Novell exteNd Director

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WORKFLOW GUIDE

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Novell, Inc.
404 Wyman Street, Suite 500
Waltham, MA 02451
U.S.A.

www.novell.com

exteNd Director*Workflow Guide*
June 2004

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Contents

About This Book

Purpose

This book introduces the basic concepts, architecture, and tools of the Novell® exteNd Director™ Workflow subsystem. It also presents some introductory workflow programming topics.

Audience

This book is for anyone who needs to design workflow processes or understand the features of the Workflow subsystem.

Prerequisites

This book assumes knowledge of Java programming and familiarity with the basic ideas of process automation.

I Concepts

1 About Workflow in exteNd Director

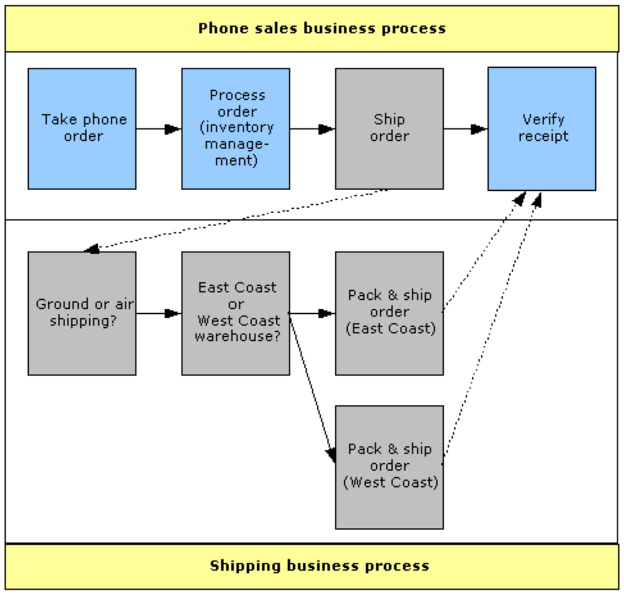
This chapter introduces the exteNd Director Workflow subsystem. It includes these topics:

What is workflow?

Workflow is the automation of a business process, in whole or part, during which documents, information, or tasks are passed from one participant to another for action, according to a set of procedural rules. Workflow can apply to business-to-customer, business-to-business, or internal processes.

Before you decide to implement workflow, your organization might be executing its work manually, with minimal automation if any. By studying the current work, a business analyst can isolate one or more procedures that together achieve an objective of the organization. Workflow designers call this set of procedures a *business process*.

The figure below shows two business processes: one that models how an organization executes telephone sales orders and one that models the shipping process.



Phone sales business process
Take phone order
Process order (inventory manage-ment)
Ship order
Verify receipt
Ground or air shipping?
East Coast or West Coast warehouse?
Pack & ship order (East Coast)
Pack & ship order (West Coast)
Shipping business process

A business process:

- **Has a definite starting point, or entry conditions**—In the telephone sales example, a customer phone call on a workday between 9 a.m. and 5 p.m. makes up a common set of entry conditions. Entry conditions trigger the start of a business process.
- **Accomplishes an objective of the organization**—Executing a sale is the objective of the business process triggered by the phone call.
- **Can be manual, partially automated, or completely automated**—In the shipping process, packing the product could be manual, choosing a carrier could be partially automated, and inventory management could be completely automated. Each step is still part of the business process.
- **Can be broken down into smaller business processes as necessary**—In the sales example, the original Ship Order step could be replaced by the shipping business process.
- **Has a definite ending point, or defined outputs**—For example, perhaps the business process cannot conclude until the customer verifies receipt.

Workflow automates the routing of work from activity to activity according to procedural rules. Work is expressed as a dynamic set of documents (data) associated with information that characterizes the set of documents (metadata). Taken together, the data and metadata are called a **workitem**. Users can act on the information in the workitem, accomplish tasks, update workitem information, and trigger the continuation of the workitem in the workflow.

The exteNd Director Workflow Subsystem provides the framework and resources for creating and running a workflow application using Java and XML technologies.

About the Workflow Modeler

The core of a workflow application is the *process definition*, an XML file that you create visually using the Workflow Modeler. A *workflow process* is the visual representation of the process descriptor in the Workflow Modeler.

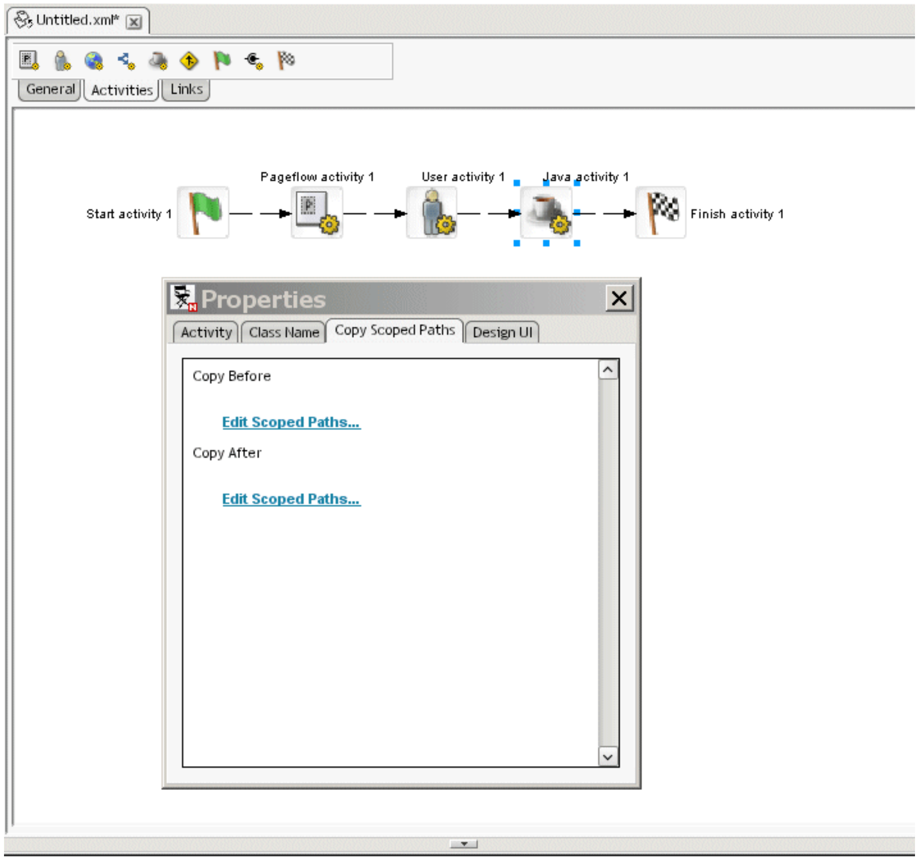
The *Workflow Modeler* that allows you to quickly and visually create a workflow process. The Workflow Modeler allows you to:

- Graphically lay out, annotate, and format your workflow
- Create, change, and delete activities and links
- Set activity and link properties
- Use the Scoped Path Navigator to associate activities and links with workitems

When you save a workflow process, the Workflow Modeler translates it into an XML-based file called a *process definition*. The process definition saves the layout and format of your workflow and translates the flow logic into a program the workflow engine can read and execute.

About the workflow process

Here is what a process looks like in the workflow Modeler:



Here is a summary of the main features of a workflow:

Process component	Description
Activity	Each process has a set of *activities* that control the runtime execution of the flow. The Workflow Modeler provides activities that present information to the user and respond to user interactions (User and Pageflow activites in the example above) and system activities that perform background tasks that are not visible to the user (Java activity in the example). Two of the system activities are required in every workflow: ◆ **Start activity:** represents the Workflow subsystem functions necessary to create a new workitem and optionally to assign an initial document to the workitem. ◆ **Finish activity:** represents the Workflow subsystem functions necessary to bring a workflow process to a normal end.

Process component	Description
Link	Links are what tie the activities in a workflow together (Links are represented by arrows in the workflow process). A *link* is a single logical path between two activities. An activity can have multiple source (incoming) links and multiple destination (outgoing) links. The Workflow Modeler provides two types of links: ◆ **Simple link:** allows you to specify expressions that evaluate to true or false. When the expression for a simple link evaluates to true, the link is followed to the next activity. ◆ **Condition macro link:** allows you to specify one or more conditions that are evaluated by the Rules subsystem. When a condition link evaluates to true, the link is followed to the next activity.
Scoped path	Scoped paths is a core exteNd Director feature that provides a syntax for accessing application data. exteNd Director includes a scoped path called **flow** that lets you access workitem data from the Workflow modeler. The example above shows the Java activity accessing the **copy scoped paths** feature.

Workflow architecture

The Workflow subsystem architecture consists of the following key components:

- Workflow engine
- Workflow queue
- Workitems
- Workflow client

Workflow engine The workflow engine is responsible for executing and managing workflow processes. The workflow engine uses the process descriptor created with the Workflow Modeler to:

- Create new process instances
- Start, suspend, resume, and terminate activities
- Evaluate links and forward to the next activity
- Direct the workitem to the specified addressee

The workflow engine acts as a process container, controlling startup of new processes and lifecycle management for the processes. The workflow process implementation controls execution forwarding and for a process.

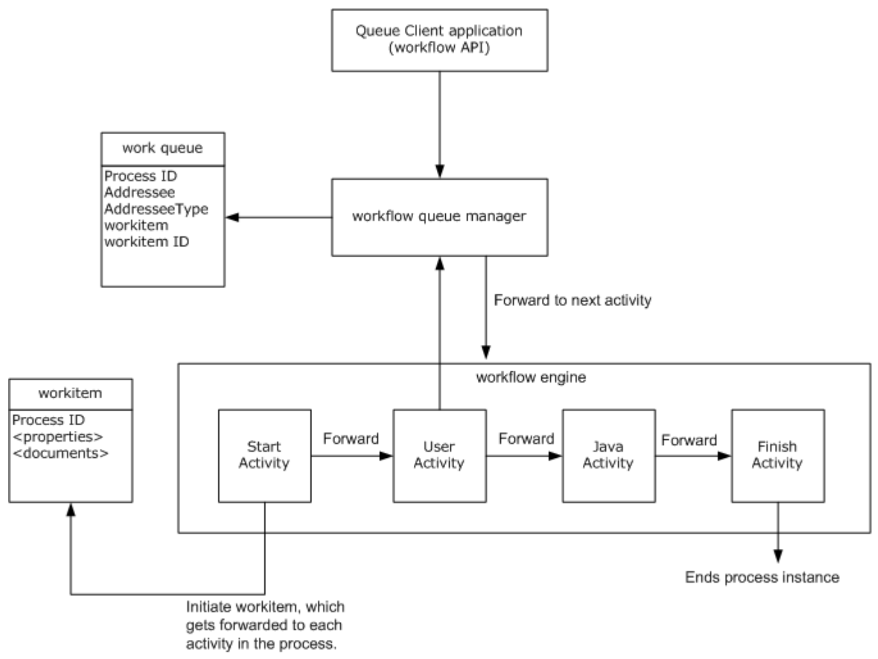
Workflow queue The workflow queue consists of the queue itself and a queue manager, which coordinates traffic between the workflow engine and workitems.

The queue persists workitems so they can be made available to workflow users. The queue stores workitem instances and data associated with them, such as the addressee (user) and the addressee type (user or security role). When the activity is completed, the queue manager tells the engine to forward the workitem to the next activity.

When workflow activities want to persist workitems in the queue, they send messages to the workflow queue dispatcher. Workitems are persisted to the WFQUEUE table in the database. There is a single instance of the queue dispatcher class that is instantiated at boot time.

Workitems The workitem is a container for the application data. It represents the state of the data at any given point in a process instance. In a typical workflow scenario, the workflow engine moves a workitem from activity to activity according to the link logic. (The workitem should not be confused with the data itself, which is typically modified by each activity.)

Workflow client The workflow client provides access to the engine, queue and workitems through the workflow API. The diagram below shows how a workflow queue delegate (instance of EbiQueueDelegate) accesses queued items for a specified addressee:



The diagram illustrates a single process instance, but in a real application there are likely to be many processes instances running at any given time. The queue can contain up to the number of active process instances for an activity (assuming that a workitem has reached the activity in each process).

NOTE: exteNd Director includes core portlets for starting the workflow engine and accessing the queue. For more information, see Chapter 8, “Content Life Cycle Application”.

Workflow in a cluster The workflow subsystem provides support for clustering. A cluster is a group of application servers running on different hosts that share the processing load for a single application. In a cluster configuration, clients interact with the cluster as if it were a single high-performance server. Clustering offers several benefits, including scalability and high availability.

NOTE: For details on configuring a workflow application to run in a cluster, see “Configuring workflow to run in a cluster” on page 68.

Workflow and pageflow

It might be helpful to understand workflow by contrasting it with the exteNd Director *pageflow* model. A workflow and a pageflow are modeled in a similar manner, but a workflow application has some distinguishing features, as shown in this comparison:

Workflow	Pageflow
Process-based Workflow is a linear business process that might span several days, or even weeks.	**Session-based** A pageflow is open-ended and the duration is controlled by a single user.

Workflow	Pageflow
Definite starting point	**Designed entry point**
Some specific event or condition triggers a process instance. This can be a system-generated event, like a monthly notification, or user-generated.	The entry point is determined by the flow itself, and is typically not triggered by an external event.
Multiple users	**Single user**
A workflow assumes multiple users are performing discrete tasks at each activity.	A pageflow application is driven by a single user.
Persistent data	**Session data**
Instance data must be stored outside the session so workitems can be passed to subsequent users.	A pageflow relies principally on instance data stored in the current session, although the application can access persistent data.
Definite ending point	**User-controlled exit point**
Some specific event or condition ends the process instance.	The user chooses when to end the session, although some specific action could trigger a work flow.

NOTE: Although workflow and pageflow are used to build different types of applications, the Workflow subsystem provides facilities for integrating them. See "Pageflow in a workflow" on page 21.

About the Workflow API

The Workflow API lets clients access workitems and define application logic for Java activities and User Activities. You can also use the APIs to access the engine and queue.Most of the classes for developing business logic are contained in the com.sssw.wf.api and com.sssw.wf.client packages. Here are some key classes:

Interface	Description
EbiWorkitemDelegate	Used by clients to interact with workitems. It provides methods for accessing workitem properties and associated documents, and for locking and unlocking workitems for users or user sessions.
EbiContext	Provides access to the workflow context for process instances.
EbiDocumentManager	Provides access to documents and document properties.
EbiQueueDelegate	Provides operations for accessing, forwarding, and reassigning queued workitems.
EbiWorkflowEngineDelegate	Provides methods for starting a process instance.
EbiJavaActivity	Provides methods for coding a Java Activity.
EbiActivity	Provides methods for accessing the behavior of activities at runtime.

2 Designing Workflows

This chapter describes how to get started with workflow and introduces some workflow deign concepts. It includes these topics:

- Getting started with workflow
- Process design concepts
- Pageflow in a workflow

Getting started with workflow

Before you begin to develop a workflow you might want to look at the installed Content Life Cycle application. This workflow follows a document through several activities, including document assignment, authoring, approval, and publishing to the Content Management subsystem. It also uses the installed WorkflowStartProcess portlet and WorkflowQueue portlet to start the process and queue workitems for User activity addressees.

📖 For information about running the application and accessing the sources, see Chapter 8, “Content Life Cycle Application”.

You should get familiar with the Workflow Modeler by opening the Content Life Cycle process or by creating your own process. If you have used the exteNd Director Pageflow modeler, you will find the design environment is similar.

📖 For more information, see Chapter 5, “Workflow Modeler”.

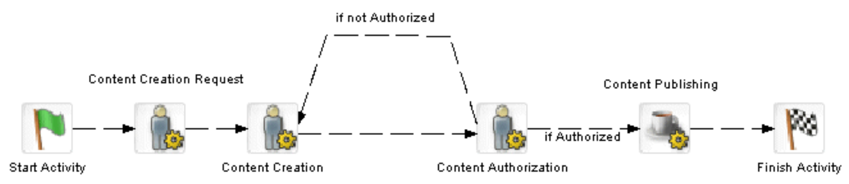
Process design concepts

The Workflow subsystem allows you to create two basic flow structures:

- Single-branch flow
- Multiple-branch flow

Single-branch flow

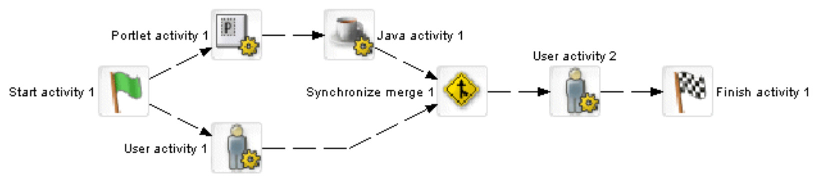
In a single-branch structure, the workflow engine forwards a single workitem from one activity to the next until the process finishes. The installed Content Life Cycle workflow is an example of a single-branch flow:



Sample Content Management Process

Multiple-branch flows

For more complex requirements, you can split the flow to allow for parallel or exclusive work by different process branches. In parallel execution the process follows two or more paths so that different work can be executed at the same time. for example, you might have two documents in the workitem that require different processing. Here is an example of parallel execution:



In this example, it is assumed that work is being forwarded on both branches following the Start activity. In the case of conditional branching like this, you must merge the branches using the **Synchronize Merge** activity.

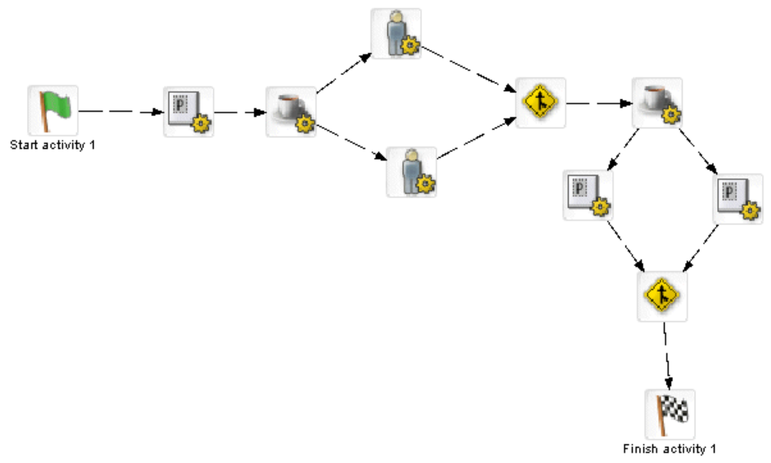
How synchronize merge works

Here is how the workflow engine synchronizes multiple branches:

1. When encountering a split, the engine forwards the workitem to the next activity in each branch, where the link evaluates to true.
2. The work is processed by each branch activity and forwarded according to the flow logic, until each one reaches the Synchronize Merge activity.
3. The workflow engine waits until work is completed on all branches and forwards the workitem to the next activity.

Multiple splits

This example illustrates how to handle multiple splits. You must merge each split before proceeding to another split:

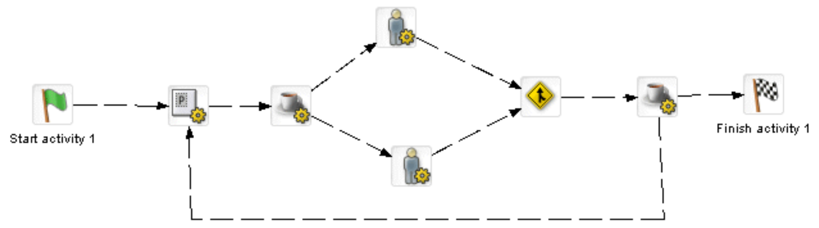


Exclusive branching and looping

The next example illustrates two more points:

- When your logic dictates that only one of multiple branches will execute exclusively, a Synchronize Merge activity is not necessary.
- You can loop back to a split that occurs earlier in the process as long as you return to an activity that is executed before the split.

In this example, it is assumed that the split after the last activity will proceed exclusively to the Finish activity or loop back to the first activity before the split:



📖 For more information, see “Synchronize Merge activity” on page 32.

Pageflow in a workflow

exteNd Director supports the integration of pageflows and workflows. The Pageflow activity in the Workflow Modeler allows you to specify a pageflow to run as a presentation activity within a workflow. This allows you to incorporate the rich client features of the exteNd Director Pageflow Modeler in your workflow process.

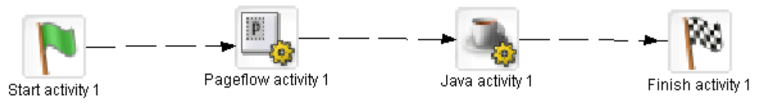
To use a pageflow in a workflow you need to implement these components:

Workflow/Pageflow integration component	Description
Pageflow activity	Place a Pageflow activity in the workflow process where you want the pageflow to run. This activity passes the persistent workitem to the pageflow.

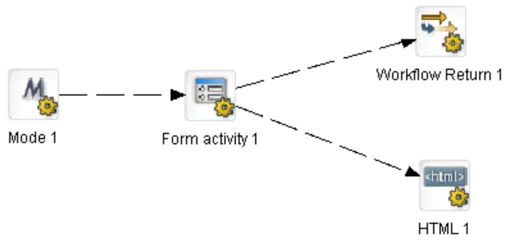
Workflow/Pageflow integration component	Description
Workflow Return activity	Place a Workflow Return activity in the pageflow where you want to return the workitem to the workflow. This activity tells the workflow to forward the workitem to the next activity.
Flow scoped path	Use the Flow scoped path in both the pageflow and the workflow to store workitem instances. A pageflow that is included in a workflow accesses the same persistent workitem through the Flow scope.

Using the Workflow Return activity

Here is what a Pageflow activity looks like in a workflow process:



Here is what a pageflow that the Pageflow activity points to might look like:



This example shows how you can handle a common requirement in a workflow: allow a user to edit a workitem with the option to forward or not forward but persist the current state of the workitem for another session. For example, one link might be followed when the user selects a **Save and Forward** button and the other when the user selects **Save without Forwarding**.

The Workflow Return activity handles the first requirement. To address the second requirement this example uses an HTML activity that does nothing more than close the window:

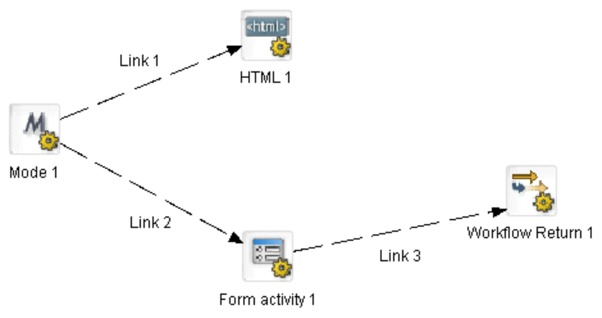
```
<script>self.close()</script>
```

Locking and unlocking workitems

Being able to lock and unlock a workitem for workflow users at runtime is a basic workflow requirement. The workflow API provides lock() and unlock() methods on EbiWorkitemDelegate for this purpose. For pageflows running in a workflow, there are some Flow scope properties you can use to lock and unlock workitems:

Flow scope property	Description
lock	Attempts to lock a workitem for the current user: ◆ Returns **true** if the workitem was successfully locked or if the workitem is already locked for this user. ◆ Returns **false** if the workitem is already locked for another user.
unlock	Attempts to unlock a workitem for the current user: ◆ Returns **true** if the workitem was successfully unlocked or if the workitem is already unlocked. ◆ Returns **false** if the workitem could not be unlocked because it is locked for another user.
persistent	Returns the state of the workitem. Returns **true** if the workitem is in a persistent state (workflow context) and **false** if not persistent (pageflow context).

The locking and unlocking of work takes place within the pageflow activity. As a rule, you want to lock the workitem when you start the pageflow, and unlock it before the Workflow Return activity is executed.



Suppose you have a Pageflow activity in a workflow calling the pageflow shown above, and you want to lock the workitem when the addressee accesses it from the queue. This is the basic procedure to follow:

NOTE: This section does not describe the mechanics of copying scoped paths in the Workflow Modeler. For more information, see Chapter 5, “Workflow Modeler”. For more information about scoped paths, see the chapter on using scoped paths in *Developing exteNd Director Applications*

1 Use Flow/lock to lock the workitem and copy the return value to another location. For example:

```
Flow/lock ---> Flow/property/lockSuccess
```

You could do the copy scope before or after the Mode activity.

2 Test the return value and handle both cases.

- If the return value is false, you could display a message that tells the user that the workitem is already locked by another user, as shown in Link 1 in the example
- If the return value is true, provide the flow logic that lets the user update the workitem, as shown in link 2. When finished, link to a Workflow Return activity.

3 Use Flow/unlock to unlock the workitem before it is returned to the workflow. For example:

```
Flow/unlock ---> Flow/property/unlockSuccess
```

You could do the copy scope before the Workflow Return activity.

In this case you might ignore the return value.

3 Working with Activities

This chapter describes the activities you can use in the Workflow Modeler. It includes these topics:

- About workflow activities
- Pageflow activity
- User activity
- Web Service activity
- Rule activity
- Java activity
- Synchronize Merge activity
- Start activity
- Composer Service activity
- Finish activity

📖 For information about using the Workflow Modeler, see Chapter 5, "Workflow Modeler".

About workflow activities

There are two types of workflow activities:

Category	Description	Activites
Presentation	Provide user interaction for the flow	Pageflow User
System	Perform background processing functions required by the flow	Start Web Service Rule Java Synchronize Merge Composer Finish

About activity properties The workflow activities have properties you can set in the Workflow Modeler. Some of these properties are common to all activities, and others are available only on some of the activities.

Some activities have a *primary property.* The primary property associates an object with the activity. For presentation activities, this is the item to display. For system properties, this is the object you want to execute.

About scoped paths *Scoped paths* are pointers to application data that you can select visually in the Workflow Modeler. You can use scoped paths to select the activity's primary property. In addition, most activities allow you to copy scoped paths before or after the execution of an activity.

📖 For more information, see the chapter on working with scoped paths in *Developing exteNd Director Applications*.

Pageflow activity

Description

The **Pageflow activity** represents a task or step in your business process that uses a portlet created using the Pageflow Modeler. Including a pageflow in a workflow allows you to take advantage of the Pageflow Modeler's integrated client technology.

Properties

The properties for the Pageflow activity are

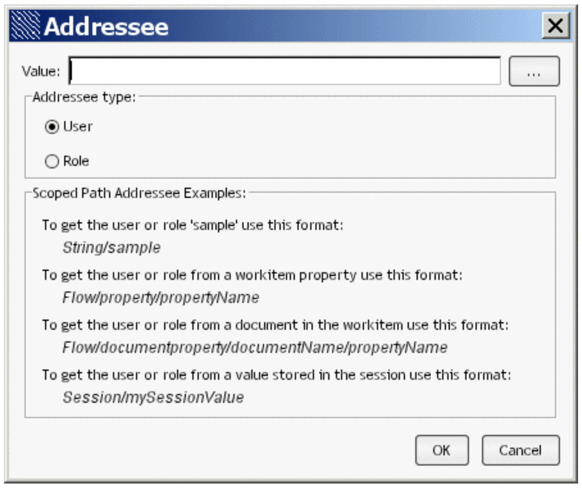
Property Inspector tab	Property name	Description
Activity	Name	A unique reference to this activity that is used for runtime processing.
	Description	A description of the activity intended for the Workflow Modeler user.
Pageflow Portlet	Portlet	Primary property. Specifies the pageflow descriptor in the resource set.
Addressees	Addressee	A valid user, group, or role name. See Specifying the addressee below.
Copy Scoped XPaths	Copy Before	Copies data from one scoped path location to another before the activity is executed.
	Copy After	Copies data from one scoped path location to another after the activity is executed.
Design UI	Design UI properties control the design-time appearance of the activity. For more information, see "Setting object display properties" on page 55.	

Specifying the addressee The addressee property determines where the workitem will be routed by the workflow engine. Each link can accept a single value for its Addressee property. Typically this value is a role, and the role defines a list of users with permission to perform work at the activity. You can also specify that the addressee value be dynamically derived at runtime from a workitem property.

➢ To specify an addressee:

1 Open the Property Inspector for the activity and choose the **Addressees** tab.

2 Click **Edit Addressee**:



Scoped Path Addressee Examples:

To get the user or role 'sample' use this format:
String/sample

To get the user or role from a workitem property use this format:
Flow/property/propertyName

To get the user or role from a document in the workitem use this format:
Flow/documentproperty/documentName/propertyName

To get the user or role from a value stored in the session use this format:
Session/mySessionValue

3 In the **Value** field specify a scoped path for a user or role. See the examples at the bottom of the Addressee form.

- Click **User** if you are specifying a user known to your directory realm. For example:

  `String/JSmith`

NOTE: If you are accessing an LDAP realm, specify the distinguished name. For example:

  `cn=user,ou=users.`

- Click **Role** if you are specifying a security role descriptor. For example:

  `String/workflowUser`

  The name of the security role you specify must be the name of a security role descriptor file, without the file extension. For the example shown above to work, you would need to define the role `workflowUser` in a file called `workflowUser.xml`.

📖 For information about creating and using roles, see the chapter on using security roles in the *User Management Guide*.

Usage

At runtime, the Workflow engine delegates processing to the specified pageflow until the **Workflow-Return activity** in the pageflow is executed.

This activity ensures that the workflow engine does the following:

- Executes a forward operation to the next workflow activity in the containing workflow.
- Closes the portlet window, if the **close window** property on the **Workflow-Return activity** is selected.

This process is repeated for each included pageflow.

📖 For more information with examples, see “Pageflow in a workflow” on page 21.

User activity

Description

The **User activity** represents a task or step in your business process that requires user interaction. Use this activity is for:

- A custom portlet, JSP page, or servlet not created or associated with a pageflow
- A non-Web client such as a word processing program or spreadsheet

Properties

The properties for the User activity are:

Property Inspector tab	Property name	Description
Activity	Name	Primary property. The name must match the **name** element in the **activity policy descriptor**, as described in "Binding activities to client types" on page 28.
	Description	An optional description of the activity for the Workflow Modeler user.
Addressees	Addressee	A valid user or role name. See "Specifying the addressee" on page 26.
Copy Scoped XPaths	Copy Before	Copies data from one scoped path location to another before the activity is executed.
	Copy After	Copies data from one scoped path location to another after the activity is executed.
Design UI	Design UI properties control the design-time appearance of the activity. For more information, see "Setting object display properties" on page 55.	

Usage

Binding activities to client types The default client for workflow applications is the Portal subsystem. The Workflow subsystem provides a mechanism for specifying different client types for workflow activities. For example, you might want the UI for a particular workitem to be a spreadsheet application, a Java client, or some other application.

With a User activity you are required to specify clients in a descriptor called **activity-policy.xml**.

Creating an Activity policy descriptor You need to create a descriptor that follows the schema is defined in **activitypolicy.xsd**, located in library/WorkflowService/schema in your installation directory. Place the descriptor in the data/workflow-activity-policy directory in your exteNd Director project's resource JAR.

NOTE: The name of the file must be activity-policy.xml

Here is the activity policy defined for three portlets used in the installed Content Life Cycle workflow application.

```
<?xml version="1.0" ?>
- <activitypolicy xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="activitypolicy.xsd">
- <activity name="AssignContent">
<client type="portal" uri="/portal/portlet/WorkflowAssignPortlet">Portal</client>
</activity>
```

```
- <activity name="CreateContent">
<client type="portal" uri="/portal/portlet/WorkflowCreatePortlet">Portal</client>
</activity>
- <activity name="AuthorizeContent">
<client type="portal" uri="/portal/portlet/WorkflowAuthorizePortlet">Portal</client>
</activity>
</activitypolicy>
```

Element	Description
name	The name of the activity. This must match the Name property in the Workflow Modeler. For example, the Name property in the Workflow Modeler for the first activity would be **AssignContent**
client	The client type and URI for the application portlet or JSP page. The default client type is **portal**, which means the activity will use exteNd Director portal services to render the client. NOTE: You can also specify **default** as the client type and provide an implementation. You can also add a client tag under <activitypolicy> as a global default using the string **default**.

Adding client types To provide a different client type you must modify the activity policy file and add the new client type and associated URLs. The XSL of the WorkflowQueue core portlet (WorkflowQueueDefault.xsl) looks for **portal** as the client type and uses the associated URL as the link for the activity. To reference a different client type, modify the XSL for the queue portlet and the activity-policy client type accordingly.

NOTE: The WorkflowQueue portlet only supports direct URL references as an URI pointer.

Accessing policy information EbiWorkitemDelegate provides access to activity policy information. Here are some of the methods:

Client info method	Description
getClientTypes()	Returns an array of all client types for this activity
getClientURI()	Returns the URI of the specified client type
getPolicyDefaultURI()	Returns the default policy client URI for this activity
hasClientType()	Determines whether the activity includes the specified client type
hasClientDefault()	Determines whether the activity has a default client type

Coding the User activity You need to access the workitem and define your presentation logic in the implementation class. For code examples, refer to the sources for the User activities in the Content Life Cycle application.

For more information see "Content life Cycle application sources" on page 75.

Web Service activity

Description. The **Web Service activity** is a system activity that executes a Web Service.

The Web Service activity only provides support for document-style WSDL files that contain a schema. However, you can create a pageflow that uses an RPC-style Web Service by using a Java activity.

For background information on Web Services, see the chapter on Web Service basics in *Utility Tools*.

For details on how to use an RPC-style Web Service in the context of a pageflow, see the chapter on working with RPC-Style Web Services in the *Pageflow and Form Guide*.

Properties

The properties of the Web Service activity are:

Property Inspector tab	**Property name**	**Description**
Activity	Name	A unique reference to this activity that is used for runtime processing.
	Description	A description of the activity intended for the Workflow Modeler user.
Document Style	Web Service Input Document Path	Provides instance data for the request being made to the service. The input document is specified by means of a scoped path. Typically, the scope used for the input document is Flow/document.
	Web Service Name	The name of the service, as specified in the WSDL file.
	Web Service Operation	The name of the operation, as specified in the WSDL file.
	Web Service Output Parameter (optional)	The node name of the element returned by the service.
	Web Service Port Type	The port type for the service, as specified in the WSDL file.
	Web Service Return Document Path	Provides instance data for the response returned from the service. The output document is specified by means of a scoped path. Typically, the scope used for the output document is Flow/document.
	Web Service WSDL Document Path	Specifies the name of the WSDL file that describes the Web Service. TIP: Fill in this property first when you're working in the Workflow Modeler. Once the property sheet has a path to the WSDL file, it can automatically fill in many of the other properties associated with the activity.
Copy Scoped XPaths	Copy Before	Copies data from one scoped path location to another before the activity is executed.
	Copy After	Copies data from one scoped path location to another after the activity is executed.
Design UI	Design UI properties control the design-time appearance of the activity. For more information, see "Setting object display properties" on page 55	

Rule activity

Description

The **Rule activity** represents the Rule subsystem functionality needed to execute a rule within a workflow. Rules allow you to build complex logic into your workflow by using installed conditions and actions.

Properties

The properties for the Rule activity are:

Property Inspector tab	Property name	Description
Activity	Name	A unique reference to this activity that is used for runtime processing.
	Description	A description of the activity intended for the Workflow Modeler user.
Rule	RuleID	Primary property. Specifies the rule descriptor in the resource set.
Copy Scoped XPaths	Copy Before	Copies data from one scoped path location to another before the activity is executed.
	Copy After	Copies data from one scoped path location to another after the activity is executed.
Design UI	Design UI properties control the design-time appearance of the activity. For more information, see "Setting object display properties" on page 55.	

Java activity

Description

The **Java activity** represents an unattended task or step in your process. This can be any kind of logic or processing that you want to happen automatically without user intervention. You specify a Java class you want to execute, which you create using the Java Activity Wizard. The class that you define extends EbiJavaActivity.

For information about creating and coding the Java class, see Chapter 6, "Java Activity Wizard".

Properties

The properties for the Java activity are:

Property Inspector tab	Property name	Description
Activity	Name	A unique reference to this activity that is used for runtime processing.
	Description	A description of the activity intended for the Workflow Modeler user.

Property Inspector tab	Property name	Description
Class Name	Class Name	Primary property. The Java class that you want to execute.
Copy Scoped XPaths	Copy Before	Copies data from one scoped path location to another before the activity is executed.
	Copy After	Copies data from one scoped path location to another after the activity is executed.
Design UI	Design UI properties control the design-time appearance of the activity. For more information, see “Setting object display properties” on page 55.	

Synchronize Merge activity

Description

The **Synchronize Merge activity** is used to synchronize a split in a workflow process. This activity is necessary only in cases when workitems are forwarded on more than one path of the split.

Here is how the workflow engine synchronizes multiple branches:

1. When encountering a split the engine forwards the workitem to the next activity in each branch where the link evaluates to true.
2. The work is processed by each branch activity and forwarded according to the flow logic, until each one reaches the Synchronize Merge activity.
3. The workflow engine waits until work is completed on all branches and forwards the workitem to the next activity.

Properties

The properties for the Synchronize Merge activity are:

Property Inspector tab	Property name	Description
Activity	Name	A unique reference to this activity that is used for runtime processing.
	Description	A description of the activity intended for the Workflow Modeler user.
Copy Scoped XPaths	Copy Before	Copies data from one scoped path location to another before the activity is executed.
	Copy After	Copies data from one scoped path location to another after the activity is executed.
Design UI	Design UI properties control the design-time appearance of the activity. For more information, see “Setting object display properties” on page 55.	

Usage

For more information and examples, see “Process design concepts” on page 19.

Start activity

Description

The **Start activity** represents the Workflow subsystem functions necessary to create a new workitem, and optionally to assign an initial document to the workitem. The start activity is created when a new workflow process is created and cannot be deleted from the process. There is only one Start activity per process.

Properties

The properties for the Start activity are:

Property Inspector tab	Property name	Description
Activity	Name	A unique reference to this activity that is used for run-time processing.
	Description	A description of the activity intended for the Workflow Modeler user.
Document	Document Name	A unique reference for the start document that can be accessed from other flow objects.
	Start Document	A name and a string (separated by a space) that points to the contents of the start document. The pointer can be an URL.
Copy Scoped XPaths	Copy Before	Copies data from one scoped path location to another before the activity is executed.
	Copy After	Copies data from one scoped path location to another after the activity is executed.
Design UI	Design UI properties control the design-time appearance of the activity. For more information, see "Setting object display properties" on page 55.	

Composer Service activity

Description

The **Composer Service activity** is a system activity that executes an exteNd Composer service. exteNd Composer services typically combine executable units of work called *components* and coordinate the flow of data between them. A typical service might include a series of components that receive an input XML document, perform sophisticated document mappings and transformations, collect information from back-end data sources, execute transactions on mainframes and AS/400s, process error conditions, send context-sensitive e-mail or JMS notifications, and/or return one or more XML response documents to the original requestor(s).

By breaking up a service's tasks into discrete components, important benefits—in terms of testing, debugging, code maintenance, and code reuse—can be realized.

For details on using the Composer Pageflow Wizard, see the chapter on the Composer Pageflow Wizard in the *Pageflow and Form Guide*.

Properties

The properties of the Composer Service activity are:

Property Inspector tab	Property name	Description
Activity	Name	A unique reference to this activity that is used for runtime processing.
	Description	A description of the activity intended for the Workflow Modeler user.
Composer Service	Input Document	Provides instance data for the request being made to the service. The input document is specified by means of a scoped path. Typically, the scope used for the input document is Flow/document.
	Service	Indicates which service to run by specifying a service descriptor in the resource set
	Output Document	Provides instance data for the response returned from the service. The input document is specified by means of a scoped path. Typically, the scope used for the input document is Flow/document.
Copy Scoped XPaths	Copy Before	Copies data from one scoped path location to another before the activity is executed.
	Copy After	Copies data from one scoped path location to another after the activity is executed.
Design UI	Design UI properties control the design-time appearance of the activity. For more information, see "Setting object display properties" on page 55.	

Finish activity

Description

The **Finish activity** represents the Workflow subsystem functions necessary to bring a workflow process to a normal end. There must be one (and only one) Finish activity in a workflow process.

Properties

The properties for the Finish activity are:

Property Inspector tab	Property name	Description
Activity	Name	A unique reference to this activity that is used for runtime processing.
	Description	A description of the activity intended for the Workflow Modeler user.
Copy Scoped XPaths	Copy Before	Copies data from one scoped path location to another before the activity is executed.
	Copy After	Copies data from one scoped path location to another after the activity is executed.
Design UI	Design UI properties control the design-time appearance of the activity. For more information, see "Setting object display properties" on page 55.	

4 Working with Links

This chapter describes the links you can use in a workflow process. It includes these topics:

- About links
- Simple link
- Condition link

For information about adding links to your workflow, see Chapter 5, “Workflow Modeler”.

About links

The following types of explicit links are supported within a workflow:

- Simple links
- Condition links

Links are evaluated in order of precedence When an activity is linked to more than one other activity, the workflow engine uses **precedence** to determine which link to follow. Each link has a precedence number associated with it. In cases where more than one link expression might evaluate to true, the engine evaluates the links in precedence order, following all links that return true.

What happens when all link expressions return false You can mark a link as the **default** path to follow out of a particular activity. When all of the link expressions evaluate to false, the workflow engine follows the default link.

About scoped paths *Scoped paths* are pointers to application data that you can select visually in the Workflow Modeler. You can use scoped paths to select test values for link expressions or to specify the path for an activity’s primary property. You can also copy scoped paths after the execution of a link.

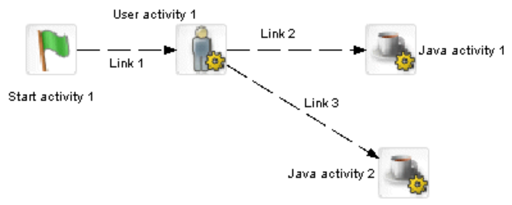
For more information, see the chapter on working with scoped paths in *Developing exteNd Director Applications*.

Simple link

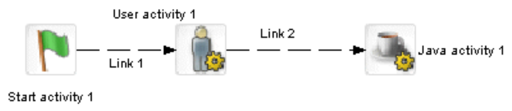
A **simple link** represents a simple path from one activity to another. Simple links allow you to specify expressions that evaluate to true or false. When the expression for a simple link evaluates to true, the link is followed to the next activity. When the expression evaluates to false, the path is not followed.

Simple links provide an easy way to choose between multiple target activities. When an activity finishes processing, you can use expressions on simple links to determine which activity should be executed next.

For example, you could use expressions on Link 2 and Link 3 in the following workflow to determine whether Java activity 1 or Java activity 2 would be executed after User activity 1:



If you do not specify an expression for a simple link, the workflow engine automatically moves to the target activity when the source activity finishes. For example, you would not need an expression on Link 2 in the following workflow, since the User activity1 activity has only one outgoing link:

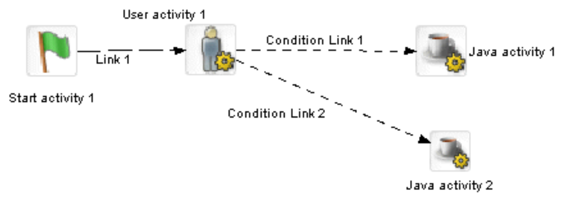


A Simple link has these properties:

Property Inspector tab	Property name	Description
Link	Name	A unique reference to this link that can be accessed in the flow.
	Description	A description of the link intended for the Workflow Modeler user.
	Copy Scoped Paths	Use to copy scoped data to another scope. The scope gets copied after the link is evaluated and before the target activity is executed. For more information, see “Using scoped paths” on page 48.
	Default	Select to make this path the default. Use if you have multiple links to or from an activity. The default is the path that is used if no other path evaluates to true.
	Expression	Use to build a logical expression that evaluates to true or false. If you do not build an expression, the path will evaluate to true and will be executed. For more information, see “Creating link expressions” on page 53.
	Precedence	Specify the order in which you want this link to be evaluated. Use if you have multiple links to or from an activity.
Design UI	Design UI properties control the design-time appearance of the link. For more information, see “Setting object display properties” on page 55.	

Condition link

Like a simple link, a **condition link** represents a path from one activity to another. However, a condition link does not have an expression directly associated with it. Instead, it executes a condition macro created in the Rule Editor. A condition macro executes a set of conditions that contain reusable business logic:



Condition links evaluate to true or false. When a condition link evaluates to true, the link is followed to the next activity. When it evaluates to false, the path is not followed.

A Condition link has these properties:

Property Inspector tab	Property name	Description
Condition Link	Name	A unique reference to this link that can be accessed in the flow.
	Description	A description of the link intended for the WorkFlow Modeler user.
	Copy Scoped Paths	Use to copy scoped data to another scope. The scope gets copied after the link is evaluated and before the target activity is executed. For more information, see “Using scoped paths” on page 48.
	Default	Select to make this path the default. Use if you have multiple links to or from an activity. The default is the path that is used if no other path evaluates to true.
	Condition macro ID	The name of the condition macro XML descriptor, as specified in the Rule Editor. For more information, see the chapter on rule and macro editors in the *Rules Guide*.
	Precedence	Specify the order in which you want this link to be evaluated. Use if you have multiple links to or from an activity.
Design UI	Design UI properties control the design-time appearance of the link. For more information, see “Setting object display properties” on page 55.	

II Tools

5 Workflow Modeler

This chapter has general information about how to create workflow processes using the Workflow Modeler. It has these sections:

About the Workflow Modeler

The Workflow Modeler allows you to create and save an XML document that can be executed by the workflow engine at runtime. Creating a workflow process is a three-step process:

1. Use the graphing environment of the Workflow Modeler to lay out the logic of your process:
    - Add activities
    - Create links between activities
    - Add labels (optional)
2. Use the Property Inspector to configure activity and link properties that link the process to the resources of your exteNd Director environment.
3. Save the process in your project resource set. The Workflow Modeler converts it to a process definition that the workflow engine can execute.

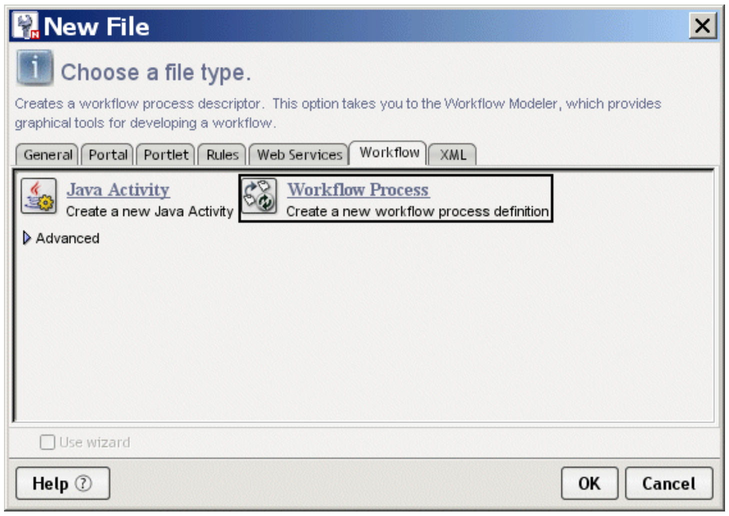
Starting the Workflow Modeler

To start the Workflow Modeler you create a new process or open an existing one.

➤ **To create a workflow process:**

1 In the development environment, select **File>New**.

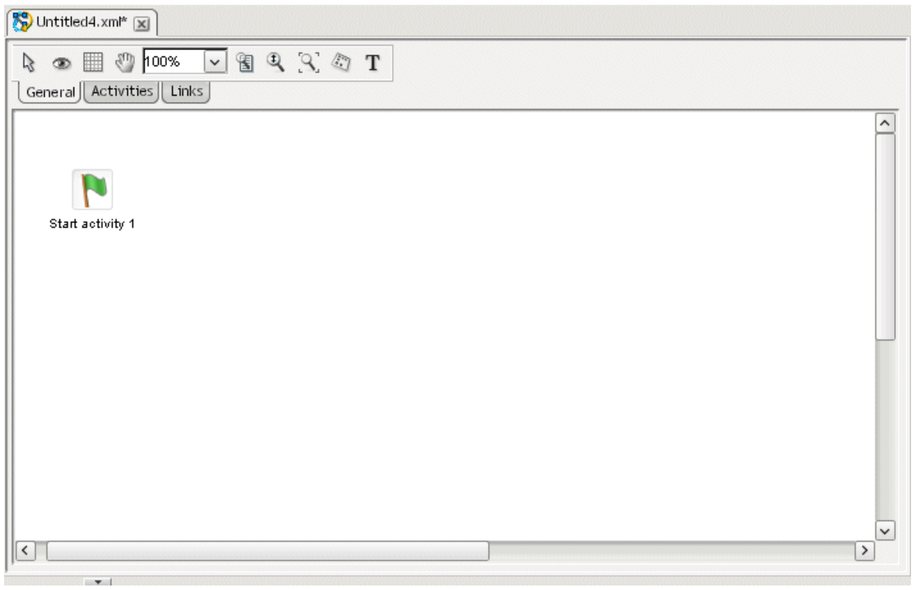
2 Click the **Workflow** tab:



Creates a workflow process descriptor. This option takes you to the Workflow Modeler, which provides graphical tools for developing a workflow.

3 Select **Workflow Process** and click **OK**.

The main window of the Workflow Modeler opens in the editing area. The flag icon represents the Start activity for the process:



➤ **To save a workflow process:**

1 Select **File>Save** from the exteNd Director menu.

If the Workflow Modeler detects any mistakes in the process, a popup message informs you and asks if you would like to save anyway. This validation occurs on all save events. You can address the warnings later.

2 Click **Yes**.

If this is your first save, the **Save As** dialog appears.

The contents of the workflow process definitions folder display in your project resource set. Although you can specify another directory, it is recommended that you accept the default.

3 Specify a file name and click **Save**.

➢ To open a workflow process:

1 Select **File>Open** from the exteNd Director menu.

2 Navigate to the workflow process in your project resource set.

3 Double-click to open.

Process properties

You can access the process property sheet to view current information about the process and set UI properties.

➢ To access process properties:

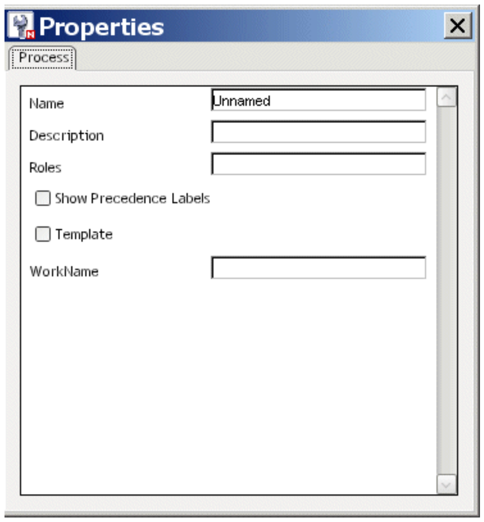
1 Do one of the following:

- Click the **Properties** icon on the Modeler toolbar:

  OR

- With the cursor in the Modeler window, right-click and select **Properties**.

The Property Inspector displays the process properties:



Name: Unnamed
Description:
Roles:
☐ Show Precedence Labels
☐ Template
WorkName:

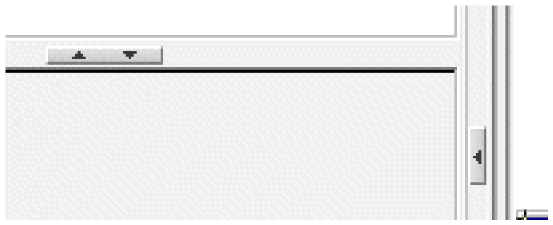
2 Edit or view the process properties:

Property	Description
Name	The formal name of the process. The default is the name specified for the process descriptor.
Description	A description of the process intended for the Workflow Modeler user.

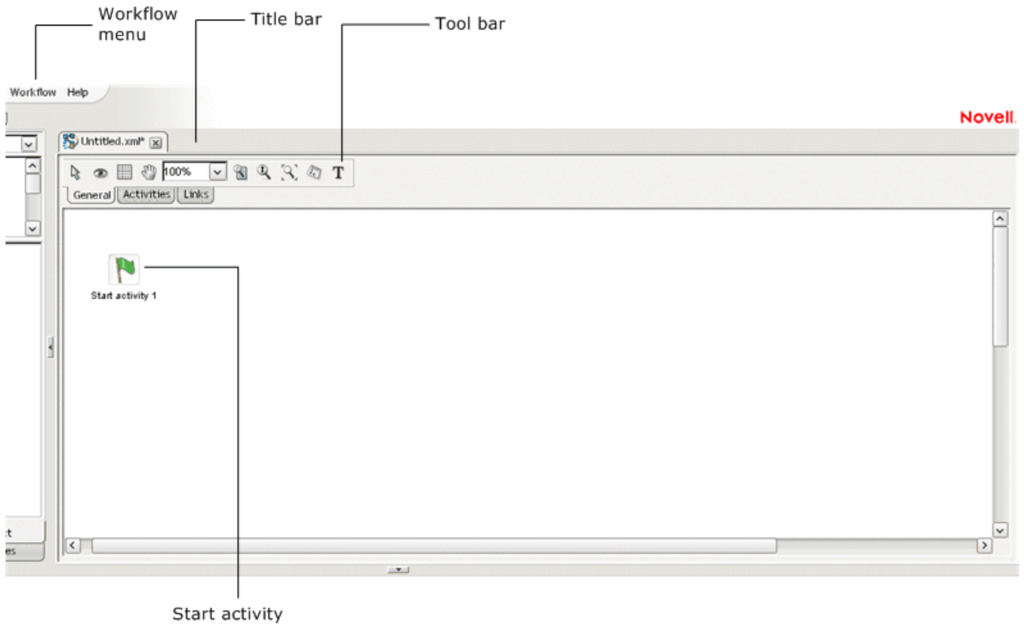
Property	Description
Roles	A semicolon-delimited list of existing security roles that are authorized to start a process and create workitems. For example: `authors;developers;managers` For more information, see the chapter on using security roles in the *User Management Guide*.
Show Precedence Labels	Specifies whether precedence labels should be displayed in the workflow graph. When an activity is linked to more than one other activity, the Workflow engine uses precedence to determine which link to follow. Each link has a precedence number associated with it. In cases where more than one link expression might evaluate to true, the engine evaluates the links in precedence order, following the first link that returns true.
Template	Specifies whether this workflow can be used as a template for the creation of other workflows.
WorkName	A descriptive name for the Workflow Modeler user.

About the Modeler window

Providing more screen space To provide more screen space you can close the Navigation and Output Panes in exteNd Director by clicking the panel view selectors:



Command features Here are the command features of the Workflow Modeler:



Navigating, selecting, and moving objects

➢ **To navigate the window:**

1 With the General tab selected, click the **Pan** button on the toolbar to change the cursor to pan mode:

2 Drag the **hand cursor** on the graph area to scroll the graph in the editing area.

You can also use the horizontal and vertical scroll bars to achieve the same effect.

➢ **To select objects:**

1 With the General tab selected, click the **Select** button on the toolbar:

NOTE: Select mode is the default

2 Click any object to select it.

3 To select multiple objects, click empty space and drag the selection rectangle around the group.

➢ **To move objects:**

1 Select the object.

2 Drag it to where you want it.

When you move an activity, any associated links move with it.

Adding activities

An *activity* represents a *workitem* in the workflow process. You associate the activity with a workitem and/or business logic by setting properties on the activity icon, or node.

Workflow activity types

The following is a summary of the activities in the Workflow Modeler. For details about activity properties and usage, click on the appropriate item:

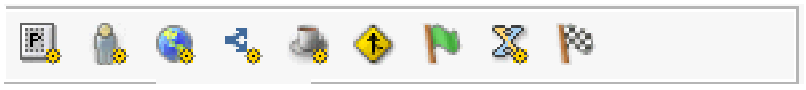
Node	Toolbar icon	Represents
Pageflow activity		A pageflow created with the Pageflow Modeler
User activity		A presentation activity for custom client implementations
Web Service activity		A system activity that executes a Web Service

Node	Toolbar icon	Represents
Rule activity		A system activity that executes a business rule at runtime
Java activity		A system activity for executing custom business logic
Synchronize Merge activity		A system activity that provides a synchronization point for parallel branches of execution
Start activity		A system activity that marks the beginning of a workflow (required)
Composer Service activity		A system activity that executes an exteNd Composer service
Finish activity		A system activity that marks the end of a workflow (required)

➤ **To add an activity:**

1 Click the **Activities** tab.

The activity toolbar displays:



2 Select an activity type.

3 Click anywhere on the graph to place the activity. Click and drag to move.

➤ **To delete an activity:**

1 Select the activity.

2 Press the **Delete** key or right-click and select **Delete**.

➤ **To access activity properties:**

1 Select the activity.

2 Right-click and select **Properties**—or click the **Eye** icon on the **General** tab.

3 Click the appropriate tab in the property sheet.

📖 The properties are specific for the activity type. For more information, see "Workflow activity types" on page 45.

Adding links

A *link* is a single logical path from one activity to another activity. Each link represents a potential routing of workitems exiting a single activity. Links are represented by arrows in the Workflow Modeler.

Workflow link types

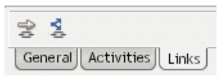
There are two types of links:

Link type	Toolbar icon	Represents
Simple link		A logical path from one activity to one or more other activities. On the link properties you specify: ◆ Routing logic using the link expression builder ◆ Destination addressee as a user or role
Condition link		A logical path from one activity to one or more other activities. On the link properties you specify a Condition Macro that you created using the Rule Editor.

➢ **To create a link:**

1 Click the **Links** tab.

The link toolbar displays:



2 Select a link type.

3 Click on an activity and drag from the starting activity to the target activity, then release the mouse button.

📖 See also "Drawing a link segment" on page 47.

➢ **To delete a link:**

1 Select the link.

2 Press the **Delete** key or right-click and select **Delete**.

➢ **To access link properties:**

1 Select the link.

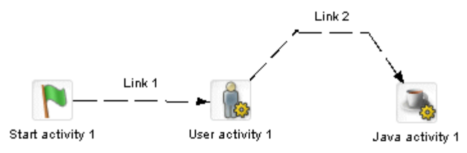
2 Click the **Eye** icon on the **General** tab—or right-click and select **Properties**.

3 Click the appropriate tab in the property sheet.

📖 Properties are specific for the link type. For more information, see "Workflow link types" on page 47.

Drawing a link segment

A *segment* is the line between two points of a link. Segments are purely cosmetic. You can use them to enhance the legibility and appearance of the process model:



➤ **To draw a segment:**

1. Click any point on a link and drag in any direction.

   The point you drag becomes the bend in the link.

2. Release the mouse button at the point where you want to end the segment.
3. Click again and drag to add another segment.
4. For the final segment, drag to the destination activity and click on it.

Using scoped paths

Scoped paths allow you to associate data with workflow activities and links. exteNd Director provides a set of predefined scoped paths that you can access using the Scoped Path Navigator.

📖 For background information about scoped paths, see the chapter on working with scoped paths in *Developing exteNd Director Applications*.

This section describes how to:

- Associate scoped paths directly with the primary property for an activity
- Copy scoped paths before or after an activity or a link executes in the flow

Associating a scoped path with an activity

You can use a scoped path to associate an object with an activity. To do this, you specify a scoped path as the value for the activity's primary property.

Activities you can associate You can do this with any of the following types of activities:

- Portlet activity
- User activity
- Java activity
- Rule activity
- Start activity
- Web Service activity
- Composer Service activity

Two procedures Associating a scoped path with an activity requires two procedures:

- To associate a scoped path with an activity's primary property:
- To specify a scoped path:

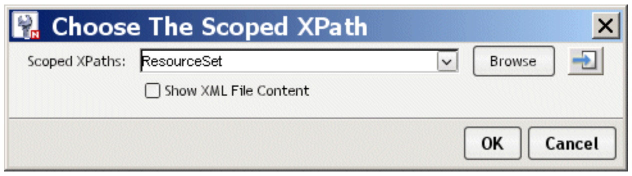
➢ **To associate a scoped path with an activity's primary property:**

1 Select the activity, then right-click and select **Properties**.

2 In the Property Inspector, click the tab that has the primary property. This tab typically has the same name as the activity. For example, the Pageflow activity has a Pageflow tab where you can set the primary property.

3 Click the primary property for the selected activity. For details, see "Workflow activity types" on page 45.

The Choose The Scoped XPath dialog displays showing the default predefined path for this activity type:



The Show **XML File Content** check box applies to the Browse option. If selected, the XPath Navigator will display the tree contents of the XML file. If not selected the contents will not display. For more information, see "To browse to a new path:" on page 50.

4 Complete the next procedure to specify a scoped path.

➢ **To specify a scoped path:**

1 Use one of these methods to specify the path:

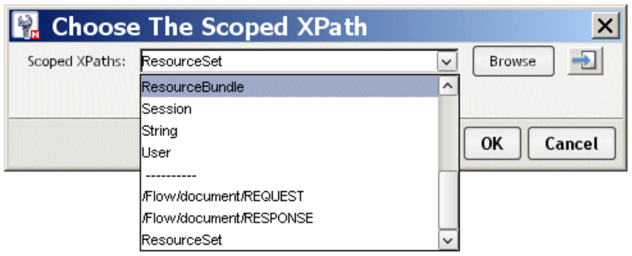
To enter the path directly:

- Type the path in the text box.

  This requires that you know the syntax for the scoped path. For more information, see the section on predefined scoped paths in *Developing exteNd Director Applications*.

To select another path or a path already defined for this flow:

- Open the dopdown list for the current path:



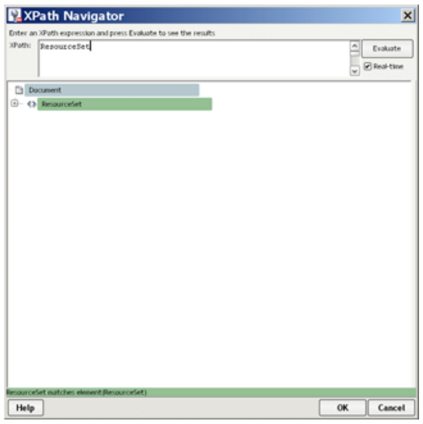
- Select another predefined path from the top of the list, or select a current path (already defined for this flow) from the bottom of the list.

  TIP: If you choose a current path that accesses the resource set, you can display the contents of the file by clicking the icon next to the **Browse** button.

To browse to a new path:

- Click **Browse**.

  When you click **Browse** the XPath Navigator displays:

  Enter an XPath expression and press Evaluate to see the results

  XPath: ResourceSet

  ResourceSet matches element(ResourceSet)

  The XPath Navigator is an interactive tool that allows you to specify the path using a tree view (where applicable) and the XPath expression builder. The available options depend on the scoped path you selected.

  For more information on using the XPath Navigator, see the section on using the XPath Navigator in *Developing exteNd Director Applications*.

2 Click **OK**.

Editing a scoped path To edit an existing scoped path, repeat the two procedures above (To associate a scoped path with an activity's primary property: and To specify a scoped path:).

Copying scoped paths

With the exception of the Start and Finish activites, you can copy scoped paths before or after the execution of any activity, and copy scoped paths after the execution of a any link.

For design considerations that relate to copying scoped paths, see the section on copying scoped paths in *Developing exteNd Director Applications*.

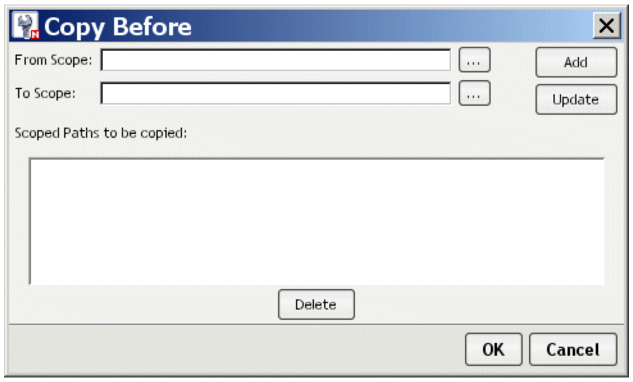
➢ To copy a scoped path before or after an activity:

1 Select the activity, then right-click and select **Properties**.

2 In the Property Inspector click the **Copy Scoped XPaths** tab.

- To copy the scoped path **before** execution, click the link **Edit Scoped XPaths** under **Copy Before.**
- To copy the scoped path **after** execution, click the link **Edit Scoped XPaths** under **Copy After**.

The appropriate Copy dialog (Copy Before or Copy After) displays:



3 Click the ellipsis for **From scope**.

The dialog displays the default predefined scope for this activity type. If you want to use another scope, select it from the dropdown list.

4 To specify the path, use one of the methods described under "To specify a scoped path:" on page 49.

5 Click the ellipsis for **To scope**. Repeat the procedure for specifying the From scope.

6 On the Copy Scope dialog, click **Add**, then click **OK** to exit the dialog.

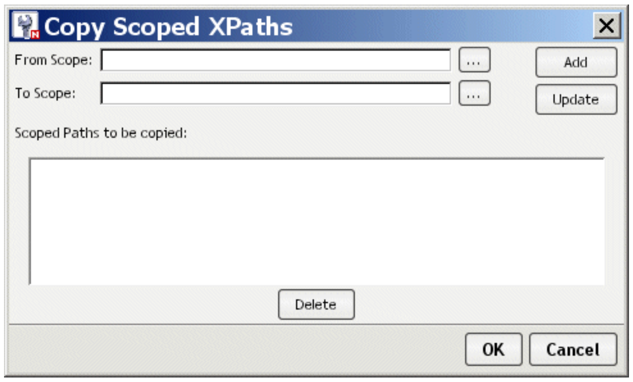
7 To edit an existing scope, repeat the procedure and click **Update** instead of Add.

➢ **To copy a scoped path after the execution of a link:**

1 Select the link, then right-click and select **Properties**.

2 In the Property Inspector click the link **Edit Scoped XPaths** under **Copy Scoped XPaths.**

The Copy Scoped XPaths dialog displays:



3 Click the ellipsis for **From scope**

The dialog displays the default predefined scope for this activity type. If you want to use another scope, select it from the dropdown list.

4 To specify the path, use one of the methods described under "To specify a scoped path:" on page 49.

5 Click the ellipsis for **To scope**. Repeat the procedure for specifying the From scope.

6 On the Copy Scope dialog click **Add**, then click **OK** to exit the dialog.

7 To edit an existing scope, repeat the procedure and click **Update** instead of Add.

Accessing scoped paths

You can view all of the current paths used for a selected object in the flow or for all objects in the flow.

➢ **To access current scoped paths for an activity or link:**

1 Select the object.

2 Right-click and choose **Scoped paths**.

The Available Scoped XPaths dialog displays.

➢ **To access all current paths in the flow:**

1 Do one of the following:

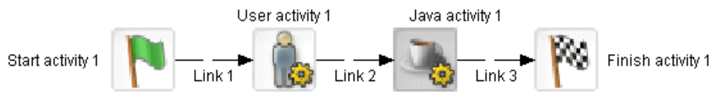
- From the **Workflow** menu, select **View Scoped Paths**.

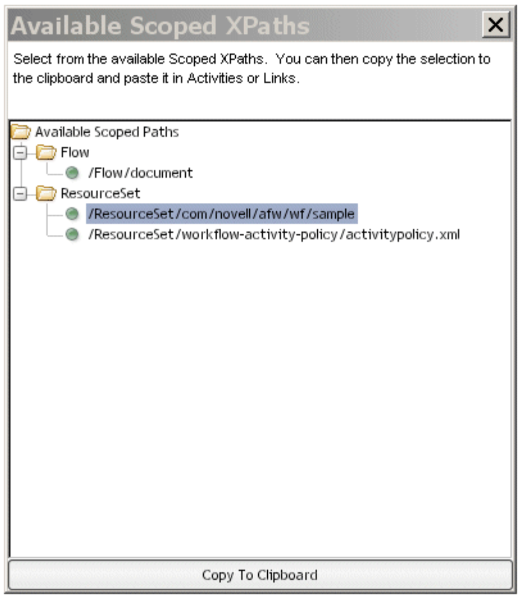
  OR

- With no objects selected, right-click and choose **Scoped paths**.

The Available Scoped XPaths dialog displays.

2 Click a scoped path. Notice that the objects that use it are highlighted, as shown with the Java activity in this example:




Available Scoped XPaths

Select from the available Scoped XPaths. You can then copy the selection to the clipboard and paste it in Activities or Links.

```
Available Scoped Paths
⊟ Flow
    /Flow/document
⊟ ResourceSet
    /ResourceSet/com/novell/afw/wf/sample
    /ResourceSet/workflow-activity-policy/activitypolicy.xml
```

Copying a scoped path to the clipboard

Form the Available Scoped XPaths dialog you can copy a selected path to the clipboard and paste it wherever you want.

➢ **To copy a scoped path to the clipboard:**

1 Access the scoped paths using one of the methods described in the preceding section.

2 Select the path you want to copy.

3 Double-click the path or click **Copy to Clipboard** at the bottom of the dialog.

4 Go to where you want to copy the path and press **Ctrl+V**.

Creating link expressions

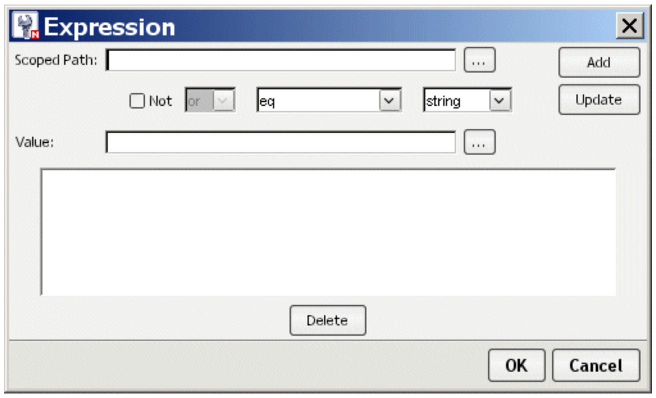
Link expressions let you dynamically route work based on runtime workitem values. The expression builder allows you to test workitem properties in simple or compound expressions that evaluate to true or false. Expressions apply to the Simple link only.

For more information, see "Simple link" on page 35.

To specify a link expression:

1. Select a Simple link, then right click and select **Properties**.
2. In the Property Inspector select **Edit Expression**.

   The Expression dialog displays:



3. Click **Choose Scope** to access a workitem.
4. To specify the path, use one of the methods described under "To specify a scoped path:" on page 49.
5. In the **Value** field, specify the value to test against the scoped data.
6. Select the operator from the data operator dropdown list.
7. Select the data type (which must match the scoped data) in the data type dropdown.

   The expression builder validates your entry:

   - For **Boolean**, you must enter **true** or **false**.
   - For **Timestamp**, use this format:

     ```
     MM/DD/YYY < optional: HH:MM:SS>
     ```
8. Click **Add** to add the expression to the text area at the bottom.
9. To add additional clauses to the expression, select the appropriate item from the logical operator dropdown, complete the clause, and click **Add** for as many clauses as you need.

   NOTE: Enable the **Not** check box to negate the current expression.
10. To edit or delete an expression, click **Update** or **Delete**.
11. Click **OK** when you're done.

Validating a process

You can validate a process at design time whenever you choose. The Workflow Modeler analyzes the process structure and displays any errors encountered. Note that the validation applies to the design-time process structure only.

➢ **To validate a process:**

- Use one of these methods:
  - Select **Validate Process** from the Workflow toolbar menu.

    OR
  - Right-click and select **Validate Process**.

Adding text labels

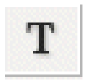
Labels are separate objects in the graphing environment and have their own property sheets. Labels have two forms: **floating** and **attached**.

Floating labels

Floating labels are simply text you place on your workflow graph and have no association with another workflow graph object. Titles, version numbers, notes, and legends are all good uses for floating labels.

➢ **To create a floating label:**

1. From the Workflow Modeler toolbar, select the **Label** button:

2. Click the location on the graph where you want the label to appear.

   The label appears as a box with the text **Untitled** inside.

   Each click creates a new label.
3. From the toolbar, select the arrow button.
4. Double-click inside a new label and edit the text.
5. Click outside the label to save your changes.

Attached labels

Most labels are associated with an activity or link and are called attached labels. By default, activities and links start with a label.

➢ **To edit an attached label:**

1. In the Workflow Modeler, right-click an activity icon or link.
2. From the popup menu, select **Create Label**.

   A label appears directly below the activity or link.
3. Double-click inside the label and edit the text.
4. Click outside the label to save your changes.

An activity or link can have many labels. You can reposition the attached by dragging it to a new location. Note the line that appears as you drag. This line indicates the activity or link the label is attached to.

➢ **To format any label:**

1. In the Workflow Modeler, right-click the label and select **Properties**.

   The Property Inspector displays showing the current formatting properties. (If the Property Inspector is already open, just click the label.)
2. Select the **Design UI** tab.
3. Make the changes you want.

   📖 For a description of the UI properties, see "Setting object display properties" on page 55.

➢ **To delete a label:**

1. Select the label.
2. Press the **Delete** key.

Setting object display properties

Each activity, link, and label has a set of graphical properties associated with it. Select and right-click an element, and the properties of the element are displayed in the **Design UI** tab in the Property Inspector. The table below describes the graphical properties found on some or all of the elements:

Activity graphical properties	Description
Arrowhead Height	Customize the height (thickness) of the arrowhead for the selected links.
Arrowhead Width	Customize the width (length) of the arrowhead for the selected links.
Border Color	The color of the square outlining the activity. Click the color bar to display a standard color selection dialog.
Color	The background color of the activity. Click the color bar to display a standard color selection dialog.
Font	Click the data area to bring up a standard text formatting dialog.
Height	(Read-only) Height of the activity in pixels. You can enlarge or shrink the activity by dragging its handles.
Margin Height	For labels, the amount of space on the top and bottom between the text and the bounding box.
Margin Width	For labels, the amount of space on the left and right sides between the text and the bounding box.
Show Border	When enabled, displays a square outline around the activity, even when the background color is set to transparent.
Style	Choose a solid line or one of several dashed patterns from the dropdown list. Your choice affects only the currently selected link destination. To change several destinations at once, hold down the Shift key and click each one. Select a style from the Property Inspector.
Text color	The font color of the label. Click the color bar to display a standard color selection dialog.
Transparent	Overrides the color setting and makes the activity background transparent.
Width	(Read-only) Width of the activity in pixels. You can enlarge or shrink the activity by dragging its handles.

Activity graphical properties	Description
X Center	When the workflow process is first created, the origin (0, 0) is the bottom-left corner of the graph. The graph automatically resizes in all directions as you create and drag items around. When this happens, the origin does not reset itself to the new bottom-left corner; it remains fixed. A positive value is the number of pixels above the origin the vertical center of the icon is currently located. A negative value indicates a position below the origin. Enter a new value to have the Workflow Modeler automatically move the activity to the vertical position specified.
Y Center	When the workflow process is first created, the origin (0, 0) is the bottom-left corner of the graph. The graph automatically resizes in all directions as you create and drag items around. When this happens, the origin does not reset itself to the new bottom-left corner; it remains fixed. A positive value is the number of pixels to the right of the origin the horizontal center of the icon is currently located. A negative value indicates a position to the left of the origin. Enter a new value to have the Workflow Modeler automatically move the activity to the horizontal position specified.

Using the layout features

The *layout* is the arrangement of the activities, links, and labels in your graph. The Workflow Modeler has a sophisticated layout feature that can completely rearrange your graph to maximize readability and minimize space.

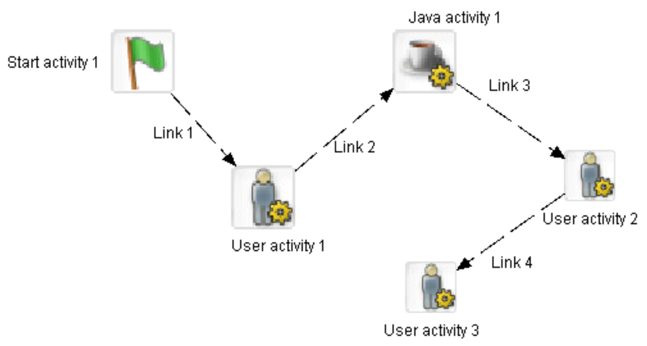
You can specify whether you want the new arrangement to have a horizontal or vertical orientation and whether you want links drawn as diagonal lines or composed of perpendicular segments.

There are two kinds of layout: *full layout* and *incremental layout.*

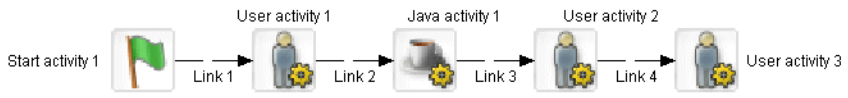
Full layout

Full layout gives the Workflow Modeler great freedom to move activities, links, and labels around the graph.

For example, this figure displays a hand-arranged layout:



This figure shows the result of applying a full layout to the hand-arranged layout:



➢ **To apply a full layout:**

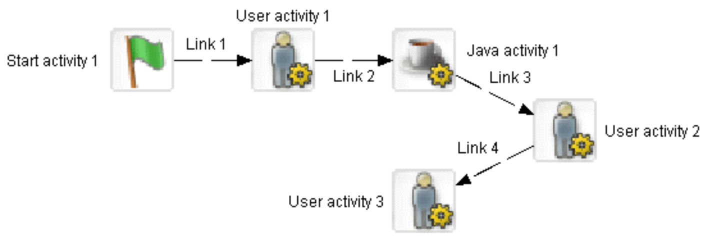
- Choose **Workflow >Full Layout**.

  OR
- Press **Ctrl+Shift+L**.

Incremental layout

Incremental layout attempts to make a graph more attractive and organized but also tries to keep the basic design of your hand-arranged layout.

This figure shows the result of applying an incremental layout to the hand-arranged layout:



➢ **To apply an incremental layout:**

- Choose **Workflow>Incremental Layout**.

  OR
- Press **Ctrl+Shift+M**.

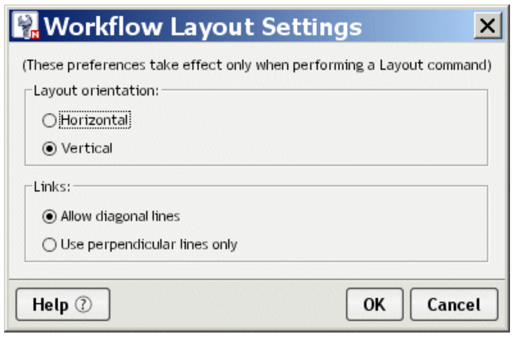
TIP: Try a layout on your graph and select **Edit>Undo** to back out of a layout you don't want.

Setting preferences

You can set layout preferences for a workflow graph. These preferences let you specify whether you want the new arrangement to have a horizontal or vertical orientation and whether you want link links drawn as diagonal lines or composed of perpendicular segments.

➢ **To set layout preferences:**

1 Choose **Workflow>Layout Settings**.



Workflow Layout Settings

(These preferences take effect only when performing a Layout command)

Layout orientation:
- ○ Horizontal
- ● Vertical

Links:
- ● Allow diagonal lines
- ○ Use perpendicular lines only

2 Select an orientation.

3 Select a link style.

4 Click **OK**.

Undoing a layout

You can undo a layout selection and return to the previous layout.

➢ **To undo or redo a layout:**

- From the Main Menu select **Edit>Undo**.
- From the Main Menu select **Edit>Redo**.

Using the zoom features

The Workflow Modeler gives you four ways to zoom:

Zoom type	Toolbar icon	Description
Standard zoom	125%	Allows you to pick from a list of common zoom percents
Marquee zoom	🔍	Allows you to drag and select a portion of the graph area to be zoomed to fill the graph window
Interactive zoom	🔍	Allows you to zoom up or down by dragging up or down on the graph
Fit in window	🔍	Allows you to zoom the graph window to show all the activities in the graph. To do this, it shrinks or enlarges the content of the current document to fit in the graph window.

➢ **To zoom using the toolbar:**

- Select the appropriate icon from the **General** tab on the toolbar.

  OR
- Right-click in the Modeler window and select **Zoom**>*<option>* from the popup window.

Using the grid features

The Workflow Modeler includes a drawing grid that works much like the grid in any graphics program:

- When the grid is visible, the corners of activity and label objects stick to the intersections of horizontal and vertical grid lines. This makes it much easier to line up objects and use consisting spacing.
- When the grid is invisible, objects can be positioned without constraint in one-pixel increments.
- Turning the grid on does not reposition existing items to align with the grid.

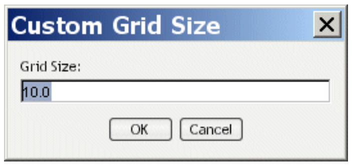
➢ To turn the grid on or off:

- Choose **Workflow>Toggle Grid**.
  OR
- Click the **Grid** button from the Workflow Modeler toolbar:

  OR
- Press **Ctrl+Shift+G**.

➢ To change the spacing of grid lines (grid size):

1. Choose **Workflow>Grid Size**.
   The Grid Size dialog displays:



Custom Grid Size

Grid Size:

10.0

2. Enter a value in pixels from 7.5 to 1000.
   The default is 10.
3. Click **OK**.

Using the Bird’s Eye View

The Bird’s Eye View is a popup window that gives you a view of the entire workflow graph to help you find your way around in a large graph. The Bird’s Eye View window:

- Appears when you click the Bird’s Eye View button on the Workflow Modeler toolbar:

- Stays on top as you work in the graph area
- Is dismissed by clicking the X button in the upper-right corner
- Can be resized by dragging the corners
- Indicates the area visible in the graph window with a blue outline box

You can use the blue outline box of the Bird’s Eye View window to do several useful things:

Doing this	Has this effect
Clicking outside the outline box	Centers the outline box on the point clicked and pans the graph area to correspond to the new location of the outline box
Dragging outside the outline box	Draws the outline box in the new location and pans the graph area to correspond to the new location of the outline box
Dragging inside the outline box	Pans the outline box and pans the graph area to correspond to the new location of the outline box
Dragging a corner of the outline box	Resizes the outline box and zooms the graph area to correspond to the new size of the outline box

Creating a process resource view

You can create a custom view of all resource files associated with a workflow. Once you've created the view, you can use display it on the **View** tab.

TIP: To get to the **View** tab, you need to first click on the **Resources** tab in the Navigation Pane.

➢ **To create a custom view for a workflow process:**

- Choose **Workflow> Create Resource View**.

6 Java Activity Wizard

This chapter describes how to create a Java activity to use in a workflow process. It has these sections:

- About Java activities
- Using the Java Activity Wizard
- Coding the Java activity

About Java activities

A Java activity is a Java class that executes within the context of an exteNd Director workflow application. A Java activity allows you to write custom business logic that executes automatically without user intervention.

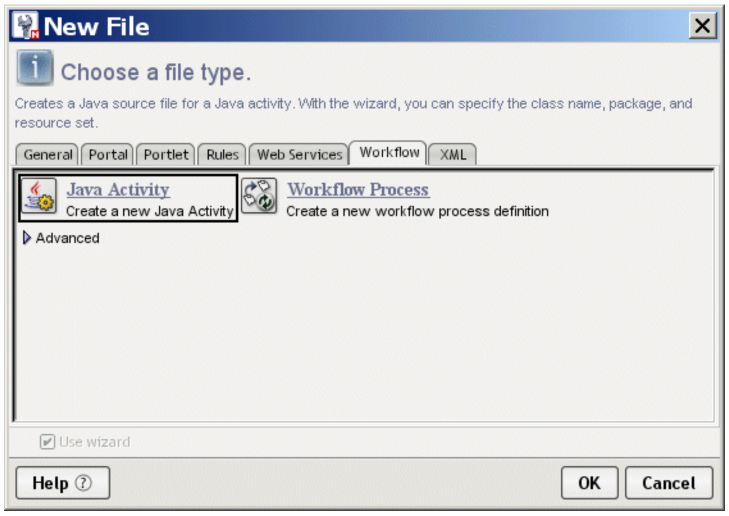
You can create the Java activity using the Java Activity Wizard, code the resulting Java class template, and add the activity in the Workflow Modeler. The workflow engine automatically forwards work after the Java activity is processed.

Using the Java Activity Wizard

➤ **To generate the Java activity code template:**

1 With your project open in exteNd Director, select **File>New>File**.

2 From the New File dialog, select the **Workflow** tab and click **Java Activity**:

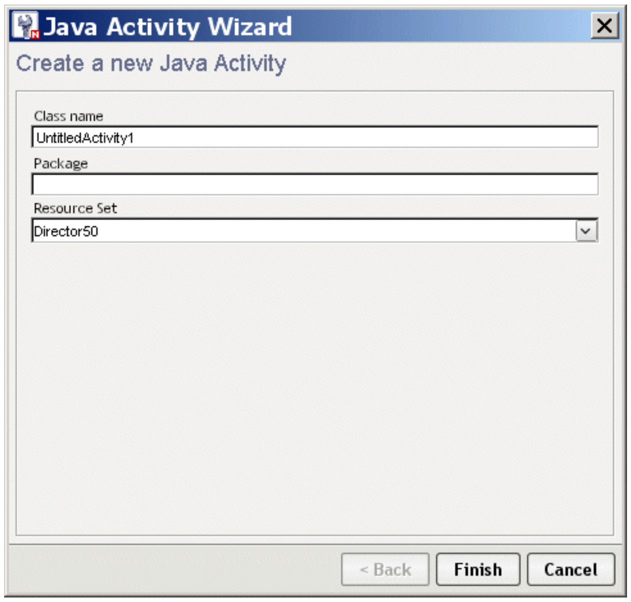


Creates a Java source file for a Java activity. With the wizard, you can specify the class name, package, and resource set.

Java Activity — Create a new Java Activity

Workflow Process — Create a new workflow process definition

3 Click **OK** to start the wizard. This panels displays:



Class name: UntitledActivity1
Package:
Resource Set: Director50

4 Complete the wizard panel:

Option	What to do
Class name	Specify a class name for the Java activity
Package	(Optional) Specify a package hierarchy (with levels separated by periods) to place the Java activity in a subdirectory of the base directory. This affects only the directory where the Java activity is saved. For example, if the base directory is *ProjectDir*/src and you specify **com.myco** as the package, the Java activity will be created in *ProjectDir*/src/com/myco.
Resource Set	Select the Resource Set in which to store your application data.

5 Click **Finish**. The wizard generates the Java source template.

6 Click **OK** on the popup to access the template.

Coding the Java activity

The generated class implements the EbiJavaActivity interface and generates a method stub for the invoke() method. This method supplies the workflow context, and is called when work is forwarded to the Java activity in the workflow process.

Accessing a scoped path

The following example shows how to access a scoped path in the Java activity at runtime. This example uses the Session scope. Typically workitems in a workflow are stored in the Flow scope.

```
import com.sssw.wf.api.*;

  public void invoke(EbiContext context) {

        try {
            // how to get a value from a scopedPath. ( assuming a request var of fname )
            com.sssw.fw.api.EbiScopedPath fname =
              com.sssw.fw.factory.EboScopedPathFactory.createScopedPath(
                 "/Request/param/fname");
            String theFirstName = (String)fname.getValue( context );

            // how to set a value on a scopedPath.
            com.sssw.fw.api.EbiScopedPath sessionDoc =
              com.sssw.fw.factory.EboScopedPathFactory.createScopedPath(
                "/Session/DOC");
            sessionDoc.setValue( context, "mySessionDocValue" );

            // how to copy the request Referer into a session variable
            com.sssw.fw.api.EbiScopedPath from =
              com.sssw.fw.factory.EboScopedPathFactory.createScopedPath(
                "/Request/prop/Referer");
            com.sssw.fw.api.EbiScopedPath to =
              com.sssw.fw.factory.EboScopedPathFactory.createScopedPath(
                "/Session/Referer");
            com.sssw.fw.core.EboScopedPathUtil.copy( context, from, to );
        }
        catch (Exception e) {
            System.out.println(e);
        }

    }
```

Performing a JNDI lookup

In the code for a Java activity, you cannot use the InitialContext object to perform a JNDI lookup. Instead, you need to use EbiServiceLocator interface.

For example, suppose you have an environment entry in the web.xml descriptor for a exteNd Director WAR file:

```
<env-entry>
<env-entry-name>mydata</env-entry-name>
<env-entry-value>myvalue</env-entry-value>
<env-entry-type>java.lang.String</env-entry-type>
</env-entry>
```

If you use the following code to try to retrieve the environment entry, you will not be able to access the environment entry:

```
Context ic = new InitialContext();
Context env = (Context) ic.lookup("java:comp/env");
String value = (String) env.lookup("mydata");
```

However, the following code will work:

```
com.sssw.fw.api.EbiServiceLocator locator =
  com.sssw.fw.factory.EboFactory.getServiceLocator();
String value = (String) locator.getEnvEntry("mydata");
```

7 Workflow Administration

This chapter describes how to use the Workflow administration tools and features. It has these sections:

- Using the workflow administration portlets
- Auditing runtime processes
- Generating runtime exception reports
- Configuring workflow to run in a cluster

Using the workflow administration portlets

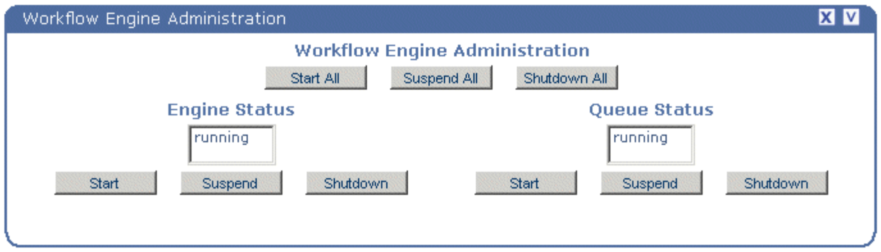
The exteNd Director install includes two workflow administration portlets for managing the engine, queue, and runtime processes:

- Engine and Queue Administration Console (WorkflowEngineAdmin)
- Workflow Administration Client (WorkflowAdminClient)

Workflow administrators can access these portlets from the Director Administration Console (DAC).

For more information, see the chapter about the Director Administration Console in *Developing exteNd Director Applications*.

Engine and Queue Administration Console



The engine and queue administration console provides the following functionality:

- Start, suspend, or shut down the workflow queue
- Start, suspend, or shut down the workflow engine
- Start, suspend, or shut down both

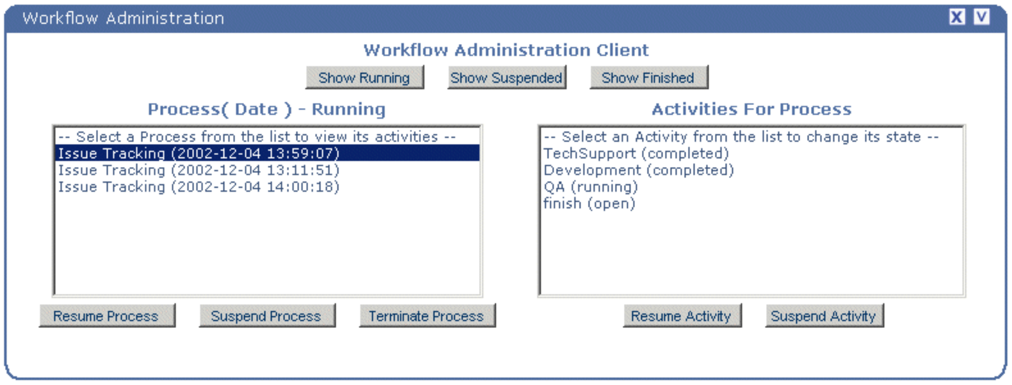
Start functions Start the selected operation. This option starts an operation from scratch, resumes a suspended operation, or restarts an operation that was shut down.

Suspend functions Suspend the specified operation. Any messages sent to the engine or queue are stored but not executed until you select **Start**.

Shutdown functions Shut down the specified operation. Any messages sent to the engine or queue during the shutdown phase are lost.

NOTE: You cannot shut down the engine or the queue if it is in the suspended state. In other words, the engine or queue must be running in order for the shutdown function to work.

Workflow Administration Client



```
-- Select a Process from the list to view its activities --
Issue Tracking (2002-12-04 13:59:07)
Issue Tracking (2002-12-04 13:11:51)
Issue Tracking (2002-12-04 14:00:18)
```

```
-- Select an Activity from the list to change its state --
TechSupport (completed)
Development (completed)
QA (running)
finish (open)
```

This portlet allows you to manipulate the execution of a process instance by allowing you to:

- See lists of running, suspended, and finished process instances
- See a list of the activities and their states in a selected process instance
- Suspend or resume a process instance
- Suspend or resume an activity in a process instance
- Terminate a process instance

Process functions

Process functions operate on all workitems associated with the process, unless that work is already displayed in a user's queue. In this case, workitems are not affected by suspending or resuming either processes or activities. Essentially, the user owns this work, and no existing functions (apart from locking) can prevent the user from updating and forwarding this work.

Suspending a process Suspending a process tells the Workflow subsystem that no updates should be made to workitems associated with that process. Resuming a process returns it to the running state. The effect of suspending and resuming is apparent only when a user forwards work from one activity to another.

For example, assume there are two work queues, workqueue-A and workqueue-B. Also assume that workitem-1 is displayed in workqueue-A, and a forward on workitem-1 would normally result in the work appearing in workqueue-B.

If the workflow process currently being executed by workitem-1 is suspended (by someone selecting the Suspend Process button on the Process Administration Console), a forward on workitem-1 would result in the work disappearing from workqueue-A but not appearing in workqueue-B.

Resuming a process Resuming a process returns it to its original state. Continuing with the same example, assume the workflow process is resumed (by selecting the Resume Process button on the Process Administration Console). A refresh of workqueue-B will reveal workitem-1, ready for updating and forwarding by the user.

Terminating a process Terminating a process tells the Workflow subsystem to remove the process instance and its associated activities from the engine queue process. When a process is terminated, it cannot be recovered.

Activity functions

Suspending and resuming activities is similar to suspending and resuming processes, but enables more precision.

An activity can be in one of the following states:

This state	Means the workitem
Idle	Is not yet running and has not been suspended
Running	Is active and cannot be suspended
Suspended	Has been suspended; resuming the activity will reopen the workitem
Finished	Has been completed and forwarded to the next activity; cannot be suspended
Pending	Activity has finished executing and is waiting for the engine that owns the process to forward to the next activity. Applies only to presentation activities running in a cluster.

Suspending an activity Suspending an activity tells the Workflow subsystem not to forward work to this activity in this process. Only idle activities may be suspended; attempting to suspend a running or finished activity will have no effect. Other combinations may also be ignored (such as attempting to suspend a process or activity that is already suspended).

IMPORTANT: Java activities cannot be suspended, so you cannot access this type of activity using the workflow administration client portlet or the administration APIs.

Continuing with the example from the preceding section, assume there is an additional work queue (workqueue-C) but that workitem-1 is currently displayed in workqueue-A as before. Further assume that a forward from workqueue-B would result in the work appearing in workqueue-C (giving a simple A-B-C queue sequence).

If the workflow activity for workqueue-C is suspended (by someone selecting the Suspend Activity button), then a forward on workitem-1 (currently in workqueue-A) would result in the work showing up in workqueue-B, as expected. However, a forward from workqueue-B would not result in workitem-1 showing up in workqueue-C, since the associated activity is currently suspended.

Resuming an activity Now assume that the activity for workqueue-C is resumed (by someone selecting the Resume Activity button). A refresh of workqueue-C will then reveal workitem-1, ready for updating and forwarding by the user.

Auditing runtime processes

The Workflow API provides the EbiAuditDelegate.getAuditInfo() method for getting audit information about workflow processes, activities, workitems, and workitem properties. Here is the method declaration:

```
public Document getAuditInfo(
    String processId, String runNumber, String activityName, Date startDate, Date
endDate)
throws com.sssw.wf.client.EboAuditLoggerException
```

The DTD for the return document is available in your exteNd Director project directory at library/WorkflowService/DTD/workflow-auditlist.dtd.

NOTE: All parameter values are optional. To return all information, specify **null** for the parameter.

Generating runtime exception reports

The Workflow API includes exception-handling classes for the Workflow subsystem portlets, including EboEngineException, EboQueueException, and EboWorkitemException. By default, exception messages are written out to the server console. But you can have the messages sent via e-mail to a specified user. The setting for this option is in config.xml.

➢ **To configure exception messages to be sent to an administrator:**

1. Outside exteNd Director, open the following file:

   ```
   My_Project/library/WorkflowService/WorkflowService-conf/config.xml
   ```

2. Uncomment the following lines:

   ```
    <!--
      <property>
          <key>WorkflowService/administrator-host</key>
          <value>SomeHost</value>
      </property>
      <property>
          <key>WorkflowService/administrator-address</key>
          <value>SomeAddress</value>
      </property>
      -->
   ```

   NOTE: After you uncomment the properties, you can access them in the XML Editor in exteNd Director.

3. Set the two properties to a valid user or admin group with a valid e-mail address. For example:

   ```
   <property>
          <key>WorkflowService/administrator-host</key>
          <value>SMPT mail server hostname</value>
      </property>
      <property>
          <key>WorkflowService/administrator-address</key>
          <value>admin@addresss.com</value>
      </property>
   ```

4. Save the file.

Configuring workflow to run in a cluster

The workflow subsystem provides support for clustering. A cluster is a group of application servers running on different hosts that share the processing load for a single application. In a cluster configuration, clients interact with the cluster as if it were a single high-performance server. Clustering offers several benefits, including scalability and high availability.

To ensure that each workflow process instance executes successfully in a cluster, the workflow subsystem carefully manages the state of the process throughout its execution. The workflow subsystem also manages state information for the workitem and the queue.

What you need to do

To deploy a workflow application to run in a cluster, you need to deploy the project that contains the workflow to each server in the cluster. Then you start each server with a system property that specifies the ID for the workflow engine.

Deploy the application to each server

To run a workflow application in a cluster, you must first deploy the application to each server in the cluster. The procedure for deploying the application is the same as for any exteNd Director application. The only restriction you need to be aware of is that all of the servers within the cluster must share a single exteNd Director database.

📖 For more information, see the chapter on deploying applications in *Developing exteNd Director Applications*.

Start each server with a unique engine ID

A workflow process instance must execute on a single workflow engine running within a cluster. To bind a process instance to an engine, the workflow subsystem associates the process with an engine ID that is specified when the server is first started. The system property used to specify the engine ID is `com.novell.afw.wf.engine-id`. This property setting overrides the value specified in the config.xml file for the workflow subsystem.

The standard format for specifying system properties for the server is:

```
-DpropName=propvalue
```

You can use this format to specify the engine ID. For example, when starting the exteNd Application Server, you would include this argument to set the engine ID:

```
+Dcom.novell.afw.wf.engine-id=engine-id-value
```

The value you specify for the engine ID is a logical name that can include numbers or letters.

IMPORTANT: The workflow administrator is responsible for ensuring that each engine ID value is unique for all the workflow engine instances running in the cluster.

Once started by an engine running on a particular server, a workflow process instance can only run and complete on that server. This ensures that the workflow process executes safely. However, it does not provide process instance failover support. If a server in the cluster crashes, the process instance will not be restarted until an engine with the same ID is restarted.

What to do if a machine cannot be recovered If a server machine cannot be restarted because of a serious hardware or software failure, you can start the application server on a new machine, associating the server with the workflow engine ID that was specified on the unrecoverable machine. Since the engine ID is a logical name, not a direct mapping to the physical machine on which the engine was running, the dangling process instance will complete successfully on the new machine.

What happens at server restart

When a server is restarted after a crash, the workflow engine restarts automatically rather than waiting for a client component to make a request. At this point, the engine restarts any processes that were left dangling at the time of the crash. These processes in turn forward execution to any activities that have not been completed.

Process restart is handled by the engine All logic required for process startup is handled by the workflow engine. During process restart, the engine restarts only those processes that have the same ID as that of the engine. Therefore, the process instance will be restarted by only one server in the cluster. When the engine is restarted, it reads process state information from the WFPROCESSTATE table in the exteNd Director database.

Activity dispatch is handled by the process All logic required for activity dispatch (forwarding of execution) is handled by the process. Any activities (user or system activities) that have completed successfully (including corresonding database updates) are not reexecuted when the process is restarted.

Process instances are tied to the engine that started the process. However, a user may logon to any engine in a cluster to execute a **presentation activity** (user activity or pageflow activity). When the workflow engine forwards from a presentation activity to the next activity in the workflow, it must execute on the engine that started the workflow process instance. When a workflow engine is finished executing a presentation activity for a process that it does not own, the activity state in the database is set to PENDING. The other engines in the cluster periodically poll the activity state table looking for activities that belong to a process they own. Whenever an engine finds one of these activities, it then forwards to the next activity in the process.

Activity state management To keep track of which activities should be executed at restart time, the system stores activity states in the WFACTIVITYSTATE table in the exteNd Director database. These activity states provide **checkpoints** that can be used to determine where execution should resume after a restart.

The activity states are as follows:

Activity state	Description
Idle	Activity is not executing but can be dispatched to.
Running	Activity is executing.
Suspended	Activity has been suspended.
Finished	Activity has finished execution.
Pending	Activity has finished executing and is waiting for the engine that owns the process to forward to the next activity. Applies only to presentation activities running in a cluster.

Once an activity is finished processing, it is transitioned to Idle.

Here’s a scenario that illustrates what happens when two activities (activity A and activity B) are executed sequentially.

1 Before execution is dispatched to activity A, the process makes an entry in the WFACTIVITYSTATE table that contains the name of the activity and its state. The entry has the values {“Activity A”, “Running”}.

2 Activity A is executed.

3 After activity A finishes executing, the entry is modified to be {“Activity A”, “Finished”}.

4 Before execution is dispatched to activity B, the process makes an entry for this activity {“Activity B”, “Running”}. Following that, the entry for activity A is removed.

When the engine restarts a process, the process uses data in the WFACTIVITYSTATE table to determine where to resume execution within the process. The data in the WFACTIVITYSTATE table indicates the last finished activity of every executing branch. This information is treated as a kind of checkpoint from which processing can resume. Once the last finished activity is identified, execution is resumed with the following activity.

Workitem state management Workitems retrieved from the engine always update their state directly from the database, rather from a cache. Therefore, all process engines running in a cluster access queue, workitem, and lock state that is consistent and up-to-date.

Workitem changes made by a user on one machine in the cluster are not overwritten by changes made by another user on a different machine. The workflow subsystem uses an **optimistic concurrency control** that relies on the use of the SQL WHERE clause to safeguard changes made to the workitem. Each UPDATE statement issued against the database includes a WHERE clause that specifies some of the values initially retrieved. If the record has been modified by another engine since it was first retrieved, the update operation fails.

III Applications

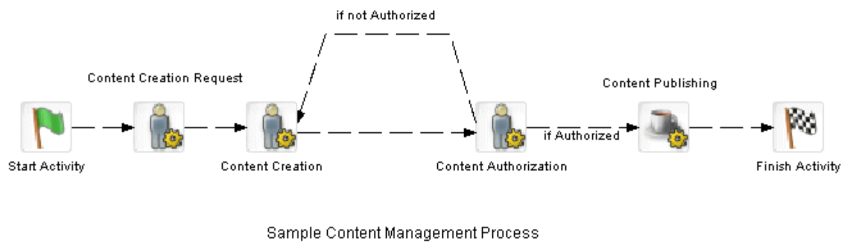
8 Content Life Cycle Application

This chapter describes how to run the installed Content Life Cycle workflow application and how to access the application sources. It has these sections:

- About the Content Life Cycle application
- Running the application
- Content life Cycle application sources

About the Content Life Cycle application

Content Life Cycle is a workflow portlet application that allows different users to complete activities representing the life cycle of a document. Here is what the process looks like in the Workflow Modeler:



Each of the User activities is associated with a different user. Let’s assume the following users:

- Content Creation Request: sample
- Content Creation: sample2
- Content Authorization: sample3

Here’s how the application works:

1 The user **sample** creates a new process and completes a form that requests the creation of a document. Sample then forwards the workitem.

2 Sample2 creates a document and adds it to the Content Management subsystem. Sample2 then forwards the workitem.

3 Sample3 reviews the document and indicates whether the document is authorized for publication, and forwards the workitem to the next activity:

   The two links from the Content Authorization activity use the **Flow** scoped path to test the value of a workitem document property called *authorized*. If the value is true the link to the Content Publishing Java activity is followed. If it is false the link back to the Content Creation activity is followed.

4 When the content is authorized, the Content Publishing activity (a Java activity) publishes the document using the CM subsystem APIs.

   The Java activity uses a scoped path to point to the executable Java class in the project resource set.

Running the application

Before running the Content Life Cycle application, you need add some sample users to your server directory realm.

➢ **To add sample users:**

1 Use your application server tools or the Director Administration Console (DAC) to add the following sample users:

- sample

This is the user specified in the workflow process descriptor. The other two can have any name you want, for example:

- sample2
- sample3

➢ **To run the Content Life Cycle application:**

1 In three separate browsers log in to exteNd Director MyPortal using each sample user.

2 For the **sample** user create a personal page called **workflow** and add these installed portlets to the content:

- **WorkflowStartProcess**
- **WorkflowQueue**

3 Repeat steps 1 and 2 for the other two users, but just add the WorkflowQueue portlet to the personal pages.

4 Run the portal personal page in each browser. In the **sample** user browser go to the Workflow Start Process, select the process from the dropdown list, and click **Start**.

This creates a workitem in the WorkflowQueue portlet.

NOTE: You can create as many instances as you want.

5 Select the workitem and click **View Item**. This displays a workitem form for assigning a document.

6 Complete the form, specify one of your workflow users as an addressee, and choose **Forward**.

7 Follow the process through content creation, approval, and publish:

- Click **Refresh** in the WorkflowQueue portlet in the appropriate browser.
- Select the workitem and click **View Item**.
- Complete each form, specify an addressee, and forward where appropriate.

Dynamic addressing of workitems

The Content Life Cycle application uses a static addressee (the user called **sample**) for the Content Creation Request activity. However, the application allows users to specify the addressee for the Content Creation and Content Authorization activities dynamically at runtime. In the process definition, the **addressee** field for these activities uses the **Flow** scoped path to scope to a workflow property called *target_addressee*.

The value of this property is set by the portlet source for the User activity. Whatever the value is at the time the activity gets forwarded determines the addressee. When the portlet sets a new addressee, it sets a workitem property on the EbiWorkitemDelegate:

```
EbiProperty addrProp = new EboProperty( WORKITEM_ADDRESSEE,
  m_addressee, EboConstants.ATT_STRING, false );
delegate.setProperty( addrProp, WFcontext );
```

TIP: You can also use the Set Workitem Value action in the Rules subsystem to dynamically set workitem properties. For more information, see the chapter on installed actions in the *Rules Guide*.

Content life Cycle application sources

The application source files and artifacts are contained in JAR files at:

```
install_dir/Director/templates/Director/TemplateResources/
```

Here is a summary:

Parent directory and JAR	Contents
workflow-portlets/ **workflow_portlets.jar**	◆ Class files and XSL descriptors for the WorkflowStartProcessPortlet and WorkflowQueuePortlet. ◆ WorkflowUsers security role descriptor
workflow-portlets/ **workflow_portlets_src.jar**	◆ Java sources for WorkflowStartProcessPortlet and WorkflowQueuePortlet.
workflow-sample-portlets/ **workflow_sample_portlets.jar**	◆ Class files for the User activities ◆ activitypolicy.xml for specifying the client classes for the User activities ◆ The Content Life Cycle process descriptor
workflow-sample-portlets/ **workflow_sample_portlets_src.jar**	◆ Java sources for the User activity classes

IV Reference

9 Workflow Tag Library

This chapter describes how to use the JSP tags contained in **WorkflowTag.jar**.

For background information, see the chapter on using the exteNd Director tag libraries in *Developing exteNd Director Applications*.

These are the JSP tags:

- addressee
- createProperty
- forwardWorkitem
- getDocument
- getProcessList
- getProperty
- getPropertyList
- getQueueStatus
- getWorkitem
- getWorklist
- hasDocument
- hasProperty
- isDocumentLocked
- isWorkitemLocked
- setProperty
- startProcess
- updateDocument
- workitemLock

addressee

Description

Specifies a workitem addressee that is passed to the tag within which it is nested. This tag is a nested tag. It can only be used as the child of another tag.

The parent tag must have a method of signature addAddressee(String x). The addressee tag calls that method on the parent tag and passes in the addressee.

See also

getWorklist

Syntax

```
<prefix:addressee>addressee</>
```

Example

This example shows how to specify addressee nested tags in the getWorklist parent tag:

```
<epwf:getWorkList id="example" iterate="true" >

<epwf:addressee>user1</epwf:addressee>
```

```
<epwf:addressee>user2</epwf:addressee>

 Activity = <%=activity%><br/>
 workitemid = <%=workitemid%><br/>
 name = <%=name%><br/>
 lockedby = <%=lockedby%><br/>
 message = <%=message%><br/>
</epwf:getWorkList>
```

createProperty

Description

Creates an EbiProperty object for a workitem or document using the specified values for property name, value, and type.

If docName is provided, the property object is created for the document. The EbiProperty object is returned in a default scripting variable called **newProperty**, or the name provided in the id attribute.

This tag wraps a version of createProperty() on the EbiWorkitemDelegate interface.

Syntax

```
<prefix:createProperty workitemID="workitemID" docName="docName" propName="propName"
value="value" type= "type" immutable="immutable" id="id"/>
```

Attribute	Required?	Request-time expression values supported?	Description
workitemID	Yes	Yes	Workitem ID
docName	No	Yes	Name of the document to which to add the property
propName	Yes	Yes	Name for the property
value	Yes	Yes	Property value
type	Yes	Yes	Data type for the property value; for valid entries, see EbiProperty in the API documentation
immutable	No	Yes	Boolean value (true or false) that specifies whether the property is immutable; default is false
id	No	No	Name of the variable in which to store the returned property object; default name is **newProperty**

Example

This example creates a workitem property and gets the property name from the returned object:

```
<epwf:createProperty id="example" workitemID="<%=wid.getWorkitem().getId()%>"
propName="wiproperty2" value="testvalue" type="string" / >

<% com.sssw.wf.api.EbiProperty prop =
(com.sssw.wf.api.EbiProperty)pageContext.getAttribute("example");%><br/>
<%=prop.getPropertyName()%>
```

forwardWorkitem

Description. Forwards a workitem to the next activity and returns a boolean representing whether the attempt to forward was successful.

The value is returned on a scripting variable called **wi_forward** or the name provided in the id attribute.

This tag wraps the forward() method on the EbiQueueDelegate interface.

Syntax

```
<prefix:forwardWorkitem workitemID="workitemID" id="id"/>
```

Attribute	Required?	Request-time expression values supported?	Description
workitemID	Yes	Yes	Current workitem ID
id	No	No	Name of the variable in which to store the return value; default name is **wi_forward**

Example

```
<epwf:forwardWorkitem id="forward" workitemID='<%=x%>' />
    <%=pageContext.getAttribute("forward") %>
```

getDocument

Description Returns a document for a specified workitem ID. By default it returns the document as an object of type org.w3c.dom.Document. If returnDOM is set to false, the document is returned as a String. The value is returned on a scripting variable called **wi_document** or the name provided in the id attribute.

This tag wraps getDocument() on the EbiWorkitemDelegate interface.

Syntax

```
<prefix:getDocument workitemID="workitemID" docName="docName" returnDOM="returnDOM"
id="id"/>
```

Attribute	Required?	Request-time expression values supported?	Description
workitemID	Yes	Yes	Workitem ID
docName	Yes	Yes	Name of the document
returnDOM	No	Yes	Boolean that returns the document as an object of type org.w3c.dom.Document (true) or as a String (false); the default is false
id	No	No	Name of the variable in which to store the return value; default name is **wi_document**

Example This example gets a workitem document as a String:

```
<epwf:getDocument id="example" workitemID="<%=wid.getWorkitem().getId()%>"
docName="mydoc1" returnDOM="false" />
<%=pageContext.getAttribute("example")%>
```

getProcessList

Description Retrieves a list of available workflow processes. Returns the list as a DOM or as variables that can be set within the tag. The result is returned using a scripting variable called **processList** or by a value set in the id attribute.

Tag options Do one of the following:

- Set **returnDOM** to true (returns DOM) or false (returns String XML). In this case the iterate attribute must be false.

  OR
- Set **iterate** to true to return results via variables in the body tag. In this case returnDOM is not used.

This tag wraps the getProcessDefinitions() method on the EbiWorkflowEngineDelegate interface.

Syntax

```
<prefix:getProcessList returnDOM="returnDOM" iterate="iterate" id="id"/>
```

Attribute	Required?	Request-time expression values supported?	Description
returnDOM	No	Yes	Boolean value (true or false) that indicates whether to return the list as a DOM (true) or as an XML String (false) The DOM adheres to workflow-process_4_0.dtd NOTE: If returnDOM is set to true, the iterate attribute must be set to false
iterate	No	Yes	Boolean value (true or false) that indicates whether this tag will operate as a body tag so that each row can be processed separately; default value is false If the iterate attribute is set to true, the following values can be accessed from within the getProcessList tag: ◆ processid ◆ name Each of these variables has a scope of NESTED NOTE: When the iterate attribute is set to true, returnDOM is not used
id	No	No	Name of the variable in which to store the returned boolean value; the default name is **processList**

Example This example gets a process list using iterated nested variables:

```
<epwf:getProcessList iterate="true" >
    ProcessID = <%=processid%><br/>
    Name = <%=name%><br/>
</epwf:getProcessList>
```

getProperty

Description. Gets a property object of type EbiProperty for a workitem or (if docName is provided) for a document. The value is returned on a scripting variable called **property** or the name provided in the id attribute.

This tag wraps the getProperty() method on the EbiWorkitemDelegate interface.

Syntax

```
<prefix:getProperty workitemID="workitemID" propName="propName" docName="docName"
id="id"/>
```

Attribute	Required?	Request-time expression values supported?	Description
workitemID	Yes	Yes	Workitem ID
propName	Yes	Yes	Name of the property
docName	No	Yes	If this is a document property, the name of the document associated with the property
id	No	No	Name of the variable in which to store the returned property object; the default name is **property**

Example This example gets a workitem property name and value from the returned property object:

```
<epwf:getProperty id="example" workitemID="<%=wid.getWorkitem().getId()%>"
propName="wiproperty" />

<%=((com.sssw.wf.api.EbiProperty)pageContext.getAttribute("example")).getPropertyN
ame()%> = name
<%=((com.sssw.wf.api.EbiProperty)pageContext.getAttribute("example")).getPropertyV
alue()%> = value
```

getPropertyList

Description Returns a List (java.util.List) of EbiProperty objects for a given workitem and/or related document. Either the forWorkitem or forDocuments attribute must be set to true. If both are set to true, all properties will be returned for the workitem and all related documents. List is returned on a scripting variable called **propertyList** or the name provided in the id attribute.

This tag wraps the getAllProperties(), getWorkitemProperties, and getDocumentProperties on the EbiWorkitemDelegate interface, depending on the attributes provided.

Syntax

```
<prefix:getPropertyList workitemID="workitemID" forWorkitem="forWorkitem"
forDocuments="forDocuments" docName="docName" iterate="iterate" id="id"/>
```

Attribute	Required?	Request-time expression values supported?	Description
workitemID	Yes	Yes	Workitem ID
for Workitem	No	Yes	Boolean value that specifies workitem properties; if this attribute and the forDocuments attribute are true and no docName is provided, all workitem properties are returned
for Documents	No	Yes	Boolean value that specifies document properties; if this attribute is true, you can also set the docName attribute
docName	No	Yes	Name of the document whose properties you want returned (only the properties for the specified document are returned); if you do not specify a docName, all properties are returned
iterate	No	Yes	Boolean value (true or false) that indicates whether this tag will operate as a body tag so that each row can be processed separately The default is **false**, which returns a List object on the scripting variable named **propertyList** or the name provided in the id attribute; List contains objects of type EbiProperty If iterate is set to true, the following values will be available in the body tag: ◆ **name**: the property name ◆ **type**: the property type ◆ **value**: the property value ◆ **docName**: the name of the document to which the property is related Each of these variables has a scope of NESTED
id	No	No	Name of the variable in which to store the List; the default name is **propertyList**

Examples

Property list **using iterated nested variables**:

```
<epwf:getPropertyList id="example1" iterate="true"
workitemID="<%=wid.getWorkitem().getId()%>" forWorkitem="true" forDocuments="true"
>
 name = <%=name%><br/>
 value = <%=value%><br/>
 docName = <%=docName%><br/>
</epwf:getPropertyList>
```

Property list **as a Java List**:

```
<epwf:getPropertyList id="example2" iterate="false"
workitemID="<%=wid.getWorkitem().getId()%>" forWorkitem="true" forDocuments="true"
/>
<%=example2.size()%> = size
```

getQueueStatus

Description. Checks the status of the workflow engine. Returns the word **running**, **shutdown**, or **suspended**. The value is returned on a scripting variable called **queueStatus** or the name provided in the id attribute.

This tag wraps getQueueStatus on the EbiQueueDelgate interface.

Syntax

```
<prefix:getQueueStatus id="id"/>
```

Attribute	Required?	Request-time expression values supported?	Description
id	No	No	Name of the variable in which to store the return value; the default name is **queueStatus**

Example

```
<epwf:getQueueStatus id="queue" />
    <%=pageContext.getAttribute("queue") %>
```

getWorkitem

Description Returns an object of type EbiWorkitemDelegate for the specified workitemID. The value is returned on a scripting variable called **workitem** or the name provided in the id attribute.

This tag wraps getWorkitem() on the EbiQueueDelgate interface.

Syntax

```
<prefix:getWorkitem workitemID="workitemID" id="id"/>
```

Attribute	Required?	Request-time expression values supported?	Description
workitemID	Yes	Yes	Workitem ID
id	No	No	Name of the variable in which to store the return value; the default name is **workitem**

Example

```
<epwf:getWorkitem id="get" workitemID='<%=x%>' />
    <%=pageContext.getAttribute("get") %>
```

getWorklist

Description Retrieves a list of workitems from a specified queue. The result is returned using a default scripting variable called **workList** or by a value set in the id attribute.

You can embed the workitem addressee in this tag using the addressee tag.

This tag wraps a version of getWorklist() on the EbiQueueDelegate interface. The method version used depends on which tag attributes are provided.

Tag options

Two steps are required:

Step	What to do
1	First make sure **one of the following** is true: ◆ The user is logged in so that the workitem list can be retrieved from the workflow context. OR ◆ The activity attribute is set. OR ◆ The addressee or name attribute is set. The ignoreSuspended attribute is used in this instance, with default value true. To pass the addressee you can nest the addressee tag inside the getWorklist tag.
2	Then do **one of the following**: ◆ Set the returnDOM attribute to true (return as XML DOM) or false (return as XML string). When this attribute is set, the iterate attribute must be set to false. OR ◆ Set iterate to true. The results are returned via variables in the body tag. In this case, returnDOM is not used. OR ◆ Set returnList to true. In this case a list of EbiWorkitemDelegate objects is returned in an object of type java.util.List.

The getWorklist tag wraps a version of getWorklist() on the EbiQueueDelegate interface. The method version used depends on which tag attributes are provided.

Syntax

```
<prefix:getWorklist activity="activity" name="name" returnDOM="returnDOM"
returnList="returnList" iterate= "iterate" priority="priority"
ignoreSuspended="ignoreSuspended" id="id"/>
```

Attribute	Required?	Request-time expression values supported?	Description
activity	No	Yes	Name of the activity; this corresponds to the Name property for the activity defined in the Workflow Modeler
name	No	Yes	Name of the workitem; this corresponds to the WorkName property defined for the process in the Workflow Modeler
returnDOM	No	Yes	Boolean value (true or false) that indicates whether or not to return the list as a DOM (true) or as an XML String (false) The DOM adheres to workflow-worklist_4_0.dtd If returnDOM is set to true, the iterate attribute must be set to false
returnList	No	Yes	A boolean value (true or false) that when set to true returns a list of EbiWorkitemDelegate objects as an object of type java.util.List

Attribute	Required?	Request-time expression values supported?	Description
iterate	No	Yes	A boolean value (true or false) that indicates whether this tag will operate as a body tag so that each row can be processed separately; the default value is false If the iterate attribute is set to true, the following values can be accessed from within the getWorkList tag: ◆ activity ◆ name ◆ workitemid ◆ message ◆ lockedby Each of these variables has a scope of NESTED NOTE: When the iterate attribute is set to true, returnDOM is not used
priority	No	Yes	Provided to support user-implemented priority schemes; not supported in the current version
ignore Suspended	No	Yes	Boolean value (true or false) that indicates whether to ignore suspended activities in the returned list
id	No	No	Name of the variable in which to store the result; the default name is **workList**

Examples

Worklist **using iterated nested variables**:

```
<epwf:getWorkList iterate="true" >
        Activity = <%=activity%><br/>
        Name = <%=name%><br/>
        Workitemid = <%=workitemid%><br/>
        <%! String x;%>
        <% x = (String) pageContext.getAttribute("workitemid"); %>
        Message = <%=message%><br/>
        Lockedby = <%=lockedby%><br/>
    </epwf:getWorkList>
```

Worklist **as a DOM**:

```
<epwf:getWorkList id="list" iterate="false" returnDOM="true" />
// access the DOM
xml string = <%org.w3c.dom.Document doc = (org.w3c.dom.Document)
pageContext.getAttribute("list");%>
        <%=doc.getFirstChild().getNodeName()%>
```

Worklist **as a Java List object**:

```
<epwf:getWorkList id="list2" returnList="true" />
<% for (int x=0;x<list2.size();x++){
    // parse the List
    com.sssw.wf.client.EbiWorkitemDelegate wid =
(com.sssw.wf.client.EbiWorkitemDelegate) list2.get(x); %>
    Wid <%=x%> activity name = <%=wid.getActivityName()%>
<% } %>
```

Worklist **as an XML string**:

```
<epwf:getWorkList id="list3" iterate="false" returnDOM="false" />
xml string = <%=(String) pageContext.getAttribute("list3")%>
```

Worklist **using an embedded addressee tag**:

```
<epwf:getWorkList iterate="true" >
<epwf:addressee>sample</epwf:addressee>
 Activity = <%=activity%><br/>
 workitemid = <%=workitemid%><br/>
 name = <%=name%><br/>
 lockedby = <%=lockedby%><br/>
 message = <%=message%><br/>
</epwf:getWorkList>
```

hasDocument

Description

Checks whether a document exists for workitem and returns a boolean. The value is returned on a scripting variable called **hasDocument** or the name provided in the id attribute.

This tag wraps hasDocument() on the EbiWorkitemDelegate interface.

Syntax

```
<prefix:hasDocument workitemID="workitemID" docName="docName" returnDOM="returnDOM"
id="id"/>
```

Attribute	Required?	Request-time expression values supported?	Description
workitemID	Yes	Yes	Workitem ID
docName	Yes	Yes	Name of the document
returnDOM	No	Yes	Boolean that returns the document as an object of type org.w3c.dom.Document (true) or as a String (false); default is false
id	No	No	Name of the variable in which to store the return value; the default name is **hasDocument**

Example

```
<epwf:hasDocument workitemID="<%=wid.getWorkitem().getId()%>" docName="mydocument" />
<%=pageContext.getAttribute("hasDocument")%>
```

hasProperty

Description

Checks whether a property exists for a workitem or (if docName is provided) for a document. Returns a boolean. The value is returned on a scripting variable called **hasProperty** or the name provided in the id attribute.

This tag wraps hasProperty() and hasDocument Property on the EbiWorkitemDelegate interface.

Syntax

```
<prefix:hasProperty workitemID="workitemID" docName="docName" propName="propName"
id="id"/>
```

Attribute	Required?	Request-time expression values supported?	Description
workitemID	Yes	Yes	Workitem ID
docName	No	Yes	Name of the document whose property you want to check; use only for document properties
propName	Yes	Yes	Name of the property
id	No	No	Name of the variable in which to store the return value; the default name is **hasProperty**

Example

```
<epwf:hasProperty id="status" workitemID="<%=wid.getWorkitem().getId()%>"
propName="wiproperty2" />
<%=pageContext.getAttribute("status")%>
```

isDocumentLocked

Description

Checks whether a workitem document is locked—and if the userID attribute is set, also checks whether the document is locked by a particular user. Returns a boolean. The value is returned on a scripting variable called **doc_islocked** or the name provided in the id attribute.

This tag wraps isDocumentLocked() or isDocumentLockedBy() on the EbiWorkitemDelegate interface.

Syntax

```
<prefix:isDocumentLocked workitemID="workitemID" docName="docName" userID ="userID"
id="id"/>
```

Attribute	Required?	Request-time expression values supported?	Description
workitemID	Yes	Yes	Workitem ID
docName	Yes	Yes	Name of the document
userID	No	Yes	UserID; if not set, the tag checks the document status only
id	No	No	Name of the variable in which to store the return value; the default name is **doc_isLocked**

Example

```
<epwf:isDocumentLocked id="doclocked" workitemID='<%=x%>' docName="doc1" />
    <%=pageContext.getAttribute("doclocked") %> <br/>
```

isWorkitemLocked

Description

Checks whether a workitem is locked—and if the userID attribute is set, also checks whether the workitem is locked by a particular user. Returns a boolean. The value is returned on a scripting variable called **wi_islocked** or the name provided in the id attribute.

This tag wraps isLocked() or isLockedBy() on the EbiWorkitemDelegate interface.

Syntax

```
<prefix:isWorkitemLocked workitemID="workitemID" userID ="userID" id="id"/>
```

Attribute	Required?	Request-time expression values supported?	Description
workitemID	Yes	Yes	Workitem ID
userID	No	Yes	UserID to check; if not set, the tag checks the workitem status only
id	No	No	Name of the variable in which to store the return value; the default name is **wi_isLocked**

Example

```
<epwf:isWorkitemLocked id="worklock" workitemID='<%=x%>' />
    <%=pageContext.getAttribute("worklock") %> <br/>
```

setProperty

Description

Stores an existing EbiProperty object for a workitem (or for a document if docName is provided) using the specified EbiProperty object. Returns a boolean representing success or failure. Return value is stored in a scripting variable called **setProperty** or the name provided in the id attribute.

If the userID attribute is not specified, the current user is used.

This tag wraps setProperty() and setDocumentProperty() on the EbiWorkitemDelegate interface.

Syntax

```
<prefix:setProperty workitemID="workitemID" property="property"
forDocument="forDocument" userID ="userID" id="id"/>
```

Attribute	Required?	Request-time expression values supported?	Description
workitemID	Yes	Yes	Workitem ID
property	Yes	Yes	Name of the property to add
for Document	No	Yes	Boolean value that specifies whether the property is a document property; the default is false **NOTE:** The property must have been previously associated with the specified document; see “createProperty” on page 80
userID	No	Yes	UserID If set, the tag sets the document or workitem property for the user; otherwise, it uses the current context
id	No	No	Name of the variable in which to store the return value; the default name is **setProperty**

Example

This example sets a property from an attribute provided on the page:

```
<epwf:setProperty id="set" workitemID="<%=wid.getWorkitem().getId()%>"
property="<%=(com.sssw.wf.api.EbiProperty)pageContext.getAttribute("myatt")%>" / >
<%=pageContext.getAttribute("set")%>
```

startProcess

Description

Starts a workflow process with a specified processID. Starts the process with a document if the docName attribute is specified, as well as one of the following attributes representing the document:

- document of type org.w3c.dom.Document
- docstring of type String
- url to the document

Returns an int representing success or failure:

Value	Meaning
0	Success
-1	Engine not running; unable to start process
-2	Process definition not found
-3	Process suspended

The value is returned on a scripting variable called **processStarted** or the name provided in the id attribute.

This tag wraps startProcess() on the EbiWorkflowEngineDelegate interface.

Syntax

```
<prefix:startProcess processID="processID" docName="docName" document="document"
docstring="docstring" url ="url" id="id"/>
```

Attribute	Required?	Request-time expression values supported?	Description
processID	Yes	Yes	Workitem ID
docName	No	Yes	Name of the starting document
document	No	Yes	Starting document, as a DOM
docstring	No	Yes	Starting document, as a String
url	No	Yes	URL to the starting document (DOM)
id	No	No	Name of the variable in which to store the return int value; the default name is **processStarted**

Example

```
<epwf:startProcess id ="start" processID="c373e9ea737c902a8f7af0aa8c836fd6" />
    <%=pageContext.getAttribute("start") %>
```

updateDocument

Description

Updates or adds a document for the specified workitem ID and document name and returns a boolean representing success. The return value is stored in a scripting variable called **wi_document** or the id you specify.

To add a new document, set the **addMode** attribute to true. To update an existing document, set it to false (default).

The document may be specified using one of these attributes:

- document as an XML string or a DOM object
- String identifier
- url of type java.net.URL

If the userID attribute is not specified, the current user is used.

This tag wraps addDocument() and updateDocument() on the EbiWorkitemDelegate interface.

Syntax

```
<prefix:updateDocument workitemID="workitemID" docName="docName" document="document"
identifier="identifier" url="url" userID="userID" addMode="addMode" id="id"/>
```

Attribute	Required?	Request-time expression values supported?	Description
workitemID	Yes	Yes	Workitem ID
docName	Yes	Yes	Name of the document
document	No	Yes	The actual document; the document can be specified as an XML String or an object of type org.w3c.dom
identifier	No	Yes	The string identifier for information in the document
url	No	Yes	The URL for the document, specified as an object of type java.net.URL
userID	No	Yes	The user with whom to associate the document; if not specified, gets the user ID from the context
addMode	No	Yes	Boolean indicating whether to add a new document (true) or update an existing document (false); the default is false.
id	No	No	Name of the variable in which to store the return value; default name is **wi_document**

Examples

Adding a document with identifier:

```
<epwf:updateDocument id="doc1" workitemID="<%=wid.getWorkitem().getId()%>"
docName="identifier" addMode="true" identifier="myidentifier" / >
<%= pageContext.getAttribute("doc1")%>
```

Updating a document with identifier:

```
// lock the document first
<epwf:workitemLock workitemID="<%=wid.getWorkitem().getId()%>"
docName="identifier" documentLock="true" action="lock"/>
// update the document
<epwf:updateDocument id="doc2" workitemID="<%=wid.getWorkitem().getId()%>"
docName="identifiertest3" identifier="newidentifier" / >
<%=pageContext.getAttribute("doc2")%>
```

Adding document with string XML:

```
<epwf:updateDocument id="doc3" workitemID="<%=wid.getWorkitem().getId()%>"
docName="string1" addMode="true" document="<main><node1>this is my
document</node1></main>" / >
<%= pageContext.getAttribute("doc3")%>
```

workitemLock

Description

Locks or unlocks a workitem or the documents associated with a workitem. The action attribute must be set to either **lock** or **unlock**. Returns a boolean value representing success. The value is returned on a scripting variable called **wilocked** or the name provided in the id attribute.

If documentLock is set to true, a docName must be specified.

If the userID attribute is not specified, the object is locked or unlocked using the current user.

This tag wraps lock(), unlock(), lockDocument(), and unlockDocument() on the EbiWorkitemDelegate interface.

Syntax

```
<prefix:workitemLock workitemID="workitemID" action="action"
workitemLock="workitemLock" documentLock="documentLock" docName="docName"
userID="userID" id="id"/>
```

Attribute	Required?	Request-time expression values supported?	Description
workitemID	Yes	Yes	Workitem ID
action	Yes	Yes	Specify **lock** or **unlock**
workitem Lock	No	Yes	Boolean indicating whether the action is for the workitem (true); the default is false Either this attribute or documentLock (or both) must be set to true
document Lock	No	Yes	Boolean value indicating whether the lock is for a document associated with the workitem (true); the default is false Either this attribute or workitemLock (or both) must be set to true; if documentLock is true, docName must be specified
docName	No	Yes	Name of the document; use if documentLock is true
userID	No	Yes	User to execute the action on (if not specified, the user ID from the context)
id	No	No	Name of the variable in which to store the return value; the default name is **wilocked**

Examples

workitemLock:

```
<epwf:workitemLock id="wilock" workitemID='<%=x%>' action="lock"
workitemLock="true" />
    <%=pageContext.getAttribute("wilock") %> <br/>
    <% get.addDocument("test", "ID" , "sample"); %>
```

documentLock:

```
<epwf:workitemLock id="doclock" workitemID='<%=x%>' action="lock"
workitemLock="false" documentLock="true" docName="test" />
    <%=pageContext.getAttribute("doclock") %>
```

workitemUnlock:

```
<epwf:workitemLock id="wiunlock" workitemID='<%=x%>' action="unlock"
workitemLock="true" />
    <%=pageContext.getAttribute("wiunlock") %> <br/>
    <%-- get.addDocument("test1456", "ID" , "sample"); --%>
```

documentUnlock:

```
<epwf:workitemLock id="docunlock" workitemID='<%=x%>' action="unlock"
workitemLock="false" documentLock="true" docName="test" />
    <%=pageContext.getAttribute("docunlock") %>
```

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