IBM WebSphere® Process Integration V6.0 – Lab Exercise

Raising and Monitoring Business Events

What this exercise is about

Because integration applications involve different technologies spread across the enterprise, it is important to monitor transactions that flow through the different systems and components. Messages or events can be generated when components are run or state changes occur. These events can then be collected and correlated for a complete view of the business transaction by monitoring applications. WebSphere Process Server V6.0 includes the Common Event Infrastructure (CEI) framework, which can capture generated events that use the Common Base Event (CBE) format. WebSphere Integration Developer V6.0 provides the ability to enable event generation for SCA components and state changes.

Lab Requirements

List of system and software required for the student to complete the lab.

- WebSphere Integration Developer V6 installed

- WebSphere Process Server V6 test environment installed

- Sample code in the directory C:\Labfiles60 (Windows®) or /tmp/LabFiles60 (Linux®)

What you should be able to do

At the end of this lab you should be able to:

- Enable event generation on BPEL business process, human tasks, selectors, business rules and SCA components in general with WebSphere Integration Developer v6.0.

- Enable WebSphere Process Server v6.0 to log events in for business processes and human tasks.

- View generated events using the CBE Browser included with WebSphere Process Server v6.0.

- Dynamically enable event generation in WebSphere Process Server v6.0.

Introduction

With integration applications involving different technologies spread across the enterprise, it becomes important to monitor transactions which flow through the different systems and components. Messages or events can be generated when components are run or different state changes occur. These events can then be collected and correlated for a complete view of the business transaction by monitoring applications. WebSphere Process Server v6.0 includes the Common Event Infrastructure (CEI) as a framework which can capture generated events which use the Common Base Event (CBE) format. WebSphere Integration Developer v6.0 provides the ability to enable event generation for different SCA components and state changes. With the combination of support from these two products, the core capabilities to monitor business transactions are provided.

Exercise Instructions

Some instructions in this lab might be specific for Windows platforms. If you run the lab on a platform other than Windows, you will need to run the appropriate commands, and use appropriate files (for example .sh in place of .bat) for your operating system. The directory locations are specified in the lab instructions using symbolic references as follows:

Reference Variable	Windows Location	Linux Location
<WID_HOME>	C:\Program Files\IBM\WebSphere\ID\6.0	/opt/IBM/WebSphere/ID/6.0
<WPS_HOME>	<WID_HOME>\runtimes\bi_v6	<WID_HOME>/runtimes/bi_v6
<LAB_FILES>	C:\Labfiles60	/tmp/Labfiles60
<WORKSPACE>	C:\Labfiles60\eXchange\CEIMonitor\workspace	/tmp/Labfiles60/eXchange/CEIMonitor/workspace
<TEMP>	C:\temp	/tmp
<SOLUTION>	C:\Labfiles60\eXchange\CEIMonitor\Solution\	/tmp/Labfiles60/eXchange/CEIMonitor/Solution

Windows users' note: When directory locations are passed as parameters to a Java™ program such as wsadmin, you must replace the backslashes with forward slashes to follow the Java convention. For example, C:\LabFiles60\ would be replaced by C:/LabFiles60/.

Note that the previous table is relative to where you are running WebSphere Integration Developer. The following table is related to where you are running remote test environment:

Reference Variable	Example: Remote Windows test server location	Example: Remote z/OS® test server location	Input your values for the remote location of the test server
<SERVER_NAME>	server1	cl1sr01	
<WAS_HOME>	C:\Program Files\IBM\WebSphere\AppServer	/etc/cl1cell/AppServerNode1	
<HOSTNAME>	localhost	mvsxxx.rtp.raleigh.ibm.com	
<BOOTSTRAP_PORT>	2809	2809	
<TELNET_PORT>	N/A	1023	
<PROFILE_NAME>	AppSrv01	default	
<USERID>	N/A	cl1admin	
<PASSWORD>	N/A	fr1day	

Instructions for using a remote testing environment, such as z/OS, AIX® or Solaris, can be found at the end of this document, in the section "**Task: Adding Remote Server to WebSphere Integration Developer Test Environment**".

Part 1: Initialize the Workspace for this Lab Exercise

_____ 1.   Follow the directions below to initialize the Workspace using the following values:

<WORKSPACE>

   C:\Labfiles60\eXchange\CEIMonitor\workspace

<PROJECT_INTERCHANGE>

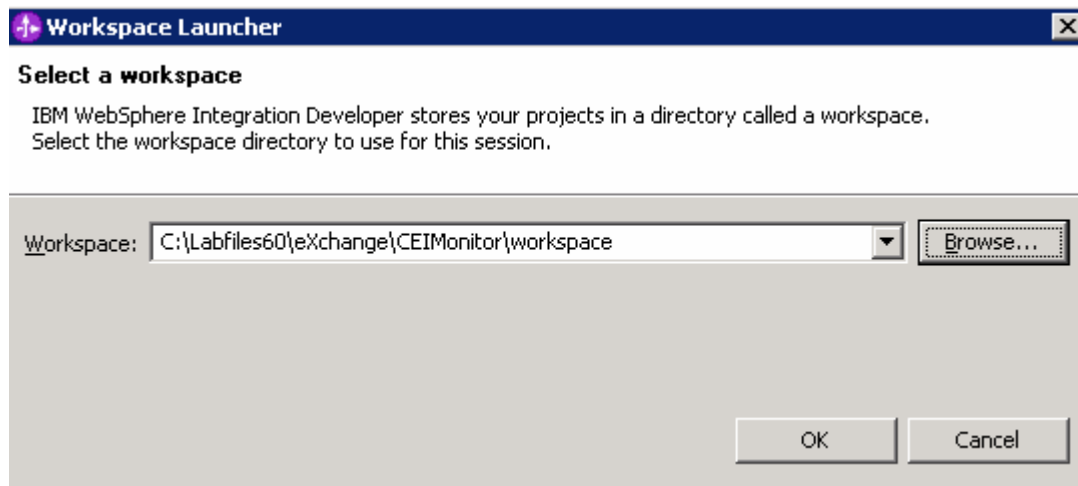   C:\Labfiles60\eXchange\CEIMonitor\import\CEIMonitorStart_PI.zip

<MODULE>

   n/a

<DEPENDENT_LIBRARIES>

   n/a

_____ 2.   Start WebSphere Integration Developer V6 with a new workspace located at **<WORKSPACE>**.

   __ a. From Windows Explorer, navigate to the **<WID_HOME>** directory and double click on wid.exe.

   __ b. When prompted for workspace name, enter the value provided by the **<WORKSPACE>** variable for this lab and click **OK.**

__ c. When WebSphere Integration Developer V6.0 opens, close the **Welcome page** by clicking on the Go to the workbench icon (bent over arrow at top-right).

__ d. Ensure you are in the **Business Integration** perspective.

_____ 3.   If this lab requires you to import a project interchange file, setup the required libraries and modules for this lab by importing the project interchange file **<PROJECT_INTERCHANGE>.**

__ a. From the menu bar, select **File -> Import…**

__ b. In the Import dialog, scroll down and select **Project Interchange.**
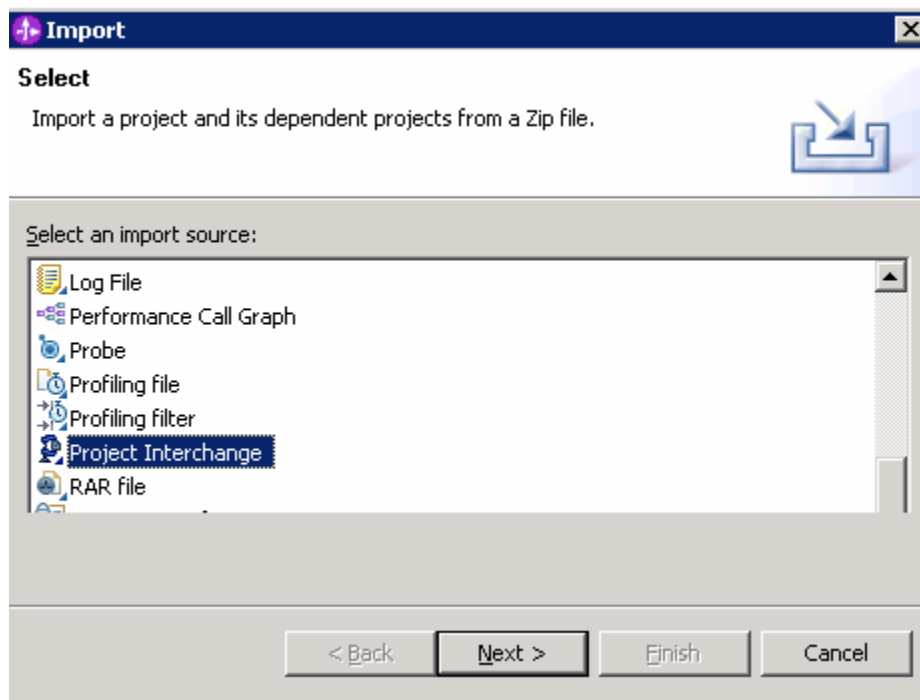
__ c. Click **Next.**

__ d. In the Import Projects dialog, initialize the **From zip file:** field to
<**PROJECT_INTERCHANGE>.**

__ e. Click the **Select All** button.
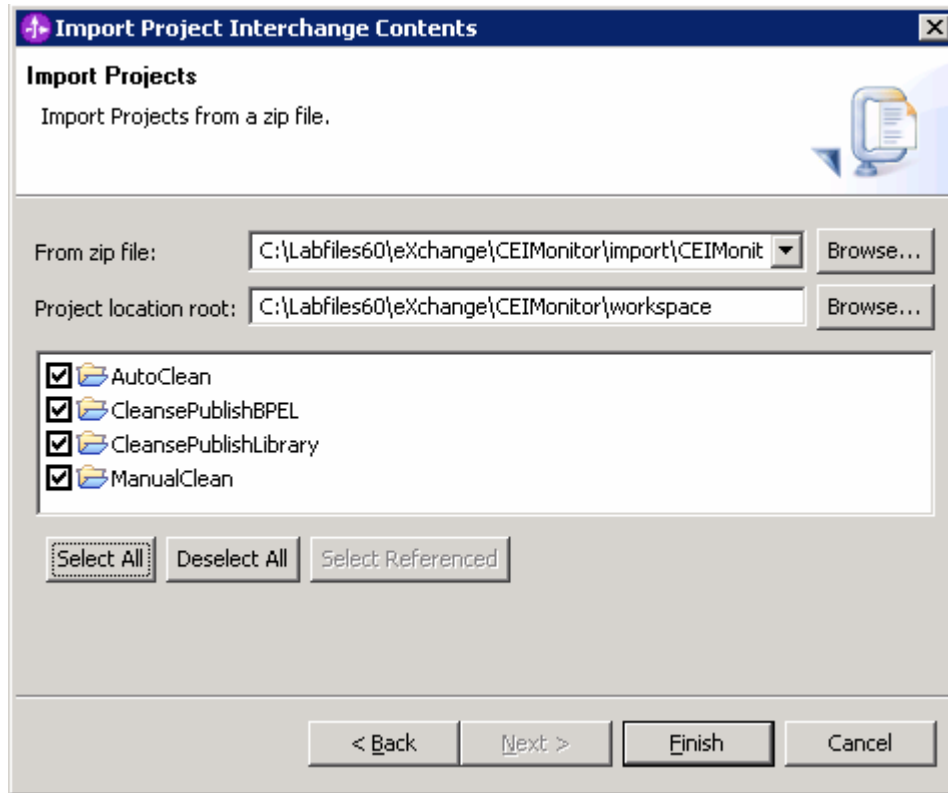

__ f. Click **Finish.**

Part 2: Enable Event Monitoring

In this part you will enable event generation in different components of the eXchange application. You will also enable the test server to allow for event generation from these components.

_____ 1.   Set CEI/CBE event generation for the CleansePublishBPEL process.

__ a. Expand **CleansePublishBPEL > Business Logic > Processes** in the Business Integration view and open **CleansePublishProcess**. If you receive a message indicating the layout information does not match, click **OK**.

__ b. Switch to the Properties view and click on any open area in the editor. The overall properties for the task should be shown.

__ c. Select the **Event Monitor** tab.

__ d. There are two destinations for events for business processes. CEI is an event framework which is a core component of WebSphere Process Server and available to capture CBE events generated throughout the different components running on the server. The Audit Log is a specific framework which also accepts events and audit information generated by business process components and human tasks only.
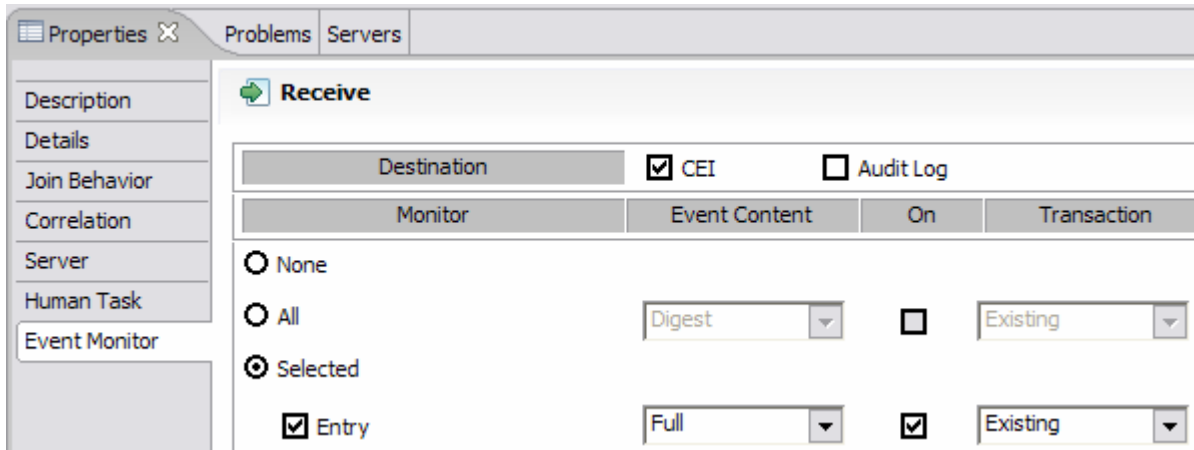
__ e. Ensure the **CEI** checkbox is checked.
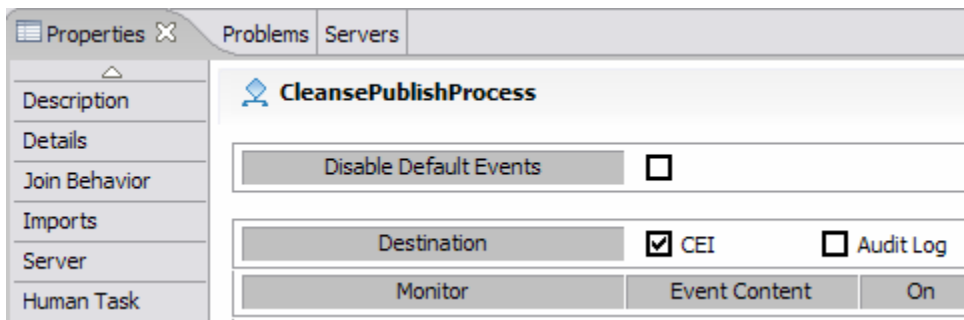
__ f. Each different component has different possible events which can be generated. Within each component is a finer level of events which can be generated. For example the events which can be generated at the business process level are different from the events which can be generated from invoke activities. Select the All radio button and change the Event Context to **Full** and check the box for **On**. Setting all events to be generated will cause the largest amount of overhead and if the monitoring product does not utilize the information, you should consider enabling only certain events, such as the Entry, Exit, and Failure. A setting of Full places the largest amount of information in the event.
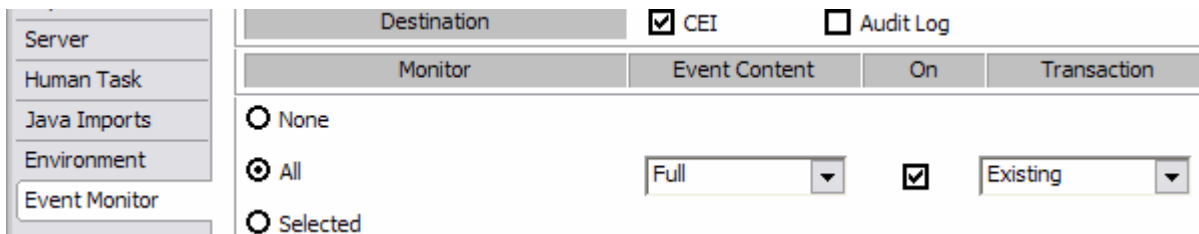

__ g. Select the **Receive** activity in the editor.

__ h. Ensure the **CEI** checkbox is enabled on the Event Monitor tab.

__ i. Notice the difference in the events that can be set on the receive activity compared to the overall business process. Click the **Selected** radio button.

__ j. Check the box for **Entry** and change the Event Content to **Full**. Check the **On** box.

__ k. Select the **AutoClean** activity.

__ l. Ensure the **CEI** checkbox is enabled on the Event Monitor tab.

__ m. Select the **All** radio button.

__ n. Change the Event Content to **Full**. Check the **On** box.

__ o. Set all the events to be generated for the **ManualClean** and **Publish** invoke activities. Set the
Event Content to **Full** and check the **On** box.

__ p. Select the **inClipBG** variable. Events can also be checked on Variables.

__ q. Click the **Selected** radio button and check the box for **Changed**. The only event that can be generated on a variable is a change in value.

__ r. Select **Full** for the Event Content and check the **On** box.

__ s. Save the process. Notice the icon markers are added to the activities to indicate monitoring is enabled.
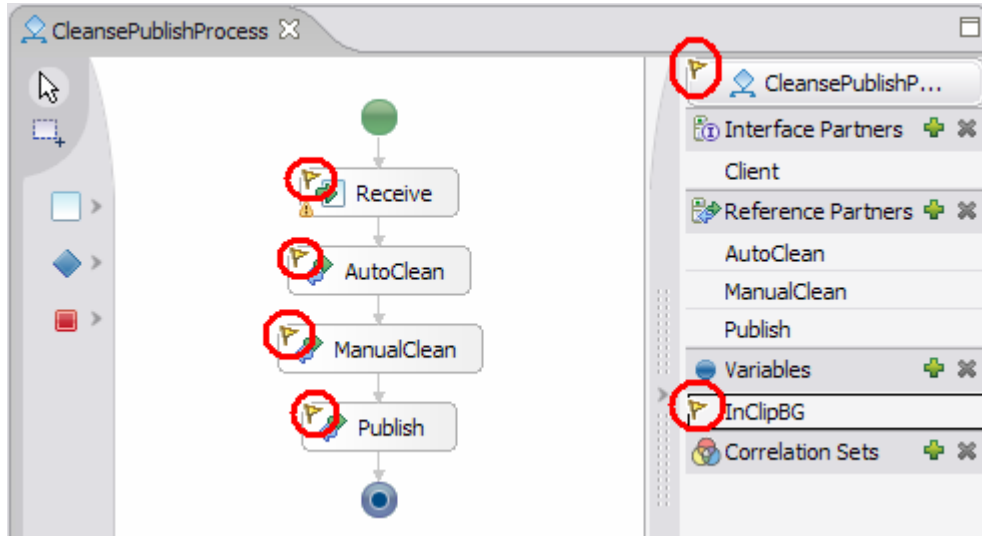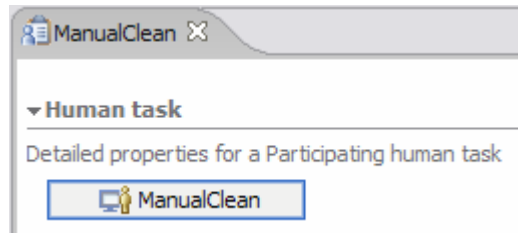

__ t. Close the process editor.

____ 2.   Events can also be generated from human tasks. Set event generation for the ManualClean human task.

__ a. Expand **ManualClean > Business Logic > Human Tasks** in the Business Integration view and open **ManualClean**.

__ b. Select the **ManualClean** box In the Task editor.

__ c. Select the Event Monitor tab in the Properties view if it is not already shown. For Human Tasks, there are different state changes associated with the task that can cause events to be created. Notice the different events that can be generated for the Human Task.

__ d. Click on **Selected** radio button.

__ e. Check **Entry** and **Exit** for the Event Content and click the **On** box for each one.

__ f. Select **Escalation1** In the Escalation settings section. Events can also be generated for Escalations. Notice the different events that can be generated for the escalation. These are different from the events for the task.

__ g. Click the **Selected** radio button and check the box **Work item created**. Change the level to **Full**. Check the **On** box.

Destination		☑ CEI	☐ Audit Log		
Monitor		Event Content		On	Transaction
○ None					
○ All		Digest	▼	☐	Existing ▼
◉ Selected					
☐ Entry		Digest	▼	☐	Existing ▼
☑ Work item created		Full	▼	☑	Existing ▼

__ h. Save the task editor. Notice the icon markers are added to the editor.

__ i. Close the task editor.

WPSWIDv6_eXcLab_RaiseMonitorEvents.doc

_____ 3. Set event generation for the AutoClean selector and business rule. Selectors and Business Rules can also generate events.

__ a. Expand **AutoClean > Business Logic > Selectors** in the Business Integration view. Open **SelectClean**.

__ b. Select the **cleanseClip** operation in the Selector editor.
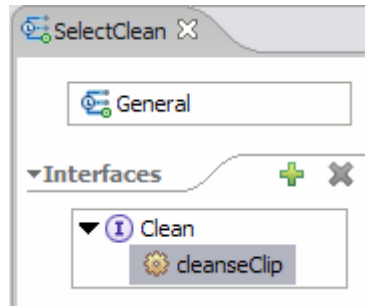
__ c. Select the **Event Monitor** tab in the Properties view.

__ d. Select the **All** radio button and change the Event Content to **Full** and click the **On** box. For selectors, the only destination for events is CEI.
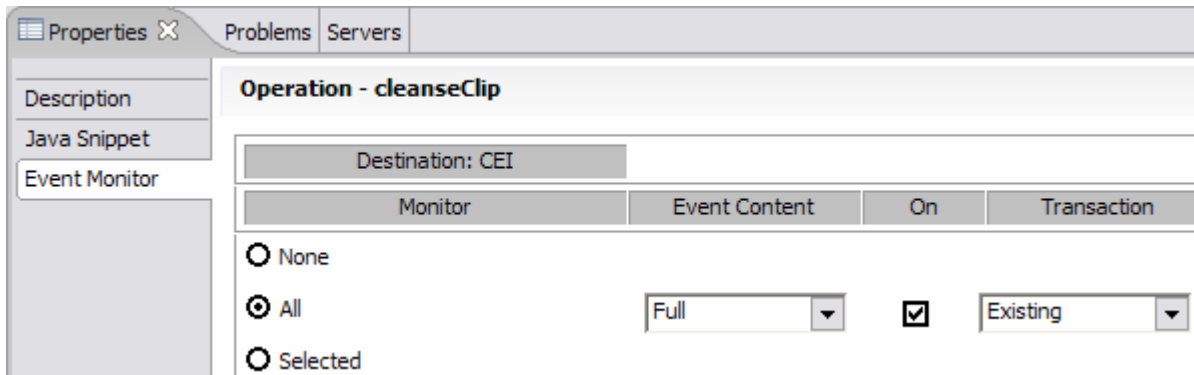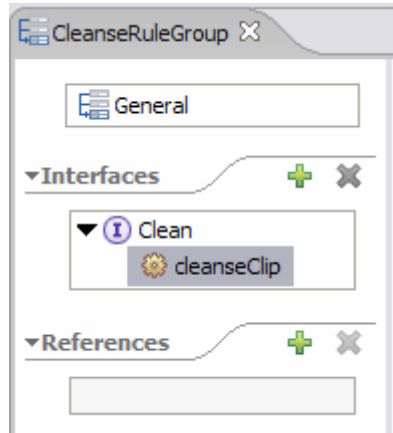
__ e. Save the editor. Notice the icon markers are added to the editor.

__ f. Close the editor.

WPSWIDv6_eXcLab_RaiseMonitorEvents.doc
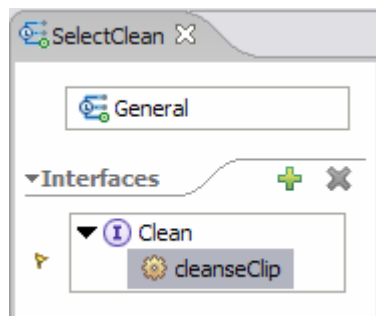
__ g. Expand **AutoClean > Business Logic > Rule Groups** in the Business Integration view. Open the Business Rule Group **CleanseRuleGroup**.

__ h. Select the **cleanseClip** operation in the Selector editor.

__ i. Select the **Event Monitor** tab In the Properties view.

__ j. Select the **All** radio button and change the Event Content to **Full**.and click the **On** box. For Business Rule Groups, the only destination for events is CEI.

__ k. Save the editor. Notice the icon markers are added to the editor.
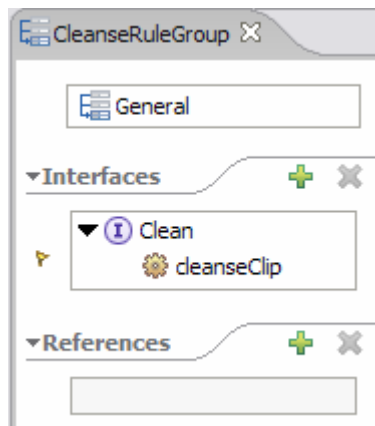
__ l. Close the editor.

_____ 4.   Events generation has also been integrated at the SCA level. This instrumentation allows for any SCA component to generate events which can be monitored. SCA event generation can be enabled in the assembly editor on the interfaces for the different SCA components. Any SCA invocation can be monitored with the proper event enablement. Set basic monitoring for the SCA invocations.

__ a. Open the assembly editor for CleansePublishBPEL.

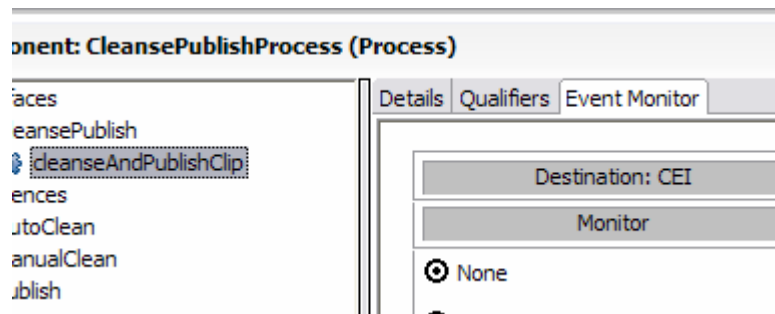__ b. Select the interface on the **CleansePublishBPEL** component.
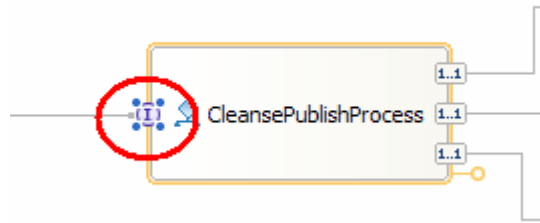
__ c. Select the **Details** tab in the Properties view.

__ d. Expand **Interfaces> CleansePublish** and select **cleanseAndPublishClip**.
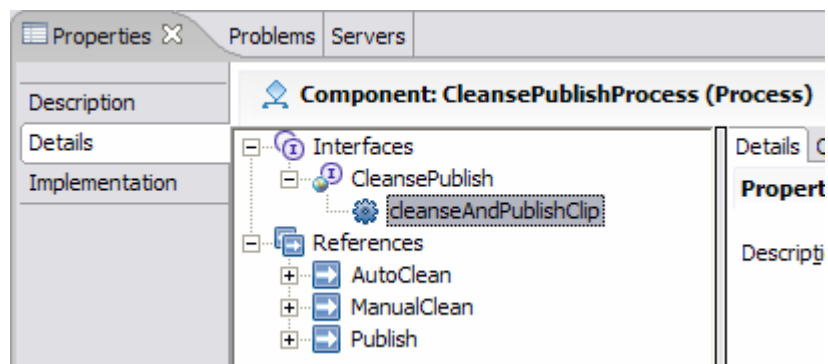
__ e. Select the **Event Monitor** tab.

__ f. Notice the different events which can be generated for the invocation of the component.

__ g. Click the **Selected** radio button. Check the box for **Entry** and check the **On** box.

Details	Qualifiers	Event Monitor

Destination: CEI			
Monitor	Event Content	On	Transaction
O None			
O All	Digest ▼	☐	Existing ▼
⊙ Selected			
☑ Entry	Digest ▼	☑	Existing ▼

__ h. Select the Export or any of the Imports. On the Interfaces tab, expand the interfaces and select the Event Monitor tab. Events on SCA invocation can also be generated at these points.

Note: For this situation, enabling event generation on the Export and the business process component is redundant because requests from SCA components to the business process will pass through the Export directly before the business process.

__ i. Close the assembly editor. In the other assembly editors for the other modules, event could also be enabled at the SCA interfaces.

_____ 5. Event generation for the different components will occur by default if event instrumentation is enabled. However, event logging must be enabled at the container level for business processes and human tasks components. For these components, this offers a single administrative point were the event logging can be controlled if it is enabled for individual artifacts. Enable event logging for business processes and human server.

__ a. If using a remote testing environment, follow the directions provided in **Task: Adding Remote Server to WebSphere Integration Developer Test Environment** (at the end of this document) to add a server to the WebSphere Integration Developer test environment and start it. This is especially true for z/OS, AIX, Solaris remote test environment, where the WebSphere Integration Developer will be remote to the test environment.

If you are using a local testing environment, right-click on **WPS Server v6.0** in the Server view and select **Start**.

__ b. Open the administrative console after the server starts by right-clicking on WPS Server v6.0 and select **Run administrative console**.

__ c. Click **Log in**.

__ d. Expand **Server > Applications servers**.

__ e. Click **server1**.

__ f. Expand **Business Process Container Settings** under the Containers Settings section.

__ g. Click **Business Process Container**.

__ h. Check the box **Enable Common Event Infrastructure Logging**.

__ i. Click **OK**.

__ j. Click on the **server1** link to return to the properties for the server.

__ k. Expand **Human task container settings** under the Containers Settings section.

__ l. Click on **Human task container**.

__ m. The **Enable Common Event Infrastructure logging** box must be checked in order for the server to generate events for human tasks and click **OK**

__ n. Click the **Save** link and the **Save** button.

__ o. Click the Logout button.

__ p. Close the Administrative Console.

____ 6.	To enable event generation from the Business Process Container and the Human Task manager, the server must be restarted. Before restarting the server, deploy the appropriate applications.

__ a. Right-click on WPS Server v6.0 in the Servers view and select **Add and remove projects**.

__ b. Move the CleansePublishBPELApp, AutoCleanApp, and ManualCleanApp applications to the **Configured** projects in the dialog window.

__ c. Click **Finish**.

__ d. Once the applications have finished publishing, you will need to restart the server.

If using a remote testing environment, stop the server. Right click on Websphere Process Server from the Servers menu and select Stop from the context menu. Then follow the directions provided in **Task: Adding Remote Server to WebSphere Integration Developer Test Environment** (at the end of this document) to restart a server.

If using a local testing environment, right-click on the server and select **Restart > Start**.

Part 3: Generate and View Events

In this part you will view the different events generated after executing the CleansePublishBPEL business process.

_____ 1.   Events will be generated in the application when the different areas are reached where event generation was enabled. Run the application to generate the events.

__ a. Right-click on WPS Server v6.0 in the Servers view and select **Launch > BPC Explorer**. You can also reach the BPC Explorer by opening a Web browser and navigating to http://<HOSTNAME>:9080/bpc. The list of business process templates will be listed.

__ b. Click on **My Process Templates**.
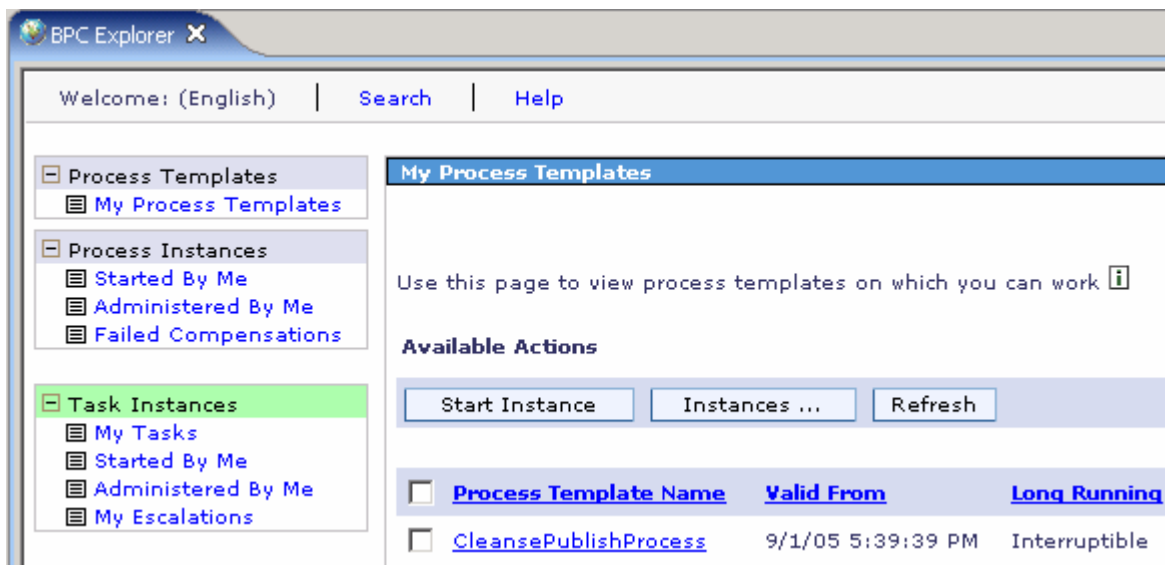
__ c. Check the box for **CleansePublishProcess** and click **Start Instance**.

__ d. Fill in the Process Input Message with some values and click **Submit**.
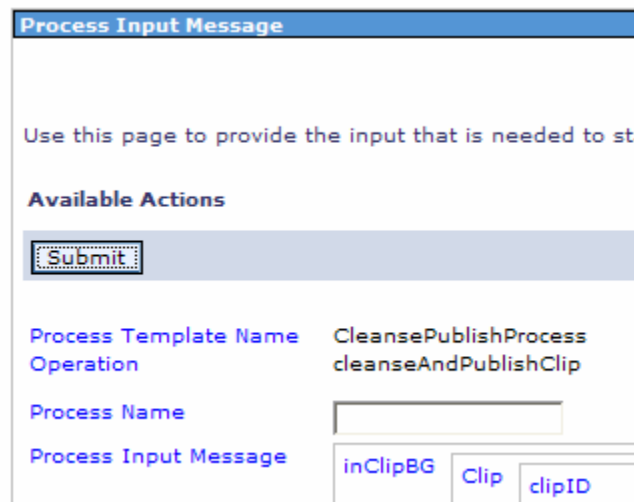
__ e. Click on the **My Tasks** link to display the task.

__ f. Check the box for **ManualClean** and click **Work on**. The Task Input Message will be displayed. Beneath that you will find the output message.

__ g. Fill in some of the fields with any information and click **Complete** to complete the task.

__ h. The task will be marked as **Finished**.

_____ 2. View the generated events using the default CBE Event Browser application which is included as part of WebSphere Process Server v6.0. The CBE Event Browser.

__ a. Right-click on the server in the Servers view and click Launch > CBE Event Browser. You can also open a browser and navigate to **http://<HOSTNAME>:9080/ibm/console/cbebrowser** or reach it from within the Administrative Console under Integration Applications.

__ b. Accept the defaults and click the **Get Events** at the bottom of the window. You can filter the search for specific events. Accept The **Number of events** should be updated.
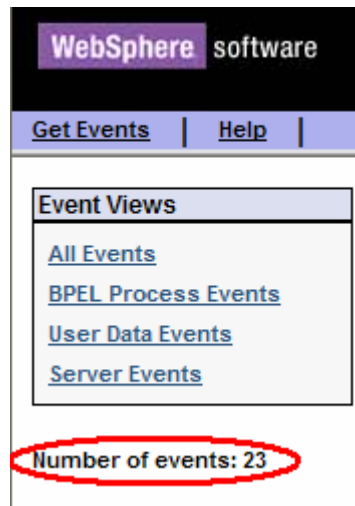
__ c. Click the **All Events** link. The generated events will be listed.

__ d. In the Name column, the kind of event that was generated is listed and in the far right Situation column, the state of the event is listed.   Notice that the different components (WBI.JService=SCA, BPC.BFM=business process choreography, WBI.SEL=selectors, WBI.BR=business rule, BPC.HTM=human task) generate different named messages.

__ e. Click the link for the first activity event (WBI.JService.MethodInvocation.ENTRY). The first activity listed is the event fired with the SCA interface when the CleansePublishBPEL component is called by the receive activity that started the business process.

__ f. The event data will be shown in the lower window. Scroll down and view the information. Notice the event has an ID (**contextDataElement** / **ECSCurrentID** / **contextValue**) and there is a parent ID (**contextDataElement** / **ECSParentID** / **contextValue**). Take note of the parent ID that uniquely identifies the session from which the event was generated.

elapsedTime	
contextDataElement / ECSCurrentID / contextValue	9.41.223.72;CleanPublishBPEL;sca/dynamic/reference;;cleanseAndPub
contextDataElement / ECSParentID / contextValue	9.41.223.72;CleanPublishBPEL;;cleanseAndPublishClip;1121896106577
extendedDataElement / EventNature	ENTRY
extendedDataElement / PayloadType	digest

__ g. In the **extendedDataElement** / **EventNature**, you can also see the type of event is ENTRY.

__ h. Select the next event from the list, **BPC.BFM.PROCESS.START**. Find the parent ID **(contextDataElement** / **ECSParentID** / **contextValue)** for the event. You will notice the parent ID is the same as the Parent ID of the ENTRY. The parent ID value can be used to correlate different events together in order to monitor the overall business transaction. For other events you might notice a different parent ID value. The parent ID value will change as different SCA components are called from other SCA components. However, the parent ID is traceable back to the original parent ID as it is hierarchical.

__ i. Continue to look through the different events. You should see events generated from the selector, business rule, and human task in addition to those created from the business process. Find the event that signals a change in the variable in the business process (BPC.BFM.VARIABLE.STATUS).

__ j. In the Properties view, scroll down to the property **extendedDataElement** / **variableData_BO** / **Raw Data**. With an Event Content value of Full set for the event, the contents of the variable are actually displayed.

extendedDataElement / variableData_BO / TYPE	ClipBG
| extendedDataElement / variableData_BO / Raw Data | ```xml
<?xml version="1.0" encoding="UTF-8"?>
<mon:MonitorWrapper xsi:type="scm:ClipBG" >
<Clip>
<clipID>1000</clipID>
<GLN>1000</GLN>
<clip>500</clip>
<size>small</size>
<color>red</color>
<brand>dull</brand>
<retailItems>
<itemID>123</itemID>
<GTIN>456</GTIN>
<package>100</package>
<quantity>100</quantity>
<fullDescription>red dull clip</fullDescription>
<price>10.0</price>
<startDate>2005-06-01</startDate>
<endDate>2005-07-31</endDate>
<contactFirstName>Jane</contactFirstName>
<contactLastName>Doe</contactLastName>
</retailItems>
</Clip>
</mon:MonitorWrapper>
``` |

For other events with an Event Content value of Full, you might also see a business object displayed in the event, though the event is not guaranteed to have a business object. If the action or state at which the event (business process end) was generated does not involve a business object, the event will not contain one.

Part 4: Generate Events Dynamically and View Results

Event generation can also be enabled dynamically for situations where additional event information could help in determining the cause of a problem or in obtaining more information for a short time period. Dynamic events would be in addition to the statically declared events that are declared with the components. The dynamic events can only enable new events and are not able to disable statically defined events. These dynamically generated events can be generated and caught by the CEI infrastructure or recorded in the log files. Enabling the events dynamically is done in the same manner as enabling trace.

_____ 1. Enable event generation for all of the activities in the CleansePublishProcess.

    __ a. Right-click on WPS Server v6.0 in the Servers view and select **Run Administrative Console**.

    __ b. Click Log in.

    __ c. Expand **Troubleshooting**.

    __ d. Click **Logs and Trace**.

    __ e. Click **server1**.

    __ f. Click **Change Log Detail Levels**. The list of Components that can be enabled for trace will be listed. The ability to generate events can also be enabled here.

    __ g. Select the **Runtime** tab to enable event generation immediately.

Note: The page may take a little while to display. The link to the Runtime tab will become available before the Please Wait message disappears.

    __ h. The SCA component types that have been loaded by the server will be shown in the Component list. Human task is one of these types and is listed as **WBILocationMonitor.CEI.task.***. This component will generate the events to the CEI infrastructure (WBILocationMonitor.LOG.task component generates events to the log files). Expand **WBILocationMonitor.CEI.task.** If the Please Wait box is shown, you can still expand the components.

__ i. The various tasks will be listed for tracing. Expand the manualclean item. Individual events can be enabled even if they were not marked to generate events in WebSphere Integration Developer.

```
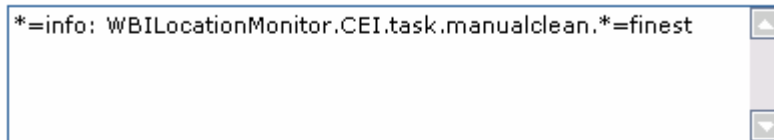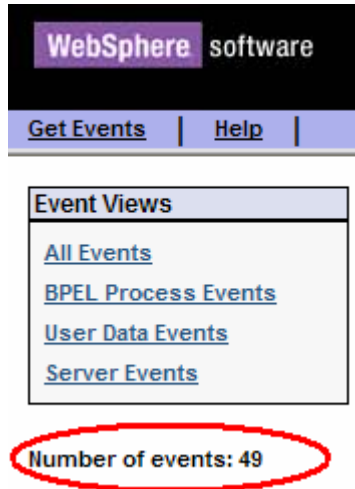I.task.manualclean.*
.CEI.task.manualclean.com.clipsandtacks.task.ManualClean.Task._ManualClean.ASSIGNED
.CEI.task.manualclean.com.clipsandtacks.task.ManualClean.Task._ManualClean.ENTRY
.CEI.task.manualclean.com.clipsandtacks.task.ManualClean.Task._ManualClean.EXIT
.CEI.task.manualclean.com.clipsandtacks.task.ManualClean.Task._ManualClean.WI_CREATED
```

__ j. Click on **WBILocationMonitor.CEI.task.manualclean.*** and select **Finest**. This will enable event generation for all possible event generators in the process. If the menu of log levels is not shown, enter the string **WBILocationMonitor.CEI.task.manualclean.*=finest** into the trace box. Check the entry to ensure there are no spelling mistakes or capitalization inconsistencies.

```
*=info: WBILocationMonitor.CEI.task.manualclean.*=finest
```

__ k. Click **OK** to set the trace.

_____ 2. Generate dynamic events along with the statically defined events.

__ a. Return to the BPC Explorer and start another CleansePublishBPEL business process.

__ b. Complete the ManualClean task.

_____ 3. View the Events.

__ a. Return to the CBE Event Viewer.

__ b. Click the **Get Events** link.

__ c. Click the **Get Events** button. The number of events will have increased by more than double.

__ d. Click the **All Events** link.

__ e. Read through the new human tasks events which were generated. You should notice two new types of events (BPC.HTM.TASK.WISTATUS and BPC.HTM.TASK.INTERACT). Look at the different fields to see the events for each of the activities.

_____ 4. Clean up test environment.

__ a. Right-click on appropriate WPS Server on which you deployed the applications in the Servers view and select Add and remove projects…

__ b. Click << Remove All.

__ c. Click Finish.

_____ 5. Stop the Server

__ a. Right click on WebSphere Process Server v6.0 server from the Servers view and select Stop from the context menu.

What you did in this exercise

In this chapter you enabled CBE generation for a business process, human task, selector and business rule using WebSphere Integration Developer. These events were caught by the CEI framework which is included in WebSphere Process Server. You viewed the events using the CBE Event Browser. You also enabled event generation dynamically and viewed the additional generated events using the CBE Event Browser.

Solution Instructions

____ 1.   Follow the directions in the task <u>Initialize the Workspace for a Lab Exercise</u>, using the following values:

<WORKSPACE>

C:\Labfiles60\eXchange\CEIMonitor\Solution\workspace

<PROJECT_INTERCHANGE>

C:\Labfiles60\eXchange\CEIMonitor\Solution\CEIMonitorSolution_PI.zip

<MODULE>

n/a

<DEPENDENT_LIBRARIES>

n/a

____ 2.   Continue with **Part 2, step 5**.

Task: Adding Remote Server to WebSphere Integration Developer Test Environment

This task describes how to add a remote server to the WebSphere Integration Developer Test environment. This sample will use a z/OS machine.

_____ 1.	Create a new remote server.

_____ 2.	Right click on the background of the Servers view to access the pop-up menu.

_____ 3.	Select **New > Server.**

_____ 4.	Specify hostname to the remote server, **<HOSTNAME>**.

_____ 5.	Ensure that '**WebSphere Process v6.0 Server**' is highlighted in the server type list.

_____ 6.	Click **Next.**

_____ 7.	On the WebSphere Server Settings page, select the radio button for **RMI** and change the ORB bootstrap port to the correct setting (**<BOOTSTRAP_PORT>**).

____ 8. Click **Finish**.

____ 9. The new server should be seen in the Server view.

____ 10. Start the remote server if it is not already started. WebSphere Integration Developer does not support starting remote servers from the Server View.

____ 11. From a command prompt, telnet to the remote system if needed:

'**telnet <HOSTNAME> <TELNET_PORT>**'

userid : **<USERID>**

pw : **<PASSWORD>**

____ 12. Navigate to the bin directory for the profile being used:

cd <WAS_HOME>/profiles/<PROFILE_NAME>/bin

____ 13. Run the command file to start the server: **./startServer.sh <SERVER_NAME>**

____ 14. Wait for status message indicating server has started:

```
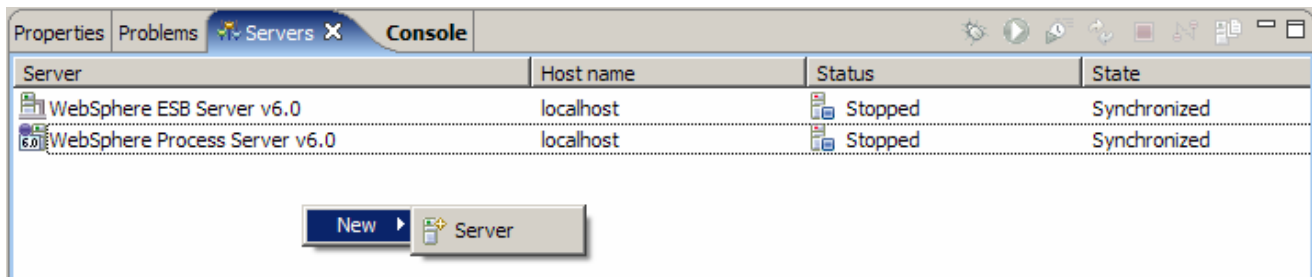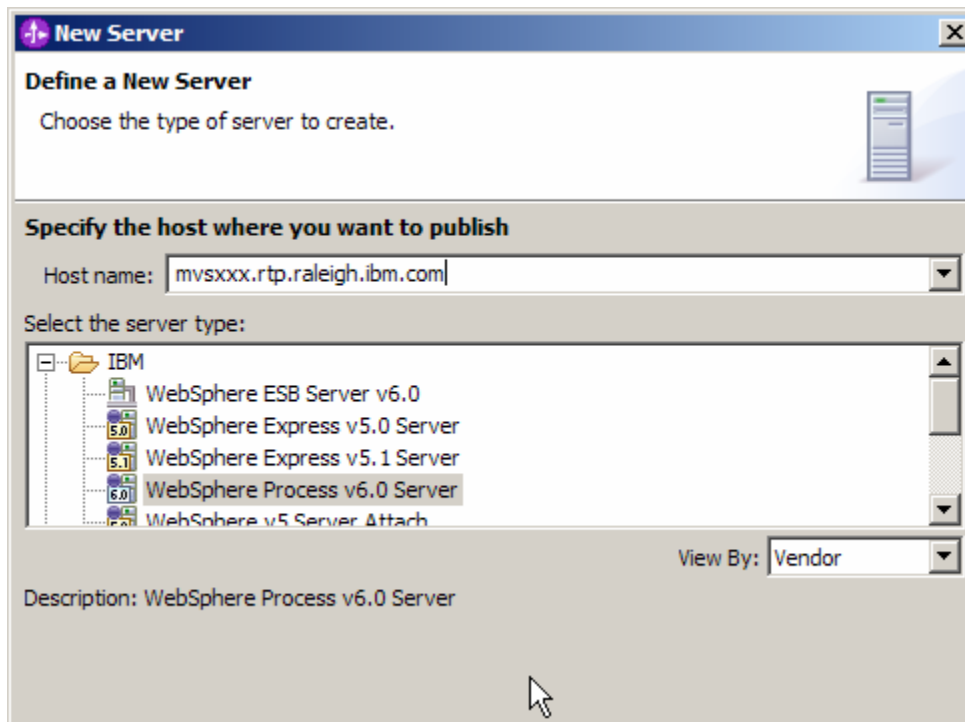ADMU3200I: Server launched. Waiting for initialization status.
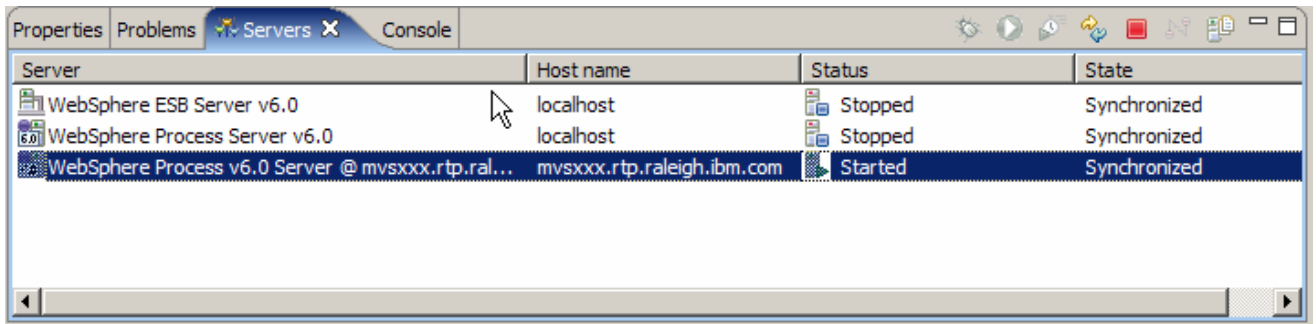
ADMU3000I: Server cl1sr01 open for e-business; process id is 0000012000000002
```