. See *Consuming Data*.



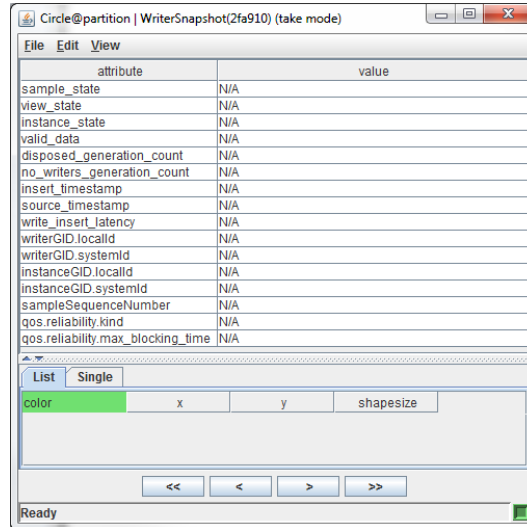
When a reader snapshot window is closed, the reader snapshot is deleted.



### 3.5.10.3 Inspecting Data in a Writer History Snapshot

The creation of a snapshot of writer history cache results in the popup of a writer snapshot window. Such a window looks almost the same as a reader window and has the same capabilities. A writer snapshot window is shown below.

**Writer Snapshot Window**



The window consists of:

**Title Bar** - Displays the title. Format is: `<topic_name>@<partition(s)> | WriterSnapshot(<heap_address>)(<mode>)`.

**Menu Bar** - Consists of *File*, *Edit* and *View* menus.

**Sample information View** - Displays the sample information of one specific sample.

**User Data View** - Displays the user data that is consumed by OpenSplice Tuner.

**Button Panel** - Contains buttons to consume data from OpenSplice.

**Status Bar** - Displays the current action as well as the status of the snapshot.



When a writer snapshot window is closed, the writer snapshot is deleted.

### 3.5.10.4 Consuming Data Using a Reader-Writer

The creation of a reader-writer results in the popup of a reader-writer window (*The Reader-Writer Window*). The reader-writer window is combination of a reader window and a writer window. It provides both the reader and writer window facilities.

### 3.5.10.5 Injecting and Consuming Data With Coherent and Ordered Access

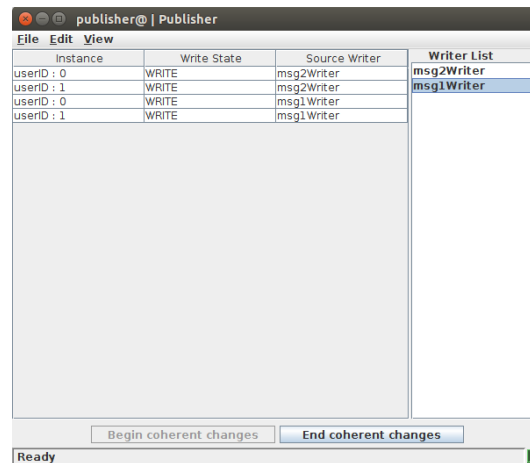
Vortex OpenSplice supports setting of the Presentation policy of publishers and subscribers. As a result, Tuner can set these policies on its own created publishers and subscribers and be able to inject/consume coherent sets of data into/from the system.

#### 3.5.10.5.1 Publishing Coherent Sets

Tuner is able to create and publish coherent sets of data for either existing publishers in the system or from its own created publishers. To create a coherent publisher in Tuner, see [Creating a Publisher](#).

In the main window's entity tree, in either participant or partition view mode, right click a publisher that has its *access\_scope* set to either *TOPIC* or *GROUP*, and its *coherent\_access* set to *true*. If these conditions are true, then the right click context menu will show a new item called **Publish coherent sets**. Selecting this menu option will bring up the coherent publish window.

**Coherent Publisher Window**



This view contains two parts: the list of writers currently under this Publisher, and the user data table containing data about the outgoing samples in a coherent set.

The actions available to the user in this view are:

- *Begin coherent changes*
- *End coherent changes*
- *Refresh writer list*

*Begin coherent changes* will set the publisher in coherent mode. In this state, samples written by this publisher's writers will not be made visible to remote readers (under a subscriber with matching Presentation policy) until the *End coherent changes* action is made. Otherwise, samples written while the publisher is not in coherent mode are published normally.

Samples can be constructed and written from this view by either double clicking or right clicking on a writer in the writers list and selecting *Write data*. This brings up a writer window identical to the one in [Injecting Data Using a Writer](#), only this one will update the Coherent publish window with written data.

When a sample is constructed in the writer window and then written, disposed, or any other writer action made, and if the publisher is in coherent mode, then the sample will appear in the Coherent publish window's data table.

The data table displays the written sample's instance key, the outgoing instance state, and the originating writer's name. Samples in the data table can be double clicked to bring up a read only view of the writer window to view the sample's

fields.



Once a sample has been written from the writer window, regardless if the publisher is in coherent mode or not, it is live in the system and cannot be edited.

Once editing a set of coherent data is complete, clicking *End coherent changes* button will notify the publisher that the set is complete, and remote coherent subscribers will allow access to the published data.

The *Refresh writer list* action (accessible from the *Edit* menu or **F5** keystroke) refreshes the current list writers that the publisher owns, if any writers were created or deleted since the creation of the window.

### 3.5.10.5.2 Access Data On Readers

Tuner is able to access data from a subscriber scope, specifically for viewing coherent and/or ordered sets of data for either existing subscribers in the system or from its own created subscribers. To create a coherent subscriber in Tuner, see *Creating a Subscriber*.

In the main window's entity tree, in either participant or partition view mode, right click a subscriber that has its *access\_scope* set to either *TOPIC* or *GROUP*, and its *coherent\_access* set to *true*. If these conditions are true, then the right click context menu will show a new item called **Access data on readers**. Selecting this menu option will bring up the subscriber access window.

**Subscriber Access Window**

Instance	Read State	Source reader
userID : 2	ALIVE, NEW	reader2
userID : 1	ALIVE, NEW	reader1
userID : 2	ALIVE, NOT_NEW	reader2
userID : 1	ALIVE, NEW	reader2
userID : 2	ALIVE, NEW	reader1
userID : 1	ALIVE, NOT_NEW	reader1
userID : 1	ALIVE, NOT_NEW	reader2
userID : 2	ALIVE, NOT_NEW	reader1

This view contains a single component, a table containing samples that are taken from the subscriber's data readers in a coherent and ordered set (if the subscriber's Presentation policy has those attributes set).

The actions available to the user in this view are:

- *Access available data*
- *Clear table*

*Access available data* Will access all owned data reader entities that have data available, in order, and will display all samples returned in the data table. The table displays the instance key and key value, the instance and view state of the sample, and the originating reader name that received the sample. A grayed out row also appears after the end of the table, to visually separate distinct accesses from each other.

Double clicking or right clicking on a table row and selecting the *View data* action will bring up a reader frame displaying the full sample info and user data of the selection. This particular reader frame is only for viewing the current selection of the subscriber's data table, the read/take, import/export, and monitoring functions are disabled.

**i** Note that the *Access available data* action on a coherent subscriber will populate the data table with completed coherent publications, it will also display any samples that were published incoherently. That is to say, a writer under a coherent publisher is capable of writing data outside of a coherent change block, in which case, the data is received by compatible data readers normally.

**i** *Access available data* action only uses *take* on owned data readers.

*Clear table* Clears all rows from the data table.

## 3.6 Exporting and Importing

Next to injecting and consuming data, OpenSplice Tuner also provides facilities to export information from OpenSplice to a file on disk, and to import information from a file on disk.

There are two kinds of information that can be exported/imported. It is possible to export/import a Topic and also samples for that Topic.

OpenSplice Tuner considers the Topic itself as *metadata* and the samples for a Topic as *data*. OpenSplice Tuner exports both metadata and data to disk in XML format. See the section *Exporting and Importing*.

### 3.6.1 Export Metadata

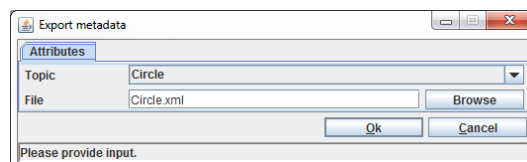
Topics in OpenSplice can be exported to a file on disk with OpenSplice Tuner. Once a Topic is exported, it can for instance be imported in another OpenSplice domain later on. It might also be useful to re-insert the Topic after a restart of OpenSplice.

Exported metadata consists of:

- Topic Name
- Topic Type Name
- Topic Key List
- Topic Data Type
- Topic Quality of Service

Exporting metadata can be achieved by choosing *Edit > Export metadata* in the menu of the main window (*Main Window Edit Menu*) or by right-clicking a Topic entity in the entity tree of the main window followed by selecting *Export metadata* from the popup menu that appears (see *Enable and Disable Entity Relations*). Both of these actions will result in the display of the dialog window shown below.

**Export Metadata dialog**



The value provided in the *Topic* field determines the topic that needs to be exported to disk. The *File* field determines the location where OpenSplice Tuner will store the information. By clicking the *Browse* button it is possible to select the location to store the information using a file chooser.

When the *OK* button is clicked, the input is validated. If the input is correct, the metadata is exported. If the input is not correct, an error message will appear in the status bar of the dialog window. The *export metadata* action can be cancelled by clicking the *Cancel* button. In this case, no metadata will be exported.

## 3.6.2 Export Data

Next to topics, samples in OpenSplice can also be exported. Just as with the creation of a reader-writer, exporting data is available in two modes.

- Exporting data from one existing partition.
- Exporting data from partitions that match a user-defined expression.

It is also possible to export data from an existing reader using the list view of a reader window and reader-writer window.

It is not necessary to export the metadata prior to exporting the data, because OpenSplice Tuner exports the metadata of the data as well.

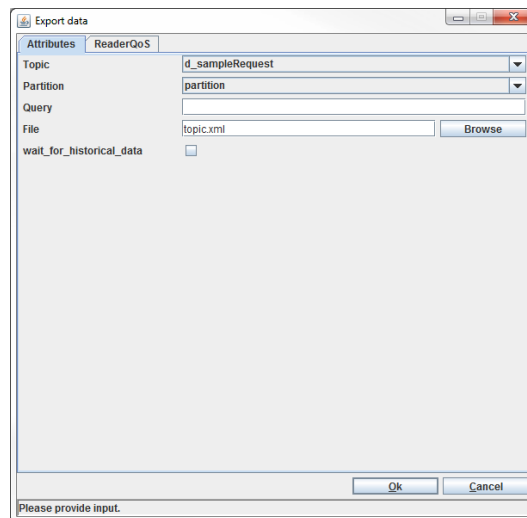
### 3.6.2.1 Existing Partition

Data from an existing partition can be exported by:

- Choosing *Edit > Export data > Existing Partition* from the menu bar of the main window
- Right-clicking a partition entity in the entity tree of the main window followed by choosing *Export data* from the popup menu that appears.
- Right-clicking a topic entity in the entity tree of the main window followed by choosing *Export data > Existing Partition* from the popup menu that appears.

All of these actions result in the popup of the dialog window shown below.

**Export Data (Existing Partition) dialog**



The *Topic* field specifies the topic whose data must be exported.

The *Partition* field determines from which partition the data must be exported.

The *Query* field can optionally be used to specify a query, so only data that matches the query will be exported.

The *File* field determines the location where to store the data. The *Browse* button can be used to select that location from within a file chooser.

The export functionality uses a reader to gain access to the data that needs to be exported.

The *WaitForHistoricalData* field determines whether the Reader will wait for historical data to arrive during creation (maximum of 30 seconds). In this case the Reader will still receive historical data.

By default the QoS settings of the Reader are copied from the Topic it reads. However, it is also possible to override these settings by specifying its own QoS settings/profile (see *QoS Profiles*) in the *ReaderQoS* tab. The QoS settings of the Reader influence the data that will be exported.

When the *OK* button is clicked, the input is validated. If the input is correct, all data that matches the topic, partition (and query) is exported to the specified file.

If the file already exists, it is overwritten.

If the input is not correct, an error message will appear in the status bar of the dialog window.

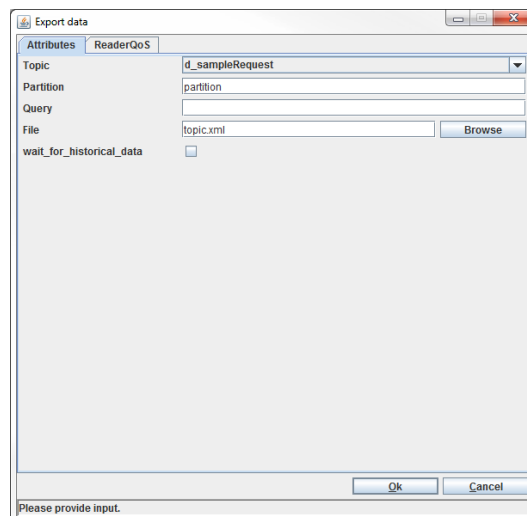
The Export data action can be cancelled by clicking the *Cancel* button. In this case, no data will be exported.

### 3.6.2.2 Partition Expression

Exporting data according to a partition expression looks a lot like exporting data from an existing partition. The only difference is that the data is exported from *all* partitions that match the supplied partition expression instead of only exporting data from one partition.

To export data according to a partition expression, choose *Edit > Export data > Partition expression* from the menu bar of the main window or right-click a Topic entity followed by choosing *Export data > Partition expression* from the popup menu that appears. Both of these actions result in the display of a dialog window as shown below.

**Export Data (Partition Expression) dialog**



The *Topic*, *Query* and *File* input fields match the ones in the dialog window above.

The *Partition* field accepts a partition expression.

The export functionality uses a reader to gain access to the data that needs to be exported. The *WaitForHistoricalData* field determines whether the Reader will wait for historical data to arrive during creation (maximum of 30 seconds). In this case the Reader will still receive historical data.

By default the QoS settings of the Reader are copied from the Topic it reads. However, it is also possible to override these settings by specifying its own QoS settings/profile (see *QoS Profiles*) in the *ReaderQoS* tab. The QoS settings of the Reader influence the data that will be exported.

When the *OK* button is clicked, the input is validated.

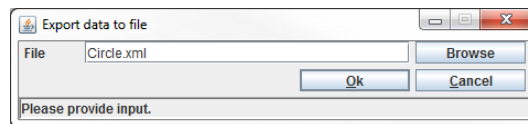
If the input is correct, all data that matches the topic, partition expression (and query) is exported to the specified file. If the file already exists, it is overwritten. If the input is not correct, an error message appears in the status bar of the dialog window.

The Export data action can be cancelled by clicking the *Cancel* button. In this case, no data will be exported.

### 3.6.2.3 From Existing Reader

OpenSplice Tuner also provides facilities to export data from an existing reader. This can be achieved from within a reader window and reader-writer window. To export data from a reader window or reader-writer window, choose *Edit > Export* from the menu of that window. This action results in the display of the dialog window shown below.

**Export Data (From Existing Reader) dialog**



Because both *Topic* and *Partition* are already known, only the *File* has to be specified in the dialog window.

The *Browse* button allows the selection of a file in a file chooser.

When the *OK* button is clicked, the input is validated.

If the input is correct, all data in the list view of the window is exported to the specified file. If the file already exists, it is overwritten. If the input is not correct, an error message appears in the status bar of the dialog window.

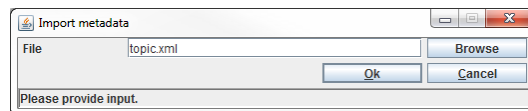
The Export data action can be cancelled by clicking the *Cancel* button. In this case, no data will be exported.

## 3.6.3 Import Metadata

Exported metadata can be imported again. Successful importing of metadata in a specific OpenSplice domain results in the creation of a topic in that OpenSplice domain.

To import metadata choose *Edit > Import metadata* from the menu bar of the main window. This results in the display of the dialog window shown below.

**Import Metadata dialog**



The *File* input field must specify the location of the file that contains the exported metadata. A file chooser can be used to look up the file by clicking the *Browse* button and selecting the file there.

When the *OK* button is clicked, the input is validated.

If the input is correct, the metadata in the specified file is imported into the connected OpenSplice domain. If the topic already exists with exactly the same characteristics (name, type name, key list, data type and quality of service), importing is also allowed but has no use.

If the input is not correct or a topic with the same name but other characteristics already exists in the connected domain, an error message appears in the status bar of the dialog window.

The Import metadata action can be cancelled by clicking the *Cancel* button. In this case, no data will be imported.

### 3.6.4 Import Data

Just like exported metadata, exported data can also be imported into a specific OpenSplice domain. When importing data, OpenSplice Tuner also checks whether the metadata of the data that needs to be imported is already available. If so, it checks to see if the metadata matches the metadata of the data to import. If not, it also imports the metadata. This means it is not necessary to import the metadata prior to importing the data when the metadata is unknown in the OpenSplice domain.

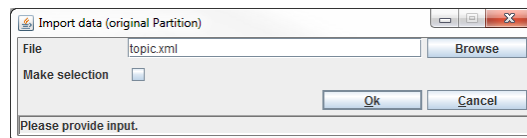


Data that is imported will arrive at all data readers of running OpenSplice applications that are participating in that domain and are subscribed to this data.

#### 3.6.4.1 Original Partition(s)

Importing data in its original partition(s) means that the data will be imported into the partitions it was exported from. Choosing *Edit > Import data > Original Partition(s)* from the menu bar of the main window results in the display of the dialog illustrated below.

**Import Data (original Partition) dialog**



The *File* input field must specify the location of the data on disk.

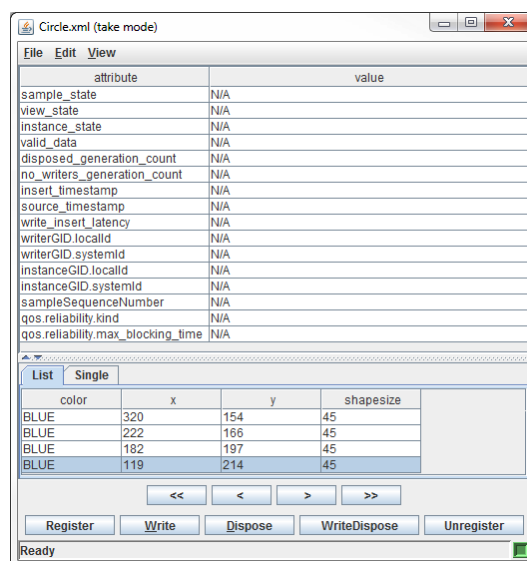
The *Make selection* allows importing a subset of the data in the file specified by the *File* input field.

The Import data action can be cancelled by clicking the *Cancel* button. In this case, no data will be imported.

When the *OK* button is clicked and the *Make selection* check box is unchecked, OpenSplice Tuner validates the specified file and if so imports all data in the file into the original partition(s).

If the *Make selection* check box is checked when the *OK* button is clicked, the Import window shown below is displayed.

**The Import Window**



The import window consists of:



**Title Bar** - Displays the title. Format is: *<file\_name>( <mode> )*.

**Menu Bar** - Consists of *File*, *Edit* and *View* menus.

**Sample information View** - Displays the sample information of one specific sample.

**User Data View** - Displays the user data that is read by OpenSplice Tuner from the input file.

**Button Panel** - Contains buttons to consume data from the input file.

**Status Bar** - Displays the current action as well as the status of the snapshot.

Initially no data is displayed in the import window. By clicking the *>* and the *>>* buttons, the data in the file on disk is loaded and displayed in the window. Once data is displayed, it can be injected or disposed in the connected domain and partition.

Data can be injected by selecting the desired sample followed by choosing *Edit > Write* in the menu bar of the import window or by clicking the *Write* button at the bottom of the import window. To write all displayed data, choose *Edit > Write all* from the menu bar of the import window.

To dispose data, select the desired sample in the import window followed by choosing *Edit > Dispose* in the menu bar or by clicking the *Dispose* button at the bottom of the import window. To dispose all displayed data, choose *Edit > Dispose all* from the menu bar of the import window.

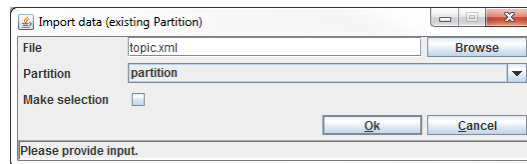
Samples that are injected or disposed are removed from the view in the import window.

Information about the *Register*, *WriteDispose* and *Unregister* buttons can be found in the section *Injecting Data Using a Writer*.

### 3.6.4.2 Existing Partition

Importing data in an existing partition almost works the same as importing it in its original partition. The only difference is that the partition to import the data in can be chosen now. To import data into an existing partition choose *Edit > Import data > Existing Partition* in the menu bar of the main window or right-click a partition entity in the entity tree of the main window followed by selecting *Import data* in the popup menu that appears. Both of these actions result in the display of the dialog window shown below.

**Import Data (existing Partition) dialog**



The *File* input field must specify the location of the data on disk.

The *Partition* field specifies the partition where the data must be imported in.

The *Make selection* allows importing a subset of the data in the file specified by the *File* input field.

The Import data action can be cancelled by clicking the *Cancel* button. In this case, no data will be imported.

When the *OK* button is clicked and the *Make selection* check box is unchecked, OpenSplice Tuner validates the specified file. If the specified file is valid, all data in the file is imported into the original partition(s). If the *Make selection* check box is checked when the *OK* button is clicked, the import window as illustrated earlier [44] is displayed.

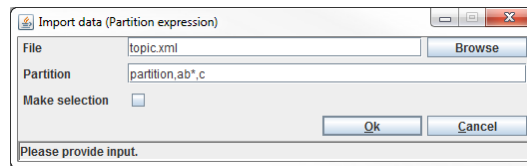
By using the import window a subset of the data can be injected or disposed in the specified partition.

### 3.6.4.3 Partition Expression

Importing data in an existing partition almost works the same as importing it in its original partition and importing data in an existing partition. When using a partition expression, it is possible to import data into *all* partitions that match a specific expression.

To import data using a partition expression choose *Edit > Import data > Partition expression* in the menu bar of the main window. This action results in the display of the dialog window shown below.

#### Import Data (Partition expression) dialog



The *File* input field must specify the location of the data on disk.

The *Partition* field specifies a partition expression, which describes all partitions where the data must be imported in.

The *Make selection* allows importing a subset of the data in the file specified by the *File* input field.

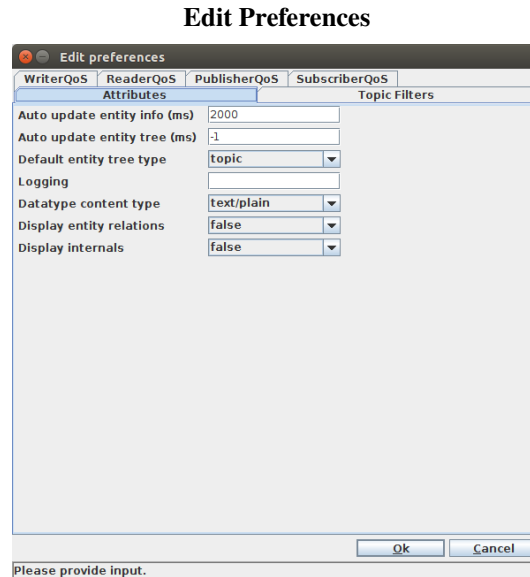
The Import data action can be cancelled by clicking the *Cancel* button. In this case, no data will be imported.

When the *OK* button is clicked and the *Make selection* check box is unchecked, OpenSplice Tuner validates the specified file and if so imports all data in the file into the original partition(s). If the *Make selection* check box is checked when the *OK* button is clicked, the import window (*The Import Window*) is displayed. By using the import window a subset of the data can be injected or disposed in the specified partition.

## 3.7 Preferences

OpenSplice Tuner remembers user preferences. These preferences are stored on disk in `<USER_HOME>/ospl_tooling.properties.<OpenSplice Version>`.

(The `<USER_HOME>` variable represents the home directory of the user). The preferences can be modified by choosing `Edit > Preferences` in the menu bar of the main window. This action results in the display of a dialog to edit the preferences.



The *Edit preferences* dialog allows user to save preferences to disk, so they will be remembered when OpenSplice Tuner is exited.

Once the options are set to the desired value, they can be saved by clicking the *OK* button. This action triggers OpenSplice Tuner to save the preferences to disk. The dialog window is closed when the preferences have been saved successfully. If the input is not correct, an error message appears in the status bar of the dialog window.

The *Edit preferences* action can be cancelled by clicking the *Cancel* button. In this case, the preferences will not be saved.

The *Edit preferences* dialog has 6 tabs.

- The *Attributes* tab has seven configuration options (see also *Attributes Tab*).
- The *Topic Filters* tab provides filters to hide/show built-in topics in the different views (see also *Topic Filters Tab*).
- There are four tabs for creating and editing Writer, Reader, Publisher and Subscriber QoS Profiles (see also *QoS Profiles*).

## 3.7.1 Attributes Tab

### 3.7.1.1 Auto Update Entity information

This option determines whether the information in an entity information window is updated automatically and at what frequency. This only applies to the status of the entity that is displayed in the *Status* tab of that window (see *Status*). The value of this setting must be expressed in milliseconds. The value of the option must be  $\geq 500$  or  $-1$ . When  $-1$  is supplied, no automatic updates are performed. With a value  $\geq 500$ , an update is performed every value period. If the value approaches  $500$ , the intrusiveness of OpenSplice Tuner on OpenSplice increases.

The default value for this option is  $2000$ .

### 3.7.1.2 Auto Update Entity Tree

This option determines whether the entity relations (see *Entity Relationships*) in the entity tree in the main window are updated automatically and at what frequency.

The value of this setting must be expressed in milliseconds.

The value of this option must be  $\geq 500$  or  $-1$ . When  $-1$  is supplied, no automatic updates are performed. With a value  $\geq 500$ , an update is performed every value period. If the value approaches  $500$ , the intrusiveness of OpenSplice Tuner on OpenSplice increases.

The default value for this option is  $"-1"$ .

### 3.7.1.3 Default Entity Tree Type

This option determines the default view for the entity tree in the main window. There are three options: "participant", "topic" and "partition". The view can be changed during execution (see *Entity Relationships*).

The default value for this option is "topic".

### 3.7.1.4 Logging

This option can be used to log internal OpenSplice Tuner information.



This setting is intended for OpenSplice Tuner engineering purposes only and should *not* be used.

The default value for this option is "".

### 3.7.1.5 Datatype Content Type

This option determines the default content type for the displaying of entity data types in the Data type tab of an entity information window. There are two options: "text/plain" and "text/html". (See *Data Type*.)

The default value for this option is "text/plain".

### 3.7.1.6 Display Entity Relations

This option determines whether entity relations are visible by default. There are two possibilities: "true" and "false".

The default value for this option is "false".

### 3.7.1.7 Display Internals

This option determines whether OpenSplice internals are visible in the information that is shown by OpenSplice Tuner. There are two possibilities for this option: "true" and "false".

When "true" is selected, internals are displayed; if "false" is selected, they are not.

This option currently only has impact on which attributes of an entity are displayed.

The default value for this option is "false".

## 3.7.2 Topic Filters Tab

The topic filters allow the user to hide and show built-in topics in the different views (Participant, Topic and Partition).

By default the specification (DCPS) built-in topics are shown, and the other topic filters for internal built-in product topics are hidden. (CM, d\_, q\_, rr\_)

## 3.8 QoS Profiles

The OpenSplice Tuner can store QoS Profiles for the following entities:

- Writer
- Reader
- Publisher
- Subscriber

A QoS profile is a pre-defined set of QoS settings identified by a name. This set can be used when creating a writer, reader, publisher or subscriber.

For each entity a separate tab is available in all creation windows of the specified entities.

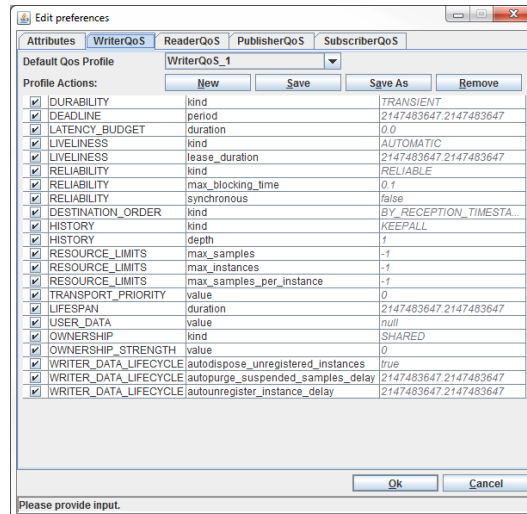
For the Writer and Reader a pre-defined QoS profile TopicQoS is automatically added. This profile contains all QoS settings of the chosen Topic.

For the Publisher and Subscriber a pre-defined QoS profile DefaultQoS is automatically added. This profile is based on the default qos settings as described in the DDS specification for the chosen entity. When creating and editing QoS profiles through the Preferences window these default QoS Profiles are not displayed.

### 3.8.1 QoS Profile window

A QoS profile window contains a drop-down list (*Default QoS Profile*) of defined QoS Profiles for that Entity.

**The QoS Profile Window**



Below the drop-down list there is an action bar (*Profile Actions*) with four buttons. The rest of the window contains the QoS table where all QoS settings can be viewed and changed.

The *New* button creates a new QoS profile based on the default qos settings as described in the DDS specification for the chosen entity. When the *New* button is clicked, a dialog box appears for entering a name for the new profile.



Two names are *reserved* for internal QoS settings: `DefaultQoS` and `TopicQoS`; these names cannot be used for user-created QoS profiles.

The *Save* button saves the QoS settings as shown in the QoS table to the currently-selected QoS Profile.

The *Save As* button saves the QoS settings as shown in the QoS table to a new QoS profile.

When the *Save As* button is clicked, a dialog box appears for entering a name for the new profile.



Two names are *reserved* for internal QoS settings: `DefaultQoS` and `TopicQoS`; these names cannot be used for user-created QoS profiles.

The *Remove* button removes the currently-selected QoS profile from the QoS Profile list.

All QoS fields in the QoS table have a checkbox in front of them which determines whether the field is editable:

- If the checkbox is checked the value cannot be edited and will automatically get the value as defined in the selected QoS profile.
- If the checkbox is *un*\*checked the QoS field will get the value that is currently set in that field when the QoS profile is saved or the entity is created.

All QoS profiles are stored in the Tuner Preferences file in `<USER_HOME>/ .ospl_tooling.properties`. `<OpenSplice Version>` where `<USER_HOME>` represents the home directory of the user.

## 3.9 Support for Google Protocol Buffers

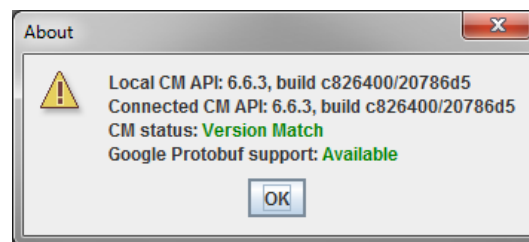
### 3.9.1 About Google Protocol Buffers in Tuner

In versions of Vortex OpenSplice that support Google Protocol Buffers, Tuner is able to read from protocol buffer topics and display its samples as regular field name and value pairs, just as if it were from a regular IDL-defined topic.

The Tuner feature for Google Protocol Buffer topic reading is enabled only on Vortex OpenSplice middleware installs where Google Protocol Buffer support is included. For installations where it is not included, the feature is disabled in Tuner.

Tuner's About dialog shows if the feature is available in the current build. It is accessible from the main window menu bar *File -> About*.

**About Dialog**



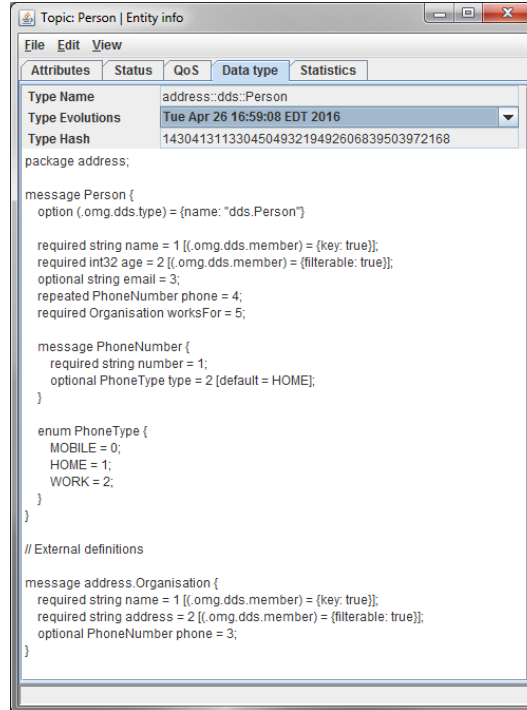
### 3.9.2 Viewing type evolutions

The main feature of using Google Protocol Buffers as the type definition for a topic is the ability to change, or 'evolve', a topic's type. Tuner can become aware of changes to a protocol buffer topic's type, and can display the topic type definition for each type evolution that is registered.

To view the type evolutions for a protocol buffer backed topic, right-click a topic, reader, or writer element in the entity tree, choose *Display Entity*, and navigate to the *Data Type* tab. For this case, the *Data Type* tab displays some additional information.

- The *Type Evolutions* for the type are displayed in a drop-down combo box. It lists the known evolutions for the type according to the time it was registered in the DDS system. The most recent evolution is at the top of the list and is selected by default.
- The *Type Hash* is a non-editable text field that displays the 128-bit hash that uniquely identifies the selected type evolution for the topic type.
- The main text area now displays a description for all fields and nested types defined in the protocol buffer message for the currently-selected evolution, in a text format emulating the original `.proto` file format. Message type fields found in the typedef that are not defined as nested messages inside the main DDS message type are defined under a separate section, **External Definitions**. These messages have their fully-qualified type name to indicate where they were defined. Please note that this typedef reconstruction is only meant to give the user an idea as to what type of data is found in the topic type. It is not guaranteed to be a 100% reconstruction of the original `.proto` file as it was written, or to be compilable by the `protoc` compiler.

#### **Protocol Buffer Type Definition**



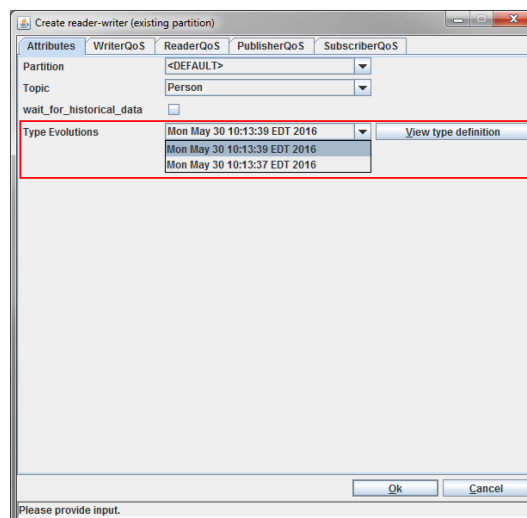
**i** HTML data type representation is not available for Protocol Buffer topics.

### 3.9.3 Reading protocol buffer topics

Tuner reads protocol buffer data by reading in the byte sequence data contained in the user data, and then replacing all fields with regular field name and value pairs just as if it were data from a regular topic. The process for creating readers for protocol buffer topics is almost identical to the process described in Section 3.5.5, Creating a ReaderWriter.

If creating a reader-writer on a protocol buffer backed topic, the *Create Reader-Writer Dialog* will have an extra combo box input, allowing the user to select which type evolution to view the user data as. The default selection is the most recently registered version of the type in the DDS system.

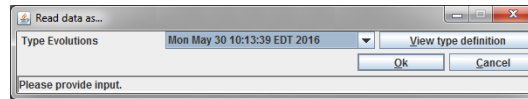
#### Create ReaderWriter Dialog With Type Evolution Chooser





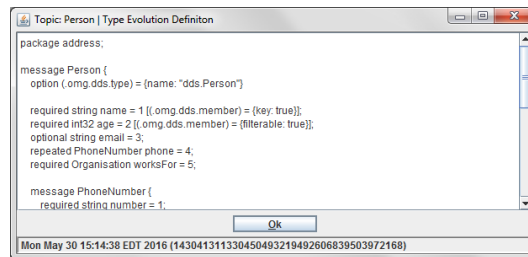
If selecting to read or write data on an existing reader or writer by choosing *Read data* or *Make database snapshot* for a reader, or *Write data* or *Make history snapshot* for a writer, a choice must be made as to what type evolution to view the data as, if the associated topic type is a protocol buffer defined type.

### Read Data As Type Evolution Chooser



There is also a *View Type Definition* button in both dialogs that when clicked, brings up a new window showing the type definition text for the currently selected type evolution, as well as the registration time and type hash in the status bar. The window remains if the dialog is closed, and is reused with the contents updated if a different topic or type evolution is chosen for view.

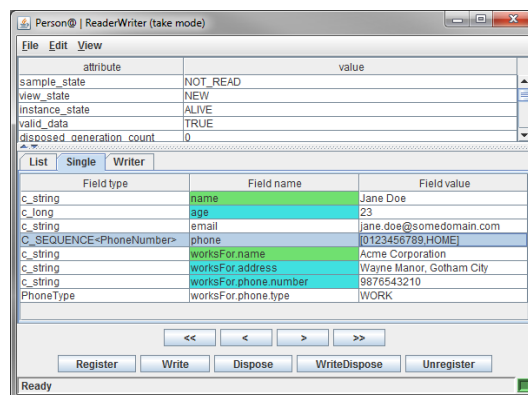
### View Type Evolution Type Definition



Once selections are complete and the reader or writer window appears, the user data model is populated with type fields and values that are decoded according to the type evolution that was chosen. An additional table highlight colour is shown in *cyan* where fields are defined as required in the protobuf type definition. Topic key fields are still coloured *green* and are implied to be required. All other unhighlighted fields are optional fields.

Aside from the above table changes, all interaction with the user data is the same as if it were being read or written from a regular topic.

### A Reader-Writer Window for a Protocol Buffer backed Topic



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Facebook: <https://www.facebook.com/ADLINKTECH>

## 4.2 Notices

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