

SYBASE®

Studio Guide

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**Sybase CEP Option R4**

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# Overview

An overview of the Sybase® CEP Studio.

## Sybase CEP Studio Overview

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Sybase CEP Studio is the graphical application component of Sybase CEP Engine that enables the developing, compiling, and running of Sybase CEP projects. While Sybase CEP Studio is most often used to develop and test Sybase CEP applications, you can also use it to run production applications.

Many of the actions performed using the Sybase CEP Studio interface modify the project's CCL code. This same result can be achieved by manually editing the code.

Use Sybase CEP Server in conjunction with a tool that compiles, loads, starts, stops, and executes projects. Besides Sybase CEP Studio, you can also use the Sybase CEP Eclipse Plug-In or the command-line tools `c8_compiler` and `c8_client`. See the *Sybase CEP Eclipse Plug-In Guide* and the *Sybase CEP Integration Guide* for more information about these tools.

The *Sybase CEP Getting Started Guide* tutorial includes exercises you can complete to become familiar with Sybase CEP Studio and general Sybase CEP Engine concepts.

## Sybase CEP Studio and Sybase CEP Server

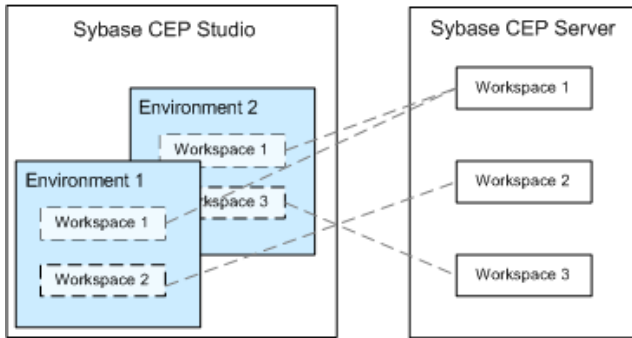
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Use Sybase CEP Studio to edit the source code of a Sybase CEP project, compile it with the Sybase CEP compiler, and send the results to Sybase CEP Server for execution.

Sybase CEP Server executes a project in a specific Workspace, an autonomous processing area.

A Sybase CEP Studio Environment provides a view into one or more Workspaces on Sybase CEP Server. Multiple Environments can contain views into the same Workspace.

The following diagram illustrates the relationship between Sybase CEP Studio Environments and Sybase CEP Server Workspaces:

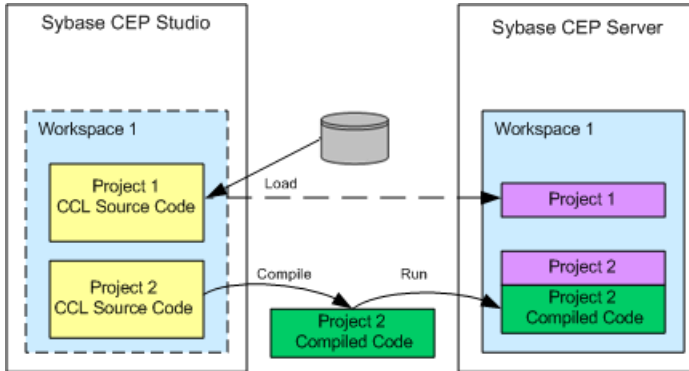


In Sybase CEP Studio, you connect to a Workspace, which allows you to interact with it.

When you use Sybase CEP Studio to load a project, it makes the source code available for editing and compiling. It also associates the project with a Workspace on Sybase CEP Server temporarily, although a single project can be loaded into different Workspaces at different times, or even simultaneously loaded into the same Workspace under different names.

When using Sybase CEP Studio to run a project, the Studio first calls the Sybase CEP compiler to compile the CCL code and then sends the result to Sybase CEP Server for execution in a particular Workspace.

The following diagram illustrates loading, compiling, and running Sybase CEP Projects:



Note that Sybase CEP Studio and the Sybase CEP compiler must have access to the files containing a project's CCL source code, while Sybase CEP Server uses only the compiled code (contained in .ccx files). You must explicitly stop a running project. Exiting Sybase CEP Studio has no effect on projects running on Sybase CEP Server.

## Downloading Sybase CEP Studio

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A description of the steps required to download Sybase CEP Studio from the Sybase CEP website.

1. Open a Web browser and go to the Sybase CEP Web site at *www.sybase.com*.
2. On the Developers menu, click Download.
3. Find the version of operating system you are using in the list of supported platforms and versions.
4. Click the link to the right of the listing for Sybase CEP Studio under the appropriate platform.
5. Follow the displayed instructions to log in and save the downloaded file.

## Installing Sybase CEP Studio

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Follow these steps to install Sybase CEP Studio:

1. If you are installing Sybase CEP Studio on Microsoft Windows Vista, make sure that you are logged in as administrator.
2. Locate the Sybase CEP Studio installation file you downloaded from the Sybase CEP Web site on your computer and then open it to start the Sybase CEP Studio Setup Wizard.
3. Complete the Sybase CEP Studio Setup Wizard, accepting the default setup options that are offered on each page, unless you have been advised by your System Administrator to specify other options.
4. On the last page of the Sybase CEP Studio Setup Wizard, check the “Run Sybase CEP Studio version” check box. This option starts Sybase CEP Studio immediately after you complete the wizard.

### Next

See the *Sybase CEP Installation Guide* for more information about the available installation options, as well as instructions for installing Sybase CEP Studio on UNIX-like operating systems.

## Project Components and Data Flow

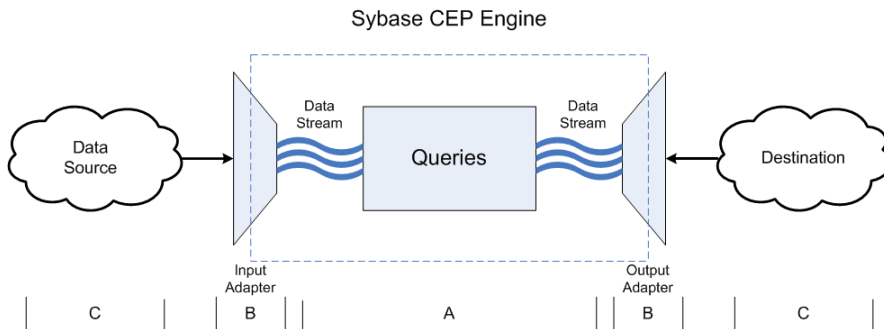
Sybase CEP projects are made up of one or more discrete units called query modules. Every project contains one main query module, represented in Sybase CEP Studio by the same icon as the project.

Creating a project automatically creates the main query module. Likewise, loading, unloading, compiling, and running a project automatically loads, unloads, compiles, or runs the main query module.

You can define other, nested, query modules, called *submodules*, within a main query module. When you compile and run a project, you compile and run the submodules.

Query modules include groups of CCL statements (*sometimes called queries*) that process data, data streams that carry data, formatted into rows and columns, through Sybase CEP Engine, adapters that translate data to or from a format compatible with Sybase CEP Engine, and windows that retain rows until a specified count or period of time is reached.

The following diagram illustrates the components of a Sybase CEP project and how data typically flows through Sybase CEP Engine:



Data typically flows through Sybase CEP Engine as follows:

1. Data enters Sybase CEP Engine from an external source through an input adapter, which converts data into a Sybase CEP-compatible format and publishes it to an input stream.
2. *Queries run continuously, subscribe to input streams, process the incoming rows, and publish rows to output streams.*
3. An output adapter converts the data into a format suitable for its external destination.

*A few more details about data streams:*

- *Input:* Streams receive data from outside the current query module, either through input adapters as shown in the diagram, or through bindings to streams in other modules. Input streams cannot be used as the destination for CCL statements as you cannot send data to an input stream with a query.



- *Output:* Streams send data to destinations outside the current query module, either through output adapters as shown in the diagram, or through bindings to streams in other modules.
- *Local:* Streams carry data solely within the current query module. They cannot be connected to input or output adapters, and they can only be bound to input and output streams in the query module's submodules. They cannot connect to streams outside the current project.

For more information about these components and how to work with them in CCL, see the *Sybase CEP CCL Reference Guide*.



# User Interface

An overview of the CEP Studio user interface, including windows, menus, toolbars, views, and viewers.

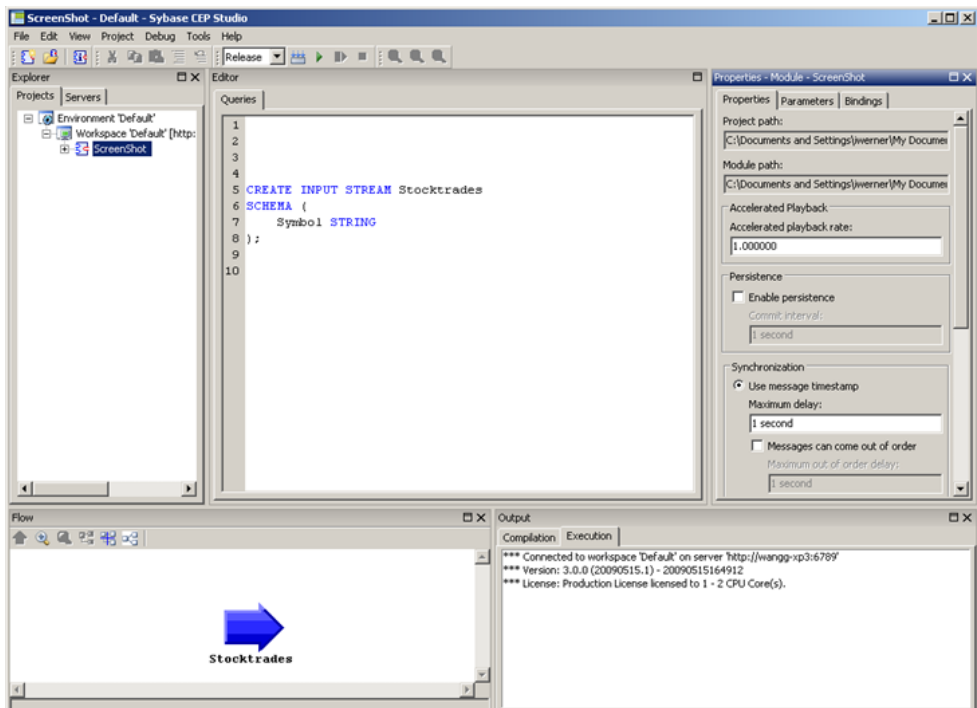
## Sybase CEP Studio Interface

An illustration of the Sybase CEP Studio user interface.

### Sybase CEP Studio Main Window

A description of how to modify views in the main Sybase CEP Studio window.

The following illustration shows Sybase CEP Studio with the default views displayed and docked in their default locations.



The following list provides links to additional information about the components of the main Sybase CEP Studio window:

## User Interface

<i>File Menu</i> on page 10
<i>Edit Menu</i> on page 11
<i>View Menu</i> on page 12
<i>Project Menu</i> on page 13
<i>Debug Menu</i> on page 14
<i>Tools Menu</i> on page 16
<i>Help Menu</i> on page 16
<i>Module Toolbar</i> on page 18
<i>Editor Toolbar</i> on page 18
<i>Compile Toolbar</i> on page 18
<i>Stream Viewer Toolbar</i> on page 19
<i>Explorer View</i> on page 20
<i>Editor View</i> on page 20
<i>Properties View</i> on page 21
<i>Flow View</i> on page 30
<i>Output View</i> on page 32
<i>Flow View Toolbar</i> on page 19

Display or hide a view by clicking the name of the view on the View menu.

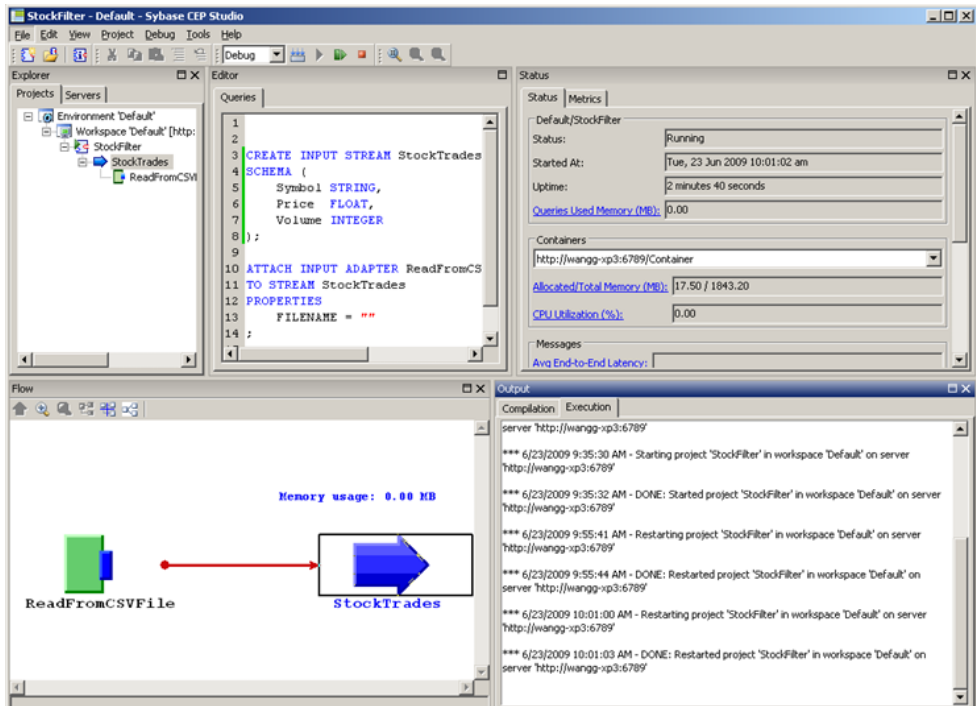
Display or hide a toolbar by pointing to Toolbars on the View menu and then clicking the name of the toolbar.

Move views by dragging their title bars and toolbars by dragging their handles. Sybase CEP Studio remembers the location of your views and toolbars across sessions. Hold the Control key while dragging a view to dock it in the main Sybase CEP Studio window.

To restore the views and toolbars to their original locations, click Restore Default Layout on the View menu.

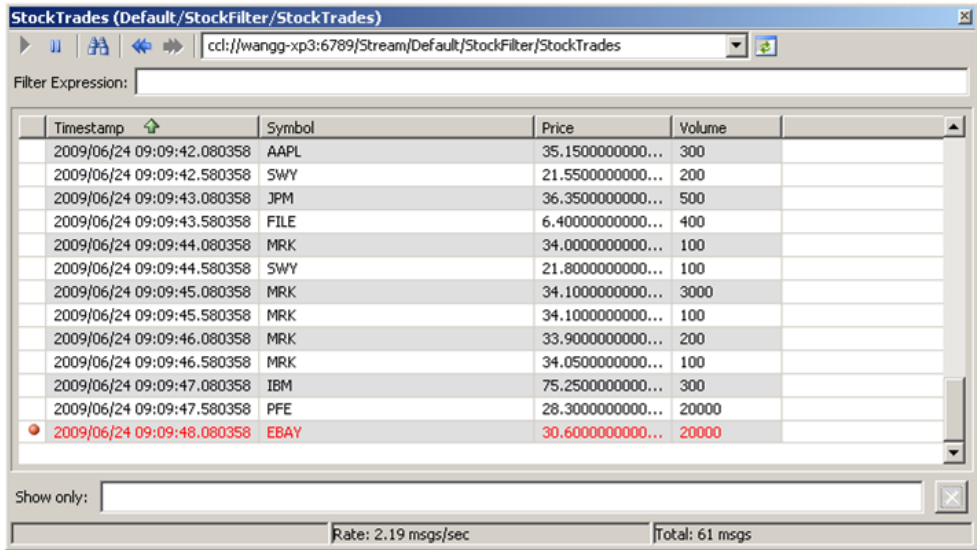
## Status View Layout

When you run a project, the default layout includes the Status view instead of the Properties view.



## Stream or Window Viewer

A stream or window viewer, which displays the contents of a stream or named window, opens as a separate window.



The following list provides links to additional information about the components of a stream or window viewer:

[Stream or Window Viewer Toolbar on page 19](#)

[Filtering Data in a Viewer on page 32](#)

## Menus

A description of functions you can access from the various menus of Sybase CEP Studio.

### File Menu

A description of functions you can access from the File Menu in Sybase CEP Studio.

New Project	Creates a new project and loads it into the selected Workspace, placing the files in the location you specify.
Load Project	Loads an existing project from the file you specify into the selected Workspace. Once loaded, you can temporarily change the name of the project by clicking Rename on the shortcut menu. This allows you to load multiple instances of the same project.

Reload Project	Identifies the source files for a previously loaded project that Sybase CEP Studio cannot locate for some reason. The icon in the Explorer view appears dimmed for such a project before you reload it.
Unload Project	Unloads a project from a Workspace.
Unload Multiple Projects	Unloads several projects at once from a Workspace.
Import BPEL File	Runs the BPEL to CCL Wizard, which translates a BPEL file and a Sybase CEP schema file into a CCL query module for monitoring BPEL business processes.
Export to a Zip File	Starting with the directory containing the specified project file, creates a Zip file containing the entire tree. If the project is under the SybaseC8Repository, then the archive reflects the project directory path under the SybaseC8Repository; otherwise the archive contains the directory tree without a preceding path.
Connect to Workspace	Connects to an existing Workspace or creates a new Workspace on Sybase CEP Server.
Reconnect Workspace	Attempts to reconnect to a Workspace .
Disconnect Workspace	Disconnects from the specified Workspace .
Environment	New: Closes the current Environment, and opens the New Environment dialog box, where you can create a new Environment. Open: Closes the current Environment, and opens the Open Environment dialog box, from which you can open an existing Environment. Close: Closes the current Environment.
Page Setup	Sets up the format for printing the contents of the Queries tab.
Print	Prints the contents of the Queries tab.
Recent Projects	Shows a list of up to nine recently opened projects that you can click to open.
<b>Recent Workspaces</b>	Shows a list of up to nine recently connected Workspaces that you can click to connect.
Exit	Exits Sybase CEP Studio.

## Edit Menu

A description of functions you can access from the Edit Menu in Sybase CEP Studio.

The Edit menu commands affect the text in the Queries tab of the Editor view.

Undo	Undoes edits starting from the most recent and proceeding backward.
Redo	Recreates the actions you undid with the Undo command, starting with the last Undo, and proceeding backward.
Cut	Cuts selected text to the clipboard.
Copy	Copies selected text to the clipboard.
Paste	Pastes text from the clipboard.
Delete	Deletes the selected text without copying it to the clipboard.
Find	Searches for specified text in the Queries tab.
Replace	Searches for specified text in the Queries tab and replaces it.
Select All	Selects the entire contents of the Queries tab.
Comment Selection	Converts the selected lines in the Queries tab to comments.
Uncomment Selection	Converts the selected lines in the Queries tab from comments to text.

## View Menu

A description of functions you can access from the View Menu in Sybase CEP Studio.

Go to Parent Module	Transfers the focus from a submodule to its parent module.
Zoom in Flow View	Zooms in to the Flow view diagram.
Zoom out Flow View	Zooms out of the Flow view diagram.
Center Flow View	Centers the Flow view diagram and resizes it to fit in the window.
<b>Show Selected in Flow View</b>	Centers the diagram around the selected component, if the component is outside the frame of the window.
Automatic Flow View Layout	Resets the Flow view diagram to its default layout.
Show Runtime Information	In the Flow view, displays or hides the number of rows processed by CCL statements. See <i>Viewing Project Data Flow in the Flow View</i> on page 30.
Explorer View	Displays or hides the <i>Explorer view</i> on page 20.
Output View	Displays or hides the <i>Output view</i> on page 32.
Flow View	Displays or hides the <i>Flow view</i> on page 30.



Properties View	Displays or hides the <i>Properties view</i> on page 21.
Status View	Displays or hides the <i>Status view</i> on page 28.
Toolbars	Module: Displays or hides the <i>Module toolbar</i> on page 18. Editor: Displays or hides the <i>Editor toolbar</i> on page 18. Compile: Displays or hides the <i>Compile toolbar</i> on page 18. Stream Viewer: Displays or hides the <i>Stream Viewer toolbar</i> on page 19.
Restore Default Layout	Restores views and toolbars to their default positions.

## Project Menu

A description of functions you can access from the Project Menu in Sybase CEP Studio.

Compile	Compiles the selected project and all of its modules, if needed, without running it. Any error messages appear in the <i>Output view</i> on page 32.
Compiler Options	Allows you to set compiler options for the selected module. See <i>Compiler Options</i> on page 39.
Module Enabled	Enables or disables the selected query module. Allows you to prevent a module from being compiled or run as part of the project without completely unloading it. The name of a disabled module appears in italics in the Explorer view.
New Query Module	Creates a new submodule of the selected module.
Load Query Module	Loads an existing query module as a submodule of the selected module.
Reload Query Module	Identifies the source files for a previously loaded module that Sybase CEP Studio cannot locate for some reason. The icon in the Explorer view appears dimmed for such a module before you reload it.
Unload Query Module	Unloads a query module.
Open Query Module with	Allows you to view the query module in another program, either the default XML viewer (as specified in the <i>External Tools settings</i> on page 37) or a program that you specify.
Add Input Stream	Adds an input data stream to the selected module.
Add Output Stream	Adds an output data stream to the selected module.
Add Local Stream	Adds a local data stream to the selected module.
Convert Stream to	Converts the selected stream to another type (local, input, or output).

Delete Stream	Deletes the selected stream.
<b>Add Schema</b>	Adds a schema named MySchema with a single column of type String named ColumnName. Modify the schema either by editing the CCL code directly or using the Schema Editor in the <i>Properties</i> on page 27 tab.
<b>Add Window</b>	Adds a window named MyWindow with a schema containing single column of type String named ColumnName and the window policy KEEP LAST. Modify the window and its schema either by editing the CCL code directly or using the <i>Properties</i> on page 27 tab and <i>Schema</i> on page 26 tab.
<b>Add Parameter</b>	Adds a parameter of type String named MyParameter. Modify the parameter either by editing the CCL code directly or using the <i>Parameters</i> on page 25 tab.
Attach Input Adapter	Attaches an input adapter to the selected data stream. Input adapters translate data from an external source to a format usable by Sybase CEP Engine. If the adapters supplied by Sybase CEP don't fit your needs, you can write your own. See the <i>Sybase CEP Integration Guide</i> for more information.
Attach Output Adapter	Attaches an output adapter to the selected data stream. Output adapters translate data from Sybase CEP Engine to an external source. If the adapters supplied by Sybase CEP don't fit your needs, you can write your own. See the <i>Sybase CEP Integration Guide</i> for more information.
Remove Adapter	Removes the selected adapter.

## **Debug Menu**

A description of functions you can access from the Debug Menu in Sybase CEP Studio.

<b>Start</b>	Compiles and runs the selected project. The project is only compiled if it is new or has been changed since the last compile.
<b>Start with Clean Slate</b>	Starts the selected project without recovering persisted data. The project starts as if it were being run for the first time, without recovering partially processed rows, or window, adapter, and CCL state. Only meaningful for a project with persistence enabled for at least one module.
<b>Restart</b>	Stops and restarts the selected project.
<b>Stop</b>	Stops the selected project.
<b>Start Multiple</b>	Compiles and runs several projects at once. Projects are only compiled if they are new or have been changed since the last compile.

<b>Start Multiple with Clean Slate</b>	Starts several projects at once without recovering persisted data. The projects start as if they were being run for the first time, without recovering partially processed rows, or window, adapter, and CCL state. Only meaningful for projects with persistence enabled for at least one module.
<b>Restart Multiple</b>	Stops and restarts several projects at once.
<b>Stop Multiple</b>	Stops several projects at once.
<b>Step Forward</b>	Highlights all rows in all open stream and window viewers, with a timestamp that falls between the timestamp of the selected row and that of the next subsequent row. See <i>Using Viewers to Debug an Application</i> on page 34.
<b>Step Backward</b>	Highlights all rows in all open stream and window viewers, with a timestamp that falls between the timestamp of the selected row and that of the closest previous row. See <i>Using Viewers to Debug an Application</i> on page 34.
<b>View Stream 'Name'</b>	Opens a viewer for the selected data stream or window.
<b>View Stream</b>	Opens a viewer for the data stream you identify by URI (the Properties view displays the URI of a selected stream). You can <i>specify filter columns or a filter expression</i> on page 32 to restrict the rows reaching the viewer.
<b>View Multiple Streams in Module 'Name'</b>	Opens viewers for multiple, specified data streams in the current module and its submodules.
<b>View All Streams in Module 'Name'</b>	Opens viewers for all data streams in the selected query module, but not its submodules.
<b>View Multiple Named Windows in Module 'Name'</b>	Opens viewers for specific named windows in the current module and its submodules. You must have set the Compiler Mode on the <i>Compile toolbar</i> on page 18 to Debug.
<b>View All Named Windows in Module 'Name'</b>	Opens viewers for all named windows in the selected query module, but not its submodules. You must have set the Compiler Mode on the <i>Compile toolbar</i> on page 18 to Debug.
<b>Clear All Viewers</b>	Clears all open viewers.
<b>Close All Viewers</b>	Closes all open viewers.
<b>Show All Viewers</b>	Brings all open viewers to the foreground.
<b>Arrange All Viewers</b>	Arranges all open viewers on the screen so that each is visible.
<b>Reconnect All Viewers</b>	Restarts the scrolling data display for all open viewers, after the display has been paused.
<b>Disconnect All Viewers</b>	Pauses the scrolling data display for all open viewers.

<b>Query Public Windows in Module 'Name'</b>	Allows you to run a SQL query against a public window in a running project. For instructions on creating public windows, see "CREATE WINDOW Statement" in the <i>CCL Reference Guide</i> . Sybase CEP SQL syntax is described in "CEP SQL" in the <i>CCL Reference Guide</i> .
<b>Send Rows</b>	Allows you to send one or more rows into an external input stream identified by URI.
<b>Request Workspace Status and Open With</b>	Allows you to view the Workspace status, either with the default XML viewer (as specified in <i>Sybase CEP Studio Settings</i> on page 37) or with the program you specify.
<b>Open Workspace Status Stream</b>	Opens a stream viewer for the status stream for the selected Workspace. For a description of the messages displayed in the viewer, see "Sybase CEP Server Events" in the <i>Sybase CEP Installation Guide</i> .

## Tools Menu

A description of functions you can access from the Tools Menu in Sybase CEP Studio.

CCS File Editor	Allows you to create or modify schema files. The interface is the same as on the <i>Schema tab</i> on page 26 of the Properties view for a data stream.
Workspaces Manager	Allows you to create, connect to, and destroy Workspaces.
Import Adapter Definition	Imports an adapter definition into the list of available adapters. For use with an adapter you have written yourself or purchased from a third party. See the <i>Sybase CEP Integration Guide</i> for more information about writing adapters.
<b>Local Time Calculator</b>	Converts a timestamp expressed in number of microseconds since the epoch into a readable format, adjusted for the local time zone.
Settings	Allows you to set general Sybase CEP Studio options. See <i>Sybase CEP Studio Settings: External Tools Tab</i> on page 37, <i>Sybase CEP Studio Settings: General Tab</i> on page 37, <i>Sybase CEP Studio Settings: Query Editor Tab</i> on page 38, and <i>Sybase CEP Studio Settings: Stream Viewer Tab</i> on page 38.

## Help Menu

A description of features you can access from the Help Menu in Sybase CEP Studio.

<b>Get Help</b>	Opens a browser window displaying the Sybase CEP documentation section relevant to the active Sybase CEP Studio component.
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<b>Online Help &amp; Documentation</b>	Opens a browser window displaying the documentation page of the Sybase Web site.
<b>Contact Sybase CEP Support</b>	Creates a Zip file containing the selected project's files and then opens a browser window to the Support page of the Sybase Web site, where you can submit the Zip file along with your question.
<b>Contents</b>	Opens a browser window displaying the Sybase CEP documentation.
<b>Individual document names</b>	Opens a browser window displaying the specified area of the Sybase CEP documentation.
<b>Sybase CEP News</b>	Opens a window displaying the latest information from Sybase CEP.
<b>About Sybase CEP Studio</b>	Opens a window displaying version and copyright information about Sybase CEP Studio.

## Shortcut Menu

A description of functions you can access from the Shortcut Menu in Sybase CEP Studio.

The following table describes commands that are only available from the shortcut menu:

Clear	In the Status view, clears the history of a monitor graph. In a stream or window viewer, clears the display.
Copy	In a stream or window viewer, copies the selected rows, along with the column names, to the clipboard.
Select All	In a stream or window viewer, selects all the rows displayed in the viewer.
Rename	Renames the selected environment, project, query module, data stream, or adapter.
Show value	In a stream or window viewer, copies the contents of a String or XML column from the selected row into the default CSV file editor.

## Toolbars

A description of functions you can access from various toolbars in Sybase CEP Studio.

## Module Toolbar

A description of functions you can access from the Module Toolbar in Sybase CEP Studio.

Button	Menu Command	Description
New Project	<b>File &gt; New Project</b>	Creates a new project in the selected Workspace.
Load Project	<b>File &gt; Load Project</b>	Loads an existing project into the selected Workspace.
View Project Status	<b>View &gt; Status View</b>	Displays the <i>Status view</i> on page 28 if it is hidden.

## Editor Toolbar

A description of functions you can access from the Editor Toolbar in Sybase CEP Studio.

Cut	Cuts selected text to the clipboard.
Copy	Copies selected text to the clipboard.
Paste	Pastes text from the clipboard.
Comment Selection	Converts the selected lines to comments.
Uncomment Selection	Converts the selected lines from comments to text.

## Compile Toolbar

A description of functions you can access from the Compile Toolbar in Sybase CEP Studio.

Button	Menu Command	Description
Debug/Release	Project > Compiler Options	Sets the selected project to Release or Debug mode. See <i>Compiler Options</i> on page 39.
Compile	<b>Project &gt; Compile</b>	Compiles the selected project without running it.
Start	<b>Debug &gt; Start</b>	Compiles and runs the selected project.

Restart	<b>Debug &gt; Restart</b>	Stops and restarts the selected project.
Stop	<b>Debug &gt; Stop</b>	Stops the selected project.

### Stream Viewer Toolbar

A description of functions you can access from the Stream Viewer Toolbar in Sybase CEP Studio.

Button	Debug Menu Command	Description
View Stream	View Stream 'name'	Opens a viewer for the selected stream or named window.
Clear All Viewers	<b>Clear All Viewers</b>	Clears all the open viewers.
Close All Viewers	Close All Viewers	Closes all the open viewers.

### Flow View Toolbar

A description of functions you can access from the Flow View Toolbar in Sybase CEP Studio.

Button	View Menu Command	Description
Go to Parent Module	<b>Go to Parent Module</b>	Transfers the focus from submodule to parent module.
Zoom in	<b>Zoom in Flow View</b>	Zooms into the Flow view.
Zoom out	<b>Zoom out Flow View</b>	Zooms out of the Flow view.
Center	<b>Center Flow View</b>	Centers the Flow view diagram and resizes it to fit in the window.
Show Selected	<b>Show Selected in Flow View</b>	Centers the selected component in the window, if it is outside the frame.
Automatic Layout	<b>Automatic Flow View Layout</b>	Resets the layout in the Flow view to its default setting.

### Stream or Window Viewer Toolbar

A description of functions you can access from the Stream or Window Viewer Toolbar in Sybase CEP Studio.

Button	Debug Menu Command	Description
Reconnect All Viewers	<b>Reconnect All Viewers</b>	Starts or restarts the scrolling data stream display for all open viewers.

Disconnect All Viewers	<b>Disconnect All Viewers</b>	Stops the scrolling data stream display for all open viewers.
Find	N/A	Searches for the occurrence of specific data in the viewer. See <i>Searching for Data in a Viewer</i> on page 34.
Step Backward	<b>Step Backward</b>	In all open viewers, highlights all rows with a timestamp that falls between the timestamp of the selected row and that of the previous row in this viewer. See <i>Using Viewers to Debug an Application</i> on page 34.
Step Forward	<b>Step Forward</b>	In all open viewers, highlights all rows with a timestamp that falls between the timestamp of the selected row and that of the subsequent row in this viewer. See <i>Using Viewers to Debug an Application</i> on page 34.

## Views

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A description of the various views in Sybase CEP Studio.

### Explorer View

A description of the Explorer view in Sybase CEP Studio.

The Explorer view contains two tabs:

- The Projects tab displays Environments, Workspaces, projects, query modules, data streams, and adapters. Note that the icon for a project changes based on whether or not it is running and whether or not the project contains errors or encountered run-time problems.
- The Servers tab displays the active Environment, connected Workspaces, associated servers and server status.

Use the Explorer view to select and perform actions on Sybase CEP Studio objects, and to view the relationships between them.

### Editor View

The Editor view contains the Queries tab, which shows the CCL statements associated with the current query module. You can add and modify CCL statements in this view.

When you select a component in the Explorer view, Sybase CEP Studio highlights the CCL statement defining the component (if one exists) with a green bar in the margin next to the CCL statement. Likewise, when you select the statement in the Editor view, the corresponding component (if one exists) is highlighted in the Explorer view and Flow view.

CCL statements continually make changes to and analyze data received by Sybase CEP Engine, as long as the project in which they are contained is running. Each Query module can



contain multiple statements, all of which run when the project is started. For a full discussion of CCL statements and syntax, see the *Sybase CEP Programmer's Guide* and the *Sybase CEP CCL Reference*.

---

**Tip:** You can view the relevant section of the Sybase CEP CCL Reference by clicking a CCL statement in the **Queries** tab and then pressing F1.

---

See *Editor Toolbar* on page 18 and *Edit Menu* on page 11 for information about the commands you can use in the Editor view.

## **Properties View**

The Properties view displays details about the object currently selected in the Explorer view or the Queries tab and may enable you to perform actions on that object.

By default, the Properties view is hidden when a project is running. Information in the Properties view is arranged in tabs that vary depending on the type of object you have selected:

- **Environment:** A single tab displaying the name of the Environment.
- **Workspace:** A single tab displaying information about the instance of Sybase CEP Server that this Sybase CEP Studio is communicating with, including the Sybase CEP Server URI, software version, connection status, and license details.
- **Server:** A Properties tab showing the same information as for a Workspace, and a *Status* on page 21 tab with additional information.
- **Project or Query Module:** Three tabs allowing you to view and set module Properties, *Parameters* on page 25, and *Bindings* on page 25.
- **Stream:** Properties and *Schema* on page 26 tabs.
- **Window:** Properties and *Schema* on page 26 tabs.
- *Schema* on page 27: A single tab that allows you to modify the schema.
- *Adapter* on page 28: A single tab that allows you to set parameters specific to the adapter.

### **Displaying the Sybase CEP server status**

The Status tab shows Sybase CEP Server settings and performance. The information displayed on this tab is related to the Container process on which the project is running.

For more information about Manager and Container processes and the preferences that you can set for them, see the *Sybase CEP Installation Guide*. Clicking a link on this tab displays a chart of the associated information. To clear the display history for a graph, right-click the graph and then click **Clear**. Clicking the link again closes the chart.

- **Load Limit:** Shows the maximum number of adapters or query processors that the Container process can execute.
- **Heartbeat Frequency (sec):** Shows the frequency with which the Container notifies the Manager process that it is running.
- **Start Time:** Shows when the Container was started.

- **Total Memory (MB):** Shows the total amount of memory available to programs for processing messages on this Container.
- **Used Memory (MB):** Shows the actual memory reserved by programs on this Container. If this number reaches the value of the available memory, the program terminates.
- **CPU Time (sec):** Shows the amount of CPU used by the Container, measured in milliseconds.
- **CPU Utilization (%):** Shows the CPU percentage used by the Container, related to all available processors.
- **Server Error Count:** Shows the total number of errors in the Sybase CEP Server log for the Container. This number is reset when the Container starts.
- **Server Warning Count:** Shows the total number of warnings in the Sybase CEP Server log for the Container. This number is reset when the Container starts.
- **Rcvd Messages:** Shows the total number of rows received by queries, but not adapters, running on the Container during the current Sybase CEP Server session.
- **Sent Messages:** Shows the total number of rows published by queries, but not adapters, running on the Container during the current Sybase CEP Server session.
- **Discarded Messages:** Shows the total number of rows that have been received and then dropped due to timing or other issues by queries, not adapters, running on the Container during the current Sybase CEP Server session.
- **Pending Messages:** Shows the total number of rows in internal buffers waiting to be processed by queries running on the Container.
- **Persistence Messages:** Shows the number of state updates waiting to be saved to the disk on the Container, if you have enabled Persistence.

### **Query Module Properties**

The Properties tab for a query module enables you to view and set project properties.

- Project path shows the location of your project file.
- Module path shows the location of your query module file.
- Accelerated Playback allows you to set the Accelerated playback rate to specify a faster or slower rate at which the project should be run. The default setting is 1.0, for real time. To increase the speed, set the number to a value larger than 1.0; to decrease the speed, set the number to a value smaller than 1.0.

After adjusting the rate, time-based operations are accelerated or decelerated proportionately. Adjusted-rate playback is only available for applications that use input files, since the arrival of rows from other kinds of external data sources cannot be adjusted by Sybase CEP Engine.

- Persistence allows you to determine state persistence for the query module. When you select the Enable persistence for this module check box, Sybase CEP Server saves information about the state of the module CCL statements, named windows, data streams, and adapters to disk at the interval specified in the Commit interval field. This information can later be used to recover data in case of server failure. You can enable or disable persistence for every query module individually. You specify the commit interval in CCL Interval format. See "Time Literals" in the *Sybase CEP CCL Reference Guide* for more

information about valid formats. If you enter a positive integer without any further qualifier, Sybase CEP Engine interprets it as a number of microseconds.

The Properties tab for a query submodule includes the Inherit persistence settings from the parent module check box. When you select this check box, the submodule uses the same persistence settings as its parent.

Note that, in cases where a parent module and its submodules specify different commit intervals, the parent module and all of its submodules use the shortest specified interval. A data stream always inherits its persistence settings from its query module or submodule.

---

**Warning!** Enabling persistence can have a significant negative impact on performance.

- The Synchronization area contains properties that correct synchronization problems in a module's streams. These settings are automatically inherited by all of the module's input streams and submodules, but settings for specific streams and submodules can be overridden, as explained here and in Properties Tab for a Data Stream.

- Selecting **Use message timestamp** makes available several synchronisation options: The Maximum delay field allows Sybase CEP Server to correct synchronization problems among rows arriving in different input streams in a module. When necessary, Sybase CEP Server retains incoming rows up to the interval specified in the Maximum delay field, before sorting the order in which they arrive in their respective streams. Since different streams can have Maximum delay set to different values, the largest setting of this field among the different streams attached to the module is used to determine the overall Maximum delay interval for the module. Maximum delay should not be set to 0.

Selecting Messages can come out of order enables an additional feature that works with the Maximum out of order delay field, allowing Sybase CEP Server to correct synchronization problems on a given input stream. When selected, Sybase CEP Server retains rows arriving in the input stream for the interval specified in the Maximum out of order delay field, before ordering them by timestamp and delivering them into the stream. This ensures that any synchronization problems between Sybase CEP Server and outside data sources encountered in the specified time period are resolved before the rows are fed into the stream. If the Messages can come out of order check box is not selected, any row that arrives with an earlier timestamp than the row currently in the stream is discarded.

The Maximum out of order delay field accepts any valid CCL INTERVAL type, as described in the Sybase CEP CCL Reference Guide. If you enter a positive integer without any further qualifier, Sybase CEP Engine interprets it as a number of microseconds.

---

**Note:** Note the difference between Maximum delay and Maximum out of order delay. The first interval controls synchronization among all of the external input streams in a module. The second interval controls synchronization only for rows arriving in a single stream.

- Selecting Use current server timestamp causes rows arriving in a stream to be assigned a timestamp by Sybase CEP Server, based on the current time. This timestamp overrides and replaces the timestamp set by the adapter.

You should use this setting when it is not important to you to know when rows arrive in the module's streams. With this setting enabled, no rows are marked as arriving out of order.

- Inherit settings from the parent module sets a submodule's synchronization options to those of its parent module.
- The Guaranteed Delivery area contains settings that allow you to specify Guaranteed Delivery options. These settings are automatically inherited by all of the module's streams, but settings for specific streams can be overridden, as explained in Setting Data Stream Properties.

---

**Warning!** Guaranteed delivery only works in combination with input or output adapters that support the Guaranteed Delivery feature, and only if Guaranteed Delivery is enabled for those adapters. For more information, see the *Sybase CEP Integration Guide*. Guaranteed Delivery features by themselves do not guarantee delivery of rows if the Container process of Sybase CEP Server on which the project is running fails. A combination of Persistence and Guaranteed Delivery guarantees delivery of rows even in cases of Container failure.

---

- **Enable guaranteed delivery for this module** turns on Guaranteed Delivery, which guarantees that every row is received by its destination at least once, as long as the software components are running.
- The Maximum number of messages box specifies the maximum number of messages to hold in the Guaranteed Delivery queue. Messages that arrive when the Guaranteed Delivery queue contains this maximum number are discarded. The default setting of 0 (or clearing this box) places no limit on the number of messages in the queue.
- The Maximum message age box specifies the maximum permitted age of messages in the Guaranteed Delivery queue. Messages that exceed the allowed age are removed from the queue and discarded. This value is a CCL INTERVAL type, as described in the *Sybase CEP CCL Reference Guide*. If you enter a positive integer without any further qualifiers in this field, Sybase CEP Engine interprets it as a number of microseconds. Leaving this field blank, or entering 0 in this field, places no limit on the age of messages in the queue.

---

**Warning!** Messages in the Guaranteed Delivery queue are stored in memory. If you do not place a limit on the size of the queue, or place too high a limit on the queue, you run the risk of causing Sybase CEP Server to run out of memory.

---

- Inherit settings from the parent module sets a submodule's Guaranteed Delivery options to those of its parent module.
- The Clustering area contains the Number of project instances box, which specifies how many instances of a project to run. This feature is set from the main query module for all modules in a project. To use the parallel query feature, set the number of instances for a project to two or more.
- The Error Recovery area contains the Restart project on failure check box, which allows you to specify that the project containing the selected query module should automatically restart following a fatal error.

Note that adapters are *not* automatically restarted by selecting this option.

---

**Warning!** If the fatal error is not transient, a project set to restart automatically can enter a continuous restart loop, which can be broken by stopping the project.

---

### **Defining a parameter**

If your CCL statements uses parameters, the parameters must be defined in the Parameters table under the Parameters tab, where you can set the name and data type for each parameter.

To define a parameter, enter its name in the Name column and its type in the Type column.

To set a default value for the parameter, specify it in the Default column. This default value may be overridden by setting the Value column in the Bindings tab, as explained below.

If you need to define more than one parameter, use the Insert row button to the right of the Parameters table to add extra rows to the Parameters table. To delete unneeded rows, click on the Delete row button. To move parameter definitions up or down in the Parameters table, use the Move row up and Move row down buttons.

### **Binding streams**

Use the Bindings tab to create bindings between an input or output data stream and a stream in another query module, and to override the default values for parameters.

- To bind an input stream to a stream in a parent query module, enter the name of the input data stream in the Formal Name box of the Input Streams section and the name of the data stream to which it is bound in the Connection box. When binding an input stream to a stream in an unrelated module, the Connection specified in the binding must be the full stream URI. The stream URI is listed in the stream's properties.
- To bind an output stream to a stream in the project or parent query module, enter the name of the output data stream in the Formal Name box of the Output Streams section of this tab and the name of the parent data stream to which it is bound in the Connection box. When binding an output stream to a stream in an unrelated module, the Connection specified in the binding must be the full stream URI of the stream. The stream URI is listed in the stream's properties.
- Any parameters defined under the Parameters tab also appear in the Parameters section of the Bindings tab. To override the default value of a parameter, set the value for the parameter in the Value column on the Bindings tab.

When binding between data streams within a single project, the schema of the stream in the parent module must be a superset of the schema of the stream in the child module, matching all columns in the child schema by name and data type.

When binding between data streams in separate projects, Sybase CEP Engine matches the data based on column name and data type, regardless of number and order. Columns present in the publishing stream that are not present in the subscribing stream are ignored, while columns present in the subscribing stream that are not present in the publishing stream are set to NULL.

For example, assume stream A is defined with two columns - Symbol, type String, and Price, type Long - while stream B is defined in a separate project with three columns - Price, type

Long; Volume, type Integer; and Symbol, type String. If you bind these two streams together, with stream A publishing to Stream B, the values from stream A's Symbol and Price columns are placed in the matching columns of stream B, while stream B's Volume column is set to NULL. If you bind the streams with B publishing to A, then A receives the values from the Symbol and Price columns in stream B, while the Volume column is ignored.

### Data Stream Properties

A description of data stream properties you can access from the Properties tab in Sybase CEP Studio.

<b>Stream URI Http URI</b>	The URI information for the stream (Note: Http URI is only visible when the project is running). If multiple instances of the stream are running, the URI appears with a ~ # on the end, where # is the number of the stream instance.
<b>Synchronization</b>	<p>Allows you to override the Synchronization settings inherited from the stream's module. Clear the <b>Inherit settings from the parent module</b> check box and then set the synchronization properties, which are described in Properties Tab. Note that the settings you specify here are valid only for the specific stream. Only available for an input stream.</p> <hr/> <p><b>Note:</b> Sybase CEP strongly recommends that you set "Use current server timestamp" at the query module level, not at the stream level, if that is the synchronization setting you want to use.</p> <hr/>
<b>Guaranteed Delivery</b>	Allows you to override the Guaranteed Delivery options inherited from the stream's module. Clear the Inherit settings from the parent module check box and then set the queue size and message age properties, which are described in Properties Tab. Note that the settings you specify here are valid only for the specific stream. Only available for an input or output stream.

### Choosing or Creating a Schema file

If you edit the schema of a stream created using Sybase CEP Engine version 5.4 or older, and the schema is defined in a .ccs file, you can choose a different schema file or create a new file.

To choose a different schema file:

1. Click the name of the stream in the Explorer view.
2. Click the Open an existing schema file button in the Stream Schema Editor or click CCS File Editor on the Tools menu.
3. Navigate to the file you want to use and then click Open. The Stream Schema Editor now shows the contents of the file you opened.

Note that, if you edit a schema definition file that is used by more than one stream, the schema changes for all of the associated streams.

To create a new schema file:

1. Click the name of the stream in the Explorer view.
2. Click the Create a new schema button in the in the Stream Schema Editor.
3. Navigate to the directory where you want to create the new schema file and then enter a name for the file into the Filename box.
4. Click Save. The Stream Schema Editor now shows a blank schema.
5. Use the Insert row button to add a column to the schema, and then enter the name and type of a column.
6. Define additional columns as needed. Use the Insert row button to add a column, the Delete row button to delete a column, and the Move row up and Move row down buttons to move column definitions up and down in the editor.

### **Window Properties**

A description of properties you can set from the Properties tab for a named window.

<b>Window URI Http URI</b>	The URI information for the window (Note: Http URI is only visible when the project is running). If multiple instances of the window are running, the URI appears with a ~ # on the end, where # is the number of the window instance.
<b>Window Policies</b>	The KEEP clauses in the window definition.
<b>Public</b>	If selected, this window is public. See "Public Windows" in the <i>Sybase CEP CCL Reference Guide</i> for more information.
<b>Master/Mirror</b>	Specifies whether this window is a Master window, a Mirror window, or neither. If you specify Master, you can specify columns for filtering purposes. If you specify Mirror, you must also identify the associated master window and, optionally, values for filter columns. For a Mirror window, you can also enter an arbitrary expression into the Filter by Expression box. See "Shared Windows" in the <i>Sybase CEP CCL Reference Guide</i> for more information.
<b>Removed Rows Destination</b>	The stream or window in the current query module that receives rows removed from this window. See "CREATE WINDOW Statement" in the <i>Sybase CEP CCL Reference Guide</i> for more information.

### **Schema Properties**

The schema editor lets you modify a schema.

You can:

- Change the name or data type of any column by entering a new name or type.
- Use the Insert row button to add a column to the schema, then enter the name and data type for the column.
- Use the Delete row button to delete a column and the Move row up and Move row down buttons to move column definitions up and down in the editor.

### **Adapter Properties**

Every type of input and output adapter has properties that you must set for the adapter to function properly.

Examples include the rate at which an adapter should process data, the source from which the adapter obtains data, or the destination to which it delivers data. Some properties are unique to a particular type of adapter. When you click the name of an adapter in the Explorer view, the Properties tab of the Properties view displays the associated properties. Some labels in the Properties tab act as links, displaying or hiding a help summary for the associated property. For additional instructions on setting properties for specific adapter types, see the *Sybase CEP Integration Guide*.

### **Status View**

A description of the Status View in Sybase CEP Studio.

By default, the Status view appears only when a project is running.

The Status tab displays information about the running project selected in the Explorer view.

The Metrics tab displays information from the Status Stream related to the running project selected in the Explorer view.

### **Status Tab**

A description of the Sybase CEP Studio components you can view statuses for from the Status Tab.

Note that some labels on this tab are links, displaying or hiding a graph of the associated data.

**Table 1. Workspace-Name/Project-Name**

Name	Description
Status	The project's status, either "Running" or "Stopped".
Started At	The date and time when the project was last started.
Uptime	The length of time the project last ran, or has been running since it was started.
<b>Queries Used Memory (MB)</b>	The total memory usage for all queries in the project.  Note that this calculation is not exact. For example, memory in buffers used by all running projects is not included as part of the total, and memory used by a row that appears in multiple windows is counted multiple times. Also note that the preference "SybaseC8/Performance/EnableMemoryUsageStats" in the file c8-server.conf controls whether or not this statistic displays.



Name	Description
Queries CPU Utilization(%)	The CPU utilization of the project's queries, as a percentage of total capacity on all available processors.

**Table 2. Containers**

Name	Description
(unnamed)	A list of URIs for the Containers, including host names and port numbers.
Used/Total Memory (MB)	The amount of memory used by the selected Container and the total memory available for use by the Container.
CPU Utilization (%)	Container CPU utilization, as a percentage of total capacity on all available processors.

**Table 3. Messages**

Name	Description
Avg End-to-End Latency	The average interval between the time a row arrives to be processed by an input adapter and the time it is completely processed by an output adapter.
Avg Queries Latency	The average interval between the time a row arrives in the project and the time it is processed by all the CCL statements and submodules in the project. (Average queries latency does not count the time it takes for rows to be processed by adapters.)
Received	The total number of rows and average number of rows per second received by the project's queries since it started running.
Sent	The total number of rows and average number of rows per second published by the project's queries since it started running.
Discarded	The number of rows discarded by the project.
Pending	The number of rows pending processing by the project.
Pending Persistence	The number of rows in a Persistence-enabled project waiting to be saved to disk. This number is always 0 for non Persistence-enabled projects.

Name	Description
RPC/DB Pending	The number of rows awaiting a response from a remote procedure or function.
RPC/DB Cached	The number of rows cached by the project's database subqueries and remote subqueries.

**Metrics Tab**

The Metrics tab displays a table of Status Stream information, filtered for the selected running project.

Use the Save button to save the table to a file in CSV format.

Use the Copy button to copy the table to the clipboard.

For a description of the messages displayed in the table, see "Sybase CEP Server Events" in the *Sybase CEP Installation Guide*.

Note that you can view the complete Status Stream by clicking Open Workspace Status Stream on the Debug menu.






**Flow View**


The Flow view displays a flow diagram of your project and all of its components.

**Viewing Project Data Flow in the Flow View**

The Flow view displays an interactive diagram of a project, or one of its modules, and all of the associated components. The Flow view shows the relationships between all the components, including CCL statements and submodules, data streams and adapters, and external databases.

The following table describes the graphic elements of the Flow view:

	Input and output adapters.
	External databases.
	Input, output, and local streams. Right-clicking a stream allows you to open a viewer for that stream.
	Regular and public named windows. Right-clicking a named window allows you to open a viewer for that window.
	CCL statements inside the current module. Each blue box represents a separate CCL statement. A portion of the statement text appears inside the box.

	Submodule of the current query module.
---	--

The Flow view also displays:

- The number of rows processed by each of the module's CCL statements since the project was last started.
- The average latency to each data stream (number of microseconds it takes rows to travel from any input adapter to the stream).
- The average latency from each data stream (number of microseconds it takes rows to travel from the stream to any output adapter).
- The size of each window.
- The approximate amount of memory used by each window.
- The approximate amount of memory used by each query (note that the preference "SybaseC8/ Performance/ EnableMemoryUsageStats" in the file c8-server.conf controls whether or not the memory statistics display).

These run-time statistics can be turned on and off by clicking Show Runtime Information on the View menu.

Right-clicking a group of CCL statements in the Flow view shows the statements' detail.

Right-clicking other objects displays the same shortcut menu as when you right-click the same component in the Explorer view.

### **Navigating the Flow View**

The Flow view updates dynamically as you modify your CCL or add or remove adapters and streams.

Clicking any component of your project in the Explorer view selects the component in the Flow view, and double-clicking any component in the Flow view, except an external database, causes its information to be displayed in the Explorer, Editor, and Properties views.

Furthermore, if a query module includes nested submodules, double-clicking the submodule's icon in the Flow view displays a detailed view of the submodule's contents.

### **Changing the Flow View Display**

Inside the Flow view, you can move project and query module components manually by dragging a component to create a different layout.

Moving the components of the module in the Flow View does not change their configuration or the flow of the data in the project or module. The new layout appears in the Flow view until one of the following events resets the view to its default layout:

- You add, remove, or rename a data stream, named window, submodule, or adapter.
- You change the contents of a query module.
- You click the Automatic Layout button in the Flow view toolbar, or click Automatic Flow View Layout on the View menu.

The Flow view toolbar includes several other buttons used to control the display. See *Flow View Toolbar* on page 19 for more information.

### Output View

The Output view displays compilation and execution messages.

The Compilation tab displays messages when you compile a project.

---

**Note:** You can double-click an error message in the Output view to go to the source of the error message in your CCL code.

---

The Execution tab displays messages related to running a project and to Sybase CEP Studio operations, such as connecting to a Workspace.

### Stream and Window Viewers

A stream viewer displays rows as they arrive on the stream. A window viewer displays the current contents of the window as rows enter and are removed from the window.

New rows are shown in red and are marked with a red dot. If you have selected the Show deleted rows check box in the *Stream Viewer tab of Studio Settings* on page 38, rows that have just been removed from the window are shown crossed out until the window contents change again.

See *Using Viewers to Debug an Application* on page 34 for more information on debugging in viewers.

See *Copying Data from a Viewer* on page 34 for information on copying values or rows from a stream or window viewer.

### Filtering Data in a Viewer

A description of how to filter data in a viewer, and specify filter columns and filter expressions.

### Display

To filter the display in a viewer, enter a string into the Show only box at the bottom of the viewer. The viewer display is limited to rows that contain the specified string in any column, regardless of data type. Clear the display filter by deleting the string in the text box or by clicking the red x to the right of the box. Note that this feature only affects the display, not the contents of the stream or window.

### Subscription

You can restrict the rows reaching the stream or window viewer by specifying filter columns, a filter expression, or both.

## Filter Columns

If you are viewing an output stream or master window for which the `FILTERCOLUMNS` property has been set, you can specify parameters for the URI that limit the subscription to rows matching the specified filter values. For more information about `FILTERCOLUMNS`, see "CREATE STREAM Statement" and "CREATE WINDOW Statement" in the Sybase CEP CCL Reference.

To use this feature, follow these steps:

1. Enter a comma-separated list of values in the Filter Columns box in the viewer. The values must be in the order specified by the `FILTERCOLUMNS` property of the output stream.
2. Click the Reconnect button to the right of the URI. Sybase CEP Studio reconnects to the stream, passing the filter values as query string parameters. The viewer now displays only those rows with columns containing the specified values.

## Filter Expression

Enter an expression into the Filter Expression box to limit the subscription to those rows for which the specified expression evaluates as True, even if the stream or master window does not have the `FILTERCOLUMNS` property set.

Any standard CCL Boolean scalar expression can be specified, but it cannot include any of the following:

- Aggregator functions, such as `SUM()` or `COUNT()`.
- Stateful operators like `PREV()`.
- `FIRST / LAST / INDEX` operators.
- CCL variable references.
- `GETTIMESTAMP()`.
- `GET__COLUMNBYNAME()`.
- `XMLPATTERNMATCH()`.
- Functions used within `XMLTABLE()`.

However, you can include user-defined scalar functions and the zero-argument variant of `GETTIMESTAMP()`. For information, see the *Sybase CEP CCL Reference Guide*.

You can also specify filter column values and/or a filter expression when you open a new viewer by clicking View Stream on the Debug menu.

Note that these features filter rows before Sybase CEP Studio displays them in the viewer, but the filter only applies to the viewer and does not affect any other component of your project.

## Searching for Data in a Viewer

A description of how to search for the occurrence of specific data in a viewer using search fields.

1. Click the Find button on the viewer toolbar.
2. Enter the search criteria in the Find box.
3. Select the Match case check box if you want the search to take upper and lower case into account.
4. Select the Match whole word check box if you only want to search for whole words.
5. Click Find Next to find the next occurrence of the pattern you specified, or Mark All to search for and mark all occurrences of the pattern.

## Copying Data from a Viewer

A description of how to copy data from a viewer. Provides an example of the output format of copied data.

## Copying

- Copy a String or XML column value to a file: Right-click the column value and then click Show value. Sybase CEP Studio saves the value to a file under tmp/values in the SybaseC8Repository and then opens that file with the default CSV editor you specify in the *External Tools tab of the Settings window* on page 37.
- Copy rows to the clipboard: Select the rows of interest (right-click and then click Select All to select the entire contents of the viewer), right-click, and then click Copy.
- Copy rows to a file: Select the rows of interest, right-click, and then click Save to File.

## Output Format

Copied rows include a heading row with column names and an initial column containing the row timestamp. This example shows the results of copying a row containing two columns:

```
Timestamp,Id,Data  
1087491625647388,54,76
```

Null values are ignored. Timestamps appear in the format you specify in the *Stream Viewer tab of the Settings window* on page 37.

## Using Viewers to Debug an Application

Sybase CEP Studio viewers have a step-through feature that you can use as an aid to debug applications. It helps you to track when rows arrive in different streams within a specified interval.

To use the debug features effectively, follow these steps:

1. Open viewers for all the streams and named windows you want to analyze.
2. Pause the viewers.
3. Choose a viewer (called the primary viewer in these instructions) displaying rows with timestamps from which you will start tracking.
4. Decide whether you want to track forward or backward from the timestamp of a specific row and then click a row with the appropriate timestamp in the primary viewer.
5. Click either the Step Forward or Step Backward button on the viewer toolbar (or click either Step Forward or Step Backward on the Debug menu).
  - Step Forward selects all rows in all viewers with a timestamp equal to or greater than the timestamp of the selected row in the primary viewer, but no greater than the timestamp of the subsequent row in the primary viewer. The viewers display selected rows in red, with a red dot to their left. If you click one of these rows, the dot changes to purple and the text changes to black.
  - Step Backward selects all rows in all viewers with a timestamp no greater than the timestamp of the selected row in the primary viewer, but greater than or equal to the timestamp of the previous row in the primary viewer. The viewers display selected rows in red, with a red dot to their left. If you click one of these rows, the dot changes to purple and the text changes to black.
6. Click the Timestamp column heading to toggle between new rows being inserted at the top of the viewer and new rows being inserted at the bottom of the viewer.





# Sybase CEP Studio Settings

An overview of functions that you can access through the Sybase CEP Studio Settings.

## Sybase CEP Studio Settings: External Tools Tab

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A description of functions you can access from the External Tools tab under Sybase CEP Studio Settings.

<b>XML Viewer</b>	This application is used to display XML files.
<b>CSV Editor</b>	This application is used to edit CSV files.
<b>PDF Viewer</b>	This application is used to display PDF files and is only changeable on UNIX-like operating systems.
<b>java.exe command path</b>	The location of the Java executable. Required for the BPEL to CCL Wizard.

## Sybase CEP Studio Settings: General Tab

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A description of functions you can access from the General tab under Sybase CEP Studio Settings.

<b>Repository</b>	The location of the Sybase CEP Repository. The Repository is where Sybase CEP Studio stores its configuration files, temporary files, and examples, as well as being the default location for new projects. Click the button to the right of the field to change the location of your Repository.
<b>Adapters' Base Folder</b>	The directory Sybase CEP Studio opens when you are browsing for the data file to use with an adapter. For more information about the adapters base folder, see "Configuring Sybase CEP Adapters" in the <i>Sybase CEP Integration Guide</i> .
<b>Check Sybase CEO news on start-up</b>	Whether or not you want to see important Sybase CEP updates and notifications when you start Sybase CEP Studio.

## Sybase CEP Studio Settings: Query Editor Tab

A description of functions you can access from the Query Editor tab under Sybase CEP Studio Settings.

<b>Font</b>	The font family and point size of the text in the Queries tab of the Editor view.
<b>Display Item</b>	The colors and font styles for various items displayed in the Queries tab.
<b>Disable keyword/field-selection autocomplete</b>	If selected, disables the autocomplete feature, which automatically completes partial word entries in the Queries tab.
<b>Keyword minimum length for autocomplete</b>	The minimum number of characters you must enter to trigger the autocomplete feature.
<b>Disable projects tree and editor synchronization</b>	Controls whether or not Sybase CEP Studio scrolls to the statement that creates a component in the Queries tab when you select the corresponding component in the Explorer view, and vice versa. This feature affects only scrolling: it does not affect synchronization between the Explorer view and the Flow view. Any CCL statements associated with a component selected in one of these views is also still highlighted with a green line in the Queries tab margin, whether or not this feature is enabled.
<b>Disable automatic \$Project-Folder use</b>	When you use the Sybase CEP Studio user interface to locate the file to use with an adapter, it automatically specifies the file name relative to "\$ProjectFolder", if possible. If you check this setting, Sybase CEP Studio will instead use the absolute path or "\$BaseFolder" in the path to the file.

## Sybase CEP Studio Settings: Stream Viewer Tab

A description of functions you can access from the Stream Viewer tab under Sybase CEP Studio Settings.

<b>Rows to display</b>	The maximum number of rows viewers can display at any given time. For viewing windows, set this number to at least twice the number of rows retained by the window. Otherwise the viewer may display inaccurate data.
<b>Timestamp format</b>	A format for displaying row timestamps. For more information, see "Timestamp Format Codes" in the <i>Sybase CEP CCL Reference Guide</i> .
<b>Timestamp timezone</b>	The time zone for displaying row timestamps.

<b>Show timestamp column</b>	Whether or not the timestamp column is displayed.
<b>Show deleted rows</b>	Whether or not rows that have just been deleted from a named window appear in the viewer. If selected, deleted rows appear crossed out when they are first deleted, then disappear from the viewer when the CCL statement executes again.
<b>Rows coloring</b>	The background color for rows, either None for all white, or Zebra for alternating between white and gray after the specified number of rows.
<b>New messages are appended to the</b>	Where new rows appear in a viewer, either Top or Bottom.

## Setting the Compiler Options

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A description of features you can set from Compiler Options in the Project Menu of the Explorer view.

To set or view compiler options for a project, click the name of the project in the Explorer view and then click Compiler Options on the Project menu:

- Project path displays the location of the project file.
- Project name displays the name under which the project was loaded into the Workspace. Note that a project can be loaded several times under different names (by clicking the project in the Explorer view and then clicking Rename in the shortcut menu).
- Workspace name displays the Workspace containing the project.
- Compiler Mode (also available on the *Compile toolbar* on page 18) specifies either Debug mode, which allows the contents of local streams and named windows to be displayed in stream and window viewers, or Release mode, which does not.
- Max Errors Reported limits the number of errors the compiler reports to the specified value.
- Eliminate redundant primitives improves performance by attempting to eliminate redundancy in the low-level engine primitives generated by the compiler. Leave this option enabled unless asked to disable it by Technical Support.
- Evaluate WHERE and HAVING as soon as possible reduces resource requirements, because fewer rows are entered into time-based windows and their associated indexes, and fewer cross-products are calculated.
- Shortcut AND and OR operators stops evaluating AND and OR subclauses as soon as they become irrelevant: AND subclauses when one of their components evaluates to FALSE; OR subclauses when one of their components evaluates to TRUE. Leave this option enabled, unless asked to disable it by Technical Support
- Remove internal streams improves performance by eliminating some streams from the compiled version of the CCL file and preventing them from being created on Sybase CEP Server when the project is run. Streams are removed unless one or more of the following conditions is true:

- Debug mode is turned on.
- The Remove internal streams check box is not selected.
- The stream is an input stream.
- The stream is an output stream that has no binding to a stream in a parent module.
- The stream is attached to an adapter.

Note that the Explorer view continues to display removed streams. You can also open a stream viewer for a removed stream, but the viewer is empty.

- Suppress all warnings suppresses all warning messages.
- Warn when indexes are not used generates a warning when CCL execution is likely to be slow because an index between two or more data sources in a CCL statement could not be created or deduced.
- Issue deprecation warnings generates a warning when your project includes deprecated CCL syntax.
- Issue warnings for implicit string conversions generates a warning whenever a CCL data type within the current project is automatically converted into a `STRING` data type, or from a `STRING` to another data type.
- Issue warnings for data sources that are used in queries but receive no input generates a warning whenever a data source used in a CCL statement is not set to receive data through another statement or subquery, a stream binding, or an adapter.
- List of folders to search for imported files allows you to enter the names of directories where you want the compiler to search for files that you import into your project. List each directory on a separate line, and the compiler searches the directories in the listed order. For a complete discussion of this compiler option, see "Compiling Directly via the CCL Compiler" in the *Sybase CEP Integration Guide*, under "Importing."

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