



SAS[®] Event Stream Processing

6.1: Visualizing Event Streams with Streamviewer

Accessing Streamviewer

SAS Event Stream Processing Streamviewer is a web-based client that visualizes events that stream through event stream processing models. You can subscribe to individual windows on one or more ESP servers. You can display each event as a row in a table or as an element of a chart. You can save and load a collection of subscribers, their associated tables and charts, and other customized settings in *dashboards*. These dashboards are stored in a PostgreSQL database.

To access SAS Event Stream Processing Streamviewer, you need the following:

- A supported web browser: Firefox, Google Chrome, or Safari. The browser must be enabled for JavaScript.
- A minimum screen resolution of 1,280 x 1,024

SAS Event Stream Processing Streamviewer is packaged in the `streamviewer-6.1.jar` file, which is located in `/opt/sas/viya/home/libexec`. All supported JDBC drivers are included in this JAR file.

Note: SAS Event Stream Processing Streamviewer requires a Java Virtual Machine (JVM) of 1.8 or later.

To access SAS Event Stream Processing Streamviewer:

- 1 Open the following URL:

```
https://Streamviewer-host-name/SASEventStreamProcessingStreamviewer
```

Where *Streamviewer-host-name* is the host assigned to the system where Streamviewer is installed.

- 2 Enter your user ID and password and click **sign in**.
- 3 If Streamviewer is not connected to an ESP server, you are prompted to enter a **New ESP Server**.
- 4 After Streamviewer is connected to an ESP server, the home page appears.

You can set up and run SAS Event Stream Processing Streamviewer as a stand-alone application. For more information, see the appropriate SAS Event Stream Processing Deployment Guide.

After you set up Streamviewer as a stand-alone application, you must use the `ESP_STREAMVIEWER_DB` environment variable to run it stand-alone. This environment variable specifies the location of the associated H2

database for dashboards. Also, it is recommended that you copy the `streamviewer-6.1.jar` file to another location on your local machine or on another server.

Using the Streamviewer Dashboard

Streamviewer displays events streaming through subscribed windows in tables and charts in the main area of the Streamviewer user interface, the *dashboard*.

From the pane at the top of the dashboard, you can save how you configure the elements of the dashboard to your chosen configuration database, open previously saved dashboard configurations, and export a dashboard as an XML file. You can also add new subscribers, determine how events are displayed in the dashboard, publish data directly into your subscribed windows, and create new tables or charts for saved ESP servers and subscribed windows.

Each of the icons in the dashboard pane opens a new window or performs an action:

Table 1 Dashboard Navigation Icons

Icon	Description
	Opens the Dashboards window, which lists the dashboards that are saved to the configuration database in use.
	Creates a new dashboard.
	Saves the current dashboard.
	Saves the current dashboard with a user-specified name.
	Reloads the current dashboard.
	Opens the ESP Servers window. Also accessible from the ESP Model Viewer window, the ESP Servers window enables you to add new servers and edit existing servers that publish events to subscriber windows in Streamviewer.
	Opens the ESP Model Viewer window. From this window, you can load and view an ESP model from any project, continuous query, and server connected to Streamviewer. You can also subscribe to available model windows for use in the dashboard. For more information about the ESP Model Viewer, see “Using the ESP Model Viewer” .
	Opens the ESP Subscribers window. From this window, you can add new subscribers from existing ESP servers, edit the properties of an existing subscriber, and create new tables for existing subscribers. For more information about subscribers, see “Managing Subscribers on the Dashboard” . For more information about creating charts and tables, see “Managing Tables and Charts on the Dashboard” .
	Opens the Dashboard Fields window. From the Dashboard Fields window, you can define the name and size of the columns of event data in your dashboard’s tables and charts.

Icon	Description
	Opens the Edit Dashboard window, which provides options for editing the dashboard's appearance. To add, edit, or delete display settings for fields of data that appear in the dashboard, click Manage Fields at the bottom of the Edit Dashboard window. From the Dashboard Fields window, you can define the name and size of the columns of event data in your dashboard's tables and charts.
	Opens your email client with a URL to your current dashboard that can be sent to someone else for viewing.
	Opens the ESP Stream Publish window, which enables you to publish directly into subscribed Source windows by listing event data in CSV format or by providing the location of a CSV data file. You can also specify the date format of your publishing stream and the event block size.
	Pauses all active subscribers in the dashboard.
	Aligns all selected charts with the selected chart farthest to the left of the dashboard. To select multiple charts, hold the Shift key and click the charts that you want to select.
	Aligns all selected charts with the selected chart farthest to the top of the dashboard. To select multiple charts, hold the Shift key and click the charts that you want to select.
	Aligns all selected charts with the selected chart farthest to the right of the dashboard. To select multiple charts, hold the Shift key and click the charts that you want to select.
	Aligns all selected charts with the selected chart farthest to the bottom of the dashboard. To select multiple charts, hold the Shift key and click the charts that you want to select.
	Opens the Import Data window. From this window, you can import dashboard configuration data from a server or a local file.
	Opens the Export Data window. This window displays XML code that corresponds to your current dashboard configuration.
	Opens the Model Visualizer in a new tab. From the Model Visualizer, you can view an event stream processing model from a server or from an XML file. For more information about the Model Visualizer, see "Visualizing ESP Models" .

Managing Subscribers on the Dashboard

You can edit existing subscribers and add new subscribers from the ESP Subscribers window. To open the ESP

Subscribers window from the dashboard, click .

Subscribers in Streamviewer use the SAS Event Stream Processing WebSocket Publish/Subscribe API to communicate with the ESP server. For more information about the WebSocket API, see ["Creating and Using the WebSocket Subscriber"](#) in *SAS Event Stream Processing: WebSocket API*.

To create a new subscriber, click . The Edit ESP Subscriber window appears. From this window, you can specify the subscriber's information up to the server level and modify the subscriber's behavior.

To edit an existing subscriber, select the subscriber and click . The Edit ESP Subscriber window appears.

Note: You cannot change the subscriber mode, server, project, continuous query, or window of an existing subscriber.

Among the options available from the Edit ESP Subscriber window, the **Page Size** and **Delivery Interval** settings can significantly affect Streamviewer performance.

Page Size

The events displayed on the dashboard in the tables and charts connected to a subscriber make up the subscriber's *event page*. The event page size is measured in the number of events. It determines how many events the Streamviewer client retrieves from the ESP server and displays in a table or chart on the dashboard. The default page size is 50 events.

Delivery Interval

The delivery interval, which is measured in milliseconds, determines how often Streamviewer retrieves events from the ESP server. Specifying a delivery interval can improve user interface performance for subscribed windows with large quantities of streaming events. If no delivery interval is specified, the ESP server delivers events to Streamviewer immediately after the server receives the events from the data source.

Streamviewer retrieves only as many events as the page size for each delivery interval. If, for example, the page size is 50 and the delivery interval is 500 for a given subscriber, Streamviewer retrieves 50 events from the subscriber window every half second and displays them on each table and chart that is connected to that subscriber.

To open a new table for an existing subscriber, select the subscriber and click . For more information about editing tables and charts, see [“Managing Tables and Charts on the Dashboard”](#).

Visualizing ESP Models

To open the ESP Model Visualizer in a separate tab, click  from the dashboard. The ESP Model Visualizer enables you to view models that exist on a server or in a static file.

To view a model in a local XML file, drag and drop the file into the content portion of the window.

To view a model on a running ESP server, enter the host name and port of the ESP server in the **Server** field and click . The **Project** and **Contquery** fields are populated with the default values. You can select other continuous queries to load if they are available in the project.

Note: When entering the server host name in the **Server** field, you must specify the correct protocol.

After you load a model in the visualizer, the windows in the model and their associated edges are shown in the content area. To control the appearance of the model in the content area, modify the **Orientation** and **Link Type** settings located under the **Project** and **Contquery** fields.

Windows with a half-filled red circle in the bottom right corner are stateless and have an index of pi_EMPTY. Windows with a green check in the bottom right corner have an index other than pi_EMPTY and are stateful. Click on any window to display its XML definition in the content area at the bottom of the visualizer window.

Managing Tables and Charts on the Dashboard

After you create a new subscriber, a table of events streaming to the subscribed window appears in the dashboard. You can change the table's display type and create other visual components based on the same stream of events. You can organize data in tables and charts by key fields or by classes.



Click  at the top right of a table or chart to display a menu of options. From this menu, select from the following:

Edit

Opens the Modify Chart window. From this window, you can change the type of chart that you have selected and its title and appearance.

New Chart

Opens the New Chart window. From this window, you can create a new table or chart based on the selected subscriber. This window provides the same options for tables and charts as the Modify Chart window.

Note: The types of charts available for a subscriber depend on the subscriber window's key and non-key field types. For example, series plots require subscriber windows to have numeric key fields. Time series plots require a time key field. Some chart types require the subscriber window to have numeric non-key fields.

Filter

Filters the events displayed in a table or chart. Create filters using the Expression Engine Language. For supported functions, see [“Functional Window and Notification Window Support Functions” in SAS Event Stream Processing: Creating and Using Windows](#).

Note: Represent floating-point numbers that are used in filters in US decimal format.

Javascript

Opens the Embed Chart Javascript window. Use the chart JavaScript to embed charts in web pages. For more information, see [“Embedding Charts”](#).

Chart Page

Opens the Chart Page URL window. From this window, you can open a web page dedicated to the selected chart in a separate tab or you can embed the chart in a web page with the chart page URL. For more information, see [“Embedding Charts”](#).

Close

Removes the table or chart from the dashboard.

After a table or chart is displayed, you can move it by dragging it to the desired position. You can resize a table or chart by grabbing the lower right corner and dragging it. Anytime that you click on a table or chart, it appears in front of the other components on the screen.

Note: All tables and charts connected to a subscriber are synchronized. When you apply a filter to one table or chart, it affects all tables and charts connected to the same subscriber. Similarly, when you sort a table, all charts connected to the same subscriber are sorted accordingly.

Embedding Charts

Overview

Charts that are saved to a Streamviewer dashboard can be embedded in HTML web pages.



Click  at the top right of a table or chart to obtain the chart JavaScript or a URL for a web page dedicated to the selected chart.

Embedding JavaScript of a Chart

If you want to provide more visual control of the components of the chart on a web page, you can embed the JavaScript of a chart in HTML. The chart JavaScript provides methods that enable you to change the appearance of embedded charts.

To view the JavaScript for the chart, click **Javascript** from the chart menu. The Embed Chart Javascript window appears.

To embed the chart JavaScript in HTML, follow these steps:

- 1 Copy the following file from the SAS Event Stream Processing installation directory:

```
$DFESP_HOME/tools/svchart.tar.gz
```

- 2 Unpack the archive file in the directory of the page that will display the chart:

```
tar -xvzf svchart.tar.gz
```

- 3 On the web page where you want to embed the chart, add the following code to the head tag:

```
<script data-main="js/svchartApp" src="js/libs/require.js"></script>
<link rel="stylesheet" href="style/svchart.css" type="text/css" />
<script type="text/javascript">
function setupEsp(svchart, servers) {
    servers.setKpiSkin("modern"); // a
    servers.setGraphSkin("sheen"); // b
    svchart.create("e020cb157-0318250a-09408857", "http://host:port", servers.true).attach("mychart"); // c
}
</script>
```

- a This portion of the `setupEsp()` function controls the appearance of embedded key performance indexes (KPIs). KPIs consist of the gauge charts available in Streamviewer. Valid arguments for the `setKpiSkin()` method include: `basic`, `charcoal`, `modern`, `onyx`, and `satin`.
 - b This portion controls the appearance of all embedded charts except gauges and tables. Valid arguments for the `setGraphSkin()` method include: `sheen`, `crisp`, `gloss`, `matte`, `flat`, and `none`.
 - c Replace this portion with the JavaScript code provided by the Embed Chart Javascript window. Add a unique page ID to the `attach()` method. In this example, the ID "mychart" is used.
- 4 Add the chart to the page using the unique page ID. In the example code here, this ID is "mychart". Typically, you should use a `div` tag to contain the embedded chart. Here is an example:

```
<div id="mychart" style="width:500px;height:500px;border:1px solid black"></div>
```

Using the ESP Model Viewer

Use the ESP Model Viewer to view event stream processing models and subscribe to windows. To open the ESP Model Viewer from the dashboard, click .

At the top left of the ESP Model Viewer window, select the **Server**, **Project**, and **Contquery** that you want to view.

The windows in the selected continuous query and their associated edges are diagrammed in the content area.

Click  to change the orientation of the model and the appearance of the edges.

Click a window to display details about it. These details include the window's incoming and outgoing data sources and its schema fields.

You can create a subscriber to monitor a selected window in the dashboard. There are two subscriber modes:

Updating

A subscriber in Updating mode retrieves events from the server whose keys correspond to the events currently displayed in a table or chart on the dashboard.

Streaming

A subscriber in Streaming mode receives all events from the server of the subscriber's page size in intervals specified in the subscriber settings. For more information about specifying page sizes and intervals in the subscriber settings, see ["Managing Subscribers on the Dashboard"](#).

To create an Updating subscriber, select a window and click  at the top right of the ESP Model Viewer. To create a Streaming subscriber, select a window and click  at the top right of the ESP Model Viewer.

