

Oracle® Fusion Middleware

Using Oracle Stream Analytics

12c (12.2.1.2.0)

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Describes how to use Oracle Stream Analytics to simplify the complex event processing.

Oracle Fusion Middleware Using Oracle Stream Analytics, 12c (12.2.1.2.0)

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Preface

This document describes how to use Oracle Stream Analytics. The User Guide describes the various tasks that a user can perform using Oracle Stream Analytics.

Audience

This document is intended for all users of Oracle Stream Analytics and Event Processing.

Documentation Accessibility

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Access to Oracle Support

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Related Documents

For more information, see the following documents:

- Known Issues for Oracle SOA and BPM Products at: <http://www.oracle.com/technetwork/middleware/soasuite/documentation/soaknownissues122120-3111966.html>.
- *Administering Oracle Stream Analytics*
- *Developing Applications for Event Processing with Oracle Stream Analytics*
- *Getting Started with Event Processing for Oracle Stream Analytics*
- *Schema Reference for Oracle Stream Analytics*
- *Using Visualizer for Oracle Stream Analytics*
- *Customizing Oracle Stream Analytics*
- *Developing Applications with Oracle CQL Data Cartridges*
- *Java API Reference for Oracle Stream Analytics*

- *Oracle CQL Language Reference*
- *Getting Started with Oracle Stream Analytics*
- *Oracle Database SQL Language Reference* at: http://docs.oracle.com/cd/E16655_01/server.121/e17209/toc.htm
- SQL99 Specifications (ISO/IEC 9075-1:1999, ISO/IEC 9075-2:1999, ISO/IEC 9075-3:1999, and ISO/IEC 9075-4:1999)
- Oracle Stream Analytics Forum: <http://forums.oracle.com/forums/forum.jspa?forumID=820>

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
<i>italic</i>	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
monospace	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

What's New in This Guide?

This guide addresses the following changes in this release:

- Renamed from Oracle Stream Explorer to Oracle Stream Analytics
- Added new patterns. See [Table 7-1](#).
- Creating Maps, Connections, and Targets
- Spark Integration

Screens shown in this guide may differ from your implementation, depending on the skin used. Any differences are cosmetic.

Introduction to Oracle Stream Analytics

Oracle Stream Analytics is very advanced, scalable, reliable, and flexible. Oracle Stream Analytics helps you in designing event processing applications with ease.

Oracle Stream Analytics is developed to simplify the complex event processing operations and make them available even to users without any technical background.

This chapter contains the following sections:

- [Oracle Stream Analytics User Interface](#)
- [Components of Oracle Stream Analytics](#).

1.1 Oracle Stream Analytics User Interface

Oracle Stream Analytics user interface components are listed and explained at a high level in the sections that follow.

1.1.1 Sign In Page

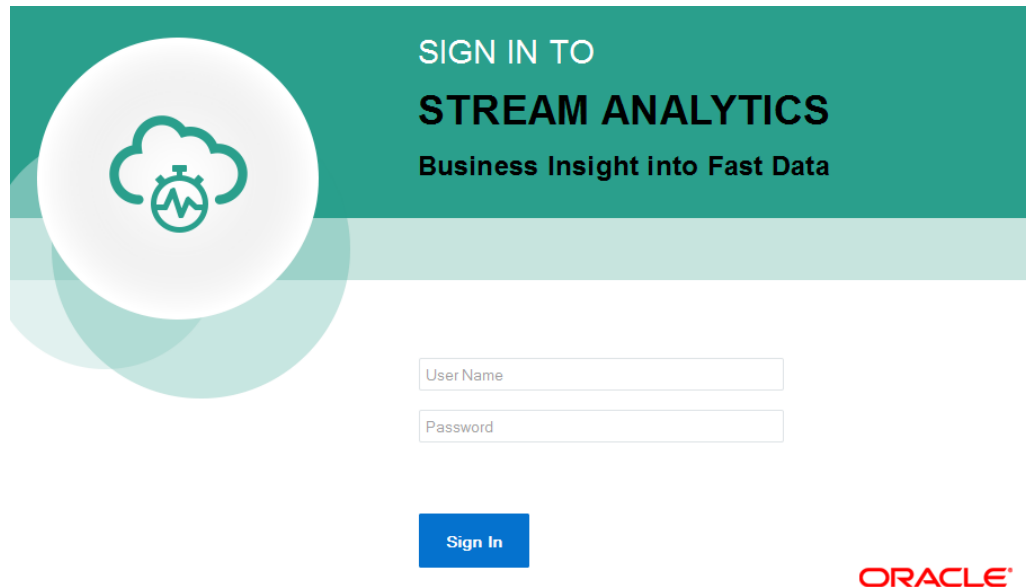
Oracle Stream Analytics uses the same set of users and user roles configured in the Visualizer. Oracle Stream Analytics uses the same role-based authorization and authentication system provided by the Oracle Stream Analytics Event Processing Server.

Sign in to the Oracle Stream Analytics application using the following credentials:

- User Name: <the user name you have provided at the time of installation> (oepadmin is the default user)
- Password: <the password you have provided at the time of installation>

You can also sign in using any of the user accounts (with an administrator role) from the Oracle Stream Analytics Event Processing Server.

The **Sign In** page is as shown below:

Figure 1-1 Oracle Stream Analytics Sign in Page

1.1.2 Home Page

The Home page lists the industry verticals that Oracle Stream Analytics supports.

Each industry vertical has a tag associated with it and the tags are case-sensitive.

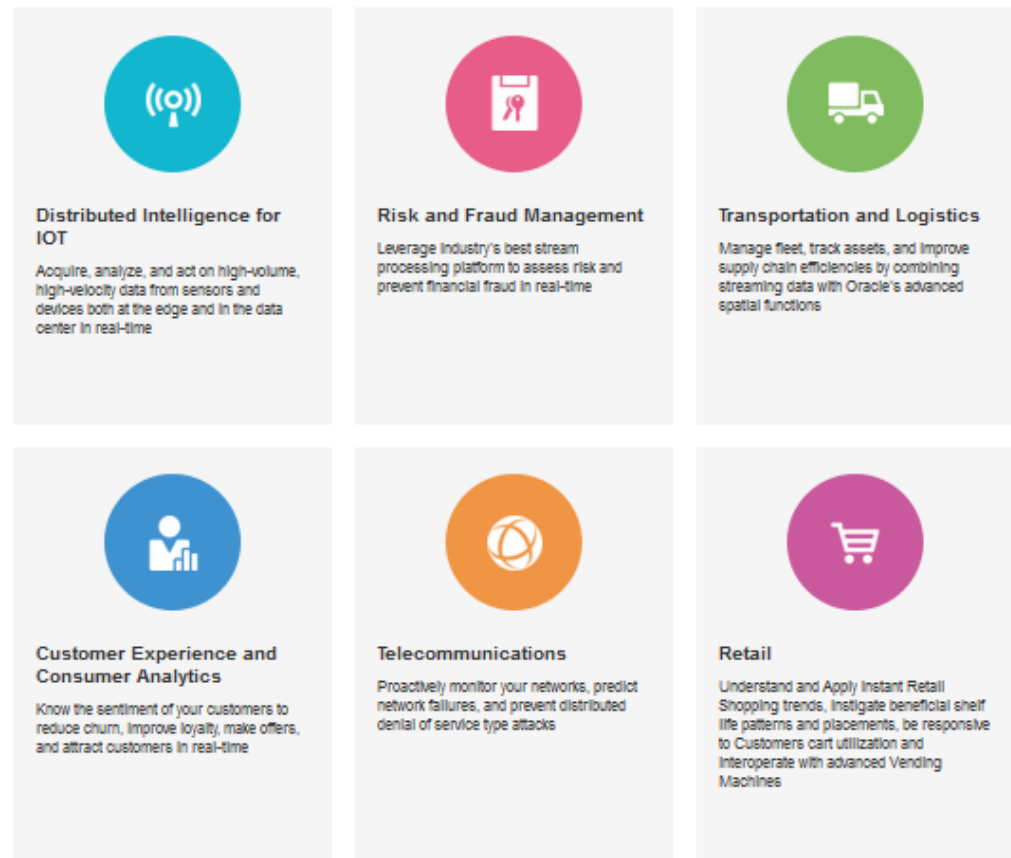
- *Distributed Intelligence for IOT* - Acquire, analyze, and act on high-volume, high-velocity data from sensors and devices both at the edge and in the data center in real-time. Tag for this vertical is *IOT*.
- *Risk and Fraud Management* - Leverage industry's best stream processing platform to assess risk and prevent financial fraud in real-time. Tag for this vertical is *risk*.
- *Transportation and Logistics* - Manage fleet, track assets, and improve supply chain efficiencies by combining streaming data with Oracle's advanced spatial functions. Tag for this vertical is *transportation*.
- *Customer Experience and Consumer Analytics* - Know the sentiment of your customers to reduce churn, improve loyalty, make offers, and attract customers in real-time. Tag for this vertical is *customer*.
- *Telecommunications* - Pro actively monitor your networks, predict network failures, and prevent distributed denial of service type attacks. Tag for this vertical is *telecom*.
- *Retail* — Understand and Apply instant Retail Shopping trends, instigate beneficial shelf life patterns and placements, be responsive to Customers cart utilization and interoperate with advanced Vending Machines. Tag for this vertical is *retail*.

The Home page is as shown below:

Figure 1-2 Oracle Stream Analytics Home Page

Welcome!

Build real-time applications with microsecond latency for any industry in half the time with Oracle Stream Analytics



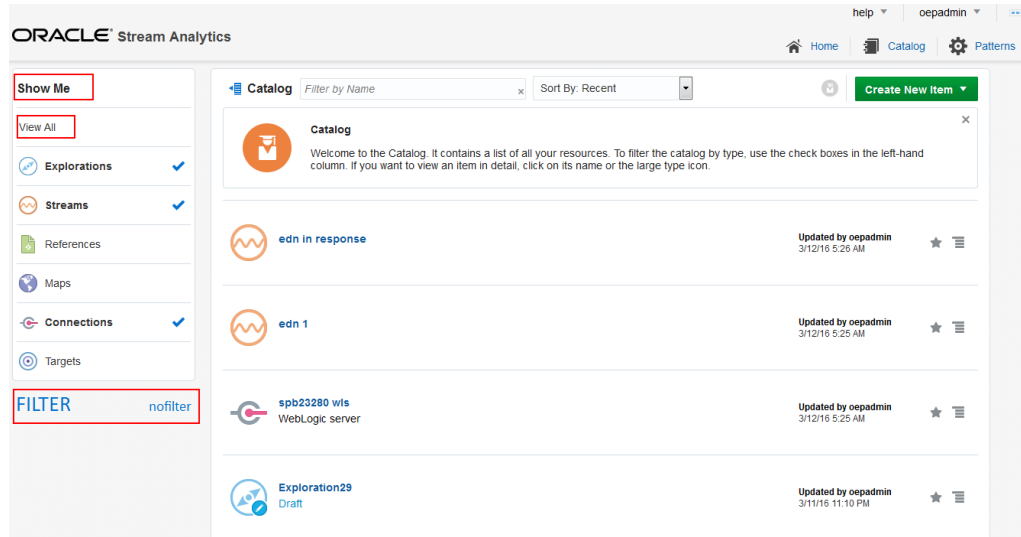
1.1.3 Catalog Page

The Catalog page is the location where resources including explorations, streams, references, maps, connections, and targets are listed. This is the go-to place for you to perform any tasks in Oracle Stream Analytics.

The resources you see in the Catalog vary depending on the runtime you are using for the application.

You can mark a resource as a favorite in the Catalog by clicking on the Star icon. Click the icon again to remove it from your favorites. You can also delete a resource or view its topology using the menu icon to the right of the favorite icon. The Catalog page is as shown below:

Figure 1-3 Catalog Page



The tags applied to items in the Catalog are also listed on the screen below the left navigational pane. You can click any of these tags to display only the items with that tag in the Catalog. The tag appears at the top of the screen. Click **Clear All** at the top of the screen to clear the Catalog and display all the items. The following screen shows the Catalog when you select a tag:

Figure 1-4 Catalog with Tag Applied



You can include or exclude explorations, streams, references, maps, connections, and targets using the **View All** link in the left panel under **Show Me**. When you click **View All**, a tick mark appears beside it and all the components are displayed in the catalog.

When you want to display or view only a few or selective items in the catalog, unselect **View All** and select the individual components. Only the selected components will be shown in the catalog.

1.1.4 Exploration Editor

Exploration Editor, also known as the *Explorer*, allows you to create or edit the explorations in Oracle Stream Analytics.

1.1.4.1 Expression Editor

The *Expression Editor* helps you to create expressions easily. *Expression Editor* supports various standard functions that allow you to perform operations on strings, numerical data, alphanumerical data, date-time, and many more data types. The *Expression Editor* is available within explorations to perform calculations and obtain certain data.

1.1.5 Streams Wizard

Streams Wizard allows you to create or edit the streams in Oracle Stream Analytics.

1.1.6 References Wizard

References Wizard allows you to create or edit the references in Oracle Stream Analytics.

1.1.6.1 Working with Maps, Connections, Targets

Maps, Connections, and Targets are new features added in this release.

See the following sections for more information:

- [Creating/Editing Maps](#)
- [Creating/Editing Connections](#)
- [Creating/Editing Targets](#)

1.1.6.1.1 Creating/Editing Maps

A *map* is a virtual fencing over a geographical area to define boundaries. The maps help you in defining boundaries over a specific area and then use it to analyze the data for your business. Based on the data you analyze, you can use the data to improve your business performance.

You can use the maps to set up triggers for your business. Whenever a device enters or exits the defined boundaries, the user is alerted through a text message or an e-mail.

To create a map:

1. Navigate to the **Catalog**.
2. Select **Create New Item > Map**.

The **Create Map — Type Properties** wizard opens.

Figure 1-5 Create Map — Type Properties

3. Enter details in the following fields of the **Type Properties** screen:
 - a. Enter a **Name** for the map. This is a mandatory field.
 - b. Enter a **Description** for the map. This is an optional field.
 - c. Enter **Tags** for the map. You can enter any tag you like. The tags help you in filtering the maps in the **Catalog**.
 - d. Select a **Map Type**. The available types are:
 - *None (Create manually)* — this value indicates that you do not want to use any of the existing map types and would like to create a type manually. When you select this option you can only save the details but cannot complete creating the map.
 - *Database Table* — the map will be based on the data stored in a database table.

Note: Your database table must contain at least one field of the SDO_GEOMETRY type.

- e. Click **Save** to commit the changes you have made or to save the details added so far.
- f. Click **Next**.

The **Create Map — Connection Details** screen opens.

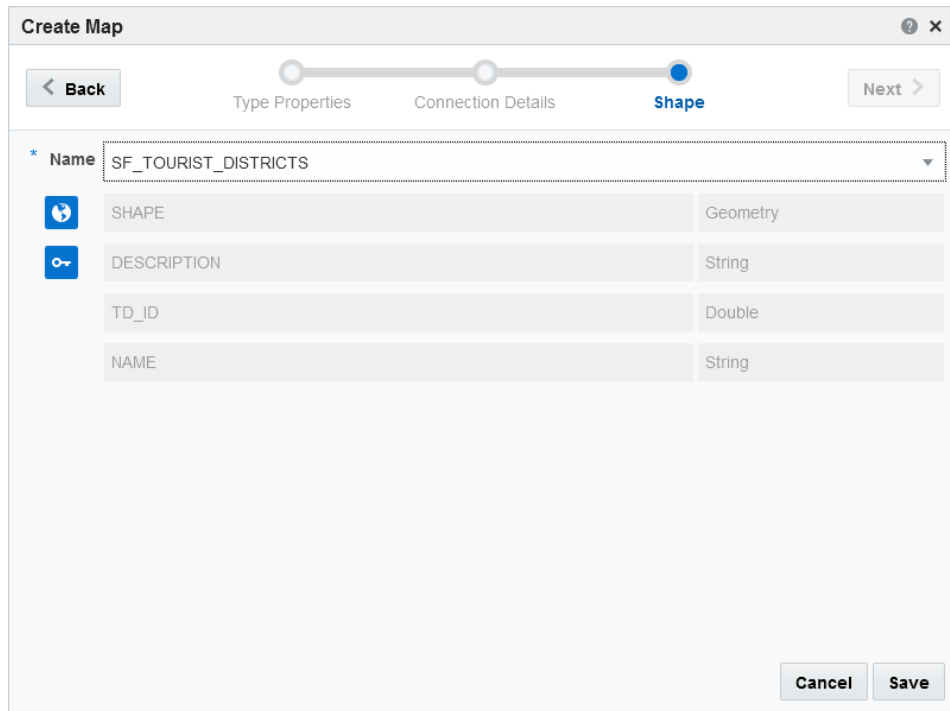
Figure 1-6 Create Map — Connection Details

The screenshot shows a wizard window titled "Create Map". At the top, there is a progress bar with three steps: "Type Properties", "Connection Details" (which is the current step and highlighted in blue), and "Shape". Below the progress bar are "Back" and "Next" buttons. The main content area shows "Type: Database Table" and a required field "* Data source name" with a dropdown menu containing the value "ds". At the bottom right, there are "Cancel" and "Save" buttons.

4. Enter details in the following fields of the **Connection Details** screen:
 - a. Select a **Data source name** from the drop-down list. This data source name comes from the connections you have created earlier.
 - b. Click **Back** if you want to navigate to the previous screen in the wizard.
 - c. Click **Save** to commit the changes you have made or to save the details added so far.
 - d. Click **Next**.

The **Create Map — Shape** screen opens.

Figure 1-7 Create Map — Shape

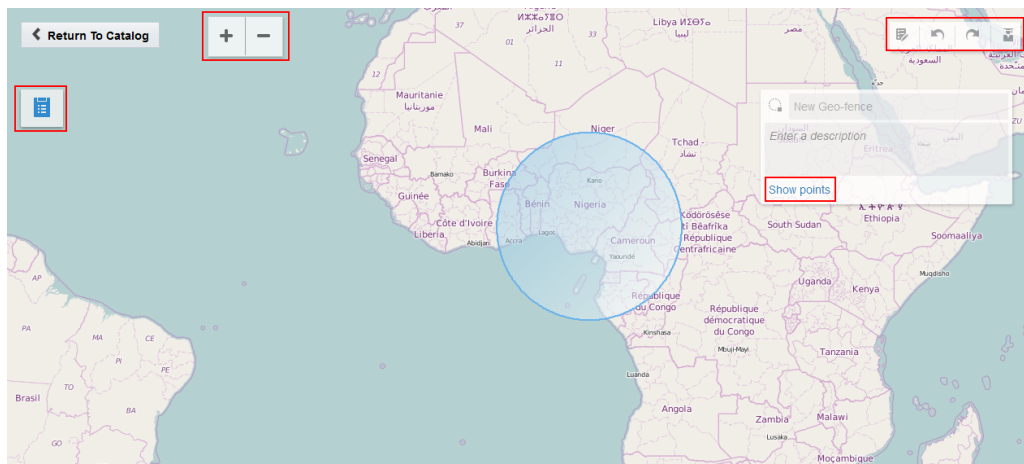


5. Select a **Name** for the shape. You can change the id property, description property, name property, shape property. The selected shape displays the shape binding keys of the map and the connection.
6. Click **Back** to navigate to the previous screen in the wizard.
7. Click **Save** to save the details you have entered so far and complete creating a map.

A map is created with the details you have provided.

The created map appears as follows:

Figure 1-8 Created Map



You can click the **Saved Geo-Fences** to view the saved area on the map. You can use the zoom in and zoom out controls the view of the map. You can click **Show Points** to see the latitude and longitude of the selected Geo-Fence.

Click the **Edit Info** icon to edit the details of the map like name, description etc. The **Undo** icon can be used to revert the last made change and **Redo** icon can be used to repeat the last action performed.

1.1.6.1.2 Creating/Editing Connections

A connection is a collection of metadata required to connect to an external system, such as URLs, credential and the like. A connection is the basis for creation of streams and targets.

To create/edit a connection:

1. Navigate to the **Catalog**.
2. Select **Create New Item > Connection**.

The **Create Connection — Type Properties** wizard opens.

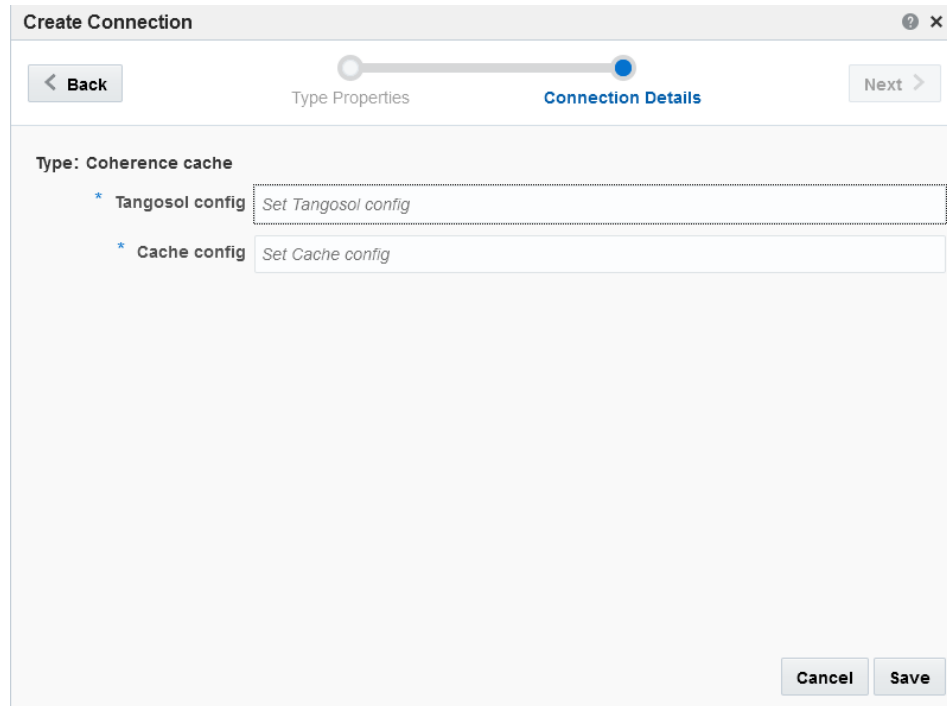
Figure 1-9 Create Connection — Type Properties

3. Enter details in the following fields of the **Type Properties** screen:
 - a. Enter a **Name** for the map. This is a mandatory field.
 - b. Enter a **Description** for the map. This is an optional field.
 - c. Enter **Tags** for the map. You can enter any tag you like. The tags help you in filtering the maps in the **Catalog**.
 - d. Select a **Connection Type**. The available types are:
 - *Kafka*
 - *Twitter*

- *Coherence cache*
 - *HTTP Pub-Sub*
 - *MQTT*
 - *WebLogic Server.*
- e. Click **Next**.

The **Create Connection — Connection Details** screen opens.

Figure 1-10 Create Connection — Connection Details



- f. The fields available vary depend on the type of connection selected.

Table 1-1 Types of Connections

Field Name	Description
Kafka	Select this type when you want to use a Kafka connection.
<p>Note: Specifying a topic name for the Kafka connection is necessary for the connection to be used in a stream. A topic must exist for the deployment to be successful.</p>	
• Zookeepers	Enter zookeepers connection strings separated by commas.
• Kafka bootstrap	Enter Kafka connection strings separated by commas.

Table 1-1 (Cont.) Types of Connections

Field Name	Description
Twitter	Select this type when you want to use a Twitter connection.
• Consumer Key	Enter an API key to be used as the consumer key.
• Consumer Secret	Enter an API secret to be used as the consumer secret.
• Access Token	Enter an access token.
• Access Token Secret	Enter a secret access token.
• Http proxy host	Enter a host for the HTTP proxy.
• Http proxy port	Enter a port number for the HTTP proxy.
Coherence cache	Select this type when you want to use a Coherence cache connection.
• Tangosol config	Copy and paste the XML content (without the XML header) from the <code>tangosol config.xml</code> file in this field.
• Cache config	Copy and paste the XML content (without the XML header) from the <code>cache config.xml</code> file in this field.
HTTP Pub-Sub	Select this type when you want to use a HTTP Pub-Sub connection.
• Server URL	Enter a URL of the server.
• Username	Enter a username to be used for this connection.
• Password	Enter a password to be used for this connection.
MQTT	Select this type when you want to use a MQTT connection.
• Server URLs	Enter a URL for the server.
WebLogic Server	Select this type when you want to use a WebLogic server connection.
• URL	Enter a URL for the server.
• Username	Enter a username to be used for the connection.
• Password	Enter a password to be used for the connection.

4. Click **Back** if you want to navigate to the previous screen in the wizard.
5. Click **Save** to commit the changes you have made or to save the details added so far.

A connection is created with the details you have provided.

1.1.6.1.3 Creating/Editing Targets

A target is an object that defines an interface with a downstream system. The list of target types is mostly the same as the list of stream types in terms of supported

technologies and messaging systems. Targets are also typed in terms of event shape definitions.

To create/edit a target:

1. Navigate to the **Catalog**.
2. Select **Create New Item > Connection**.

The **Create Connection — Type Properties** wizard opens.

Figure 1-11 Create Target — Type Properties

The screenshot shows a wizard window titled "Create Target" with a progress bar at the top. The progress bar has three steps: "Type Properties" (active, indicated by a blue dot), "Target Details", and "Shape". Below the progress bar are "Back" and "Next" buttons. The main form area contains the following fields:

- Name**: A text input field with a red asterisk indicating it is mandatory.
- Description**: A text input field.
- Tags**: A text input field with the placeholder text "Enter tag".
- Target Type**: A dropdown menu with a red asterisk indicating it is mandatory. The current selection is "Select a Target type".

At the bottom right of the form are "Cancel" and "Save" buttons.

3. Enter details in the following fields of the **Type Properties** screen:
 - a. Enter a **Name** for the map. This is a mandatory field.
 - b. Enter a **Description** for the map. This is an optional field.
 - c. Enter **Tags** for the map. You can enter any tag you like. The tags help you in filtering the maps in the **Catalog**.
 - d. Select a **Connection Type**. The available types are:
 - *HTTP Publisher*
 - *Kafka*
 - *JMS*
 - *Coherence cache*
 - *CSV File*
 - *REST*

- MQTT
 - EDN.
- e. Click Next.

The **Create Connection — Connection Details** screen opens.

Figure 1-12 Create Target — Target Details

- f. The fields available vary depend on the type of target selected.

Table 1-2 Types of Targets

Field Name	Description
HTTP Publisher	Select this type when you want to use a HTTP Publisher target.
<ul style="list-style-type: none"> • Connection 	Select a connection from the drop-down list which is of type HTTP Publisher.
<ul style="list-style-type: none"> • Channel 	Enter a suitable channel for the HTTP Publisher.
Kafka	Select this type when you want to use a Kafka target.
<ul style="list-style-type: none"> • Connection 	Select a connection from the drop-down list which is of type Kafka.
<ul style="list-style-type: none"> • Topic name 	Enter a suitable topic name for the Kafka target.
JMS	Select this type when you want to use a JMS target.
<ul style="list-style-type: none"> • Connection 	Select a connection from the drop-dwon list which is of type JMS.

Table 1-2 (Cont.) Types of Targets

Field Name	Description
• JNDI Name	Enter a suitable JNDI name for the JMS.
Coherence cache	Select this type when you want to use a Coherence cache target.
• Connection	Select a connection from the drop-down list which is of type coherence cache.
• Cache name	Enter a suitable name for the cache.
• Cache key	Enter a suitable key for the cache.
CSV File	Select this type when you want to use a CSV file as a target.
• File Name	Enter a file name and click Download to download the CSV file.
• Append	Select this check box if you want to append the CSV file to the target.
REST	Select this type when you want to use a REST target.
• Target URL	Enter a URL for the REST target.
MQTT	Select this type when you want to use a MQTT target.
• Connection	Select a connection from the drop-down list which is of type MQTT.
• Topic name	Enter a suitable name for the MQTT target. This topic name should have been defined in the MQTT connection.
• Quality of service	Enter a numerical value greater than zero. The values you can enter are: <ul style="list-style-type: none"> • 0 - at the most once • 1 - at least once • 2 - exactly once. Use the increment or decrement icons to increment or decrement the values.
EDN	Select this type when you want to use a EDN target.
• Connection	Select a connection from the drop-down list which is of type EDN.

- g. Click **Back** if you want to navigate to the previous screen in the wizard.
- h. Click **Save** to commit the changes you have made or to save the details added so far.
- i. Click **Next** to navigate to the next screen in the wizard.

The **Create Target — Shape** screen opens.

Figure 1-13 Create Target — Shape

4. Select **Select Existing Shape** to do the mapping using an exiting shape.
5. Select **Create New Shape** to create a new shape for the mapping When you create a new shape, you must provide a name for the shape, add fields to the shape and select the type of the field.
6. Click **Back** if you want to navigate to the previous screen in the wizard.
7. Click **Save** to commit the changes you have made or to save the details added so far.

A target is created with the details you have provided.

1.2 Components of Oracle Stream Analytics

The components of Oracle Stream Analytics are listed in the sections that follow.

1.2.1 Stream

A *stream* is a source of dynamic data. The data is flowing, it is not static or frozen. For example, stock prices of a particular company can be considered as a stream as the data comes in every second. Stream can be from EDN Server, JMS Server, REST Service, HTTP Pubsub Server, simulated from a CSV file (data dump), Kafka Adapter, Twitter Adapter, MQTT Adapter, Coherence Cache Adapter, or Event Generator.

1.2.2 Reference

A *reference* is a source of static data that provides contextual information about the event data. The metadata and contextual information of event data is stored in a reference. In this release, the only supported reference type is Oracle Database table.

1.2.3 Exploration

An *exploration* allows you to define business criteria for managing data (filters, summaries, group by, or correlations). The exploration is a visual representation of streaming data, expressions, and business rules. It lets you see how the business criteria apply and manage the data. You can add or attach a target to an exploration. But the target must be already created and configured.

1.2.4 Topology Viewer

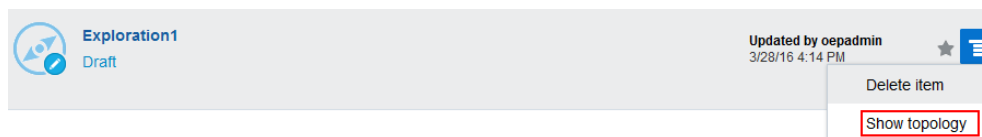
Topology is a graphical representation of the connected entities. The topology illustrates the dependencies and connections between the entities.

The *Topology Viewer* helps you in identifying the dependencies that a selected entity has on other entities. Understanding the dependencies helps you in being cautious while deleting or undeploying an entity. Oracle Stream Analytics supports 2 contexts for the topology — *Immediate Family* and *Extended Family*.

You can launch the Topology viewer in any of the following ways:

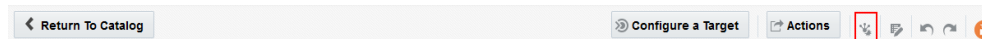
- Select **Show topology** from the **Catalog Actions** menu to launch the **Topology Viewer** for the selected entity

Figure 1-14 Show Topology Option in Catalog Actions Menu



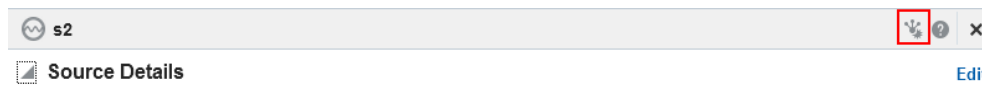
- Click **Show Topology** icon from the Exploration Editor

Figure 1-15 Show Topology Option in Exploration Editor



- Click **Show Topology** icon from the Source Details dialog (view the stream).

Figure 1-16 Show Topology Option in Source Details Dialog



Click the **Show Topology** icon at the top-right corner of the editor to open the topology viewer. Topology is the graphical representation of dependencies and connections between entities. By default, the topology of the entity from which you launch the Topology Viewer is displayed. The context of this topology is **Immediate Family**, which indicates that only the immediate dependencies and connections between the entity and other entities are shown. You can switch the context of the topology to display the full topology of the entity from which you have launched the Topology Viewer. The topology in an **Extended Family** context displays all the dependencies and connections in the topology in a hierarchical manner.

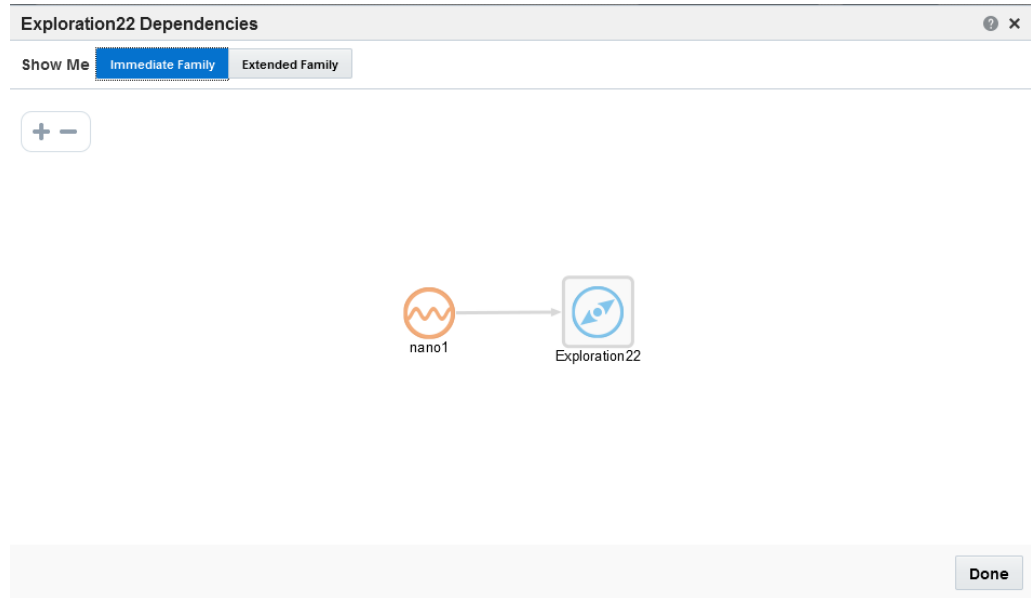
Note: The entity for which the topology is shown has a grey box surrounding it in the Topology Viewer.

Immediate Family

Immediate Family context displays the dependencies between the selected entity and its child or parent.

The following figure illustrates how a topology looks in the **Immediate Family**.

Figure 1-17 Topology Viewer in Immediate Family

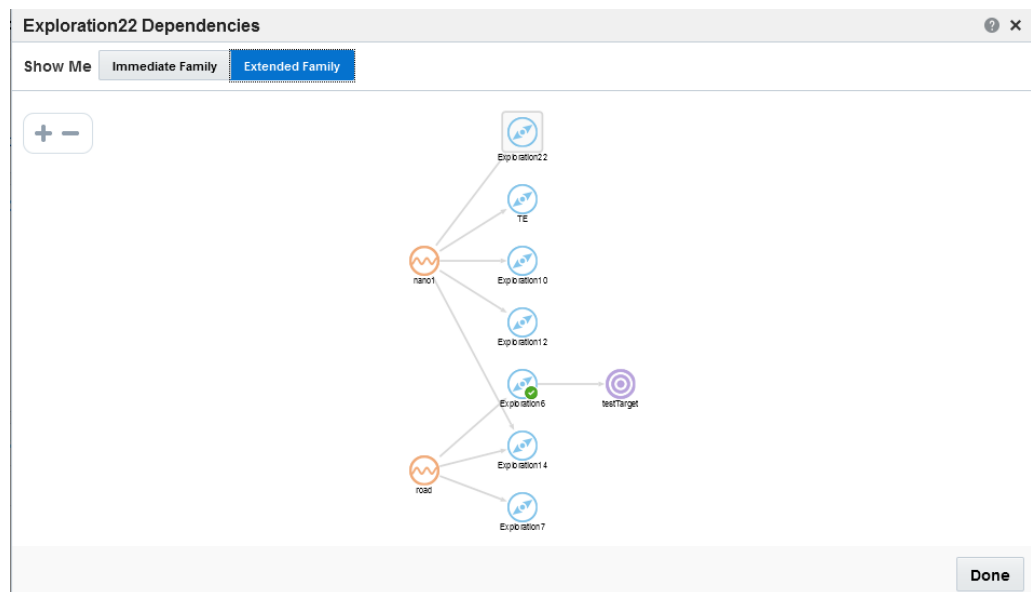


Extended Family

Extended Family context displays the dependencies between the entities in a full context, i.e., if an entity has a child entity and a parent entity, and the parent entity has other dependencies, all the dependencies are shown in the Full context.

The following figure illustrates how a topology looks in the **Extended Family**.

Figure 1-18 Topology Viewer in Extended Family



1.2.5 Pattern

A *pattern* provides you with a simple way to explore event streams based on common business scenarios.

1.2.6 Map

Map is a collection of geo-fences. A geo-fence is a geographical area, a polygon on a geographical map. In Oracle Stream Analytics, maps are used as underlying references for streaming data containing geographical coordinates, such as GPS data.

This technology has many uses in day-to-day life. For example:

- In a Mall you can set up a boundary to identify and track if the devices owned by the Mall move out of that area. Such a tracking can help the management in disabling the device or in reporting the device as lost.
- A store can offer discounts to its customers located in a specific geographic location and send discount coupons. The customers who bring the discount coupon to the store can avail the discounts.

1.2.7 Shape

A *shape* is a representation of data definition within a stream (that is, an event type).

Runtime Environment

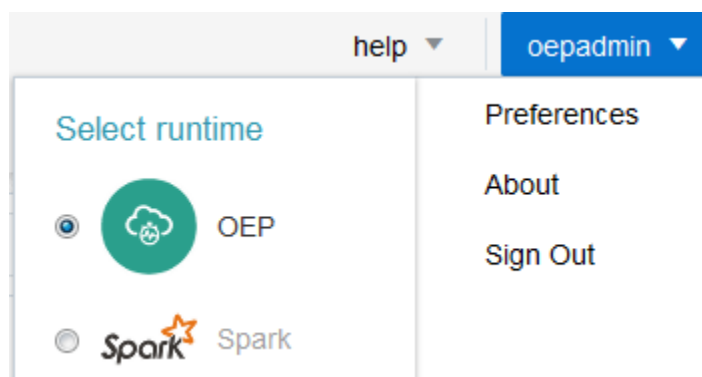
Oracle Stream Analytics provides an option to select the runtime environment on which you want to run the application.

The available runtimes are:

- *OEP* — this option provides all the event processing capabilities of Oracle Stream Analytics
- *Spark* — this option provides all the features related to Spark integration.

Click the arrow beside the *username* at the top-right corner of the screen and select a runtime from the options that appear.

Figure 2-1 Select Runtime



Warning: The Spark option may be disabled if the required configuration is not completed. Contact the system administrator.

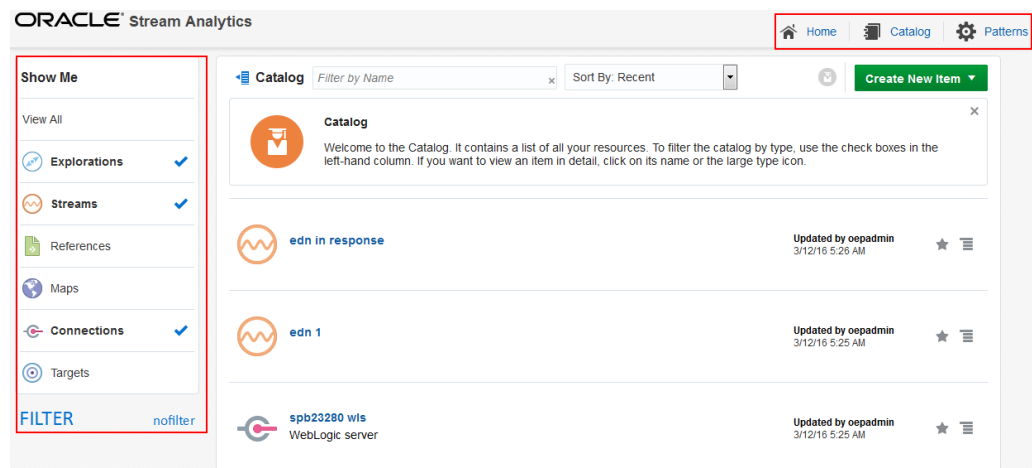
Features in OEP Runtime

The *OEP* runtime provides the following features:

- Explorations
- Streams
- References
- Maps
- Connections
- Targets
- Patterns

When you select the *OEP* runtime, the Catalog page appears as shown in the below screen.

Figure 2-2 Catalog with OEP Runtime



Features in Spark Runtime

The *Spark* runtime provides the following features:

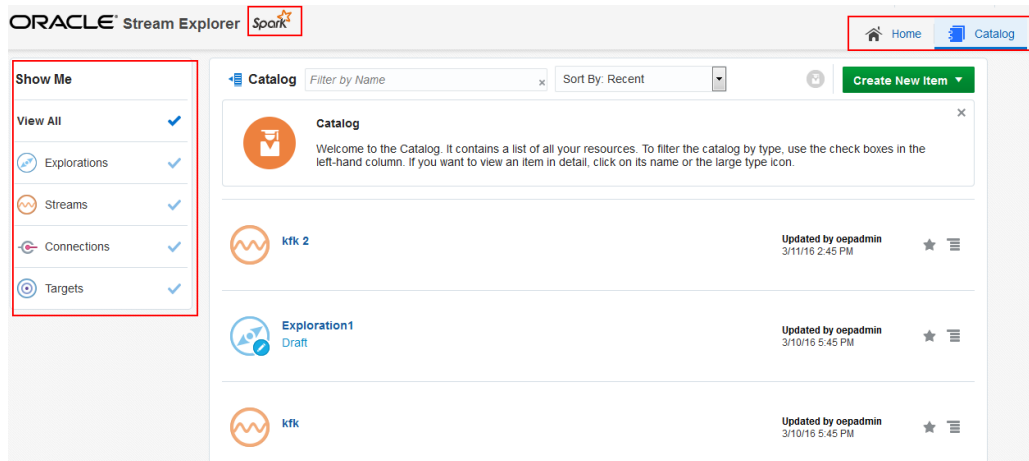
- Explorations
- Streams
- Connections
- Targets

In the *Spark* runtime environment:

- you cannot use more than one stream in an exploration
- you do not have business rules
- you cannot chain explorations. Instead, you can send events to a Kafka target and create a stream reading from that same kafka topic.
- you cannot create Patterns
- you cannot create maps
- you cannot create connections.

When you select the *Spark* runtime, the Catalog page appears as shown in the below screen.

Figure 2-3 Catalog with Spark Runtime





How to Set Oracle Stream Analytics Preferences

This chapter explains in detail about the Preferences that the user can set on the Oracle Stream Analytics. Based on the preferences the users set in this page, the characteristics of the Oracle Stream Analytics vary.

This chapter contains the following sections:

- [General Preferences](#)
- [View Mode Preferences](#)
- [Notifications Preferences](#)
- [Catalog Preferences](#)
- [Exploration - Live Output Stream Preferences.](#)

3.1 General Preferences

This section explains the general preferences that the user can set for Oracle Stream Analytics.

Figure 3-1 General Preferences

General

Language Settings

English (United States) ▼

Start Page

Home ▼

- Home
- Catalog
- Patterns

Start Page

Select if you want the **Home** page, the **Catalog** page, or the **Patterns** page to appear as the **Start Page**.

Note: **Patterns** appears as an option only if the runtime is **OEP**.

Click **Save** to apply the changes you have made or click **Restore To Default** to retain the default settings.

3.2 View Mode Preferences

This section explains the view mode preferences that the user can set for Oracle Stream Analytics.

Figure 3-2 *View Mode Preferences*

View Mode

View Mode

- Browser mode
- Presentation mode (projector)

Browser mode

Use this option to view the application in a browser mode, i.e., just like any other web application appears in a browser.

Presentation mode (projector)

Use this option to view the application in a presentation mode, i.e., as if the application is being viewed on a projector as a presentation. When you select the **Presentation mode**, a different color skin is applied to the application.

Click **Save** to apply the changes you have made or click **Restore To Default** to retain the default settings.

3.3 Notifications Preferences

This section explains the notifications preferences that the users can set for Oracle Stream Analytics.

Figure 3-3 Notifications Preferences

Notifications

Info Notifications

Show Information Notifications?

Yes

Information Notification duration (in seconds):

Show Information Notifications

Select this option if you want the information notifications to appear in the application. This option is selected by default.

Information Notification duration (in seconds)

Choose the number of seconds for which the notifications appear. 5 seconds is the default value.

Click **Save** to apply the changes you have made or click **Restore To Default** to retain the default settings.

3.4 Catalog Preferences

This section explains the catalog preferences that the user can set for Oracle Stream Analytics.

Figure 3-4 Catalog Preferences

Catalog**Default Sorting Column****Default Sorting Order****Default Page Size****Default Sorting Column**

Select the column by which you want the columns to be sorted. This value will be used as the default for all columns until you change the value again.

Default Sorting Order

Select the sorting order by which you want the columns to be sorted. This value will be used as the default value for all columns until you change the value again.

Default Page Size

Select the value to be used as the default page size. Based on the value selected, the number of records that appear on a page vary. This value will be used as the default for all pages until you change the value again.

Click **Save** to apply the changes you have made or click **Restore To Default** to retain the default settings.

3.5 Exploration Preferences

This section explains the Exploration preferences that the user can set for Oracle Stream Analytics.

Figure 3-5 Exploration User Assistance Preference

Exploration

User Assistance

Display User Assistance in the Exploration Editor?

Yes

Select **Yes** if you want to display the User Assistance text for the explorations in the Exploration Editor.

Click **Restore To Default** if you want to revert to the default option. Click **Save** to save the preference and **Cancel** to abort the operation at any point of time and navigate to **Home** page.

3.6 Exploration - Live Output Stream Preferences

This section explains the exploration preferences that the user can set for Oracle Stream Analytics.

Figure 3-6 Live Output Stream Preferences

Live Output Stream

Default Table Size

100 ▼

Default Table Size

Select a value that you want to be applied as the default table size for the data in Live Output Stream of an exploration.

Click **Save** to apply the changes you have made or click **Restore To Default** to retain the default settings.

Working with Streams

This chapter explains the details about streams, creating streams, and editing streams.

This chapter contains the following sections:

- [Understanding Streams](#)
- [Creating a Stream](#)
- [Editing a Stream](#)
- [Restoring a Stream](#)
- [Marking a Stream as Favorite](#)
- [Deleting a Stream.](#)

4.1 Understanding Streams

An event stream is an Oracle Stream Analytics Event Processing adapter node producing events of a single type.

In Oracle Stream Analytics object taxonomy, an event stream is an entity responsible for receiving events from the outside world. There are different stream types based on different communications technology or messaging system, such as, for example, REST or JMS or Kafka.

4.1.1 Metadata

Every stream has the following set of metadata:

- Name
- Tags
- Description
- Created By
- Created At
- Updated By
- Updated At
- Is Favorite.

4.2 Creating a Stream

A stream is required for the users to create an exploration. This section explains how to create a stream. The **Create Stream** screen is shown below.

Figure 4-1 Create Stream - Source Details Dialog

To create a stream:

1. Navigate to **Catalog**.
2. Select **Stream** in the **Create New Item** menu.
3. Enter a name for the stream in the **Name** field. This is a mandatory field.
4. Provide a description that helps users understand about the stream in the **Description** field. This is an optional field.
5. Enter a tag with which you want to tag the stream in the **Tag** field. You can provide multiple tags. This is an optional field. You can separate the multiple tags by *commas*, *Enter key*, or a *space*.

Note:

The tags you enter must represent the industry verticals supported by Oracle Stream Analytics. For more information about pre-existing tags, see [Home Page](#).

6. Select a stream type that you want to use for the stream from the **Source Type** field. This is a mandatory field.

Note:

If you select EDN as the source type, you can work only with an XML element that has a flat structure. The XML schema does not support any other schemas. The Stream wizard does not display all other types of EDN.

7. Select **Create Exploration with this source (Launch Exploration Editor)** if you want to launch the Exploration Editor utilizing this stream as the primary source.
8. Click **Next**. Based on the source type you have selected, you must enter data in the following fields on the **Type Properties** screen:

Figure 4-2 Create Stream - Type Properties Dialog

The screenshot shows a dialog box titled "Create Stream - Type Properties Dialog". At the top, there is a progress bar with three steps: "Source Details", "Type Properties" (which is currently selected and highlighted in blue), and "Shape". Below the progress bar, there are "Back" and "Next" buttons. The main content area is titled "Type: CSV File". Underneath, there is a "Source Path" field with a red asterisk indicating it is mandatory. To the right of this field is a blue "Upload file" button and the text "loop.csv". Below this is a text input field with the placeholder "Or provide the file URL here...". Further down, there are two input fields: "Event Interval (ms)" with the value "1000" and "Initial Delay (ms)" with the value "0". At the bottom, there is a checkbox labeled "Loop the CSV file" which is checked.

Table 4-1 Source Types for Streams

Source Type	Data Fields
CSV File	<p>If the source type is CSV File, you must enter data in the following fields:</p> <ul style="list-style-type: none"> • Source Path - either upload a local CSV file or provide a URL to the location where the file resides. This is a mandatory field. • Event Interval - the time interval at which the event refreshes. The time is in milliseconds. Default value is 1000 milliseconds, which is 1 second. • Initial Delay (ms) - the time interval before which the data streaming starts. The time is in milliseconds. Default value is 0. • Loop the CSV File - the option that allows you to keep the CSV source always running by automatically restarting it from the beginning of the file when the end of the file is reached.
HTTP Subscriber	<p>If the source type is HTTP Subscriber, you must enter data in the following fields:</p> <ul style="list-style-type: none"> • Connections - the connection of the type HTTP Subscriber. This is a mandatory field. • Password - password to access the HTTP Subscriber. This is a mandatory field.

Table 4-1 (Cont.) Source Types for Streams

Source Type	Data Fields
EDN	<p>If the source type is EDN, you must enter data in the following fields:</p> <ul style="list-style-type: none"> • Connections - a connection which is of type EDN. This is a mandatory field.
JMS	<p>If the source type is JMS, you must enter data in the following fields:</p> <ul style="list-style-type: none"> • Connections - URL to access the JMS. This is a mandatory field. • JNDI name - JNDI name (queue or topic) to access the JMS. This is a mandatory field.
REST	<p>If the source type is REST, you must enter data in the following fields:</p> <ul style="list-style-type: none"> • Context Path - the context path of the REST Adapter. This is a mandatory field.
Coherence cache	<p>If the source type is Coherence cache, you must enter data in the following fields:</p> <ul style="list-style-type: none"> • Connections - a connection which is of type coherence cache. This is mandatory field. • Cache name — the name of the cache.
Kafka	<p>If the source type is Kafka, you must enter data in the following fields:</p> <ul style="list-style-type: none"> • Connections - a connection which is of type Kafka. This is a mandatory field. • Topic name — a topic name to be used in the stream. This topic name should have been defined at the time of creating the connection. This is a mandatory field. • Group Id — a group id to be used for the stream. This id should have been defined at the time of creating the connection. This is an optional field.
MQTT	<p>If the source type is MQTT, you must enter data in the following fields:</p> <ul style="list-style-type: none"> • Connections - a connection which is of type MQTT. This is a mandatory field.

Table 4-1 (Cont.) Source Types for Streams

Source Type	Data Fields
Twitter	<p>If the source type is Twitter, you must enter data in the following fields:</p> <ul style="list-style-type: none"> • Connections - connections of type Twitter. This is a mandatory field. • Hashtags — the hashtags separated by commas that you want to include in your output stream. This is an optional field. • Languages — the languages separated by commas you want to include in your output stream. This is an optional field. • Users — list of Twitter user IDs separated by commas that you want to include in your output stream. This is an optional field. <p>At-least one of Hashtags or Users property needs to be specified.</p> <hr/> <p style="text-align: right;">Note: The logical operator OR is used when you specify both Hashtags and Users. For more information, see https://dev.twitter.com/streaming/reference/post/statuses/filter.</p> <hr/>
Event generator	<p>If the source type is Event generator, you must enter data in the following fields:</p> <ul style="list-style-type: none"> • Interval (ms) - the time interval between messages in milli seconds. This is an optional field. • Lowest number — the lowest generated numeric value. This is an optional field. • Highest number — the highest generated numeric value. This is an optional field. • Precision — the number of decimal places. This is an optional field. • Number of strings — the number of pre-generated strings. This is an optional field. • Lowest number of words — the lowest number of words in the generated string. This is an optional field. • Highest number of words — the highest number of words in the generated string. This is an optional field.

9. Click **Next**. The **Create Stream - Shape** screen appears.

Figure 4-3 Create Stream - Shape Dialog

10. Perform **Manual Mapping** or **Select a Shape** on the **Shape** screen.

When you perform manual mapping, you need to decide the best data type that is suitable for the value represented by each of the fields in the data source. The data types can be String, Byte, Integer, Big int, Float, Double, Big decimal, Boolean, Timestamp.

Note:

Providing a shape name is optional. If the shape is not specified, then this shape will not be available for reuse in the drop-down list.

If you **Select Shape**, the pre-existing configuration is used for your stream.

11. Click **Create** to create the stream. The new stream appears in the Catalog.

12. Click **Cancel** at any time to abort the operation.

4.3 Editing a Stream

After you create a stream, Oracle Stream Analytics provides you with an opportunity to edit the stream.

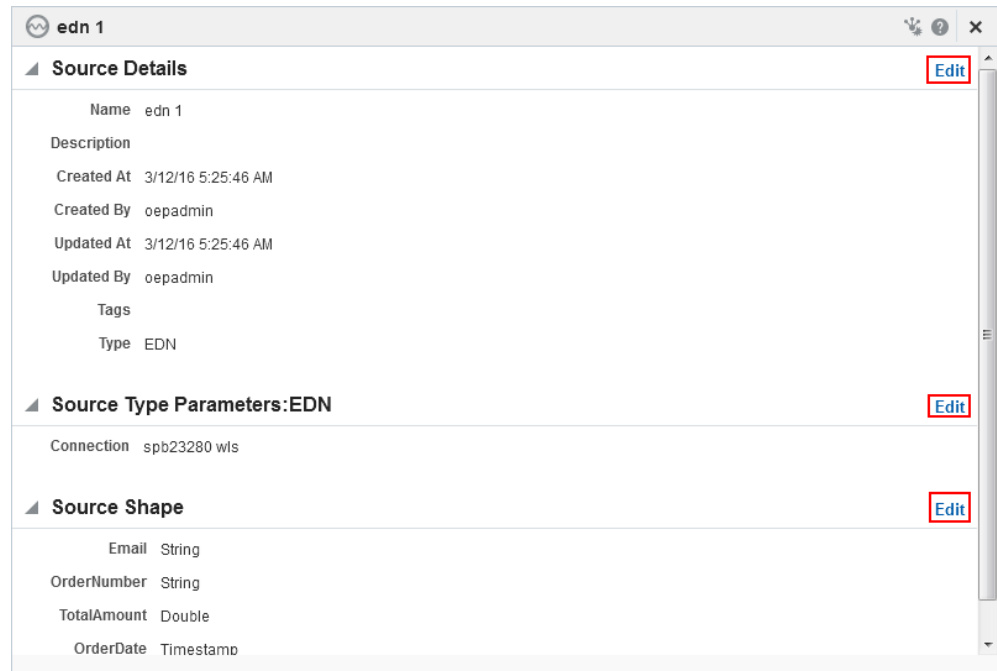
You cannot edit the stream when:

- there are published explorations using the stream
- you open the stream dialog from within the exploration.

To edit a stream:

1. Click the stream you want to edit from the **Catalog**.
2. Click **Edit** in the source dialog at the top.

Figure 4-4 Edit Source Dialog



Note: The behavior of **Edit** at each section level in the current release is to launch the **Edit Stream** wizard. This implies that the **Edit Stream - Source Details** screen is the default screen you see.

3. Update the data you want to edit in the stream dialog.

Attention: A data type of *Geometry* for the fields in the data source is not available when you are using Spark runtime.

Note: The logical operator OR is used when you specify both **Hashtags** and **Users** for a stream of type Twitter. For more information, see <https://dev.twitter.com/streaming/reference/post/statuses/filter>.

4. Select **Loop the CSV file** on the **Edit Stream - Type Properties** dialog. This feature allows you to keep the CSV source always running by automatically restarting it from the beginning of the file when the end of the file is reached.

Figure 4-5 Edit Stream — Loop the CSV File Feature

Note: This feature is available only for the CSV source and not for any other type of source or target.

5. Click **Save** when you are done with updating or editing the stream.
6. Click **Cancel** at any point of time to abort the operation.
7. Click **Done** in the stream dialog to complete the edit operation.

4.4 Restoring a Stream

A stream goes to an invalid state if the stream or the corresponding Event Processing application is undeployed in the Visualizer. Oracle Stream Analytics allows you to restore a stream that is in an invalid state.

To restore an exploration:

1. Identify the stream that is in invalid state in the **Catalog**. The stream in invalid state is indicated by a red cross icon.
2. Click the *Restore* icon to the right of the stream to fix the deployment problems and restore the stream.

Figure 4-6 Restore Icon

A notification appears about the result of restore operation.

4.5 Marking a Stream as Favorite

You can mark a stream as Favorite. Marking a stream as Favorite allows you to locate and navigate such streams easily even if you have numerous items on the catalog.

To mark a stream as favorite:

1. Identify the stream you want to mark as favorite in the **Catalog**.
2. Click the *Favorite* icon to the right of the table row for that stream to mark it as a favorite. This icon acts as a toggle button.

Figure 4-7 Favorite Icon



3. Click the *Favorite* button again to remove the stream from favorites.

4.6 Deleting a Stream

You can delete a stream if you are sure you do not require the stream anymore. If a stream has dependencies, it cannot be deleted. A stream is said to have dependencies if it is part of a published exploration being used by any user.

To delete a stream with dependencies, you must delete the dependencies first.

To delete a stream:

1. Identify the stream you want to delete in the **Catalog**.
2. Click **Delete Item** option from the **Actions** menu to the right of the stream to delete it.

A confirmation dialog appears. If you select **Delete**, the stream will be deleted. Click **Cancel** if you do not want to delete the stream for any reason.

Working with Explorations

This chapter explains about explorations in Oracle Stream Analytics.

This chapter contains the following sections:

- [Understanding Explorations](#)
- [Creating an Exploration](#)
- [Editing an Exploration](#)
- [Configuring a Target](#)
- [Understanding a Draft Exploration](#)
- [Publishing an Exploration](#)
- [Unpublishing an Exploration](#)
- [Exporting an Exploration](#)
- [Reusing an Exploration](#)
- [Marking an Exploration as Favorite](#)
- [Deleting an Exploration](#)
- [Restoring an Exploration.](#)

5.1 Understanding Explorations

Explorations are Oracle Stream Analytics Event Processing applications that allow you to apply business logic to the event flows. Explorations are the visual representation of the data streamed from a source. The data in the exploration is represented visually in the form of:

- **Live Output Stream** - Live Output Stream shows the streaming data shapes in a tabular form.

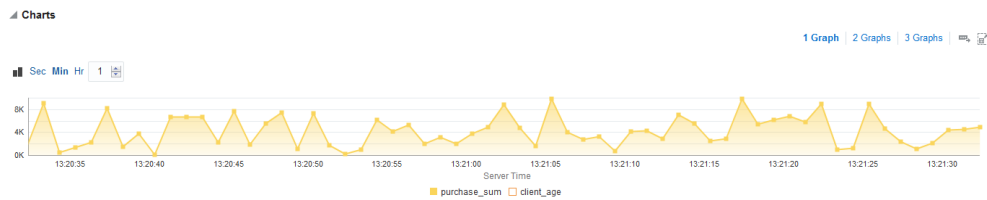
Figure 5-1 Sample Live Output Stream

Live Output Stream Restore Columns

purchase_sum	transaction_time	client_name	card_number	client_age
9809.4	3/12/15 9:20:11 PM	Carter LEE	8366639861242700	28
7269.5	3/12/15 9:20:11 PM	Muhammad MILLER	5058279836300531	30
1995.26	3/12/15 9:20:11 PM	Nathan BROOKS	5068425255184998	42
15072.86	3/12/15 9:20:11 PM	Noah STEWART	0641836651885146	38
8975.77	3/12/15 9:20:11 PM	Blake JENKINS	6040893939207415	26
11346.880000000003	3/12/15 9:20:11 PM	Austin MURPHY	8346842403385470	55
5605.78	3/12/15 9:20:11 PM	Colton HUGHES	6882047452911894	20
12981.32	3/12/15 9:20:10 PM	Cooper HARRIS	6170324806414089	65
15726.720000000001	3/12/15 9:20:10 PM	Anthony FLORES	5437521673520123	23
1211.44	3/12/15 9:20:10 PM	Nathan RUSSELL	2255474228589608	48
17211.54	3/12/15 9:20:10 PM	Christian ALLEN	6230411388518454	29

- **Line Charts** - Line charts are the primary way of visualizing time-series data. The X-axis is used to represent the time movement and allows natural scrolling of the data as time moves forward. The Y-axis is used to see the change of the dependent variable, that is, variable of interest, as time moves.

Figure 5-2 Sample Line Chart



- **Scatter Charts** - When the time dimension is not important, then data may be better understood by looking at a scatter plot. In this case, the user can assign distinct event properties to both the X-axis and Y-axis. However, values on both axes need to be numeric variables. Remember that the X-axis represents the explanatory variable and the Y-axis the response variable. Hence, the properties that indicate response or calculated field are better candidates to automatically assign to the Y-axis.

In the case of time-series, it is obvious that new values enter in the right side of the graph and old values exit in the left side. However, this behavior does not translate to scatter plots, as the new point may show up anywhere.

Figure 5-3 Sample Scatter Chart



Explorations allow you to:

- Use one or more streams and references as sources of events and data
- Correlate multiple event and data sources
- Filter events and data
- Group events and data
- Specify the time/event -based windows for aggregation functions
- Specify aggregation functions to be used in summaries

- Review incoming events (before you apply the logic) and resulting events (after you apply the logic) in tabular and graph forms
- Add targets
- Define or apply functions to the data in the live output stream
- Define Oracle Business Rules to the live data in the output stream

5.1.1 Metadata

Every exploration has the following set of metadata:

- Name
- Tags
- Description
- Created By
- Created At
- Updated By
- Updated At
- Is Favorite.

Tags, Description, and being Favorite are specified explicitly in the Exploration Editor. Creation and update information is persisted automatically.

Figure 5-4 Exploration Metadata



5.1.2 Correlations

When an exploration has more than one data source associated with it, a logical relation must be established between the data sources. This logical relation is known as correlation.

Oracle Stream Analytics allows the data sources to be joined using correlation rules. When all the sources are correlated, they provide a single event stream that can be further sent to a Target. Only fields of compatible types from different non-correlated sources may be used as operands in the correlation.

If your streams and references are not correlated, the exploration is in an invalid state and will remain so until you correlate the sources. The exploration will not be updated on the server until you correlate.

5.1.3 Filters

The conditions with which the output can be filtered are known as *Filters*. When you apply filters to the output, only the events that match ALL or ANY of the filters are displayed. You can filter events by comparing a left operand with a right operand using the following operators:

- equal to
- not equal to
- lower than
- lower than or equal to
- greater than
- greater than or equal to
- contains
- not contains
- is null
- not null.

Left operand can be any one of the following:

- a field of any source in the exploration
- a summary that is defined in the *Summaries* area.

Right operand can be any one of the following:

- a constant of a type that is compatible with the type of left operand
- a field or a summary of a field from a source of the left operand.

Add a Condition

To add a condition:

1. Click the Filter Field and select any field from the data source.
2. Click the Filter Operator and select the appropriate operator.
3. Enter a suitable value in the input field.
4. Select an appropriate datatype if the populated datatype is not correct.
A condition id added to the business rule.
5. Select match All or Match Any based on you requirement to filter.

Add a Group

Groups can be added to add nested queries. The events that match "AND" and "OR" conditions can be displayed:

To add a group:

1. Click the Filter Field and select any field from the data source.
2. Click the Filter Operator and select the appropriate operator.
3. Enter a suitable value in the input field.
4. Select an appropriate datatype if the populated datatype is not correct.
A group id added to the business rule applying the logical operator OR to added the condition..

5. Select match All or Match Any based on you requirement to filter.

5.1.4 Summaries

You can aggregate functions (*Summaries*) to fields and apply grouping by any combination of fields. The only exception is that a field cannot have both summary and be included in a Group. When you define summaries and/or grouping, all other non-aggregate and non-grouping fields will be automatically excluded from the results shape.

When you define a summary or grouping, the only fields allowed in the output are fields from *Summaries* and *Group By* area. When you define a summary, it is automatically shown in the results table and filters area is provided with an option to filter by this newly created Summary. When you remove or change the summary, if it is used in the filters and/or in output, you must confirm this action as it will affect the filter and/or output.

5.1.5 Business Rules

Business rules build conditional logic into the applications.

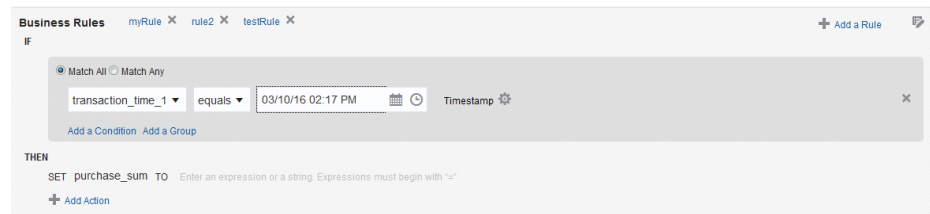
You can add business rules to an exploration. However, adding business rules is optional.

Remember: Business Rules are not available when you select *Spark* as the runtime environment.

To add a business rule:

1. Navigate to the **Exploration Editor**.
2. Click **Add a Rule** to add a business rule to the exploration.
 - a. Enter a suitable **Rule Name**. This is a mandatory field.
 - b. Enter a suitable **Description** for the business rule. This is an optional field.
 - c. Click **Done**.

Figure 5-5 Business Rules



3. Click **IF** block and select **Match All** or **Match Any**.
 - *Match All* — matches all the conditions in the business rule.
 - *Match Any* — matches any condition in the business rule.
4. Select a field from the **Filter Field** and select a suitable operator. The possible operators are:

- *equals*
 - *not equals*
 - *lower than*
 - *lower than or equals*
 - *greater than*
 - *greater than or equals*
 - *is null*
 - *is not null.*
- Enter a numerical value for a numerical filter. You can use the increment or decrement icons to increase or decrease the values. The datatype is automatically determined as `Double` or `Integer` based on the type of the filter field you select.
 - Enter a string for a text based filter. The datatype is automatically determined as `String`.
 - Select a date and time using the calendar and clock widgets for a timestamp based filter. The datatype is automatically determined as `Timestamp`.
5. Click **Add Action** in the **THEN** block. This action further refines the data of the exploration based on the details you have added in the **IF** block.

You can also use expressions in this field when required.

A business rule is created with the data you have provided and is applied to the exploration.

Click the **Edit Rule** icon to edit/modify an existing business rule.

5.1.6 Expression Builder

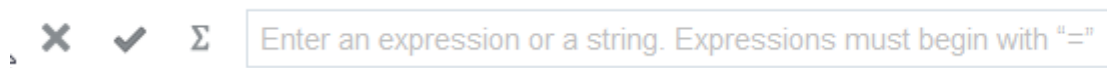
You can define expressions using the pre-defined functions and operators available in the application using the Expression Builder.

To create expressions:

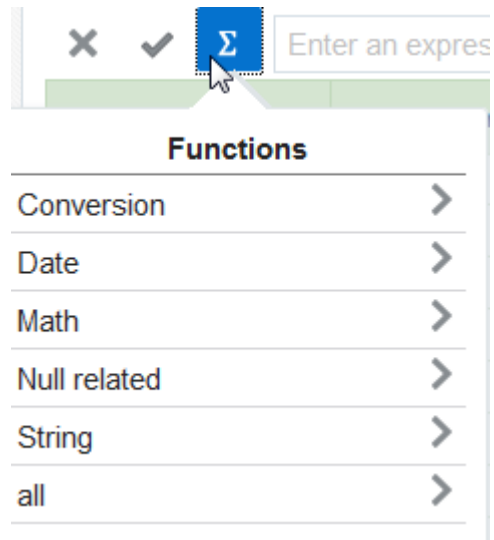
1. Click the **Expression Builder** icon. 

The Expression Builder Toolbar opens.

Figure 5-6 Expression Builder Toolbar



2. Click **List of CQL Functions** icon to see a list of functions that you can use in the expressions.





3. Select the required type of functions.

The selected function appears in the function input box.

Figure 5-7 Function Input Box



Start typing in the input parameters for the function within the braces.

4. Click the **Apply** icon to apply the expression. 
5. Click the **Cancel** icon to abort the operation and quit out of the Expression Builder. 

The applied expressions take affect on the live output stream immediately and you can see the changes you have made.

5.2 Creating an Exploration

This section explains how to create an exploration.

To create an exploration:

1. Navigate to **Catalog**.
2. Select **Exploration** in the **Create New Item** menu.
3. Enter information in the **Create Exploration** dialog. The **Create Exploration** screen is as shown below.

Figure 5-8 Create Exploration Dialog

- a. Enter a name for the exploration in the **Name** field. This is a mandatory field.
- b. Provide a description that helps users understand about this exploration in the **Description** field. This is an optional field.
- c. Enter a tag with which you want to tag the exploration in the **Tags** field. You can provide multiple tags. This is an optional field.
- d. Select a stream as the source for the exploration in the **Source** field. This can be another exploration that is in published state. This is a mandatory field. You can select multiple streams.

Note:

You cannot create an exploration based only on a reference as the source. You must start with a stream and then add reference(s) as source later.

Attention: When you are using *Spark* as the runtime, you cannot select multiple streams for the exploration. Only a single stream is supported.

4. Click **Create** to complete the creation of an exploration. The new exploration opens in the Exploration Editor. The newly created exploration also appears in the Catalog.

You can continue to add further to the newly created exploration in this editor:

- **Correlation** — You must add correlations between sources if the exploration uses more than one source.
- **Summaries** — You can add summary of the exploration data and then group the data accordingly. This is optional. See [Summaries](#).
- **Filters** — You can add filters to further filter the data based on the summaries you have added to the exploration. This is optional. See [Filters](#).

- **Business Rules** — You can add business rules to the data of your exploration. Business rules build conditional logic into the applications. This is optional.
 - **Expressions** — You can add expressions to the streaming exploration data. The expressions help you in populating new data fields in the stream by performing calculations on the existing data. Adding expressions is optional
5. You can perform the actions on the columns in the Live Output Stream.
- **Hide** — hide any selected column
 - **Remove** — remove any selected column
 - **Rename** — rename any selected column
 - **Function** — add an expression to any selected columns
 - **Restore** — restore any removed columns. This option appears only when you have removed any column.

Figure 5-9 Actions You Can perform on the Individual Columns in the Live Output Stream

client_name	
Lincoln JAMES	
Adam SANDERS	
Josiah RIVERA	
Eli CLARK	

6. Click **Cancel** at any point of time to abort the operation.

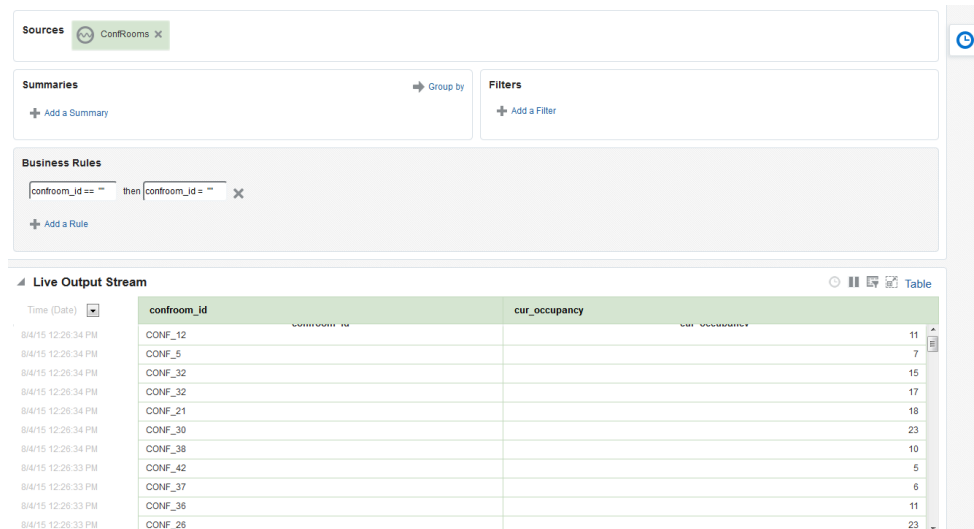
5.3 Editing an Exploration

When you create an exploration, the exploration opens up in the Exploration Editor. You have the option to edit the parameters of the exploration. You can edit or update existing explorations. You can add or modify the data sources for the exploration.

To edit an exploration:

1. Navigate to the **Catalog**.
2. Identify the exploration that you want to edit or update. Click the name string of the exploration or the exploration icon to open it for editing. The Exploration Editor is as shown below.

Figure 5-10 Exploration Editor



3. Click anywhere in the **Sources** field to add or remove data sources. If you have more than one data source, the sources must be correlated.

Important: You cannot have more than one stream when you are using the *Spark* runtime.

Remember: If you see an error similar to `-ERROR: ../sxservices/webresources/v0.1/exploration/41 Empty exploration`, check that you have at least one source in the exploration. When you remove all the data sources from the exploration, you see this kind of error message.

4. Define the **Correlations** if the exploration has more than one data source.

Note: Your changes to the exploration are not applied until the sources are correlated. An error message is generated when you try to save the changes without correlating the sources.

5. Click **Add Summary** in the **Summaries** area to add a summary to the exploration.

Note: You cannot use calculated fields in Group By feature.

6. Click **Add a Filter** in the **Filters** area to add filters to the output. The filters further filter the streaming data based on the summaries you have added.

7. Click **Add Rule** in the **Business Rules** area to add business rules to the exploration. Business rules build conditional logic into your applications.

8. Click **Timestamp** to display the timestamp in the **Live Output Stream**. The timestamp at which the streaming data was captured appears against each row of live output stream. This is a toggle button and you can use it to switch ON or OFF the timestamp in the live data.

9. You can pause the live data that is streaming using the **Pause** icon and resume the stream using the **Resume** icon.
10. Click **Restore Columns** to restore any of the columns that you have hidden earlier.
11. Click **Detach** to detach the Live Output Stream into a separate window. You can attach it later again.
12. You can click the header of any column and rename the columns. And also you can click and drag any of the columns in the live output stream to reorder the columns. You can resize the columns using the mouse. You can also hide or unhide the columns.
13. You can add expressions or functions to the live output stream to calculate certain data based on the data that is streaming. Use the **Expression Editor** to add a function or expression. Click the expression editor and enter = followed by the required function in the **Enter your expression** field. Click the **Done** icon to finish adding the expressions and save the added expressions or functions. Click **Cancel** icon to abort the operation at any time.
14. Configure the number of graphs you want to be displayed for the output stream in the **Charts** area.
15. Click **Window Drawer** icon, available to the right of the screen, to specify time and event based windows used in processing your stream.
 - a. Select a value in the **Range** drop-down list and specify a numerical value. This value specifies the range of time period for the stream of data. The range is defined in units like now, nanoseconds, microseconds, milliseconds, seconds, minutes, hours, or events.

Now indicates that the range is as narrow as 1 nanosecond and unbounded indicates a range since the server has started. When the range is anything other than Now, another field, **Evaluation frequency** appears.
 - b. Select a value in the **Evaluation frequency** drop-down list and specify a numerical value. This value defines how often the system produces the result events.

Note:

Evaluation frequency cannot be greater than **Range**.

16. Click the **Show Topology** icon to view the topology. For more information, see [Topology Viewer](#).
17. Click the pencil icon at the top-right corner to view the information of the exploration.
 - a. Click **Edit Info** to update Name, Description, or Tags of the exploration.

Figure 5-11 Update Information of Exploration

- b. Click **Done** after updating the information.
18. Click **Undo Changes** icon at the top-right corner to undo the changes you have made. Click **Redo Changes** icon at the top-right corner to re-apply the changes you have made. The Undo/Redo is applicable only on the following changes:
- add/edit/delete summary
 - group by
 - add/edit/delete filter
 - specifying range
 - renaming the property in Live Output Stream
 - changes/updates in the Expression Editor.

Note:

Undo operation is not available for publish action. To undo a publish, you must un-publish the exploration.

Figure 5-12 Undo Changes Icon



Figure 5-13 Redo Changes Icon



Note:

Clicking Undo once, reverses only the last made change.

Note:

Clicking Redo once, re-applies only the last made change.

19. Click the **User Assistant** icon at the top-right corner to view explanation about the Exploration Editor. This icon acts as a toggle button.

Figure 5-14 User Assistant Icon

20. Click **Configure a Target** to configure a target for the exploration. See [Configuring a Target](#).

Note:

Only the fields that appear in the live output stream can be sent to the target.

Note:

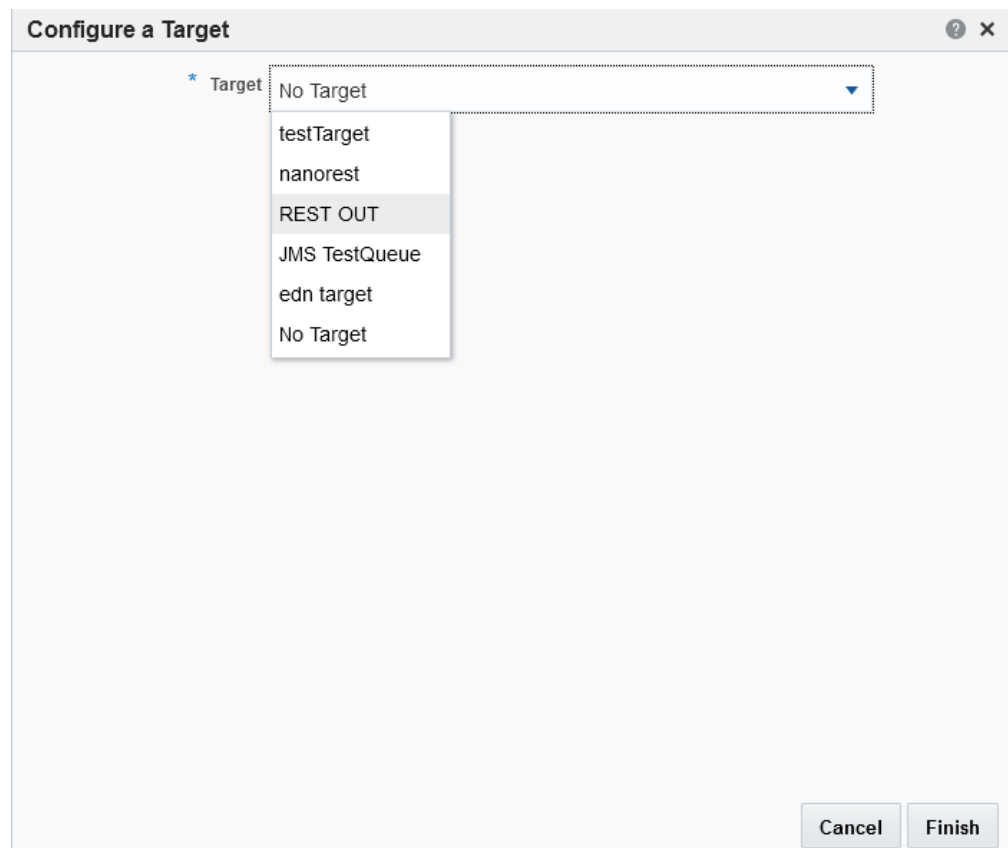
When you edit an exploration, you must publish it again for the changes to be implemented.

5.4 Configuring a Target

Every exploration must be configured with a target to send the details downstream. Unless the exploration is published, you cannot send the events downstream to the configured target.

To configure a target:

1. Click **Configure a Target** in the Exploration Editor. The **Configure a Target** dialog appears.

Figure 5-15 Configure a Target Dialog

2. Select the **Target** in the **Configure a Target** dialog.
3. Click **Cancel** at any point of time to abort the operation.
4. Click **Finish** in the **Configure a Target** screen to configure the exploration.

5.5 Understanding a Draft Exploration

When you create an exploration, it is in draft state by default. The draft exploration is not available to other users of the application. An exploration moves to a published state when it is published.

When a published exploration is deleted or unpublished, the exploration moves to a draft state.

A draft exploration has the following distinctive features:

- it gets undeployed from the runtime once the Exploration Editor is closed
- it is not sending events into the target even if there is a target. You have to publish the exploration before events appear in the target.

5.6 Publishing an Exploration

You must publish an exploration to make the exploration available for all the users of Oracle Stream Analytics. A published exploration:

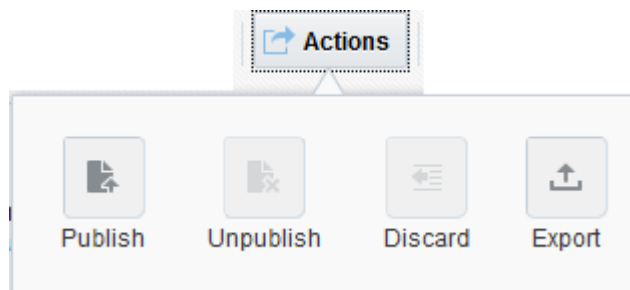
- can be used as a source for another exploration

- will be visible to other users of the application
- is in running state until another user unpublishes or deletes the exploration
- can have targets applied.

To publish an exploration:

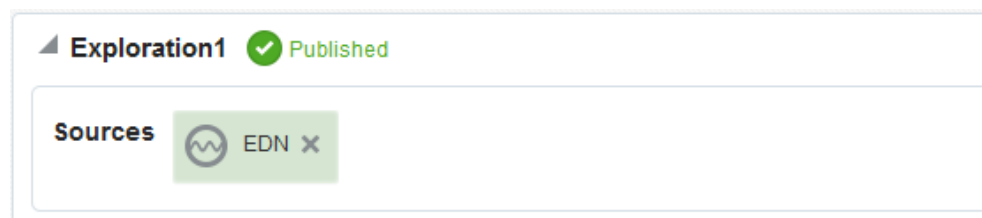
1. Navigate to the Catalog.
2. Identify the exploration you want to publish and click its name or icon.
3. Select **Publish** from the **Actions** menu.

Figure 5-16 Actions Menu



The exploration gets published and you can see a confirmation message. When the exploration is published, it is indicated in the Catalog as shown in the figure below.

Figure 5-17 Published Exploration



You can publish/re-publish an exploration when no consumers are using it, in the following scenarios:

- Re-publish a published exploration with no changes
- Publish a published exploration after modifying its details (a published exploration moves to Draft status when it is modified). After publishing, the draft status changes to published status.
- Re-publish an exploration that has a target configured.

When more than one user tries to publish the exploration after modifications, a conflict arises. The following conflict resolution actions help you in resolving the conflict:

- a. Click **Overwrite** to overwrite the published version with the changes you have made.
- b. Click **Discard** to discard your changes and go to the latest published version of the exploration.

- c. Click **Clone** to publish the exploration under a different name, retaining changes from multiple users.

Note: If there are any users using a published exploration, you cannot re-publish that exploration until you clear the dependencies.

5.7 Unpublishing an Exploration

You can unpublish an exploration that has already been published.

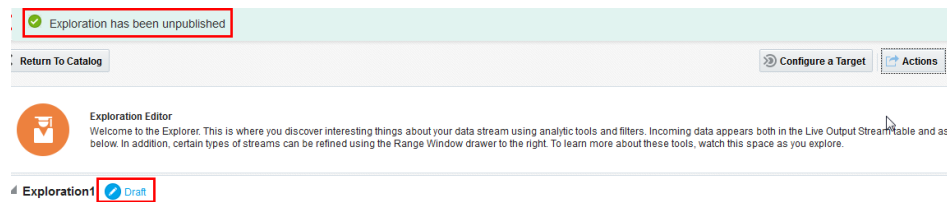
Note: If there are users using a published exploration, you cannot un-publish that exploration until you clear all the dependencies.

To unpublish an exploration:

1. Navigate to the Catalog.
2. Identify the published exploration you want to configure and click it.
3. Select **Unpublish** from the **Actions** menu.

The exploration gets unpublished and you can see a confirmation message. When the exploration is unpublished, the Published status changes to Draft in the Catalog.

Figure 5-18 Unpublished Exploration



Note:

You cannot un-publish a published exploration when it is being used by any user.

5.8 Exporting an Exploration

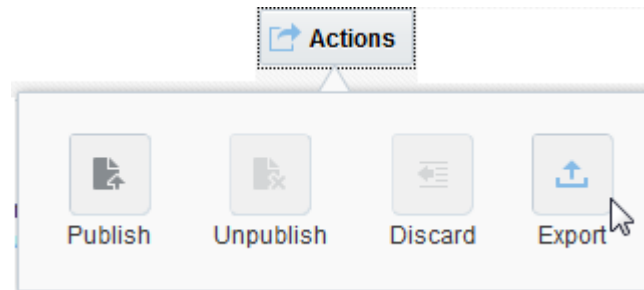
Oracle Stream Analytics allows you to export an exploration as a JAR file and download it for reuse. If you try to export an exploration that is not published, you get an error message.

You can import the exported exploration into JDeveloper and develop the application. However, you cannot import an application or exploration into Oracle Stream Analytics.

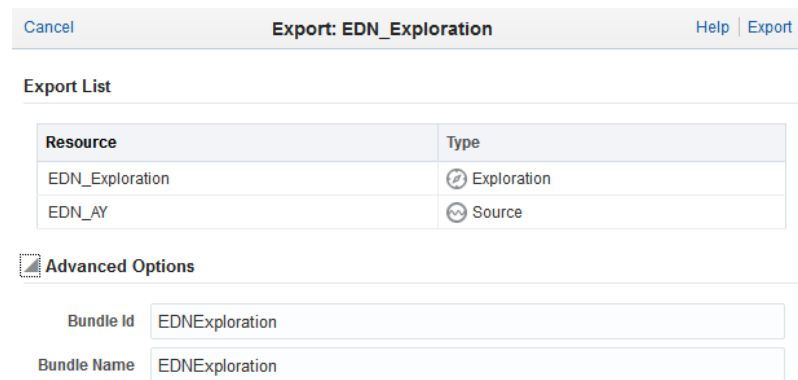
Remember: You cannot export an exploration when you are using *Spark* as the runtime environment.

To export an exploration:

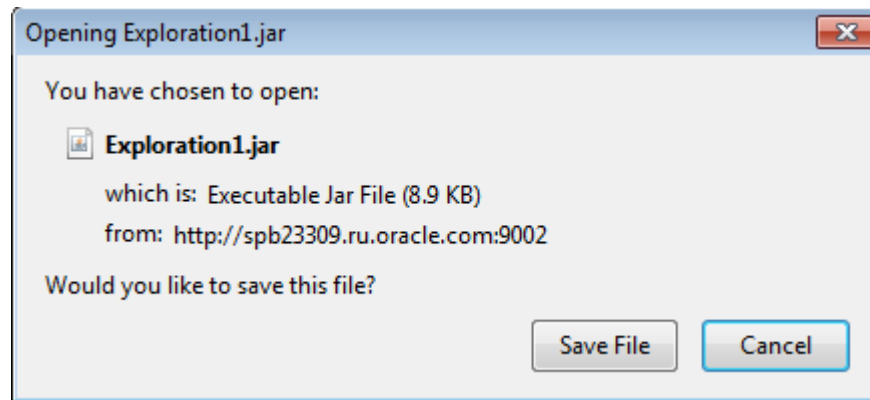
1. Navigate to the Catalog.
2. Identify the published exploration you want to export and click it.
3. Select **Export** from the **Actions** menu.

Figure 5-19 Export Exploration

The Export Exploration dialog is as shown below:

Figure 5-20 Export Exploration Dialog

4. Review the details of the exploration under **Export List**. **Resource** is the name of the exploration and its dependencies to be exported. **Type** is the type of the resource (exploration/source).
5. Edit/update the exploration bundle details under **Advanced Options** if required.
 - a. Enter a value in the **Bundle ID** field. This is an OSGI `Bundle-SymbolicName` parameter which is unique OSGI Bundle and will be the name of the exported JAR file.
 - b. Enter a value in the **Bundle Name** field. This is the name with which the exploration will be exported.
6. Click **Export** to complete exporting the exploration. The exploration is saved as a jar file. You can save the JAR file to any location.

Figure 5-21 Save Exported Exploration

7. Click **Cancel** at any point of time to abort the operation.

If an exploration uses any target or sources with specified user credentials (EDN, JMS, HTTP pubsub), then the exported exploration contains the credentials with encrypted passwords. Passwords are encrypted with the server encryption key. Usually, different servers use different encryption keys. As a result, you must update the encrypted passwords or convert them to plain text passwords before deploying the exploration to a server. If you do not do this, an encryption error appears.

5.9 Reusing an Exploration

You can re-use an existing exploration as a source for another exploration.

Remember: You cannot export an exploration when you are using *Spark* as the runtime environment.

5.10 Marking an Exploration as Favorite

You can mark an exploration as Favorite. Marking an exploration as Favorite allows you to locate and navigate such explorations easily even if you have numerous items on the catalog.

To mark an exploration as favorite:

1. Identify the exploration you want to mark as favorite in the **Catalog**.
2. Click the *Favorite* icon to the right of the exploration to mark it as a favorite. This icon acts as a toggle button.

Figure 5-22 Favorite Icon

3. Click the *Favorite* icon to remove the exploration from favorites.

5.11 Deleting an Exploration

You can delete an exploration if you are sure you do not require the exploration anymore. When you delete a published exploration, it moves into a draft state. When an exploration is available in both draft and published state, the delete operation first

deletes the draft exploration. When you invoke delete operation for the second time on the same exploration, the exploration gets deleted.

To delete an exploration:

1. Identify the exploration you want to delete in the **Catalog**.
2. Click the *Delete* icon to the right of the exploration to delete it.

Figure 5-23 Delete Icon



A confirmation dialog appears. If you select **OK**, the exploration will be deleted.

5.12 Restoring an Exploration

An exploration goes to an invalid state in any of the following scenarios:

- if the deployment was removed from the Visualizer
- the EDN source could not start because of a network issue
- a CSV source could not start because of the file absence
- the corresponding Event Processing application was undeployed or paused on the Event Processing Server

The above stated scenarios are a few amongst the reasons why an exploration can go into an invalid state.

Invalid state indicates that there is no deployment for the object, either a source or a published exploration.

You can restore an exploration. The restore operation tries to deploy an object in invalid state with the information available in Oracle Stream Analytics. For example, there is an exploration E1 that uses the source S1, and both of them are in invalid state. When you invoke a restore operation on the exploration, the Oracle Stream Analytics tries to deploy both the stream and exploration in sequence.

To restore an exploration:

1. Identify the exploration that is in invalid state in the **Catalog**. The exploration in invalid state is indicated by a red cross icon.

Figure 5-24 Exploration in Invalid State



2. Click the *Restore* icon to the right of the exploration to fix the deployment problems and restore the exploration.

Figure 5-25 Restore Icon



A notification appears about the result of restore operation.

Working with References

This chapter explains about references in Oracle Stream Analytics.

This chapter contains the following sections:

- [Understanding References](#)
- [Creating a Reference](#)
- [Editing a Reference](#)
- [Marking a Reference as Favorite](#)
- [Deleting a Reference](#)

6.1 Understanding References

Oracle Stream Analytics allows you to create references to static data to enrich the event streams.

6.2 Creating a Reference

Steps required to create a reference are listed in this section.

To create a reference:

1. Navigate to Catalog.
2. Select **Reference** in the **Create New Item** menu.
3. Enter information in the **Create Reference** dialog. The **Create Reference - Source Details** screen is as shown below.

Figure 6-1 Create Reference - Source Details Dialog

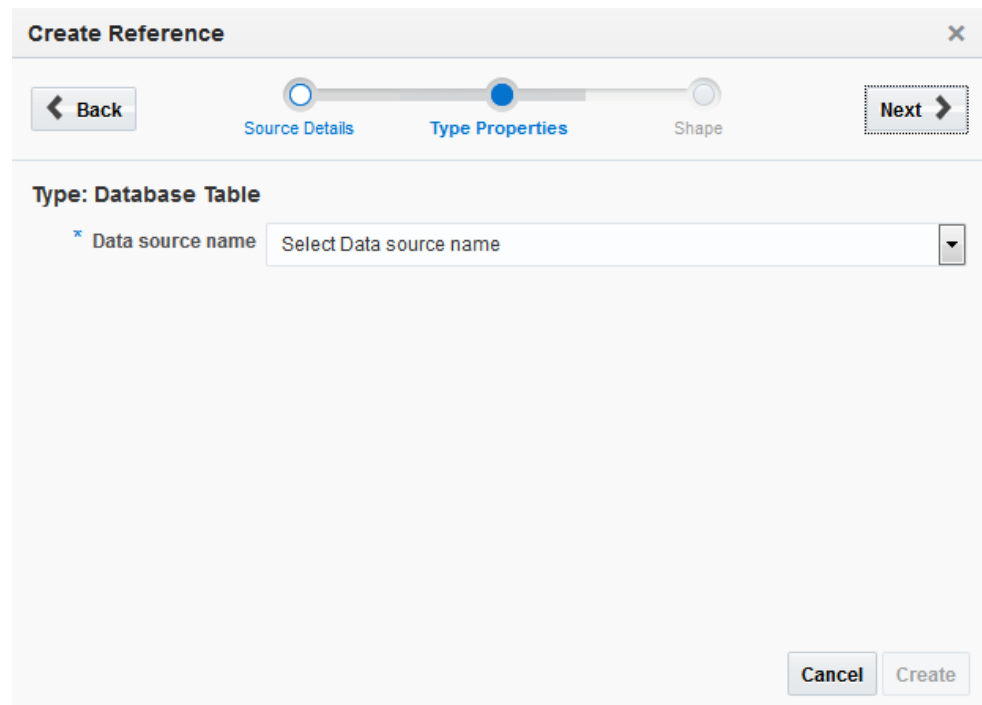
The screenshot shows a dialog box titled "Create Reference" with a close button (X) in the top right corner. Below the title bar is a progress indicator with three steps: "Source Details" (selected with a blue circle), "Type Properties", and "Shape". Navigation buttons include "Back" (left arrow), "Next" (right arrow, highlighted with a dashed border), and "Cancel" and "Create" buttons at the bottom right. The main content area contains four fields: a mandatory "Name" field (marked with an asterisk), a "Description" field, a "Tags" field with the placeholder "Enter tag", and a mandatory "Source Type" dropdown menu (marked with an asterisk) showing "Choose a Source Type...".

- a. Enter a name for the reference in the **Name** field. This is a mandatory field.
- b. Provide a description that helps users understand about this reference in the **Description** field. This is an optional field.
- c. Enter a tag with which you want to tag the reference in the **Tags** field. You can provide multiple tags. This is an optional field.
- d. Select a source type from the **Source Type** drop down list. The source must be defined in Oracle Stream Analytics Visualizer. This is a mandatory field.

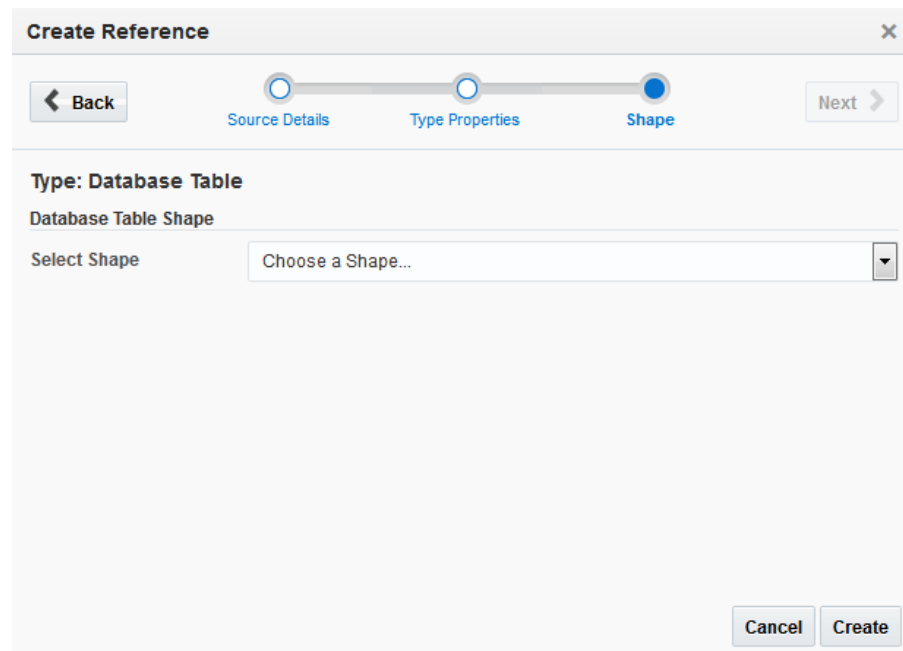
Note:

In this release, only Database Table (Oracle Database) is supported. The driver `oracle.jdbc.driver.OracleDriver` is deprecated and not supported. Use `oracle.jdbc.OracleDriver` instead in the `config.xml` file.

4. Click **Next** to go to the **Type Properties** screen. The **Create Reference - Type Properties** screen is as shown below.

Figure 6-2 Create Reference - Type Properties Dialog

- a. Select a **Data source name**.
 - b. Click **Back** at any point if you want to change any of the details.
5. Click **Next** to go to the **Shape** screen. The **Create Reference - Shape** screen is as shown below.

Figure 6-3 Create Reference - Shape Dialog

- a. Select a **Shape** for the reference.

The shape is applied on based on the pre-existing shape you choose.

6. Click **Create** to complete the creation of a reference. The new reference appears in the catalog.
7. Click **Cancel** at any point of time to abort the operation.

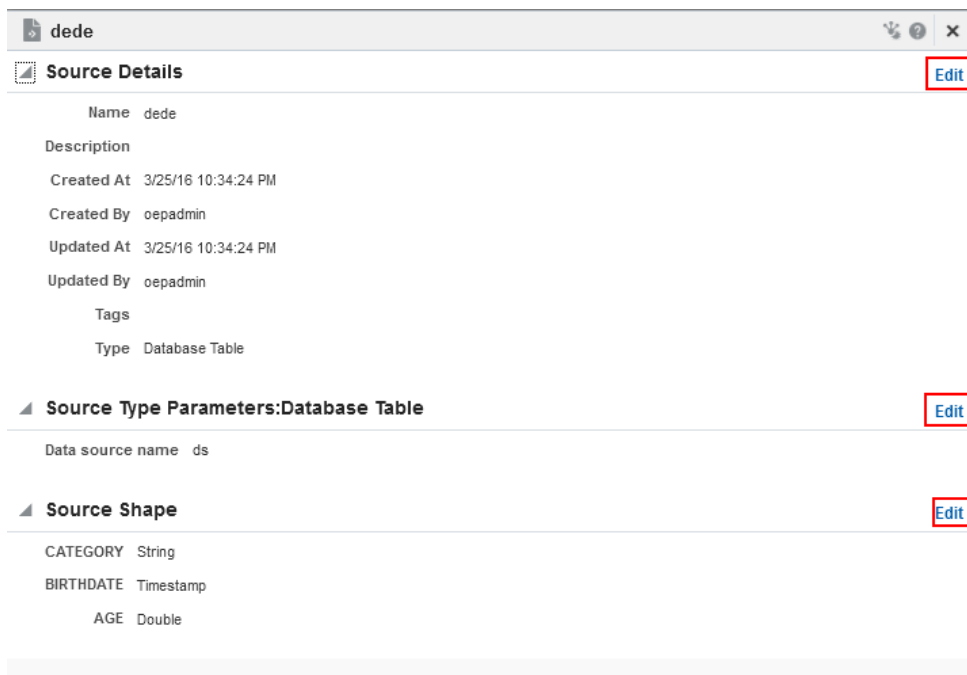
6.3 Editing a Reference

Oracle Stream Analytics allows you edit or update an existing reference. This section explains how to edit a reference.

To edit a reference:

1. Navigate to Catalog.
2. Identify the reference you that want to edit. Click the name string of the reference or the reference icon to open it for editing. The reference details screen appears and it is as shown below.

Figure 6-4 Edit Reference Screen



3. Click **Edit** in the top-right corner of the screen. The **Edit Reference - Source Details** screen is as shown below.

Figure 6-5 Edit Reference - Source Details Dialog

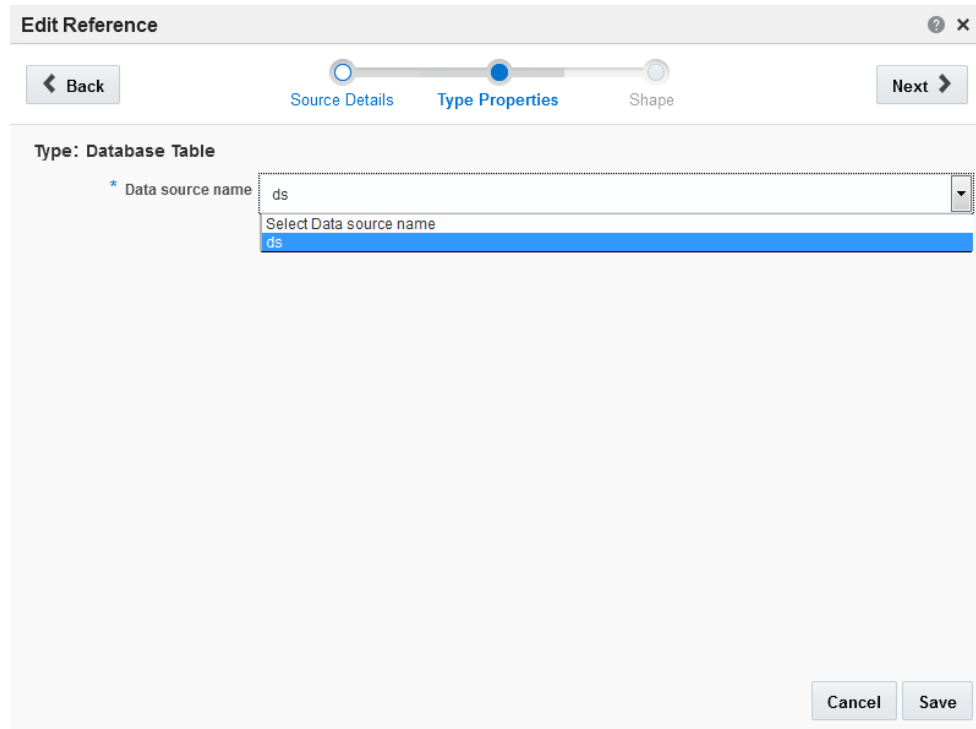
The screenshot shows a dialog box titled "Edit Reference" with a close button (X) in the top right corner. Below the title bar is a navigation bar containing a "Back" button, a progress indicator with three steps ("Source Details", "Type Properties", and "Shape"), and a "Next" button. The "Source Details" step is currently active. The main content area contains the following fields:

- * Name: EmployeeReference
- Description: (empty text area)
- Tags: Enter tag
- * Source Type: Database Table (dropdown menu)

At the bottom right of the dialog are "Cancel" and "Save" buttons.

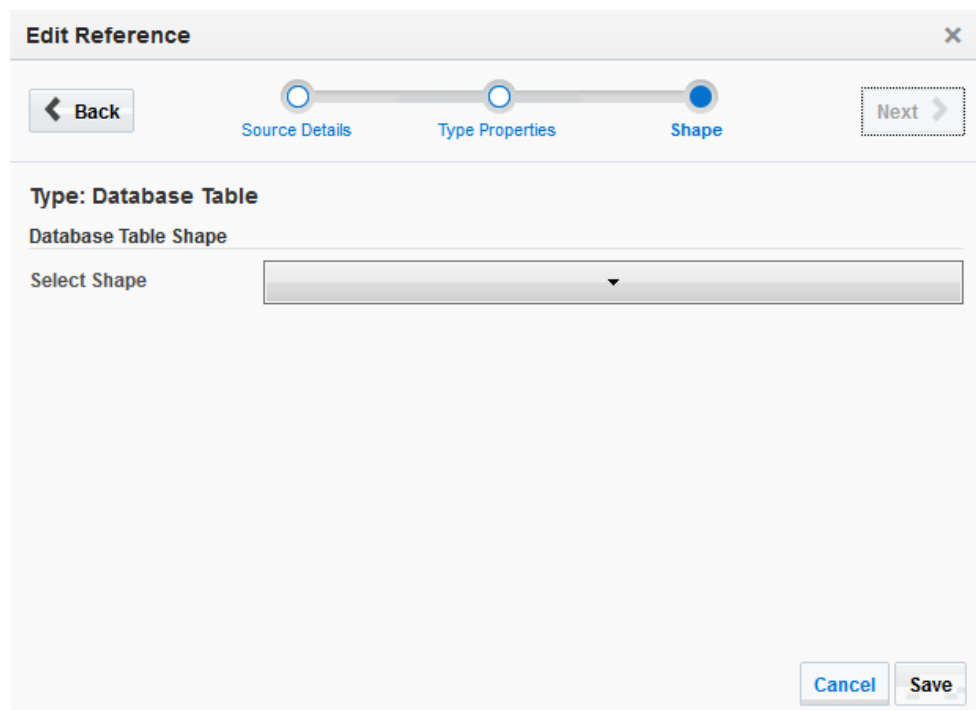
- a. Update the name of the reference, if required.
 - b. Update the description of the reference, if required.
 - c. Add or update the tags with which you want to tag the reference. You can provide multiple tags.
 - d. The **Source Type** cannot be modified in this release. Hence, it is disabled.
4. Click **Next** to go to the **Type Properties** screen. The **Edit Reference - Type Properties** screen is as shown below.

Figure 6-6 Edit Reference - Type Properties Dialog



- a. Select a different **Data source name** if you want to update the source.
 - b. Click **Back** at any point if you want to change any of the details.
5. Click **Next** to go to the **Shape** screen. The **Edit Reference - Shape** screen is as shown below.

Figure 6-7 Edit Reference - Shape Dialog



- a. Select a different **Shape** if you want to update the shape of the reference.
6. Click **Save** to complete the editing of a reference.
7. Click **Cancel** at any point of time to abort the operation.
8. Click **Done** on the reference details page to complete the operation. The update reference appears in the catalog.

6.4 Marking a Reference as Favorite

You can mark a reference as Favorite. Marking a reference as Favorite allows you to locate and navigate such reference easily even if you have numerous items on the catalog.

To mark a reference as favorite:

1. Identify the reference you want to mark as favorite in the **Catalog**.
2. Click the *Favorite* icon to the right of the reference to mark it as a favorite. This icon acts as a toggle button. Click this button again to remove the reference from favorites.

Figure 6-8 *Favorite Icon*



6.5 Deleting a Reference

You can delete a reference if you are sure you do not require the reference anymore. If a reference has dependencies, it cannot be deleted. A reference is said to have dependencies if it is part of a published exploration being used by any user. To delete a reference with dependencies, you must delete the dependencies first.

To delete a reference:

1. Identify the reference you want to delete in the **Catalog**.
2. Click the *Delete* icon to the right of the reference to delete it.

Figure 6-9 *Delete Icon*



A confirmation dialog appears. If you select **OK**, the reference will be deleted.

Working with Patterns

Patterns are much simpler than standard explorations. When working from a pattern, you need to specify a few key fields to discover an interesting result. Once you have created a pattern, it will appear in the Catalog just like any other exploration. You can use the patterns to create new explorations.

A *pattern* is a template of an Oracle Stream Analytics application that already has the business logic built into it. The visual representation of the event stream varies from one pattern type to another based on the key fields you choose. A *pattern* provides you with a simple way to explore event Streams based on common business scenarios. Use the filters at left to view different categories of pattern and then click on **Use this pattern** to create an exploration. You can see full descriptions and learn more about each pattern by clicking the box that contains it. Click again to hide the extra information.

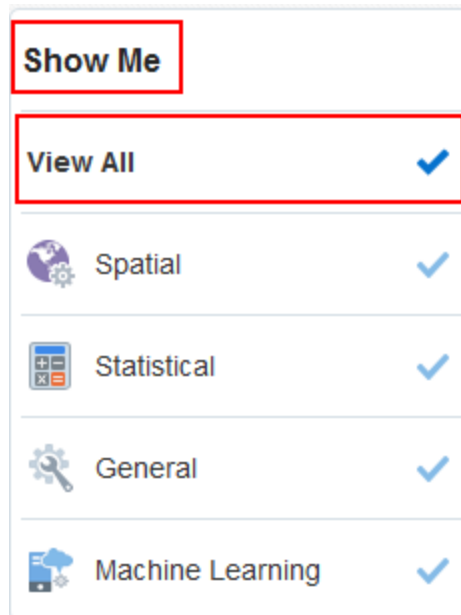
A *pattern* provides you with the results displayed in a live output stream based on common business scenarios.

Note: While entering data in the fields for a specific pattern, ensure that the data you enter corresponds to the datatype of the field. If there is a mismatch between the entered data and the datatype, the pattern yields incorrect results.

You can include or exclude patterns based on their categories using the **View All** link in the left panel under **Show Me**. When you click **View All**, a tick mark appears beside it and all the patterns are displayed in the page.

When you want to display/view only a few/selective patterns, unselect **View All** and select the individual patterns. Only the selected patterns will be shown in the catalog.

Figure 7-1 Select Patterns



The following table categorizes the patterns.

Table 7-1 Categories of Patterns

Category	Pattern	New/ Existing
General	Change Detector	New
	'A' Followed by 'B'	New
	'A' Not Followed by 'B'	New
	Bottom N	Existing
	Detect Duplicates	Existing
	Down Trend	Existing
	Eliminate Duplicates	Existing
	Fluctuation	Existing
	Inverse W	Existing
	Detect Missing Heartbeat	New
	Top N	Existing
	Up Trend	Existing
	W	Existing
	Union	New
	Left Outer Join	New

Table 7-1 (Cont.) Categories of Patterns

Category	Pattern	New/ Existing
Machine Learning	K-Means. Anomaly Detection	New
Spatial	Spatial General	New
Statistical	Median	New
	Correlation	New
	Quantile	New
	Standard Deviation	New

7.1 Understanding Patterns

Oracle Stream Analytics provides a feature known as patterns. A *pattern* provides you with the results displayed in a live output stream based on common business scenarios. A *pattern* is a template of an Oracle Stream Analytics application that already has the business logic built into it. The visual representation of the event stream varies from one pattern type to another based on the key fields you choose.

7.2 Creating a Pattern

Oracle Stream Analytics provides various patterns.

The various types or categories of patterns available are:

- *General*
- *Machine Learning*
- *Spatial*
- *Statistical*.

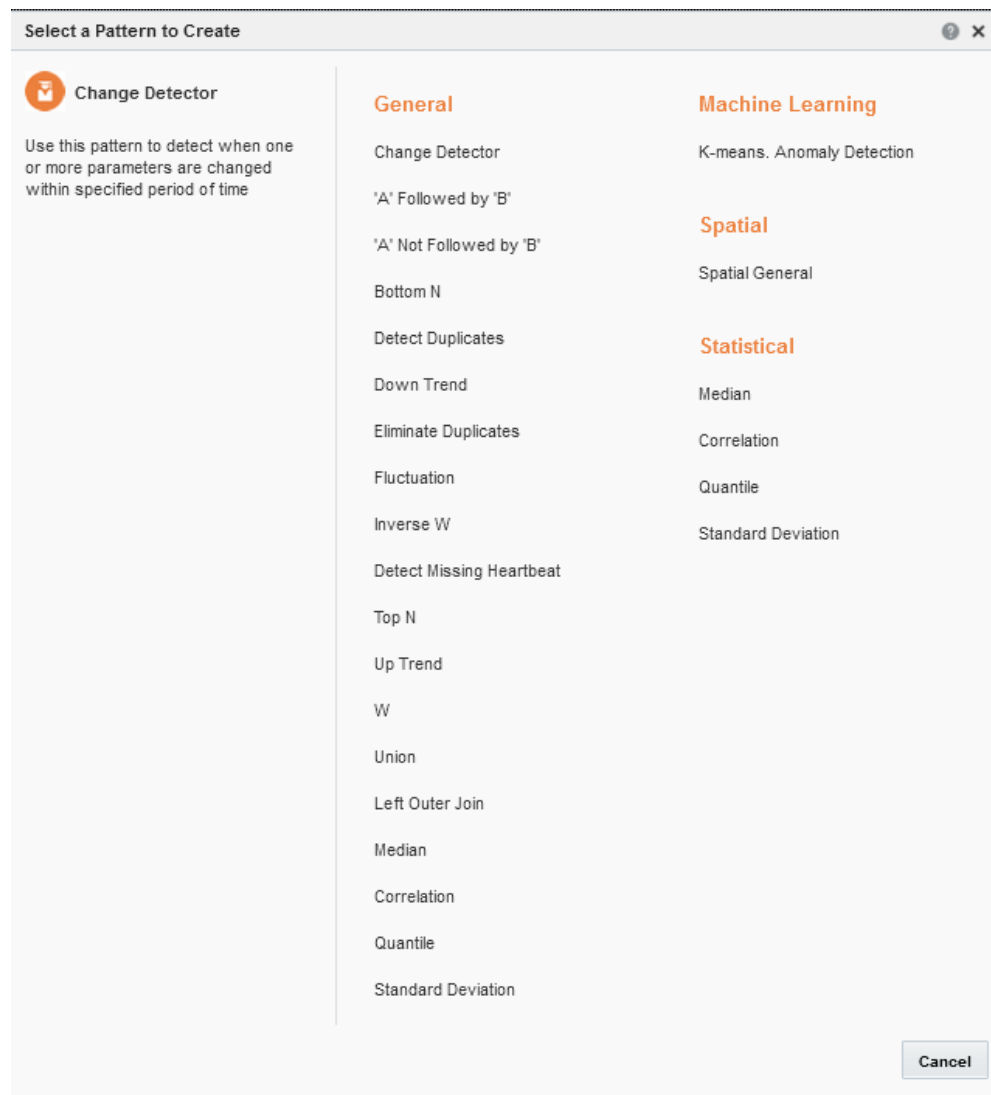
The entire list of patterns is displayed category-wise on this dialog. Hover over each of the patterns to see its description.

To create a pattern:

1. Navigate to the **Catalog**.
2. Click **Create New Item > Pattern**.

The **Select a Pattern to Create** dialog opens.

Figure 7-2 Select a Pattern to Create Dialog



3. Click the pattern that you want to create.

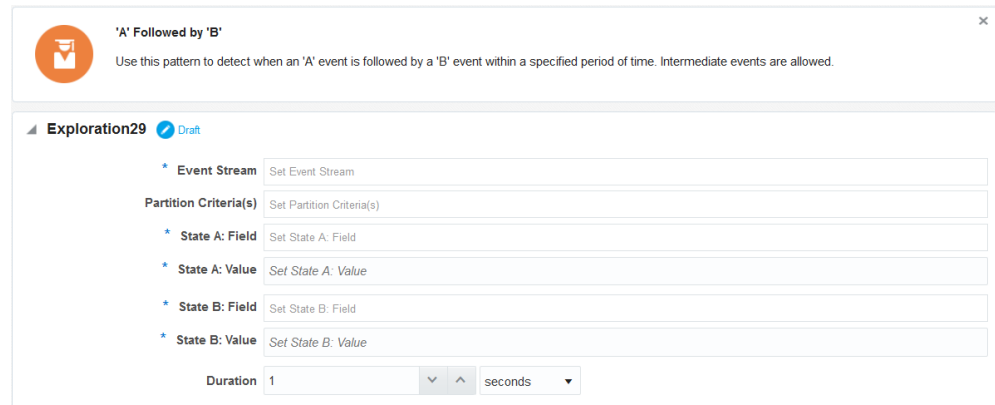
Figure 7-3 Create a <pattern> Exploration



4. Enter a **Name** for the exploration. This is a mandatory field.

5. Enter a **Description** for the exploration. This is an optional field.
6. Enter suitable **Tags** for the exploration. This is an optional field.
7. Click **Create**. An editor to create a pattern with the exploration you just created appears.

Figure 7-4 *Pattern Editor*

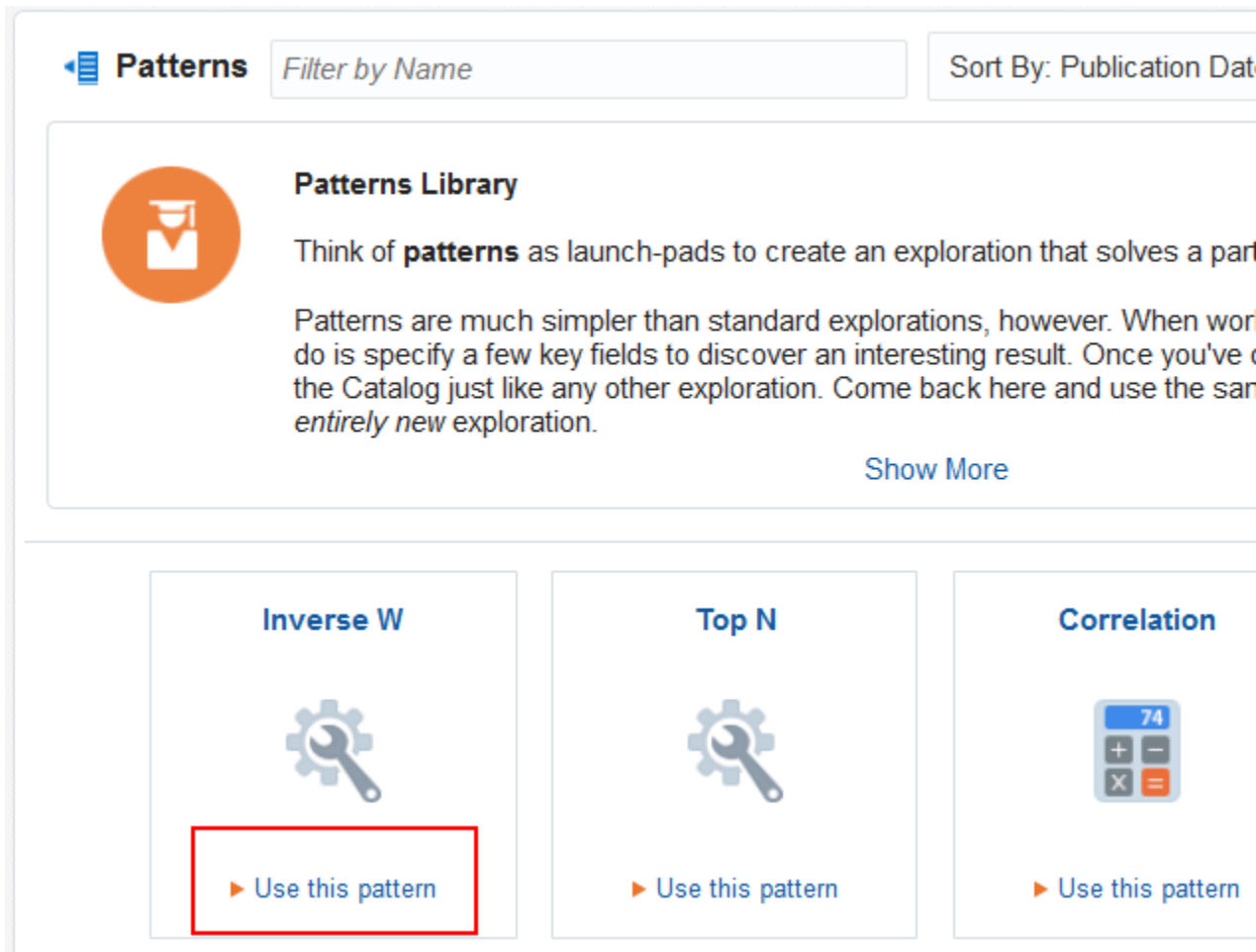


The screenshot shows a web-based interface for creating a pattern. At the top, there is a header for the pattern named "'A' Followed by 'B'", with a description: "Use this pattern to detect when an 'A' event is followed by a 'B' event within a specified period of time. Intermediate events are allowed." Below this is a section for an exploration named "Exploration29" in a "Draft" state. The configuration fields include: "Event Stream" (Set Event Stream), "Partition Criteria(s)" (Set Partition Criteria(s)), "State A: Field" (Set State A: Field), "State A: Value" (Set State A: Value), "State B: Field" (Set State B: Field), and "State B: Value" (Set State B: Value). At the bottom, there is a "Duration" field set to "1" with a unit dropdown menu currently showing "seconds".

The selected pattern is created.

An alternate way to create a pattern is to Click **Patterns** and select **Use this pattern** on the required pattern tile.

Figure 7-5 Use this Pattern



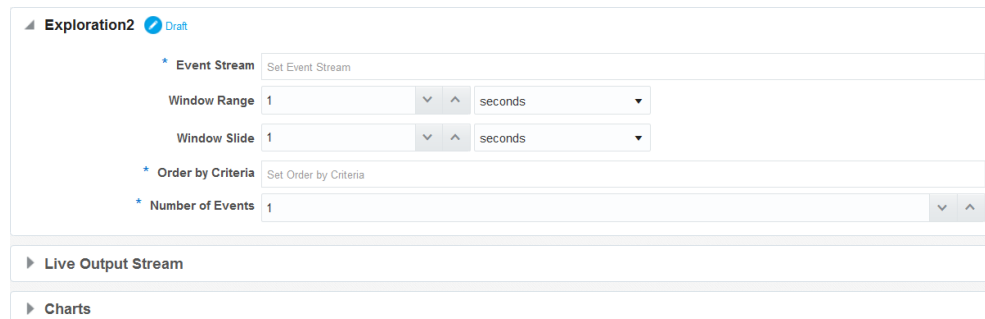
7.3 Creating Top N Pattern

Use this pattern to obtain the first N events in a window range.

To create a Top N pattern:

1. Navigate to the **Catalog**.
2. Select **Create New Item >Pattern > Top N**. You can also click **Patterns** and select **Top N**.The create pattern screen appears as shown below:

Figure 7-6 Create Top N Pattern



3. Select an **Event Stream**.
4. Enter a value for **Window Range** and select its unit (one of nanoseconds, milliseconds, microseconds, seconds, minutes, and hours). This number must be greater than or equal to 1.

A Window range is the range from which the output is generated.
5. Enter a value for **Window Slide** and select its unit (one of nanoseconds, milliseconds, microseconds, seconds, minutes, and hours). This is the frequency at which you want to refresh the data.
6. Select a value in the **Order by Criteria** field. You can select multiple fields.
7. Enter a value in the **Number of Events** field. This number must be greater than or equal to 1. This is the number that indicates the number of events to be considered for the pattern.

The pattern is visually represented based on the data you have entered/selected.

7.4 Creating Bottom N Pattern

Use the Bottom N pattern to obtain the last N events in a window range.

This section explains how to create a Bottom N pattern.

To create a Bottom N pattern:

1. Navigate to the **Catalog**.
2. Select **Create New Item > Pattern > Bottom N**. You can also click **Patterns** and select **Bottom N**. The create pattern screen appears as shown below:

Figure 7-7 Create Bottom N Pattern

The screenshot shows a configuration interface for a 'Bottom N' pattern. At the top, it says 'Exploration3 Draft'. The main form has several fields:

- Event Stream:** A dropdown menu with the text 'Set Event Stream'.
- Window Range:** A text input with '1', a small up/down arrow, and a unit dropdown menu set to 'seconds'.
- Window Slide:** A text input with '1', a small up/down arrow, and a unit dropdown menu set to 'seconds'.
- Order by Criteria:** A dropdown menu with the text 'Set Order by Criteria'.
- Number of Events:** A text input with '1' and a small up/down arrow.

 Below the form, there are two expandable sections: 'Live Output Stream' and 'Charts', each with a right-pointing arrow.

3. Select an **Event Stream**.
4. Enter a value for **Window Range** and select its unit (one of nanoseconds, milliseconds, seconds, minutes, and hours). This number must be greater than or equal to 1.

A Window range is the range from which the output is generated.
5. Enter a value for **Window Slide** and select its unit (one of nanoseconds, milliseconds, seconds, minutes, and hours). This is the frequency at which you want to refresh the data.
6. Select a value in the **Order by Criteria** field. You can select multiple fields.

7. Enter a value in the **Number of Events** field. This number must be greater than or equal to 1. This is the number that indicates the number of events to be considered for the pattern.

The pattern is visually represented based on the data you have entered/selected.

7.5 Creating Up Trend Pattern

Use this pattern to detect when a numeric event field shows a specified trend change higher in value. For example, use this pattern to identify when the temperature value from a sensor device starts continuously increasing.

To create an Up Trend pattern:

1. Navigate to the **Catalog**.
2. Select **Create New Item > Pattern > Up Trend**. You can also click **Patterns** and select **Up Trend**. The create pattern screen appears as shown below:

Figure 7-8 Create Up Trend Pattern

The screenshot shows a configuration interface for creating an Up Trend pattern. At the top, it says 'Exploration5 Draft'. Below that are four main configuration sections, each with a blue asterisk icon:

- Event Stream:** A text input field with the placeholder 'Set Event Stream'.
- Partition Criteria:** A text input field with the placeholder 'Set Partition Criteria'.
- Duration:** A numeric input field containing '1', followed by a small up/down arrow icon, and a dropdown menu currently showing 'seconds'.
- Tracking Value:** A text input field with the placeholder 'Set Tracking Value'.

Below these sections are two expandable sections: 'Live Output Stream' and 'Charts', each with a right-pointing arrow.

3. Select an **Event Stream**.
4. Enter a value for **Partition Criteria**. This value is used for partitioning the data in the event stream.

These are the fields in which you want to track the trend.

5. Enter a value for **Duration** and select its unit (one of nanoseconds, milliseconds, seconds, minutes, and hours). This is the interval within which the application looks for a pattern match.
6. Select a value in the **Tracking Field** drop-down. You can select only 1 item.

This is a source field whose behavior follows the trend for the pattern to emit the event.

The pattern is visually represented based on the data you have entered/selected.

7.6 Creating Down Trend Pattern

Use this pattern to detect when a numeric event field shows a specified trend change lower in value. For example, use this pattern to identify when the temperature value from a sensor device starts continuously decreasing.

To create a Down Trend pattern:

1. Navigate to the **Catalog**.
2. Select **Create New Item > Pattern > Down Trend**. You can also click **Patterns** and select **Down Trend**. The create pattern screen appears as shown below:

Figure 7-9 Create Down Trend Pattern

Exploration3 Draft

- * **Event Stream** Set Event Stream
- * **Partition Criteria** Set Partition Criteria
- Duration** 1 ▼ ▲ seconds ▼
- * **Tracking Value** Set Tracking Value

▶ Live Output Stream

▶ Charts

3. Select an Event Stream.

4. Enter a value for Partition Criteria. This field can be used to partition the data in the event stream.

These are the fields in which you want to track the trend.

5. Enter a value for Duration and select its unit (one of nanoseconds, milliseconds, seconds, minutes, and hours). This is the interval within which the application looks for a pattern match.

6. Select a value in the Tracking Value field. You can select only 1 item.

This is a source field whose behavior follows the trend for the pattern to emit the event.

The pattern is visually represented based on the data you have entered/selected.

7.7 Creating Fluctuation Pattern

Use this pattern to detect when an event data field value changes in a specific upward or downward fashion within a specific time window. For example, use this pattern to identify the variable changes in an Oil Pressure value are maintained within acceptable ranges.

To create a Fluctuation pattern:

1. Navigate to the Catalog.

2. Select Create New Item > Pattern > Fluctuation. You can also click **Patterns** and select **Fluctuation**. The create pattern screen appears as shown below:

Figure 7-10 Create Fluctuation Pattern

Exploration5 Draft

- * **Event Stream** Set Event Stream
- * **Partition Criteria** Set Partition Criteria
- * **Tracking Value** Set Tracking Value
- Window** 1 ▼ ▲ seconds ▼
- * **Deviation Threshold %** 0 ▼ ▲

▶ Live Output Stream

▶ Charts

3. Select an Event Stream.

4. Enter a value for **Partition Criteria**. This field can be used to partition the data in the event stream.

These are the fields in which you want to track the trend.

5. Enter a value in the **Tracking Field**. This value is used to track the event data and create a pattern in the live output stream.
6. Enter a value for **Window** and select its unit (one of nanoseconds, milliseconds, seconds, minutes, and hours). This is the frequency at which you want to refresh the data.
7. Enter a value for **Deviation Threshold %**. This value indicates the percentage of deviation you want to be included in the pattern.

This is the interval in which the application looks for a matching pattern.

The pattern is visually represented based on the data you have entered/selected.

7.8 Creating Eliminate Duplicates Pattern

Use this pattern to build an exploration that eliminates duplicate events in your event stream.

To create an Eliminate Duplicates pattern:

1. Navigate to the **Catalog**.
2. Select **Create New Item > Pattern > Eliminate Duplicates**. You can also click **Patterns** and select **Eliminate Duplicates**. The create pattern screen appears as shown below:

Figure 7-11 Create Eliminate Duplicates Pattern

3. Select an **Event Stream**.
4. Enter a value for **Duplicate Criteria**.
This is the field that you want to eliminate for duplicate keys.
5. Enter a value for **Window** and select its unit (one of nanoseconds, milliseconds, seconds, minutes, and hours). This is the range within which the application searches for duplicates.

The pattern is visually represented based on the data you have entered/selected.

7.9 Creating Detect Duplicates Pattern

Use this pattern to detect when an event data field has duplicate values within a specified period of time. For example, use this pattern when the same order is placed twice within a day.

To create a Detect Duplicates pattern:

1. Navigate to the **Catalog**.
2. Select **Create New Item > Pattern > Detect Duplicates**. You can also click **Patterns** and select **Detect Duplicates**. The create pattern screen appears as shown below:

Figure 7-12 Create Detect Duplicates Pattern

3. Select an **Event Stream**.
4. Enter a value for **Duplicate Criteria**.
This is the field that you want to look for duplicate keys.
5. Enter a value for **Window** and select its unit (one of nanoseconds, milliseconds, seconds, minutes, and hours). This is the interval in which the application looks for duplicates.

The pattern is visually represented based on the data you have entered/selected.

7.10 Creating W Pattern

Use this pattern to detect when an event data field value rises and falls in “W” fashion over a specified time window. For example, use this pattern when monitoring a market data feed stock price movement to determine a buy/sell/hold evaluation.

To create a W pattern:

1. Navigate to the **Catalog**.
2. Select **Create New Item > Pattern > W**. You can also click **Patterns** and select **W**. The create pattern screen appears as shown below:

Figure 7-13 Create W Pattern

3. Select an **Event Stream**.
4. Enter a value for **Partition Criteria**. You can select multiple fields.
These are the fields by which the data is partitioned to form a W.

5. Enter a value for **Window** and select its unit (one of nanoseconds, milliseconds, seconds, minutes, and hours). This is the interval in which the application looks for a matching pattern.
6. Select a numeric value for **Tracking Value** based on which variation constitutes a W-shape for the pattern-based exploration to produce event.

The pattern is visually represented based on the data you have entered/selected.

7.11 Creating Inverse W Pattern

Use this pattern to detect an inverse W pattern with live output stream.

To create an Inverse W pattern:

1. Navigate to the Catalog.
2. Select **Create New Item > Pattern > Inverse W**. You can also click **Patterns** and select **Inverse W**. The create pattern screen appears as shown below:

Figure 7-14 Create Inverse W Pattern

3. Select an **Event stream**.
4. Enter a value for **Partition Criteria**.
This is the field by which the data is partitioned to form an inverse W.
5. Enter a value for **Window** and select its unit (one of nanoseconds, milliseconds, seconds, minutes, and hours). This is the interval in which the application looks for a matching pattern.
6. Select a numeric value for **Tracking Value** based on which variation constitutes an inverse W-shape for the pattern-based exploration to produce event.

The pattern is visually represented based on the data you have entered/selected.

7.12 Creating 'A' Not Followed by 'B' Pattern

Use this pattern to pattern to detect when 'B' doesn't occur within a specified period of time after 'A'.

To create a 'A' Not Followed by 'B' pattern:

1. Navigate to the **Catalog**.
2. Select **Create New Item > Pattern > 'A' Not Followed by 'B'**. You can also click **Patterns** and select **'A' Not Followed by 'B'**. The create pattern screen appears as shown below:

Figure 7-15 Create 'A' Not Followed by 'B'

Exploration3 Draft

- * Event Stream
- Partition Criteria
- * State A: Field
- * State A: Value
- * State B: Field
- * State B: Value

Duration ▼ ▲ seconds ▼

▶ Live Output Stream

▶ Charts

3. Select an **Event Stream**.

4. Select a field for **Partition Criteria**.

These are the fields based on which the pattern is formed to illustrate that A is not followed by B.

5. Select a field for **State A: Field**.

6. Select a field for **State A: Value**. This is the value for **State A: Field**.

7. Select a field for **State B: Field**.

8. Select a field for **State B: Value**. This is the value for **State B: Field**.

9. Enter a numerical value for the **Duration** which is greater than zero. You can use the increment and decrement icons to increase or decrease the values. This field is used to observe the pattern for specified duration.

The pattern is visually represented based on the data you have entered/selected.

7.13 Creating A Followed by B Pattern

Use this pattern to detect when an 'A' event is followed by a 'B' event within a specified period of time. Intermediate events are also allowed.

To create a 'A' Followed by 'B' pattern:

1. Navigate to the **Catalog**.

2. Select **Create New Item > Pattern > 'A' Followed by 'B'**. You can also click **Patterns** and select **'A' Followed by 'B'**. The create pattern screen appears as shown below:

Figure 7-16 Create A Followed by B Pattern

3. Select an **Event Stream**.
4. Select a field for **Partition Criteria**.
These are the fields based on which the pattern is formed to illustrate that A is followed by B.
5. Select a field for **State A: Field**.
6. Select a field for **State A: Value**. This is the value for **State A: Field**.
7. Select a field for **State B: Field**.
8. Select a field for **State B: Value**. This is the value for **State B: Field**.
9. Enter a numerical value for the **Duration** which is greater than zero. You can use the increment and decrement icons to increase or decrease the values. This field is used to observe the pattern for specified duration.

The pattern is visually represented based on the data you have entered/selected.

7.14 Creating Standard Deviation Pattern

Use this pattern to calculate the standard deviation of the selected values with the expected values.

To create a Standard Deviation pattern:

1. Navigate to the **Catalog**.
2. Select **Create New Item > Pattern > Standard Deviation**. You can also select Patterns and click **Standard Deviation**. The create pattern screen appears as shown below:

Figure 7-17 Create Standard Deviation Pattern

▲ Exploration3 📌 Draft

* **Event Stream**

Partition Criteria

* **Observable Parameter**

Window ▼ ▲

Slide ▼ ▲

▶ **Live Output Stream**

▶ **Charts**

3. Select an **Event Stream**.
4. Select a field for the **Partition Criteria**. This field decide the partition criteria in the standard deviation pattern.
5. Select an **Observable Parameter**. The standard deviation is calculated based on this parameter.
6. Enter a numerical value greater than zero for **Window**. You can use the increment and decrement icons to increase or decrease the values. Remember to select a suitable time unit for the **Window**. This value indicates the window within which you are tracking the standard deviation.
7. Enter a numerical value greater than zero for **Slide**. You can use the increment and decrement icons to increase or decrease the values. Remember to select a suitable time unit for the **Window**. This value indicates the value by which you can slide the window for calculating the standard deviation.

The pattern is visually represented based on the data you have entered/selected.

7.15 Creating Correlation Pattern

Use this pattern to calculate a correlation between two observable parameters of the live output stream.

To create a Correlation pattern:

1. Navigate to the **Catalog**.
2. Select **Create New Item > Patterns > Correlation**. You can also click **Patterns** and select **Correlation**. The create pattern screen appears as shown below:

Figure 7-18 Create Correlation Pattern

3. Select an **Event Stream**.
4. Select a field for **Partition Criteria**. This field is used as the criteria for partition.
5. Select a parameter for **Observable Parameter 1**. This is the first parameter to observe.
6. Select a parameter for **Observable Parameter 2**. This is the second parameter. These parameters are used to calculate a correlation between them.
7. Enter a numerical value greater than zero for **Window**. Use increment or decrement icons to increase or decrease the values. Select a suitable time unit. This is the window duration for which the correlation is calculated.
8. Enter a numerical value greater than zero to be used for the **Slide** duration. Use the increment or decrement values to increase or decrease the values.

The pattern is visually represented based on the data you have entered/selected.

7.16 Creating Quantile Pattern

Use this pattern to calculate the quantile of the event stream.

To create a Quantile pattern:

1. Navigate to the **Catalog**.
2. Select **Create New Item > Pattern > Quantile**. You can also click **Patterns** and select **Quantile**. The create pattern screen appears as shown below:

Figure 7-19 Create Quantile Pattern

3. Select an **Event Stream**.

4. Select a field for **Partition Criteria**. This field is used as the criteria for partition.
5. Select a field as the Observable Parameter 1.
6. Enter a numerical value greater than zero for the **Phi-quantile**. This value is used to calculate the quantile of the selected event stream.
7. Enter a numerical value for the **Window** which is greater than zero. You can use the increment and decrement icons to increase or decrease the values. Select a suitable time unit. This field determines the window within which the quantile is calculated.
8. Enter a numerical value greater than zero for the **Slide**. You can use the increment and decrement icons to increase or decrease the values. Select a suitable time unit. This field determines the slide duration.

The pattern is visually represented based on the data you have entered/selected.

7.17 Creating Median Pattern

Use this pattern to calculate the median of an event stream with respect to a specific parameter.

To create a Median pattern:

1. Navigate to the **Catalog**.
2. Select **Create New Item > Pattern > Median**. You can also click **Patterns** and select **Median**. The create pattern screen appears as shown below:

Figure 7-20 Create Median Pattern

3. Select an **Event Stream**.
4. Select a field for **Partition Criteria**. This field acts as the criteria for the partition.
5. Select an **Observable Parameter**. This is the parameter with respect to which the median of the stream is calculated.
6. Enter a numerical value greater than zero for **Window**. You can use the increment or decrement icons to increase or decrease the values. Select a suitable time unit. This field indicates the window within which you want to calculate the median.
7. Enter a numerical value greater than zero for **Slide**. You can use the increment or decrement icons to increase or decrease the values. Select a suitable time unit. This field indicates the slide of the pattern.

The pattern is visually represented based on the data you have entered/selected.

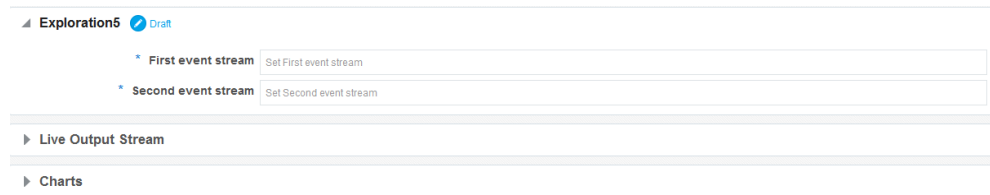
7.18 Creating Union Pattern

Use this pattern to create a union of events from two streams. The event shape of both the streams must be the same.

To create a Union pattern:

1. Navigate to the **Catalog**.
2. Select **Create New Item > Pattern > Union**. You can also click **Patterns** and select **Union**. The create pattern screen appears as shown below:

Figure 7-21 Create Union Pattern



3. Select the **First event Stream**.
4. Select the **Second event Stream**. A union of these event stream is created.

Remember: The shape must be the same for both the event streams.

The pattern is visually represented based on the data you have entered/selected.

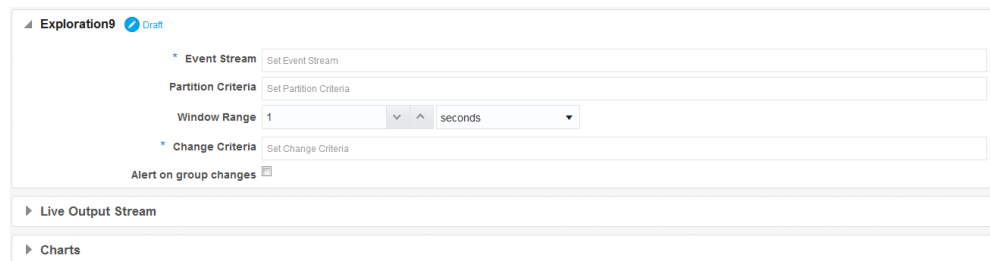
7.19 Creating Change Detector Pattern

Use this pattern to detect when one or more parameters are changed within specified period of time.

To create a Change Detector pattern:

1. Navigate to the **Catalog**.
2. Select **Create New Item > Pattern > Change Detector**. You can also click **Patterns** and select **Change Detector**. The create pattern screen appears as shown below:

Figure 7-22 Create Change Detector Pattern



3. Select an **Event Stream**.
4. Select a field for **Partition Criteria**. This field acts as the criteria for the partition.

5. Enter a numerical value greater than zero for the Window Range. You can use the increment or decrement icons to increase or decrease the values. Select a suitable time unit.

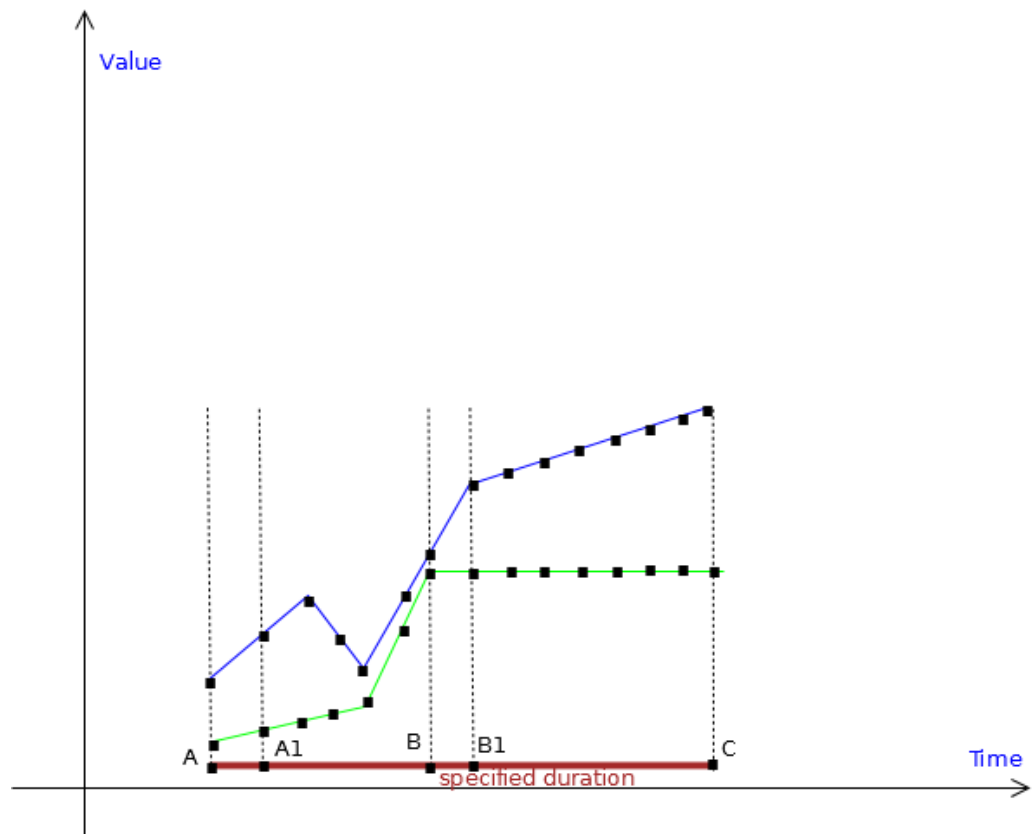
This field is used to specify the window within which the change needs to be detected.

6. Select a field for which you to detect the change in **Change Criteria (s)**. You can select multiple fields.
7. Select **Alert on Group Changes** if you want to be alerted for all observable parameters are changed together within a specified period of time. Deselect it if you want to be alerted for any one of observable parameters are changed within a specified period of time.

The pattern is visually represented based on the data you have entered/selected.

Oracle Stream Analytics detects changes within the specified period of time and sends output event (alert) either at the end of this period or either at the moment when changes do not happen any more. Let us consider the following graph for example.

Figure 7-23 Change Detector Pattern Example



Assume you specified duration equal to A-C interval. In "green" case you have values continuously changing from A to B within A-C interval. But, after the point B values do not change any more. So, you will receive alert at the moment B1.

In "blue" case you have values continuously changing during the whole interval - A-C. You will receive alert at the end of specified duration A-C, at the moment C.

Sometimes, you need to get alert immediately after any changes happen. That is in both cases "green" and "blue" cases, you will receive alert at the moment A1 because value had changed and continue receiving alerts until the point B in "green" case and point C in "blue" case.

As a workaround, you can minimize the window value to receive events just after the changes happen.

7.20 Creating K-means.Anomaly Detection Pattern

Use this pattern to explore data clusters and detect anomalies. K-Means is a widely used unsupervised machine learning algorithm for data exploration. K-Means is used in anomaly detection by identifying low density clusters (clusters with very few members), which equates to being less common. Oracle Stream Analytics supports 2 dimensional (2D) space of observations.

To create a K-means.Anomaly Detection pattern:

1. Navigate to the **Catalog**.
2. Select **Create New Item > Pattern > K-means.Anomaly Detection**. You can also click **Patterns** and select **K-means.Anomaly Detection**. The create pattern screen appears as shown below:

Figure 7-24 Create K-means.Anomaly Detection Pattern

3. Select an **Event Stream**.
4. Select a **Value 1**. This value is used to detect anomalies.
5. Select a **Value 2**. This value is used to detect anomalies.
6. Enter a numerical value greater than zero for N-clusters. You can use the increment or decrement icons to increase or decrease the values. This value indicates the number of clusters to be considered for detecting the anomalies.

The pattern is visually represented based on the data you have entered/selected.

7.21 Creating Spatial General Pattern

Use this pattern to analyze streams containing geo-location data and determine how events relate to pre-defined geo-fences in your maps.

To create a Spatial General pattern:

1. Navigate to the **Catalog**.
2. Select **Create New Item > Pattern > Spatial General**. You can also click **Patterns** and select **Spatial General**. The create pattern screen appears as shown below:

Figure 7-25 Spatial Pattern

status	NAME	phoneNo	name	email	longitude	latitude
NEAR	SF Piers sealions district	4155551004	Todd Dover	t dover@email.example.com	-122.3987660521499	37.78882875992786

The color coded on the map denote that:

- *Black* - indicates that no event is missed
- *Orange* - indicates that an event has entered the specified range
- *Blue* - indicates that an event has is near a specified range
- *Purple* - indicates that an event is within the stay range
- *Green* - indicates that an event has exited the specified range.

3. Select a **Map**. Maps that you have created earlier appear in this list.

4. Select an **Event Stream**.

5. Select a field to be used as the **Latitude** for the spatial.

6. Select a field to be used as the **Longitude** for the spatial.

7. Select a field to be used as the **Object** for the spatial. The object, latitude, and longitude determine the way a spatial map is displayed.

8. Select the options for **Tracking Events**. This field determines the proximity of the location for the pattern. The possible values are:

- **Near** — whenever a new event occurs in the defined spatial region defined by the specified latitude and longitude.
- **Enter** — whenever an existing event enters the spatial region defined by the specified latitude and longitude.

- **Exit** — whenever an event exits the spatial region defined by the specified latitude and longitude.
 - **Stay** — when an event stays (the duration is specified in step 11) in the spatial region defined by the specified latitude and longitude.
9. Select an ID of the **Coordinate System**. The possible values are:
- 3857 — also known as WGS 84/Pseudo-Mercator - is a geodetic projected Cartesian 2d coordinate system
 - 8307 — also known as Longitude/Latitude (WGS 84) - is an Elipsoidal 2d coordinate system. This coordinate system is introduced by Oracle and is used by default.
10. Enter a numerical value greater than zero for the **Distance Buffer**. Use the increment or decrement icons to increase or decrease the values. Select a suitable unit for the distance. This value determines the buffer range for calculating the spatial distance when you are tracking an even with a **Near** parameter.

A buffer usually defines the +/- range for the base value.

Note: This field is enabled only when you select **Near** in **Tracking Events**.

11. Enter a numerical value greater than zero for the **Stay Duration**. Use the increment or decrement icons to increase or decrease the values. Select a suitable time unit. This value is used when you select the **Stay** option in **Tracking Events**. An event that stays for the specified **Stay Duration** will be detected.

Note: This field is enabled only when you select **Stay** in **Tracking Events**.

The pattern is visually represented in the form of a map based on the data you have entered/selected.

7.22 Creating Detect Missing Heartbeat Pattern

Use this pattern to detect when an expected event does not occur within a specific time window. For example, use this pattern in circumstances when the next heartbeat event is missing.

To create a Detect Missing Heartbeat pattern:

1. Navigate to the **Catalog**.
2. Select **Create New Item** > **Patterns** > **Detect Missing Heartbeat**. You can also click **Patterns** and select **Detect Missing Heartbeat**. The create pattern screen appears as shown below:

Figure 7-26 Create Detect Missing Heartbeat Pattern

3. Select an **Event Stream**.
4. Select a field for **Partition Criteria**.
5. Enter a numerical value greater than zero for **Heartbeat Interval**. Use the increment or decrement icons to increase or decrease the value. Select a suitable time unit.

This value indicates the interval within which you want to detect a missing heartbeat.

The pattern is visually represented based on the data you have entered/selected.

7.23 Creating Left Outer Pattern

Use this pattern to enrich original stream events with the data from external reference or another stream. If there are no records in the reference/stream then stream shows null values as the output.

To create Left Outer Join pattern:

1. Navigate to the **Catalog**.
2. Select **Create New Item > Pattern > Left Outer Join**. You can also click **Patterns** and select **Left Outer Join**. The create pattern screen appears as shown below:

Figure 7-27 Create Left Outer Join Pattern

3. Select a **Primary Stream**.
4. Select an **Enriching Reference/Stream** for the **Primary Stream**.
5. Select a **Primary Stream Correlation Criteria**. This value acts as the correlation criteria for the primary stream.

6. Select an **Enriching Reference/Stream Correlation Criteria** for the **Primary Stream Correlation Criteria**.
7. Enter a numerical value greater than zero for the **Window Range of the Primary Stream**. You can use the increment or decrement icons to increase or decrease the value. Select a suitable time unit. This value indicates the window for the primary stream.
8. Enter a numerical value greater than zero for the **Window Slide of the Primary Stream**. You can use the increment or decrement icons to increase or decrease the value. Select a suitable time unit. This value indicates the slide for the primary stream.
9. Enter a numerical value greater than zero for the **Window Range of the Enriching Stream**. You can use the increment or decrement icons to increase or decrease the value. Select a suitable time unit. This value indicates the window for the enriching/secondary stream.
10. Enter a numerical value greater than zero for the **Window Slide of the Enriching Stream**. You can use the increment or decrement icons to increase or decrease the value. Select a suitable time unit. This value indicates the slide for the enriching/secondary stream.

The pattern is visually represented based on the data you have entered/selected.

Sign Out of Oracle Stream Analytics

This chapter explains the details about signing out of the Oracle Stream Analytics application.

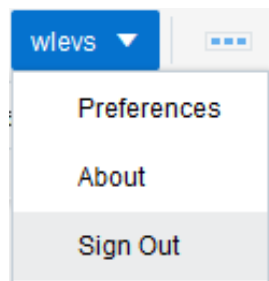
8.1 Signing Out

After you are done with using the Oracle Stream Analytics application, you must sign out of the application.

To sign out:

1. Click the username at the top-right corner of the screen.
2. Select Sign Out in the drop-down list.

Figure 8-1 Signout



You are signed out of the application and taken back to the Sign In page. Sign In again to use the Oracle Stream Analytics application. For more information about signing in, see [Sign In Page](#).

