CHAPTER 7

Advanced Authoring Concepts

Cisco Process Orchestrator provides integrations with various technologies. Although it supports numerous types of integrations, at the core Process Orchestrator provides the individual steps that make up the workflows in processes; these are called *activities*. For example, Process Orchestrator provides:

- A set of String activities that you can use to manipulate string text and characters.
- A set of Table activities that you can use to modify the format for existing defined table variables. The available table variables can be defined as either a global or process variable.
- A Set Variable activity that you can use to place a collection of bits in a Process Orchestrator number.
- Knowledge base articles provide information to help understand the results of an activity, including a summary of what has occurred, the possible cause of the result, and suggested actions to take to resolve issues with an activity.

Note that:

- Modifying a process does not automatically modify an activity. Activity definitions are included in a process workflow and the activity properties must be modified separately from the process properties.
- Activities can only be modified in the Process Editor. With the appropriate rights from the Operations view, the Process Editor is launched when accessing the process properties.
- When user rights are restricted, the Process Viewer is launched with the properties displaying a display-only view after determining that the user cannot edit the activity.

The following topics describe these activities:

- Using String Activities
- Using Table Activities
- Using Core Activities
- Authoring Knowledge Base Articles

Related Topics

For instructions about inserting a variable in an activity, see Inserting Reference Variables.

Using String Activities

You can use String activities to search, replace, and modify string content in the objects within Process Orchestrator. For example, you can:

Activity Type	Purpose
Find String	Search for specific content in a string.
Replace String	Replace specific content substrings in a string.
Split String	Split a string into multiple parts around matches of the given delimiter or delimiters.
String Escape	Specify characters that must be escaped within a string so that the string can be inserted into messages or file names.
String Lowercase	Lower the text case in a string
String Uppercase	Capitalize the text case in a string
Substring	Return part of a string starting with the characters in the start position and ending with the character in the specified end position. For example: Input string = `dictionary` Start position = `4` End position = `6` Dictionary 0123456 <- using 0 as the starting point Positions 4 through 6 yield ‘ion’
Trim String	Trim characters from the content in a string. When no character is specified, the activity will trim all leading and trailing whitespace characters, including empty lines at the beginning and at the end.

Using Table Activities

You can use Table activities to modify the format for existing defined table variables.

Note Any boolean and numeric values that are used by the Table activities in the product are not localized. Numbers use [.] for the decimal format regardless of the regional and language options. Boolean values for substitutable boolean must be *true* or *false* regardless of the installed language.

For example, you can:

Table 7-1 Sample Table Activities

Activity Type	Purpose
Add Row to Table	Append new rows to a table variable. The row is added to the end of the table. This activity will not work on tables that are outputs of other activities.
Analyze Table	Summarize and analyze data in a table variable or property using basic aggregation functions.
Highlight Row	Highlight selected rows of a table variable. Highlighted rows can only be displayed in an automation summary. Therefore you will not see the highlighted rows in Process Orchestrator unless you are viewing the automation summary.
Read Table from Text	Read a comma-separated value (CSV) string variable and convert the text into a table with a specified set of columns.

Read Table from XML	Read an XML snippet and convert it into a table with a specified set of columns. For example:
	Row XML Element Name:
	`MyRow`
	Columns to read:
	`Name String`
	`Age Integer`
	Source XML:
	`<MyData>`
	`<MyRow>`
	`<Name>Jeff</Name>`
	`<Age>32</Age>`
	`</MyRow>`
	`<MyRow>`
	`<Name>Mark</Name>`
	`<Age>31</Age>`
	`</MyRow>`
	`<MyRow>`
	`<Name>Jay</Name>`
	`<Age>30</Age>`
	`</MyRow>`
	`</MyData>`
	This produces a table with two columns (name, age), with three rows.

Table 7-1 Sample Table Activities (continued)

Activity Type	Purpose
Remove Row from Table	Remove one or more rows from a table variable based on specified criteria. This activity will not work on tables that are outputs of other activities.
Select From Table	Query and select rows from a source table using specified criteria. The user can also determine the order of the rows selected as well as limit the number of rows displayed.
Set Table Variable	Modify the value of a defined table variable. You must specify a name for the activity, choose the defined variable that you want to modify, and enter a new value for the table variable using a different table variable property. The table variables used must match in their entirety, including the name of columns, number of columns, and the type of columns or the activity will fail.
Update Row in Table	Update the selected rows of a table variable. The new rows become part of the variable being modified. You will not see the modified rows in the automation summary, but you can see the rows in the variable property pages in Process Orchestrator. This activity will not work on tables that are outputs of other activities.

Using Core Activities

Core activities are a set of items that span applications. For example, use the following activities to:

Table 7-2 Sample Core Activities

Activity Type	Purpose
Calculate Date	Calculate a new date/time value based on a specified base date/time and adjustments.

Format Date	Convert the date and time into a string text format. For example:
	Format string
	`yyyyMMdd hh:mm:ss tt`
	Original Date/Time
	`10/23/2009 10:23:00 PM`
	Result
	`20091023 10:23:00 PM`

Correlate Process Event	Check whether a process event occurred within a certain amount of time of another problem (see Creating Correlate Event Activities).

Table 7-2 Sample Core Activities

Activity Type	Purpose
Create Automation Summary	Generate an automation summary including data selected activities in a process. To generate the data output, choose the activity, then specify the section in the automation summary in which to output the data. An automation summary is a collection of data summarizing the objects included in the process and the data retrieved by the processing of the of the objects. The share path specified in the Core Functions Adapter properties will be used when viewing the automation summary reports.
Find Targets	Among other use cases supported by this activity, you can find targets whose properties have certain values.
Insert Event	Define the configuration properties to be used to insert one event into Process Orchestrator Reporting Database.
Publish Metric	Define the performance metric properties to be published into the Process Orchestrator Reporting Database and the Windows Management Instrumentation (WMI) provider. The metrics are published under the *root\TEO* name space through the WMI class, *TEO_PerformanceMetric*.
XPath Query	XPath queries navigate through XML documents and search through the document nodes. Use the XPath Query dialog box to enter the XPath properties to query from the source XML code. For additional information, see: • Adding an XPath Namespace Definition • XPath Query Example
XSL Transform	Apply an XSLT transformation to a specific XML text. XSLT transformation can transform XML into plain text, HTML, or other XML.

Adding an XPath Namespace Definition

An XML namespace provides a way to avoid element and attribute name conflicts within an XML document. An XML namespace is uniquely identified by a Uniform Resource Identifier (URI) and is assigned a prefix (unique to the XML document) used for its element and attribute names.

To add an XPath namespace:

Step 1 In the Process Editor, choose **Toolbox > Core Activities > XPath Query**, then drag and drop the activity onto the Workflow pane.

Step 2 Choose the **XPath Query** tab, then choose **Namespaces > New**.

Step 3 In the XPath Namespace Definition dialog, enter the prefix and URI for the new namespace, then click **OK**.

XPath Example Syntax

The following expressions can be used when selecting nodes in a path expression.

Path Expression	Description
nodename	Selects all child nodes of the named node
/	Selects from the root node
//	Selects nodes in the document from the current node that match the selection no matter where they are
.	Selects the current node
..	Selects the parent of the current node
@	Selects attributes

XPath Query Example

The following is an example of source XML.

Example XML

```
<?xml version=”1.0” encoding=”ISO-8859-1”?>
<bookstore>
<book>
  <title lang=”eng”>Harry Potter</title>
  <price>29.99</price>
</book>
<book>
  <title lang=”eng”>Learning XML</title>
  <price>39.95</price>
</book>
</bookstore>
```

The following example path expressions and related results are based on the preceding source XML.

Path Expression	Description
bookstore	Selects all child nodes of the bookstore element
/bookstore	Selects the root element bookstore **Note** If the path starts with a slash (/) it always represents an absolute path to an element.
bookstore/book	Selects all book elements that are children of bookstore
//book	Selects all book elements no matter where they are in the document
bookstore//book	Selects all book elements that are descendant of the bookstore element, no matter where they are under the bookstore element
//@lang	Selects all attributes that are named lang

For additional examples, see http://www.w3schools.com/xpath/xpath_syntax.asp.

XPath Query Example 2

In the following example, the elements prefixed with xdc are associated with a namespace whose name is http://www.xml.com/books, while those prefixed with h are associated with a namespace whose name is http://msdn.microsoft.com/en-us/library/ms950779.aspx.

Example XML

```
<h:html xmlns:xdc=”http://www.xml.com/books”
        xmlns:h=”http://www.w3.org/HTML/1998/html4”>
 <h:head><h:title>Book Review</h:title></h:head>
 <h:body>
  <xdc:bookreview>
   <xdc:title>XML: A Primer</xdc:title>
   <h:table>
    <h:tr align=”center”>
     <h:td>Author</h:td><h:td>Price</h:td>
     <h:td>Pages</h:td><h:td>Date</h:td></h:tr>
    <h:tr alignment”>
     <h:td><xdc:author>Simon St. Laurent</xdc:author></h:td>
     <h:td><xdc:price>31.98</xdc:price></h:td>
     <h:td><xdc:pages>352</xdc:pages></h:td>
     <h:td><xdc:date>1998/01</xdc:date></h:td>
    </h:tr>
   </h:table>
  </xdc:bookreview>
 </h:body>
</h:html>
```

For additional examples, see http://msdn.microsoft.com/en-us/library/ms950779.aspx.

Authoring Knowledge Base Articles

Knowledge base articles provide information to help understand the results of an activity, including a summary of what has occurred, the possible cause of the result, and suggested actions to take to resolve issues with an activity. Knowledge base articles can make automation summaries more usable, explaining how to use the information that is surfaced.

Knowledge base articles are referenced by specific activities and can be viewed in the following locations in Process Orchestrator:

- Operations Workspace—When viewing activity instance properties, you can view the display-only properties of the associated knowledge base articles by selecting the Knowledge Base tab.
- Process Editor—You can reference a knowledge base article to an activity when defining the activity properties in the Process Editor.
- Automation Summary—All referenced knowledge base articles will display on the automation summary.

The Definitions > Knowledge Base view displays the available knowledge base articles that can be assigned to a process activity or to a trigger. When Knowledge Base Articles is selected in the Navigation pane, the defined knowledge base articles display in the Results pane.

Process Orchestrator ships with predefined knowledge base articles, or you can create your own knowledge base articles to associate with activities in the process.

To create a knowledge base article:

Step 1 Choose **Definitions > Knowledge Base**, right-click and choose **New > Knowledge Base**.

Step 2 On the **Knowledge Base** property pages, define the properties, including:

- Summary—A concise description of the issue.
- Possible cause—An explanation of the condition that may be causing the issue. If necessary, enter multiple possible causes so that all possibilities are investigated.
- Possible resolution—List of actions that can be performed to attempt to resolve the issue.
- Related information—Additional information that may be relevant to the issue.

Step 3 Click **OK** to close the dialog box.