

TIBCO ActiveMatrix BusinessWorks™

Palette Reference

*Software Release 5.11
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Preface

TIBCO ActiveMatrix BusinessWorks is a standards-based, easy-to-deploy solution for companies looking to integrate their enterprise computing environment and automate their business processes. This manual describes how to create process definitions using TIBCO ActiveMatrix BusinessWorks.

Topics

- [Changes from the Previous Release of this Guide, page xxviii](#)
- [Related Documentation, page xxix](#)
- [Typographical Conventions, page xxxi](#)
- [Connecting with TIBCO Resources, page xxxiii](#)

Changes from the Previous Release of this Guide

This section itemizes the major changes from the previous release of this guide.

Support for SHA256, SHA384, SHA512 Algorithm

Support added for **SHA256**, **SHA384**, and **SHA512** signature algorithms in the Security Policy resource (Inbound/Inbound Fault and Outbound/Outbound Fault policy types) that can be used for:

- creating signatures for outgoing messages
- checking signatures of incoming messages

For details, refer to [Integrity](#) under [Security Policy](#), page 518.

Dynamic Properties

This is an enhancement in the JMS receiver activities to allow an aspect to add properties at run-time. It impacts the following JMS activities:

[JMS Queue Receiver](#), page 403

[JMS Topic Subscriber](#), page 445

[Wait for JMS Queue Message](#), page 462

[Wait for JMS Topic Message](#), page 471

[Get JMS Queue Message](#), page 379

[JMS Queue Requestor](#), page 411

[JMS Topic Requestor](#), page 435

Dynamic Headers

This enhancement supports additional header parameters for incoming HTTP messages. It impacts the following HTTP activities:

[Send HTTP Request](#), page 238

[HTTP Receiver](#), page 225

[Wait for HTTP Request](#), page 268

Related Documentation

This section lists documentation resources you may find useful.

TIBCO ActiveMatrix BusinessWorks Documentation

The following documents form the TIBCO ActiveMatrix BusinessWorks documentation set:

- *TIBCO ActiveMatrix BusinessWorks Concepts* Read this manual before reading any other manual in the documentation set. This manual describes terminology and concepts of TIBCO ActiveMatrix BusinessWorks, and the other manuals in the documentation set assume you are familiar with the information in this manual.
- *TIBCO ActiveMatrix BusinessWorks Getting Started* This manual steps you through a very simple example of designing, deploying, and monitoring a TIBCO ActiveMatrix BusinessWorks process.
- *TIBCO ActiveMatrix BusinessWorks Process Design* This manual describes how to create, edit, and test business processes using TIBCO ActiveMatrix BusinessWorks.
- *TIBCO ActiveMatrix BusinessWorks Palette Reference* This manual describes each of the palettes available in TIBCO ActiveMatrix BusinessWorks.
- *TIBCO ActiveMatrix BusinessWorks Administration* This manual describes how to use TIBCO Administrator to deploy, manage, and monitor TIBCO ActiveMatrix BusinessWorks processes.
- *TIBCO ActiveMatrix BusinessWorks Installation* Read this manual for information on installing one or more components of TIBCO ActiveMatrix BusinessWorks and setting up a TIBCO ActiveMatrix BusinessWorks domain.
- *TIBCO ActiveMatrix BusinessWorks Error Codes* This manual describes errors returned by TIBCO ActiveMatrix BusinessWorks.
- *TIBCO ActiveMatrix BusinessWorks Release Notes* Read the release notes for a list of new and changed features. This document also contains lists of known issues and closed issues for this release.

Other TIBCO Product Documentation

TIBCO ActiveMatrix BusinessWorks is used with other products. You may find it useful to read the documentation for the following TIBCO products:

- TIBCO Designer™ software: TIBCO Designer is an easy to use graphical user interface for design-time configuration of TIBCO applications. TIBCO Designer includes online help for each palette.
- TIBCO Administrator™ software: TIBCO Administrator is the monitoring and managing interface for new-generation TIBCO products such as TIBCO ActiveMatrix BusinessWorks.
- TIBCO Adapter software
- Third-Party Documentation




Typographical Conventions

The following typographical conventions are used in this manual.

Table 1 General Typographical Conventions

Convention	Use
	<p>TIBCO products are installed into an installation environment. A product installed into an installation environment does not access components in other installation environments. Incompatible products and multiple instances of the same product must be installed into different installation environments.</p> <p>An installation environment consists of the following properties:</p>
<i>ENV_NAME</i>	<ul style="list-style-type: none"> • Name Identifies the installation environment. This name is referenced in documentation as <i>ENV_NAME</i>. On Microsoft Windows, the name is appended to the name of Windows services created by the installer and is a component of the path to the product shortcut in the Windows Start > All Programs menu.
<i>TIBCO_HOME</i>	<ul style="list-style-type: none"> • Path The folder into which the product is installed. This folder is referenced in documentation as <i>TIBCO_HOME</i>.
<i>BW_HOME</i>	<p>TIBCO ActiveMatrix BusinessWorks installs into a directory within a <i>TIBCO_HOME</i>. This directory is referenced in documentation as <i>BW_HOME</i>. The default value of <i>BW_HOME</i> depends on the operating system. For example on Windows systems, the default value is C:\tibco\bw\5.11.</p>
<code>code font</code>	<p>Code font identifies commands, code examples, filenames, pathnames, and output displayed in a command window. For example:</p> <p>Use MyCommand to start the foo process.</p>
bold code font	<p>Bold code font is used in the following ways:</p> <ul style="list-style-type: none"> • In procedures, to indicate what a user types. For example: Type admin. • In large code samples, to indicate the parts of the sample that are of particular interest. • In command syntax, to indicate the default parameter for a command. For example, if no parameter is specified, MyCommand is enabled: MyCommand [enable disable]

Table 1 General Typographical Conventions (Cont'd)

Convention	Use
<i>italic font</i>	<p>Italic font is used in the following ways:</p> <ul style="list-style-type: none">• To indicate a document title. For example: See <i>TIBCO ActiveMatrix BusinessWorks Concepts</i>.• To introduce new terms For example: A portal page may contain several portlets. <i>Portlets</i> are mini-applications that run in a portal.• To indicate a variable in a command or code syntax that you must replace. For example: <code>MyCommand <i>PathName</i></code>
Key combinations	<p>Key name separated by a plus sign indicate keys pressed simultaneously. For example: Ctrl+C.</p> <p>Key names separated by a comma and space indicate keys pressed one after the other. For example: Esc, Ctrl+Q.</p>
	<p>The note icon indicates information that is of special interest or importance, for example, an additional action required only in certain circumstances.</p>
	<p>The tip icon indicates an idea that could be useful, for example, a way to apply the information provided in the current section to achieve a specific result.</p>
	<p>The warning icon indicates the potential for a damaging situation, for example, data loss or corruption if certain steps are taken or not taken.</p>

Connecting with TIBCO Resources

How to Join TIBCOCommunity

TIBCOCommunity is an online destination for TIBCO customers, partners, and resident experts. It is a place to share and access the collective experience of the TIBCO community. TIBCOCommunity offers forums, blogs, and access to a variety of resources. To register, go to <http://www.tibcommunity.com>.

How to Access TIBCO Documentation

You can access TIBCO documentation here:

<http://docs.tibco.com>

How to Contact TIBCO Support

For comments or problems with this manual or the software it addresses, contact TIBCO Support as follows:

- For an overview of TIBCO Support, and information about getting started with TIBCO Support, visit this site:

<http://www.tibco.com/services/support>

- If you already have a valid maintenance or support contract, visit this site:

<https://support.tibco.com>

Entry to this site requires a user name and password. If you do not have a user name, you can request one.

Chapter 1 **Process Palette**

The Process palette allows you to create process definitions.

Topics

- [Process Definition, page 2](#)

Process Definition

Resource



The Process Definition resource allows you to define business processes. Drag and drop the Process Definition resource into the design panel to create a new process definition.

Select a process definition in the project tree panel to edit a process definition. When editing process definitions, the palette panel changes to a list of activity palettes that you can use in a process definition. Subsequent chapters of this manual describe the activity palettes.

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about creating and editing process definitions.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the process.
Description	Short description of the process.
Custom Icon File	You can choose your own custom icon for the process, if desired. Use the Browse button to locate an image file (GIF, JPEG, and so on) to use as the icon for this process.
Namespace Registry	Clicking the Edit button in this field allows you to view, add, change or delete the namespaces used in the input partners defined for this process definition. You can also view and edit schema and WSDL imports.

Field	Description
Target Namespace	<p>Target namespace of the process definition. This field is mandatory when specifying partners in the process definition.</p> <p>This field is generated automatically whenever you create a process definition. While creating new processes, it is recommended that the targetNamespace value generated automatically be retained. Typically, this value is <code>http://xmlns.example.com/<rand_num></code>, where <code><rand_num></code> is replaced by a random number.</p> <p>If you want to specify partners in processes that were created in older versions, then you must provide the targetNamespace manually.</p> <p>Ensure that the value specified for targetNamespace is unique across the project.</p>

Process Variables

The Process Variables tab allows you to specify user-defined process variables for the process definition. See the Processes chapter of *TIBCO ActiveMatrix BusinessWorks Process Design Guide* for a complete description of user-defined process variables.

You can assign a value to the process variables with the [Assign](#) activity. See [Assign on page 135](#) for more information about assigning a value to a user-defined process variable.

This tab contains two panels:

- The left panel allows you to add, delete, and rename process variables.
- The right panel allows you to define data schemas for the process variable selected in the left panel. See [Appendix A, Specifying Data Schema, on page 743](#) for more information about specifying data schema.

Partners

The Partners tab allows you to define partners for the process definition. The partner can be either located inside the same project or it can be an external service that can be invoked over the Internet by way of SOAP protocol.

The Partners tab has the following fields.

Field	Description
Partners	<p>The Partners tab allows you to specify binding information for partner definitions. The port type and port type namespace fields in the table are non-editable. To modify the value of the Port Type for a Partner, select the Browse button at the right corner of the field Port Type below the Partners table.</p> <p>Partner Name - specifies the name used by the process to reference a partner. Click the Browse button on the right side to add a new Partner.</p> <p>Port Type - This is a non-editable field displaying the Port Type selected.</p> <p>PortType Namespace - This is a non-editable field displaying the PortType Namespace corresponding to the Port Type selected.</p> <p>Partner Link - specifies the partner link configuration for the partner. This field can optionally be specified by double-clicking on the field and browsing the list of available partner link resources in the project.</p>
Port Type	<p>Allows you to select an interface (port type) from the list of available partner interfaces in the project. To add or modify the Port Type, click the Browse Resources button at the right end of the field and select the Port Type you want to add to the Partners tab.</p>

ActiveEnterprise Adapter Palette

The ActiveEnterprise Adapter palette contains activities for communicating with configured TIBCO ActiveEnterprise adapters. This chapter assumes you are familiar with the concepts and features of TIBCO ActiveEnterprise adapter products. For more information about configuring adapters, see the documentation for your adapter product.



You can use these activities to communicate with adapters that are supported by TIBCO ActiveMatrix BusinessWorks. See your adapter documentation for information on whether TIBCO ActiveMatrix BusinessWorks is supported.

Topics

- [Common Features Across ActiveEnterprise Activities, page 6](#)
- [Adapter Request-Response Server, page 21](#)
- [Adapter Subscriber, page 25](#)
- [Invoke an Adapter Request-Response Service, page 29](#)
- [Publish to Adapter, page 34](#)
- [Respond to Adapter Request, page 40](#)
- [Send Exception to Adapter Request, page 43](#)
- [Wait for Adapter Message, page 46](#)
- [Wait for Adapter Request, page 51](#)

Common Features Across ActiveEnterprise Activities

The activities in the ActiveEnterprise Adapter palette reference Adapter Configuration resources in your project. This section describes common features across all activities in this palette.

Support for Message Filter Resources

An Adapter Configuration resource can use a Message Filter resource. Message filters are used to provide custom, user-written code to transform the messages sent or received from an adapter, call out to TIBCO Adapter SDK functions, or perform other tasks. See *TIBCO Designer Palette Reference* for more information about Message Filter resources.

The activities in the ActiveEnterprise Adapter palette support the use of Message Filter resources. When using TIBCO Designer, the message filter is specified for the Adapter Configuration, and the ActiveEnterprise Adapter activities automatically make use of the class specified in the Message Filter resource.

When you deploy your project, however, you must ensure that the BusinessWorks process engine has access to any classes specified in a Message Filter resource. For example, if you have a Publish to Adapter activity in your process definition, the process engine must have access to the class used when executing the `transformOutbound()` message filter call. If you deploy your TIBCO Adapter and BusinessWorks process engine on the same machine, no additional configuration steps are required. If the components are installed on different machines, you must place your message filter class on the machine where your process engine is deployed and make certain the location of the message filter class is in the CLASSPATH for the process engine (this is set in the `bwengine.tra` file).

See *TIBCO ActiveMatrix BusinessWorks Administration* for more information about deploying process engines.

Internationalization Support

TIBCO ActiveMatrix BusinessWorks and TIBCO Adapter products can send text messages that are encoded using either the Latin-1 or UTF-8 character encoding. Both the sender and receiver of the message must use the same encoding. The character encoding sent by resources configured in TIBCO Designer is set at the project level during design time. For deployed projects, TIBCO Administrator allows you to set the message encoding.

At design time, the message encoding property can be set when creating a new project. In the Save Project dialog, choose either ISO8859-1 or UTF-8 in the TIBCO Messaging Encoding option list. See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about saving projects. After the messaging encoding is chosen, it will take effect at design time, such as in debug mode, or if the project is running in a standalone mode before deployment.

After the project is deployed, the messaging encoding is determined by the encoding property of the TIBCO Administrator domain. This property is set when the domain is created. ISO8859-1 and UTF-8 are the two supported character encoding options. The messaging encoding set for the domain overrides any encoding set for a project.

Refresh Adapter Service Button

All activities in the ActiveEnterprise Adapter palette can use preconfigured adapter services. These adapter service configurations can change after an adapter service is specified in the configuration of an ActiveEnterprise Adapter palette activity. Therefore, the configured adapter service may become inconsistent with your process definition.

The Refresh Adapter Service button is available on most activities in the ActiveEnterprise Adapter palette. This button allows you to synchronize your activities with the adapter service specified in the activity. Any changes that have occurred to the adapter service are reflected in the activity after the refresh completes.

For example, an adapter service may change the schema it uses for incoming or outgoing messages. When this schema change occurs, any activity using that adapter service may no longer have the correct input and output schemas. Clicking the Refresh Adapter Service button changes the activity to use the current configuration of the adapter service. This invalidates input mappings, and you may need to use the Mapper Check and Repair button on the Input tab to correct the activity input schemas.



The Refresh Adapter Service button is only enabled when you use all settings from the Adapter Service. That is, if you change the Transport Type on the Transport tab to anything other than Adapter Service Default, the Refresh Adapter Service button becomes disabled.

If you want to keep your ActiveEnterprise Adapter activities synchronized with an adapter service, do not change the Transport Type.

If you want to use a different transport configuration for the activity, you should check the Custom AESchema field on the Configuration tab and specify the adapter service schema in the Custom AESchema Reference field, and then modify the settings on the Transport tab.

Transport Tab

Transports specify the underlying communication characteristics for messages sent and received by adapter services. Normally, the activities of the ActiveEnterprise Adapter palette use the same transport configuration as the adapter service with which they are communicating. However, in some situations, you may want to override the transport configuration of the adapter service and use different transport parameters.

The Transport tab is available in activities in the ActiveEnterprise Adapter palette. This tab allows you to override the transport configuration of the adapter service. The Transport tab has different fields depending upon which transport is selected in the Transport Type field. [Table 2](#) describes the fields of the transport tab.

Table 2 The Transport tab

Field	Global Var?	Description
Transport Type	No	<p>The transport on which the incoming request will be received. This is normally the transport used by the adapter service, but you can override this by specifying different transport parameters. The possible values for this field are:</p> <ul style="list-style-type: none">• Adapter Service Default• Tibrv Reliable• Tibrv Certified• Tibrv Certified Message Queue• JMS Topic• JMS Queue <p>The sub-sections of this table describe the fields that appear when each of these options is selected as the transport type.</p>
Tibrv Reliable Transport		
See the TIBCO Rendezvous documentation for more information about these fields.		
Subject	Yes	The subject of the incoming request.

Table 2 The Transport tab

Field	Global Var?	Description
Service	Yes	The service parameter of the transport of the incoming request.
Network	Yes	The network parameter of the transport of the incoming request.
Daemon	Yes	The daemon parameter of the transport of the incoming request.
SSL	No	Specifies that SSL should be used when connecting to the TIBCO Rendezvous daemon. See Configure SSL Button on page 18 for more information about configuring SSL parameters.
Message Format	Yes	Specifies the message format for the message. This can be either AE message format or AE XML format. This field is only available on the Transport tab of the following activities: <ul style="list-style-type: none"> • Adapter Subscriber • Publish to Adapter • Wait for Adapter Message
Tibrv Certified Transport		
See the TIBCO Rendezvous documentation for more information about these fields.		
Subject	Yes	The subject of the incoming request.
Service	Yes	The service parameter of the transport of the incoming request.
Network	Yes	The network parameter of the transport of the incoming request.
Daemon	Yes	The daemon parameter of the transport of the incoming request.

Table 2 The Transport tab

Field	Global Var?	Description
SSL	No	Specifies that SSL should be used when connecting to the TIBCO Rendezvous daemon. See Configure SSL Button on page 18 for more information about configuring SSL parameters.
CM Name	Yes	The CM name of the incoming request.
PreRegister Listeners	Yes	<p>This field is only available on activities that publish messages (for example, Invoke an Adapter Request Response Service or Publish to Adapter).</p> <p>This field specifies the cmname(s) of the certified subscriber(s). This allows the publisher to pre-register with any expected listeners. If multiple cmnames are specified, separate each cmname with a comma.</p>
Relay Agent	Yes	Name of the relay agent, if one is used.
Ledger File	Yes	<p>Name and location of the ledger file.</p> <p>Warning: TIBCO ActiveMatrix BusinessWorks constructs the default value of this field from global variables and the Adapter Service configuration. The value of this field must result in a valid path on the filesystem where the process is run. You may need to modify the default value in this field or modify the global variables used in this field to make sure the field results in a valid filesystem path.</p>
Sync Ledger	Yes	When checked, this specifies the ledger file should be kept synchronous (asynchronous ledger updates are performed, if this field is unchecked).
Default Time Limit	Yes	The default message time limit for certified messages specified in milliseconds.
Require Old Messages	Yes	Specifies that unconfirmed messages should be kept in the ledger file.

Table 2 The Transport tab

Field	Global Var?	Description
Message Format	Yes	Specifies the message format for the message. This can be either AERV or XML. This field is only available on the Transport tab of the following activities: <ul style="list-style-type: none"> • Adapter Subscriber • Publish to Adapter • Wait for Adapter Message
Tibrv Certified Message Queue Transport See the TIBCO Rendezvous documentation for more information about these fields.		
Subject	Yes	The subject of the incoming request.
Service	Yes	The service parameter of the transport of the incoming request.
Network	Yes	The network parameter of the transport of the incoming request.
Daemon	Yes	The daemon parameter of the transport of the incoming request.
SSL	No	Specifies that SSL should be used when connecting to the TIBCO Rendezvous daemon. See Configure SSL Button on page 18 for more information about configuring SSL parameters.
CMQ Name	Yes	The CMQ name of the incoming request.
Complete Time	Yes	The amount of time (in seconds) the scheduler waits for a worker process to complete. If the worker process does not complete in the specified period, the scheduler reassigns the message to another worker.
Scheduler Weight	Yes	The scheduler weight for the process engine.
Scheduler Heartbeat	Yes	The scheduler heartbeat interval (in milliseconds).

Table 2 The Transport tab

Field	Global Var?	Description
Scheduler Activation	Yes	The scheduler activation interval (in milliseconds).
Worker Weight	Yes	The worker weight for the process engine.
Worker Tasks	Yes	The maximum number of incoming adapter requests this process engine can accept.
Message Format	Yes	<p>Specifies the message format for the message. This can be either AERV or XML. This field is only available on the Transport tab of the following activities:</p> <ul style="list-style-type: none">• Adapter Subscriber• Wait for Adapter Message
JMS Topic Transport		
See the TIBCO Enterprise Message Service documentation for more information about these fields.		
Topic	Yes	The topic name of the incoming request.
Auto Confirm	No	<p>Specifies whether the incoming request should be automatically confirmed. This field is only available for activities that receive messages (for example, Adapter Subscriber).</p> <p>If checkbox is not selected then the message will be acknowledged at a later point by using the Confirm activity. If the message is not confirmed before the process instance ends, the message is redelivered and a new process instance is created to handle the new incoming message. Ensure that your process definition confirms the message.</p>

Table 2 The Transport tab

Field	Global Var?	Description
Transactional	No	<p>This field is only available for activities that receive messages (for example, Adapter Subscriber).</p> <p>Check this field when a transaction that can process JMS messages is included in the process definition and you want the incoming message to be a part of the transaction. Any reply or exception message associated with the incoming message is also part of the transaction.</p> <p>The message is acknowledged when the transaction commits. Checking this field disables the Auto Confirm field.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about creating transactions.</p>
Override Transaction	No	<p>This field is only available for activities that publish messages (such as Publish to Adapter or Invoke an Adapter Request-Response Service).</p> <p>By default, ActiveEnterprise Adapter activities that are included in the appropriate transaction group are included in the transaction. Check this field if you want to exclude the activity from the transaction.</p>

Table 2 The Transport tab

Field	Global Var?	Description
Durable	No	<p>Specifies whether the client making the request is a durable subscriber. The durable subscription name is a concatenation of the process definition name and the name of the activity.</p> <p>This field is only available on the Transport tab of the following activities:</p> <ul style="list-style-type: none">• Adapter Subscriber• Adapter Request-Response Server• Wait for Adapter Message• Wait for Adapter Request
Durable Name	No	<p>When the Durable field is checked, you can specify the name of the durable subscription that is registered with the JMS server in this field. This field is only available when the Durable field is checked.</p>
Delivery Mode	No	<p>This field is only available on the Transport tab of the Publish to Adapter or Invoke an Adapter Request-Response Service activities.</p> <p>This field specifies the delivery mode of the published message. This can be either persistent or non-persistent.</p>
Time To Live	Yes	<p>This field is only available on the Transport tab of the Publish to Adapter or Invoke an Adapter Request-Response Service activities.</p> <p>This field specifies the expiration time (in milliseconds) for the message. Specifying zero signifies the message should never expire.</p>
JNDI Lookups	No	<p>Specifies that references to the JMS objects (ConnectionFactory, Topic, and so on) should be obtained from a JNDI server.</p>

Table 2 The Transport tab

Field	Global Var?	Description
SSL	No	Specifies that SSL should be used when connecting to the JMS server. See Configure SSL Button on page 18 for more information about configuring SSL parameters.
Topic Connection Factory Name	Yes	Specifies the Topic ConnectionFactory object.
Connection User Name	Yes	User name to use when connecting to the JMS server.
Password	Yes	Password to use when connecting to the JMS server.
Provider URL	Yes	URL for the JMS server.
JMS Application Properties	No	Any application-specific message properties that will be part of the message. This is specified by the JMS Application Properties shared configuration resource. Once specified, these properties appear on the Input or Output tab as "OtherProperties".
Transacted Session	Yes	Specifies if the AE Event Source is a part of a transaction. When checked, this field disables Transactional and Auto Confirm. The fields Precreate Transactions and XA Transaction Manager will not visible.
Precreate Transactions	Yes	When checked, this field specifies that the transaction is created before a message arrives at the JMS receiver. This field is available when Transactional field is checked.
XA Transaction Manager	Yes	Specifies the XA Transaction Manager Configuration used to create the XA transaction. This field is available when Precreate Transactions field is checked.

Table 2 The Transport tab

Field	Global Var?	Description
JMS Queue Transport		
See the TIBCO Enterprise Message Service documentation for more information about these fields.		
Queue	Yes	The queue name of the incoming request.
Delivery Mode	No	<p>This field is only available on the Transport tab of the Publish to Adapter or Invoke an Adapter Request-Response Service activities.</p> <p>This field specifies the delivery mode of the published message. This can be either persistent or non-persistent.</p>
Time To Live	Yes	<p>This field is only available on the Transport tab of the Publish to Adapter or Invoke an Adapter Request-Response Service activities.</p> <p>This field specifies the expiration time (in milliseconds) for the message. Specifying zero signifies the message should never expire.</p>
Transactional	No	<p>This field is only available for activities that receive messages (for example, Adapter Subscriber).</p> <p>Check this field when a transaction that can process JMS messages is included in the process definition and you want the incoming message to be a part of the transaction. Any reply or exception message associated with the incoming message is also part of the transaction.</p> <p>The message is acknowledged when the transaction commits. Checking this field disables the Auto Confirm field.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about creating transactions.</p>

Table 2 The Transport tab

Field	Global Var?	Description
Override Transaction	No	<p>This field is only available for activities that publish messages (such as Publish to Adapter or Invoke an Adapter Request-Response Service).</p> <p>By default, ActiveEnterprise Adapter activities that are included in the appropriate transaction group are included in the transaction. Check this field if you want to exclude the activity from the transaction.</p>
JNDI Lookups	No	Specifies that references to the JMS objects (ConnectionFactory, Queue, and so on) should be obtained from a JNDI server.
SSL	No	Specifies that SSL should be used when connecting to the JMS server. See Configure SSL Button on page 18 for more information about configuring SSL parameters.
Queue Connection Factory Name	Yes	Specifies the Queue ConnectionFactory object.
Connection User Name	Yes	User name to use when connecting to the JMS server.
Password	Yes	Password to use when connecting to the JMS server.
Provider URL	Yes	URL for the JMS server.
JMS Application Properties	No	<p>Any application-specific message properties that will be part of the message. This is specified by the JMS Application Properties shared configuration resource.</p> <p>Once specified, these properties appear on the Input or Output tab as "OtherProperties".</p>

Table 2 The Transport tab

Field	Global Var?	Description
Transacted Session	No	Specifies if the AE Event Source is a part of a transaction. When checked, this field disables the Precreate Transactions at the receiver and the fields Precreate Transactions and XA Transaction Manager Reference are not visible.
Precreate Transactions	Yes	When checked, this field specifies that the transaction is created before a message arrives at the JMS receiver. This field is available when Transactional field is checked.
XA Transaction Manager Reference	Yes	Specifies the XA Transaction Manager Configuration used to create the XA transaction. This field is available when Precreate Transactions field is checked.

Configure SSL Button

The Configure SSL button allows you to configure the SSL parameters when the transport supports SSL and the SSL field is checked. The following are the fields of the Configure SSL dialog.

Basic

The Basic tab of the SSL Configuration dialog allows you to specify the simplest required SSL configuration parameters for the connection. The Basic tab has the following fields:

Field	Description
Trusted Certificates Folder (JMS Transports)	Location of the trusted certificates on this machine. The trusted certificates are a collection of certificates from servers to whom you will establish connections. If the server you want to establish a connection to presents a certificate that does not match one of your trusted certificates, the connection is refused. This prevents connections to unauthorized servers.

Field	Description
Daemon Certificate (TIBCO Rendezvous transports)	<p>File containing one or more certificates from trusted certificate authorities. This file is checked when connecting to a daemon to ensure that the connection is to a daemon that is trusted. This prevents connections to rogue TIBCO Rendezvous daemons that attempt to impersonate trusted daemons.</p> <p>You can retrieve a daemon's certificate using the administration interface in TIBCO Rendezvous. See the TIBCO Rendezvous documentation for more information about obtaining certificates through the administration interface. Once retrieved, you can select a folder in your project and import this certificate into the folder using the Tools>Trusted Certificates>Import Into PEM Format menu item.</p>
Identity	<p>This is an Identity resource used to authenticate to the JMS server or TIBCO Rendezvous daemon. The Browse button allows you to select from a list of appropriately configured Identity resources.</p> <p>For TIBCO Rendezvous transports, only Identity resources with the Type field set to Identity File or Username/Password are listed.</p> <p>See <i>TIBCO Designer Palette Reference</i> for more information.</p>

Advanced

The Advanced tab of the SSL Configuration dialog allows you to specify more advanced SSL configuration parameters for the connection. The Advanced tab is available only for JMS transports.

Field	Description
Trace	Specifies whether SSL tracing should be enabled during the connection. If checked, the SSL connection messages are logged and sent to the console.

Field	Description
Debug Trace	Specifies whether SSL debug tracing should be enabled during the connection. Debug tracing provides more detailed messages than standard tracing.
Verify Host Name	Specifies whether to verify that the host you are connecting to is the expected host. The host name in the host's digital certificate is compared against the value you specify in the Expected Host Name field. If the host name does not match the expected host name, the connection is refused.
Expected Host Name	<p>Specifies the name of the host you are expecting to connect to. This field is only relevant if the Verify Host Name field is also checked.</p> <p>If the name of the host in the host's digital certificate does not match the value specified in this field, the connection is refused.</p> <p>This prevents other hosts from attempting to impersonate the specified host.</p>
Strong Cipher Suites Only	<p>When checked, this field specifies that the minimum strength of the cipher suites used can be specified with the <code>bw.plugin.security.strongcipher.minstrength</code> custom engine property. See <i>TIBCO ActiveMatrix BusinessWorks Administration</i> for more information about this property. The default value of the property disables cipher suites with an effective key length below 128 bits.</p> <p>When this field is unchecked, only cipher suites with an effective key length of up to 128 bits can be used.</p>

Adapter Request-Response Server

Process Starter

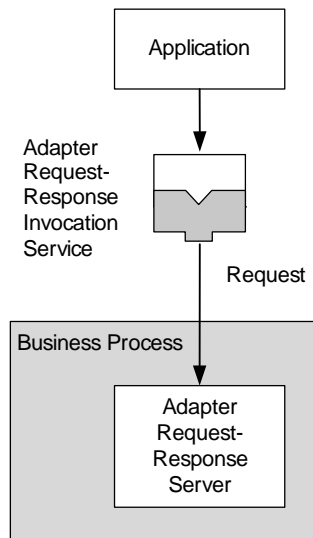


Starts a process based on the receipt of a request from an adapter. The adapter sends a request using a preconfigured request-response invocation service, and the process that is started acts as the implementation of the request. The process sends any required responses back to the adapter's service using the [Respond to Adapter Request](#) activity.

Adapter request-response invocation services are configured during adapter configuration, and the activity uses the information in the adapter configuration to fill in most of the fields of this activity. See your adapter documentation for more information about creating adapter configurations and creating adapter services.

[Figure 1](#) illustrates an Adapter Request-Response Server activity starting a business process to handle an incoming request from an adapter request-response invocation service. At a later point in the business process, the [Respond to Adapter Request](#) activity is used to perform the response.

Figure 1 An Adapter Request-Response Server activity



Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Adapter Service	No	<p>The preconfigured adapter request-response invocation service. You must specify the adapter service when configuring the adapter.</p> <p>Use the Browse button to locate the appropriate service for this activity.</p>
Operation	No	This field contains a drop down list of any operations defined by the schema used in the selected Adapter Service. Select the operation that this process definition implements.

Transport

See [Transport Tab on page 8](#) for more information about the Transport tab.

Misc

The Misc tab contains the following fields:

Field	Description
Sequencing Key	<p>This field can contain an XPath expression that specifies which processes should run in order. Process instances with sequencing keys that evaluate to the same value will be executed sequentially in the order the process instance was created.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about controlling the execution order of process instances and about XPath expressions.</p>

Field	Description
Custom Id	This field can contain an XPath expression that specifies a custom ID for the process instance. This ID is displayed in the View Service dialog of TIBCO Administrator, and it is also available in the <code>\$_processContext</code> process variable.

Output

The output for the activity is the following.

Output Item	Datatype	Description
subject	string	The subject of the message.
replySubject	string	The reply subject of the message.
certifiedSequenceNumber	string	This element is only available when Tibrv Certified is the transport. This element contains the sequence number in which this message was received.
certifiedSender	string	This element is only available when Tibrv Certified is the transport. This element contains the cmname of the message sender.
trackingInfo	complex	The AE tracking info of the sender. This element contains the tracking ID and appInfo sent by the application.
MessageID	string	This element is only available when JMS Topic or JMS Queue is the transport. This is the message ID of the message.

Output Item	Datatype	Description
JMSHeaders	complex	<p>This element is only available when JMS Topic or JMS Queue is the transport.</p> <p>This element contains the message header fields for the message. See JMS Properties on page 399 for more information about message header fields. Only properties applicable to this type of message are displayed.</p>
OtherProperties	complex	<p>This element is only available when JMS Topic or JMS Queue is the transport and a JMS Application Properties resource is specified on the Transport tab.</p> <p>This element contains the message properties for the message. See JMS Properties on page 399 for more information about message properties. Only properties applicable to this type of message are displayed.</p>
body	complex	<p>The class specified for the client service of the specified adapter configuration.</p>

Adapter Subscriber

Process Starter

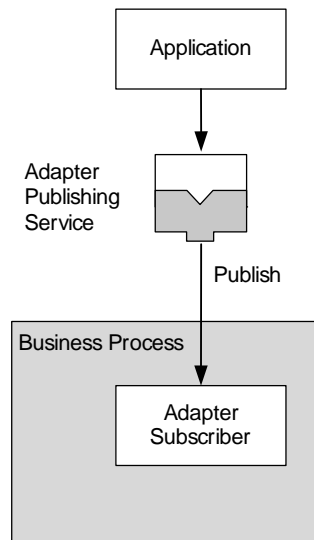


Starts a process based on the receipt of a message from the publication service of the specified adapter.

Publication services are configured during adapter configuration, and the activity uses the information in the adapter configuration to fill in most of the fields of this activity. See your adapter documentation for more information about creating adapter configurations and creating adapter publication services.

[Figure 2](#) illustrates an adapter publishing service publishing a message and the Adapter Subscriber process starter starting a business process.

Figure 2 An Adapter Subscriber activity receiving a message and starting a process



Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.

Field	Global Var?	Description
Description	No	Short description of the activity.
Adapter Service	No	<p>The preconfigured adapter publishing service. You must specify the adapter service when configuring the adapter.</p> <p>Use the Browse button to locate the appropriate service for this activity.</p>
Custom AESchema	No	Specifies whether you want to supply an output class for this activity.
Custom AESchema Reference	No	Only appears when the Custom AESchema field is checked. This field specifies the TIBCO ActiveEnterprise class to use for the body of the output message of this activity.

Transport

See [Transport Tab on page 8](#) for more information about the Transport tab.

Misc

The Misc tab contains the following fields:

Field	Description
Sequencing Key	<p>This field can contain an XPath expression that specifies which processes should run in order. Process instances with sequencing keys that evaluate to the same value will be executed sequentially in the order the process instance was created.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about controlling the execution order of process instances and about XPath expressions.</p>

Field	Description
Custom Id	This field can contain an XPath expression that specifies a custom ID for the process instance. This ID is displayed in the View Service dialog of TIBCO Administrator, and it is also available in the <code>\$_processContext</code> process variable.

Output

The output for the activity is the following.

Output Item	Datatype	Description
subject	string	The subject of the message.
replySubject	string	The reply subject of the message.
certifiedSequenceNumber	string	This element is only available when Tibrv Certified is the transport. This element contains the sequence number in which this message was received.
certifiedSender	string	This element is only available when Tibrv Certified is the transport. This element contains the cmname of the message sender.
trackingInfo	complex	The AE tracking info of the sender. This element contains the tracking ID and appInfo sent by the application.
MessageID	string	This element is only available when JMS Topic or JMS Queue is the transport. This is the message ID of the message.

Output Item	Datatype	Description
JMSHeaders	complex	<p>This element is only available when JMS Topic or JMS Queue is the transport.</p> <p>This element contains the message header fields for the message. See JMS Properties on page 399 for more information about message header fields. Only properties applicable to this type of message are displayed.</p>
OtherProperties	complex	<p>This element is only available when JMS Topic or JMS Queue is the transport and a JMS Application Properties resource is specified on the Transport tab.</p> <p>This element contains the message properties for the message. See JMS Properties on page 399 for more information about message properties. Only properties applicable to this type of message are displayed.</p>
body	complex	<p>The class specified for the publication service of the specified adapter configuration.</p>

Invoke an Adapter Request-Response Service

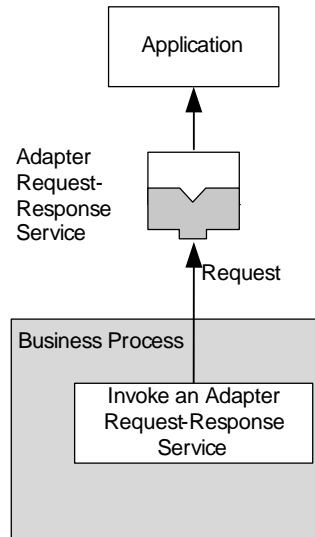
Activity



The Invoke an Adapter Request-Response Service activity is used to communicate with an adapter's request-response service. This service invokes an operation with input and output by way of the adapter. Request-response services are configured during adapter configuration, and the activity uses the information in the adapter configuration to fill in most of the fields of this activity. See your adapter documentation for more information about creating adapter configurations and creating adapter request-response services.

Figure 3 illustrates an Invoke an Adapter Request-Response Service activity sending a request to an adapter request-response service.

Figure 3 An Invoke an Adapter Request-Response Service activity sending a request



Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.

Field	Global Var?	Description
Description	No	Short description of the activity.
Adapter Service	No	<p>The preconfigured adapter request-response invocation service. You must specify the adapter service when configuring the adapter.</p> <p>Use the Browse button to locate the appropriate service for this activity.</p> <p>You can choose services configured with the RVCMQ transport, but the transport is converted to RVCM when used by this activity. This is because the RVCMQ transport does not apply to publishing activities.</p>
Operation	No	This field contains a drop down list of any operations defined by the schema used in the selected Adapter Service. Select the operation that you want to invoke.
One Way	No	This is a read-only field that displays whether the selected operation is one-way.

Transport

See [Transport Tab on page 8](#) for more information about the Transport tab.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
subject	string	The subject to send the request on. The default subject is displayed on the Advanced tab, but you can override the default by specifying a subject here.

Input Item	Datatype	Description
requestTimeout	integer	The time to wait (in milliseconds) for the synchronous request-reply operation to complete. An error is returned if the operation does not complete in this time limit.
replySubject	string	The Subject/Destination that is used to send the response when using the RV/JMS transport.
businessKey	string	<p>This string is appended to the AE tracking info appInfo field. The AE tracking info for messages published is a concatenation of bw + <processName> + <jobID> + <businessKey>.</p> <p>Note: It is a good idea to have all publishers in a process use the same business key. Only the most recent publisher's business key is used in the tracking info for the message.</p>
OtherProperties	complex	<p>This element is only available when JMS Topic or JMS Queue is the transport and a JMS Application Properties resource is specified on the Transport tab.</p> <p>This element contains the message properties for the message. See JMS Properties on page 399 for more information about message properties. Only properties applicable to this type of message are displayed.</p>
body	complex	The input parameters for the specified operation. The input parameters are defined by the operation class for the specified Adapter Service for this activity.

Output

The output for the activity is the following.

Output Item	Datatype	Description
replyDestination	string	A reply message can optionally have a reply destination, presumably so that the two applications can communicate with further messages. This element contains the reply subject (RV) or destination (JMS) set on the reply message, if one is set. If no reply subject or destination is set on the reply message, this element is not populated.
trackingInfo	string	<p>The AE tracking info.</p> <p>The id element is set to the same value for all message publishers in a process definition. The appInfo element is obtained from the businessKey element on the Input tab.</p>
JMSHeaders	complex	<p>This element is only available when JMS Topic or JMS Queue is the transport.</p> <p>This element contains the message header fields for the message. See JMS Properties on page 399 for more information about message header fields. Only properties applicable to this type of message are displayed.</p>
OtherProperties	complex	<p>This element is only available when JMS Topic or JMS Queue is the transport and a JMS Application Properties resource is specified on the Transport tab.</p> <p>This element contains the message properties for the message. See JMS Properties on page 399 for more information about message properties. Only properties applicable to this type of message are displayed.</p>

Output Item	Datatype	Description
body	complex	The reply schema for the specified operation.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
<code>TransportException</code>	The transport cannot be created.
<code>SerializationException</code>	The outgoing message cannot be serialized.
<code>DeserializationException</code>	The incoming response message cannot be serialized.
<code>ConfirmationException</code>	The message could not be confirmed.
<code>TimeoutException</code>	A timeout occurred.
<i>operationException</i>	<p>The adapter service returned an exception encountered while performing the operation. Any exception class defined on the operation schema can be returned.</p> <p>The potential exceptions are displayed as a choice element for activities after an error transition.</p>

Publish to Adapter

Activity

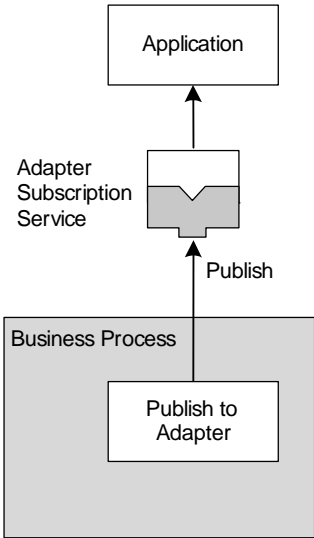


Publish to Adapter

The Publish to Adapter activity publishes a message that can be received by an adapter’s subscription service. Subscription services are configured during adapter configuration, and the activity uses the information in the adapter configuration to fill in most of the fields of this activity. See your adapter documentation for more information about creating adapter configurations and creating adapter subscription services.

Figure 4 illustrates a Publish to Adapter activity sending a message to a preconfigured adapter subscription service.

Figure 4 A Publish to Adapter activity sending a message



Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.

Field	Global Var?	Description
Adapter Service	No	<p>The preconfigured adapter subscription service. You must specify the adapter service when configuring the adapter.</p> <p>Use the Browse button to locate the appropriate service for this activity.</p> <p>You can choose services configured with the RVCMQ transport, but the transport is converted to RVCM when used by this activity. This is because the RVCMQ transport does not apply to publishing activities.</p>
RequestReply	No	<p>Specifies that this publish activity is sending a request message and expecting a response message. This is similar to using the Invoke an Adapter Request-Response Service activity, except this activity uses an adapter Subscription service instead of a Request-Response service.</p> <p>When this field is checked, the Request AE Schema and Reply AE Schema fields appear. Also, the replyDestination element appears in the activity output.</p>
Request AE Schema	No	Only appears when the RequestReply field is checked. This field specifies the TIBCO ActiveEnterprise schema to use for the body of the message in the input of this activity.
Reply AE Schema	No	Only appears when the RequestReply field is checked. This field specifies the TIBCO ActiveEnterprise schema to use as the output reply message.
Custom AESchema	No	Specifies whether you want to supply a class for this activity's input.
Custom AESchema Reference	No	Only appears when the Custom AESchema field is checked. This field specifies the TIBCO ActiveEnterprise schema to use for the body of the message in the input of this activity.

Transport

See [Transport Tab on page 8](#) for more information about the Transport tab.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
subject	string	The subject to send the request on. The default subject is displayed on the Advanced tab, but you can override the default by specifying a subject here.
requestTimeout	integer	When publishing in request/reply mode, this element specifies the timeout (in milliseconds) to wait for the reply.
preRegisterListener	string	<p>When using TIBCO Rendezvous Certified Messaging (RVCM), this field specifies the cmname(s) of the RVCM subscriber(s). This allows the publisher to pre-register with any expected listeners. If multiple cmnames are specified, separate each cmname with a comma. Any listeners preregistered on the Transport tab are also preregistered with the listeners specified in this element.</p> <p>See the TIBCO Rendezvous documentation for more information about RVCM.</p>
replySubject	string	The subject that replies to this message should be sent to.

Input Item	Datatype	Description
businessKey	string	<p>This string is appended to the AE tracking info appInfo field. The AE tracking info for messages published is a concatenation of bw + <processName> + <jobID> + <businessKey>.</p> <p>The AE tracking info id is set to the same value for all message publishers in a process definition.</p> <p>Note: It is a good idea to have all publishers in a process use the same business key. Only the most recent publisher's business key is used in the tracking info for the message.</p>
OtherProperties	complex	<p>This element is only available when JMS Topic or JMS Queue is the transport and a JMS Application Properties resource is specified on the Transport tab.</p> <p>This element contains the message properties for the message. See JMS Properties on page 399 for more information about message properties. Only properties applicable to this type of message are displayed.</p>
body	complex	<p>The schema definition for the specified adapter service. This can be overridden by specifying a different schema in the Custom AESchema Reference field on the Configuration tab, or by specifying a Request AE Schema when RequestReply is checked on the Configuration tab.</p>

Output

This activity only produces output when the RequestReply field on the Configuration tab is checked. The output for the activity is the following.

Output Item	Datatype	Description
replyDestination	string	A reply message can optionally have a reply destination, presumably so that the two applications can communicate with further messages. This element contains the reply subject (RV) or destination (JMS) set on the reply message, if one is set. If no reply subject or destination is set on the reply message, this element is not populated.
trackingInfo	string	The AE tracking info. The id element is set to the same value for all message publishers in a process definition. The appInfo element is obtained from the businessKey element on the Input tab.
MessageID	string	This element is only available when JMS Topic or JMS Queue is the transport. This is the message ID of the message.
JMSHeaders	complex	This element is only available when JMS Topic or JMS Queue is the transport. This element contains the message header fields for the message. See JMS Properties on page 399 for more information about message header fields. Only properties applicable to this type of message are displayed.

Output Item	Datatype	Description
OtherProperties	complex	<p>This element is only available when JMS Topic or JMS Queue is the transport and a JMS Application Properties resource is specified on the Transport tab.</p> <p>This element contains the message properties for the message. See JMS Properties on page 399 for more information about message properties. Only properties applicable to this type of message are displayed.</p>
body	complex	The specified reply schema.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
TransportException	The transport cannot be created.
SerializationException	The outgoing message cannot be serialized.
TimeoutException	The specified timeout has been reached for the request/reply operation.

Respond to Adapter Request

Activity

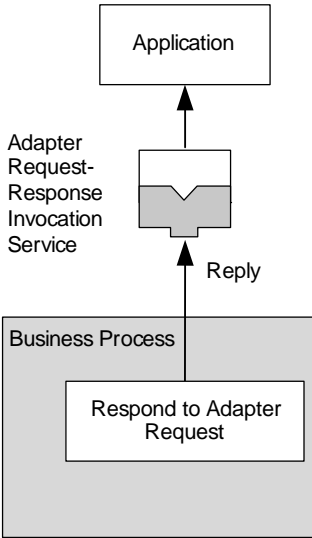


Respond to Adapter Request

The Respond to Adapter Request activity is used to send a response to an adapter for a previously received request. For example, you may have a [Wait for Adapter Request](#) activity in a process definition. The incoming adapter request may require a response from your process. The Respond to Adapter Request is used to send that response.

[Figure 5](#) illustrates a Respond to Adapter Request activity sending a response to a previously received request from an adapter.

Figure 5 A Respond to Adapter Request sending a response



Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.

Field	Global Var?	Description
Reply For	No	drop down list of activities that this activity can send a response for.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
businessKey	string	<p>This string is appended to the AE tracking info appInfo field. The AE tracking info for messages published is a concatenation of</p> <p style="text-align: center;">bw + <processName> + <jobID> + <businessKey>.</p> <p>Note: It is a good idea to have all publishers in a process use the same business key. Only the most recent publisher’s business key is used in the tracking info for the message.</p>
body	complex	The schema definition for the response. The structure of this element is retrieved from the adapter service of the activity that this activity is publishing a response for.

Output

This activity produces no output.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
TransportException	The transport cannot be created.
SerializationException	The outgoing reply cannot be serialized.
ReplyException	The reply could not be sent.

Send Exception to Adapter Request

Activity

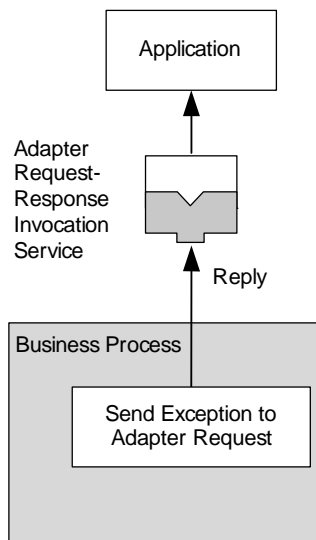


Send Exception to
Adapter Request

The Send Exception to Adapter Request activity is used to send an exception to an adapter for a previously received request. For example, you may have a [Adapter Request-Response Server](#) process starter in a process definition. An error may occur while attempting to perform the requested operation. The Send Exception to Adapter Request activity allows you to return an exception to the adapter service with information about the exception.

[Figure 6](#) illustrates a Send Exception to Adapter Request activity sending an exception to a previously received request from an adapter.

Figure 6 A Send Exception to Adapter Request sending an exception



Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.

Field	Global Var?	Description
Send Exception To	No	drop down list of activities that this activity can send an exception to.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
businessKey	string	<p>This string is appended to the AE tracking info appInfo field. The AE tracking info for messages published is a concatenation of</p> <p>bw + <processName> + <jobID> + <businessKey>.</p> <p>Note: It is a good idea to have all publishers in a process use the same business key. Only the most recent publisher’s business key is used in the tracking info for the message.</p>
body	complex	The schema definition for the exception. The schema used by the adapter service must define exception schemas that can be sent.

Output

This activity produces no output.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
TransportException	The transport cannot be created.
SerializationException	The outgoing reply cannot be serialized.
ReplyException	The exception could not be sent.

Wait for Adapter Message

Activity



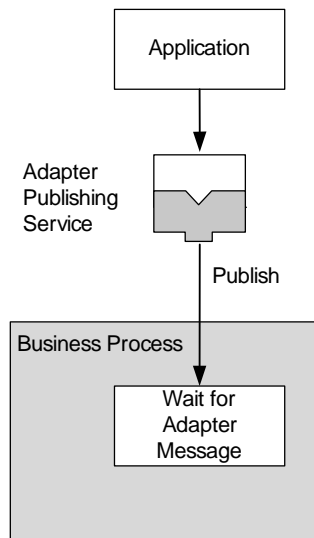
Waits for the receipt of a message from the publication service of the specified adapter.

Publication services are configured during adapter configuration, and the activity uses the information in the adapter configuration to fill in most of the fields of this activity. See your adapter documentation for more information about creating adapter configurations and creating adapter publication services.

See [Scalability With Incoming Events on page 226](#) in *TIBCO ActiveMatrix BusinessWorks Process Design Guide* for information on running the "Wait for..." activities in a multi-engine mode.

Figure 7 illustrates an adapter publishing service publishing a message and the Wait for Adapter Message activity receiving the message in a business process.

Figure 7 A Publish to Adapter activity sending a message



Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Adapter Service	No	<p>The preconfigured adapter publishing service. You must specify the adapter service when configuring the adapter.</p> <p>Use the Browse button to locate the appropriate service for this activity.</p>
Custom AESchema	No	Specifies whether you want to supply a class for this activity's output.
Custom AESchema Reference	No	Only appears when the Custom AESchema field is checked. This field specifies the TIBCO ActiveEnterprise schema to use for the body of the message in the output of this activity.

Transport

See [Transport Tab on page 8](#) for more information about the Transport tab.

Event

The Event tab has the following fields.

Field	Description
Candidate Event Key	<p>Expression built from the data of the incoming message. This expression should evaluate to a string and it is compared to the "key" field of the activity's input. If the Candidate Event Key and the activity's key match, then the process accepts the incoming message.</p> <p>For example, you may have a Publish to Adapter activity that sends a message with a particular ID. You are expecting a reply message that contains that same ID so that you can determine the message is a response to your sent message. You would specify the field of the incoming message that contains your ID in the Candidate Event Key. You would then use the message ID of the message you sent earlier in the process as the "key" field in the input.</p> <p>This expression is specified in XPath, and only data from the incoming event is available for use in this XPath expression. See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about XPath expressions.</p>
Event Timeout (msec)	<p>A message may arrive before this activity is executed. This field specifies the amount of time (in milliseconds) a message waits if it is received before this activity is executed. If the event timeout expires, an error is logged and the event is discarded.</p> <p>If no value is specified in this field, the message waits indefinitely. If zero is specified, the event is discarded immediately, unless this activity has already been reached.</p>



When building an expression in the Candidate Event Key field, only data from the incoming event is available. This is because you want to place an expression containing incoming event data in the Candidate Event Key field. When the results of this expression match the results of the expression in the "key" item on the Input tab, the Wait For Adapter Message activity proceeds.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
key	string	The value that is compared to the Candidate Event Key field of the Event tab to determine if this message applies to this process. See Event on page 48 for an example of using the Candidate Event Key field with the key input item.
processTimeout	integer	The time (in milliseconds) to wait for the incoming message. An error is returned if the message is not received in this time limit.

Output

The output for the activity is the following.

Output Item	Datatype	Description
subject	string	The subject of the message.
replySubject	string	The reply subject of the message.
certifiedSequenceNumber	string	This element is only available when Tibrv Certified is the transport. This element contains the sequence number in which this message was received.
certifiedSender	string	This element is only available when Tibrv Certified is the transport. This element contains the cmname of the message sender.

Output Item	Datatype	Description
trackingInfo	complex	The AE tracking info of the sender. This element contains the tracking ID and appInfo sent by the application.
body	complex	The class specified for the publication service of the specified adapter configuration or in the Custom AESchema Reference field on the Configuration tab.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
ActivityTimedOutException	The specified processTimeout has been reached.
TransportException	The transport cannot be created.
DeserializationException	The outgoing reply cannot be serialized.
ConfirmationException	The message could not be confirmed.

Wait for Adapter Request

Activity



Wait for Adapter Request

Waits for the receipt of a request from an adapter request-response invocation service. The adapter sends a request using a preconfigured service, and the process definition acts as the implementation of the request. The process sends any required responses back to the adapter's service by placing the [Respond to Adapter Request](#) activity at a later point in the process definition.

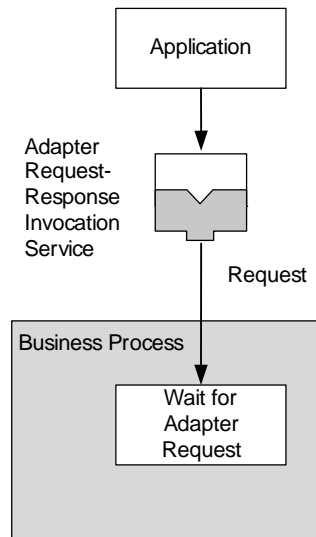
[Adapter Request](#) activity at a later point in the process definition.

Adapter request-response invocation services are configured during adapter configuration, and the activity uses the information in the adapter configuration to fill in most of the fields of this activity. See your adapter documentation for more information about creating adapter configurations and creating adapter services.

See [Scalability With Incoming Events on page 226](#) in *TIBCO ActiveMatrix BusinessWorks Process Design Guide* for information on running the "Wait for..." activities in a multi-engine mode.

Figure 8 illustrates a Wait for Adapter Request activity waiting for a request from an adapter request-response invocation service. At a later point in the business process, a [Respond to Adapter Request](#) activity sends the response.

Figure 8 A Wait for Adapter Request activity



Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Adapter Service	No	<p>The preconfigured adapter request-response invocation service. You must specify the adapter service when configuring the adapter.</p> <p>Use the Browse button to locate the appropriate service for this activity.</p>
Operation	No	This field contains a drop down list of any operations defined by the schema used in the selected Adapter Service. Select the operation that this process definition is waiting for.

Transport

See [Transport Tab on page 8](#) for more information about the Transport tab.

Event

The Event tab has the following fields.

Field	Description
Candidate Event Key	<p>Expression built from the data of the incoming message. This expression should evaluate to a string and it is compared to the "key" field of the activity's input. If the Candidate Event Key and the activity's key match, then the process accepts the incoming message.</p> <p>For example, you may have a Invoke an Adapter Request-Response activity that sends a request with a particular ID. You are expecting a response message that contains that same ID so that you can determine the message is a response to your sent message. You would specify the field of the incoming reply that contains your ID in the Candidate Event Key. You would then use the message ID of the request you sent earlier in the process as the "key" field in the input.</p> <p>This expression is specified in XPath, and only data from the incoming event is available for use in this XPath expression. See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about XPath expressions.</p>
Event Timeout (msec)	<p>A message may arrive before this activity is executed. This field specifies the amount of time (in milliseconds) a message waits if it is received before this activity is executed. If the event timeout expires, an error is logged and the event is discarded.</p> <p>If no value is specified in this field, the message waits indefinitely. If zero is specified, the event is discarded immediately, unless this activity has already been reached.</p>



When building an expression in the Candidate Event Key field, only data from the incoming event is available. This is because you want to place an expression containing incoming event data in the Candidate Event Key field. When the results of this expression match the results of the expression in the "key" item on the Input tab, the Wait For Adapter Request activity proceeds.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
key	string	The value that is compared to the Candidate Event Key field of the Event tab to determine if this message applies to this process. See Event on page 53 for an example of using the Candidate Event Key field with the key input item.
processTimeout	integer	The time (in milliseconds) to wait for the incoming message. An error is returned if the message is not received in this time limit.

Output

The output for the activity is the following.

Output Item	Datatype	Description
subject	string	The subject of the message.
certifiedSequenceNumber	string	This element is only available when Tibrv Certified is the transport. This element contains the sequence number in which this message was received.

Output Item	Datatype	Description
certifiedSender	string	This element is only available when Tibrv Certified is the transport. This element contains the cmname of the message sender.
trackingInfo	complex	The AE tracking info of the sender. This element contains the tracking ID and appInfo sent by the application.
MessageID	string	This element is only available when JMS Topic or JMS Queue is the transport. This is the message ID of the message.
JMSHeaders	complex	This element is only available when JMS Topic or JMS Queue is the transport. This element contains the message header fields for the message. See JMS Properties on page 399 for more information about message header fields. Only properties applicable to this type of message are displayed.
OtherProperties	complex	This element is only available when JMS Topic or JMS Queue is the transport and a JMS Application Properties resource is specified on the Transport tab. This element contains the message properties for the message. See JMS Properties on page 399 for more information about message properties. Only properties applicable to this type of message are displayed.
body	complex	The class specified for the client service of the specified adapter configuration or the schema specified in the Custom AESchema Reference field on the Configuration tab.

Chapter 3 **File Palette**

The File palette is used to read, write, delete, or create files. This palette also has a process starter that allows you to poll for files and start a process based on the presence of a file.

Topics

- [Copy File, page 58](#)
- [Create File, page 61](#)
- [File Poller, page 64](#)
- [List Files, page 69](#)
- [Read File, page 72](#)
- [Remove File, page 75](#)
- [Rename File, page 77](#)
- [Wait for File Change, page 80](#)
- [Write File, page 85](#)

Copy File

Activity



The Copy File activity allows you to copy files and directories to a new location.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Overwrite	No	Overwrite existing file or directory with the same name, if one exists. The activity raises an exception if the specified file or directory exists and this field is unchecked.
Create Destination Directory	No	Create any directories in the destination path that do not already exist. This activity raises an exception if any of the directories on the specified destination path do not exist and this field is unchecked.
Include Sub-Directories	No	When the source to copy is a directory, include all sub-directories in the source directory.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
fromFileName	string	<p>The path and name of the file or directory to copy.</p> <p>For directories, you must specify an absolute path. You may use wildcards when specifying files within a directory.</p> <p>For example, to copy a directory, specify <code>c:\myDirectory</code>. To copy all text files in a directory, specify <code>c:\myDirectory*.txt</code>.</p>
toFileName	string	<p>The destination for the copy operation. This must be an absolute path; wildcards cannot be used in this element.</p>

Output

This activity produces no output.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
<code>FileNotFoundException</code>	The source file is not found or the destination is not found and the Create Destination Directory field is not checked on the Configuration tab.
<code>IllegalCopyException</code>	The destination exists and its type is different than the type of the specified source. For example, in the activity input, the <code>fromFileName</code> is a directory and the <code>toFileName</code> is a file.
<code>FileAlreadyExistsException</code>	The destination you are attempting to copy to already exists and the Overwrite field is not checked on the Configuration tab.

Exception	Thrown When...
<code>FileIOException</code>	There is an I/O error. For example, the file or directory already exists and is write protected.

Create File

Activity



The Create File activity creates a new file or directory with the specified name. When creating a file, you can also provide the file contents.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Overwrite	No	Overwrite existing file with the same name, if one exists. The activity raises an exception if the specified file exists and this field is unchecked.
Is a Directory	No	When checked, the activity creates a directory instead of a file.
Create Non-Existing Directories	No	When checked, the activity creates all directories in the specified path, if they do not already exist. If this field is unchecked and there are one or more directories in the specified path that do not exist, an exception is raised.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
fileName	string	The path and name of the file to create. If the Is a Directory field is checked on the Configuration tab, this specifies the name of the directory to create.

Output

The output for the activity is the following.

Output Item	Datatype	Description
fileInfo	complex	Element containing the fileName, location, type, readProtected, writeProtected, and size data.
fullName	string	The name of the file or directory, including the path information.
fileName	string	The name of the file or directory without the path information.
location	string	The path to the file or directory.
configuredFileName	string	This element is optional and it is not populated by this activity.
type	string	The file type.
readProtected	boolean	Whether the file or directory is protected from reading.
writeProtected	boolean	Whether the file or directory is protected from writing.
size	integer	Size of the file (in bytes).
lastModified	string	Time stamp indicating when the file was last modified.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
FileAlreadyExistsException	The file or directory you are attempting to create already exists and the Overwrite field is not checked on the Configuration tab.
FileNotFoundException	There is an I/O error. For example, the file or directory already exists and is write protected.

File Poller

Process Starter



The File Poller process starter polls for files or directories with the given name and starts a process when the specified change (creation, modification, deletion) is detected.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
File Name	Yes	<p>The path and name of the file or directory to monitor. Use the Browse button to locate an existing file.</p> <p>You can also use wildcards to monitor a directory for files that match the given specification. For example, C:\files*.log would match any change to a file in the files directory with an extension of .log.</p>
Polling Interval (sec)	Yes	Polling interval (in seconds) to check for the specified file.
Include Existing Files	No	<p>Check for the file among the files that existed before the process engine started running.</p> <p>When this field is checked, if an existing file matches the specification in the File Name field when a process engine starts, then a new process instance is created.</p> <p>If this field is not checked, any existing files that match the specification in the File Name field are ignored until there is a change in the file.</p>

Field	Global Var?	Description
Exclude File Content	No	Specifies not to load the data from the file into this activity's output. If this check box is selected, the contents of the file are not available to subsequent activities in the process definition.
Content as	Yes	The type of content in the file. Can be either text or binary.
Encoding	Yes	The character encoding for the file (when text is specified in the Content as field).

Advanced

The Advanced tab has the following fields.

Field	Global Var?	Description
Poll for Create Events	No	Checking this field starts a new process when a file or directory matching the specification in the File Name field is created. If this field is unchecked, newly created files/directories are ignored.
Poll for Modify Events	No	Checking this field starts a new process when a file or directory matching the specification in the File Name field is modified. If this field is unchecked, modifications to files/directories are ignored.
Poll for Delete Events	No	Checking this field starts a new process when a file or directory matching the specification in the File Name field is deleted. If this field is unchecked, deletions of files/directories are ignored.
Include Sub-Directories	No	When this field is checked, events that occur in subdirectories of the specified directory are also monitored. If this field is unchecked, only the directory is monitored, any subdirectories are ignored.

Field	Global Var?	Description
Mode	No	<p>Specifies the type of polling to perform. Specify one of the following:</p> <ul style="list-style-type: none">• only-directories — only tracks the specified changes for directories.• only-files — only tracks the specified changes for files.• files-and-directories — tracks the specified changes for both files and directories.
Sort By	No	<p>Specifies the order in which files should be processed, if more than one file is detected. You can sort by file name, modification date, or specify no sorting is to be performed.</p> <p>Files are processed as the polling interval occurs. Therefore, the Sort By field applies to all files that have changed since the last polling interval. The Sort By field can be very useful if you want to process files in a specific order when the process engine starts and the Include Existing Files field is checked (then all existing files are processed in the specified order).</p> <p>Note: The File Poller starts process instances based on the specified Sort By order, but the process instances may not complete in the same order. If you want to guarantee that processes start and complete in a given order, you must specify Max Jobs = 1 and enable the Activation Limit field when you deploy your project. See <i>TIBCO ActiveMatrix BusinessWorks Administration</i> for more information about deploying projects.</p>
Sort Order	No	<p>Specifies whether the order specified in the Sort By field is ascending or descending. This field is only applicable if File Name or Date Modified is selected in the Sort By field.</p>

Misc

The Misc tab contains the following fields:

Field	Description
Sequencing Key	<p>This field can contain an XPath expression that specifies which processes should run in order. Process instances with sequencing keys that evaluate to the same value will be executed sequentially in the order the process instance was created.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about controlling the execution order of process instances and about XPath expressions.</p>
Custom Id	<p>This field can contain an XPath expression that specifies a custom ID for the process instance. This ID is displayed in the View Service dialog of TIBCO Administrator, and it is also available in the <code>\$_processContext</code> process variable.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
action	string	The event that occurred to trigger the File Poller activity. The possible values are: create, remove, or modify.
timeOccured	integer	<p>The time that the File Poller activity detected the change in the file.</p> <p>The time is expressed as the amount of time, in milliseconds since midnight, January 1, 1970, UTC.</p>
fileInfo	complex	Element containing the fileName, location, type, readProtected, writeProtected, and size data.
fullName	string	The name of the file, including the path information.

Output Item	Datatype	Description
fileName	string	The name of the file without the path information.
location	string	The path to the file.
configuredFileName	string	The name of the file or directory this activity is configured to operate on.
type	string	The file type.
readProtected	boolean	Whether the file is read-protected.
writeProtected	boolean	Whether the file is write-protected.
size	integer	Size of the file in bytes.
lastModified	string	Time stamp indicating when the file was last modified.
fileContent	complex	Element containing the textContent and binaryContent data.
textContent	string	Contents of the file (text files), if the Exclude File Contents field is not checked on the Configuration tab.
binaryContent	binary	Contents of the file (binary files), if the Exclude File Contents field is not checked on the Configuration tab.
encoding	string	The character encoding for the file.

List Files

Activity



The List Files activity returns information about files or directories, or a listing of all the files in the specified directory.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Mode	No	<p>The type of listing you would like to retrieve. The following are the choices for this field:</p> <ul style="list-style-type: none"> directories-only files-only files-and-directories

Input

The input for the activity is the following.

Input Item	Datatype	Description
fileName	string	<p>The path and name of the directory with files or subdirectories to list.</p> <p>If you supply a file or directory name, information about that file or directory is returned.</p> <p>You can use wildcards to list files or directories that match the given specification. For example, C:\files*.log lists any file in the files directory that have a .log extension. C:\files\mylogs*. * lists all files in the directory mylogs.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
fileInfo	complex	Element containing the fileName, location, type, readProtected, writeProtected, and size data. This is a repeating element. Each item in the element is a file or directory contained in the specified directory that matches the given criteria.
fullName	string	The name of the file, including the path information.
fileName	string	The name of the file without the path information.
configuredFileName	string	The name of the file or directory this activity is configured to operate on.
location	string	The path to the file.
type	string	The file type.
readProtected	boolean	Whether the file is read-protected.
writeProtected	boolean	Whether the file is write-protected.
size	integer	Size of the file in bytes.
lastModified	string	Time stamp indicating when the file was last modified. You can compare values in this element using the <code>compare-dateTime()</code> XPath function. For example, <code>compare-dateTime(\$List-Files/ListFilesActivityOutput/files/fileInfo[fileName="myFile.txt"]/lastModified,current-dateTime())</code>

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
FileNotFoundException	The specified path is not found.

Read File

Activity



The Read File activity is used to read a file and place its contents into the activity’s output.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Exclude File Content	No	Specifies not to load the data from the file into this activity’s output. If this field is checked, the contents of the file are not available to subsequent activities in the process definition.
Read as	Yes	The type of content in the file. Can be either text or binary.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
fileName	string	The path and name of the file to read.

Input Item	Datatype	Description
encoding	string	The character encoding for text files. This element is only available when the Read as field on the Configuration tab is set to text. Encoding names supported by Java can be specified in this element. If this element is not specified, the default encoding of the Java Virtual Machine used by the process engine is used.

Output

The output for the activity is the following.

Output Item	Datatype	Description
fileInfo	complex	Element containing the fileName, location, type, readProtected, writeProtected, and size data.
fullName	string	The name of the file, including the path information.
fileName	string	The name of the file without the path information.
location	string	The path to the file.
configuredFileName	string	This element is optional and it is not populated by this activity.
type	string	The file type.
readProtected	boolean	Whether the file is read-protected.
writeProtected	boolean	Whether the file is write-protected.
size	integer	Size of the file in bytes.
lastModified	string	Time stamp indicating when the file was last modified.
fileContent	complex	Element containing the textContent and binaryContent data.

Output Item	Datatype	Description
textContent	string	Contents of the file (text files), if the Exclude File Content field is not checked on the Configuration tab.
binaryContent	binary	Contents of the file (binary files), if the Exclude File Content field is not checked on the Configuration tab.
encoding	string	The character encoding for the file.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
FileNotFoundException	The file does not exist.
UnsupportedEncodingException	The text file’s encoding is not valid and the content of the file is read into process data.
FileIOException	An I/O exception occurred when trying to read the file.

Remove File

Activity



Remove File

The Remove File activity removes the specified file. This activity can also remove empty directories. If a directory that is not empty is specified, an exception is thrown.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
fileName	string	The path and name of the file or empty directory to remove.

Output

The output for the activity is the following.

Output Item	Datatype	Description
fileInfo	complex	Element containing the fileName, location, type, readProtected, writeProtected, and size data.
fullName	string	The name of the file (or empty directory), including the path information.

Output Item	Datatype	Description
fileName	string	The name of the file or empty directory without the path information.
location	string	The path to the file or empty directory.
configuredFileName	string	This element is not populated by this activity.
type	string	The file type.
readProtected	boolean	Whether the file (or empty directory) is read-protected.
writeProtected	boolean	Whether the file (or empty directory) is write-protected.
size	integer	Size of the file in bytes.
lastModified	string	Time stamp indicating when the file was last modified.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
FileNotFoundException	The file does not exist.
FileIOException	An I/O exception occurred when trying to remove the file or empty directory.

Rename File

Activity



The Rename File activity is used to rename or move files. This activity can also rename directories, but you cannot use this activity to move a directory to a new location.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Overwrite	Yes	Overwrite existing file with the same name, if one exists when renaming or moving. The activity raises an exception if the specified file or directory exists and this field is unchecked.
Create Destination Directory	Yes	Creates all directories in the specified destination path where the file is moved to, if the directories do not already exist. If this field is unchecked and one or more directories in the specified path do not exist, an exception is raised.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
fromFileName	string	<p>The path and name of the file to rename or move, or the path and name of the directory to rename.</p> <p>The value in this element must be an absolute path.</p>
toFileName	string	<p>The new name and location of the file or directory. Files can be moved to a new location, but directories must remain in the same location.</p> <p>The value in this element must be an absolute path.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
fileInfo	complex	Element containing the fileName, location, type, readProtected, writeProtected, and size data.
fullName	string	The name of the file (or directory), including the path information.
fileName	string	The name of the file or directory without the path information.
location	string	The path to the file or directory.
configuredFileName	string	This element is not populated by this activity.
type	string	The file type.
readProtected	boolean	Whether the file (or directory) is read-protected.

Output Item	Datatype	Description
writeProtected	boolean	Whether the file (or directory) is write-protected.
size	integer	Size of the file in bytes.
lastModified	string	Time stamp indicating when the file was last modified.

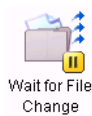
Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
<code>FileNotFoundException</code>	The file does not exist.
<code>IllegalRenameException</code>	The destination file exists and its type is different than the type of the source file.
<code>FileAlreadyExistsException</code>	The file already exists.
<code>FileIOException</code>	An I/O exception occurred when trying to rename the file or directory. This exception is also thrown if an attempt is made to move a directory.

Wait for File Change

Activity



The Wait for File Change activity waits for a file creation, modification, or deletion event to occur during process execution. When this activity is executed, the process instance suspends and waits for the specified change to occur before resuming.

See [Scalability With Incoming Events on page 226](#) in *TIBCO ActiveMatrix BusinessWorks Process Design Guide* for information on running the "Wait for..." activities in a multi-engine mode.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
File Name	Yes	<p>The path and name of the file to poll for. You can use the Browse button to locate an existing file.</p> <p>You can also use wildcards to monitor a directory for files that match the given specification. For example, C:\files*.log would match any change to a file in the files directory with an extension of .log.</p>
Polling Interval (sec)	Yes	Polling interval (in seconds) to check for changes in the specified file.

Field	Global Var?	Description
Include Existing Files	Yes	<p>Check for the file among the files that existed before the process engine started running.</p> <p>When this field is checked, if an existing file matches the specification in the File Name field when a process engine starts, then the Wait for File Change activity accepts that file as changed and proceeds to the next activity.</p> <p>If this field is not checked, any existing files that match the specification in the File Name field are ignored until there is some change in the file.</p>
Exclude File Content	Yes	<p>Specifies not to load the data from the file into this activity's output. If this field is checked, the contents of the file are not available to subsequent activities in the process definition.</p>
Content as	Yes	<p>The type of content in the file. Can be either text or binary.</p>
Encoding	Yes	<p>The character encoding for the file.</p>

Event

The Event tab has the following fields.

Field	Description
Candidate Event Key	<p>Expression built from the data of the incoming file change event. This expression should evaluate to a string and it is compared to the "key" field of the activity's input. If the Candidate Event Key and the activity's key match, then the process accepts the incoming file change event.</p> <p>For example, you may have created a file earlier in the process and you may want to wait for an external application to modify the file. When the external application modifies the file, it appends the word "Changed" to the filename to signify the file is ready for processing.</p> <p>You should specify the <code>\$fileInfo/fileName</code> for the Candidate Event Key field, and you should specify <code>concat("\$CreateFile/fileName", "Changed")</code> for the "key" field on the Input tab. <code>\$CreateFile/fileName</code> is the name of the file created earlier in the process. This expression is specified in XPath, and only data from the incoming event is available for use in this XPath expression. See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about XPath expressions.</p>
Event Timeout (msec)	<p>A file change may occur before this activity is executed. This field specifies the amount of time (in milliseconds) to wait if the file change occurs before this activity is executed in the process instance. If the event timeout expires, an error is logged and the event is discarded.</p> <p>If no value is specified in this field, the message waits indefinitely. If zero is specified, the event is discarded immediately, unless this activity has already been executed.</p>



When building an expression in the Candidate Event Key field, only data from the incoming event is available. This is because you want to place an expression containing incoming event data in the Candidate Event Key field. When the results of this expression match the results of the expression in the "key" item on the Input tab, the Wait For File Change activity proceeds.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
key	string	The value that is compared to the Candidate Event Key field of the Event tab to determine if this message applies to this process. See Event on page 82 for an example of using the Candidate Event Key field with the key input item.
processTimeout	integer	The time (in milliseconds) to wait for the incoming file change event. An error is returned if the event is not received in this time limit.

Output

The output for the activity is the following.

Output Item	Datatype	Description
action	string	The change in the file that occurred. The action is either the create, remove, or modify.
timeOccured	integer	The time that the Wait for File Change activity detected the change in the file. The time is expressed as the amount of time, in milliseconds since midnight, January 1, 1970, UTC.
fileInfo	complex	Element containing the fileName, location, type, readProtected, writeProtected, and size data.
fullName	string	The name of the file, including the path information.

Output Item	Datatype	Description
fileName	string	The name of the file without the path information.
location	string	The path to the file.
configuredFileName	string	This element is not populated by this activity.
type	string	The file type.
readProtected	boolean	Whether the file is read-protected.
writeProtected	boolean	Whether the file is write-protected.
size	integer	Size of the file in bytes.
lastModified	string	Time stamp indicating when the file was last modified.
fileContent	complex	Element containing the textContent and binaryContent data.
textContent	string	Contents of the file (text files), if the Exclude File Contents field was not checked on the Configuration tab.
binaryContent	binary	Contents of the file (binary files), if the Exclude File Contents field was not checked on the Configuration tab.
encoding	string	The character encoding for the file.

Write File

Activity



Write File

The Write File activity writes content to the specified file.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Append	Yes	Appends contents to an existing file. If unchecked, the file is overwritten.
Write as	Yes	Specifies the type of file content to write: text or binary.
Create Non-Existing Directories	Yes	When checked, the activity creates all directories in the specified path, if they do not already exist. If this field is unchecked and there are one or more directories in the specified path that do not exist, an exception is raised.
Compress	No	Specifies whether to compress the output file using GZip format. Specify None for no compression or GZip for a compressed output file. When you specify GZip for this field, you must rename the file to use the .gz suffix and use gunzip to uncompress the file.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
fileName	string	The path and name of the file. Wildcards are not permitted in this field.
textContent	string	Contents of the file (text files).
binaryContent	binary	Contents of the file (binary files).
addLineSeparator	boolean	Specifies whether to add a carriage return after each input line.
encoding	string	The character encoding for text files. This element is only available when the Write as field on the Configuration tab is set to text. Encoding names supported by Java can be specified in this element. If this element is not specified, the default encoding of the Java Virtual Machine used by the process engine is used.

Output

The output for the activity is the following.

Output Item	Datatype	Description
fileInfo	complex	Element containing the fileName, location, type, readProtected, writeProtected, and size data.
fullName	string	The name of the file, including the path information.
fileName	string	The name of the file without the path information.
location	string	The path to the file.

Output Item	Datatype	Description
configuredFileName	string	This element is not populated by this activity.
type	string	The file type.
readProtected	boolean	Whether the file is read-protected.
writeProtected	boolean	Whether the file is write-protected.
size	integer	Size of the file in bytes.
lastModified	string	Time stamp indicating when the file was last modified.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
FileNotFoundException	The file does not exist.
UnsupportedEncodingException	The encoding is not valid.
IOException	An I/O exception occurred when trying to write to the file.

Chapter 4 **FTP Palette**

The FTP palette is used to issue FTP commands.

Topics

- [FTP Change Default Directory, page 90](#)
- [FTP Connection, page 93](#)
- [FTP Delete File, page 98](#)
- [FTP DIR, page 101](#)
- [FTP Get, page 104](#)
- [FTP Get Default Directory, page 110](#)
- [FTP Make Remote Directory, page 113](#)
- [FTP Put, page 116](#)
- [FTP Quote, page 121](#)
- [FTP Remove Remote Directory, page 124](#)
- [FTP Rename File, page 127](#)
- [FTP Sys Type, page 130](#)

FTP Change Default Directory

Activity



The FTP Change Default Directory activity changes the current default directory on the remote machine to the specified directory path.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
FTP Connection	No	Path to the shared configuration resource containing the user information such as host name, user name, and password. See FTP Connection on page 93 for more information.
Quit (post-command)	No	<p>When checked, this field specifies that the FTP connection should be closed after completing this command.</p> <p>If this field is not checked, the FTP connection remains open so that all FTP activities that specify the same FTP session (that is, the same host, port, username, and password) share the FTP session until the connection is closed.</p>

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
Host	string	The name of the FTP server. This overrides the value specified in the FTP Connection resource.
Port	integer	Port number for incoming FTP requests on the FTP server. This overrides the value specified in the FTP Connection resource.
UserName	string	Username for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
Password	string	Password for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
NewDefaultDir	string	Path to the new default directory on the FTP server.
Timeout	integer	<p>The amount of time to wait for the FTP server to respond. This timeout is used when the FTP server places the FTP connection used by this activity into a waiting state.</p> <p>This overrides the value specified in the FTP Connection resource. See FTP Connection on page 93 for more information.</p>

Output

This activity produces no output.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
ConnectionErrorException	An error occurred when connecting to the FTP server.
CommandExecutionException	An error occurred when executing the FTP command.

FTP Connection

Shared Configuration



FTP Connection

The FTP Connection shared configuration resource describes a connection to an FTP server. FTP connections are used when configuring activities in the FTP palette.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the resource.
Description	Short description of the shared resource.
SSL	Specifies to use the HTTPS (secure socket layer or SSL) protocol for the FTP connection. This protocol authenticates the FTP client to the server. Enabling this field allows you to specify SSL parameters with the Configure SSL button (described in Configure SSL Button on page 95).
Host	Host name or IP address of the FTP server.
Port	Port number of the FTP server. For connections inside of a firewall, 21 is the default when no value is specified in this field.
User Name	User name to use when logging into the FTP server.
Password	Password to use when logging into the FTP server.
Mode	Specifies whether to use Active or Passive mode to connect to the FTP server.

Field	Description
Connection Timeout (msec)	<p>The timeout specified in this field (in milliseconds) applies to the following situations:</p> <ul style="list-style-type: none"> • Making the control socket connection to the FTP Server • Making the data socket connection to the FTP server (passive mode) • Waiting for the data socket connection from the FTP server (active mode) • Reading a reply from control socket after sending a FTP control command. • Reading data from data socket. <p>If the specified time is reached when attempting any of these operations, the activity using this FTP connection terminates without error and takes any matching success transitions to the next activity in the process definition.</p>
Remote Filename Encoding	<p>A drop down list of values for specifying the character encoding of file names supplied to FTP commands using this connection.</p> <p>The encoding specified in this field is used when sending path and file names supplied to FTP commands that use this FTP Connection resource. Set this field when the FTP server has a different system encoding than the machine where the process engine is running.</p>
Firewall	<p>Specifies whether the FTP host resides outside of a firewall. If this field is checked, you must supply the Proxy Host and Proxy Port fields with the name and the port of the proxy server used to access sites outside of a firewall. You can optionally specify the User Name and Password for the proxy server, if necessary.</p>
Proxy Host	<p>Used when the remote FTP server is outside of a firewall. Specifies the host name or IP address of the firewall server.</p>

Field	Description
Proxy Port	Used when the remote FTP server is outside of a firewall. Specifies the port number of the firewall server.
Proxy User Name	Used when the remote FTP server is outside of a firewall. Specifies the user name to use to connect to the proxy server, if necessary.
Proxy Password	Used when the remote FTP server is outside of a firewall. Specifies the password to use for the specified user name when connecting to the proxy server, if necessary.

Configure SSL Button

The Configure SSL button allows you to specify the SSL parameters for the HTTP connection. The following are the fields in the SSL Configuration for HTTPS Connections dialog:

Field	Description
Trusted Certificates Folder	Specifies a folder in the project containing one or more certificates from trusted certificate authorities. This folder is checked when a client connects to ensure that the server's certificate is from a trusted certificate authority. This prevents connections from rogue servers.
Identity	An Identity resource that contains the HTTP server's digital certificate and private key. See <i>TIBCO Designer Palette Reference</i> for more information.

Field	Description
Verify Host Name	<p>Specifies to check that the host name of the FTP server against the host name listed in the server’s digital certificate. This provides additional verification that the host name you believe you are connecting to is in fact the desired host.</p> <p>If the host name specified in the Host field on the Configuration tab is not an exact match to the host name specified in the server’s digital certificate, the connection is refused.</p> <p>Note: If you specify an equivalent hostname (for example, an IP address) in the Host field, but the name is not an exact match of the hostname in the host’s digital certificate, the connection is refused.</p>
Strong Cipher Suites Only	<p>When checked, this field specifies that the minimum strength of the cipher suites used can be specified with the <code>bw.plugin.security.strongcipher.minstrength</code> custom engine property. See <i>TIBCO ActiveMatrix BusinessWorks Administration</i> for more information about this property. The default value of the property disables cipher suites with an effective key length below 128 bits.</p> <p>When this field is unchecked, only cipher suites with an effective key length of up to 128 bits can be used.</p>

Test Connection Button

When the Test Connection button is clicked, BusinessWorks attempts to connect to the specified remote FTP server on the specified port using the specified username and password. You can use this button to determine if the specified connection configuration is correct.

Available Commands Button

The Available Commands button displays a dialog with details about which FTP commands are available on the specified remote server. FTP servers on different operating systems and from different vendors support slightly different commands. You can use this button to determine which commands are available on the remote FTP server before attempting to execute them with the [FTP Quote](#) activity.

FTP Delete File

Activity



The FTP Delete File activity issues an FTP delete or mdelete command to remove one or more files from the remote server.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
FTP Connection	No	Path to the shared configuration resource containing the user information such as host name, user name, and password. See FTP Connection on page 93 for more information.
Quit (post-command)	No	<p>When checked, this field specifies that the FTP connection should be closed after completing this command.</p> <p>If this field is not checked, the FTP connection remains open so that all FTP activities that specify the same FTP session (that is, the same host, port, username, and password) share the FTP session until the connection is closed.</p>

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
Host	string	The name of the FTP server. This overrides the value specified in the FTP Connection resource.
Port	integer	Port number for incoming FTP requests on the FTP server. This overrides the value specified in the FTP Connection resource.
UserName	string	Username for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
Password	string	Password for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
RemoteDirectory	string	<p>Path to the directory containing the file(s) to be deleted. This element is concatenated with the RemoteFilename element to provide the complete path to the file(s) to be deleted.</p> <p>This element is optional.</p>
RemoteFilename	string	<p>The path and name of the file to delete on the remote server. Wildcards (? for any one character, * for one or more characters) are permitted in this field.</p> <p>You can specify an absolute or relative path for the remote file name. Relative paths are relative to the path specified in the RemoteDirectory element or the user's home directory, if RemoteDirectory is null.</p>

Input Item	Datatype	Description
Timeout	integer	<p>The amount of time to wait for the FTP server to respond. This timeout is used when the FTP server places the FTP connection used by this activity into a waiting state.</p> <p>This overrides the value specified in the FTP Connection resource. See FTP Connection on page 93 for more information.</p>

Output

This activity produces no output.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
ConnectionErrorException	An error occurred when connecting to the FTP server.
CommandExecutionException	An error occurred when executing the FTP command.

FTP DIR

Activity



The FTP DIR activity provides a listing of files in the specified directory of the FTP server.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
FTP Connection	No	Path to the shared configuration resource containing the user information such as host name, user name, and password. See FTP Connection on page 93 for more information.
Quit (post-command)	No	<p>When checked, this field specifies that the FTP connection should be closed after completing this command.</p> <p>If this field is not checked, the FTP connection remains open so that all FTP activities that specify the same FTP session (that is, the same host, port, username, and password) share the FTP session until the connection is closed.</p>
NLST	Yes	<p>Specifies to use the NLST command instead of the DIR command.</p> <p>The DIR command produces verbose output including file size, modification time, and permissions. NLST produces only a list of filenames.</p>

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
Host	string	The name of the FTP server. This overrides the value specified in the FTP Connection resource.
Port	integer	Port number for incoming FTP requests on the FTP server. This overrides the value specified in the FTP Connection resource.
UserName	string	Username for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
Password	string	Password for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
DirParameters	string	Command parameters to pass to the DIR or NLST command.
Directory	string	Path to the directory for which you want to list the files. This parameter is optional, and if null, the current remote directory is listed.
Timeout	integer	The amount of time to wait for the FTP server to respond. This timeout is used when the FTP server places the FTP connection used by this activity into a waiting state. This overrides the value specified in the FTP Connection resource. See FTP Connection on page 93 for more information.

Output

The output for the activity is the following.

Output Item	Datatype	Description
ItemCount	integer	The number of entries returned from the remote directory listing.
DirectoryItems	string	A repeating element containing the list of items returned.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
ConnectionErrorException	An error occurred when connecting to the FTP server.
CommandExecutionException	An error occurred when executing the FTP command.

FTP Get

Activity



The FTP Get activity issues an FTP `get` or `mget` command to the specified server. The content of the remote files can be placed in the activity’s output or written directly to local storage. If you choose to place the contents of a remote file into the activity’s output, you can only retrieve one remote file (FTP `get` command) and the file’s content will be stored in memory as part of the activity’s output. If you choose to write the contents of the retrieved files to local storage, you can retrieve one or more files (FTP `get` or `mget` commands).

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
FTP Connection	No	Path to the shared configuration resource containing the user information such as host name, user name, and password. See FTP Connection on page 93 for more information.
Quit (post-command)	No	<p>When checked, this field specifies that the FTP connection should be closed after completing this command.</p> <p>If this field is not checked, the FTP connection remains open so that all FTP activities that specify the same FTP session (that is, the same host, port, username, and password) share the FTP session until the connection is closed.</p>

Field	Global Var?	Description
Use Process Data	Yes	<p>Specifies to write contents of the file retrieved from the FTP server to the process data. The activity's output includes an element that contains the remote file's contents, and the data can be used by subsequent activities in the process definition.</p> <p>Warning: Do not use this option if you are retrieving multiple files. You can only write the contents of one file to this activity's output. An error is returned if you specify wildcards in the RemoteFilename input element when this field is checked.</p>
Binary	Yes	<p>Specifies whether to retrieve the file content in binary or ASCII mode (checked signifies binary).</p> <p>When ASCII mode is used, differences in line endings between the FTP server and the machine executing the FTP command are automatically handled. Also, ASCII mode implies text data, and that data can be encoded in a character encoding other than ASCII (such as UTF-8 or Latin-1).</p>
Overwrite Existing File	Yes	<p>When this field is checked, and the Use Process Data field is unchecked, any existing local files are overwritten if the FTP command returns files with the same names.</p> <p>If this field is unchecked, any attempt to write a file to disk with the same name as an existing file results in an exception.</p>
Maintain 2.0 Compatibility	No	<p>This field is present only for activities migrated from TIBCO BusinessWorks 2.0. If checked, this field ensures the output schema retains the elements available in TIBCO BusinessWorks 2.0.</p>

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
RemoteFilename	string	<p>The path and name of the file to retrieve from the remote server. Wildcards (? for any one character, * for one or more characters) are permitted in this field.</p> <p>You can specify an absolute or relative path for the remote file name. Relative paths are relative to the path specified in the RemoteDirectory element or the current directory, if RemoteDirectory is null.</p> <p>Note: Do not specify wildcards for this element if the Use Process Data Configuration field is checked.</p>
LocalFileName	string	<p>This input item is available only if the Use Process Data field on the Configuration tab is unchecked and only one remote file is retrieved.</p> <p>This input item specifies the name and path of the local file where the contents of the retrieved file should be written.</p> <p>If more than one remote file is retrieved, the local files are named to match the remote file names.</p>
Host	string	<p>The name of the FTP server. This overrides the value specified in the FTP Connection resource.</p>
Port	integer	<p>Port number for incoming FTP requests on the FTP server. This overrides the value specified in the FTP Connection resource.</p>
UserName	string	<p>Username for logging into the FTP server. This overrides the value specified in the FTP Connection resource.</p>

Input Item	Datatype	Description
Password	string	Password for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
Encoding	string	<p>When the retrieved file is not binary and the Use Process Data field on the Configuration tab is checked, this specifies the character encoding of the retrieved file.</p> <p>If this is not specified, it is assumed that the encoding of the file is the same encoding of the machine where the FTP command is executed. If the encoding of the local machine and the FTP server are different, specify the encoding used by the FTP server in this element and the activity converts the retrieved file into the local machine's encoding.</p>
Timeout	integer	<p>The amount of time to wait for the FTP server to respond. This timeout is used when the FTP server places the FTP connection used by this activity into a waiting state.</p> <p>This overrides the value specified in the FTP Connection resource. See FTP Connection on page 93 for more information.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
Data	string	When Use Process Data is checked and only one file is retrieved, this element contains the data retrieved from the remote file.

Output Item	Datatype	Description
FilesTransferred	complex	<p>When one or more remote files are retrieved and written to local storage, this element contains a list of the remote filenames that were retrieved. This element contains two elements, Name and NumOfBytes.</p> <p>If an error occurred while retrieving files, the activity output is not available, but the Error Output tab lists the successfully transferred files and the files that failed to be transferred.</p>
Name	integer	The name of the remote file retrieved.
NumOfBytes	integer	The number of bytes contained in the associated file name.
Success	boolean	<p>Only available when Maintain 2.0 compatibility is checked on the Configuration tab.</p> <p>True or false depending upon whether the FTP get command was successfully executed by the FTP server.</p>
Errormsg	string	<p>Only available when Maintain 2.0 compatibility is checked on the Configuration tab.</p> <p>Any error messages returned from the FTP server.</p>

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
GetFilesException	An error occurred during the FTP get operation.
ConnectionErrorException	An error occurred when connecting to the FTP server.

Exception	Thrown When...
CommandExecutionException	An error occurred when executing the FTP command.
ConnectionTimeoutException	The connection to the FTP server has timed out before the command has completed its execution.

FTP Get Default Directory

Activity



The FTP Get Default Directory activity retrieves the name of the current remote directory. The default remote directory is operating system-dependent and determined by the remote FTP server. On UNIX systems, the default remote directory is usually the home directory of the user account that is used to establish an FTP connection.

The current remote directory may be different from the default directory, because you can use the [FTP Change Default Directory](#) or [FTP Quote](#) activities to issue an FTP command to change to a different directory. This activity returns the currently set remote directory.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
FTP Connection	No	Path to the shared configuration resource containing the user information such as host name, user name, and password. See FTP Connection on page 93 for more information.
Quit (post-command)	No	<p>When checked, this field specifies that the FTP connection should be closed after completing this command.</p> <p>If this field is not checked, the FTP connection remains open so that all FTP activities that specify the same FTP session (that is, the same host, port, username, and password) share the FTP session until the connection is closed.</p>

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
Host	string	The name of the FTP server. This overrides the value specified in the FTP Connection resource.
Port	integer	Port number for incoming FTP requests on the FTP server. This overrides the value specified in the FTP Connection resource.
UserName	string	Username for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
Password	string	Password for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
Timeout	integer	<p>The amount of time to wait for the FTP server to respond. This timeout is used when the FTP server places the FTP connection used by this activity into a waiting state.</p> <p>This overrides the value specified in the FTP Connection resource. See FTP Connection on page 93 for more information.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
CurrentDirectory	string	The currently set directory on the remote FTP server. By default, this directory is set by the FTP server, but you can use the FTP Quote activity to issue an FTP command to change to another directory.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
ConnectionErrorException	An error occurred when connecting to the FTP server.
CommandExecutionException	An error occurred when executing the FTP command.

FTP Make Remote Directory

Activity



The FTP Make Remote Directory activity creates the specified directory on the remote FTP server.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
FTP Connection	No	Path to the shared configuration resource containing the user information such as host name, user name, and password. See FTP Connection on page 93 for more information.
Quit (post-command)	No	<p>When checked, this field specifies that the FTP connection should be closed after completing this command.</p> <p>If this field is not checked, the FTP connection remains open so that all FTP activities that specify the same FTP session (that is, the same host, port, username, and password) share the FTP session until the connection is closed.</p>

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
Host	string	The name of the FTP server. This overrides the value specified in the FTP Connection resource.
Port	integer	Port number for incoming FTP requests on the FTP server. This overrides the value specified in the FTP Connection resource.
UserName	string	Username for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
Password	string	Password for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
RemoteSITECommand	string	Optional, system-specific command to execute before the directory is created.
ParentRemoteDirectory	string	Path to the remote directory to create. This element is concatenated with the RemoteDirName element to provide the complete path to the directory to create. This element is optional.
RemoteDirName	string	Name of the remote directory to create. You can optionally include the complete path of the directory to create.

Input Item	Datatype	Description
Timeout	integer	<p>The amount of time to wait for the FTP server to respond. This timeout is used when the FTP server places the FTP connection used by this activity into a waiting state.</p> <p>This overrides the value specified in the FTP Connection resource. See FTP Connection on page 93 for more information.</p>

Output

This activity produces no output.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
ConnectionErrorException	An error occurred when connecting to the FTP server.
CommandExecutionException	An error occurred when executing the FTP command.

FTP Put

Activity



The FTP Put activity issues an FTP put or mput command to the specified server. You can use process data as the content of the file to send to the remote server or you can send files in local disk storage. If you choose to use process data, you can place only one file on the remote server (FTP put command). If you use locally stored files, you can place one or more files on the remote server (FTP mput command).

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
FTP Connection	No	Path to the shared configuration resource containing the user information such as host name, user name, and password. See FTP Connection on page 93 for more information.
Quit (post-command)	No	<p>When checked, this field specifies that the FTP connection should be closed after completing this command.</p> <p>If this field is not checked, the FTP connection remains open so that all FTP activities that specify the same FTP session (that is, the same host, port, username, and password) share the FTP session until the connection is closed.</p>

Field	Global Var?	Description
Binary	Yes	<p>Specifies whether to send the file content in binary or ASCII mode (checked signifies binary).</p> <p>When ASCII mode is used, differences in line endings between the FTP server and the machine executing the FTP command are automatically handled. Also, ASCII mode implies text data, and that data can be encoded in a character encoding other than ASCII (such as UTF-8 or Latin-1).</p>
Timeout (msec)	Yes	<p>The amount of time to wait (in milliseconds) for the FTP server to respond. This timeout is used when the FTP server places the FTP connection used by this activity into a waiting state.</p> <p>This overrides the value specified in the FTP Connection resource. See FTP Connection on page 93 for more information.</p>
Overwrite Existing File	Yes	<p>When this field is checked, any existing files on the FTP server are overwritten if the FTP command sends files with the same names.</p> <p>If this field is unchecked, any attempt to send a file to the remote server with the same name as an existing file results in an exception.</p>
Append	Yes	<p>This field is only available when the Overwrite Existing File field is unchecked.</p> <p>This field specifies whether to append data to an existing file. If the specified file exists on the FTP server, append the data to the file when this field is checked. If this field is not checked, the file is overwritten if it exists on the FTP server.</p>
Use Process Data	Yes	<p>Specifies to use process data as the content of the file to place on the remote server. If this field is checked, you can only place one file on the remote server.</p>

Field	Global Var?	Description
Maintain 2.0 Compatibility	No	This field is present only for activities migrated from TIBCO BusinessWorks 2.0. If checked, this field ensures the output schema retains the elements available in TIBCO BusinessWorks 2.0.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
RemoteFilename	string	The path and name of the file to place onto the remote server. Wildcards are not permitted in this field.
LocalFilename	string	The path and name of the local file to use in the FTP Put command. This item is only available if the Use Process Data field is unchecked.
Data	binary or string (depends upon if the Binary Configuration field is checked)	<p>The contents of the file to be transferred to the FTP server, if the Use Process Data field is checked on the Configuration tab.</p> <p>You must map one or more process variables to this input item. The most common way to get the data for the remote file is to read a local file using the Read File activity, but you can map other data to this input item as well.</p>
Host	string	The name of the FTP server. This overrides the value specified in the FTP Connection resource.
Port	integer	Port number for incoming FTP requests on the FTP server. This overrides the value specified in the FTP Connection resource.

Input Item	Datatype	Description
UserName	string	Username for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
Password	string	Password for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
Encoding	string	<p>When the file to send is not binary and the Use Process Data field on the Configuration tab is checked, this specifies the character encoding of the file to send to the FTP server.</p> <p>If this is not specified, it is assumed that the encoding of the file is the same encoding of the machine where the FTP command is executed. If the encoding of the local machine and the FTP server are different, specify the encoding used by the FTP server in this element and the activity converts the file into the specified encoding.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
FilesTransferred	string	<p>A repeating string element containing a list of names of files that were transferred.</p> <p>If an error occurred while transferring files, the activity output is not available. However, the Error Output tab lists the successfully transferred files and the files that failed to be transferred.</p>

Output Item	Datatype	Description
Success	boolean	Only available when Maintain 2.0 compatibility is checked on the Configuration tab. True or false depending upon whether the FTP put command was successfully executed by the FTP server.
Errormsg	string	Only available when Maintain 2.0 compatibility is checked on the Configuration tab. Any error messages returned from the FTP server.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
PutFilesException	An error occurred during the FTP put operation.
ConnectionErrorException	An error occurred when connecting to the FTP server.
CommandExecutionException	An error occurred when executing the FTP command.
ConnectionTimeoutException	The connection to the FTP server has timed out before the command has completed its execution.

FTP Quote

Activity



The FTP Quote activity sends an arbitrary FTP command to the FTP server. You can determine which FTP commands are supported by using the Available Commands button on the [FTP Connection](#) shared configuration resource. FTP commands vary by operating system and by FTP version and configuration, so you should determine which commands are available on the remote server before using this activity.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
FTP Connection	No	Path to the shared configuration resource containing the user information such as host name, user name, and password. See FTP Connection on page 93 for more information.
Quit (post-command)	No	<p>When checked, this field specifies that the FTP connection should be closed after completing this command.</p> <p>If this field is not checked, the FTP connection remains open so that all FTP activities that specify the same FTP session (that is, the same host, port, username, and password) share the FTP session until the connection is closed.</p>
Has Socket Data	No	If checked, indicates that data will be sent back by the FTP server as a result of executing the command.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
Host	string	The name of the FTP server. This overrides the value specified in the FTP Connection resource.
Port	integer	Port number for incoming FTP requests on the FTP server. This overrides the value specified in the FTP Connection resource.
UserName	string	Username for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
Password	string	Password for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
RemoteSiteCommand	string	Optional, system-specific command to be executed before the specified command is executed.
ValidReturnCode	string	<p>Optional list of valid return codes for validating the reply. Codes are three-digit numbers. To specify multiple codes, separate each code with a comma or a space.</p> <p>If the remote server returns a code not specified in this list, this activity raises an exception.</p>
RemoteCommand	string	Command to be executed on the remote FTP server.

Input Item	Datatype	Description
Timeout	integer	<p>The amount of time to wait for the FTP server to respond. This timeout is used when the FTP server places the FTP connection used by this activity into a waiting state.</p> <p>This overrides the value specified in the FTP Connection resource. See FTP Connection on page 93 for more information.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
CommandItems	string	Each element in this repeating element is a returned value from the command executed on the remote server.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
ConnectionErrorException	An error occurred when connecting to the FTP server.
CommandExecutionException	An error occurred when executing the FTP command.

FTP Remove Remote Directory

Activity



The FTP Remove Remote Directory activity deletes the specified directory from the remote FTP server.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
FTP Connection	No	Path to the shared configuration resource containing the user information such as host name, user name, and password. See FTP Connection on page 93 for more information.
Quit (post-command)	No	<p>When checked, this field specifies that the FTP connection should be closed after completing this command.</p> <p>If this field is not checked, the FTP connection remains open so that all FTP activities that specify the same FTP session (that is, the same host, port, username, and password) share the FTP session until the connection is closed.</p>

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
Host	string	The name of the FTP server. This overrides the value specified in the FTP Connection resource.
Port	integer	Port number for incoming FTP requests on the FTP server. This overrides the value specified in the FTP Connection resource.
UserName	string	Username for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
Password	string	Password for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
ParentRemoteDirectory	string	Path to the remote directory you want to remove. This element is concatenated with the RemoteDirName element to provide the complete path to the directory to remove. This element is optional.
RemoteDirName	string	Name of the remote directory to remove. You can optionally include the complete path of the directory to remove.
Timeout	integer	The amount of time to wait for the FTP server to respond. This timeout is used when the FTP server places the FTP connection used by this activity into a waiting state. This overrides the value specified in the FTP Connection resource. See FTP Connection on page 93 for more information.

Output

This activity produces no output.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
ConnectionErrorException	An error occurred when connecting to the FTP server.
CommandExecutionException	An error occurred when executing the FTP command.

FTP Rename File

Activity



The FTP Rename File activity renames the specified file on the remote FTP server.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
FTP Connection	No	Path to the shared configuration resource containing the user information such as host name, user name, and password. See FTP Connection on page 93 for more information.
Quit (post-command)	No	<p>When checked, this field specifies that the FTP connection should be closed after completing this command.</p> <p>If this field is not checked, the FTP connection remains open so that all FTP activities that specify the same FTP session (that is, the same host, port, username, and password) share the FTP session until the connection is closed.</p>

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
Host	string	The name of the FTP server. This overrides the value specified in the FTP Connection resource.
Port	integer	Port number for incoming FTP requests on the FTP server. This overrides the value specified in the FTP Connection resource.
UserName	string	Username for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
Password	string	Password for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
OldRemoteDirectory	string	Path to the remote file you want to rename. This element is concatenated with the OldRemoteFileName element to provide the complete path to the file to rename. This element is optional.
OldRemoteFilename	string	Name of the remote file you want to rename. You can optionally include the complete path of the file to rename.
NewRemoteDirectory	string	New path for the file to rename. This element is concatenated with the NewRemoteFileName element to provide the complete path to the file to rename. This element is optional.
NewRemoteFilename	string	New name for the remote file. You can optionally include the complete path of the file.

Input Item	Datatype	Description
Timeout	integer	<p>The amount of time to wait for the FTP server to respond. This timeout is used when the FTP server places the FTP connection used by this activity into a waiting state.</p> <p>This overrides the value specified in the FTP Connection resource. See FTP Connection on page 93 for more information.</p>

Output

This activity produces no output.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
ConnectionErrorException	An error occurred when connecting to the FTP server.
CommandExecutionException	An error occurred when executing the FTP command.

FTP Sys Type

Activity



The FTP Sys Type activity retrieves the FTP server’s operating system type.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
FTP Connection	No	Path to the shared configuration resource containing the user information such as host name, user name, and password. See FTP Connection on page 93 for more information.
Quit (post-command)	No	<p>When checked, this field specifies that the FTP connection should be closed after completing this command.</p> <p>If this field is not checked, the FTP connection remains open so that all FTP activities that specify the same FTP session (that is, the same host, port, username, and password) share the FTP session until the connection is closed.</p>

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
Host	string	The name of the FTP server. This overrides the value specified in the FTP Connection resource.
Port	integer	Port number for incoming FTP requests on the FTP server. This overrides the value specified in the FTP Connection resource.
UserName	string	Username for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
Password	string	Password for logging into the FTP server. This overrides the value specified in the FTP Connection resource.
Timeout	integer	<p>The amount of time to wait for the FTP server to respond. This timeout is used when the FTP server places the FTP connection used by this activity into a waiting state.</p> <p>This overrides the value specified in the FTP Connection resource. See FTP Connection on page 93 for more information.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
SystemType	string	<p>The FTP server type. This element can be one of the following:</p> <ul style="list-style-type: none"> • UNIX • UUNIX • Windows_NT • MVS_OS390 • UNKNOWN

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
ConnectionErrorException	An error occurred when connecting to the FTP server.
CommandExecutionException	An error occurred when executing the FTP command.

Chapter 5

General Activities Palette

The General Activities palette contains several general-purpose activities and process starters. For example, the Timer process starter is used to start a process at a specific time. This chapter describes the activities contained in the General Activities palette.

Topics

- [Assign, page 135](#)
- [Call Process, page 136](#)
- [Catch, page 140](#)
- [Checkpoint, page 142](#)
- [Confirm, page 145](#)
- [Engine Command, page 149](#)
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- [On Shutdown, page 193](#)
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- [Receive Notification, page 195](#)
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- [Set Shared Variable, page 199](#)
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- [Sleep, page 204](#)
- [Timer, page 205](#)
- [Wait, page 208](#)
- [Write To Log, page 210](#)
- [OnError, page 213](#)

Assign

Activity



The Assign activity allows you to assign a value to a user-defined process variable. See [Process Definition on page 2](#) for more information about creating user-defined process variables.

When the Assign activity is executed, the entire schema for the selected process variable is replaced with the specified values. Elements that do not have a value specified in the Input tab are set to null. Therefore, be certain to set all necessary values when using the Assign activity to set a process variable.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the activity in the process definition.
Description	Short description of the activity.
Process Variable to Set	A drop down list of the available user-defined process variables for the process definition. You can select any user-defined process variable to modify.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
<schema>		The specified data schema for the user-defined process variable selected on the Configuration tab.

Output

This activity produces no output.

Call Process

Activity



The Call Process activity calls and executes an existing process definition. The input to the called process is defined in the Start activity of the called process. The output of the called process is defined in the End activity of the called process. See the description of the Start and End activities in *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about specifying the input and output of a process.



You should only call processes that have Start activities. Do not call processes that begin with a process starter such as HTTP Receiver or Receive Mail. Providing the name of a process with a process starter results in an exception at run time.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the activity in the process definition.
Description	Short description of the activity.
Process Name	The process definition you would like to call. You can browse the available process definitions.
Process Name Dynamic Override	An XPath formula specifying the name of the process to call. Use this field to dynamically determine which process to call when the process instance is running. See Dynamically Determining the Process to Call on page 137 for more information about this field.
Spawn	Specifies whether to spawn a new machine process for executing the called process. If this option is checked, the parent process cannot access the called process' output. The called process is executed in a separate process instance.

Field	Description
Custom Id	<p>This field is only available when the Spawn field is checked.</p> <p>This field can contain an XPath expression that specifies a custom ID for the spawned process instance. This ID is displayed in the View Service dialog of TIBCO Administrator, and it is also available in the <code>\$_processContext</code> process variable in the spawned process instance.</p>
Custom Icon File	File to use for the Call Process activity in the process definition. This allows you to customize the look of your process definition with your own images.

Dynamically Determining the Process to Call

You can use the Process Name Dynamic Override field on the Configuration tab to specify an XPath expression that determines which process to call. This is useful for calling a different process depending upon the value of the XPath expression. For example, you have an incoming HTTP request that contains an attribute named `orderAmount`. For all incoming orders over \$10,000, you want to call a process that includes activities in the Manual Work palette to obtain the proper approvals. For orders under \$10,000, you want to call a process that handles the order automatically. You can create the following expression that resolves to the proper process name for each type of order:

```
if($IncomingOrder/orderAmount > 10000) then
    '/MyProject/manualApproval.process'
else '/MyProject/processOrder.process'
```

Use the full path and name of the process file as stored in the project directory.

When you use the Process Name Dynamic Override field, you must also specify a process to call in the Process field. The input, output, and error definitions of the specified process must be the same as any process that the expression in the Process Name Dynamic Override field can evaluate to.



It may be helpful to create process definitions that act as programmatic interfaces when using the Process Name Dynamic Override field.

In the example above, you may create a process named `orderProcessOrApprove`. The only purpose of this process is for specifying the input, output, and error schemas. Place this process in the Process field of the Call Process tab. Then, create the `manualApproval` and `processOrder` process definitions as copies of the `orderProcessOrApprove` process. The Call Process activity then has the correct input, output, and error schemas for all processes that can be called.



If you use the Process Name Dynamic Override field, make sure you include all potentially callable subprocesses when you create your Process Archive for deployment. TIBCO Designer cannot determine which subprocesses are potentially callable at design time, and therefore they cannot be automatically included in a process archive. See *TIBCO Designer User's Guide* for more information about creating process archives.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
input	varies	The input to the called process is defined by the Output Editor tab in the called process' Start activity. See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information.

Output

The output for the activity is the following.

Output Item	Datatype	Description
output	varies	The output of the called process is defined by the Input Editor tab in the called process' End activity. See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information.

Catch

Activity



The Catch activity receives control of execution when an unhandled exception occurs. You can select a specific exception type to catch or you can specify that this activity should catch all unhandled exceptions. You can have more than one Catch activity in each exception scope, but each Catch activity must have a unique exception type.

The Catch activity allows you to transition to activities you want to perform to handle the exception. Transitions are permitted between Catch tracks within an exception scope, but you cannot transition back to the main execution track from the Catch track.

If you want to propagate the caught exception to the next highest scope, use the [Rethrow](#) activity.

See the description error handling in *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about using the Catch activity.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the activity in the process definition.
Description	Short description of the activity.
Catch All	<p>Checking this box indicates you want processing to resume with this activity when any exception is encountered that is not already handled by an error transition or another Catch activity.</p> <p>You can have only one Catch activity within an exception scope that has this field checked.</p>
Exception to Catch	<p>Specifies the exception type to catch. The list of available exceptions that can be raised in the current scope is automatically placed in the drop-down list in this field. This field is not available when the Catch All field is checked.</p> <p>Each Catch activity within an exception scope must specify a different value for this field.</p>

Input

This activity has no Input.

Output

The output for the activity is the following.

Output Item	Datatype	Description
<exceptionName>	varies	Contains the schema for the thrown exception. The contents of this element vary depending upon the exception that is encountered.

Checkpoint

Activity



The Checkpoint activity performs a checkpoint in a running process instance. A checkpoint saves the current process data and state so that it can be recovered at a later time in the event of a failure. If a process engine fails, all process instances can be recovered and resume execution at the location of their last checkpoint in the process definition. If a process instance fails due to an unhandled exception or manual termination, it can optionally be recovered at a later time, if the process engine is configured to save checkpoint data for failed processes. See *TIBCO ActiveMatrix BusinessWorks Administration* for more information about recovering failed process instances.

Only the most recent state is saved by a checkpoint. If you have multiple checkpoints in a process, only the state from the last checkpoint is available for recovering the process.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the activity in the process definition.
Description	Short description of the activity.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
duplicateKey	String	<p>A key value that is used to compare to other process instances to determine whether another process instance with the same duplicateKey value already exists.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information on detecting duplicate process instances.</p>

Checkpoints and Transactions

A Checkpoint activity cannot be placed in or in parallel to a transaction. You can, however, specify that an implicit checkpoint should be taken as part of a transaction by checking the Include Checkpoint field on a transaction group.

For explicit Checkpoints, place the checkpoint activity outside of any transaction group. Also, make sure that if you have multiple paths in your process definition, the Checkpoint activity does not occur in parallel with a path that has a transaction group. Instead, any Checkpoint activities should be placed at points that are guaranteed to be reached before or after the transaction group is reached.

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about creating groups for transactions and including an implicit checkpoint in a transaction.

Called Processes

Checkpoints save the state of the entire process instance. By default when a process calls another process, the subprocess is executed in the same process instance as the calling process. If the called process spawns a new machine process, however, the called process is a new process instance.

When a checkpoint occurs in a called process, the checkpoint saves the state of the current process instance. If no called processes spawn new process instances, then a checkpoint in any called process saves the state of the process instance, including state from the parent process(es) of the current process. In the case of a called process that spawns a new process instance, only the spawned process instance is saved.

Recovering After a Crash

If a process engine crashes, all process instances can be recovered up to the point of their last checkpoint. You must be careful with certain types of process starters or incoming events when placing your checkpoint in a process definition.

For example, if the process starter is waiting for an incoming HTTP request, and a checkpoint is taken after the process starts but before the response to the request is sent, the process cannot respond to the request when the process instance is restarted. The socket for the HTTP request is closed when the process engine crashes, therefore the Send HTTP Response activity in the restarted process returns an error. In this case, place the response activity before the checkpoint so that any response is sent before a checkpoint is taken.

There are other examples of situations where an incoming event must be handled before the checkpoint is taken. The following lists some of these circumstances:

- An email message is received, then deleted from the email server.
- An HTTP request is received.

You should exercise care in placing checkpoints in your process definitions. Make certain that the process has all of the data required to continue at the time of the checkpoint so that in the event of a failure, a restarted process does not attempt to access resources that no longer exist.



By default, checkpointed process instances are restarted when the engine restarts. If the engine encounters errors during startup, the restarted process instances continue to be processed and may eventually be lost depending upon the type of error at startup. You can specify to shut down the process engine if any errors are encountered during startup so that checkpointed jobs are not lost in the event of an error. The custom engine property named `Engine.ShutdownOnStartupError` controls this behavior. By default, the value of the property is `false`. Setting the property to `true` shuts the engine down if errors are encountered when the engine starts.

See *TIBCO ActiveMatrix BusinessWorks Administration* for more information about setting custom engine properties.

Checkpoints and the Confirm Activity

In the case of confirmable messages (for example, a confirmable TIBCO Rendezvous or Adapter message is received), you must consider the consequences of performing a checkpoint before or after a [Confirm](#) activity.

If the checkpoint is taken before the Confirm activity, then a crash occurs after a checkpoint but before a confirm, the original message is resent. In this case, the restarted process can no longer send the confirmation. However, a new process is started to handle the resent message, and you can implement your process to handle the restarted and new processes appropriately.

If the checkpoint is taken after a Confirm activity, there is potential for a crash to occur after the Confirm but before the checkpoint. In this case, the message is confirmed and therefore not redelivered. The process instance is not restarted, because the crash occurred before the checkpoint.

You must consider the type of processing your process definition performs to determine when a checkpoint is appropriate if your process definition receives confirmable messages.

Confirm

Activity



The Confirm activity confirms any confirmable messages received by the process instance. For example, if a process is started because of the receipt of an RVCN message, the Confirm activity can send a confirmation message to the publisher of the RVCN message.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the activity in the process definition.
Description	Short description of the activity.
Confirm Event	<p>The message you want to confirm. This is a drop down list of any process starter or activity that expects an incoming event in the current process definition.</p> <p>You can only confirm messages from confirmable message sources, for example, RVCN, RVDQ, or JMS messages. E-mail is also confirmable when received by the Receive Mail process starter (the e-mail message is deleted from the server when it is confirmed). Select only the event that sent the confirmable message.</p> <p>If you select an event from the list that does not correspond to a confirmable message (for example, a Wait for File Change event) or if you try to confirm the same message more than once, no message is confirmed.</p>

See [Checkpoints and the Confirm Activity on page 144](#) for more information about using the Checkpoint and Confirm activities in a process definition.

It is not recommended to use the Confirm Activity with in the Service Resource process as this will unblock the TIBCO ActiveMatrix provider thread. The new message will still flow on that thread eventhough the TIBCO ActiveMatrix BusinessWorks process execution continues for the previous message.

In case of the Service Resource operation process, perform Auto-confirm in case of **clientAck** after the end Activity which would still work even if you are not using Confirm Activity in the Operation Process.

Custom Activity

Resource



Custom Activity

The Custom Activity resource allows you to create an activity that references a process definition. This is useful if you want to develop processes for others to use, but you also want to hide the implementation details of the process from users. The Custom Activity behaves like any other TIBCO ActiveMatrix BusinessWorks activity.

You can also package and distribute custom activities within custom palettes. See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about creating and packaging custom activities.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the custom activity. This name also becomes the default name of the activity when it is dragged and dropped into a process definition.
Description	Short description of the activity.
Select Process	<p>The process definition that contains the implementation of the custom activity. You can only specify process definitions that start with the Start activity. You cannot specify process definitions that use any other process starter.</p> <p>Any resources referenced by the selected process are automatically included in the custom activity. Dynamically called subprocesses are not known at design time, and therefore are not referenced by the process definition. Therefore, dynamically called subprocesses cannot be used by a process definition within a custom activity.</p> <p>Global variables referenced by the resources in the custom activity are added to the <code>\$_globalVariables</code> process variable of the process that uses the custom activity. You should document any required global variables so that users of the custom activity can specify appropriate values for the variables.</p>

Field	Description
Custom Icon File	The icon you want to display for the custom activity.

Engine Command

Activity



Engine Command

The Engine Command activity allows you to retrieve statistics and information about process definitions, process instances, and activities in the currently running process engine. This activity also lets you perform engine maintenance, such as suspending and resuming process instances and shutting down the engine.

This activity uses TIBCO Hawk to perform the desired command. A direct call is made to the TIBCO Hawk AMI method (no message is sent).



Before using this activity, the `Hawk.Enabled` property must be set to either `true` or `local`. Also, some commands require memory and processor overhead for gathering statistics or for getting information on the current state of the process. Because of the performance implications, certain instrumentation is disabled by default. You can enable instrumentation for a specific process or for all processes with the `Instrumentation` property.

See *TIBCO ActiveMatrix BusinessWorks Administration* for more information about setting custom engine properties.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Command to Execute	No	The command to execute. See Commands on page 151 for more information about the commands and their input and output.

Field	Global Var?	Description
Process Definition Name	No	<p>Certain commands accept a process definition name. This field allows you to specify the process definition name that applies to the selected command. This field only appears when the one of the following commands is selected in the Command to Execute field:</p> <ul style="list-style-type: none">• GetActivityStats• GetProcessInstanceInfo• ResumeProcessStarter• SuspendProcessStarter

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
<commandInput>	varies	The input for this activity varies depending upon the command selected in the Command to Execute field on the Configuration tab. See Commands on page 151 for more information about the input for each command.

Output

The output for the activity is the following.

Output Item	Datatype	Description
<commandOutput>	varies	The output for this activity varies depending upon the command selected in the Command to Execute field on the Configuration tab. See Commands on page 151 for more information about the output for each command.

Commands

The following are the commands that can be executed by this activity and the corresponding input and output for each command.

GetActivityStats

Retrieves information about the activities that have been executed for a given process definition since the engine was started. The activity information is cumulative. A single activity name represents all executions of that activity.

The ExecutionTime computation for the Call Process Activity includes the sum of the execution times for all activities in the called process, not just the execution time for the call process activity itself.

Input Item	Datatype	Description
ProcessDefinitionName	String	Name of the process definition. Specifying a value for this element overrides the process definition specified on the Configuration tab.

Output Item	Datatype	Description
ProcessDefinitionName	String	Name of the process definition.
ActivityName	String	Name of the activity.
ActivityClass	String	Name of the class that implements the activity.
ExecutionCount	integer	Number of times the activity has been executed.
ElapsedTime	integer	Total clock time (in milliseconds) used by all executions of this activity. This includes waiting time for Sleep, Call Process, and Wait For... activities.
ExecutionTime	integer	Total clock time (in milliseconds) used by all executions of this activity. This does not include waiting time for Sleep, Call Process, and Wait For... activities.

Output Item	Datatype	Description
ErrorCount	integer	Total number of executions of the activity that have returned an error.
LastReturnCode	String	Status code returned by most recent execution of this activity. This can be either OK, DEAD, or ERROR.
TracingEnabled	boolean	True if tracing is enabled for this activity, false if tracing is disabled.
MinElapsedTime	integer	Elapsed clock time (in milliseconds) of the activity execution that has completed in the shortest amount of elapsed time.
MaxElapsedTime	integer	Elapsed clock time (in milliseconds) of the activity execution that has completed in the longest amount of elapsed time.
MinExecutionTime	integer	Execution time (in milliseconds) of the activity execution that has completed in the shortest amount of execution time.
MaxExecutionTime	integer	Execution time (in milliseconds) of the activity execution that has completed in the longest amount of execution time.
MostRecentElapsedTime	integer	Elapsed clock time (in milliseconds) of the most recently completed activity execution.
MostRecentExecutionTime	integer	Execution time (in milliseconds) of the most recently completed activity execution.
TimeSinceLastUpdate	integer	Time (in milliseconds) since the statistics have been updated.
ExecutionCountSinceReset	integer	A comma-separated list of names of process definitions called by this activity.

Output Item	Datatype	Description
CalledProcessDefs	String	Number of activity executions that have completed since the last reset of the statistics.

GetProcessDefinitionStats

Retrieves information about process definitions. I

Output Item	Datatype	Description
ProcessDefinitionName	String	Name of the process definition.
ProcessStarterName	String	Name of the process starter for the process.
NumberCreated	integer	Number of process instances created for this process definition.
NumberSuspended	integer	Number of times process instances have been suspended.
NumberSwappedToDisk	integer	Number of times process instances have been swapped to disk.
NumberQueued	integer	Number of times process instances have been queued for execution.
NumberAborted	integer	Number of times process instances have been aborted.
NumberCompleted	integer	Number of process instances that have been successfully completed.
NumberCheckpointed	integer	Number of times process instances have executed a checkpoint.
TotalExecutionTime	integer	Total execution time (in milliseconds) for all successfully completed process instances.

Output Item	Datatype	Description
AverageExecutionTime	integer	Average execution time (in milliseconds) for all successfully completed process instances.
TotalElapsedTime	integer	Total elapsed time (in milliseconds) for all successfully completed process instances.
AverageElapsedTime	integer	Average elapsed clock time (in milliseconds) for all successfully completed process instances.
MinElapsedTime	integer	Elapsed clock time (in milliseconds) of the process instance that has completed in the shortest amount of elapsed time.
MaxElapsedTime	integer	Elapsed clock time (in milliseconds) of the process instance that has completed in the longest amount of elapsed time.
MinExecutionTime	integer	Execution time (in milliseconds) of the process instance that has completed in the shortest amount of execution time.
MaxExecutionTime	integer	Execution time (in milliseconds) of the process instance that has completed in the longest amount of execution time.
MostRecentExecutionTime	integer	Execution time (in milliseconds) of the most recently completed process instance.
MostRecentElapsedTime	integer	Elapsed clock time (in milliseconds) of the most recently completed process instance.

Output Item	Datatype	Description
TimeSinceLastUpdate	integer	Time (in milliseconds) since the statistics have been updated.
NumberCompletedSinceReset	integer	Number of process instances that have completed since the last reset of the statistics.

GetProcessInstanceExceptions

Retrieves error information reported by the specified process.

Input Item	Datatype	Description
ProcessId	integer	ID for the process instance. If not specified, or if 0 is specified, exceptions for all process instances are returned.

Output Item	Datatype	Description
ExceptionSequenceNumber	integer	Sequence number of the exception, with the most recent exception first.
ProcessId	integer	ID for the process instance.
ExceptionMessage	String	Exception message.
StackTrace	String	Exception stack trace.
ExceptionClass	String	Exception class name.

Output Item	Datatype	Description
ProcessStack	String	Process stack at exception. This displays the [ProcessName/GroupName/ActivityName] of the activity issuing the exception. If the activity is in a called sub-process, then the calling activity's process stack plus a '>' separator character will be pre-pended to the normal information to produce the process stack of the activity issuing the exception.
TrackingID	integer	Tracking ID for the process instance.
ProcessDefinitionName	String	Name of the process definition.
State	String	State of the process.

GetProcessInstanceInfo

The values of the input elements for this command specify for which process instances you want to retrieve information. If you specify more than one input element, the values are treated as an AND condition. For example, If you specify the process definition name and the minimum duration, information for process instances for the specified process definition that meet the minimum duration time will be returned.

Input Item	Datatype	Description
ProcessId	integer	ID for the process instance.
ProcessDefinitionName	String	Name of the process definition used by the process instance. Specifying a value for this element overrides the process definition specified on the Configuration tab.
MinimumDuration	integer	Minimum time (in milliseconds) in elapsed clock time since the process instance started. All process instances with greater elapsed times will be retrieved.

Output Item	Datatype	Description
ProcessId	integer	ID for the process instance.
ProcessInstanceName	String	Name of the process definition used by the process instance.
TrackingId	String	Tracking ID for the process instance.
CustomId	String	Custom ID for the process instance.
Status	String	Status of the process.
StartTime	integer	Time (in milliseconds) when the process instance started.
ElapsedTimeSinceStarted	integer	Elapsed clock time (in milliseconds) since the process instance started.
MainProcessName	String	Name of the main process definition.

Output Item	Datatype	Description
CurrentActivityName	String	Name of the currently executing activity in the process instance.
ProcessStarterName	String	Name of the process starter that started this process instance.
SubProcessName	String	Name of the process definition for the sub-process.

GetProcessStarterStats

Retrieves information about either active or inactive process starters. The information is cumulative. A single process starter name represents all executions of that process starter.

Output Item	Datatype	Description
ProcessDefinitionName	String	Name of the process definition.
ProcessStarterName	String	Name of the process starter.
Status	String	Status of the process starter. The status can be INACTIVE, ACTIVE, or READY.
TotalNumberCreated	integer	Number of process instances created by this process starter.
NumberCreatedPerHour	integer	Number of process instances per hour created by this process starter.
NumberRunning	integer	Number of process instances currently executing.
NumberCompleted	integer	Number of process instances that have completed.
StartTime	String	Time (in milliseconds) at which the process starter was started.
ElapsedTimeSinceStarted	integer	Elapsed clock time since the process starter was started.

Output Item	Datatype	Description
RestartedFromCheckpoint	boolean	True if the process was restarted from a checkpoint.
TracingEnabled	boolean	True if tracing is enabled for this process starter, false if tracing is disabled.

GetRecoverableProcesses

Retrieves the process instances that can be recovered. See *TIBCO ActiveMatrix BusinessWorks Administration* for more information about recoverable process instances. Use the returned process ID in the RestartRecoverableProcess or RemoveRecoverableProcess commands.

Output Item	Datatype	Description
ProcessId	integer	Process ID of the process instance that can be restarted.
Status	string	Status of the process instance. Can be one of the following: <ul style="list-style-type: none"> faulted — this status occurs when the process instance is terminated due to an unhandled exception. interrupted — this status occurs when the process instance is terminated due to engine failure (and the instance did not automatically restart when the engine restarted) or a manual termination.
TrackingId	string	Tracking ID for the process instance.
CustomId	string	Custom ID for the process instance.
ProcessDefinitionName	string	Process definition name for this process instance.

Output Item	Datatype	Description
RestartActivityName	string	Name of the last executed Checkpoint activity in the process instance. This is the point at which the process instance will begin executing when it is restarted.

KillProcessInstance

Kills the specified process instance. The process instance is stopped immediately and permanently removed from the engine.

Input Item	Datatype	Description
ProcessId	integer	Process ID of the process instance you want to kill.

ListAllRoles

Returns a list of all roles, along with the current state (enabled or disabled) of each role.

Output Item	Datatype	Description
Role	string	Name of the role.
Enabled	boolean	True if the role is enabled, false if the role is disabled.

ListUserRoles

Returns a list of all user roles, along with the current state (enabled or disabled) of each role.

Output Item	Datatype	Description
Role	string	Name of the role.
Enabled	boolean	True if the role is enabled, false if the role is disabled.

RemoveRecoverableProcess

Removes the specified recoverable process instance from the list of potential recoverable processes. After executing this command, the checkpoint data of the specified process instance is removed and the process instance will no longer be able to be recovered. Obtain the process ID of the recoverable process with [GetRecoverableProcesses](#) the command.

Input Item	Datatype	Description
ProcessId	integer	The name or process ID of the process instance you want to remove.

RestartRecoverableProcess

Restarts the specified recoverable process instance. Obtain the process ID of the recoverable process with [GetRecoverableProcesses](#) the command.

Input Item	Datatype	Description
ProcessId	integer	The name or process ID of the process instance you want to restart.

ResumeProcessInstance

Resumes the specified process instance.

Input Item	Datatype	Description
ProcessId	integer	The name or process ID of the process instance you want to resume. You can retrieve the process ID for a process instance by using the GetProcessInstanceInfo command.

ResumeProcessStarter

Resumes the specified process starter.

Input Item	Datatype	Description
ProcessDefinitionName	string	The name of the process definition whose process starter you want to resume. Specifying a value for this element overrides the process definition specified on the Configuration tab.

StartStatsCollector

Enables collection of statistics for each executed activity. See *TIBCO ActiveMatrix BusinessWorks Administration* for more information about collecting activity statistics.

Output Item	Datatype	Description
FileName	string	Name of the file containing the collected data.

StopStatsCollector

Disables collection of statistics for each executed activity. See *TIBCO ActiveMatrix BusinessWorks Administration* for more information about collecting activity statistics.

Shutdown

Shuts down the process engine. If no input is provided, this command shuts down the engine immediately. You can optionally specify an amount of time to delay the shut down of the engine or you can specify that the engine should wait for any checkpointed process instances to complete before shutting down.

Input Item	Datatype	Description
MaxDelayInSeconds	integer	Specifies the amount of time (in seconds) to wait before shutting down the process engine.
WaitForCheckpoints	boolean	When true is specified, the engine waits for any checkpointed process instances to complete before shutting down.

SuspendProcessInstance

Suspends the specified process instance.

Input Item	Datatype	Description
ProcessId	integer	The name or process ID of the process instance to suspend. You can retrieve the process ID for a process instance by using the GetProcessInstanceInfo command.

SuspendProcessStarter

Suspends the specified process starter.

Input Item	Datatype	Description
ProcessDefinitionName	string	The name of the process definition whose process starter you want to suspend. Specifying a value for this element overrides the process definition specified on the Configuration tab.

External Command

Activity



The External Command activity allows you to execute an operating system command. This activity waits for the command to complete before transitioning to the next activity. Optionally, the command output and any errors can be included in this activity’s output schema, written to a file, or both.

Long-Running Commands

If you want to execute long-running commands (such as daemons), it may not be practical to execute the command directly. Because the specified command must terminate before control is passed to the next activity, the process instance must run until the external command completes. To avoid this problem, you may want to create a script that runs the desired commands in the background.

The syntax of executing commands as background processes differs by operating system. For example, on UNIX, to run a command in the background, you append the ampersand character (&) to the command. On Microsoft Windows, you use the START command in a batch file to run a command in a different process.

After creating a script to run commands in the background, specify the script as the command to run in the External Command activity. The script runs the desired command and returns the process ID of the process it started. The return code of the script is stored in the `returnCode` item of the External Command activity’s output.

If you want to start a long-running command in the background and then later terminate the background process, you should store the process ID returned by the script in a file or database table. Another process instance can then read the process ID and kill the process with the appropriate operating system command when necessary.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.

Field	Global Var?	Description
Description	No	Short description of the activity.
Command to Execute	Yes	<p>The command line to execute. You can also specify any input and command-line arguments to the command in this field. You cannot specify more than one command by piping output from one command to another (for example, <code>ls more</code> is not allowed).</p> <p>You can specify a global variable for this configuration field. This allows you to easily specify different commands on different operating systems. For example, you may specify <code>%%EXTERNAL_COMMAND%%</code> as the value for this field. On MS Windows, the value of the global variable may be the following:</p> <pre>cmd /c dir</pre> <p>On UNIX, the global variable may have the following value:</p> <pre>ls</pre> <p>If the command to execute is not located in one of the directories specified in the <code>PATH</code> environment variable (on UNIX or Windows), you can specify the full path for the executable command or you can use the <code>environment</code> input element to specify the environment for the command.</p>
Make Output Available as Activity Output	Yes	<p>When checked, this field specifies that the output sent to standard output and standard error by the command should be available in the output schema of this activity.</p> <p>For commands that produce a large amount of output, it is recommended to uncheck this field and write the output to a file. This saves memory and allows you to use other activities, such as Read File and Parse Data, to handle the output file more efficiently.</p>

Field	Global Var?	Description
Remove Parameter Quotes	Yes	<p>When checked, this field specifies that the quotes surrounding the parameters should be removed. The quotes will be removed even if the parameter contains space(s).</p> <p>By default, the checkbox is not selected.</p>
Output Filename	Yes	<p>Name and location of the file for storing any output or errors produced by the command. If this field is blank, no output file is created.</p>
Output Line Splitting	Yes	<p>Controls whether the command output and errors are split into multiple strings. This field can have the following values:</p> <ul style="list-style-type: none">• None — The activity produces a single string containing the command’s output or errors. Line end characters are included in this string.• At Operating System Line End — The activity produces a repeating string element with one string element per output line. The lines are split by default on the carriage return/line feed character, depending on the operating system. The line end characters are not included in the output.• At Specified Token — The lines are split wherever the specified token occurs. The token is specified as an activity input element, and the token is not included in the output.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
command	string	<p>The command to execute, including any input or command-line arguments. Specifying this input item overrides the command specified on the Configuration tab.</p>
input	string	<p>An input string to supply to the command's standard input. This schema item accomplishes the same goal as entering the command from a command prompt and then typing in input without specifying a carriage return.</p> <p>For example, on UNIX, typing <code>sed</code> into a command prompt allows you to enter more text as input into the <code>sed</code> command.</p> <p>Use <code>&crLf;</code> in the string for this item to specify a carriage return (that is, <code>&crLf;</code> simulates pressing the Enter key).</p>
environment	string	<p>The environment variable settings used for running the command. This element is specified as a comma-separated list of <code><name>=<value></code> pairs where <code><name></code> is the name of the environment variable and <code><value></code> is the value of the environment variable.</p> <p>If no value is specified for this element, the command is run with the environment variable settings that are specified in the login scripts for the user account used to execute the TIBCO ActiveMatrix BusinessWorks process engine.</p> <p>If a value is specified, the value of this element replaces any environment settings for the user account used to run the TIBCO ActiveMatrix BusinessWorks process engine. That is, the user environment is ignored and this element's value is used instead.</p>

Input Item	Datatype	Description
workingDirectory	string	<p>The working directory for the command process.</p> <p>If workingDirectory is not specified, the command process inherits its working directory from the process engine.</p>
token	string	<p>Command output can be split into multiple strings based on the token specified in this element. This field is only available when At Specified Token is chosen in the Line Split field on the Configuration tab.</p> <p>The following escape sequences are supported in this element:</p> <ul style="list-style-type: none">• \r — newline carriage return character• \n — newline character• \t — tab character• \\ — backslash character <p>For example, \r\n signifies to split at a carriage return/linefeed, \\ signifies to split when a backslash is encountered.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
returnCode	integer	<p>The numeric return code returned by the command.</p> <p>Typically, a value of 0 in this element signifies the command executed successfully. A non-zero value usually indicates termination of the command due to an error.</p>

Output Item	Datatype	Description
output	string	<p>Any output produced by the command and sent to <code>stdout</code>. This output item is only available if the Make Output Available as Activity Output field is checked on the Configuration tab.</p> <p>This element can be repeating if the Line Split configuration setting causes the command's output to be split into several lines.</p>
error	string	<p>Any errors produced by the command and sent to <code>stderr</code>. This element is only available if the "Make Output Available as Activity Output" field is checked on the Configuration tab.</p> <p>This element can be repeating if the Line Split configuration setting causes the command's errors to be split into several lines.</p>

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
<code>InvalidInputException</code>	There is an error in the activity's configuration or input mapping that is preventing the command from being executed.
<code>CommandExecutionError</code>	The command could not be executed.
<code>FileIOError</code>	<p>There was an error when attempting to write the output to a file.</p> <p>Make sure the user that is running the TIBCO ActiveMatrix BusinessWorks engine has permission to write to the output file.</p>

Generate Error

Activity



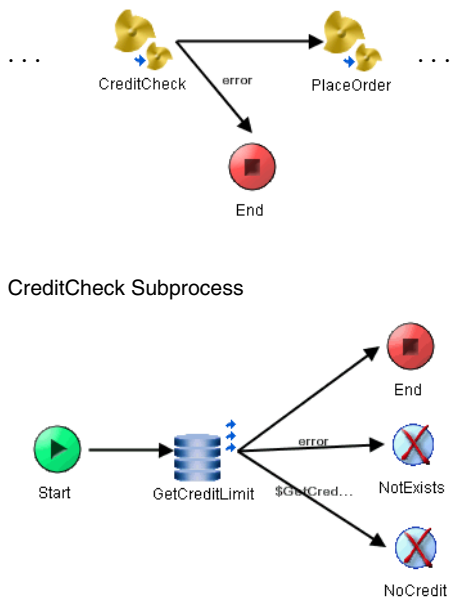
Generate Error

This activity generates an error and causes an immediate transition to any error transitions. If there are no error transitions, the process instance halts execution. This activity is useful in a group or in a called process. If you would like to catch and raise your own error conditions, you can use this activity to do so.

For example, for a process that calls a subprocess to check the credit of a customer, you can use the Generate Error activity to raise an error for any error conditions, such as the customer does not exist, or the customer has no credit available. In the called subprocess, create a transition to the Generate Error activity after detecting the error condition and the called process terminates. Processing continues with an error in the calling process. An error transition on the Call Process activity can handle the error.

Figure 9 illustrates the example described above.

Figure 9 Using the Generate Error activity



See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about handling errors in process definitions.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the activity in the process definition.
Description	Short description of the activity.
Select Error Schema	<p>The process error schema to send to the parent process. - Default - specifies that the error should be propagated only in the <code>\$_error</code> process variable.</p> <p>Process error schemas are defined on the Error Schemas tab of the End activity for the process. The schema specified in this field is added to the Input schema for this activity. Data mapped to the error schema is propagated to the parent process.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about specifying process error schemas.</p>

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
message	string	The text of the error message to generate.
messageCode	string	The error code of the error. This is used as an identifier for the error so that applications can test for the error.
data	complex	The schema specified in the Select Error Schema field of the Configuration tab is contained in this input item. Map data from the list of process variables to this input item to propagate the data to the parent process.

Output

This activity produces no output.

Get Shared Variable

Activity



The Get Shared Variable activity retrieves the current value of a [Shared Variable](#) or [Job Shared Variable](#) resource. If you are using this activity to retrieve the value of a Shared Variable resource, you may want to use a critical section group to ensure that no other process instances are altering the value of the shared variable at the same time.

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about shared variables and critical section groups.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Variable Configuration	No	The Shared Variable or Job Shared Variable whose value you would like to retrieve.

Output

The output for the activity is the following.

Output Item	Datatype	Description
<schema>	varies	The value of the shared variable specified in the Variable Configuration field of the Configuration tab is the output for this activity. The schema for the output is determined by the schema specified for the shared variable.

Inspector

Activity



The Inspector activity is used to write the output of any or all activities and process variables to a file and/or `stdout`. This is particularly useful when debugging process definitions and you want to see the entire schema instead of mapping specific elements to the Write File activity.

You can use the inspector activity to write the output of any activity or process variable in the current process. Activities and process variables in a subprocess are not available to the Inspector activity (but the output of a Call Process activity can be written using the Inspector activity). If you want to obtain the output from one or more activities or process variables in a subprocess, place the Inspector activity in the process definition of the subprocess.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the activity in the process definition.
Description	Short description of the activity.
Stdout	Specifies whether the output of this activity should be sent to <code>stdout</code> . When checked, the output is sent to <code>stdout</code> , when unchecked, the output is not sent to <code>stdout</code> .
Activity	<p>The output of the process variable you want to output. This is a drop down list of the available items to output.</p> <p>You can select All to output all available output. You can also select global variables, process context, error variables, or user-defined process variables to output. Only activities that have output and are executed prior to the Inspector activity are shown in the drop down list.</p>

Field	Description
Append to File	When checked, specifies that the output should be appended to the file specified in this activity's input. If unchecked, any file that exists with the specified name is overwritten.
Suppress Job Headers	When checked, this suppresses the output of header information, such as the process instance ID and the timestamp. If unchecked, header information for the current process instance is written before the output of the activity or process variable.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
fileName	string	The absolute path to the file you want to write. This file will contain the output of the specified activity or process variable.

Output

The output for the activity is the following.

Output Item	Datatype	Description
output	string	The output of the process variable or activity specified on the Configuration tab in string form. This can be used if you want to use this output in subsequent activities, in addition to writing the output to a file or <code>stdout</code> . For example, you can use this output as the body of a TIBCO Rendezvous message.

JNDI Configuration

Shared Configuration



The JNDI Configuration shared configuration resource provides a way to specify JNDI connection information that can be shared by other resources. This resource can be specified in any resource that permits JNDI connections. For example, [JDBC Connection](#) and [JMS Connection](#) can use JNDI connections.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the resource.
Description	No	Short description of the shared resource.
JNDI Context Factory	No	<p>The initial context factory class for accessing JNDI. (<code>javax.naming.Context.INITIAL_CONTEXT_FACTORY</code>). You can choose from the drop down list of supported classes.</p> <p>See IBM WebSphere and JNDI Context Caching on page 178 for more information when using IBM WebSphere.</p> <p>Note: TIBCO ActiveMatrix BusinessWorks attempts to find the class. However, you may need to add the JAR file supplied by your JNDI service provider to the CLASSPATH environment variable to use JNDI.</p>
JNDI Context URL	Yes	<p>The URL to the JNDI service provider (<code>javax.naming.Context.PROVIDER_URL</code>). An example URL is provided when one of the supported JNDI context factory classes is selected.</p> <p>See your JNDI provider documentation for the syntax of the URL.</p>
JNDI User Name	Yes	User name for logging into the JNDI server (<code>javax.naming.Context.SECURITY_PRINCIPAL</code>). If the JNDI provider does not require access control, this field can be empty.

Field	Global Var?	Description
JNDI Password	Yes	Password for logging into the JNDI server (<code>javax.naming.Context.SECURITY_CREDENTIALS</code>). If the JNDI provider does not require access control, this field can be empty.

Test Configuration Button

The Test Configuration button allows you to test that the specified configuration fields result in a valid connection to a JNDI server.

Advanced

The Advanced tab has the following fields.

Field	Global Var?	Description
Validate JNDI Security Context	No	<p>Some application servers store the security context on the thread used to establish the JNDI connection (at the time of this release, only the WebLogic application server does this). In that case, the first activity to use this resource establishes the security context, then subsequent activities use the same security context, unless this field is checked. Checking this field ensures that each activity that uses this resource examines the security context to determine if the activity uses the same security context as the security context established on the thread. If they are different, the activity's configured security context is used.</p> <p>Checking this field causes additional overhead for activities that use this resource. Therefore, only check this field when necessary.</p>

Field	Global Var?	Description
Optional JNDI Properties	No	The table in this field contains optional properties to pass to the JNDI server. Use the +, X, and arrow keys to add, delete, and move properties in the list. Each property requires the property name, the datatype for the property, and the value for the property. See the documentation for your JNDI provider for more information about properties that can be passed to the JNDI server.

IBM WebSphere and JNDI Context Caching

The IBM WebSphere application server provides a mechanism for caching the JNDI context object to improve the performance of JNDI lookup operations. TIBCO ActiveMatrix BusinessWorks also caches the JNDI context object when resources such as EJB activities, JMS activities, JDBC activities, or JTA UserTransactions use JNDI. BusinessWorks performs best when using its own caching mechanism. Therefore, you must disable the IBM WebSphere caching mechanism when using IBM WebSphere with BusinessWorks. See the IBM WebSphere documentation for a complete description of its caching features.

You can disable the IBM WebSphere JNDI context caching feature by performing the following procedure:

1. Configure a JNDI Configuration resource.
2. On the Advanced tab, click the + button next to the table in the Optional JNDI Properties field to add a property.
3. In the Name field of the property, enter `com.ibm.websphere.naming.jndicache.cacheobject`.
4. Leave the Type field as the default value of `string`.
5. In the Value field, enter `none`.
6. Click **Apply** to accept the changes.
7. Use the JNDI Configuration resource in an EJB Connection, JMS Connection, or JTA UserTransaction shared configuration resource.

Job Shared Variable

Shared Configuration



A Job Shared Variable shared configuration resource allows you to store data for use by each process instance. A copy of the variable is created for each new process instance. This resource is useful for passing data to and from sub-processes without creating an input or output schema for the called process.

You can use the [Get Shared Variable](#) and [Set Shared Variable](#) activities to access the data instead of mapping data to a called processes input or output schemas. New process instances receive a copy of the variable, so data cannot be shared across process instances. Therefore, if a called process has the Spawn configuration field checked, a new process instance is created and the process instance receives a new copy of the job shared variable.

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about shared variables.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the resource.
Description	No	Short description of the shared resource.

Schema

The Schema tab allows you to define a custom schema to hold the data of the variable. You can define your own datatype on this tab, and you can reference XML schema stored in the project. See [Appendix A, Specifying Data Schema, on page 743](#) for a description of how to define a schema.

Initial Value

The Initial Value tab allows you to specify an initial value for the variable. You can choose one of the following:

- None — specifies that no initial value is set for the shared variable. You must use the [Set Shared Variable](#) activity to set a value before you can read the value of the variable with the [Get Shared Variable](#) activity.
- Select Value — causes the Select Value field to appear. This field allows you to choose a stored XML Instance resource containing data that matches the schema specified on the Schema tab.
- Build Value — causes the Build Value field to appear. The Edit button brings up a smaller version of the XML Instance configuration. In this dialog you can construct an XML document that contains the initial value of the shared variable.

See *TIBCO Designer Palette Reference* for more information on creating XML Instance resources.

Label

Graphic Tool



Label

The Label resource allows you to create a generic label so that you can provide documentation and comments in your process definition. The Label is not an activity, because you cannot draw transitions to or from it, and it does not perform any action. You use the label to create a descriptive tag that you can place anywhere in a process definition.

Labels can also be resized to cover an area. You can apply a border to the area by selecting a value in the Border Type and Border Thickness fields. You can also apply a background color to the area by selecting a color in the Background color field. This allows you to annotate your process definition and provide colors and borders to visually group related activities in your process definition.

The text of the label remains in the top left of the label area, but you can edit the text either in the design panel or by editing the Description field.

Configuration

The Configuration tab has the following fields.

Field	Description
Description	Descriptive text that you would like to add to the label. You can add comments here about the process diagram. Use this field to provide documentation for the process.
Label Color	Allows you to pick a color for the text and border of the label. Use the Chose Color button to bring up a dialog to select a color.
Label Font	Allows you to pick a font for the text of the label. Use the Choose Font button to bring up the Font Panel dialog.
Background Color	Allows you to pick a background color for the area the label covers. Use the Chose Color button to bring up a dialog to select a color.
Border Type	Allows you to select the type of border (either a dashed line or a solid line) for the label.
Border Thickness	Allows you to specify the thickness of the border line. 0 indicates no border.

Field	Description
Gradient Background Color	<p>Specifies whether the background color changes from lighter to darker. When this checkbox is unchecked, the background is a solid color.</p> <p>The following illustrates the difference between a gradient and solid background color. The top label uses a gradient background color and the bottom label uses a solid background color.</p> <div><div>Label</div><div>Label</div></div> <p>By default, the background color is gradient.</p>

Lock Object

Shared Configuration



Lock Object shared configuration resources are used by Critical Section groups to ensure that only one process instance executes the activities in a critical section group at a time.

The Lock Object resource can be used to synchronize process instances from more than one process definition in the same process engine, or it can be used to synchronize process instances across multiple process engines.

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about Critical Section groups and Lock Object resources.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the resource.
Description	No	Short description of the shared resource.
Multi-Engine	Yes	<p>When checked, this field specifies the resource will be used to synchronize process instances across more than one process engine. If you are using this resource to synchronize shared variable access, make sure that the Lock Object and Shared Variable resources have the same setting for this field.</p> <p>When synchronization is performed across process engines, a database transaction is performed to ensure proper execution order. Therefore, you must configure your process engine to use a database for storage, if you want to synchronize Critical Section groups across process engines. See <i>TIBCO ActiveMatrix BusinessWorks Administration</i> for more information about specifying a database for storing process engine information.</p>

Mapper

Activity



The Mapper activity adds a new process variable to the process definition. This variable can be a simple datatype, a TIBCO ActiveEnterprise schema, an XML schema, or a complex structure. You can map data values from the current list of process variables to the elements of the variable added with the Mapper activity.

Input Editor

The Input Editor tab defines the structure of the process variable to add to the process definition.

You can use a simple datatype, or you can define a group of data elements on this tab. You can also reference XML schema or ActiveEnterprise classes stored in the project. Once defined, the data specified on the Input Editor tab becomes the input and output schema of the Mapper activity. This data then becomes available to other activities in the process definition.

See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Input Editor tab.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is defined by the specified data elements on the Input Editor tab.

Output

The output for the activity is defined by the specified data elements on the Input Editor tab.

Notify

Activity



The Notify activity allows a process instance to send data to a corresponding process instance containing a [Wait](#) activity or [Receive Notification](#) process starter. The Notify Configuration resource specified on the Configuration tab and the key specified on the Input tab create the relationship between the Notify activity and the corresponding Wait or Receive Notification. The data specified in the Notify's input is sent to the Wait or Receive Notification that specifies the same Notify Configuration resource and has the same value for the key.

The Wait, Receive Notification, and Notify activities allow running process instances to communicate. See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information on inter-process communication.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the activity in the process definition.
Description	Short description of the activity.
Shared Configuration	<p>The Notify Configuration shared configuration resource that defines a data schema for this activity. See Notify Configuration on page 187 for more information.</p> <p>The Notify Configuration resource is required, but the schema can be empty if you do not want to pass data between processes.</p>

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
key	string	<p>The key that coordinates a Notify activity with the corresponding Wait or Receive Notification. For example, in an order handling process, the order ID might be the key that Wait and Notify use to determine which Wait activity corresponds to the Notify activity.</p> <p>The key can be an XPath expression, but it must evaluate to a string.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information and examples of choosing the key for Wait, Notify, and Receive Notification.</p>
timeout	integer	<p>The timeout (number of milliseconds) to keep the information for this Notify activity. The activity executes immediately and transitions to the next activity, but the Notify information is kept by the engine until a corresponding Receive Notification or Wait occurs. If the corresponding activity does not occur before this timeout is reached, the Notify information is removed.</p>
schema	complex	<p>The schema specified by the Shared Configuration on the Configuration tab. This schema is used to pass data from the process instance into the process instance containing a corresponding Receive Notification or Wait.</p>

Output

This activity produces no output.

Notify Configuration

Shared Configuration



The Notify Configuration resource specifies a schema to use for passing data between executing process instances. Corresponding [Receive Notification](#), [Notify](#), and [Wait](#) activities use the same Notify Configuration resource to define the data for inter-process communication. The schema can be empty, if you do not want to pass data between processes. See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about inter-process communication.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the resource.
Description	Short description of the shared resource.
Local Only	When checked, this field specifies that the notification will be performed in memory only. When unchecked, a database is used to perform the notification.

Data

The Data tab allows you to define a custom schema. The schema can be empty, if you do not want to pass data between processes.

You can define your own datatype on this tab, and you can reference XML schema or ActiveEnterprise classes stored in the project. Once defined, the data specified on the Data tab appears on the Input or Output tab of the [Receive Notification](#), [Wait](#), or [Notify](#) activity where this shared configuration resource is used.

See [Appendix A, Specifying Data Schema, on page 743](#) for a description of how to define a schema.

Null

Activity



The Null activity is an activity with no action performed. This activity has a name and a description specified on the Configuration tab, but there is no input or output for the activity.

This activity is useful if you want to join multiple process flows. That is, when you have multiple transitions out of an activity and each transition takes a different path in the process definition, you can create a transition from the activity at the end of each path to a Null activity to resume a single flow of execution in the process.

On Event Timeout

Process Starter



The On Event Timeout process starter specifies a process to execute when a Wait For ... activity discards an incoming event due to a timeout. A Wait For ... activity's event timeout is specified by the Event Timeout field on the Event tab of the activity.

The default behavior for an event timeout is to confirm and then discard the event. You can override the default behavior by creating a process definition using the On Event Timeout process starter.

You can specify an On Event Timeout process definition for a specific event source (that is, a specific Wait For... activity). You can specify one or more On Event Timeout process definitions for specific event sources, but you should not create more than one process definition for the same event source. Once a Wait For... activity experiences a timeout, that timeout can only apply to one On Event Timeout process definition.

You can also specify that an On Event Timeout process definition applies to any event source that experiences a timeout. If there is no On Event Timeout specified for a particular event source, the process engine calls the On Event Timeout process definition whose Any Event Source field is checked.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the resource.
Description	Short description of the process starter.
Any Event Source	Specifies that this process starter should execute when any event source experiences an event timeout, and there is no On Event Timeout process definition specified for the event source.

Field	Description
Event Source	<p>Only appears when the Any Event Source field is unchecked. This field allows you to specify for which event source this process should execute when there is an event timeout.</p> <p>Only one On Event Timeout process definition can correspond to any event timeout. That is, you cannot create multiple process definitions and use the same Wait For ... activity the Event Source field.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
originatingProcess	string	The name of the process definition containing the activity that had the event timeout.
originatingActivity	string	The name of the activity that had an event timeout.
<event>	complex	The schema of the discarded event. If the Any Event Source field is checked on the Configuration tab, this appears as an element of type any. If a specific activity is supplied in the Event Source field, the output schema of that activity is provided.

On Notification Timeout

Process Starter



The On Notification Timeout process starter specifies a process to execute when a timeout is reached for storing notification data for a [Notify](#) activity. See [Notify on page 185](#) for more information about the Notify activity and how to specify a timeout for storing notification information.

You can specify an On Notify Timeout process definition for a specific Notify Configuration. The process definition with the On Notification Timeout process starter executes when a Notify activity with a matching Notify Configuration experiences a timeout. You can specify one or more On Notify Timeout process definitions for specific Notify Configurations, but you should not create more than one process definition for the same Notify Configuration. Once a Notify activity experiences a timeout of its stored notification information, that timeout can only apply to one On Notification Timeout process definition.

You can also specify that an On Notification Timeout process definition applies to any Notify activity that experiences a timeout. If there is no On Notification Timeout specified for the Notify Configuration of the Notify activity, the process engine calls the On Notification Timeout process definition that has the Any Notify Config field checked.



Notify timeouts cause the notify information to be marked for removal, but the information is removed at regular intervals. The default interval for checking Notify timeouts is 60 seconds, and therefore, the OnNotificationTimeout process starter only starts processes after each interval. If you want to reduce the interval, you can do so by altering the `Engine.WaitNotify.SweepInterval` custom engine property to the desired number of seconds. However, as you decrease the number of seconds in the interval you will incur further engine overhead.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the resource.
Description	Short description of the process starter.

Field	Description
Any Notify Config	<p>Specifies that this process starter should execute when any Notify activity experiences a timeout, and there is no On Notify Timeout process definition specified for the Notify Configuration for the activity.</p> <p>When this field is checked, the Notify Configuration field becomes disabled. Uncheck this field when you want to specify a process definition for a specific Notify Configuration.</p>
Notify Configuration	<p>Only appears when the Any Notify Config field is unchecked. This field allows you to specify the Notify Configuration that this process applies to. Only timeouts for Notify activities with a matching Notify Configuration will start a process instance.</p> <p>Only one On Notification Timeout process definition can correspond to any Notify Configuration. That is, you cannot create multiple process definitions and use the same Notify Configuration.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
notificationData	Object	This element contains the schema specified in the Notify Configuration of the Notify activity that has timed out.

On Shutdown

Process Starter



The On Shutdown process starter specifies a process to execute when the process engine shuts down, after all process instances are executed.

The On Shutdown process starter can be useful for specifying any post-processing that must be done before shutting down the engine. For example, your application may back up a database table then purge the data. Also, you may want to send email to administrators notifying them that the process engine is shutting down.

Typically, you create one process definition that uses the On Shutdown process starter and place all post-processing activities into that process definition. However, you can have more than one process definition that uses the On Shutdown process starter. All process definitions with the On Shutdown process starter execute in no specific order when the process engine shuts down.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the resource.
Description	Short description of the process starter.

On Startup

Process Starter



The On Startup process starter specifies a process to execute when the process engine starts, before any incoming events are processed. In the event that the process engine is restarting and attempting to recover checkpointed process instances, the On Startup process definition must complete its execution before any recovered process instances execute.

The On Startup process starter can be useful to specify any pre-processing that must be done before regular processing starts. For example, your application may check that the required database tables exist and create them necessary. Also, you may want to send email to administrators notifying them that the process engine is starting.

Typically, you create one process definition that uses the On Startup process starter and place all pre-processing activities into that process definition. However, you can have more than one process definition that uses the On Startup process starter. All process definitions with the On Startup process starter execute in no specific order when the process engine starts.



All On Startup process definitions must complete successfully before normal processing can begin.

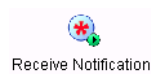
Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the resource.
Description	Short description of the process starter.

Receive Notification

Activity



The Receive Notification process starter starts a process when another process executes a [Notify](#) activity with a matching key and Notify Configuration resource. The key specified in the Key field of the Configuration tab creates a relationship between the Receive Notification process starter and the corresponding Notify activity.

The same Notify Configuration shared configuration resource must be specified by corresponding Receive Notification and Notify activities so that data can be passed from the process containing the Notify activity to the process started with Receive Notification. The schema in the Notify Configuration resource can be empty, if you do not want to pass data between processes.

The Wait, Receive Notification, and Notify activities allow running process instances to communicate. See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information on inter-process communication.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the activity in the process definition.
Description	Short description of the activity.
Shared Configuration	<p>The Notify Configuration shared configuration resource that defines a data schema for this activity. See Notify Configuration on page 187 for more information.</p> <p>The Notify Configuration resource is required, but the schema can be empty if you do not want to pass data between processes.</p>

Field	Description
Key	<p>The key that coordinates a Receive Notification process starter with the corresponding Notify activity. For example, in an order handling process, the order ID might be the key that Receive Notification uses to determine which Notify activity corresponds to this process starter.</p> <p>The key must be a fixed string. You may use global variables, but XPath expressions cannot be used.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information and examples of choosing the key for Wait, Notify, and Receive Notification.</p>

Misc

The Misc tab contains the following fields:

Field	Description
Sequencing Key	<p>This field can contain an XPath expression that specifies which processes should run in order. Process instances with sequencing keys that evaluate to the same value will be executed sequentially in the order the process instance was created.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about controlling the execution order of process instances and about XPath expressions.</p>
Custom Id	<p>This field can contain an XPath expression that specifies a custom ID for the process instance. This ID is displayed in the View Service dialog of TIBCO Administrator, and it is also available in the <code>\$_processContext</code> process variable.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
schema	complex	The schema specified by the Shared Configuration field on the Configuration tab. This schema is used to pass data from the process instance containing the Notify activity into this process instance.

Rethrow

Activity



The Rethrow activity throws the exception caught by the [Catch](#) activity again. Use this activity when you want to propagate the exception to the next level. See the description of error handling in *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about using the Rethrow activity.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the activity in the process definition.
Description	Short description of the activity.

Input

This activity has no Input.

Output

This activity has no Output.

Set Shared Variable

Activity



The Set Shared Variable activity allows you to change the value of a shared variable. If you are using this activity to set the value of a Shared Variable resource, you may want to use a critical section group to ensure that no other process instances are altering the value of the shared variable at the same time.

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about shared variables and critical section groups.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Variable Configuration	No	The Shared Variable or Job Shared Variable whose value you would like to change.
Output New Value	No	When checked, the new value of the shared variable is placed into this activity's output. The value is then available to subsequent activities in the process definition. If not checked, this activity has no output.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
<schema>	varies	The schema of the shared variable specified in the Variable Configuration field on the Configuration tab is the input schema for this activity.

Output

The output for the activity is the following.

Output Item	Datatype	Description
<schema> or no output	varies	When the Output New Value field on the Configuration tab is unchecked, this activity has no output. When the field is checked, the new value of the shared variable is output. The schema for the output is determined by the schema specified for the shared variable.

Shared Variable

Shared Configuration



A Shared Variable resource allows you to share data across process instances. All process instances can read and update the data stored in a shared variable.

This resource is useful if you want to marshal data across process instances or if you want to make a common set of information available to all process instances. For example, you may have a set of approval codes for incoming orders that change daily for security purposes. You can create a shared variable to hold the approval codes and create one process definition for setting the codes. You can then retrieve the shared variable in all processes that require the current approval codes.

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about shared variables.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the resource.
Description	No	Short description of the shared resource.
Persistent	Yes	<p>The current value of the shared variable is stored in memory for fast access by process instances. However, if a process engine crashes, the current state of the shared variable may be lost. To preserve the current state of a Shared Variable resource, you can check this field to store the current value of the shared variable in the process engine’s storage location.</p> <p>The current state of the shared variable is only updated in the process engine’s persistent storage when the value of the variable changes.</p>

Field	Global Var?	Description
Multi-Engine	Yes	<p>Checking this field specifies that you want to make the value of a Shared Variable resource available to process instances across multiple process engines.</p> <p>If you choose this option, a database must be used to store process engine data. Also, only engines that are in the same deployment and use the same database to store process information can share variables. See <i>TIBCO ActiveMatrix BusinessWorks Administration</i> for more information on specifying a database for process engine storage during deployment. See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information on specifying a database for process engine storage during testing.</p> <p>Because multiple process engines access the shared variable when this field is checked, the current value of the variable is not stored in memory. Both retrieving the current value of the variable and assigning a new value to the variable requires I/O to the process engine's database storage.</p> <p>If this field is not checked, each process engine operates on its own set of shared variable resources. Process instances on one engine cannot retrieve the value of the shared variable set by a different process engine, when this field is unchecked.</p>

Schema

The Schema tab allows you to define a custom schema to hold the data of the shared variable. You can define your own datatype on this tab, and you can reference an XML schema stored in the project. See [Appendix A, Specifying Data Schema, on page 743](#) for a description of how to define a schema.

Initial Value

The Initial Value tab allows you to specify an initial value for the shared variable. You can choose one of the following:

- None — specifies that no initial value is set for the shared variable. You must use the [Set Shared Variable](#) activity to set a value before you can read the value of the variable with the [Get Shared Variable](#) activity.
- Select Value — causes the Select Value field to appear. This field allows you to choose a stored XML Instance resource containing data that matches the schema specified on the Schema tab.
- Build Value — causes the Build Value field to appear. The Edit button brings up a smaller version of the XML Instance configuration. In this dialog you can construct an XML document that contains the initial value of the shared variable.

See *TIBCO Designer Palette Reference* for more information on creating XML Instance resources.

Sleep

Activity



The Sleep activity suspends the process on the current transition for the given amount of time. If you have multiple control flows in your process, only the current execution branch of the process is suspended.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the activity in the process definition.
Description	Short description of the activity.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
IntervalInMillisec	integer	The amount of time, in milliseconds, to suspend the current branch of the process.

Timer

Process Starter



The Timer process starter starts a process at a specific time. You can also specify that processes are to be started periodically.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Start Time	Yes	<p>The day and time to start the process. If the process is to be run periodically, then the start time indicates the first time to run the process.</p> <p>The local machine's time zone is used to determine when the process should start. If the project is run on machines in different time zones, the time zone of the machine where the project was saved is used. Use a global variable in this field to supply start times relative to the time zone where the project is deployed.</p> <p>If you supply a global variable for this field, the format of the specified time must be the following:</p> <p>yyyy MMM dd HH:mm:ss z</p> <p>For example, "2004 Apr 28 20:35:11 EST". The z at the end of the date format is the name of the time zone. See Time Zone Names on page 372 for a list of time zone names.</p>
Run once	No	Indicates this process should be run only once at the day and time indicated by the Start Time field. If unchecked, the Time Interval and Interval Unit fields appear to allow you to specify the frequency of the process.

Field	Global Var?	Description
Time Interval	Yes	<p>Integer indicating the number of units specified in the Interval Unit field. For example, if a value of 1 is specified and the Interval Unit field is specified as Hour, a new process is started every hour beginning at the time specified in the Start Time field.</p> <p>If a value of 2 is specified and the Interval Unit field is specified as Month, a process is started every other month, beginning at the time specified in the Start Time field.</p> <p>If the value specified is less than one second (1000 milliseconds), the timer ignores the specified interval and is triggered once every second.</p> <p>Note: If you use a global variable for this field, the global variable specifies the time interval in milliseconds and the Interval Unit field is not displayed.</p>
Interval Unit	No	<p>Unit of time to use with the Time Interval field to determine how often to start a new process. The units can be: Millisecond, Second, Minute, Hour, Day, Week, Month, Year.</p>

Misc

The Misc tab contains the following fields:

Field	Description
Sequencing Key	<p>This field can contain an XPath expression that specifies which processes should run in order. Process instances with sequencing keys that evaluate to the same value will be executed sequentially in the order the process instance was created.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about controlling the execution order of process instances and about XPath expressions.</p>

Field	Description
Custom Id	This field can contain an XPath expression that specifies a custom ID for the process instance. This ID is displayed in the View Service dialog of TIBCO Administrator, and it is also available in the <code>\$_processContext</code> process variable.

Output

The output for the activity is the following.

Output Item	Datatype	Description
TimerOutputSchema		The time the process instance started. The time is represented by several items in the output schema indicating the hour, minute, second, and so on. Each item uses the appropriate datatype.

Wait

Activity



The Wait activity suspends execution of the process instance and waits for a Notify activity with a matching key to be executed in another process instance. The key specified in the Notify Configuration resource specified on the Configuration tab and the Key field of the Input tab creates a relationship between the Wait activity and the corresponding Notify activity.

The same Notify Configuration shared configuration resource must be specified by corresponding Wait and Notify activities so that data can be passed from the process instance containing the Notify activity to this process instance. The schema in the Notify Configuration resource can be empty, if you do not want to pass data between processes.

The Wait, Receive Notification, and Notify activities allow running process instances to communicate. See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information on inter-process communication.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the activity in the process definition.
Description	Short description of the activity.
Shared Configuration	<p>The Notify Configuration shared configuration resource that defines a data schema for this activity. See Notify Configuration on page 187 for more information.</p> <p>The Notify Configuration resource is required, but the schema can be empty if you do not want to pass data between processes.</p>

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
key	string	<p>The key that coordinates a Wait activity with the corresponding Notify. For example, in an order handling process, the order ID might be the key that Wait and Notify use to determine which Wait activity corresponds to the Notify activity.</p> <p>The key can be an XPath expression, but it must evaluate to a string.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information and examples of choosing the key for Wait, Notify, and Receive.</p>
timeout	integer	<p>The timeout (number of milliseconds) for this Wait activity. If a Notify activity that has a matching key is not executed in this specified number of seconds, the Wait times out and transitions to the next activity.</p> <p>If no value or if zero is specified in this field, this activity waits indefinitely.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
schema	complex	<p>The schema specified by the Shared Configuration on the Configuration tab. This schema is used to pass data from the process instance containing the Notify into this process instance.</p>

Write To Log

Activity



This activity writes a message to the log. There is one log file for each process engine.

Depending upon whether you are using a process engine in testing mode or a deployed process engine, the logs are stored in different locations. During test mode, the logs are stored in the TIBCO ActiveMatrix BusinessWorks working directory under the logs subdirectory. See *TIBCO Designer User's Guide* for more information about specifying the working directory. For deployed process engines, the log location is specified by custom engine properties. See *TIBCO ActiveMatrix BusinessWorks Administration* for more information about custom engine properties.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the activity in the process definition.
Description	Short description of the activity.
Role	<p>The user-defined role name for this log entry.</p> <p>Roles can be used to filter the log entries when displaying them. For example, if you set the role as Debug, you can choose to view or not view all log entries that have the role set to Debug.</p> <p>You can enable or disable system or user-defined roles using custom engine properties at deployment time. See Custom Properties for the Write To Log Activity on page 211 for more information.</p>
Suppress Job Info	<p>If checked, no additional information is added to the log entry.</p> <p>If unchecked, each log message has the Job number, process definition name, and activity name prepended to the message text.</p>

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
message	string	<p>The message that you would like to appear in the log.</p> <p>Logs are stored in the TIBCO ActiveMatrix BusinessWorks installation directory under the <code>logs</code> subdirectory.</p> <p>Note: When the message contains non-ASCII data, the default encoding of the Java Virtual Machine used by the TIBCO ActiveMatrix BusinessWorks process engine is used to encode the text when writing to the log file.</p>
msgCode	string	The error code of the message. This is used as an identifier for the message so that applications can scan the log for the message.

Output

This activity produces no output.

Custom Properties for the Write To Log Activity

In some situations, you may want to specify which messages are sent to the log file. You can use custom engine properties to specify which roles are enabled or disabled for log messages. You may configure the following properties:

- `Trace.<roleName>.Log` — Setting this property to false disables writing messages for the specified role name to the log.
- `Trace.<roleName>.*` — Setting this property to false disables all messages for the specified role. The specified role can be one of the following system roles: `ERROR`, `WARN`, `DEBUG`, or `INFO`.
- `Trace.Role.<roleName>` — Setting this property to false disables all messages for the specified user-defined role. Setting `Trace.Role.*` to false disables all messages to all user-defined roles.

- `Trace.Role.*` — Setting this property to false disables all messages for all user-defined roles.

You can also specify the character encoding of the log file by using the `log.file.encoding` property.

See *TIBCO ActiveMatrix BusinessWorks Administration* for more information about setting custom engine properties.

OnError

Activity



On
Error

This activity provides error handling mechanism for all the errors that happen outside the job boundaries of all processes associated with the service resource.

You are recommended to create only one process definition with this event source for the whole project. If you create multiple processes, then all of them will be triggered and may not be in sequence.

Whenever an error occurs for messages triggered through Service Resource outside of Job boundaries, the Error handler process gets triggered with the appropriate data.

This error handler process can be used only for Logging purposes. The actual Service MEP will not be affected.



The Error handler handles the failure in Pre-process, Post-process (failure while sending the response), and Fault Sending scenarios. It does not catch the error during the execution process.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the activity in the process definition.
Description	Short description of the activity.

Misc

The Misc tab has the following fields.

Field	Description
Sequencing Key	<p>This field can contain an XPath expression that specifies which processes should run in order. Process instances with sequencing keys that evaluate to the same value will be executed sequentially in the order the process instance was created.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design Guide</i> for more information about controlling the execution order of process instances and about XPath expressions.</p>
Custom ID	<p>This field can contain an XPath expression that specifies a custom ID for the process instance. This ID is displayed in the View Service dialog of TIBCO Administrator, and it is also available in the <code>\$_processContext</code> process variable.</p>

Output

The Output-tab of the onError event source contains the following schema:

- **errorCode** - Contains the error code useful for filtering the errors.
- **errorDesc** - Contains description of errors.
- **errorStack** (optional) - Contains stack of error logs.
- **msgData** - Contains the Soap-Envelope of the message.
- **MessageHeaders** (optional) - Contains either JMS or HTTP transport headers.
This depends on the transport for which the error is captured.
- **mimeEnvelopeElement** (optional) - Contains mime data.

Chapter 6 HTTP Palette

The HTTP palette allows you to send and receive HTTP requests.

Topics

- [HTTP Connection, page 216](#)
- [HTTP Receiver, page 225](#)
- [Proxy Configuration, page 237](#)
- [Send HTTP Request, page 238](#)
- [Send HTTP Response, page 261](#)
- [Wait for HTTP Request, page 268](#)

HTTP Connection

Shared Configuration



HTTP Connection

The HTTP Connection resource describes the characteristics of the connection used to receive incoming HTTP requests. This resource is used when TIBCO ActiveMatrix BusinessWorks expects to receive an HTTP request on a specific port where a process engine is running. For example, the process starters [HTTP Receiver](#) and [SOAP Event Source](#) and the signal-in activity [Wait for HTTP Request](#) receive HTTP requests.



There can be at most one process with an HTTP Receiver or Wait for HTTP Request that uses the same HTTP Connection resource. This restriction allows the HTTP server listening for incoming requests to dispatch the request to the correct process.

There can be more than one SOAP Event Source that uses the same HTTP Connection.

Also, SOAP Event Source and HTTP activities can use the same HTTP Connection resource and the HTTP server correctly dispatches the incoming request to the correct process.

Two types of servers are available for the HTTP Connection resource: Tomcat and HTTPComponent.

Tomcat has a synchronous request response paradigm and can be used in scenarios where high throughput is important. To achieve a good throughput with Tomcat, the `maxprocessor` value should be almost equal to the number of concurrent requests the server can handle. Note that increasing the `maxprocessor` count also increases the memory footprint.

HTTPComponent is a light-weight and scalable server based on NIO which can be useful in scenarios where handling thousands of requests in a resource efficient manner is more important than the throughput. HTTPComponent server gives a consistent throughput for any number of concurrent requests with little or no increase in its worker thread (`maxprocessor` thread).



You can choose the server type at runtime by setting the global property `bw.plugin.http.server.serverType` in the file `bwengine.tra`. Using this property, you can use the HTTPComponent server at run-time for older projects without having to modify the server type at design-time. The value set for this property in the `bwengine.tra` file overrides the value that is set in design-time.

The HTTP Connection resource can specify that the HTTPS (secure sockets layer or SSL) protocol must be used by clients. If this is enabled, you can configure the SSL parameters for the HTTP server using the Configure SSL Button. See [Configure SSL Button on page 219](#) for more information.



If you have multiple HTTP Connection resources specified by multiple HTTP Receiver process starters, the HTTP servers require that all of the connections must be valid to initialize all HTTP Receivers. Therefore, make certain that all HTTP Connection resources have valid configurations before testing or deploying the project.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the resource.
Description	No	Short description of the shared resource.

Field	Global Var?	Description
Host	Yes	<p>Specifies the name of the host that accepts the incoming requests. For machines that have only one network card, the default value <code>localhost</code> specifies the current machine. For machines that have more than one network card, this field specifies the host name of the card that will be used to accept incoming HTTP requests.</p> <p>If there is more than one network card on the machine, and you specify <code>localhost</code> in this field, all network cards on the machine will listen for incoming HTTP requests on the specified port.</p> <p>Note: Only one HTTP server can be started on each port. Therefore, if you have a machine with multiple network cards, make certain that all HTTP Connection resources that use the same host name specify different port numbers.</p> <p>Note: When the hostname is <code>localhost</code>, TIBCO ActiveMatrix BusinessWorks considers the machine as a non multi home environment. Hence it is <i>not required to set</i> the <code>bw.plugin.http.server.defaultHost</code> property in <code>bwengine.tra</code> file.</p> <p>However, when the hostname is anything other than the <code>localhost</code>, then TIBCO Activematrix BusinessWorks considers the machine as a multi home environment. Set the <code>bw.plugin.http.server.defaultHost</code> property in <code>bwengine.tra</code> file to the same value as has been set in the host field of HTTP Shared Connection for default host.</p>
Port	Yes	<p>Port number on which to listen for incoming HTTP requests.</p>

Field	Global Var?	Description
SSL	No	Specifies whether incoming requests must use the HTTPS (secure socket layer or SSL) protocol. This protocol authenticates the server to the client, and optionally authenticates the client to the server. Enabling this field allows you to specify SSL parameters with the Configure SSL button (see Configure SSL Button on page 219).
Server Type	No	Specifies the server type to be used. The drop-down lists the available options: Tomcat and HTTPComponent.

Configure SSL Button

The Configure SSL button allows you to specify the SSL parameters for the HTTP connection. The following are the fields in the SSL Configuration for HTTPS Connections dialog:



The HTTPComponent server type does not support Entrust based SSL. Set property `java.property.TIBCO_SECURITY_VENDOR` to `j2se` in the `bwengine.tra` file for HTTP SSL to work with HTTPComponent server type.

Field	Description
Requires Client Authentication	Checking this field requires clients to present their digital certificate before connecting to the HTTP server. When this field is checked, the Trusted Certificates Folder becomes enabled so that you can specify a location containing the list of trusted certificate authorities.
Trusted Certificates Folder	This field is only applicable when the Requires Client Authentication field is checked. This field specifies a folder in the project containing one or more certificates from trusted certificate authorities. This folder is checked when a client connects to ensure that the client is trusted. This prevents connections from rogue clients.

Field	Description
Identity	<p>This is an Identity resource that contains the HTTP server’s digital certificate and private key.</p> <p>See <i>TIBCO Designer Palette Reference</i> for more information.</p>
Strong Cipher Suites Only	<p>When checked, this field specifies that the minimum strength of the cipher suites used can be specified with the <code>bw.plugin.security.strongcipher.minstrength</code> custom engine property. See <i>TIBCO ActiveMatrix BusinessWorks Administration</i> for more information about this property. The default value of the property disables cipher suites with an effective key length below 128 bits.</p> <p>When this field is unchecked, only cipher suites with an effective key length of up to 128 bits can be used.</p>

Advanced

The Advanced tab has the following fields

Field	Global Var?	Description
Enable DNS Lookups	No	<p>Checking this field enables a Domain Name System (DNS) lookup for HTTP clients so that the IP address is resolved to a DNS name. This can adversely affect throughput. Uncheck this field by default and check this field only when required.</p>
Connection Properties		
maxPostSize	Yes	<p>This property is available when the Server Type Tomcat is selected.</p> <p>Specifies the maximum size in bytes of the POST that the container FORM URL parameter parsing can handle.</p> <p>By default, the value of this field is set to 2M or 2097152 bytes. Setting the value less than or equal to zero disables the limit for maxPostSize.</p>

Field	Global Var?	Description
maxSavePost Size	Yes	<p>This property is available when the Server Type Tomcat is selected.</p> <p>Specifies the maximum size in bytes of the POST that the container can save/buffer during FORM or CLIENT-CERT authentication.</p> <p>During FORM authentication, the request message is saved while the user is redirected to the login page. It is retained until the user authentication succeeds or the session associated with the authentication request expires.</p> <p>During CLIENT-CERT authentication, the request message is buffered for the entire duration of the SSL handshake. Once the request is processed, the buffer is emptied.</p> <p>However, in both the cases the buffering happens before the user is authenticated.</p> <p>By default, the value of this field is set to 4K or 4096 bytes. Setting the value to -1 disables the limit for this field.</p>
URI Encoding	Yes	<p>Specifies the character encoding used to decode the URI bytes.</p> <p>If you do not set any value for uriEncoding, the default encoding set in HTTP Receiver is used.</p> <p>Specifying this property automatically sets the Tomcat property <code>useBodyEncodingForURI</code> to false.</p>

Field	Global Var?	Description
acceptCount	Yes	<p>This property is available when the Server Type Tomcat is selected.</p> <p>Specifies the maximum number of incoming connection requests that can be accepted when all HTTP processors are in use.</p> <p>The default value for acceptCount is 100. Incoming requests received after the acceptCount limit is reached are rejected.</p> <p>If the value is not set in TIBCO Designer, you can set the value for either design-time or run-time.</p> <ul style="list-style-type: none">Specify the value in a .config file. Provide the file name and location while starting TIBCO Designer to set the value of acceptCount in design-time.Specify the value in <code>bwengine.tra</code> to set the value in run-time.
compressable MimeType	Yes	<p>Specifies the list of MIME types for which HTTP compression may be used. The default value for this comma separated list is <code>text/html</code>, <code>text/xml</code>, <code>text/plain</code>.</p>
compression	Yes	<p>Specifies if the output of the HTTP Connection is compressed using HTTP/1.1 GZIP compression.</p> <p>The acceptable values for this field are -</p> <p><code>off</code>: By default, the compression is disabled.</p> <p><code>on</code>: Allows compression for text data.</p> <p><code>force</code>: Forces compression in all cases.</p> <p>Note that if the content length is not known and compression is enabled, the output will still be compressed.</p> <p><i>any numerical integer value</i>: Any numerical value equivalent to "on", and specifies the minimum amount of data before the output can be compressed.</p>

Field	Global Var?	Description
connectionTimeout	Yes	Specifies the number of milliseconds that the Connector waits for the request URI line to be presented after the connection is accepted. The default value is 60000 i.e., 60 seconds.

Custom Properties for the HTTP Palette

In some situations, you may want to alter the configuration of the HTTP server that receives incoming HTTP requests for TIBCO ActiveMatrix BusinessWorks. You can configure the following custom properties:

- `bw.plugin.http.server.minProcessors` — the minimum number of threads available for incoming HTTP requests. The HTTP server creates the number of threads specified by this parameter when it starts up. The default value of this property is 10.
- `bw.plugin.http.server.maxProcessors` — the maximum number of threads available for incoming HTTP requests. The HTTP server will not create more than the number of threads specified by this parameter. The default value of this property is 75.
- `bw.plugin.http.server.maxSpareProcessors` - the maximum number of unused request processing threads that can exist until the thread pool starts stopping the unnecessary threads. The default maximum number of spare threads is 50.
- `bw.plugin.http.server.acceptCount` — the maximum queue size for incoming requests. Incoming requests that are not handled by available threads are placed on the queue until they can be processed. If the queue is full, new incoming requests are refused with an error. The default value of this property is 100.
- `bw.plugin.http.server.allowIPAddresses` — a comma-separated list of regular expression patterns that is compared with the remote client's IP address before accepting or rejecting requests from the client. The remote IP address of the client must match for the request to be accepted.
- `bw.plugin.http.server.restrictIPAddresses` — a comma-separated list of regular expression patterns that is compared with the remote client's IP address before accepting or rejecting requests from the client. The remote IP

address of the client must not match for any request from this client to be accepted.



If the same IP address is allowed and restricted, the restriction overrides the allowance and the IP address will be restricted.

- `bw.plugin.http.server.serverType` — the type of server to be used for the HTTP connection resource. Two server types are available: Tomcat and HTTP Component. The default value of this property is Tomcat.
- `bw.plugin.http.server.httpcomponents.workerThread` — the maximum number of web server threads available to handle HTTP requests for the HTTPComponents server type. The default value of this property is 50.

If you have a large number of incoming requests, you may want to change the values of these properties to handle more incoming requests concurrently.

See *TIBCO ActiveMatrix BusinessWorks Administration* for more information about setting custom engine properties.



When a client sends a request that cannot be processed because no threads are available, TIBCO ActiveMatrix BusinessWorks returns a `ConnectionRefused` exception to the client.

The HTTP Receiver uses the `minProcessors`/`maxProcessors` properties to control the flow of incoming HTTP requests. If you set the Flow Limit deployment property for a process definition with the HTTP Receiver process starter, `maxProcessors` is set to `<flowLimitValue> - 1` and `minProcessors` is set to `<maxProcessorValue> / 2`. Therefore, the Flow Limit value will never be reached because the `maxProcessors` property will prevent new requests from being accepted before the Flow Limit value is reached.

HTTP Receiver

Process Starter



Starts a process based on the receipt of a HTTP request.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
HTTP Connection	No	<p>The HTTP Connection resource describes the characteristics of the connection used to receive incoming HTTP requests.</p> <p>See HTTP Connection on page 216 for more information about specifying shared resources.</p>
Output Style	No	Type of output. Can be either String or Binary.
Parse Post Method Data	No	<p>Specifies to parse the message body of the HTTP request into a schema for the activity’s output.</p> <p>When this checkbox is checked, the parameters specified in the Parameters field are used to validate the incoming request and parse it into the output schema.</p> <p>Note: In the case of an incoming GET request, there is no message body, so this field has no effect on incoming GET requests.</p>

Field	Global Var?	Description
Parameters	No	<p>The parameters of the incoming HTTP request. Specifying parameters in this table allows the incoming request to be parsed and represented as a schema in this activity's output. For each parameter, you must provide a name, datatype, and whether the field is required, optional, or repeating.</p> <p>Use the + and x buttons to the right of the parameter table to add and remove parameters. Use the up and down arrows to move parameters to new positions in the table.</p> <p>Note: Specifying parameters in this field parses the query string of the request into the output schema, regardless of whether the Parse Post Method Data field is checked. Checking the Parse Post Method Data field and specifying parameters here is required to parse the message body along with the query string of the request.</p>
HTTP Authentication	No	<p>Specifies that the client sending the HTTP request must be authenticated. The user name and password specified in the incoming request must exist in the domain. Users are created and managed in the domain using TIBCO Administrator.</p>
Expose Security Context	No	<p>Places the information from the user's security context (either authentication or SSL certificate information) into the Context/SecurityContext output element.</p> <p>This is a fairly expensive operation and SSL certificates can consume memory resources, so check this option only if you require information from the user's security context for later use in your process definition.</p>

Field	Global Var?	Description
Default Encoding	Yes	<p>Specifies the encoding to use if no charset is specified in the Content-Type header of the message. This encoding is used for the message body and URL.</p> <p>However, when URIEncoding is specified in the HTTP Connection shared resource, the Default Encoding parameter specified here applies to the contentType alone and not to the URIEncoding property.</p>
Upgrade Configuration	No	<p>This field is available only when projects created in BusinessWorks 5.2.x or earlier versions are migrated to a higher version.</p> <p>Selecting the checkbox upgrades the schema in the input/output tab for the activity. You can revert back to the old schema by clearing the checkbox.</p> <p>However, if you create new processes in the older projects, the activities will always show the new schema in their input/output tabs. In this case, it is not possible to revert to the old schema.</p>

Advanced

The Advanced tab contains the following fields:

Field	Global Var?	Description
Write to File	No	<p>Checking this field specifies to write incoming requests that exceed the specified threshold size to a file instead of storing the request in memory. This allows you to accept large incoming requests without consuming a great deal of memory. When this field is checked, the Directory and Threshold Size fields appear.</p> <p>Note: This option is not intended to be used with the Parse Post Method Data option on the Configuration tab. When Write to File is specified, the PostData output element becomes a choice element containing either the output FileName or the PostData depending upon whether the data exceeds the size specified in the Threshold Size field. It is recommended to use either the Write to File option or the Parse Post Method data option, but not both at the same time.</p> <p>Leaving this field unchecked specifies to keep incoming requests in memory.</p> <p>Note: Once written, the files created by using this option are not deleted automatically. You must manage the storage used by these files and delete them when they are no longer used.</p>
Directory	Yes	Create Non-Existing Directories
Threshold Size (bytes)	Yes	<p>The maximum size (in bytes) of an incoming request that can be kept in memory. Requests larger than the specified size are written to a file in the specified directory. The file's name is output so that subsequent activities in the process definition can access the file and read its contents.</p> <p>Specifying zero (0) in this field causes all incoming requests to be saved to a file.</p>

Misc

The Misc tab contains the following fields:

Field	Description
Sequencing Key	<p>This field can contain an XPath expression that specifies which processes should run in order. Process instances with sequencing keys that evaluate to the same value will be executed sequentially in the order the process instance was created.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about controlling the execution order of process instances and about XPath expressions.</p>
Custom Id	<p>This field can contain an XPath expression that specifies a custom ID for the process instance. This ID is displayed in the View Service dialog of TIBCO Administrator, and it is also available in the <code>\$_processContext</code> process variable.</p>

Special Characters in HTTP Requests

Depending upon the content type of the data for the request, the request can contain URL-encoded data and the server is expected to decode the data. For example, an incoming request may have the following message body:

```
name=John%20Smith&address=500%201%2F2%20Main%20Street
```

If the message body is not parsed (Parse Post Method Data is unchecked on the Configuration tab), the body of the message remains URL-encoded in the PostData output element. If the message body is parsed, the data is decoded before being placed into the PostData output element, and that element would appear as follows:

```
name=John Smith&address=500 1/2 Main Street
```



The order of the parameters may not be the same in the PostData output element as the order in the original HTTP request sent by the client when the message body is parsed.

Because the PostData output element can contain different data and be a different length depending upon whether the message body is parsed, it is recommended that you obtain data from the parameters output element when the message body is parsed.

See <http://www.rfc-editor.org/rfc/rfc1738.txt> for more information about the URL specification.

Output Headers

The Output Headers tab describes the data structure for the headers of the HTTP request. You can use the default structure, or you can alter the structure, if the incoming request has a specific data structure for the header of the request. This tab uses the mechanism described in [Appendix A, Specifying Data Schema, on page 743](#) to specify the data structure for the headers. See that appendix for more information about creating a customized data structure.

Header structure is defined by the HTTP protocol. See the HTTP Protocol specification for more information about the fields and content of the header of a HTTP request. You can obtain this specification at www.w3.org.

The default header fields are the following.

Header	Datatype	Description
Accept	string	<p>This field specifies media types that are acceptable for response messages for the incoming request. For example, <code>text/*</code>, <code>text/html</code>. Media types are described in the HTTP specification.</p> <p>If no Accept header field is present, then it is assumed that the client accepts all media types.</p>
Accept-Charset	string	<p>This field specifies the character sets that are acceptable for response messages for the incoming request. For example, <code>iso-8859-5</code>, <code>unicode-1-1</code>. Character sets are described in the HTTP specification.</p> <p>If no Accept-Charset header is present, then it is assumed that the client accepts any character set.</p>
Accept-Encoding	string	<p>This field specifies the content-coding values that are acceptable for response messages. For example, <code>compress</code>, <code>gzip</code>. See the HTTP specification for more information about this header field.</p>

Header	Datatype	Description
Content-Type	string	This field indicates the media type of the entity body sent to the receiver. For example, <code>text/html; charset=ISO-8850-4</code> . Media types are described in the HTTP specification.
Content-Length	string	<p>This field indicates the size of the entity body (in decimal number of OCTETs) sent to the receiver.</p> <p>This field takes into account the encoding of the message body. See Special Characters in HTTP Requests on page 229 for more information on when the message body is URL encoded.</p>
Connection	string	This field allows the requestor to specify options desired for this connection. For example, the option <code>close</code> specifies that the requestor would like the connection to be closed when the request is complete.
Cookie	string	<p>See the HTTP specification for more information about this field.</p> <p>If you want to receive more than one cookie, set the Cardinality for this field to Repeating (*).</p>
Pragma	string	This field is used to include implementation-specific directives that might apply to the receiver. See the HTTP specification for more information about using this field.

Output

The output for the activity is the following.

Output Item	Datatype	Description
Method	string	The method specified in the request. For example, GET or POST.

Output Item	Datatype	Description
RequestURI	string	The address portion of the request. This is the portion before the question mark (?).
HTTPVersion	string	Version field of the HTTP request.
PostData or BinaryContent or FileName	string	<p>The message body of the HTTP request. The content of this element depends upon whether the message body is parsed. Parsing behavior is controlled by the Parse Post Method Data field on the Configuration tab.</p> <p>See Special Characters in HTTP Requests on page 229 for more information.</p> <p>If the Write to File field is checked on the Advanced tab, this field can also contain the file name of the file containing the message, if the incoming message exceeds the specified threshold size.</p>
Command	string	Command portion of the HTTP request.
QueryString	string	The query string portion of the request. This is the portion after the question mark (?).
Header	string	The header of the HTTP request.

Output Item	Datatype	Description
DynamicHeaders	complex	<p>The dynamic header is an additional header parameter to add runtime headers to the Outgoing Http Messages. This element is specified in the Input tab. Dynamic header consists of the following information:</p> <ul style="list-style-type: none"> • Name — name of the header. • Value — value of the header. <p>The following overriding conditions can be considered:</p> <ul style="list-style-type: none"> • Overrides the value of HeaderName with the value found in DynamicHeaders if it is a non-repeating header. If more than one occurrence of this header is found under DynamicHeaders, it throws the following exception: <pre>"The header [headerName] is defined as non-Repeating Header in Input Headers. This header cannot have multiple occurrences in DynamicHeaders."</pre> • If it is repeating element, add the respective name value pairs under dynamic headers, which will be added to the existing list maintained for this element. • For a repeating element, if the new header name is not found under Headers section declared via TIBCO Designer, following is added into the HTTP Headers. <ul style="list-style-type: none"> — Shows only one value, if found once in DynamicHeaders. — Shows array of values, if found repeating in DynamicHeaders.
Protocol	string	Can be either HTTP or HTTPS depending upon the protocol used by the request.

Output Item	Datatype	Description
Port	string	Port number on which the request was received. This is the port number configured in the HTTP Connection resource.
mimeEnvelope Element	complex	This element contains the message attachments. This element contains a repeating element named mimePart that contains each mime attachment.
mimeHeaders	complex	<p>This element contains the mime header for each mimePart. Mime headers can contain the following information:</p> <ul style="list-style-type: none">• content-disposition — To suggest a filename for an attachment, use " * ; filename=<filename>" in this element. Note: HTTP servers may alter or choose to ignore the suggested name.• content-type• content-transfer-encoding• content-id• other mime header information <p>See http://www.faqs.org/rfcs/rfc2045.html for more information about MIME headers and their syntax.</p> <p>Note: When the content type is specified as "text/*" (for example, "text/xml"), the attachment content is expected to be in either the textContent input element or the file name storing the attachment is expected to be in the fileName input element. When the content type is anything other than "text/*", the attachment content is expected to be in either the binaryContent input element or the file name storing the attachment is expected to be in the fileName input element.</p>

Output Item	Datatype	Description
binaryContent textContent fileName	choice	<p>This element contains the mime attachment. The element can be one of the following:</p> <ul style="list-style-type: none"> binaryContent — content of the attachment when the attachment is binary data. textContent — content of the attachment when the attachment is text data. fileName — the file name of the attachment written to the disk.
Headers	complex	The fields of the header specified on the Output Headers tab. See the description of the Output Headers tab for more information about these items.
parameters	complex	<p>Parameters for the incoming request. These parameters are configured in the Parameters field on the Configuration tab.</p> <p>When the Parse Post Method Data field on the Configuration tab is checked, the parameters include the parameters in the query string and message body of the incoming HTTP request.</p> <p>When the Parse Post Method Data field is unchecked, the parameters only include the query string of the incoming request.</p>
Context	complex	Contains information about the client's environment. See the description of the following elements contained in the Context element for more information.
RemoteAddress	String	The IP address of the client that submitted the HTTP request.
Context	complex	This element holds the optional SecurityContext element and the RemoteAddress and RemoteHost elements described below.

Output Item	Datatype	Description
SecurityContext	complex	This output element is only available when the Expose Security Context field is checked on the Configuration tab. This element contains information about the requestor's authentication or certificate information, depending upon the security scheme used. See the description of the following elements contained in the SecurityContext element for more information.
Username PasswordToken	complex	The username and password of the HTTP client that made the request. The elements in this element are populated only when the client uses HTTP authentication.
CertificateToken	complex	<p>This element contains the SSL certificate and certain useful information taken from the certificate, such as the CipherSuite, the certificate issuer, and so on.</p> <p>If the client has more than one certificate in a certificate chain, all certificates are contained in the repeating Certificate element.</p>
RemoteAddress	String	IP address of the remote host that sent the HTTP request.
RemoteHost	String	Host name of the remote host that sent the HTTP request. This element is only available when the Enable DNS Lookups field is checked on the Advanced tab of the HTTP Connection used by this activity.

Proxy Configuration

Shared Configuration



The Proxy Configuration resource is used to specify a proxy HTTP server when HTTP requests are sent outside of a firewall.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the resource.
Description	No	Short description of the shared resource.
Proxy Host	Yes	Host name or IP address of the proxy server.
Proxy Port	Yes	Port number of the proxy host.
Proxy Authentication	No	<p>Specifies what authentication should be used . An Authentication can be of the following three types:</p> <ul style="list-style-type: none"> NONE - is default. BASIC - to continue with the current implementation of using Username Password credentials.The Identity field appears when this field is selected. NTLM - Identity and Domain fields appear when NTLM is selected. Identity is a reference of the Username and Password combination.
Identity	No	<p>This is an Identity resource that contains the username and password for connecting to the proxy server.</p> <p>See <i>TIBCO Designer Palette Reference</i> for more information.</p>
Domain	No	Specifies the domain to be used for Authentication. The user name and password specified in the Identity field must exist in the domain.

Send HTTP Request

Activity



The Send HTTP Request activity sends a HTTP request to a web server.

This activity can send a request to a server that complies with either the HTTP 1.0 or 1.1 specification. You do not need to specify the HTTP version of the server you are sending the request to. TIBCO ActiveMatrix BusinessWorks automatically sends the request using the correct version based on the version supported by the HTTP server.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the activity in the process definition.
Description	Short description of the activity.
Host	The host machine name or IP address to send the request to. For example, www.tibco.com.
Port	The port on the host machine to send the request to. The default port is 80.
Use Proxy Setting	Specifies to use a proxy server to gain access outside of a firewall. The Proxy Configuration shared configuration resource specifies the configuration of the proxy server. See Proxy Configuration on page 237 for more information.

Field	Description
Accept Redirects	<p>Checking this field indicates that the request should be automatically redirected when the HTTP server sends the redirection status code (302) in response to this request and the remote host redirects the request to the same host and port. If the remote host redirects the request to a different host or a different port on the same host, the request is not automatically redirected.</p> <p>The maximum number of redirections is 100.</p> <p>When this field is unchecked, the request is not redirected.</p>
Parameters	<p>The parameters of the HTTP request. For each parameter, you must provide a name, datatype (must be type string), and whether the parameter is required, optional, or repeating.</p> <p>These parameters are specified in the <code>parameters</code> element on the Input tab.</p> <p>See Sending Data in the HTTP Request on page 240 for more information about this field.</p>
HTTP Authentication	<p>Specifies what authentication should be used . An authentication can be of the following three types:</p> <ul style="list-style-type: none"> • NONE - is default. • BASIC - to continue with the current implementation of using username and password credentials. The Identity field appears when this field is enabled. • NTLM - Identity and Domain fields appear when NTLM is selected. Identity is a reference of the Username and Password combination.
Identity	<p>This is an Identity resource that contains the client's username and password. This identity is used to perform only Basic and NTLM authentication.</p> <p>See <i>TIBCO Designer Palette Reference</i> for more information.</p>

Field	Description
Domain	Specifies the domain to be used for Authentication. The username and password specified in the Identity must exist in the domain.
SSL	<p>When the Use SSL? checkbox is checked, this specifies to use the HTTPS (secure socket layer, or SSL) for the request. This protocol authenticates the server to the client, and optionally, the server can require that the client authenticate itself to the server.</p> <p>The Configure SSL button becomes enabled when this field is checked. See Configure SSL Button on page 242 for more information.</p>
Upgrade Configuration	<p>This field is visible only when projects created in BusinessWorks 5.2.x or earlier versions are migrated to a higher version.</p> <p>Selecting the checkbox upgrades the schema in the input/output tab for the activity. You can revert back to the old schema by clearing the checkbox.</p> <p>However, if you create new processes in the older projects, the activities will always show the new schema in their input/output tabs. In this case, it is not possible to revert to the old schema.</p>

Sending Data in the HTTP Request

There are several HTTP methods that can be used in an HTTP request. Each method sends data in the request in a different manner. For example, the GET method uses the query string of the request URI to pass parameter/value pairs. Other methods use the HTTP message body to send data in the request.

The Send HTTP Request activity has three input elements for sending data in a request:

- **PostData** — corresponds to the body of the HTTP message. All methods except the GET method accept data in this element.
- **QueryString** — corresponds to the query string of the request URI. You can use this input element to dynamically construct the query string using an XPath expression when you do not know the names or number of input parameters for the request until the activity executes.

- **Parameters** — corresponds to parameters defined in the Parameters field on the Configuration tab. This is useful if you have a fixed set of parameters that you send with the request. For requests that use the GET method, these parameters are passed as the query string of the request URI. For requests that use the POST method, these parameters are usually sent as the body of the HTTP message, but they can also be included in the query string.

For some methods, these input elements are mutually exclusive. For example, for POST requests, you can specify parameters on the Configuration tab and in the parameters input element or you can specify a PostData input element. However, you should not specify both input elements. In the case of a POST request, the PostData input element is ignored when parameters are specified on the Configuration tab.

For GET requests, you can specify parameters on the Configuration tab and in the parameters input element or you can specify a QueryString input element. Typically, if you know the list of parameters for the request, you should configure the parameters on the Configuration tab. If the list of parameters is not known until the activity executes, you should use the QueryString element. However, when all parameters on the Configuration tab are specified as Optional, you can use the QueryString input element instead of the parameters input element (but if any elements in the parameters element contain an expression, the QueryString element is ignored).

Special Characters in HTTP Requests

Depending upon the content type of the data for the request, the request can contain URL-encoded data and the server is expected to decode the data. If this is the case and you want to send special characters such as +, /, or = in your HTTP request, your data string must be URL-encoded if you send the data using the PostData or QueryString input elements. If you send the data using the parameters specified on the Configuration tab, encoding is done automatically.

For example, you want to specify the following PostData:

```
name=John Smith&address=500 1/2 Main Street
```

Your PostData input element should result in the following string:

```
name=John%20Smith&address=500%201%2F2%20Main%20Street
```

See <http://www.rfc-editor.org/rfc/rfc1738.txt> for more information about the URL specification.

Configure SSL Button

The Configure SSL button allows you to specify the SSL parameters for the HTTP request. The following are the fields in the SSL Configuration for HTTPS Client Requests dialog:

Field	Description
Trusted Certificates Folder	Folder in the project containing one or more certificates from trusted certificate authorities. This folder is checked when a client connects to the HTTP server to ensure that the server is trusted. This prevents connections to rogue servers.
Identity	<p>This is an Identity resource that contains the client's digital certificate and private key.</p> <p>See <i>TIBCO Designer Palette Reference</i> for more information.</p>
Verify Host Name	<p>This field specifies to check the host name of the HTTP server against the host name listed in the server's digital certificate. This provides additional verification that the host name you believe you are connecting to is in fact the desired host.</p> <p>If the host name specified in the Host field on the Configuration tab is not an exact match to the host name specified in the server's digital certificate, the connection is refused.</p> <p>Note: If you specify an equivalent hostname (for example, an IP address) in the Host field, but the name is not an exact match of the hostname in the host's digital certificate, the connection is refused.</p>

Field	Description
Strong Cipher Suites Only	<p>When checked, this field specifies that the minimum strength of the cipher suites used can be specified with the <code>bw.plugin.security.strongcipher.minstrength</code> custom engine property. See <i>TIBCO ActiveMatrix BusinessWorks Administration</i> for more information about this property. The default value of the property disables cipher suites with an effective key length below 128 bits.</p> <p>When this field is unchecked, only cipher suites with an effective key length of up to 128 bits can be used.</p>

Advanced

The Advanced tab contains the following fields:

Field	Global Var?	Description
Write to File	No	<p>Checking this field specifies to write incoming requests that exceed the specified threshold size to a file instead of storing the request in memory. This allows you to accept large incoming requests without consuming a great deal of memory. When this field is checked, the Directory and Threshold Size fields appear.</p> <p>Note: This option is not intended to be used with the Parse Post Method Data option on the Configuration tab. When Write to File is specified, the PostData output element becomes a choice element containing either the output FileName or the PostData depending upon whether the data exceeds the size specified in the Threshold Size field. It is recommended to use either the Write to File option or the Parse Post Method data option, but not both at the same time.</p> <p>Leaving this field unchecked specifies to keep incoming requests in memory.</p> <p>Note: Once written, the files created by using this option are not deleted automatically. You must manage the storage used by these files and delete them when they are no longer used.</p>
Directory	Yes	Create Non-Existing Directories
Threshold Size (bytes)	Yes	<p>The maximum size (in bytes) of an incoming request that can be kept in memory. Requests larger than the specified size are written to a file in the specified directory. The file's name is output so that subsequent activities in the process definition can access the file and read its contents.</p> <p>Specifying zero (0) in this field causes all incoming requests to be saved to a file.</p>

Input Headers/Output Headers

The Input Headers and Output Headers tabs describe the data structure for the headers of the HTTP request and the HTTP reply message. You can use the default structure, or you can alter the structure, if the outgoing request or the reply to the request has a specific data structure for the header. This tab uses the same mechanism described [Appendix A, Specifying Data Schema, on page 743](#) to specify the data structure for the headers. See that section for more information about creating a customized data structure.

Header structure is defined by the HTTP protocol. See the HTTP Protocol specification for more information about the fields and content of the header of a HTTP request. You can obtain this specification at www.w3.org.

The default header fields are the following.

Header	Datatype	Description
Accept (input header)	string	<p>This field specifies media types that are acceptable for response messages for the request. For example, <code>text/*</code>, <code>text/html</code>. Media types are described in the HTTP specification.</p> <p>If no Accept header field is specified, then the server assumes that all media types are acceptable.</p>
Accept-Charset (input header)	string	<p>This field specifies the character sets that are acceptable for response messages for the request. For example, <code>iso-8859-5</code>, <code>unicode-1-1</code>. Character sets are described in the HTTP specification.</p> <p>If no Accept-Charset header is specified, then the server assumes that any character set is acceptable.</p>
Accept-Encoding (input header)	string	<p>This field specifies the content-coding values that are acceptable for response messages. For example, <code>compress</code>, <code>gzip</code>. See the HTTP specification for more information about this header field.</p>

Header	Datatype	Description
Content-Type (input/output header)	string	This field indicates the media type of the entity body for the outgoing message and the incoming response. Media types are described in the HTTP specification. An example of the media type is <code>text/html; charset=ISO-8850-4</code> .
Content-Length (output header)	string	This field indicates the size of the entity body (in decimal number of OCTETs) of the response message.
Content-Encoding (output header)	string	This field is used as a modifier to the content-type. When present, its value indicates what additional content encodings have been applied to the entity-body, and thus what decoding mechanisms must be applied in order to obtain the media-type referenced by the Content-Type header field. Content-Encoding is primarily used to allow a document to be compressed without losing the identity of its underlying media type. See the HTTP specification for more information about this field.
Date (output header)	string	The date and time when the response message was sent.
Server (output header)	string	The server sending the original response message.
Location (output header)	string	This field is used to redirect the receiver to a location other than the Request-URI for completion of the request or for identification of a new resource.
Connection	string	This field allows the requestor to specify options desired for this connection. For example, the option <code>close</code> specifies that the requestor would like the connection to be closed when the request is complete.

Header	Datatype	Description
Set-Cookie (output header)	string	<p>See the HTTP specification for more information about this field.</p> <p>If you want to receive more than one cookie, set the Cardinality for this field to Repeating (*).</p>
Cookie (input header)	string	<p>A name/value pair (also known as a cookie) containing information that the HTTP server may be expecting.</p> <p>You can set the Cardinality field for this element to Repeating (*) to specify more than one cookie. You can also specify multiple name/value pairs in a single non-repeating element by separating each pair with a comma (for example, "name1=value1, name2=value2").</p> <p>If you set the custom engine property <code>bw.plugin.http.protocol.single-cookie-header</code> to true, multiple name/value pairs are sent as a single header element. See <i>TIBCO ActiveMatrix BusinessWorks Administration</i> for more information about custom engine properties.</p>
Pragma (input/output header)	string	<p>This field is used to include implementation-specific directives that might apply to the receiver. See the HTTP specification for more information about using this field.</p>

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
Host	string	The HTTP host you want to connect to. Specifying a value for this input item overrides any value specified on the Configuration tab.
Port	integer	The port number that the HTTP server uses for incoming requests. Specifying a value for this input item overrides any value specified on the Configuration tab.
Method	string	<p>The HTTP method to use for the request. All HTTP 1.1 methods are supported, but the CONNECT method is unnecessary because TIBCO ActiveMatrix BusinessWorks automatically uses the connect method when connecting by way of a proxy server.</p> <p>If no method is specified in this element, the GET method is used by default.</p>
RequestURI	string	The address portion of the request. This is the portion of the URI before the question mark (?).
PostData	string	<p>The message body of the HTTP request. Do not specify this element when the method of the request is GET.</p> <p>See Sending Data in the HTTP Request on page 240 for more information about this input element.</p>
QueryString	string	<p>The query string portion of the request. This is the portion after the question mark (?).</p> <p>See Sending Data in the HTTP Request on page 240 for more information about this input element.</p>
Timeout	integer	The amount of time (in milliseconds) to wait for a response from the HTTP server.

Input Item	Datatype	Description
Headers	complex	The header fields to send for the request. This element is specified on the Input Headers tab, and you can use this input item to supply values for the header when sending the request.

Input Item	Datatype	Description
DynamicHeaders	complex	<p>The dynamic header is an additional header parameter to add runtime headers to the Outgoing Http Messages. This element is specified in the Input tab. Dynamic header consists of the following information:</p> <ul style="list-style-type: none">• Name — name of the header.• Value — value of the header. <p>The following overriding conditions can be considered:</p> <ul style="list-style-type: none">• Overrides the value of HeaderName with the value found in DynamicHeaders if it is a non-repeating header. If more than one occurrence of this header is found under DynamicHeaders, it throws the following exception: "The header [headerName] is defined as non-Repeating Header in Input Headers. This header cannot have multiple occurrences in DynamicHeaders."• If it is repeating element, add the respective name value pairs under dynamic headers, which will be added to the existing list maintained for this element.• For a repeating element, if the new header name is not found under Headers section declared via TIBCO Designer, following is added into the HTTP Headers.<ul style="list-style-type: none">— Shows only one value, if found once in DynamicHeaders.— Shows array of values, if found repeating in DynamicHeaders.

Input Item	Datatype	Description
parameters	complex	<p>Parameters for the incoming request. These parameters are configured in the Parameters field on the Configuration tab. This element is only available when there are items specified in the Parameters field.</p> <p>See Sending Data in the HTTP Request on page 240 for more information about this input element.</p>
mimeEnvelope Element	complex	<p>This element contains the message attachments. This element contains a repeating element named mimePart that contains each mime attachment.</p> <p>Note: Only HTTP POST method can send messages with attachments.</p>

Input Item	Datatype	Description
mimeHeaders	complex	<p>This element contains the mime header for each mimePart. Mime headers can contain the following information:</p> <ul style="list-style-type: none">content-disposition — To suggest a filename for an attachment, use <code>"*;filename=<filename>"</code> in this element. Note: HTTP servers may alter or choose to ignore the suggested name.content-typecontent-transfer-encodingcontent-idother mime header information <p>See http://www.faqs.org/rfcs/rfc2045.html for more information about MIME headers and their syntax.</p> <p>Note: When the content type is specified as "text/*" (for example, "text/xml"), the attachment content is expected to be in either the textContent input element or the fileName storing the attachment is expected to be in the fileName input element. When the content type is anything other than "text/*", the attachment content is expected to be in either the binaryContent input element or the file name storing the attachment is expected to be in the fileName input element.</p>
binaryContent textContent fileName	choice	<p>This element contains the mime attachment. The element can be one of the following:</p> <ul style="list-style-type: none">binaryContent — content of the attachment when the attachment is binary data.textConetnt — content of the attachment when the attachment is text data.fileName — the file name of the attachment written to the disk.

Output

The output for the activity is the following.

Output Item	Datatype	Description
Header	string	The header of the HTTP request.
statusLine	complex	This field is the first line of the response message. This consists of the protocol version, a numeric status code, and the text phrase explaining the status code. See the HTTP specification for more information about status codes in HTTP responses.
binaryContent	binary	The binary content of the response to the request from the HTTP server.
asciiContent	string	The ASCII content of the response to the request from the HTTP server.
Headers	complex	The header fields of the reply. The structure of this output item is specified on the Output Headers tab.

Output Item	Datatype	Description
DynamicHeaders	complex	<p>The dynamic header is an additional header parameter to add runtime headers to the Outgoing Http Messages. This element is specified in the Input tab. Dynamic header consists of the following information:</p> <ul style="list-style-type: none">• Name — name of the header.• Value — value of the header. <p>The following overriding conditions can be considered:</p> <ul style="list-style-type: none">• Overrides the value of HeaderName with the value found in DynamicHeaders if it is a non-repeating header. If more than one occurrence of this header is found under DynamicHeaders, it throws the following exception: <code>"The header [headerName] is defined as non-Repeating Header in Input Headers. This header cannot have multiple occurrences in DynamicHeaders."</code>• If it is repeating element, add the respective name value pairs under dynamic headers, which will be added to the existing list maintained for this element.• For a repeating element, if the new header name is not found under Headers section declared via TIBCO Designer, following is added into the HTTP Headers.<ul style="list-style-type: none">— Shows only one value, if found once in DynamicHeaders.— Shows array of values, if found repeating in DynamicHeaders.

Output Item	Datatype	Description
mimeEnvelope Element	complex	This element contains the message attachments. This element contains a repeating element named mimePart that contains each mime attachment.
mimeHeaders	complex	<p>This element contains the mime header for each mimePart. Mime headers can contain the following information:</p> <ul style="list-style-type: none"> • content-disposition — To suggest a filename for an attachment, use "<code>*;filename=<filename></code>" in this element. Note: HTTP servers may alter or choose to ignore the suggested name. • content-type • content-transfer-encoding • content-id • other mime header information <p>See http://www.faqs.org/rfcs/rfc2045.html for more information about MIME headers and their syntax.</p> <p>Note: When the content type is specified as "text/*" (for example, "text/xml"), the attachment content is expected to be in either the textContent input element or the file name storing the attachment is expected to be in the fileName input element. When the content type is anything other than "text/*", the attachment content is expected to be in either the binaryContent input element or the file name storing the attachment is expected to be in the fileName input element.</p>

Output Item	Datatype	Description
binaryContent textContent fileName	choice	<p>This element contains the mime attachment. The element can be one of the following:</p> <ul style="list-style-type: none">binaryContent — content of the attachment when the attachment is binary data.textConetnt — content of the attachment when the attachment is text data.fileName — the file name of the attachment.

Persistent Connections

A Send HTTP Request activity requires a connection to the HTTP server. The activity exclusively uses the connection until the HTTP server sends the response message. If you have many process instances connecting to a HTTP server, each Send HTTP Request opens a connection, holds the connection, and then closes the connection when the activity completes. Opening and closing a large number of connections causes a significant overhead. Persistent connections play a major role here. Persistent connections maintain a pool of connections that can be reused by Send HTTP Request activities so that each activity does not need to open and close the connection. Once the connection is released by the process instance, it is returned to the pool maintained.



Not all HTTP servers support the use of persistent connections. To determine if the HTTP Server supports the use of persistent connections, read the documentation of that HTTP Server.

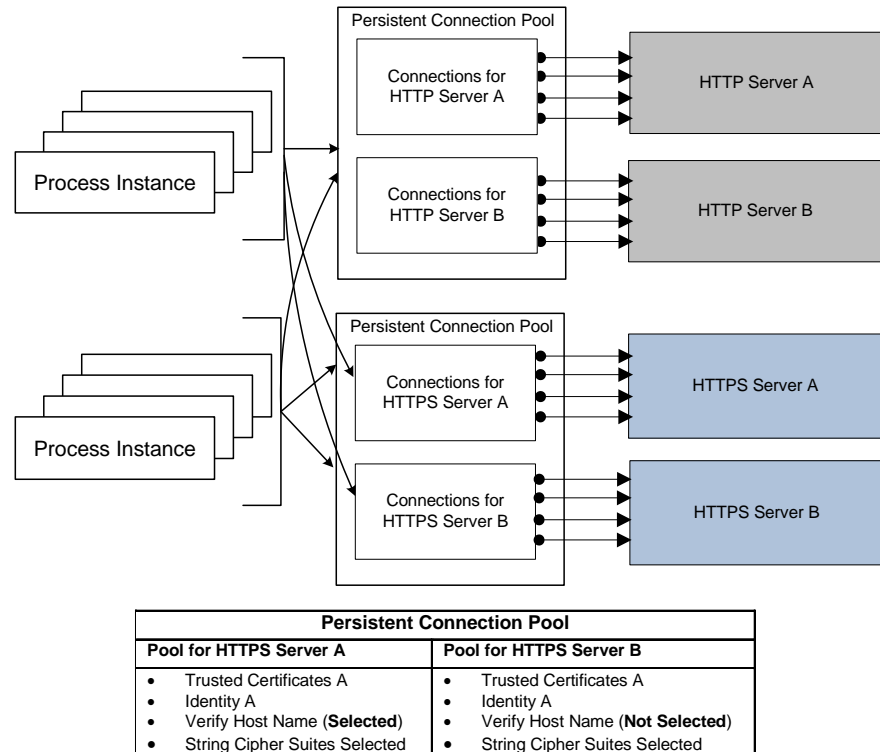
Figure 10 illustrates the persistent connection pool.

Persistent Connection Manager allows you to specify the total number of connections as well as the maximum number of connections per HTTP Server. The total number of connections is a total of connections to all HTTP Servers handled by that connection pool.

For each SSL configuration, a different Persistent Connection pool is created and maintained. All connections using the same SSL Configuration, irrespective of the HTTPS Server they are connecting to, is maintained by this pool.

When a Send HTTP Request activity requires a connection, the pool is requested for a connection that corresponds to the HTTP server. If an idle connection for that HTTP Server is found, it is used. If no idle connection is found, the pool tries to create one depending on whether the maximum connections limit for that HTTP Server has been reached. If the maximum connections limit is reached, the request waits for a connection to be released back to the pool. If the maximum connections limit is not reached, the pool creates a connection to use.

Figure 10 Persistent HTTP Connection Pool



Persistent connections are managed by custom engine properties. See *TIBCO ActiveMatrix BusinessWorks Administration* for more information about setting custom engine properties.

The following section describe the engine properties that control persistent connections.

bw.plugin.http.client.usePersistentConnectionManager

This property specifies that a pool of HTTP connections to each HTTP server must be created for the connections to be reused by the Send HTTP Request activities. This property enables persistent connections for all non-SSL Send HTTP Request in that ActiveMatrix BusinessWorks engine.

When this property is set to `true`, a pool of connections is created for each HTTP server that Send HTTP Request connects to. The total number of connections in the pool is limited by the `bw.plugin.http.client.maxTotalConnections` property. The number of connections for each host (each HTTP server) is limited by the `bw.plugin.http.client.maxConnectionsPerHost` property.

The default value of this property is `false`.

bw.plugin.http.client.usePersistentConnectionManagerForSSL

This property specifies that a pool of HTTPS connections to each HTTP server must be created for connections to be reused by the Send HTTP Request activities. This property enables persistent connections for all SSL Send HTTP Request in that ActiveMatrix BusinessWorks engine.

When this property is set to `true`, a pool of connections is created for each HTTPS server that Send HTTP Request connects to. The total number of connections in the pool is limited by the `bw.plugin.http.client.maxTotalConnections` property. The number of connections for each host is limited by the `bw.plugin.http.client.maxConnectionsPerHost` property.

The default value of this property is `false`.



SSL Configuration - consists of Trusted Certificates folder, Identity, `verifyHostName` flag, and `strongCipherSuites` flag.

NTLM Authentication Configuration - consists of Identity and `domainName`.

Different connections pools get created for the following combinations:

- HTTP
- HTTP and NTLM
- HTTPS (using SSL) and NTLM
- HTTPS (using SSL)

All persistent connection properties like `maxTotalConnections`, `maxConnectionsPerHost`, idle connections check, and timeout value are applied on each connection pool.



To enable Persistent Connections for both HTTP and HTTPS, set `bw.plugin.http.client.usePersistentConnectionManager` and `bw.plugin.http.client.usePersistentConnectionManagerForSSL` properties to true.



Define the engine property `bw.plugin.http.client.authentication.preemptive` to False, if you don't need the preemptive authentication applied for the HTTP Requests. The default value of this property is True.

`bw.plugin.http.client.connectionTimeout`

The value of this property is ignored unless the `bw.plugin.http.client.usePersistentConnectionManager` or `bw.plugin.http.client.usePersistentConnectionManagerForSSL` property is set to true. This property specifies that the timeout period (in milliseconds) for which persistent connections should be alive to each remote HTTP server.

The default value of this property is 3000 ms.

`bw.plugin.http.client.maxConnectionsPerHost`

The value of this property is ignored unless the `bw.plugin.http.client.usePersistentConnectionManager` or `bw.plugin.http.client.usePersistentConnectionManagerForSSL` property is set to true. This property specifies the maximum number of persistent connections to each remote HTTP server.

The default value of this property is 20.

`bw.plugin.http.client.maxTotalConnections`

The value of this property is ignored unless the `bw.plugin.http.client.usePersistentConnectionManager` or `bw.plugin.http.client.usePersistentConnectionManagerForSSL` property is set to true. This property specifies the maximum number of persistent connections for all HTTP servers.

The default value of this property is 200.

bw.plugin.http.client.checkForStaleConnections

The value of this property is ignored unless the `bw.plugin.http.client.usePersistentConnectionManager` or `bw.plugin.http.client.usePersistentConnectionManagerForSSL` property is set to `true`. When using persistent connections, a connection can become stale. When this property is set to `true`, a persistent connection is checked to determine if it is stale before it is used by a Send HTTP Request activity. Checking for the stale connections adds significant processing overhead, but it improves reliability. The default value of this property is `false`.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective actions to take.

Exception	Thrown When...
HttpClientException	The HTTP server replied with a message that has the 4XX status code.
HttpServerException	The HTTP server replied with a message that has the 5XX status code.
HttpCommunicationException	An HTTP exception occurred when trying to execute the specified method, or when trying to read the response.
ActivityTimedOutException	A timeout has been reached.

Send HTTP Response

Activity



Sends a response to a previously received HTTP request. This activity is used in conjunction with the HTTP Receiver process starter or the Wait for HTTP Request activity.

The default status line returned by this activity is "200 OK".

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the activity in the process definition.
Description	Short description of the activity.
Reply For	The Wait for HTTP Request activity or HTTP Receiver process starter that received the request. This is a selection list of available activities that can receive HTTP requests.
Flush Response	<p>Allows you to specify if the response is to be flushed after each Send HTTP Response activity.</p> <p>By default, this property is not checked.</p> <p>This field is useful when there are a large number of Send HTTP Response activities in a job. In such cases, the Close Connection field is checked in the last activity to indicate the response is complete. However, checking the Flush Response field overrides this behavior and causes the response to be flushed after each Send HTTP Response activity.</p>

Field	Description
Close Connection	<p>Specifies that this activity contains the last part of an HTTP response. This field is used when you have more than one Send HTTP Response activity in a process definition, each activity sending a portion of the response to the client. All Send HTTP Response activities in a process definition should have this field unchecked, except the last Send HTTP Response activity. This field should be checked in the last Send HTTP Response activity to indicate the response is complete.</p> <p>If the entire response is sent by only one Send HTTP Response activity in the process definition, this field should be checked.</p>

Input Headers

The Input Headers tab describes the data structure for the headers of the HTTP response. You can use the default structure, or you can alter the structure, if the outgoing response has a specific data structure for the header of the request. This tab uses the same mechanism described [Appendix A, Specifying Data Schema, on page 743](#) to specify the data structure for the headers. See that appendix for more information about creating a customized data structure.

Header structure is defined by the HTTP protocol. See the HTTP Protocol specification for more information about the fields and content of the header of a HTTP request. You can obtain this specification at www.w3.org.

The default header fields are the following.

Header	Datatype	Description
StatusLine	string	This field is the first line of a response message. This consists of the protocol version, a numeric status code, and the text phrase explaining the status code. See the HTTP specification for more information about status codes in HTTP responses.

Header	Datatype	Description
Content-Type	string	<p>This field indicates the media type of the entity body sent to the receiver. Media types are described in the HTTP specification. An example of the media type is <code>text/html; charset=ISO-8850-4</code>.</p> <p>By default this item is set to <code>text/html</code>. If you are using this activity and the Retrieve Resources activity to retrieve a WSDL file, you should set the type to <code>text/xml</code> when specifying values on the Input tab.</p>
Set-Cookie	string	See the HTTP specification for more information about this field.
Pragma	string	This field is used to include implementation-specific directives that might apply to the receiver. See the HTTP specification for more information about using this field.
Location	string	This field is used to redirect the receiver to a location other than the Request-URI for completion of the request or for identification of a new resource.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
binaryContent	binary	The binary content of the response to the request.
asciiContent	string	The ASCII content of the response to the request.

Input Item	Datatype	Description
Headers	complex	<p>The fields of the header specified on the Input Headers tab. See the description of the Input Headers tab for more information about these items.</p> <p>Note: Only the first Send HTTP Response activity in a process definition can set the Headers element. If your process definition contains multiple Send HTTP Response activities, the headers are set by the first activity and this element is ignored for all subsequent activities.</p>

Input Item	Datatype	Description
DynamicHeaders	complex	<p>The dynamic header is an additional header parameter to add runtime headers to the Outgoing Http Messages. This element is specified in the Input tab. Dynamic header consists of the following information:</p> <ul style="list-style-type: none"> • Name — name of the header. • Value — value of the header. <p>Consider the following overriding conditions:</p> <ul style="list-style-type: none"> • Overrides the value of the HeaderName with the value found in DynamicHeaders if it is a non-repeating header. If more than one occurrence of this header is found under DynamicHeaders, it throws the following exception: <p>"The header [headerName] is defined as non-Repeating Header in Input Headers. This header cannot have multiple occurrences in DynamicHeaders."</p> • If it is repeating element, add the respective name value pairs under dynamic headers, which will be added to the existing list maintained for this element. • For a repeating element, if the new header name is not found under Headers section declared via TIBCO Designer, following is added into the HTTP Headers. <ul style="list-style-type: none"> — Shows only one value, if found once in DynamicHeaders. — Shows array of values, if found repeating in DynamicHeaders.
mimeEnvelope Element	complex	<p>This element contains the message attachments. This element contains a repeating element named mimePart that contains each mime attachment.</p>

Input Item	Datatype	Description
mimeHeaders	complex	<p>This element contains the mime header for each mimePart. Mime headers can contain the following information:</p> <ul style="list-style-type: none">content-disposition — To suggest a filename for an attachment, use <code>"*;filename=<filename>"</code> in this element. Note: HTTP servers may alter or choose to ignore the suggested name.content-typecontent-transfer-encodingcontent-idother mime header information <p>See http://www.faqs.org/rfcs/rfc2045.html for more information about MIME headers and their syntax.</p> <p>Note: When the content type is specified as "text/*" (for example, "text/xml"), the attachment content is expected to be in either the textContent input element or the file name storing the attachment is expected to be in the fileName input element. When the content type is anything other than "text/*", the attachment content is expected to be in either the binaryContent input element or the file name storing the attachment is expected to be in the fileName input element.</p>
binaryContent textContent fileName	choice	<p>This element contains the mime attachment. The element can be one of the following:</p> <ul style="list-style-type: none">binaryContent — content of the attachment when the attachment is binary data.textContent — content of the attachment when the attachment is text data.fileName — the file name of the attachment written to the disk.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
<code>HttpCommunicationException</code>	An HTTP exception occurred when trying to send the response.

Wait for HTTP Request

Activity



Waits for an incoming HTTP request in a process definition. The process instance suspends until the incoming HTTP request is received.

See [Scalability With Incoming Events on page 226](#) in *TIBCO ActiveMatrix BusinessWorks Process Design Guide* for information on running the "Wait for..." activities in a multi-engine mode.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the activity in the process definition.
Description	Short description of the activity.
HTTP Connection	<p>The HTTP Connection shared resource that describes the host name and the port number on which the process waits for the incoming message.</p> <p>See HTTP Connection on page 216 for more information about specifying shared resources.</p>
Parse Post Method Data	<p>Specifies that the message body of the HTTP request should be parsed into a schema for the activity's output.</p> <p>When this checkbox is checked, the parameters specified in the Parameters field are used to validate the incoming request and parse it into the output schema.</p> <p>Note: In the case of an incoming GET request, there is no message body, so this field has no effect on incoming GET requests.</p>

Field	Description
Parameters	<p>The parameters of the incoming HTTP request. Specifying parameters in this table allows the incoming request to be parsed and represented as a schema in this activity's output. For each parameter, you must provide a name, datatype, and whether the field is required, optional, or repeating.</p> <p>Use the + and x buttons to the right of the parameter table to add and remove parameters. Use the up and down arrows to move parameters to new positions in the table.</p> <p>Note: Specifying parameters in this field parses the query string of the request into the output schema, regardless of whether the Parse Post Method Data field is checked. Checking the Parse Post Method Data field and specifying parameters here is required to parse the message body along with the query string of the request.</p>
HTTP Authentication	<p>Specifies that the client sending the HTTP request must be authenticated. The user name and password specified in the incoming request must exist in the domain. Users are created and managed in the domain using TIBCO Administrator.</p>

Event

The Event tab has the following fields.

Field	Description
Candidate Event Key	<p>Expression built from the data of the incoming file change event. This expression should evaluate to a string and it is compared to the "key" field of the activity's input. If the Candidate Event Key and the activity's key match, then the process accepts the incoming message.</p> <p>For example, you may have sent an HTTP request earlier in the process, and you may be waiting for a response from the HTTP server. You may specify a <code>requestID</code> as an attribute of the HTTP request and <code>responseTo</code> attribute on the Wait for HTTP request activity. The HTTP server presumably will set the <code>responseTo</code> attribute of its response to the same value as the <code>requestID</code> attribute of the request. You would then specify the <code>responseTo</code> attribute as the Candidate Event Key and the <code>requestID</code> attribute of the HTTP request as the "key" in the Input tab.</p> <p>This expression is specified in XPath, and only data from the incoming event is available for use in this XPath expression. See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about XPath expressions.</p>
Event Timeout (msec)	<p>A message may arrive before this activity is executed. This field specifies the amount of time (in milliseconds) a message waits if it is received before this activity is executed. If the event timeout expires, an error is logged and the event is discarded.</p> <p>If no value is specified in this field, the message waits indefinitely. If zero is specified, the event is discarded immediately, unless this activity has already been reached.</p>



When building an expression in the Candidate Event Key field, only data from the incoming event is available. This is because you want to place an expression containing incoming event data in the Candidate Event Key field. When the results of this expression match the results of the expression in the "key" item on the Input tab, the Wait For HTTP Request activity proceeds.

Output Headers

The Output Headers tab describes the data structure for the headers of the HTTP request. You can use the default structure, or you can alter the structure, if the incoming request has a specific data structure for the header of the request. This tab uses the same mechanism described [Appendix A, Specifying Data Schema, on page 743](#) in to specify the data structure for the headers. See that section for more information about creating a customized data structure.

Header structure is defined by the HTTP protocol. See the HTTP Protocol specification for more information about the fields and content of the header of a HTTP request. You can obtain this specification at www.w3.org.

The default header fields are the following.

Header	Datatype	Description
Accept	string	<p>This field specifies media types that are acceptable for response messages for the incoming request. For example, <code>text/*</code>, <code>text/html</code>. Media types are described in the HTTP specification.</p> <p>If no Accept header field is present, then it is assumed that the client accepts all media types.</p>
Accept-Charset	string	<p>This field specifies the character sets that are acceptable for response messages for the incoming request. For example, <code>iso-8859-5</code>, <code>unicode-1-1</code>. Character sets are described in the HTTP specification.</p> <p>If no Accept-Charset header is present, then it is assumed that the client accepts any character set.</p>

Header	Datatype	Description
Accept-Encoding	string	This field specifies the content-coding values that are acceptable for response messages. For example, <code>compress</code> , <code>gzip</code> . See the HTTP specification for more information about this header field.
Content-Type	string	This field indicates the media type of the entity body sent to the receiver. Media types are described in the HTTP specification. An example of the media type is <code>text/html; charset=ISO-8850-4</code> .
Content-Length	string	<p>This field indicates the size of the entity body (in decimal number of OCTETs) sent to the receiver.</p> <p>This field takes into account the encoding of the message body, see Special Characters in HTTP Requests on page 229 for more information on when the message body is URL encoded.</p>
Connection	string	This field allows the requestor to specify options desired for this connection. For example, the option <code>close</code> specifies that the requestor would like the connection to be closed when the request is complete.
Cookie	string	See the HTTP specification for more information about this field.
Pragma	string	This field is used to include implementation-specific directives that might apply to the receiver. See the HTTP specification for more information about using this field.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
key	string	The value that is compared to the Candidate Event Key field of the Event tab to determine if this message applies to this process. See Event on page 270 for an example of using the Candidate Event Key field with the key input item.
processTimeout	integer	The time (in milliseconds) to wait for the incoming message. An error is returned if the message is not received in this time limit.

Output

The output for the activity is the following.

Output Item	Datatype	Description
Method	string	The HTTP method to use for the request. All HTTP 1.1 methods are supported.
RequestURI	string	The address portion of the request. This is the portion before the question mark (?).
HTTPVersion	string	Version field of the HTTP request.
PostData or BinaryContent	string	The message body of the HTTP request. The content of this element depends upon whether the message body is parsed. Parsing behavior is controlled by the Parse Post Method Data field on the Configuration tab). See Special Characters in HTTP Requests on page 229 for more information.
Command	string	Command portion of the HTTP request.
QueryString	string	The query string portion of the request. This is the portion after the question mark (?).
Header	string	The header of the HTTP request.

Output Item	Datatype	Description
DynamicHeaders	complex	<p>The dynamic header is an additional header parameter to add runtime headers to the Outgoing Http Messages. This element is specified in the Input tab. Dynamic header consists of the following information:</p> <ul style="list-style-type: none">• Name — name of the header.• Value — value of the header. <p>The following overriding conditions can be considered:</p> <ul style="list-style-type: none">• Overrides the value of HeaderName with the value found in DynamicHeaders if it is a non-repeating header. If more than one occurrence of this header is found under DynamicHeaders, it throws the following exception: "The header [headerName] is defined as non-Repeating Header in Input Headers. This header cannot have multiple occurrences in DynamicHeaders."• If it is repeating element, add the respective name value pairs under dynamic headers, which will be added to the existing list maintained for this element.• For a repeating element, if the new header name is not found under Headers section declared via TIBCO Designer, following is added into the HTTP Headers.<ul style="list-style-type: none">— Shows only one value, if found once in DynamicHeaders.— Shows array of values, if found repeating in DynamicHeaders.
Protocol	string	Can be either HTTP or HTTPS depending upon the protocol used by the request.

Output Item	Datatype	Description
Port	string	Port number on which the request was received. This is the port number configured in the HTTP Connection resource.
mimeEnvelope Element	complex	This element contains the message attachments. This element contains a repeating element named mimePart that contains each mime attachment.
mimeHeaders	complex	<p>This element contains the mime header for each mimePart. Mime headers can contain the following information:</p> <ul style="list-style-type: none"> • content-disposition — To suggest a filename for an attachment, use "<code>*; filename=<filename></code>" in this element. Note: HTTP servers may alter or choose to ignore the suggested name. • content-type • content-transfer-encoding • content-id • other mime header information <p>See http://www.faqs.org/rfcs/rfc2045.html for more information about MIME headers and their syntax.</p> <p>Note: When the content type is specified as "text/*" (for example, "text/xml"), the attachment content is expected to be in either the textContent input element or the file name storing the attachment is expected to be in the fileName input element. When the content type is anything other than "text/*", the attachment content is expected to be in either the binaryContent input element or the file name storing the attachment is expected to be in the fileName input element.</p>

Output Item	Datatype	Description
binaryContent textContent fileName	choice	<p>This element contains the mime attachment. The element can be one of the following:</p> <ul style="list-style-type: none">binaryContent — content of the attachment when the attachment is binary data.textConetnt — content of the attachment when the attachment is text data.fileName — the file name of the attachment when the attachment is stored in the file system.
Headers	complex	<p>The fields of the header specified on the Headers tab. See the description of the Headers tab for more information about these items.</p>
parameters	complex	<p>Parameters for the incoming request. These parameters are configured in the Parameters field on the Configuration tab.</p> <p>When the Parse Post Method Data field on the Configuration tab is checked, the parameters include the parameters in the query string and message body of the incoming HTTP request.</p> <p>When the Parse Post Method Data field is unchecked, the parameters only include the query string of the incoming request.</p>

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
ActivityTimedOutException	A timeout has been reached.

Chapter 7 **Java Palette**

The Java palette has activities and shared configuration resources for executing Java code as well as converting between Java objects and XML documents.

Topics

- [Show Class Browser, page 278](#)
- [Common Features of Java Code and Java Method, page 280](#)
- [Java Code, page 282](#)
- [Java Custom Function, page 289](#)
- [Java Event Source, page 294](#)
- [Java Global Instance, page 302](#)
- [Java Method, page 305](#)
- [Java Schema, page 313](#)
- [Java To XML, page 315](#)
- [XML To Java, page 319](#)

Show Class Browser

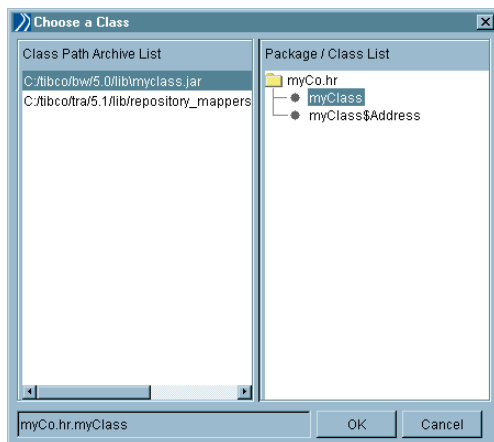
Button

The Choose a Class or Choose a Class and Method dialog appears when you click the Show Class Browser button. This dialog allows you to pick a Java class (and method of that class for the [Java Method](#) activity) from a list of archives available in the TIBCO ActiveMatrix BusinessWorks classpath. The Show Class Browser button is used in the following resources:

- [EJB Home](#)
- [Java Method](#)
- [Java Schema](#)
- [Java To XML](#)
- [XML To Java](#)

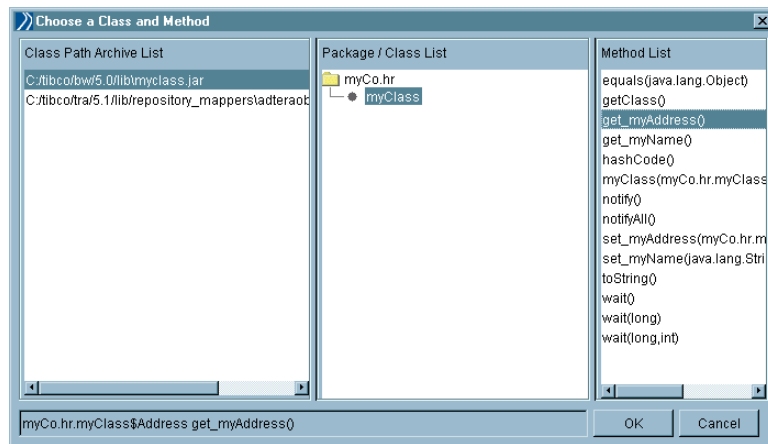
[Figure 11](#) illustrates selecting a class in the Choose a Class dialog. First you select the archive, then you select the class. Packages that contain classes are displayed as folders and the contained classes are nested below the package folder.

Figure 11 Selecting a class with the Choose a Class dialog



The [Java Method](#) and [EJB Home](#) activities allow you to select a class and a method in that class to execute. The Show Class Browser button brings up the Choose a Class and Method dialog. [Figure 12](#) illustrates this dialog.

Figure 12 Selecting a method in a class from the Choose a Class and Method dialog



Common Features of Java Code and Java Method

The [Java Code](#) and [Java Method](#) activities both execute Java. Therefore, there are some features that both activities share. This section describes some of the common features between the two activities.

Accessing TIBCO ActiveMatrix BusinessWorks Global Variables and Java System Properties

You can use the `com.tibco.pe.plugin.PluginProperties.getProperty()` method to retrieve any Java system property or global variables defined in your project.

Global variables are contained in Java System properties that are prefixed with `tibco.clientVar`. For example, if you define a global variable named `myVar`, you can access the value of the global variable with the following Java code:

```
String var1 =
    com.tibco.pe.plugin.PluginProperties.getProperty(
        "tibco.clientVar.myVar");
```

You must specify the full path for global variables contained in variable groups to access the variable's value. Use the slash character (/) to separate each element in the path. For example, if you have a global variable named `item1` contained in a group named `myGroup`, you can access the value of the global variable with the following Java code:

```
String var1 =
    com.tibco.pe.plugin.PluginProperties.getProperty(
        "tibco.clientVar.myGroup/item1");
```

Any Java System property can also be accessed with the `PluginsProperties.getProperty()` method. Supply a string containing the property name as the input parameter to the method to obtain the property's value.



The `com.tibco.pe.plugin.PluginProperties` class is contained in the `lib/engine.jar` file within the TIBCO ActiveMatrix BusinessWorks installation directory. This directory is in the TIBCO ActiveMatrix BusinessWorks classpath, and therefore Java Code activities can compile code referencing this class. If you compile your code outside of TIBCO ActiveMatrix BusinessWorks, you must ensure your development environment has access to the `engine.jar` file.

Sending Messages to The TIBCO ActiveMatrix BusinessWorks log4j File

The standard log4j logging service is available for components of TIBCO ActiveMatrix BusinessWorks. See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about using the BusinessWorks log4j properties file.

Code in the Java Code or Java Method activities can send messages to the log4j file by using the `bw.logger` class. For example, the following code obtains the `bw.logger` class and uses the class to send a message to the log file.

```
org.apache.log4j.Logger logger =  
    org.apache.log4j.Logger.getLogger("bw.logger");  
logger.warn("This is a warning message from the either a  
    Java Code or Java Method activity");
```

If you use your own logger class, you can configure the BusinessWorks log4j properties file to include your logger. This involves adding `log4j.logger` and `log4j.appender` properties to the properties file. See the log4j documentation for more information about log4j properties. Once the properties for your custom logger class are added to the BusinessWorks log4j file, you can obtain your logger class and write messages to the log file in your Java Code and Java Method activities.

Java Code

Activity



You can add custom code to your process definition with the Java Code activity. This activity allows you to write standard Java code that can manipulate any of the process data or perform any action you choose.

The Java Code activity automatically creates an `invoke()` method in which you place the code you want to execute. This method is called when the engine processes the Java Code activity.

When you specify input and output parameters for the Java Code activity, get/set method code is automatically generated for the activity. You can use the get/set methods in your Java code, and you can display the code for the get/set methods when you select the Full Class radio button on the Code tab.



Use **Edit>Preferences>Other** to specify the Java editor you want to use to edit source code.

If you do not specify an editor, a simple popup editing window is provided.

See [Common Features of Java Code and Java Method on page 280](#) for more information about features available in the Java Code activity.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.

Field	Global Var?	Description
Input Parameters	No	<p>The input parameters for the Java Code activity. These parameters appear on the Input tab after they are specified. Each input parameter has three fields:</p> <ul style="list-style-type: none"> Field Name — Name of the parameter. Type — Datatype of the parameter. Specify one of the supplied Java primitive types, or specify Object Reference if you are accepting a Java object from another Java Code activity as input. See Passing Java Objects Between Java Code Activities on page 286 for more information about passing Java objects between Java Code activities. Occurrence — Whether the parameter is required, optional, or repeating.
Output Parameters	No	<p>The output parameters for the Java Code activity. These parameters appear on the Output tab after they are specified. Each output parameter has three fields:</p> <ul style="list-style-type: none"> Field Name — Name of the parameter. Type — Datatype of the parameter. Specify one of the supplied Java primitive types, or specify Object Reference if you are passing a Java object to another Java Code activity as output. See Passing Java Objects Between Java Code Activities on page 286 for more information about passing Java objects between Java Code activities. Occurrence — Whether the parameter is required, optional, or repeating.

Code

You can choose to display the full Java class or display only the `invoke()` method body of the class. Choose the appropriate option at the top of the Code tab for the code you want to display.

The code tab has the following fields/buttons.

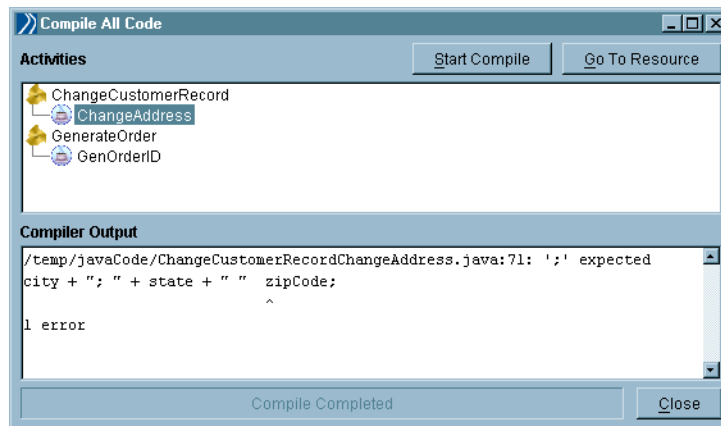
Field/Button	Description
Java Code	<p>The source code of the Java class.</p> <p>Specify the code you want to execute in the automatically generated <code>invoke()</code> method. The get/set methods for the input and output parameters are automatically generated and displayed when you choose the Full Class option above the code window.</p> <p>When the Java code is run by the engine, the automatically generated get/set methods are called, then the <code>invoke()</code> method in the Java class is called.</p>
Compile Button	<p>Compiles the current source code. When the code in the activity needs compilation (for example, the input or output parameters change or the code changes), a yellow warning icon appears on this button.</p> <p>The code will either compile successfully or the View Errors dialog will appear to display any errors in the code.</p> <p>After compilation, the source and compiled java code are placed into the <code>lib/palettes/javaCode</code> directory in the TIBCO ActiveMatrix BusinessWorks installation directory.</p>
View Errors Button	<p>Displays the errors encountered when the code was compiled.</p>
Edit Class Button	<p>Displays the source code in the editor specified with the TIBCO Designer preferences. If no editor is specified, a simple popup editing window is used.</p> <p>Use Edit>Preferences>Other to specify the Java editor you want to use to edit source code.</p> <p>Note: On MS Windows platforms, a temporary file is created to hold the Java code when you edit your code with this button. This file is located in either <code>C:\temp</code> or <code>C:\tmp</code> or your working directory. If your working directory contains a space (for example <code>C:\Documents and Settings\...</code>), there may be problems opening the temporary file. Make certain either the <code>C:\temp</code> or <code>C:\tmp</code> directory exists to avoid this issue.</p>

Compiling Java Code

You can compile each Java Code activity individually with the Compile button on the Code tab, or you can compile all Java Code activities in your project at once with the Tools > Java Code > Compile All Code menu item.

When you use the Compile All Code menu item, the Compile All Code dialog appears. [Figure 13](#) illustrates this dialog.

Figure 13 Compile All Code dialog



All process definitions containing Java Code activities that do not compile successfully are listed in the Activities area. Each Java Code activity is listed under the process definition in which it is located. You can select any Java Code activity in the Activities area to display the compilation errors for that activity.

The dialog has the following buttons:

- **Start/Cancel Compile** — Click Start Compile to begin compiling all Java Code activities in your project. When the code is compiling, this button is renamed Cancel Compile to allow you to cancel the compile all operation.
- **Go To Resource** — You can select any process definition or Java Code activity, then click the Go To Resource button to display that resource in the design and configuration panels.
- **Close** — Closes the Compile All Code dialog.

Passing Java Objects Between Java Code Activities

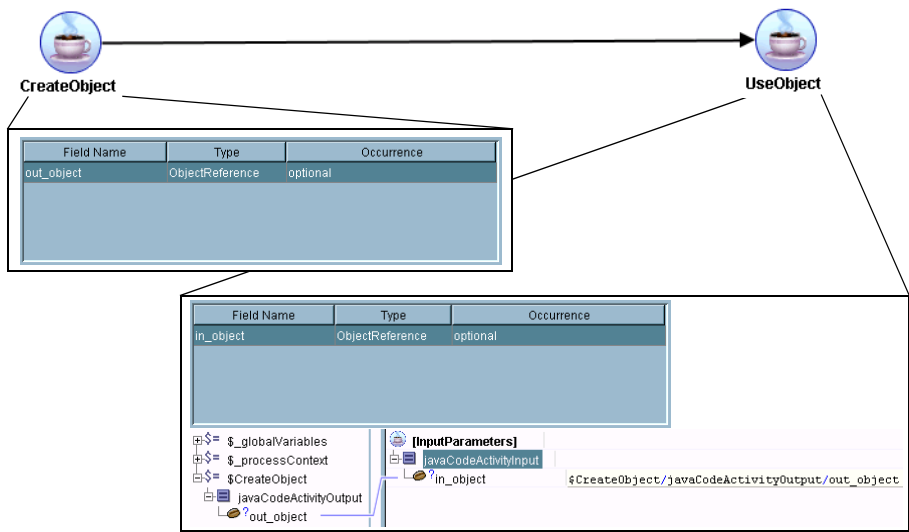
You may create instances of Java objects in your Java code or by using the [Java Method](#) or [XML To Java](#) activities. You can pass these Java objects using an output parameter to another activity later in the process definition. The Java Code activity receiving a Java object accepts the object into an input parameter and you must map the output Java object to the input object of the receiving Java Code object.



Any Java objects passed by input and output parameters between activities must be serializable.

Figure 14 illustrates two Java code activities. The CreateObject activity creates a Java object and passes a reference to the object in the output parameter named out_object. The UseObject activity defines an input parameter named in_object of type ObjectReference and maps the CreateObject activity's output object reference to its input parameter of type ObjectReference.

Figure 14 Passing objects between Java Code activities



The UseObject activity can invoke methods on the input object as it would for any other object. For example, if you want to call a method named `getInteger()` that returns an integer, you would use the following code in the UseObject activity:

```
MyClass myObject = (MyClass) in_object;
int var = 0;
if (myObject != null) {
    var = myObject.getInteger();
}
```


Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
parameters	varies	The Input tab lists all input parameters specified on the Configuration tab.

Output

The output for the activity is the following.

Output Item	Datatype	Description
parameters	varies	The Output tab lists all output parameters specified on the Configuration tab.

Error Output

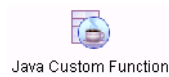
The Error Output tab lists the exceptions that can be thrown by the Java Code activity. Because the activity can return any Java exception, all potential exceptions cannot be listed here. However, the error schema for all errors is the same. The following describes the schema for exceptions returned by the Java Code activity.

Error Schema Element	Datatype	Description
msg	string	The TIBCO ActiveMatrix BusinessWorks error message. See <i>TIBCO ActiveMatrix BusinessWorks Error Codes</i> for more information.
msgCode	string	The TIBCO ActiveMatrix BusinessWorks error code. See <i>TIBCO ActiveMatrix BusinessWorks Error Codes</i> for more information.
methodName	string	The name of the Java method that raised the exception.

Error Schema Element	Datatype	Description
exceptionClassName	string	The Java exception class name. The value of this element is obtained by calling the <code><exception>.getClass().getName()</code> method.
exceptionMessage	string	The Java exception message. The value of this element is obtained by calling the <code><exception>.getMessage()</code> method.

Java Custom Function

Shared Configuration



The Java Custom Function resource allows you to create custom functions to use when mapping data in an activity's input tab. These functions are also displayed when using the XPath Editor to build an XPath expression.

To create a custom function, you must write the function as a method of a Java class and compile the code into a Java class file. You then load that class file into the project using this resource.

When the class is loaded using this resource, TIBCO ActiveMatrix BusinessWorks inspects the contents of the class and only the class methods that meet the following restrictions are made available in XPath:

- Only methods declared as `public` and `static` are loaded.
- The input parameters and return values must be of one of the types described in [Table 3](#).
- The return value of the function cannot be `void`.
- The method cannot be a constructor.
- The method cannot explicitly throw an exception. Runtime exceptions are allowed, however.
- Method names cannot be overloaded in a class or any imported classes in a single Java Custom Function resource. You can load methods of the same name into separate classes in separate Java Custom Function resources and use the Prefix field to differentiate between the methods.
- If you make references to any imported class files, these classes must be available in the classpath configured for TIBCO ActiveMatrix BusinessWorks. The easiest way to make the imported classes available is to place them in the `TIBCO/bw/2.0/lib` directory.
- Inner classes are not supported.



TIBCO ActiveMatrix BusinessWorks provides detailed online help for each XPath function. To provide online help for Java Custom Functions, create a two-dimensional array named `HELP_STRINGS` in your class. The element containing a string matching the function name is used as the help for that function. See [Example Java Function on page 292](#) for an example of creating the `HELP_STRINGS` array.

Table 3 Datatypes allows for Java custom functions

Type of Data	Datatypes Allowed for Input Parameters and Return Types	
Strings and Characters	String	char
Boolean	Boolean	boolean
Numbers	int	Integer
	float	Float
	double	Double
	short	Short
	long	Long



Static variables are not supported in Java custom functions. Do not write custom functions that use static variables.

If there are different classes that have methods with the same names, the Prefix field allows you to specify a prefix for qualifying which method you want to use in an XPath function. See the description of the Prefix field below for more information.

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about building XPath expressions and using the XPath editor.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the resource.
Description	Short description of the shared resource. The method signature plus the description supplied in this field appear as the documentation of the function in the XPath editor. You can use simple HTML markup to format the text of this field, if you desire.

Field	Description
Suggested Prefix	<p>A folder with the name you specify in this field appears in the Functions tab in the XPath editor. You can drag and drop methods from the loaded class into your XPath expression, just as you would with any standard XPath function.</p> <p>Use this name as a prefix for function names in this class, if multiple classes are loaded and function names are not unique among the classes.</p> <p>For example, if you have <code>class1.method1</code> and <code>class2.method1</code>, you will need to specify <code>class1</code> in the Suggested Prefix field when you load <code>class1</code> into a Java Custom Resource. You would specify <code>class2</code> in the Suggested Prefix field when loading <code>class2</code>. When using <code>method1</code> in XPath expressions, you must qualify which <code>method1</code> you are using by specifying <code>class1:method1</code> or <code>class2:method1</code> in the XPath expression.</p> <p>The value of this field must be unique across all loaded Java Custom Function resources, and the value must be a valid XPath identifier. Also, you cannot use global variables (that is, <code>%variable%</code>) in this field.</p>
Class Location	<p>The location of the class file you want to load. Use the Browse button to locate the class file.</p> <p>Note: This field is used to locate the file initially, but the file is actually loaded and stored in the repository. Once the file is loaded, it can be removed from its original location in the file system. If you want to change the file stored in the repository, you can use this field to reload a changed file or load a new file for this resource.</p>
Class Data	<p>The size of the class in bytes. Use the Load button after a class is selected in the Class Location field to load the class and determine its size.</p>

Example Java Function

The following Java code implements custom Java functions. The example illustrates which methods of the class meet the restrictions and are therefore available as custom functions in XPath. The example also illustrates methods which do not meet the restrictions, and therefore are not available as custom functions.

```
package com.tibco;

public class Sample
{
    protected int mInternalValue;

    /**
     * The following method will not be available because it is
     * a constructor.
     */
    public Sample(int value)
    {
        mInternalValue = value;
    }

    /**
     * This method is used to concat two strings together. It
     * must be declared as public static to be made available in
     * TIBCO ActiveMatrix BusinessWorks.
     */
    public static String stringConcat(String s1, String s2)
    {
        return s1 + s2;
    }

    /**
     * This method is used to add two ints together. Note, that
     * it takes both an int type and an Integer object.
     */
    public static int intAdd(int lhs, Integer rhs)
    {
        return lhs + rhs.intValue();
    }

    /**
     * The following method will not be available because it
     * throws an exception.
     */
    public static int badAdd(int lhs, int rhs)
    throws Exception
    {
        long result = lhs + rhs;
        if (result > Integer.MAX_VALUE) {
            throw new ArithmeticException();
        }
        return new Long(result).intValue();
    }
}
```

```

/**
 * The following method will not be available because it
 * returns nothing: its void.
 */
public static void returnsNothing(String s)
{
    System.out.println(s);
}

/**
 * The following method will not be available because it
 * is not static.
 */
public int add(int rhs)
{
    return mInternalValue + rhs;
}

/**
 * The following method will not be available because it
 * is not public.
 */
protected static int protectedAdd(int lhs, int rhs)
{
    return lhs + rhs;
}

/**
 * The following is a two-dimensional array that provides the
 * online help for functions in this class. Declare an array
 * named HELP_STRINGS.
 */
public static final String[][] HELP_STRINGS ={
    {"stringConcat", "Joins two strings.",
    "Example", "stringConcat(\"test/testDict\",
    $input/key)"},
    {"intAdd", "Adds two integers.",
    "Example", "intAdd(5, $input/myInt)"},
}
}

```

Java Event Source

Process Starter



The Java Event Source allows you to create a custom process starter written in Java. For example, you may want to start a TIBCO ActiveMatrix BusinessWorks process when an application inserts a row into a database table. Your custom process starter would observe the database for insert events, then call the `onEvent()` method with the desired data as input when an insert occurs. The Java Event Source process starter creates a process when the `onEvent()` method is invoked and the object passed to the method is passed to the process definition.

This process starter uses an abstract class to define the interface. You can either write and compile your custom Java code in your own code editor and upload the class to TIBCO ActiveMatrix BusinessWorks, or you can use the Code tab to add your implementation code to the appropriate methods. See [JavaProcessStarter Abstract Class on page 295](#) for more information about the methods required by this class.



If you want to use the Edit Class button on the Code tab, select **Edit>Preferences>Other** to specify the Java editor you want to use to edit source code.

If you do not specify an editor, a simple popup editing window is provided.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Use External Class	No	When this field is checked, the Code tab is disabled, and you must load the class using the Class Library and Class fields. When this field is unchecked, you must add your code to the appropriate methods on the Code tab.

Field	Global Var?	Description
Java	No	This field contains the Class Library, Class, and Init Method fields that allow you to specify which class and method to use.
Class Library	No	Use this field to specify an AliasLibrary resource that is used to locate the Java class files. See <i>TIBCO Designer Palette Reference</i> for more information about AliasLibrary resources.
Class	No	The compiled Java class that implements the JavaProcessStarter abstract class. Use the Show Class Browser button to select the class from the specified Class Library.
Init Method	No	<p>The <code>init()</code> method for the class. This field is automatically populated when you use the Show Class Browser button. See JavaProcessStarter Abstract Class on page 295 for more information about the <code>init()</code> method.</p> <p>You can use the drop down list to select a different method in the selected Java class, if desired.</p> <p>Note: You can hover the cursor over this field to display the signature of the selected method.</p>
Init Method Parameters	No	<p>This table allows you to specify default values for the input parameters of the <code>init()</code> method. Each input parameter has three fields:</p> <ul style="list-style-type: none"> Parameter Name — Name of the parameter. Parameter Type — Datatype of the parameter. Parameter Value — Specify a default value for the parameter.

JavaProcessStarter Abstract Class

The JavaProcessStarter abstract class defines the interface of your Java Process Starter with the TIBCO ActiveMatrix BusinessWorks process engine. You must define an implementation for the following methods:

- `init()` — this method is called when the process engine starts up. This method should initialize any resource connections. You could also specify a

Java Global Instance on the Advanced tab that initializes resource connections. Java Global Instances are also loaded and initialized during process engine start up. You can call `this.getJavaGlobalInstance()` to obtain the Java Global Instance resource in your process starter code.

- `onStart()` — this method is called by the process engine to activate the process starter. This method should activate any event notifier or resource observer code. The notifier or observer code can then call the `onEvent()` method to start a process instance.
- `onStop()` — this method is called by the process engine to deactivate the process starter. This method should deactivate any event notifier or resource observer code.
- `onShutdown()` — this method is called by the process engine when the engine shuts down. This method should release any resources and resource connections and perform any required clean up operations.

The following methods are already implemented and can be used in your code:

- `onEvent(Object object)` — this method is called when a listener or resource observer catches a new event. The input to this method is a Java object containing the event data.
- `getGlobalInstance()` — this method returns an object reference to the Java Global Resource specified on the Advanced tab of the process starter. This is useful if you want to place initialization code or other shared information in a Java Global Resource instead of in the `init()` method of this class.
- `onError()` — this method throws the exception specified in the input parameter. Use this method to propagate an error to the TIBCO ActiveMatrix BusinessWorks process instance when a listener or resource observer fails to generate an event.

Code

This tab is only enabled if the Use External Class field is unchecked. This tab allows you to add implementation code to the appropriate methods of the `JavaProcessStarter` class. You can choose to display the full Java class or display a particular method by selecting the appropriate value in the Show field at the top right of the Code tab.

The code tab has the following fields/buttons.

Field/Button	Description
Source Code	The source code of the <code>JavaProcessStarter</code> implementation class.

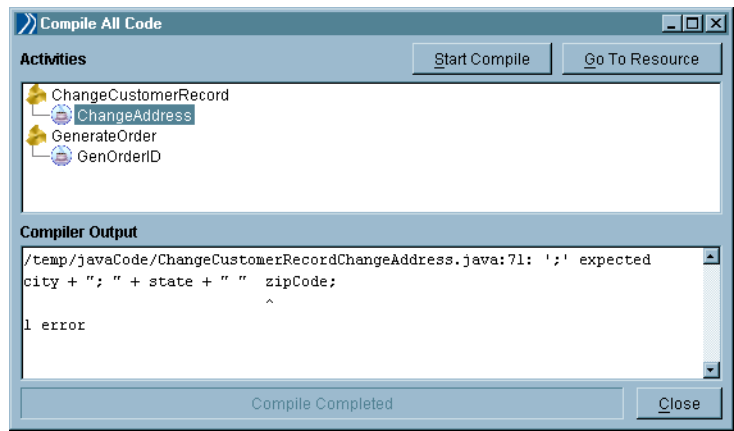
Field/Button	Description
Show	<p>Displays the selected method or the entire class. The following are valid options to select:</p> <ul style="list-style-type: none"> • init • onStart • onStop • onShutdown • Entire Class
Compile Button	<p>Compiles the current source code. When the code in the activity needs compilation (for example, the code changes), a yellow warning icon appears on this button.</p> <p>The code will either compile successfully or the View Errors dialog will appear to display any errors in the code.</p> <p>After compilation, the source and compiled java code are placed into the <code>lib/palettes/javaCode</code> directory in the TIBCO ActiveMatrix BusinessWorks installation directory.</p>
View Errors Button	<p>Displays the errors encountered when the code was compiled.</p>
Edit Class Button	<p>Displays the source code in the editor specified with the TIBCO Designer preferences. If no editor is specified, a simple popup editing window is used.</p> <p>Use Edit>Preferences>Other to specify the Java editor you want to use to edit source code.</p> <p>Note: On MS Windows platforms, a temporary file is created to hold the Java code when you edit your code with this button. This file is located in either <code>C:\temp</code> or <code>C:\tmp</code> or your working directory. If your working directory contains a space (for example <code>C:\Documents and Settings\...</code>), there may be problems opening the temporary file. Make certain either the <code>C:\temp</code> or <code>C:\tmp</code> directory exists to avoid this issue.</p>

Compiling Java Code

You can compile each Java Code activity and Java Process Starter resource individually with the Compile button on the Code tab, or you can compile all Java Code and Java Process Starter resources in your project at once with the Tools > Java Code > Compile All Code menu item.

When you use the Compile All Code menu item, the Compile All Code dialog appears. [Figure 13](#) illustrates this dialog.

Figure 15 Compile All Code dialog



All process definitions containing Java Code activities and Java Process Staters that do not compile successfully are listed in the Activities area. Each Java Code activity or Java Process Starter is listed under the process definition in which it is located. You can select any Java Code activity or Java Process Starter in the Activities area to display the compilation errors for that activity.

The dialog has the following buttons:

- Start/Cancel Compile — Click Start Compile to begin compiling all Java Code activities and Java Process Starters in your project. When the code is compiling, this button is renamed Cancel Compile to allow you to cancel the compile all operation.
- Go To Resource —You can select any process definition, Java Process Starter, or Java Code activity, then click the Go To Resource button to display that resource in the design and configuration panels.
- Close — Closes the Compile All Code dialog.

Advanced

The Advanced tab has the following fields:

Field	Global Var?	Description
Java Global Instance	No	<p>A Java Global Instance resource. Specify a value in this field if you want to reference a Java Global Instance resource in your JavaProcessStarter implementation class. You can use the <code>getGlobalInstance()</code> method to obtain a reference to the Java Global Instance resource.</p> <p>See Java Global Instance on page 302 for more information about Java Global Instance resources.</p>
Convert Output Object To XML	No	<p>When this field is unchecked, the object passed to the <code>onEvent()</code> method is output by this process starter as a Java object reference. You can use the Java To XML activity to render the Java object as an XML tree, if desired.</p> <p>Check this field if you want the data of the input object to the <code>onEvent()</code> method to be converted to an XML tree in this process starter's output.</p> <p>For the output to be returned as an XML tree, the output object type must be specified. To achieve this, you must add the <code>getOutputObjectType()</code> class to your implemenntation class. For example, the output can be a string:</p> <pre>public Class getOutputObjectType() { return String.class; }</pre> <p>Then, the object you pass into the input parameter of the <code>onEvent()</code> method must be a String.</p>

Misc

The Misc tab contains the following fields:

Field	Description
Sequencing Key	<p>This field can contain an XPath expression that specifies which processes should run in order. Process instances with sequencing keys that evaluate to the same value will be executed sequentially in the order the process instance was created.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about controlling the execution order of process instances and about XPath expressions.</p>
Custom Id	<p>This field can contain an XPath expression that specifies a custom ID for the process instance. This ID is displayed in the View Service dialog of TIBCO Administrator, and it is also available in the <code>\$_processContext</code> process variable.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
javaObject or Object	varies	<p>The Java object that was passed to the <code>onEvent()</code> method. By default, this element is a Java object reference. If the Convert Output Object to XML field is checked on the Advanced tab and the output class is specified in your implementation class, the output is represented as an XML tree.</p>

Error Output

The Error Output tab lists the exceptions that can be thrown by the Java Event Source resource. Because the resource can return any Java exception, all potential exceptions cannot be listed here. However, the error schema for all errors is the same. The following describes the schema for exceptions returned by the Java Event Source resource.

Error Schema Element	Datatype	Description
msg	string	The TIBCO ActiveMatrix BusinessWorks error message. See <i>TIBCO ActiveMatrix BusinessWorks Error Codes</i> for more information.
msgCode	string	The TIBCO ActiveMatrix BusinessWorks error code. See <i>TIBCO ActiveMatrix BusinessWorks Error Codes</i> for more information.

Java Global Instance

Shared Configuration



Java Global Instance

The Java Global Instance shared configuration resource allows you to specify a Java object that can be shared across all process instances in a Java Virtual Machine (JVM). When the process engine is started, an instance of the specified Java class is constructed. When the process engine is shut down, if specified, a cleanup method is invoked on the object and the object is released before the engine shuts down. Any [Java Method](#) activity can be configured to access the shared Java Global Instance when the process engine runs. Any [Java Code](#) activity can access the shared Java Global Instance by invoking the static methods of the configured Java class.

If multiple process instances access the shared Java Global Instance, you may want to ensure that only one process instance can access the object at a time. You can accomplish this by either declaring the methods of the configured class as synchronous or by using a critical section group. See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about using critical section groups.



Java class files or archives referenced by this resource must be available to the Java VM in which TIBCO Designer and the TIBCO ActiveMatrix BusinessWorks process engine are running. This is done either by adding the correct path to the classpath in the `designer.tra` and `bwengine.tra` files (see the comments in the `.tra` files for more information about modifying the classpath) or by using an Alias Library resource. If you add the path to the classpath, the system class loader loads the class into the Java VM. If you use an Alias Library resource, the TIBCO ActiveMatrix BusinessWorks application class loader loads the class into the Java VM. If both techniques are used, the class loaded by the system class loader takes precedence.

Objects created from classes loaded by different class loaders are not able to interact. For example, an Alias Library resource points to the location of Java ClassA and a Java Method activity references ClassA. Java class ClassB is placed in the classpath and referenced by a Java Code activity. The Java Method activity can pass the ClassA object to the Java Code activity, but the ClassB object in the Java Code activity may not be able to interact with the ClassA object. If you want objects to interact correctly, ensure that the activities use the same class loader.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the shared configuration resource.
Description	No	Short description of the resource.
Java	No	This field contains the Library, Class, and Method fields that specify the Java object to create.
Library	No	Use this field to specify an AliasLibrary resource that is used to locate the Java class files. See <i>TIBCO Designer Palette Reference</i> for more information about AliasLibrary resources.
Class	No	Use the Show Class Browser button to locate the class you want to use.
Method	No	<p>Select a constructor from the drop down list of constructors available for this class. This will be used to construct the class when the engine is started.</p> <p>This field displays only the default constructor (that is, the constructor with no parameters) or constructors that have only parameters of Java primitive types. You cannot create an object using a constructor that requires an object, array, or non-primitive type for a parameter.</p>

Field	Global Var?	Description
Parameters Input	No	<p>The input parameters for the constructor selected in the Method field. Each input parameter has three fields:</p> <ul style="list-style-type: none">• Parameter — Name of the parameter.• Type — Datatype of the parameter.• Value — Supply a value for the parameter in this field. Note: When string is the datatype for the parameter, do not use quotes around the string when entering the value.

Advanced

The Advanced tab has the following fields:.

Field	Global Var?	Description
Invoke Cleanup Method	No	<p>When checked, this specifies that you want to invoke a method on the object before the object is released from memory when the process engine terminates. This allows you to perform cleanup activities, such as closing connections, releasing resources, and so on.</p> <p>When this field is checked, the Cleanup Method field appears.</p>
Cleanup Method	No	<p>This field is only available when the Invoke Cleanup Method field is checked.</p> <p>This field allows you to specify the name of the method to invoke before the object in memory is released. The method selected cannot contain any parameters, therefore only methods without parameters are listed in this field. Any values returned by the selected method are ignored, but exceptions raised by the selected method are sent to the log.</p>

Java Method

Activity



The Java Method activity allows you to invoke a method contained in a Java class. You can construct an instance of the specified Java class, if you choose to invoke the constructor for the class.

The Java class file must be located in the classpath for TIBCO Designer and the TIBCO ActiveMatrix BusinessWorks process engine. Update the `designer.tra` and `bwengine.tra` file to contain the directory where your Java class files are located.

See [Common Features of Java Code and Java Method on page 280](#) for more information about features available in the Java Code activity.

Configuration

The Configuration tab has the following fields:

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.

Field	Global Var?	Description
Java Global Instance	No	<p>You can execute methods on shared Java objects created by Java Global Instance resources by specifying the resource in this field. See Java Global Instance on page 302 for more information about the shared Java objects created by Java Global Instance resources.</p> <p>When a resource is specified in this field, the Library and the Class fields are automatically populated with the correct values from the Java Global Instance resource, and the fields on the Advanced tab become unavailable. You can select the method to execute in the drop down list in the Method field.</p> <p>Note: If the configuration of the Java Global Instance resource changes, you must select and view any Java Method activities in your process definitions that reference the Java Global Instance to automatically propagate the changes. An exception is raised if you attempt to test your process definitions before refreshing the reference to the Java Global Instance. You may need to manually update the mappings of any input or output if you select a new method with a different signature in the Java Global Instance resource.</p>
Java	No	<p>This field contains the Library, Class, and Method fields that allow you to specify which class and method to execute.</p>
Library	No	<p>Use this field to specify an AliasLibrary resource that is used to locate the Java class files. See <i>TIBCO Designer Palette Reference</i> for more information about AliasLibrary resources.</p>
Class	No	<p>The declared Java class whose method you want to execute. Use the Show Class Browser button to select the class and method, or use the Java Global Instance field to specify a shared Java object.</p>

Field	Global Var?	Description
Method	No	<p>The method in the selected Java class you want to execute. This field is automatically populated when you use the Show Class Browser button.</p> <p>You can use the drop down list to select a different method in the selected Java class, if desired.</p> <p>Note: You can hover the cursor over this field to display the signature of the selected method.</p>

Advanced

The Advanced tab has the following fields:.

Field	Global Var?	Description
Construct Declared Class	No	<p>This field controls whether the declaring class must be constructed when the activity is executed or whether an object reference must be supplied in the activity's input schema.</p> <p>When this field is checked, the declaring class is constructed using the default constructor when the activity executes. In this case, the declaring class is not included in the activity's input schema.</p> <p>When this field is unchecked, you must supply an object reference for the Java class specified on the Configuration tab. The object must be created and contained in the output schema of a previously executed activity, such as a Java Code activity, another Java Method activity, a RMI Server process starter, or an XML To Java activity. In this case, the declaring class is included in the activity's input schema.</p> <p>This field is not available when a static method is selected.</p>

Field	Global Var?	Description
Cache Constructed Class	No	<p>This field is only available when the Construct Declared Class is checked.</p> <p>When checked, this specifies that all instances of this Java Method activity will share the instance of the constructed declaring class. If the constructed object is cached, it is kept in memory until the process engine terminates.</p> <p>If this field is unchecked, each instance of this Java Method activity creates its own copy of the declaring class.</p> <p>See Caching the Java Class on page 309 for more information about caching the declared class.</p>
Invoke Cleanup Method	No	<p>This field is only available when the Cache Constructed Class field is checked.</p> <p>When checked, this specifies that you want to invoke a method on the cached object before the object is released from memory when the process engine terminates. This allows you to perform cleanup activities, such as closing connections, updating database tables, and so on.</p> <p>When this field is checked, the Cleanup Method field appears.</p>
Cleanup Method	No	<p>This field is only available when the Invoke Cleanup Method field is checked.</p> <p>This field allows you to specify the name of the method to invoke before the cached class in memory is released. The selected method cannot contain any parameters, therefore only methods with no parameters are listed in this field. Any values returned by the selected method are ignored, but any exceptions raised are sent to the log.</p>

Caching the Java Class

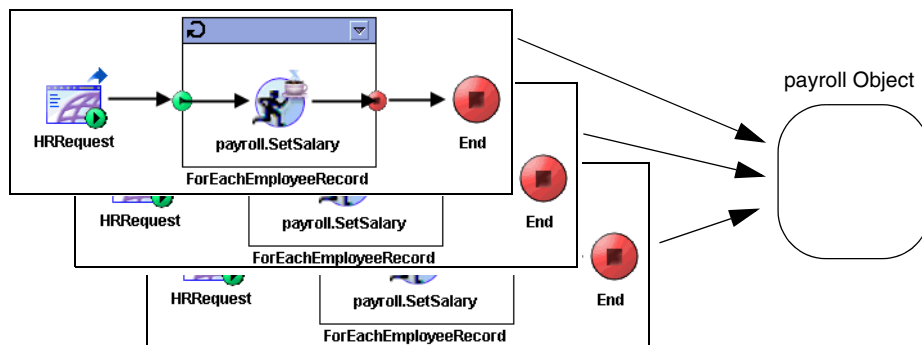
When the Cache Constructed Class checkbox is checked on the Advanced tab, all instances of the same Java method activity share the same Java object. For example, each process instance that executes this Java Method activity will share the same instance of the class.

Also, if this activity is executed multiple times in a loop, each execution of this activity uses the same cached instance of the object. [Figure 16](#) illustrates multiple processes and Java Methods in a group all sharing the same Java class.



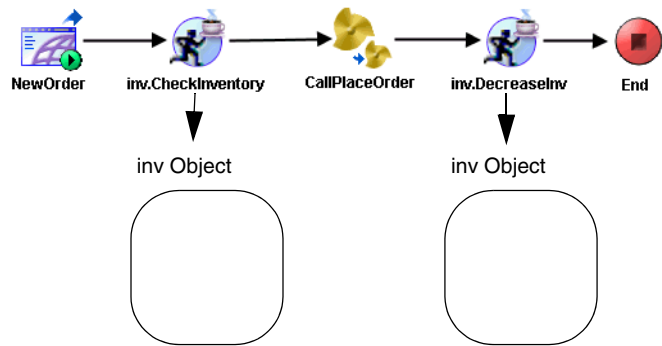
If you choose to cache the constructed instance of the class, the same Java object is shared by Java Method activities that invoke methods on the class. Therefore, be aware of potential concurrency issues, if your class or its methods are not threadsafe.

Figure 16 Sharing a cached class



However, different instances of a Java Method activity that invoke methods on the same class do not share the instance of the object. For example, [Figure 17](#) illustrates two Java Method activities in the same process definition, each executing different methods on the same Java object. However, each of these Java Method activities operate on their own instances of the `inv` class, if they both select the Cache Constructed Class checkbox.

Figure 17 Different Java Method activities in the same process do not share the class



In the process definition illustrated in [Figure 17](#), for each process instance that is created, each time the `inv.CheckInventory` activity executes, it shares one instance of the `inv` object that has been cached. Similarly, each time the `inv.DecreaseInv` activity executes, it shares the instance of the `inv` object that the activity has cached. However, the `inv.CheckInventory` and `inv.DecreaseInv` activities do not share their cached Java objects with each other.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
<declaringClass>	Java Object	<p>An object reference to the Java Class specified on the Configuration tab. This element is not shown when the method you want to invoke it static.</p> <p>Also, this element is only available when the Construct Declared Class field on the Advanced tab is unchecked.</p>

Input Item	Datatype	Description
MethodParameters	varies	<p>This element contains a list of input parameters that are required for the Java method selected on the Configuration tab.</p> <p>This element is not available when the selected method has no parameters.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
MethodReturnValue	varies	<p>The Output tab will have the return value specified for the Java method selected on the Configuration tab.</p> <p>This element is not available for methods that return void.</p>

Error Output

The Error Output tab lists the exceptions that can be thrown by the invoked method. Once a method to invoke is selected, the exceptions that the method can throw are listed on the Error Output tab. Because a method can return any Java exception, the potential exceptions cannot be listed here.

While all potential errors cannot be known, the error schema for all errors is the same. The following describes the schema for exceptions returned by the Java Method activity.

Error Schema Element	Datatype	Description
<code><exceptionName></code>	complex	The fully-qualified name of the exception, including the Java package name. This is a container for the other elements.
<code><exceptionName></code>	Java Object	The Java exception object.

Error Schema Element	Datatype	Description
exceptionClassName	string	The exception class name. The value of this element is obtained by calling the <code><exception>.getClass().getName()</code> method.
exceptionMessage	string	The exception message. The value of this element is obtained by calling the <code><exception>.getMessage()</code> method.

Java Schema

Shared Configuration



Java Schema

The Java Schema shared configuration resource allows you to specify a Java class that is used to configure a [Java To XML](#) or [XML To Java](#) activity.

The Java class is converted to an XML schema using the following rules:

- Only the public data members of the Java class are mapped to XML elements. Private and protected members are not included.
- The Java class member public variable name is mapped to an XML element with the same name. For example, a Java class member variable declared as `public int ZipCode` is mapped to an XML element named `ZipCode`.
- Java Bean accessors and modifiers are mapped to appropriate XML element names. For example, a Java class method `public int getBalance()` or `public void setBalance(int Balance)` are mapped to an XML element named `Balance`.
- Only one XML element is created regardless of how many members of the Java class share the same name. For example, there may be an attribute named `MySalary` and accessors named `getMySalary()` and `setMySalary()`. This translates to one element named `MySalary` in the resulting XML document.
- Conversion is case-sensitive. For example, if you have a data member declared as `public int zipCode` and an accessor method declared `public void setZipCode(int NewZipCode)`, there will be two elements in the resulting XML schema, `zipCode` (for the data member) and `ZipCode` (for the accessor). You must make sure to use the correct element when using the resulting XML in input mappings of subsequent activities.
- All Java primitive types are supported. Datatypes that extend `java.util.Collections` are also supported (for example, `List`, `ArrayList`, and `Vectors`). Arrays (for example, `int[]` and `string[]`) are also supported.
- The datatype `java.util.Map` or any types that extend `java.util.Map` are not supported. For example, `HashMap` is not supported.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the resource.

Field	Description
Description	Short description of the shared resource.
Java	This field contains the Library and Class fields that allow you to specify the Java class for this resource.
Library	Use this field to specify an AliasLibrary resource that is used to locate the Java class files. See <i>TIBCO Designer Palette Reference</i> for more information about AliasLibrary resources.
Class	The Java class that specifies the data of the schema. This class must implement or be a subtype of a class that implements the Serializable interface. You can use the Show Class Browser button to browse Java classes in the TIBCO ActiveMatrix BusinessWorks classpath.
Schema Namespace	The namespace to use for the schema when converting to or from XML.

Schema Text

The Schema Text tab displays the resulting XML schema from the Java class selected on the Configuration tab.

Java To XML

Activity



Java To XML

The Java To XML activity allows you to convert a Java object's data members into an XML document. See [Java Schema on page 313](#) for the conversion rules.



If the class does not have a public data member and only has a Java bean modifier that sets the data, the input schema contains an element for the modifier, but the resulting XML document has no value set for the corresponding element.

For example, the Java object has a method declared as `public int setID()`, but there is no method for getting the ID and the data member `ID` is not public. In this case, there will be an element named `ID` in this activity's output schema, but that element has no value because there is no public mechanism for getting the data.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the resource.
Description	No	Short description of the activity.
Use Java Schema	No	Specifies whether you want to use a Java Schema shared configuration resource to configure this activity or whether you want to specify a Java class file. When unchecked the Java Class field appears. When checked, the Java Schema: and Class: fields appear.
Java Schema:	No	Only available when the Use Java Schema field is checked. This field specifies a Java Schema shared configuration resource. This resource is used to specify the schema used to convert the Java object to the XML schema.

Field	Global Var?	Description
Java Class:	No	<p>When Use Java Schema is checked, this is the class in the Java Schema to use.</p> <p>Use the Show Class Browser button to bring up the dialog to choose the Java class.</p>

Advanced

The Advanced tab has the following fields:.

Field	Global Var?	Description
Construct Declared Class	No	<p>This field controls whether the declaring class must be constructed when the activity is executed or whether an object reference must be supplied in the activity’s input schema.</p> <p>When this field is checked, the declaring class is constructed using the default constructor when the activity executes. In this case, the declaring class is not included in the activity’s input schema.</p> <p>When this field is unchecked, you must supply an object reference for the Java Class specified on the Configuration tab. The object must be created and contained in the output schema of a previously executed activity, such as a Java Code activity, Java Method, or an XML To Java activity. In this case, the declaring class is included in the activity’s input schema.</p>

Field	Global Var?	Description
Cache Constructed Class	No	<p>This field is only available when Construct Declared Class is checked.</p> <p>When checked, this specifies that all instances of this Java To XML activity share the instance of the constructed declaring class. If the constructed object is cached, it is kept in memory until the process engine terminates.</p> <p>If this field is unchecked, each instance of this Java To XML activity creates its own copy of the declaring class.</p> <p>See Caching the Java Class on page 309 for more information about caching the declared class.</p>

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
<code><declaringClass></code>	Java Object	An object reference to the Java Class specified on the Configuration tab. This element is only available when the Construct Declared Class field on the Advanced tab is unchecked.

Output

The output for the activity is the following.

Output Item	Datatype	Description
XML Schema	varies	<p>The XML schema from the converted Java object is output.</p> <p>The elements appear in the schema in alphabetical order.</p>

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
JavaToXMLConversionException	An error occurred when converting the Java object to XML.

XML To Java

Activity



The XML to Java activity allows you to create an instance of a Java object based on data from an XML document. The XML schema for providing input to the Java object is created from the Java object or Java Schema specified on the Configuration tab of this activity. The specified Java class must meet the following requirements:

- The Java class must have a public default constructor (that is, a constructor with no arguments).
- The Java class must be serializable (that is, the class must implement or be a subclass of a class that implements `java.io.Serializable`).

See [Java Schema on page 313](#) for a description of the conversion rules.



If the class does not have a public data member and only has a Java bean accessor that retrieves the data, the input schema contains an element for the accessor, but the resulting Java object has no value set for the member.

For example, the object has a method declared as `public int getID()`, but there is no method for setting the ID and the data member ID is not public. In this case, there is an element named ID in this activity's input schema, but mapping a value to the element does not result in setting the ID member of the output Java object because there is no public mechanism for setting the data.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the resource.
Description	No	Short description of the activity.
Use Java Schema	No	<p>Specifies whether you want to use a Java Schema shared configuration resource to configure this activity or whether you want to specify a Java class file.</p> <p>When unchecked the Java Class field appears. When checked, the Java Schema: and Class: fields appear.</p>

Field	Global Var?	Description
Java Schema:	No	Only available when the Use Java Schema field is checked. This field specifies a Java Schema shared configuration resource. This resource is used to specify the schema used to convert the XML schema to the Java object.
Java Class:	No	When Use Java Schema is checked, this is the class in the Java Schema to use. Use the Show Class Browser button to bring up the dialog to choose the Java class.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
XML Schema	varies	The XML schema that you want to convert to a Java object. The content of this schema depends upon the Java class or Java Schema defined on the Configuration tab. The elements appear in the schema in alphabetical order.

Output

The output for the activity is the following.

Output Item	Datatype	Description
<declaringClass>	Java Object	A Java object that is created out of the XML schema.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
<code>XMLToJavaConversionException</code>	An error occurred when converting the XML schema to a Java object.

Chapter 8 **JDBC Palette**

The JDBC palette contains activities and shared configuration resources for querying, updating, or calling stored procedures in a database.

Topics

- [JDBC Call Procedure, page 324](#)
- [JDBC Connection, page 331](#)
- [JDBC Get Connection, page 338](#)
- [JDBC Query, page 343](#)
- [JDBC Update, page 353](#)
- [Query Designer, page 360](#)
- [SQL Direct, page 365](#)

JDBC Call Procedure

Activity



The JDBC Call Procedure activity calls a database procedure using the specified JDBC connection.

If this activity is not part of a transaction group, the SQL statement is committed after the activity completes. If this activity is part of a transaction group, the SQL statement is committed or rolled back with the other JDBC activities in the group at the end of the transaction. See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about creating groups for transactions.

If you want to override the default behavior of transaction groups for certain JDBC activities in a transaction group, you can check the Override Transaction Behavior field on the Advanced tab. This specifies that the activity is outside of the transaction and the SQL statement is committed when the activity completes, even if the activity is in a transaction group.

The Refresh button on this activity allows you to synchronize the activity with the contents of the database. This is useful if you make a change to the database while you are editing a process definition containing this activity in TIBCO ActiveMatrix BusinessWorks.



When using the jConn or Data Direct 3.3 driver and connecting to a Sybase database, stored procedures that are supposed to return multiple result sets do not return any data. To avoid this problem, you can either use the `sun.jdbc.odbc.JdbcOdbcDriver` instead or you can add `set nocount on` to your stored procedure definition.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
JDBC Connection	Yes	Path to the shared configuration resource containing the JDBC connection information. See JDBC Connection on page 331 for more information about JDBC resources.

Field	Global Var?	Description
Schema	Yes	<p>The schema in which the procedure resides. This name is used to resolve naming conflicts if more than one schema in the database has the selected procedure with the same name.</p> <p>The Select Schema button allows you to choose a schema from the database using the specified JDBC Connection.</p>
Catalog/Package	Yes	<p>The catalog or package in which the procedure resides. This name is used to resolve naming conflicts if more than one catalog or package in the database has the selected procedure with the same name.</p> <p>This field is only applicable to databases that have more than one catalog and package. See your database documentation for more information about catalogs and packages.</p> <p>The Select Catalog/Package button allows you to choose a catalog or package from the database using the specified JDBC Connection. If a schema is specified in the Schema field, only catalogs or packages in the specified schema are listed.</p>
Procedure/ Function Name	Yes	<p>Name of the database procedure or user-defined function to call. You can use the Select Procedure/Function button to query the database for available procedures or functions once the JDBC Connection field is specified. The list of available procedures and functions will be limited by the values supplied in the Schema and Catalog/Package fields.</p> <p>Note: The input parameters and output parameters are displayed when you use the Select Procedure/Function button. TIBCO Designer retrieves the signature of each stored procedure/function from the database once. If you change the signature while editing your project, you must click the Refresh button to retrieve the changes from the database.</p>

Field	Global Var?	Description
Timeout (sec)	Yes	Time to wait for the procedure call to complete. If the call does not complete in the given time limit, an error is returned.
Maximum Rows	Yes	The maximum number of rows to retrieve. To retrieve all rows, specify 0.
Parameter Types	No	This field displays the parameters for the procedure and allows you to override the parameter type (IN, OUT, INOUT) for each parameter.

Advanced

The Advanced tab has the following fields.

Field	Global Var?	Description
Override Transaction Behavior	Yes	<p>Overrides the default behavior of a transaction group. If this activity is in a transaction group, the activity is normally committed or rolled back with the other transactional activities.</p> <p>If this checkbox is checked, this activity is not part of the transaction group and is committed when it completes. Checking this option uses a separate database connection to perform the activity and commit the SQL statement.</p>
Interpret Empty String as Null	No	<p>Specifies how empty strings in the activity’s input elements should be handled. When the field is checked, nulls are sent to the database where empty strings are supplied. When the field is unchecked, empty strings are treated as zero-length strings. Whether you use this field or not, you can still use XPath to set input elements explicitly to null.</p> <p>Note: Many databases treat empty strings and nulls as the same, so this field will not affect how the database interprets empty strings.</p>

Field	Global Var?	Description
Resultsets Use Schema	No	<p>Specifies that the design-time must try to fetch the schema when a resultset is expected from a stored procedure call.</p> <p>When selected, designer tries to invoke the stored procedure with default values and get the metadata for the resultset.</p> <p>If the checkbox is not selected, or if designer does not get any metadata, the results will be displayed as 'unknown resultsets'.</p>

Input

The input for this activity is dependent upon the input parameters of the database procedure.

Input Item	Datatype	Description
ServerTimeZone	string	<p>Specifies the time zone for the database server. See Time Zone Construction on page 371 for more information about how time zones are constructed using this field.</p> <p>You can use the Constants tab in the XPath Formula Builder to supply a valid time zone name. The list of time zone names is generated from <code>java.util.TimeZone.getAvailableIDs()</code>. See Time Zone Names on page 372 for the list of valid time zone names.</p>
inputSet	complex	The input parameters of the database procedure. The datatype contained in this element varies depending upon the parameters specified for the database procedure.
timeout	number	Time (in seconds) to wait for the procedure call to complete. If the call does not complete in the given time limit, an error is returned.

Input Item	Datatype	Description
maxRows	number	The maximum number of rows to retrieve. To retrieve all rows, specify 0.

Output

The output for the activity is dependent upon the output parameters of the database procedure.

Output Item	Datatype	Description
outputSet	complex	The output of the database procedure. The datatype contained in this element varies depending upon what the database procedure returns.
unknownResultSets	complex	<p>The output of the database procedure may return other result sets. These result sets are returned in this output item as an XML string. Create a Schema resource to describe these result sets, then use the Parse XML activity to parse the XML based on the schema. You can then use the parsed output in subsequent activities.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Release Notes</i> for a more detailed description of this procedure.</p>

Output Item	Datatype	Description
Elapsed Time	long	<p>This field displays the time taken for the execution of the activity in milliseconds.</p> <p>This is an optional element that appears only when the property <code>java.property.bw.activity.output.stats.elapsedTime.JDBCCallActivity</code> is set to true in <code>designer.tra</code>. For run-time, set the property to true in the <code>bwengine.tra</code> file. By default, the property is set to false.</p> <p>If set in the design-time, this property must be carried forward to the run-time; else it can cause run-time errors.</p> <p>Enabling this property causes additional performance overhead. Hence, it is recommended that you use this property only when this information is to be consumed by some other ActiveMatrix BusinessWorks activity. Also, it is recommended that this property be used only in a non-production environment as a diagnostic tool and the property be turned off at run-time.</p> <p>You can turn off the property and not calculate the elapsed time at run-time by setting the property <code>java.property.bw.activity.output.stats.elapsedTime.turnoff</code> in the <code>bwengine.tra</code> file. However, note that setting this property will turn off the calculation of elapsed time at run-time for all the JDBC activities.</p>

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
JDBCDriverLoadingException	An error occurred when loading the specified JDBC driver.
JDBCConnectionNotFoundException	An error occurred when attempting to connect to the specified database.
InvalidTimeZoneException	An invalid timezone was specified. See Time Zone Names on page 372 for a list of valid timezones.
JDBCSQLException	A SQL error occurred.
JDBCTimedOutException	The operation has timed out.
LoginTimedOutException	A timeout has occurred while attempting to connect to the database.

JDBC Connection

Shared Configuration



The JDBC Connection resource describes a JDBC connection. JDBC connections are used when specifying activities from the JDBC palette.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the resource.
Description	No	Short description of the shared resource.
Connection Type	No	<div>Specifies the kind of JDBC connection you want to create. The connection type can be one of the following:<ul style="list-style-type: none">JDBCJNDIXA<div>The type of connection determines the other configuration fields that appear.</div></div>
JDBC Connection Type Configuration Fields		
JDBC Driver	Yes	<div>The name of the JDBC driver class. You can select from a list of supported drivers.</div> <div>If you select a supported driver, the Database URL field is populated with a template for the URL of the driver.</div> <div>See Database Drivers on page 335 for more information about database drivers.</div>

Field	Global Var?	Description
Database URL	Yes	<p>The URL to use to connect to the database. A template of the URL is supplied for the selected JDBC driver. You must supply the portions of the URL that are in angle brackets (<>). For example, if you select the <code>tibcosoftwareinc.jdbc.oracle.OracleDriver</code>, the following appears in the Database URL field:</p> <pre>jdbc:tibcosoftwareinc:oracle:// <host>:<port#>:<db_instancename></pre> <p>You must supply the host, port number, and database instance name in the URL.</p>
Maximum Connections	No	<p>The maximum number of database connections to allocate. The default maximum is 10. The minimum value that can be specified is 1.</p> <p>See Connection Pooling on page 336 for more information about this field.</p>
User Name	Yes	<p>User name to use when connecting to the database.</p>
Password	Yes	<p>Password to use when connecting to the database.</p>
Login Timeout	Yes	<p>Time (in seconds) to wait for a successful database connection. Only JDBC drivers that support connection timeouts can use this configuration field. If the JDBC driver does not support connection timeouts, the value of this field is ignored. Most JDBC drivers support connection timeouts.</p> <p>You can also set this timeout with the <code>Config.JDBC.Connection.SetLoginTimeout</code> custom engine property. The value of the property in the configuration file overrides the value of this field. See <i>TIBCO ActiveMatrix BusinessWorks Administration</i> for more information about setting custom engine properties.</p>

Field	Global Var?	Description
JNDI Connection Type Configuration Fields		
Use Shared JNDI Configuration	No	<p>When this field is checked, the JNDI Configuration field appears, allowing you to choose a JNDI Configuration shared configuration resource.</p> <p>When this field is unchecked, the JNDI Context Factory, JNDI Context URL, JNDI User Name, and JNDI Password fields appear.</p>
JNDI Configuration	No	<p>This field only appears when the Use Shared JNDI Configuration field is checked. This field allows you to choose a JNDI Configuration shared configuration object that specifies the JNDI connection information.</p>
JNDI Context Factory	No	<p>This field only appears when the Use Shared JNDI Configuration field is unchecked. The initial context factory class for accessing JNDI. (<code>javax.naming.Context.INITIAL_CONTEXT_FACTORY</code>). You can choose from the drop down list of supported classes, or you can type in a different InitialContextFactory class name.</p> <p>When using IBM WebSphere, you should use the JNDI Configuration resource instead of specifying the JNDI configuration on this resource. See IBM WebSphere and JNDI Context Caching on page 178 for more information.</p> <p>Note: TIBCO ActiveMatrix BusinessWorks attempts to find the class. However, you may need to add the Java file supplied by your JNDI service provider to the CLASSPATH environment variable to use JNDI.</p>

Field	Global Var?	Description
JNDI Context URL	Yes	This field only appears when the Use Shared JNDI Configuration field is unchecked. This is the URL to the JNDI service provider (<code>javax.naming.Context.PROVIDER_URL</code>). An example URL is provided when one of the supported JNDI context factory classes is selected. See your JNDI provider documentation for the syntax of the URL.
JNDI User Name	Yes	This field only appears when the Use Shared JNDI Configuration field is unchecked. Specify the user name to use when logging into the JNDI server (<code>javax.naming.Context.SECURITY_PRINCIPAL</code>). If the JNDI provider does not require access control, this field can be empty.
JNDI Password	Yes	This field only appears when the Use Shared JNDI Configuration field is unchecked. Specify the password for logging into the JNDI server (<code>javax.naming.Context.SECURITY_CREDENTIALS</code>). If the JNDI provider does not require access control, this field can be empty.
JNDI DataSource Name	Yes	The JNDI name specified for the DataSource.
XA Connection Type Configuration Fields		
XA DataSource Class	No	The XA DataSource class. Note: TIBCO ActiveMatrix BusinessWorks attempts to find the class. However, you may need to add the location of the class to the CLASSPATH environment variable.

Field	Global Var?	Description
Database URL	Yes	<p>The URL to use to connect to the database. A template of the URL is supplied for the selected XA DataSource class. You must supply the portions of the URL that are in angle brackets (<>). For example, if you select the <code>tibcosoftwareinc.jdbcx.oracle.OracleDataSource</code>, the following appears in the Database URL field:</p> <pre>jdbc:tibcosoftwareinc:oracle://<host>: <port#>;SID=<db_instancename></pre> <p>You must supply the host, port number, and database instance name in the URL.</p>
Maximum Connections	Yes	<p>The maximum number of database connections to allocate. The default maximum is 10. The minimum value that can be specified is 1.</p> <p>See Connection Pooling on page 336 for more information about this field.</p>
User Name	Yes	User name to use when connecting to the database.
Password	Yes	Password to use when connecting to the database.

Database Drivers

The following drivers are supported, but you must obtain, install, and configure these from the appropriate vendor:

- `oracle.jdbc.driver.OracleDriver (oci)`
- `oracle.jdbc.driver.OracleDriver (thin)`
- `com.sybase.jdbc2.jdbc.SybDriver`
- `com.timesten.jdbc.TimesTenDriver`
- `com.ibm.db2.jcc.DB2Driver`
- `com.mysql.jdbc.Driver`

The following drivers are JDBC 2.0-compliant and should work correctly, but they are not officially supported with BusinessWorks. You must obtain, install, and configure the driver from the appropriate vendor:

- `sun.jdbc.odbc.JdbcOdbcDriver`

- `weblogic.jdbc.mssqlserver4.Driver`

You can download, install, and use other JDBC drivers, but TIBCO does not guarantee the drivers will function properly with TIBCO ActiveMatrix BusinessWorks. To use an unsupported driver, perform the following:

1. Download the JDBC driver and copy the required JAR files to a location in the classpath of the TIBCO ActiveMatrix BusinessWorks Engine. For example, you can copy the files to the following location:
`TIBCO_HOME/tpcl/<version>/jdbc.`
2. In the JDBC Connection resource, choose Select Driver from the drop-down list in the JDBC Driver field and type in the name of the driver class in the text box within that field. Then, type in the correct URL in the Database URL field and specify the other fields in the resource.

See *TIBCO ActiveMatrix BusinessWorks Release Notes* for more information on the supported and tested versions of databases and database drivers.

Connection Pooling

TIBCO ActiveMatrix BusinessWorks creates a pool of JDBC connections for every JDBC Connection shared resource that uses the JDBC connection type. The maximum size of this pool is specified by the Maximum Connections configuration field.

Activities that use this JDBC Connection resource are given a connection from the pool. Once the maximum number of connections is reached, activities requesting a connection cannot proceed. Once a connection is freed by an activity, the connection is returned to the pool.

Connections that are left open will eventually time out and be closed. These connections can be reopened at a later time, until the maximum number of connections specified in this field is reached. If you want to configure a timeout value for these connections, you can set the `Engine.DBConnection.idleTimeout` property. See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information.

If an activity detects a connection in the pool is invalid (for example, the database is restarted), the activity that uses the JDBC connection resource attempts to reestablish the connection.

All activities that are part of the same transaction will use the same connection in the connection pool. The first activity in a transaction attempts to reestablish an invalid connection. If a connection becomes invalid during a transaction, the transaction is rolled back and must be retried, if necessary.

Test Connection Button

The Test Connection button allows you to test that the specified configuration fields result in a valid connection to a database.

JDBC Get Connection

Activity



The JDBC Get Connection activity retrieves an object reference to a `JavaConnectionAccessor` object for the specified JDBC Connection from the connection pool. This allows you to use the optimized TIBCO ActiveMatrix BusinessWorks database connection pool instead of specifying database configuration information in your Java code. This database connection can then be used within Java activities to access the specified database.

See [Using The JDBC Connection in Java on page 341](#) for more information on using the JDBC Get Connection activity.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
JDBC Connection	Yes	Path to the shared configuration resource containing the JDBC connection information. See JDBC Connection on page 331 for more information about JDBC resources.
Override Transaction Behavior	No	<p>Overrides the default behavior of a transaction group. If the activity that uses this JDBC connection is in a transaction group, the activity is normally committed or rolled back with the other transactional activities.</p> <p>If this checkbox is checked, the database connection is in auto commit mode, where each operation is committed as it is performed. You can disable the auto commit mode, if desired, and your code is then responsible for performing the commit or rollback operation before releasing the connection.</p>

Input

This activity has no input.

Output

The output for the activity is dependent upon the output parameters of the database procedure.

Output Item	Datatype	Description
JavaConnectionAccessor	Java Object	A Java object reference to a JavaConnectionAccessor object. This object can be passed as input to a Java activity where custom Java code can use the connection to perform database operations.

Output Item	Datatype	Description
Elapsed Time	long	<p>This field displays the time taken for the execution of the activity in milliseconds.</p> <p>This is an optional element that appears only when the property <code>java.property.bw.activity.output.stats.elapsedTime.JDBCGetConnectionActivity</code> is set to true in <code>designer.tra</code>. For run-time, set the property to true in the <code>bwengine.tra</code> file. By default, the property is set to false.</p> <p>If set in the design-time, this property must be carried forward to the run-time; else it can cause run-time errors.</p> <p>Enabling this property causes additional performance overhead. Hence, it is recommended that you use this property only when this information is to be consumed by some other ActiveMatrix BusinessWorks activity. Also, it is recommended that this property be used only in a non-production environment as a diagnostic tool and the property be turned off at run-time.</p> <p>You can turn off the property and not calculate the elapsed time at run-time by setting the property <code>java.property.bw.activity.output.stats.elapsedTime.turnoff</code> in the <code>bwengine.tra</code> file. However, note that setting this property will turn off the calculation of elapsed time at run-time for all the JDBC activities.</p>

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
JDBCSQLException	A SQL error occurred.
LoginTimedOutException	A timeout has occurred while attempting to connect to the database.

Using The JDBC Connection in Java

The database connection obtained with the JDBC Get Connection activity has the following restrictions:

- Checkpoints should not be taken after a JDBC Get Connection activity completes.
- Do not pass the `JavaConnectionAccessor` object reference to a subprocess that spawns a new process.

The JDBC Get Connection activity creates a `JavaConnectionAccessor` object reference that can be passed to an input parameter of a [Java Code](#) or [Java Method](#) activity. See [Passing Java Objects Between Java Code Activities on page 286](#) for details on how to pass Java object references between activities.

`JavaConnectionAccessor` has the following methods:

- `java.sql.Connection getDBConnection();` — retrieves a database connection from the connection pool.
- `void releaseConnection();` — releases a database connection so that it can return to the connection pool.
- `boolean isTransactional();` — returns `true` if the activity using the JDBC connection is in a transaction group and the `Override Transaction Behavior` on the `Configuration` tab of the JDBC Get Connection activity is unchecked.
- `void releaseConnection(SQLException ex)` — releases the connection obtained by way of the `getDBConnection()` method. Use this method instead of the standard `releaseConnection` method because this method detects if the SQL Exception passed as input is due to a connection problem. If the connection is no longer usable, it is destroyed and it is not returned to the connection pool.

When the connection is part of a transaction, the `JavaConnectionAccessor` object prevents you from committing or rolling back the transaction. The transaction will complete when the transaction group either commits or rolls back. If the connection is part of an XA transaction group, the `enlist` and `delist` operations are performed by the `getDBConnection` and `releaseConnection` methods.

When the connection is not part of a transaction, the database connection is in auto commit mode, where each operation is committed as it is performed. You can disable the auto commit mode, if desired, and your code is then responsible for performing the commit or rollback operation before releasing the connection.



If your Java code does not release the connection, the connection is automatically released when the process instance terminates. This could have undesirable consequences.

Your code should check for SQL Exceptions returned when executing JDBC statements. If you encounter an unexpected SQL Exception, you can use the `releaseConnection(SQLException ex)` method to release the connection. This allows you to check if the connection is no longer valid. If the connection is no longer valid, your Java code should return an appropriate exception for subsequent activities so that transactions can be rolled back, if necessary.

JDBC Query

Activity



The JDBC Query activity performs the specified SQL SELECT statement.

If this activity is not part of a transaction group, the SQL statement is committed after the activity completes. If this activity is part of a transaction group, the SQL statement is committed or rolled back with the other JDBC activities in the group at the end of the transaction. See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about creating groups for transactions.

If you want to override the default behavior of transaction groups for certain JDBC activities in a transaction group, you can check the Override Transaction Behavior field on the Advanced tab. This specifies that the activity is outside of the transaction and the SQL statement is committed when the activity completes, even if the activity is in a transaction group.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
JDBC Connection	Yes	Path to the shared configuration resource containing the JDBC connection information. See JDBC Connection on page 331 for more information about JDBC resources.
SQL Statement	Yes	The SQL SELECT statement to perform in the database. You can use a wizard to build the query for the desired database. See Query Designer on page 360 for more information about using the Query Designer wizard.
Timeout (sec)	Yes	Time (in seconds) to wait for the query to complete. If the query does not complete in the given time limit, an error is returned.

Field	Global Var?	Description
Maximum Rows	Yes	The maximum number of rows to retrieve. To retrieve all rows, specify 0.
Prepared Parameters	No	See Prepared Parameters on page 344 for a description of this field.

Fetch Button

The Fetch button on this activity allows you to synchronize the activity with the contents of the database.

When you first configure a JDBC activity, you must click the Fetch button to retrieve the schema for the output result set before attempting to apply your changes with the Apply button or by saving your project. If you do not click the Fetch button before applying your changes, TIBCO ActiveMatrix BusinessWorks displays an error dialog prompting you to first fetch the output schema.

After you have configured your activity, the Fetch button is useful when you make a change to the database while editing a process definition containing this activity in TIBCO ActiveMatrix BusinessWorks. The Fetch button synchronizes with the database and changes the output schema, if necessary.

Prepared Parameters

If you want to replace static names in the SQL statement with process variables, you must edit the SQL Statement field and replace the variable items with a question mark (?). For example, if you want to specify a variable for the first column returned, you would specify the following SQL statement:

```
SELECT DEMO.ITEM.ITEM_ID FROM DEMO.ITEM
WHERE DEMO.ITEM.ITEM_ID = ?
```

The ? replaces the value in the WHERE clause, and you can then provide input to the SQL statement from process data on the Input tab.



Editing the SQL statement disables the Design tab of the Query Designer wizard. Make sure you have designed the query you need before editing it and inserting question marks for process variables. If your question marks are in the WHERE clause, you can put those conditions into the Design tab in the Where fields of each column. This will allow you to keep the Design tab available and still have process variables in your query.

Keep in mind, ? is not valid SQL syntax, so checking the syntax of a query that contains question marks will return an invalid character error in the Query Designer wizard.

When you add or remove question marks in SQL statements, a warning appears to the right of the Prepared Parameters field ("SQL/ Prepared Parameter Count Mismatch") to alert you to add or remove corresponding prepared parameters. Each prepared parameter corresponds to the question mark in the same position in the SQL statement. That is, the first prepared parameter in the list corresponds to the first question mark, the second prepared parameter in the list corresponds to the second question mark, and so on. The warning is for informational purposes only, you must make sure the parameters in this field correctly correspond to the SQL statement.

You can optionally specify names for each prepared parameter. By default, the prepared parameters are named Prepared_Param_1, Prepared_Param_2, and so on.

You must supply the datatype of each parameter to the SQL statement, and this datatype is used in the input schema for the statement. You can use the up or down arrow keys to move a specified datatype to the previous or next parameter. You can also select a contiguous set of parameters to move them up or down, or delete them with the delete button.



At run time, any parameters you place in the SQL statement are replaced with the mapped values for those parameters on the Input tab.



Any mappings or expressions you create on the Input tab are not updated when you move or delete prepared parameters. You must manually update the Input tab after changing the prepared parameter field.

Advanced

The Advanced tab has the following fields.

Field	Global Var?	Description
Override Transaction Behavior	Yes	<p>Overrides the default behavior of a transaction group. If this activity is in a transaction group, the activity is normally committed or rolled back with the other transactional activities.</p> <p>If this checkbox is checked, this activity is not part of the transaction group and is committed when it completes. Checking this option uses a separate database connection to perform the activity and commit the SQL statement.</p>
Use Nil	No	<p>Specifies whether NULLs are represented as optional schema elements or whether each item that can contain a NULL has sub-items.</p> <p>For example, in the following schema, the NAME column can contain NULLs. If Use Nil is unchecked, the NAME element appears with a ? indicating it is optional (and if the column is NULL, the schema element is not included for that row). If Use Nil is checked, the NAME element is not optional, and it has two sub-elements, @nil and text(). The @nil element indicates whether the column value for the row is NULL, the text() element contains the column value when the column is not NULL.</p> <div><div>Use Nil Unchecked</div><div>Use Nil Checked</div></div>

Field	Global Var?	Description
Interpret Empty String as Null	No	<p>Specifies how empty strings in the activity’s input elements should be handled. When the field is checked, nulls are sent to the database where empty strings are supplied. When the field is unchecked, empty strings are treated as zero-length strings. Whether you use this field or not, you can still use XPath to set input elements explicitly to null.</p> <p>Note: Many databases treat empty strings and nulls as the same, so this field will not affect how the database interprets empty strings.</p>
Process In Subsets	No	<p>Checking this field specifies that you would like to process the result set in smaller batches rather than processing the entire result set at once. When this field is checked, the <code>subsetSize</code> input element appears to allow you to specify the size of each batch of records you want to process. Also, the <code>lastSubset</code> output element appears and is set to true when the last batch of records is being processed.</p> <p>When this field is unchecked, the entire result set is returned.</p> <p>See Fetching Subsets of the Result Set on page 349 for more information.</p>

Input

The input for the activity is the following.

Input Item	Datatype	Description
ServerTimeZone	string	<p>Specifies the time zone for the database server. See Time Zone Construction on page 371 for more information about how time zones are constructed using this field.</p> <p>You can use the Constants tab in the XPath Formula Builder to supply a valid time zone name. The list of time zone names is generated from <code>java.util.TimeZone.getAvailableIDs()</code>. See Time Zone Names on page 372 for the list of valid time zone names.</p>
Prepared_Param_* (name corresponds to name specified in the Prepared Parameters field on the Configuration tab)	varies	<p>The list of prepared parameters supplied in the SQL statement. Prepared parameters allow you to substitute process data for items in the SQL statement. See the description of the Prepared parameters field on the Configuration tab.</p>
subsetSize	integer	<p>This element is only available when the Process In Subsets field on the Advanced tab is checked. When that field is checked, records are processed in batches and this element specifies the number of records to process in each batch.</p> <p>This allows you to process smaller batches of rows instead of retrieving one large result set. This element must be used in conjunction with a Repeat Until True loop group for processing the result sets. See Fetching Subsets of the Result Set on page 349 for more information.</p>

Input Item	Datatype	Description
timeout	number	Time (in seconds) to wait for the query to complete. If the query does not complete in the given time limit, an error is returned.
maxRows	number	The maximum number of rows to retrieve. To retrieve all rows, specify 0.

Fetching Subsets of the Result Set

When the result set of a query is very large, you can retrieve subsets of the result set and iterate until the entire result set is processed. To retrieve subsets, you must use a Repeat Until True loop group to iterate until the entire result set is processed. Use the following procedure as a guideline for creating your Repeat Until True loop group.

1. Create a JDBC Query activity.
2. Specify the fields on the Configuration tab and create a query that returns multiple rows.
3. Check the Process In Subsets field on the Advanced tab.
4. Set the `subsetSize` input item for the JDBC Query activity to the number of records you want to process for each execution of the loop. You could specify a constant, or you could use a global variable to store the value. Using a global variable has the advantage that you can change the value of the variable at deployment time. For example, create a global variable named `BATCH_SIZE`, then specify the `chunkSize` input element as `$_globalVariables/pfx:GlobalVariables/BATCH_SIZE`.
5. Select the JDBC Query activity and click the group icon on the toolbar to create a group containing the activity. See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about working with groups.
6. Select Repeat Until True as the Group action, and specify an index name (for example, `i`).
7. The loop should exit when the entire result set has been consumed. The output element `lastSubset` is a boolean that is set to true when the last subset of records is being processed. For example, the condition for the loop could be set to the following:

```
$JDBCQuery/resultSet/lastSubset = "true"
```

The procedure above is a general guideline for creating a loop group for processing a large set of records. You may want to modify the procedure to include additional processing of the records, or you may want to change the XPath expressions to suit your business process.

See the examples included in the TIBCO ActiveMatrix BusinessWorks installation directory for an example of processing subsets of a larger result set.

Output

The output for the activity is the following.

Output Item	Datatype	Description
resultSet	complex	The root class for the output of the JDBC Query activity. This class contains all output items for the activity.
Record	complex	The result of the database query. The contents of the Record element depends upon the columns returned by the query.
lastSubset	boolean	This element only appears when the Process In Subsets field on the Advanced tab is checked. This field is set to true when the current subset of records being processed is the last subset of records. You can use this element to create an XPath expression to determine when a Repeat Until True loop that is processing records in batches should stop processing. For example: <code>\$JDBCQuery/resultSet/lastSubset = "true"</code>

Output Item	Datatype	Description
Elapsed Time	long	<p>This field displays the time taken for the execution of the activity in milliseconds.</p> <p>This is an optional element that appears only when the property <code>java.property.bw.activity.output.stats.elapsedTime.JDBCQueryActivity</code> is set to true in <code>designer.tra</code>. For run-time, set the property to true in the <code>bwengine.tra</code> file. By default, the property is set to false.</p> <p>If set in the design-time, this property must be carried forward to the run-time; else it can cause run-time errors.</p> <p>Enabling this property causes additional performance overhead. Hence, it is recommended that you use this property only when this information is to be consumed by some other ActiveMatrix BusinessWorks activity. Also, it is recommended that this property be used only in a non-production environment as a diagnostic tool and the property be turned off at run-time.</p> <p>You can turn off the property and not calculate the elapsed time at run-time by setting the property <code>java.property.bw.activity.output.stats.elapsedTime.turnoff</code> in the <code>bwengine.tra</code> file. However, note that setting this property will turn off the calculation of elapsed time at run-time for all the JDBC activities.</p>

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
<code>JDBCDriverLoadingException</code>	An error occurred when loading the specified JDBC driver.

Exception	Thrown When...
InvalidSQLException	A parameter's datatype does not match the datatype of the table column.
JDBCConnectionNotFoundException	An error occurred when attempting to connect to the specified database.
DuplicatedFieldNameException	A duplicate field name was specified.
InvalidTimeZoneException	An invalid timezone was specified. See Time Zone Names on page 372 for a list of valid timezones.
JDBCSQLException	A SQL error occurred.
JDBCTimedOutException	The operation has timed out.
LoginTimedOutException	A timeout has occurred while attempting to connect to the database.

JDBC Update

Activity



The JDBC Update activity performs the specified SQL INSERT, UPDATE, or DELETE statement.

If this activity is not part of a transaction group, the SQL statement is committed after the activity completes. If this activity is part of a transaction group, the SQL statement is committed or rolled back with the other JDBC activities in the group at the end of the transaction. See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about creating groups for transactions.

If you want to override the default behavior of transaction groups for certain JDBC activities in a transaction group, you can check the Override Transaction Behavior field on the Advanced tab. This specifies that the activity is outside of the transaction and the SQL statement is committed when the activity completes, even if the activity is in a transaction group.

Configuration

The Configuration tab has the following fields:

Field	Global Var?	Description
Name	No	The name to appear as the label for this field in the process definition.
Description	No	Short description of the activity.
JDBC Connection	Yes	Path to the shared configuration resource containing the JDBC connection information. See JDBC Connection on page 331 for more information.
SQL Statement	Yes	The SQL INSERT, UPDATE, or DELETE statement to perform.
Timeout (sec)	Yes	The time to wait for the statement to complete.
Prepared Parameters	No	See Prepared Parameters on page 354 for a description of this field.

Prepared Parameters

If you want to replace static names in the SQL statement with process variables, you must edit the SQL statement field and replace the variable items with a question mark (?). For example, you might specify the following statement:

```
UPDATE emp SET ename = ?, phone = ?
WHERE id = ?
```

The ? replaces the value, and you can then provide input to the SQL statement from process data on the input tab.

When you add or remove question marks in SQL statements, a warning appears to the right of the Prepared Parameters field ("SQL/ Prepared Parameter Count Mismatch") to alert you to add or remove corresponding prepared parameters. Each prepared parameter corresponds to the question mark in the same position in the SQL statement. That is, the first prepared parameter in the list corresponds to the first question mark, the second prepared parameter in the list corresponds to the second question mark, and so on. The warning is for informational purposes only, you must make sure the parameters in this field correctly correspond to the SQL statement.

You can optionally specify names for each prepared parameter. By default, the prepared parameters are named Prepared_Param_1, Prepared_Param_2, and so on.

You must supply the datatype of each parameter to the SQL statement, and this datatype is used in the input schema for the statement. You can use the up or down arrow keys to move a specified datatype to the previous or next parameter. You can also select a contiguous set of parameters to move them up or down, or delete them with the delete button.

At run time, any parameters you place in the SQL statement are replaced with the mapped values for those parameters.



Any mappings or expressions you create on the Input tab are not updated when you move or delete prepared parameters. You must manually update the Input tab after changing the prepared parameter field.

For INSERT and DELETE statements, all prepared parameters appear as required items in the Input tab. For UPDATE statements, all prepared parameters appear as optional in the Input tab, but you must supply a value for at least one column in the statement or a runtime error occurs.

Advanced

The Advanced tab has the following fields:

Field	Global Var?	Description
Override Transaction Behavior	Yes	<p>Overrides the default behavior of a transaction group. If this activity is in a transaction group, the activity is normally committed or rolled back with the other transactional activities.</p> <p>If this checkbox is checked, this activity is not part of the transaction group and is committed when it completes. Checking this option uses a separate database connection to perform the activity and commit the SQL statement.</p>
Interpret Empty String as Null	No	<p>Specifies how empty strings in the activity's input elements should be handled. When the field is checked, nulls are sent to the database where empty strings are supplied. When the field is unchecked, empty strings are treated as zero-length strings. Whether you use this field or not, you can still use XPath to set input elements explicitly to null.</p> <p>Note: Many databases treat empty strings and nulls as the same, so this field will not affect how the database interprets empty strings.</p>

Field	Global Var?	Description
Batch Update	No	<p>Checking this field signifies you want to perform multiple statements by supplying an array of records as input to the activity where each record matches the prepared parameters for the statement. The statements are performed in one batch at the end of the activity's execution.</p> <p>This field is only meaningful if there are prepared parameters in the SQL statement (see Prepared Parameters on page 354).</p> <p>If this field is not checked, the expected input is the list of prepared parameters for the statement (no array of records).</p> <p>Some database drivers may not support batch updates. A JDBCSQLException is thrown if the database driver does not support batch updates.</p>

Input

The input for the activity is the following:

Input Item	Datatype	Description
Record	repeating	When batch updates are performed, the list of prepared parameters are contained in a repeating element. When only one update is performed, the list of prepared parameters appears as individual input elements. See the description of the Batch Update field on the Advanced tab for more information about batch updates.
Prepared_Param_* (name corresponds to name specified in the Prepared Parameters field on the Configuration tab)	varies	The list of the prepared parameters supplied in the SQL statement. Prepared parameters allow you to substitute process data for items in the SQL statement. See the description of the Prepared Parameters field on the Configuration tab.

Input Item	Datatype	Description
ServerTimeZone	string	<p>Specifies the time zone for the database server. See Time Zone Construction on page 371 for more information about how time zones are constructed using this field.</p> <p>You can use the Constants tab in the XPath Formula Builder to supply a valid time zone name. The list of time zone names is generated from <code>java.util.TimeZone.getAvailableIDs()</code>. See Time Zone Names on page 372 for the list of valid time zone names.</p>
timeout	number	Time (in seconds) to wait for the statement to complete.

Output

The output for the activity is the following:

Output Item	Datatype	Description
noOfUpdates	integer	<p>The number of updates performed by the statement specified on the Configuration tab.</p> <p>This element can also return -2 that indicates, in the event of a batch update, that the updates were successful, but it is unknown how many updates were performed.</p>

Output Item	Datatype	Description
Elapsed Time	long	<p>This field displays the time taken for the execution of the activity in milliseconds.</p> <p>This is an optional element that appears only when the property <code>java.property.bw.activity.output.stats.elapsedTime.JDBCUpdateActivity</code> is set to true in <code>designer.tra</code>. For run-time, set the property to true in the <code>bwengine.tra</code> file. By default, the property is set to false.</p> <p>If set in the design-time, this property must be carried forward to the run-time; else it can cause run-time errors.</p> <p>Enabling this property causes additional performance overhead. Hence, it is recommended that you use this property only when this information is to be consumed by some other ActiveMatrix BusinessWorks activity. Also, it is recommended that this property be used only in a non-production environment as a diagnostic tool and the property be turned off at run-time.</p> <p>You can turn off the property and not calculate the elapsed time at run-time by setting the property <code>java.property.bw.activity.output.stats.elapsedTime.turnoff</code> in the <code>bwengine.tra</code> file. However, note that setting this property will turn off the calculation of elapsed time at run-time for all the JDBC activities.</p>

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
JDBCDriverLoadingException	An error occurred when loading the specified JDBC driver.

Exception	Thrown When...
<code>InvalidSQLException</code>	A parameter's datatype does not match the datatype of the table column.
<code>JDBCConnectionNotFoundException</code>	An error occurred when attempting to connect to the specified database.
<code>InvalidTimeZoneException</code>	An invalid timezone was specified. See Time Zone Names on page 372 for a list of valid timezones.
<code>JDBCSQLException</code>	A SQL error occurred.
<code>JDBCTimedOutException</code>	The operation has timed out.
<code>LoginTimedOutException</code>	A timeout has occurred while attempting to connect to the database.

Query Designer

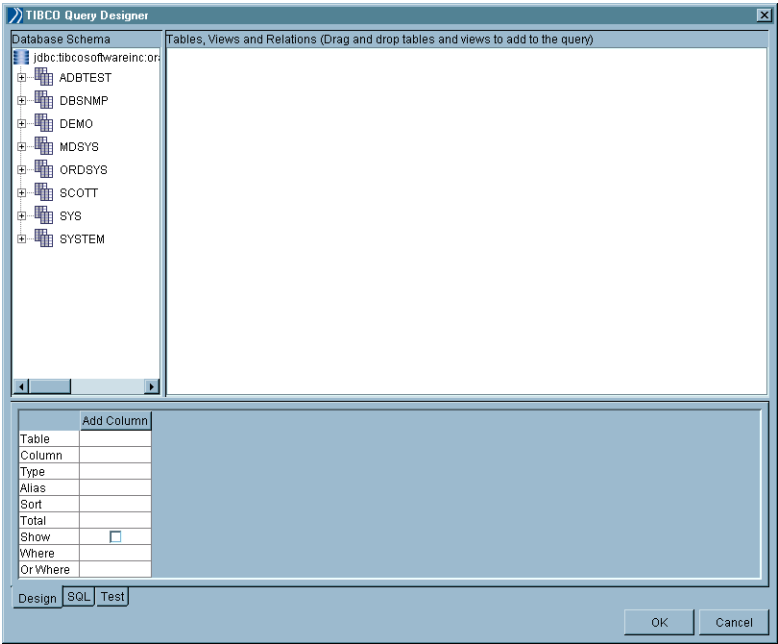
Wizard

The Query Designer is a GUI tool for building SQL queries, testing syntax, and previewing results before running the process. You can use the Query Designer in one of the following ways:

- to automatically generate SQL queries
- to manually edit and check the syntax of existing queries

In the [JDBC Query](#) activity, you must first specify a [JDBC Connection](#) shared configuration resource to connect to a database. Once the database connection is specified in the JDBC Query activity, you can click the Build Using Wizard button to create a query using the Query Designer wizard. [Figure 18](#) illustrates the Query Designer.

Figure 18 The Query Designer wizard



The Query Designer window has the following elements:

- a Database Schema panel, where schema information for the specified database and user is displayed in a tree structure.
- a Table Diagram panel, where you can drag and drop tables from the Schema panel to build a SQL query.

- a SQL panel, where you can design, refine, view, and test the query. This panel has three tabs for designing, editing, and testing your queries.



Prepared parameters in BusinessWorks are inserted into a query by using the question mark (?) character. This is not valid SQL syntax, but BusinessWorks uses this syntax for inserting process data into the query at runtime. Because this is not valid SQL syntax, an error is returned if you attempt to check the syntax of a query that has prepared parameters.

You should design and test the syntax of your query before inserting prepared parameters.

You can use the Design tab of the Query Designer to automatically generate queries. You can then click on the SQL tab of the Query Designer to manually edit the query, if you want. To manually edit the query, click the Customize checkbox on the SQL tab. On the SQL tab, you can drag and drop columns into the statement.

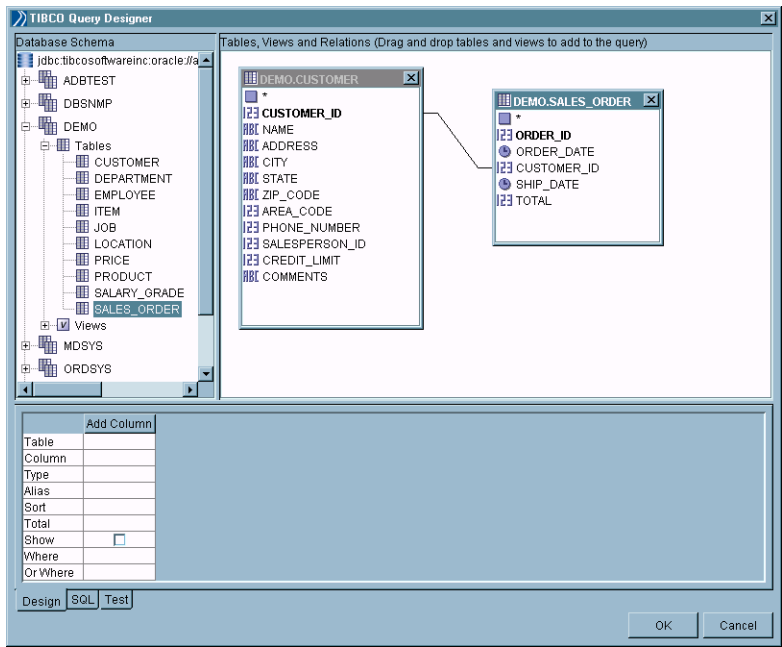


After you customize a query on the SQL tab, returning to the design tab without checking the Customize checkbox eliminates your changes. First, create a query using the Design, then click the Customize checkbox on the SQL tab to further customize it as needed.

To use the Query Designer to generate a query, perform this procedure:

1. Drag tables to include in the query from the Database Schema panel to the Table Diagram panel. Any joins defined between primary keys in the database are displayed.

For example:



This example demonstrates building a query that retrieves names of customers that also have placed orders. After dragging the CUSTOMER and SALES_ORDER tables from the Database Schema panel to the Table Diagram panel, a join is automatically displayed between the CUSTOMER_ID column in each table. You can also manually add joins by dragging the cursor from one join column to the other.

Clicking the SQL tab in the SQL panel shows the automatically generated syntax:

```
SELECT *
FROM DEMO.CUSTOMER, DEMO.SALES_ORDER
WHERE (DEMO.CUSTOMER.CUSTOMER_ID = DEMO.SALES_ORDER.CUSTOMER_ID)
```

By default, all table columns are included in the query. To constrain query syntax, click the Design tab in the SQL panel. You can drag individual columns from the Table Diagram panel to the Add Column area of this tab to refine the query. The Add Column entry is a placeholder only, and does not affect the output. It is meant to be the area where you can drag columns from the tables to add to the query.

The following example shows the results of dragging the CUSTOMER_ID, NAME, TOTAL, and SALESPERSON_ID columns to the SQL tab:

	CUSTOMER_ID	NAME	SALESPERSON_ID	TOTAL	Add Column
Table	DEMO.CUSTOMER	DEMO.CUSTOMER	DEMO.CUSTOMER	DEMO.SALES_ORDER	
Column	CUSTOMER_ID	NAME	SALESPERSON_ID	TOTAL	
Type	NUMBER	VARCHAR2	NUMBER	NUMBER	Drag and drop col
Alias					
Sort	None	None	None	None	
Total	None	None	None	None	
Show	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Where					
Or Where					

Clicking the SQL tab to view the modified syntax shows the query now selects only from the set of columns:

```
SELECT DEMO.CUSTOMER.CUSTOMER_ID, DEMO.CUSTOMER.NAME,
       DEMO.CUSTOMER.SALESPERSON_ID, DEMO.SALES_ORDER.TOTAL
FROM DEMO.CUSTOMER, DEMO.SALES_ORDER
WHERE (DEMO.CUSTOMER.CUSTOMER_ID =
DEMO.SALES_ORDER.CUSTOMER_ID)
```

- 2. To group sales by customer and show sales totals, perform the following:
 - For the TOTAL column, click in the Total field and select **Sum** from the list. The other columns are automatically updated to select the Group By value required for this function.
 - For the CUSTOMER_ID column, click the **Show** checkbox to deselect it. This column is necessary for the query, but can be hidden in the output.

Clicking the SQL tab to view the syntax shows the SUM function and GROUP BY clause has been added to the SQL:

```
SELECT DEMO.CUSTOMER.NAME, DEMO.CUSTOMER.SALESPERSON_ID,
       SUM(DEMO.SALES_ORDER.TOTAL)
FROM DEMO.CUSTOMER, DEMO.SALES_ORDER
WHERE (DEMO.CUSTOMER.CUSTOMER_ID =
GROUP BY DEMO.CUSTOMER.CUSTOMER_ID, DEMO.CUSTOMER.NAME,
DEMO.CUSTOMER.SALESPERSON_ID
```

Other criteria can be applied using the Sort, Criteria, and Or fields.

- 3. To check the SQL syntax, click the **Check Syntax** button.

A dialog displays either a success message, or a database error code and message.

4. After checking the syntax, click the Execute button on the Test tab to preview the query results:

NAME	ADDRESS	SALESPERSON_ID	SUM(DEMO.SALES_ORDER.TOTAL)
JOCKSPORTS	345 VIEWRIDGE	7844	5285.9
TKB SPORT SHOP	490 BOLL RD.	7521	101.4
VOLLYRITE	9722 HAMILTON	7654	27348
JUST TENNIS	HILLVIEW MALL	7521	806
EVERY MOUNTAIN	574 SURRY RD.	7499	7160.8
K + T SPORTS	3476 EL PASEO	7844	46370
SHAPE UP	908 SEQUOIA	7521	9076.8
WOMENS SPORTS	VALCO VILLAGE	7499	710
NORTH WOODS HEALTH AND FITNESS ...	98 LONE PINE WAY	7844	6400
STADIUM SPORTS	47 IRVING PL.	7557	16333.2

A representative number of rows, specified by the Maximum Rows value, is returned.

5. When the query returns the desired result set, click **OK**.

The SQL syntax is automatically entered in the SQL Statement field of the Database task.

The following usage restrictions apply to the Query Designer:

- You can build, modify, and test SQL queries only, not UPDATE statements or stored procedures.
- Only queries that are automatically generated can be manipulated and regenerated using the Design tab features. Query syntax that was manually typed in the SQL Statement field can be modified by typing or dropping column names on the SQL tab. The syntax checking and preview results features can also be used.
- After manually editing an automatically generated query on the SQL tab, your changes are lost if you uncheck the Customize box on the SQL tab and return to the Design tab.
- If you want to select columns with the same name from different tables, you must specify column aliases for the columns that have the same name. In SQL, you may select columns with the same name from different tables in the same SQL statement, however, TIBCO ActiveMatrix BusinessWorks requires that all names in an input or output schema are unique. Therefore, you must specify column aliases to ensure that all items in the output schema for a query are unique.

SQL Direct

Activity



The SQL Direct activity executes a SQL statement that you provide. This activity allows you to build a SQL statement dynamically (using other activities), then pass the SQL statement into this activity's input. This activity also allows you to execute SQL statements that are not supported by other activities in the JDBC palette. For example, DDL commands (for example, CREATE TABLE) are not available using any other activity.

If this activity is not part of a transaction group, the SQL statement is committed after the activity completes. If this activity is part of a transaction group, the SQL statement is committed or rolled back with the other JDBC activities in the group at the end of the transaction. See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about creating groups for transactions.

If you want to override the default behavior of transaction groups for certain JDBC activities in a transaction group, you can check the Override Transaction Behavior field on the Advanced tab. This specifies that the activity is outside of the transaction and the SQL statement is committed when the activity completes, even if the activity is in a transaction group.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
JDBC Connection	Yes	Path to the shared configuration resource containing the JDBC connection information. See JDBC Connection on page 331 for more information about JDBC resources.
Timeout (sec)	Yes	Time (in seconds) to wait for the statement to complete. If the statement does not complete in the given time limit, an error is returned.
Maximum Rows	Yes	The maximum number of rows to retrieve. To retrieve all rows, specify 0.

Advanced

The Advanced tab has the following fields.

Field	Global Var?	Description
Override Transaction Behavior	Yes	<p>Overrides the default behavior of a transaction group. If this activity is in a transaction group, the activity is normally committed or rolled back with the other transactional activities.</p> <p>If this checkbox is checked, this activity is not part of the transaction group and is committed when it completes. Checking this option uses a separate database connection to perform the activity and commit the SQL statement.</p>

Input

The input for the activity is the following.

Input Item	Datatype	Description
ServerTimeZone	string	<p>Specifies the time zone for the database server. See Time Zone Construction on page 371 for more information about how time zones are constructed using this field.</p> <p>You can use the Constants tab in the XPath Formula Builder to supply a valid time zone name. The list of time zone names is generated from <code>java.util.TimeZone.getAvailableIDs()</code>. See Time Zone Names on page 372 for the list of valid time zone names.</p>
statement	string	<p>The SQL statement you want to execute. You can use any process variables to build the statement dynamically, if desired.</p>
timeout	number	<p>Time (in seconds) to wait for the statement to complete. If the statement does not complete in the given time limit, an error is returned.</p>

Input Item	Datatype	Description
maxRows	number	The maximum number of rows to retrieve. To retrieve all rows, specify 0.

Output

The output for the activity is the following.

Output Item	Datatype	Description
noOfUpdates	integer	<p>The number of updates performed by the statement.</p> <p>There could be more than one statement performed (for example, if a stored procedure is executed). Because of this, this item is a list of integers. Each item in the list corresponds to the number of updates performed by each statement. The first integer in the list is the number of updates performed by the first statement executed by this activity. The second integer is the number of updates performed by the second statement, and so on.</p>

Output Item	Datatype	Description
unknownResultSet	complex	<p>The result of the database statement. The result element depends upon what is returned by the statement.</p> <p>The result set is a list of zero or more rows with zero or more columns. Each column contains a name and a value element. You can use XPath expressions to retrieve the desired row and column from the result set.</p> <p>There could be multiple result sets returned by the statements executed by this activity. Because of this, this output item is a repeatable list of result sets. The first item in the list of result sets corresponds to the result set returned by the first statement executed by this activity. The second item in the list of result sets corresponds to the result set returned by the second statement executed by this activity, and so on.</p>

Output Item	Datatype	Description
Elapsed Time	long	<p>This field displays the time taken for the execution of the activity in milliseconds.</p> <p>This is an optional element that appears only when the property <code>java.property.bw.activity.output.stats.elapsedTime.JDBCGeneralActivity</code> is set to true in <code>designer.tra</code>. For run-time, set the property to true in the <code>bwengine.tra</code> file. By default, the property is set to false.</p> <p>If set in the design-time, this property must be carried forward to the run-time; else it can cause run-time errors.</p> <p>Enabling this property causes additional performance overhead. Hence, it is recommended that you use this property only when this information is to be consumed by some other ActiveMatrix BusinessWorks activity. Also, it is recommended that this property be used only in a non-production environment as a diagnostic tool and the property be turned off at run-time.</p> <p>You can turn off the property and not calculate the elapsed time at run-time by setting the property <code>java.property.bw.activity.output.stats.elapsedTime.turnoff</code> in the <code>bwengine.tra</code> file. However, note that setting this property will turn off the calculation of elapsed time at run-time for all the JDBC activities.</p>

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
JDBCDriverLoadingException	An error occurred when loading the specified JDBC driver.
JDBCConnectionNotFoundException	An error occurred when attempting to connect to the specified database.
InvalidTimeZoneException	An invalid timezone was specified. See Time Zone Names on page 372 for a list of valid timezones.
JDBCSQLException	A SQL error occurred.
JDBCTimedOutException	The operation has timed out.
LoginTimedOutException	A timeout has occurred while attempting to connect to the database.

Time Zone Construction

TIBCO ActiveMatrix BusinessWorks constructs any date and time data returned from the database with the time zone specified in the `ServerTimeZone` input element. Constructed `DateTime` data is in a UTC-normalized form, and daylight savings adjustments are also automatically applied.

If an invalid time zone name is specified, an `InvalidTimeZoneException` is thrown. If no value is specified in this input item, it is assumed that the database server is in the same time zone as the local machine.

All activities that retrieve and modify data to be later updated in a database should specify the same time zone for the database server or potentially incorrect values will be stored in the database.

Examples

Date in Database	serverTimeZone	Constructed DateTime
Dec/5/1972	no value	1972-12-05T00:00:00-08:00
Jun/2/2003	no value	2003-06-02T00:00:00-07:00
Dec/5/1972	America/Los_Angeles	1972-12-05T00:00:00-08:00
Jun/2/2003	America/Los_Angeles	2003-06-02T00:00:00-07:00
Dec/5/1972	EST	1972-12-05T00:00:00-05:00
Jun/2/2003	EST	2003-06-02T00:00:00-04:00

Time Zone Names

The `ServerTimeZone` input item in JDBC activities allows you to specify the name of the time zone where the database server is located. [Table 4](#) lists the names of the time zones that you can specify. You can also retrieve these time zone names on the Constants tab of the XPath Formula Builder.

Table 4 Time zone names for the `ServerTimeZone` input item

Time Zone Name	Time Zone Name	Time Zone Name
MIT	Africa/Casablanca	Asia/Tehran
Pacific/Apia	Africa/Conakry	MET
Pacific/Niue	Africa/Dakar	Asia/Aqtau
Pacific/Pago_Pago	Africa/Freetown	Asia/Baku
America/Adak	Africa/Lome	Asia/Dubai
HST	Africa/Monrovia	Asia/Muscat
Pacific/Fakaofu	Africa/Nouakchott	Asia/Tbilisi
Pacific/Honolulu	Africa/Ouagadougou	Asia/Yerevan
Pacific/Rarotonga	Africa/Sao_Tome	Europe/Samara
Pacific/Tahiti	Africa/Timbuktu	Indian/Mahe
Pacific/Marquesas	Atlantic/Canary	Indian/Mauritius
AST	Atlantic/Faeroe	Indian/Reunion
America/Anchorage	Atlantic/Reykjavik	NET
Pacific/Gambier	Atlantic/St_Helena	Asia/Kabul
America/Los_Angeles	Europe/Dublin	Asia/Aqtobe
America/Tijuana	Europe/Lisbon	Asia/Ashgabat
America/Vancouver	Europe/London	Asia/Ashkhabad
PST	GMT	Asia/Bishkek

Table 4 Time zone names for the ServerTimeZone input item

Time Zone Name	Time Zone Name	Time Zone Name
Pacific/Pitcairn	UTC	Asia/Dushanbe
America/Dawson_Creek	WET	Asia/Karachi
America/Denver	Africa/Algiers	Asia/Tashkent
America/Edmonton	Africa/Bangui	Asia/Yekaterinburg
America/Mazatlan	Africa/Douala	Indian/Chagos
America/Phoenix	Africa/Kinshasa	Indian/Kerguelen
MST	Africa/Lagos	Indian/Maldives
PNT	Africa/Libreville	PLT
America/Belize	Africa/Luanda	Asia/Calcutta
America/Chicago	Africa/Malabo	IST
America/Costa_Rica	Africa/Ndjamena	Asia/Katmandu
America/El_Salvador	Africa/Niamey	Antarctica/Mawson
America/Guatemala	Africa/Porto-Novo	Asia/Almaty
America/Managua	Africa/Tunis	Asia/Colombo
America/Mexico_City	Africa/Windhoek	Asia/Dacca
America/Regina	ECT	Asia/Dhaka
America/Tegucigalpa	Europe/Amsterdam	Asia/Novosibirsk
America/Winnipeg	Europe/Andorra	Asia/Thimbu
CST	Europe/Belgrade	Asia/Thimphu
Pacific/Easter	Europe/Berlin	BST
Pacific/Galapagos	Europe/Brussels	Asia/Rangoon
America/Bogota	Europe/Budapest	Indian/Cocos
America/Cayman	Europe/Copenhagen	Asia/Bangkok

Table 4 Time zone names for the ServerTimeZone input item

Time Zone Name	Time Zone Name	Time Zone Name
America/Grand_Turk	Europe/Gibraltar	Asia/Jakarta
America/Guayaquil	Europe/Luxembourg	Asia/Krasnoyarsk
America/Havana	Europe/Madrid	Asia/Phnom_Penh
America/Indianapolis	Europe/Malta	Asia/Saigon
America/Jamaica	Europe/Monaco	Asia/Vientiane
America/Lima	Europe/Oslo	Indian/Christmas
America/Montreal	Europe/Paris	VST
America/Nassau	Europe/Prague	Antarctica/Casey
America/New_York	Europe/Rome	Asia/Brunei
America/Panama	Europe/Stockholm	Asia/Hong_Kong
America/Port-au-Prince	Europe/Tirane	Asia/Irkutsk
America/Porto_Acre	Europe/Vaduz	Asia/Kuala_Lumpur
America/Rio_Branco	Europe/Vienna	Asia/Macao
EST	Europe/Warsaw	Asia/Manila
IET	Europe/Zurich	Asia/Shanghai
America/Anguilla	ART	Asia/Singapore
America/Antigua	Africa/Blantyre	Asia/Taipei
America/Aruba	Africa/Bujumbura	Asia/Ujung_Pandang
America/Asuncion	Africa/Cairo	Asia/Ulaanbaatar
America/Barbados	Africa/Gaborone	Asia/Ulan_Bator
America/Caracas	Africa/Harare	Australia/Perth
America/Cuiaba	Africa/Johannesburg	CTT
America/Curacao	Africa/Kigali	Asia/Jayapura

Table 4 Time zone names for the ServerTimeZone input item

Time Zone Name	Time Zone Name	Time Zone Name
America/Dominica	Africa/Lubumbashi	Asia/Pyongyang
America/Grenada	Africa/Lusaka	Asia/Seoul
America/Guadeloupe	Africa/Maputo	Asia/Tokyo
America/Guyana	Africa/Maseru	Asia/Yakutsk
America/Halifax	Africa/Mbabane	JST
America/La_Paz	Africa/Tripoli	Pacific/Palau
America/Manaus	Asia/Amman	ACT
America/Martinique	Asia/Beirut	Australia/Adelaide
America/Montserrat	Asia/Damascus	Australia/Broken_Hill
America/Port_of_Spain	Asia/Jerusalem	Australia/Darwin
America/Puerto_Rico	Asia/Nicosia	AET
America/Santiago	CAT	Antarctica/DumontDURville
America/Santo_Domingo	EET	Asia/Vladivostok
America/St_Kitts	Europe/Athens	Australia/Brisbane
America/St_Lucia	Europe/Bucharest	Australia/Hobart
America/St_Thomas	Europe/Chisinau	Australia/Sydney
America/St_Vincent	Europe/Helsinki	Pacific/Guam
America/Thule	Europe/Istanbul	Pacific/Port_Moresby
America/Tortola	Europe/Kaliningrad	Pacific/Saipan
Antarctica/Palmer	Europe/Kiev	Pacific/Truk
Atlantic/Bermuda	Europe/Minsk	Australia/Lord_Howe
Atlantic/Stanley	Europe/Riga	Asia/Magadan
PRT	Europe/Simferopol	Pacific/Efate

Table 4 Time zone names for the ServerTimeZone input item

Time Zone Name	Time Zone Name	Time Zone Name
America/St_Johns	Europe/Sofia	Pacific/Guadalcanal
CNT	Europe/Tallinn	Pacific/Kosrae
AGT	Europe/Vilnius	Pacific/Noumea
America/Buenos_Aires	Africa/Addis_Ababa	Pacific/Ponape
America/Cayenne	Africa/Asmera	SST
America/Fortaleza	Africa/Dar_es_Salaam	Pacific/Norfolk
America/Godthab	Africa/Djibouti	Antarctica/McMurdo
America/Miquelon	Africa/Kampala	Asia/Anadyr
America/Montevideo	Africa/Khartoum	Asia/Kamchatka
America/Paramaribo	Africa/Mogadishu	NST
America/Sao_Paulo	Africa/Nairobi	Pacific/Auckland
BET	Asia/Aden	Pacific/Fiji
America/Noronha	Asia/Baghdad	Pacific/Funafuti
Atlantic/South_Georgia	Asia/Bahrain	Pacific/Majuro
America/Scoresbysund	Asia/Kuwait	Pacific/Nauru
Atlantic/Azores	Asia/Qatar	Pacific/Tarawa
Atlantic/Cape_Verde	Asia/Riyadh	Pacific/Wake
Atlantic/Jan_Mayen	EAT	Pacific/Wallis
Africa/Abidjan	Europe/Moscow	Pacific/Chatham
Africa/Accra	Indian/Antananarivo	Pacific/Enderbury
Africa/Banjul	Indian/Comoro	Pacific/Tongatapu
Africa/Bissau	Indian/Mayotte	Pacific/Kiritimati

Chapter 9

JMS Palette

Java Message Service (JMS) is a specification for how messages are sent and received between applications in a Java environment.

The JMS palette is used to send and receive JMS messages in a process definition. Both the JMS point-to-point (queues) and publish/subscribe (topics) models are supported.

Refer to the documentation of your JMS provider or the JMS specification for more information about JMS and its message models.

See *TIBCO ActiveMatrix BusinessWorks Release Notes* for more information about specific support for JMS providers.

Topics

- [Enabling JMS in TIBCO ActiveMatrix BusinessWorks, page 378](#)
- [Get JMS Queue Message, page 379](#)
- [JMS Application Properties, page 388](#)
- [JMS Connection, page 389](#)
- [JMS Properties, page 399](#)
- [JMS Queue Receiver, page 403](#)
- [JMS Queue Requestor, page 411](#)
- [JMS Queue Sender, page 420](#)
- [JMS Topic Publisher, page 428](#)
- [JMS Topic Requestor, page 435](#)
- [JMS Topic Subscriber, page 445](#)
- [Reply To JMS Message, page 454](#)
- [Wait for JMS Queue Message, page 462](#)
- [Wait for JMS Topic Message, page 471](#)

Enabling JMS in TIBCO ActiveMatrix BusinessWorks

TIBCO ActiveMatrix BusinessWorks acts as a JMS client when sending messages to or receiving messages from a JMS provider. Because of this, you must place the appropriate JMS client files supplied by the JMS provider in the proper location. Typically, this includes placing JAR files into a directory that is included on the client's CLASSPATH.

See the documentation for your JMS provider for more information about which files are needed and the location to place them to enable client access to the JMS server.

Once you have located the appropriate files, you can place them in the `<TIBCO_HOME>/bw/<version>/lib` directory. This directory is in the TIBCO ActiveMatrix BusinessWorks CLASSPATH, and placing the JMS client files in that directory allows you to design and test TIBCO ActiveMatrix BusinessWorks process definitions that include JMS Palette activities.

When deploying your project, the machine where the process engine is deployed must also have the appropriate JMS client files. You should also place the JMS client files in the `<TIBCO_HOME>/bw/<version>/lib` directory of the machines where your process engines are deployed.

Get JMS Queue Message

Activity



The Get JMS Queue Message activity retrieves a message from the specified queue. This activity allows you to perform a receive operation on the queue as opposed to waiting for a queue message to be delivered to the [Wait for JMS Queue Message](#) activity or the [JMS Queue Receiver](#) process starter.

You can use the Message Selector field on the Advanced tab to retrieve a specific queue message from the queue.

The Get JMS Queue Message activity is different from the Wait for JMS Queue Message activity in the following ways:

- Unlike the Wait for activity, which starts listening for messages from the time the BusinessWorks engine starts, this activity starts listening for incoming messages on the specified queue from the time the activity is triggered.
- This activity can receive only one message from the specified queue at a time, when the Message Selector is not used.
- Once triggered, this activity can either get a message from the specified destination queue name before timeout and proceeds or it throws a timeout error and exits.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
JMS Connection	No	The JMS connection. See JMS Connection on page 389 for more information about creating a JMS connection.

Field	Global Var?	Description
Destination Queue	Yes	<p>Name of the queue from which to retrieve the message.</p> <p>The syntax of the queue name is specific to the JMS provider you are using. See your JMS provider documentation for more information about queue names.</p> <p>Note: If you are using TIBCO Enterprise Message Service as your JMS provider, you can use the Browse button next to this field after specifying a valid connection in the JMS Connection field. The Browse button displays a list of configured destinations in the JMS server that are appropriate for this activity.</p>
Message Type	No	<p>The type of the message. This can be one of the following:</p> <ul style="list-style-type: none">• Simple — A message with no body portion.• Bytes — A stream of bytes.• Map — A set of name or value pairs. The names are strings, and the values are simple data types (JAVA primitives), an array of bytes (use the Binary datatype when mapping this data), or a string. Each item can be accessed sequentially or by its name.• Object — A serializable Java object.• Object Ref — An object reference to a Java object.• Stream — A stream of Java primitives, strings, or arrays of bytes. Each value must be read sequentially.• Text — The message is a <code>java.lang.String</code>.• XML Text — The message is XML text.

Field	Global Var?	Description
Acknowledge Mode	Yes	<p>The acknowledge mode for incoming messages. It can be one of the following:</p> <ul style="list-style-type: none">• Auto — the message is automatically acknowledged when it is received.• Client — the message will be acknowledged at a later point by using the Confirm activity. If the message is not confirmed before the process instance ends, the message is redelivered and a new process instance is created to handle the new incoming message. Ensure that your process definition confirms the message when using this acknowledge mode.

Field	Global Var?	Description
		<ul style="list-style-type: none">TIBCO EMS Explicit — (only available for TIBCO Enterprise Message Service) a message which is not acknowledged using the Confirm activity before the process instance ends, will be redelivered instead of all messages in the session. The session is not blocked and one session handles all incoming messages for each process instance. Note — In the TIBCO ActiveMatrix BusinessWorks 5.10 release, there is a change in the behavior of this feature. Now only the messages that are not confirmed, would be redelivered.TIBCO EMS Explicit Dups OK — (only available for TIBCO Enterprise Message Service) a message which is not acknowledged using the Confirm activity before the process instance ends, will be redelivered instead of all messages in the session. The session is not blocked and one session handles all the incoming messages for each process instance. However, the messages would be lazily acknowledged.TIBCO EMS No Acknowledge — the message is not acknowledged when it is received.Dups OK — the message is acknowledged automatically when it is received. JMS provides this mode for lazy acknowledgement, but TIBCO ActiveMatrix BusinessWorks acknowledges messages upon receipt.Transactional — this mode is used when a transaction that can process JMS messages is included in the process definition. The message is acknowledged when the transaction commits. See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about creating transactions that JMS activities can participate in.

Advanced

The Advanced tab has the following fields.

Field	Global Var?	Description
Message Selector	Yes	<p>A string to determine whether a message should be received. The syntax of the message selector is determined by the JMS provider, but it is usually a subset of SQL92 (where message properties are used instead of table column names).</p> <p>See your JMS provider documentation for more information and syntax for a message selector string.</p>
JMS Application Properties	No	<p>Any application-specific message properties that will be part of the message. This is specified by the JMS Application Properties shared configuration resource.</p> <p>Once specified, these properties appear on the Output tab as "OtherProperties".</p>

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
destinationQueue	string	The queue to which to send the request. This input item overrides the Destination Queue field on the Configuration tab.
timeout	integer	Specifies how long the message can remain active (in seconds). If set to 0, the message does not expire.

Input Item	Datatype	Description
selector	string	<p>A string to determine whether a message should be received. The value of this element overrides any value specified in the Message Selector field of the Advanced tab. The syntax of the message selector is determined by the JMS provider, but it is usually a subset of SQL92 (where message properties are used instead of table column names).</p> <p>See your JMS provider documentation for more information and syntax for a message selector string.</p>

Output Editor

The Output Editor tab defines the schema to use for messages of type Map, Stream, or XML Text. Map messages are name/value pairs, and the schema allows you to define the structure of the retrieved queue message. The schema defined on the Output Editor tab becomes the body of the message on the Output tab.

See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Output Editor tab.

Output

The output for the activity is the following.

Output Item	Datatype	Description
JMSHeaders	complex	<p>The message header fields for the message. See JMS Properties on page 399 for more information about message header fields.</p> <p>Only properties applicable to this type of message are displayed.</p>
JMSProperties	complex	<p>The message properties for the message. See JMS Properties on page 399 for more information about message properties.</p> <p>Only properties applicable to this type of message are displayed.</p>

Output Item	Datatype	Description
OtherProperties	complex	If the JMS Application Properties field is specified on the Advanced tab, the OtherProperties group lists the application-specific properties in the selected JMS Application Properties shared configuration resource.
Body	depends upon message type	The body of the message.

Output Item	Datatype	Description
DynamicProperties	complex	<p>The dynamic properties is an additional parameter to add runtime property to the Outgoing JMS Messages which is specified in the Input tab. This is an optional element with only one instance. Dynamic property can have multiple property elements.</p> <p>Each property element denotes a single dynamic property and can contain the following elements:</p> <p>Name — Required. Name of the property with one instance.</p> <p>Value — Required. Value of the property with one instance.</p> <p>Type — Optional. Type of the property. If not provided, it will be considered as string.</p> <p>Following Types are supported:</p> <ul style="list-style-type: none">• string• boolean• short• integer• long• float• double• byte <p>Note: The DynamicProperty will overwrite the value of a property (with the same name) added using the JMS Application Property.</p> <p>The DynamicProperties will be also added to the outgoing message.</p>

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
JMSInvalidInputException	Input to the activity is not valid.
JMSSessionCreateException	The JMS session could not be created.
JMSReceiveException	The JMS receive operation failed.
ActivityTimedOutException	The specified timeout has been reached and the activity has not completed its execution.

JMS Application Properties

Shared Configuration



The JMS Application Properties resource describes any JMS message properties that a JMS application expects. These properties can then be added to a JMS message on the Advanced tab of a JMS activity. These properties appear in the OtherProperties element on the Input or Output tab of the activity.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the resource.
Description	No	Short description of the shared resource.
Properties	No	<p>A table listing any application-specific properties. Use the + and x buttons to the right of the table to add and delete properties. Use the up and down arrow buttons to move selected properties to the desired location in the table.</p> <p>Specify the name of the property by typing the name in the PropertyName column.</p> <p>Specify the datatype of the property by double clicking the cell of the Type column for the desired property. This causes a drop down list of valid JMS datatypes to appear.</p> <p>Specify whether the property is optional or required by double clicking on the cell of the Cardinality column for the desired property. Select either optional or required in the drop down list that appears.</p>

JMS Connection

Shared Configuration



The JMS Connection resource describes a JMS connection. This resource is used to specify activities on the JMS palette.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	This name appears as the label for the resource.
Description	No	Short description of the shared resource.
User Name	Yes	<p>User name to use when logging into the JMS server.</p> <p>If the JMS provider does not require access control, this field can be empty.</p> <p>Not all JMS servers require user names and passwords. Refer to your JMS provider documentation and consult your system administrator to determine if your JMS server requires a user name and password.</p>
Password	Yes	<p>Password to use when logging into the JMS server.</p> <p>If the JMS provider does not require access control, this field can be empty.</p>

Field	Global Var?	Description
Auto-Generate Client ID	Yes	<p>Checking this field specifies that you want to automatically generate the client ID if no client ID is specified or if the specified ID is already in use. When this field is checked, if a value is specified in the Client ID field, an attempt is made to use the specified value. However, if the specified value is already in use, a new client ID is generated.</p> <p>When an automatically generated client ID is required, the following format is used for the client ID:</p> <p><i>BW-<code><projectName></code>-<code><topic or queue></code>-<code><engineName></code>-<code><timestamp></code></i></p> <p>If this field is not checked, then the value specified in the Client ID field is used. If no value is specified in the Client ID field, then no client ID is set. If the value specified in the Client ID field is already in use, an exception is thrown.</p>
Client ID	Yes	<p>Client ID for the connection. Typically JMS providers have a provider-specific format for client IDs. See your JMS provider's documentation for more information about client IDs. Each connection must use a unique Client ID. If you do not specify a value in this field, TIBCO ActiveMatrix BusinessWorks ensures the uniqueness of the client ID for each connection.</p> <p>You cannot use the same JMS Connection resource for accessing both topics and queues. You should create separate JMS Connection resources if you want to access both topic and queue destinations.</p>

Field	Global Var?	Description
SSL	No	<p>Specifies whether you want to use SSL for the connection to the JMS server. SSL is used when the Use SSL? checkbox is checked. Click the Configure SSL button to configure the SSL connection parameters.</p> <p>Note: SSL is supported only when using TIBCO Enterprise Message Service.</p> <p>See SSL Configuration on page 396 for more information.</p>
Use JNDI for Connection Factory	Yes	<p>Specifies whether JNDI should be used to look up the ConnectionFactory object. If this field is unchecked, the Provider URL and Use XA Connection Factory fields appear. If this field is checked, JNDI configuration fields appear.</p>
Provider URL	Yes	<p>This field is only available when the Use JNDI for Connection Factory field is unchecked.</p> <p>This is the URL to use to connect to the JMS server.</p>
Use XA Connection Factory	No	<p>When checked, this field specifies that an XA connection factory is to be used. This is useful if you want activities that use this connection to participate in an XA transaction.</p> <p>Note: This field appears only when the Use JNDI for Connection Factory field is unchecked.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about transactions.</p> <p>Note: If this field is selected, the "Use UFO Connection Factory" field cannot be used.</p>

Field	Global Var?	Description
Use UFO Connection Factory	Yes	<p>Use this checkbox when using EMS Unshared State Failover factories. Refer to <i>TIBCO Enterprise Message Service User's Guide</i> for details on Unshared State Failover.</p> <p>This field appears only when the Use JNDI for Connection Factory field is unchecked.</p> <p>Note: If this field is selected, the Use XA Connection Factory field cannot be used.</p> <p>When using Unshared Failover setup, if a connection loss is detected to server (A), TIBCO ActiveMatrix BusinessWorks will try to connect to server (B) as defined in the connection factory configuration. For more information on Unshared Failover, refer to <i>TIBCO Enterprise Message Service User's Guide</i>.</p> <p>After enabling this checkbox you can pass the provider URL in the form of UFO. For example: "tcp://serverA:7222+tcp://serverB:7222" where serverA and serverB are two EMS servers configured for the Unshared State Failover.</p> <p>Unsupported Features and Activities</p> <ul style="list-style-type: none">• JMS Palette<ul style="list-style-type: none">— JMS Queue Requestor— JMS Topic Requestor— Any other Requestor activity• SOAP Palette<ul style="list-style-type: none">— All activities• Service Palette<ul style="list-style-type: none">— All activities• AE Adaptor<ul style="list-style-type: none">— All activities <p>Looking up factories using JNDI is not supported because:</p> <ul style="list-style-type: none">• UFO factories cannot be retrieved through JNDI directly.

Field	Global Var?	Description
Use Shared JNDI Configuration	No	<p>When this field is checked, the JNDI Configuration field appears that allows you to choose a JNDI Configuration shared configuration resource.</p> <p>When this field is unchecked, the JNDI Context Factory, JNDI Context URL, JNDI User Name, and JNDI Password fields appear.</p>
JNDI Configuration	No	<p>This field only appears when the Use Shared JNDI Configuration field is checked.</p> <p>This field allows you to choose a JNDI Configuration shared configuration object that specifies the JNDI connection information. See JNDI Configuration on page 176 for more information.</p>
JNDI Context Factory	Yes	<p>This field appears only when the Use Shared JNDI Configuration field is unchecked. It is the initial context factory class for accessing JNDI. (<code>javax.naming.Context.INITIAL_CONTEXT_FACTORY</code>). You can choose from the drop-down list of supported classes, or you can type in a different InitialContextFactory class name.</p> <p>When using IBM WebSphere, you should use the JNDI Configuration resource instead of specifying the JNDI configuration on this resource. See IBM WebSphere and JNDI Context Caching on page 178 for more information.</p> <p>Note: TIBCO ActiveMatrix BusinessWorks attempts to find the class. However, you may need to add the Java file supplied by your JNDI service provider to the CLASSPATH environment variable to use JNDI.</p>
JNDI Context URL	Yes	<p>This field only appears when the Use Shared JNDI Configuration field is unchecked. This is the URL to the JNDI service provider (<code>javax.naming.Context.PROVIDER_URL</code>). An example URL is provided when one of the supported JNDI context factory classes is selected.</p> <p>See your JNDI provider documentation for the syntax of the URL.</p>

Field	Global Var?	Description
JNDI User Name	Yes	This field only appears when the Use Shared JNDI Configuration field is unchecked. User name to use when logging into the JNDI server (<code>javax.naming.Context.SECURITY_PRINCIPAL</code>). If the JNDI provider does not require access control, this field can be empty.
JNDI Password	Yes	This field only appears when the Use Shared JNDI Configuration field is unchecked. Password to use when logging into the JNDI server (<code>javax.naming.Context.SECURITY_CREDENTIALS</code>). If the JNDI provider does not require access control, this field can be empty.
Connection Factory SSL Password	Yes	<p>This field is only available when the SSL and the Use JNDI for Connection Factory fields are checked and the Use Shared JNDI Configuration field is unchecked.</p> <p>The SSL configuration is specified in the <code>ConnectionFactory</code> object, except for the client SSL password.</p> <p>You can specify your client SSL password in this field, or you can leave this field empty. If your password is not specified, the private key password is used.</p>

Test Connection Button

Allows you to test the connection specified in the configuration of this resource. This button is only enabled if JNDI is not used (that is, the Use JNDI for Connection Factory field is unchecked) or if the required JNDI fields on the Configuration and Advanced tab are supplied when JNDI is used.

Advanced

The Advanced tab has the following fields.

Field	Global Var?	Description
Topic Connection Factory	Yes	<p>This field is only available when the Use JNDI for Connection Factory field on the Configuration tab is checked.</p> <p>The TopicConnectionFactory object stored in JNDI. This object is used to create a topic connection with a JMS application.</p> <p>See your JNDI provider documentation for more information about creating and storing TopicConnectionFactory objects.</p>
Queue Connection Factory	Yes	<p>This field is only available when the Use JNDI for Connection Factory field on the Configuration tab is checked.</p> <p>The QueueConnectionFactory object stored in JNDI. This object is used to create a queue connection with a JMS application.</p> <p>See your JNDI provider documentation for more information about creating and storing QueueConnectionFactory objects.</p>
JNDI Properties	No	<p>Any additional properties to supply for the connection. You specify a name, datatype, and value for each property.</p> <p>These properties are typically vendor-specific. See your JNDI provider documentation for more information about the available properties.</p>

SSL Configuration

The SSL Configuration button allows you to configure the SSL connection parameters. The SSL Configuration dialog specifies the basic and advanced SSL parameters you can set for the JMS server you are connecting to.



When using JNDI to lookup the JMS Connection factory, the parameters `ssl_identity` and `ssl_verify_host` must be specified in the `factories.conf` file of the Enterprise Message Service server.

The following sections describe the SSL Configuration dialog.

Basic

The Basic tab of the SSL Configuration dialog allows you to specify the simplest required SSL configuration parameters for the connection.

Field	Description
Trusted Certificates Folder	<p>Location of the trusted certificates on this machine. The trusted certificates are a collection of certificates from servers to whom you will establish connections. If the server you want to establish a connection presents a certificate that does not match one of your trusted certificates, the connection is refused.</p> <p>This prevents connections to unauthorized servers.</p> <p>Trusted certificates must be imported into a folder, and then you can select the folder in this field.</p>
Identity	<p>The location of the client certificate. This is a resource contained in the General palette.</p> <p>Specify the client certificate and Identity field when the JMS server requires client authentication.</p> <p>See <i>TIBCO Designer Palette Reference</i> for more information.</p>

Advanced

The Advanced tab of the SSL Configuration dialog allows you to specify more advanced SSL configuration parameters for the connection.

Field	Description
Trace	Specifies whether SSL tracing should be enabled during the connection. If checked, the SSL connection messages are logged and sent to the console.
Debug Trace	Specifies whether SSL debug tracing should be enabled during the connection. Debug tracing provides more detailed messages than standard tracing.
Verify Host Name	<p>Specifies whether you want to verify that the host you are connecting to is the expected host. The host name in the host's digital certificate is compared against the value you supply in the Expected Host Name field. If the host name does not match the expected host name, the connection is refused.</p> <p>Note: The default context factories for TIBCO Enterprise Message Service automatically determine if host name verification is necessary. If you are using a custom implementation of the context factories, your custom implementation must explicitly set the verify host property to the correct value. For example:</p> <pre>com.tibco.tibjms.TibjmsSSL.setVerifyHost(false)</pre>
Expected Host Name	<p>Specifies the name of the host you are expecting to connect to. This field is only relevant if the Verify Host Name field is also checked.</p> <p>If the name of the host in the host's digital certificate does not match the value specified in this field, the connection is refused.</p> <p>This prevents hosts from attempting to impersonate the host you are expecting to connect to.</p>

Field	Description
Strong Cipher Suites Only	<p>When checked, this field specifies that the minimum strength of the cipher suites used can be specified with the <code>bw.plugin.security.strongcipher.minstrength</code> custom engine property. See <i>TIBCO ActiveMatrix BusinessWorks Administration</i> for more information about this property. The default value of the property disables cipher suites with an effective key length below 128 bits.</p> <p>When this field is unchecked, only cipher suites with an effective key length of up to 128 bits can be used.</p>

JMS Properties

Table 5 table describes message headers and message properties used in JMS messages. MessageHeader properties are set by the JMS application sending the message and are available to view once the message is received. MessageProperties can be set on outgoing messages using the Input tab of the activity that sends the message.

Table 5 Properties for JMS Messages

Property	Datatype	Description
MessageHeaders		
JMSDestination	string	Destination where a message is sent.
JMSReplyTo	string	The JMS application where the reply message should be sent.
JMSDeliveryMode	string	<div>The delivery mode of the message. Can be one of the following:<ul style="list-style-type: none">PERSISTENT — signifies the messages are stored and forwarded.NON_PERSISTENT — messages are not stored and may be lost due to failures in transmission.When using TIBCO Enterprise Message Service, the JMSDeliveryMode header can be RELIABLE_DELIVERY. See the TIBCO Enterprise Message Service documentation for more information about this mode.</div>
JMSMessageID	string	The unique ID of the message.
JMSTimestamp	long	The time a message was handed off to a JMS provider to be sent. The time is expressed as the amount of time, in milliseconds, since midnight, January 1, 1970, UTC.

Table 5 Properties for JMS Messages

Property	Datatype	Description
JMSExpiration	long	<p>The expiration time of the message. The time is expressed as the amount of time, in milliseconds since midnight, January 1, 1970, UTC. If set to 0, the message does not expire.</p> <p>For outgoing messages, this is set by specifying the JMSExpiration field on the activity's Advanced tab.</p>
JMSRedelivered	boolean	<p>Typically this item is set when the JMS provider has delivered the message at least once before.</p>
JMSPriority	integer	<p>The priority of the message. Priority is a value from 0-9. Higher numbers signify a higher priority (that is, 9 is a higher priority than 8).</p> <p>For outgoing messages, the default priority is 4. This is set on the activity's Advanced tab.</p>
JMSCorrelationID	string	<p>This ID is used to link a response message with its related request message. This is usually the message ID of a request message when this field is found in a reply message.</p> <p>See the following topics for more information about JMSCorrelationID:</p> <ul style="list-style-type: none">• JMS Queue Requestor on page 411• JMS Queue Sender on page 420• JMS Topic Publisher on page 428• JMS Topic Requestor on page 435• Reply To JMS Message on page 454

Table 5 Properties for JMS Messages

Property	Datatype	Description
JMSType	string	The JMS provider-supplied string to describe the type of the message. Some JMS providers use this property to define messages in the provider's repository. See your JMS provider documentation for more information about the use of this field.
MessageProperties		
JMSXUserID	string	<p>The ID of the user sending the message.</p> <p>This property is optionally set on incoming messages by the JMS application. This property is not set on outgoing messages.</p>
JMSXAppID	string	<p>The ID of the application sending the message.</p> <p>This property is optionally set on incoming messages by the JMS application. This property is not set on outgoing messages.</p>
JMSXProducerTXID	string	<p>The transaction identifier of the transaction where this message was produced.</p> <p>This property is optionally set on incoming messages by the JMS application. This property is not set on outgoing messages.</p>
JMSXConsumerTXID	string	<p>The transaction identifier of the transaction where this message was consumed.</p> <p>This property is optionally set on incoming messages by the JMS application. This property is not set on outgoing messages.</p>

Table 5 Properties for JMS Messages

Property	Datatype	Description
JMSXRcvTimestamp	integer	<p>The time the JMS server delivered the message to the consumer. The time is expressed as the amount of time, in milliseconds since midnight, January 1, 1970, UTC.</p> <p>This property is optionally set on incoming messages by the JMS server. This property is not set on outgoing messages.</p>
JMSXDeliveryCount	integer	<p>The number of delivery attempts for this message.</p>
JMSXGroupID	string	<p>The identity of the message group this message is a part of.</p> <p>You can set this property on outgoing messages to group messages into a numbered sequence.</p>
JMSXGroupSeq	integer	<p>The sequence number of this message in its group.</p> <p>You can set this property on outgoing messages to group messages into a numbered sequence.</p>

JMS Queue Receiver

Process Starter



Starts a process based on the receipt of a message for the specified JMS queue.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
JMS Connection	No	The JMS connection. See JMS Connection on page 389 for more information about creating a JMS connection.
Destination Queue	Yes	<p>Name of the queue of the incoming message.</p> <p>The syntax of the queue name is specific to the JMS provider you are using. See your JMS provider documentation for more information about queue names.</p> <p>Note: If you are using TIBCO Enterprise Message Service as your JMS provider, you can use the Browse button next to this field after specifying a valid connection in the JMS Connection field. The Browse button displays a list of configured destinations in the JMS server that are appropriate for this activity.</p>

Field	Global Var?	Description
Message Type	No	<p>The type of the message. This can be one of the following:</p> <ul style="list-style-type: none">• Simple — A message with no body portion.• Bytes — A stream of bytes.• Map — A set of name/value pairs. The names are strings, and the values are simple data types (Java primitives), an array of bytes (use the Binary datatype when mapping this data), or a string. Each item can be accessed sequentially or by its name.• Object — A serializable Java object.• Object Ref — An object reference to a Java object.• Stream — A stream of Java primitives, strings, or arrays of bytes. Each value must be read sequentially.• Text — The message is a <code>java.lang.String</code>.• XML Text — The message is XML text.
Acknowledge Mode	Yes	<p>The acknowledge mode for incoming messages. It can be one of the following:</p> <ul style="list-style-type: none">• Auto — the message is automatically acknowledged when it is received.• Client — the message will be acknowledged at a later point by using the Confirm activity. If the message is not confirmed before the process instance ends, the message is redelivered and a new process instance is created to handle the new incoming message. Ensure that your process definition confirms the message when using this acknowledge mode.

Field	Global Var?	Description
		<ul style="list-style-type: none"> • TIBCO EMS Explicit — (only available for TIBCO Enterprise Message Service) a message which is not acknowledged using the Confirm activity before the process instance ends, will be redelivered instead of all messages in the session. The session is not blocked and one session handles all incoming messages for each process instance. <p>Note — In the TIBCO ActiveMatrix BusinessWorks 5.10 release, there is a change in the behavior of this feature. Now only the messages that are not confirmed, will be redelivered.</p> <ul style="list-style-type: none"> • TIBCO EMS Explicit Dups OK — (only available for TIBCO Enterprise Message Service) a message which is not acknowledged using the Confirm activity before the process instance ends, will be redelivered instead of all messages in the session. The session is not blocked and one session handles all the incoming messages for each process instance. The messages however, would be lazily acknowledged. • TIBCO EMS No Acknowledge — the message is not acknowledged when it is received. • Dups OK — the message is acknowledged automatically when it is received. JMS provides this mode for lazy acknowledgement, but TIBCO ActiveMatrix BusinessWorks acknowledges messages upon receipt. • Transactional — this mode is used when a transaction that can process JMS messages is included in the process definition. The message is acknowledged when the transaction commits. See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about creating transactions that JMS activities can participate in. • Local Transactional — this mode is used when a transaction involves only JMS messages. See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about creating transactions that JMS activities can participate in.

Field	Global Var?	Description
Max Sessions	Yes	<p>When the Acknowledge Mode field is set to Client, Transactional and Local Transactional, this field appears for specifying the maximum number of JMS sessions to create for incoming messages.</p> <p>When a JMS queue message is received, the session is blocked until the message is acknowledged. Because the acknowledgement can come at a later time with the Confirm activity, this field allows you to specify a maximum number of new sessions to create to handle incoming messages.</p> <p>After reaching a maximum number of sessions, no new incoming messages can be processed. The total number of active sessions is decreased and another incoming message can be processed after confirming an incoming message.</p>

Misc

The Misc tab contains the following fields:

Field	Description
Sequencing Key	<p>This field can contain an XPath expression that specifies which processes should run in order. Process instances with sequencing keys that evaluate to the same value will be executed sequentially in the order the process instance was created.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about controlling the execution order of process instances and about XPath expressions.</p>
Custom Id	<p>This field can contain an XPath expression that specifies a custom ID for the process instance. This ID is displayed in the View Service dialog of TIBCO Administrator, and it is also available in the <code>\$_processContext</code> process variable.</p>

Load-Balancing of Incoming Messages

One common application of a JMS queue is to distribute queue messages across multiple receivers, thus balancing the processing of the messages on the queue. To achieve this goal, both the JMS server and TIBCO ActiveMatrix BusinessWorks must be properly configured. The JMS server must allow the queue messages to be distributed across multiple receivers. For example, in TIBCO Enterprise Message Service, the `exclusive` property on the queue controls whether messages can be delivered across receivers or not. In TIBCO ActiveMatrix BusinessWorks, the process definition containing the JMS Queue Receiver must be deployed across multiple process engines. This creates multiple queue receivers for the same queue.

When balancing incoming messages across TIBCO ActiveMatrix BusinessWorks engines, you should ensure that one engine does not attempt to accept and confirm a large number of incoming messages before other engines can receive the messages. In general, most JMS servers balance the load by distributing messages in a round-robin fashion to all queue receivers. However, there are situations that can cause an uneven distribution of messages across queue receivers. If you set the Acknowledge Mode field to "Auto" on the Configuration tab of the JMS Queue Receiver, the process starter confirms messages as it receives them. When process engines are started at different times, this can lead to one process engine receiving all queue messages and paging them to disk, depending upon how the engine's Max Jobs and Activation Limit properties are set when the engine is deployed.

If you are using TIBCO Enterprise Messaging Service, you can avoid this problem by setting the acknowledge mode to TIBCO EMS Explicit and then use the Flow Limit property in the deployment configuration to control the number of process instances created by the process starter.

If you are not using TIBCO Enterprise Messaging Service, set the Acknowledge Mode field to "Client". In this mode, a process engine can only receive as many messages as it has sessions specified in the Max Sessions field. Once a process engine reaches the maximum number of sessions, another process engine can begin to accept incoming messages. A process engine cannot receive more messages until the messages have been acknowledged by using the [Confirm](#) activity. Once the message is acknowledged, the session is released and the process engine can accept a new message.



If the Sequencing Key field is set to preserve the order of incoming messages, to confirm the messages sequentially you must either set the Acknowledge mode to TIBCO EMS Explicit Client Acknowledge mode or set the Acknowledge mode to Client and Max Sessions to 1. Setting Max Sessions to 1 can limit the system's throughput, so using TIBCO Enterprise Message Service and TIBCO EMS Explicit Client Acknowledge is a better choice.

Advanced

The Advanced tab has the following fields.

Field	Global Var?	Description
Message Selector	Yes	<p>A string to determine whether a message should be received. The syntax of the message selector is determined by the JMS provider, but it is usually a subset of SQL92 (where message properties are used instead of table column names).</p> <p>See your JMS provider documentation for more information and syntax for a message selector string.</p>
JMS Application Properties	Yes	<p>Any application-specific message properties that will be part of the message. This is specified by the JMS Application Properties shared configuration object.</p> <p>Once specified, these properties appear on the Output tab as "OtherProperties".</p>
Receiver Timeout (seconds)	No	<p>Specifies the polling interval to check for new messages. This default interval is set by the custom engine property <code>bw.plugin.jms.receiverTimeout</code>. If no value is specified for the property, the default polling interval is one second.</p> <p>Set a value in this field to specify the polling interval (in seconds) for this activity. The value in this field overrides the default polling interval.</p>
Precreate Transactions	No	<p>When checked, this field specifies that the transaction is created before a message arrives at the JMS receiver. This field is available when Acknowledge Mode is set to Transactional.</p>
XA Transaction Manager Reference	No	<p>Specifies the XA Transaction Manager Configuration used to create the XA transaction. This field is available when Precreate Transactions field is checked. This configuration overrides the Transaction Manager associated with the group the Event Source is tied to.</p>

Output Editor

The Output Editor tab defines the schema to use for incoming messages whose message type is Map, Stream, or XML Text. Map messages are name/value pairs, and the schema allows you to define the structure of the incoming message. Once defined, the schema on the Output Editor tab becomes the structure used for the body of the message displayed on the Output tab.

See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Output Editor tab.

Output

The output for the activity is the following.

Output Item	Datatype	Description
JMSHeaders	complex	<p>The message header fields for the message. See JMS Properties on page 399 for more information about message header fields.</p> <p>Only properties applicable to this type of message are displayed.</p>
JMSProperties	complex	<p>The message properties for the message. See JMS Properties on page 399 for more information about message properties.</p> <p>Only properties applicable to this type of message are displayed.</p>
OtherProperties	complex	<p>If the JMS Application Properties field is specified on the Advanced tab, the OtherProperties group lists the application-specific properties in the selected JMS Application Properties shared configuration resource.</p>
Body	depends upon the message type	<p>The body of the message.</p>

Output Item	Datatype	Description
DynamicProperties	complex	<p>The dynamic properties is an additional parameter to add runtime property to the Outgoing JMS Messages which is specified in the Input tab. This is an optional element with only one instance. Dynamic property can have multiple property elements.</p> <p>Each property element denotes a single dynamic property and can contain the following elements:</p> <p>Name — Required. Name of the property with one instance.</p> <p>Value — Required. Value of the property with one instance.</p> <p>Type — Optional. Type of the property. If not provided, it will be considered as string.</p> <p>Following Types are supported:</p> <ul style="list-style-type: none">• string• boolean• short• integer• long• float• double• byte <p>Note: The DynamicProperty will overwrite the value of a property (with the same name) added using the JMS Application Property.</p> <p>The DynamicProperties will be also added to the outgoing message.</p>

JMS Queue Requestor

Activity



The JMS Queue Requestor activity is used to send a request to a JMS queue name and receive a response back from the JMS client.



This activity uses temporary destinations to ensure that reply messages are received only by the process that sent the request.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
JMS Connection	No	The JMS connection. See JMS Connection on page 389 for more information about creating a JMS connection.
Destination Queue	Yes	<p>Name of the queue of the outgoing message.</p> <p>The syntax of the queue name is specific to the JMS provider you are using. See your JMS provider documentation for more information about queue names.</p> <p>Note: If you are using TIBCO Enterprise Message Service as your JMS provider, you can use the Browse button next to this field after specifying a valid connection in the JMS Connection field. The Browse button displays a list of configured destinations in the JMS server that are appropriate for this activity.</p>

Field	Global Var?	Description
Message Type	No	<p>The type of the message. This can be one of the following:</p> <ul style="list-style-type: none">• Simple — A message with no body portion.• Bytes — A stream of bytes.• Map — A set of name/value pairs. The names are strings, and the values are simple data types (Java primitives), an array of bytes (use the Binary datatype when mapping this data), or a string. Each item can be accessed sequentially or by its name.• Object — A serializable Java object.• Object Ref — An object reference to a Java object.• Stream — A stream of Java primitives, strings, or arrays of bytes. Each value must be read sequentially.• Text — The message is a <code>java.lang.String</code>.• XML Text — The message is XML text.

Advanced

The Advanced tab has the following fields.

Field	Global Var?	Description
Delivery mode	Yes	<p>The delivery mode of the message. Can be one of the following:</p> <ul style="list-style-type: none"> PERSISTENT — signifies the messages are stored and forwarded. NON_PERSISTENT — messages are not stored and may be lost due to failures in transmission. EMS_RELIABLE_DELIVERY — this mode is only available when using TIBCO Enterprise Message Service. See the TIBCO Enterprise Message Service documentation for more information about this mode.
JMSExpiration (secs)	Yes	<p>Corresponds to JMSExpiration property that specifies how long the message can remain active (in seconds).</p> <p>If set to 0, the message does not expire.</p> <p>This field is set in seconds, but the JMSExpiration property is displayed in milliseconds.</p>
Priority	Yes	<p>Priority of the message. You may set the priority to a value from 0-9. The default value is 4.</p>
Type	Yes	<p>The value to supply to the JMSType header property.</p>
JMS Application Properties	No	<p>Any application-specific message properties that will be part of the message. This is specified by the JMS Application Properties shared configuration resource.</p> <p>Once specified, these properties appear on the Output tab as OtherProperties.</p>

Input Editor/Output Editor

The Input Editor/Output Editor tabs define the schema to use for messages of type Map, Stream, or XML Text. Map messages are name/value pairs, and the schema allows you to define the structure of the outgoing request and the incoming reply. The schema defined on the Input Editor tab becomes the body of the message on the Input tab. The schema defined on the Output Editor tab becomes the body of the message on the Output tab.

See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Input/Output Editor tabs.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
destinationQueue	string	The queue to which to send the request. This input item overrides the Destination Queue field on the Configuration tab.
JMSExpiration	integer	Specifies how long the message can remain active (in seconds). If set to 0, the message does not expire.
JMSPriority	string	The priority of the message. This item overrides the priority set on the Advanced tab.
JMSCorrelationID	string	This ID is used to link a response message with its related request message. This is usually the message ID of a request message when this field is found in a reply message, but you can set this element to any value.
JMSType	string	The type of the message. This item overrides the value specified on the Advanced tab.

Input Item	Datatype	Description
requestTimeout	integer	The time to wait (in seconds) for the synchronous request-reply operation to complete. An error is returned if the operation does not complete in this time limit.
replyToDestination	string	<p>The destination to use for replies for this activity.</p> <p>Note: If more than one job has the same replyToDestination (for example, you specify a constant in this field), then the correct reply may not be received by each job. Make certain that you specify an expression in this field that assigns a different replyToDestination to each process instance.</p>
JMSProperties	complex	<p>The message properties for the message. See JMS Properties on page 399 for more information about message properties.</p> <p>Only properties applicable to this type of message are displayed.</p>
OtherProperties	complex	If the JMS Application Properties field is specified on the Advanced tab, the OtherProperties group lists the application-specific properties in the selected JMS Application Properties shared configuration resource.
Body	depends upon message type	The body of the message.

Input Item	Datatype	Description
DynamicProperties	complex	<p>The dynamic properties is an additional parameter to add runtime property to the Outgoing JMS Messages which is specified in the Input tab. This is an optional element with only one instance. Dynamic property can have multiple property elements.</p> <p>Each property element denotes a single dynamic property and can contain the following elements:</p> <p>Name — Required. Name of the property with one instance.</p> <p>Value — Required. Value of the property with one instance.</p> <p>Type — Optional. Type of the property. If not provided, it will be considered as string.</p> <p>Following Types are supported:</p> <ul style="list-style-type: none">• string• boolean• short• integer• long• float• double• byte <p>Note: The DynamicProperty will overwrite the value of a property (with the same name) added using the JMS Application Property.</p> <p>Also, DynamicProperties will be added to the outgoing message.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
JMSHeaders	complex	<p>The message header fields for the message. See JMS Properties on page 399 for more information about message header fields.</p> <p>Only properties applicable to this type of message are displayed.</p>
JMSProperties	complex	<p>The message properties for the message. See JMS Properties on page 399 for more information about message properties.</p> <p>Only properties applicable to this type of message are displayed.</p>
OtherProperties	complex	<p>If the JMS Application Properties field is specified on the Advanced tab, the OtherProperties group lists the application-specific properties in the selected JMS Application Properties shared configuration resource.</p>
Body	depends upon message type	The body of the message.

Output Item	Datatype	Description
DynamicProperties	complex	<p>The dynamic properties is an additional parameter to add runtime property to the Outgoing JMS Messages which is specified in the Input tab. This is an optional element with only one instance. Dynamic property can have multiple property elements.</p> <p>Each property element denotes a single dynamic property and can contain the following elements:</p> <p>Name — Required. Name of the property with one instance.</p> <p>Value — Required. Value of the property with one instance.</p> <p>Type — Optional. Type of the property. If not provided, it will be considered as string.</p> <p>Following Types are supported:</p> <ul style="list-style-type: none">• string• boolean• short• integer• long• float• double• byte <p>Note: The DynamicProperty will overwrite the value of a property (with the same name) added using the JMS Application Property.</p> <p>The DynamicProperties will be also added to the outgoing message.</p>

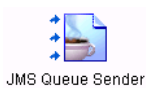
Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
JMSInvalidInputException	Input to the activity is not valid.
JMSMessageCreateException	The JMS message could not be created.
JMSSessionCreateException	The JMS session could not be created.
JMSSendException	The JMS send operation failed.
JMSReceiveException	The JMS receive operation failed.
JMSActivityException	This activity fails.
ActivityTimedOutException	This activity has reached the specified time out and the response has not been received.

JMS Queue Sender

Activity



The JMS Queue Sender activity sends a message to the specified JMS queue.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
JMS Connection	No	The JMS connection. See JMS Connection on page 389 for more information about creating a JMS connection.
Destination Queue	Yes	<p>Name of the queue of the outgoing message.</p> <p>The syntax of the queue name is specific to the JMS provider you are using. See your JMS provider documentation for more information about queue names.</p> <p>Note: If you are using TIBCO Enterprise Message Service as your JMS provider, you can use the Browse button next to this field after specifying a valid connection in the JMS Connection field. The Browse button displays a list of configured destinations in the JMS server that are appropriate for this activity.</p>

Field	Global Var?	Description
Message Type	No	<p>The type of the message. This can be one of the following:</p> <ul style="list-style-type: none"> • Simple — A message with no body portion. • Bytes — A stream of bytes. • Map — A set of name/value pairs. The names are strings, and the values are simple data types (Java primitives), an array of bytes (use the Binary datatype when mapping this data), or a string. Each item can be accessed sequentially or by its name. • Object — A serializable Java object. • Object Ref — An object reference to a Java object. • Stream — A stream of Java primitives, strings, or arrays of bytes. Each value must be read sequentially. • Text — The message is a <code>java.lang.String</code> • XML Text — The message is XML text.

Advanced

The Advanced tab has the following fields.

Field	Global Var?	Description
Reply-to Queue	Yes	<p>The name of the queue where replies should be sent. This field is optional, and replies are sent to the queue specified on the Configuration tab by default.</p> <p>Note: If you are using TIBCO Enterprise Message Service as your JMS provider, you can use the Browse button next to this field after specifying a valid connection in the JMS Connection field. The Browse button displays a list of configured destinations in the JMS server that are appropriate for this activity.</p>
Delivery mode	Yes	<p>The delivery mode of the message. It can be one of the following:</p> <ul style="list-style-type: none">• PERSISTENT — signifies the messages are stored and forwarded.• NON_PERSISTENT — messages are not stored and may be lost due to failures in transmission.• RELIABLE_DELIVERY — this mode is only available when using TIBCO Enterprise Message Service. See the TIBCO Enterprise Message Service documentation for more information about this mode.
JMSExpiration (secs)	Yes	<p>Corresponds to JMSExpiration property that specifies how long the message can remain active (in seconds).</p> <p>If set to 0, the message does not expire.</p> <p>This field is set in seconds, but the JMSExpiration property is displayed in milliseconds.</p>
Priority	Yes	<p>Priority of the message. You may set the priority to a value from 0-9. The default value is 4.</p>

Field	Global Var?	Description
Type	Yes	The value to supply to the JMSType header property.
JMS Application Properties	No	Any application-specific message properties that will be part of the message. This is specified by the JMS Application Properties shared configuration resource. Once specified, these properties appear on the Output tab as OtherProperties.
Override Transaction Behavior	Yes	Overrides the default behavior of a transaction group. If this activity is in a transaction group, the JMS message is normally committed or rolled back with the other participants in the transaction. If this checkbox is checked, the JMS message does not participate in the transaction.

Input Editor

The Input Editor tab defines the schema to use for outgoing messages whose message type is Map, Stream, or XML Text. Map messages are name/value pairs, and the schema allows you to define the structure of the outgoing message. Once defined, the schema on the Input Editor tab becomes the structure used for the body of the message displayed on the Input tab.

See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Input Editor tab.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
destinationQueue	string	The queue to which to send the request. This input item overrides the Destination Queue field on the Configuration tab.

Input Item	Datatype	Description
replyToQueue	string	The queue where replies should be sent for this request. This input item overrides the reply-to destination specified on the Advanced tab.
JMSExpiration	integer	Specifies how long the message can remain active (in seconds). If set to 0, the message does not expire.
JMSPriority	string	The priority of the message. This item overrides the priority set on the Advanced tab.
JMSDeliveryMode	string	<p>The delivery mode of the message. Can be one of the following:</p> <ul style="list-style-type: none">• PERSISTENT — signifies the messages are stored and forwarded.• NON_PERSISTENT — messages are not stored and may be lost due to failures in transmission.• When using TIBCO Enterprise Message Service, the JMSDeliveryMode header can be RELIABLE_DELIVERY. See the TIBCO Enterprise Message Service documentation for more information about this mode.
JMSCorrelationID	string	This ID is used to link a response message with its related request message. This is usually the message ID of a request message when this field exists in a reply message.
JMSType	string	The type of the message. This item overrides the value specified on the Advanced tab.

Input Item	Datatype	Description
JMSProperties	complex	<p>The message properties. See JMS Properties on page 399 for more information about message properties.</p> <p>Only properties applicable to this type of message are displayed.</p>
OtherProperties	complex	<p>If the JMS Application Properties field is specified on the Advanced tab, the OtherProperties group lists the application-specific properties in the selected JMS Application Properties shared configuration resource.</p>
Body	depends upon message type	The body of the message.

Input Item	Datatype	Description
DynamicProperties	complex	<p>The dynamic properties is an additional parameter to add runtime property to the Outgoing JMS Messages which is specified in the Input tab. This is an optional element with only one instance. Dynamic property can have multiple property elements.</p> <p>Each property element denotes a single dynamic property and can contain the following elements:</p> <p>Name — Required. Name of the property with one instance.</p> <p>Value — Required. Value of the property with one instance.</p> <p>Type — Optional. Type of the property. If not provided, it will be considered as string.</p> <p>Following Types are supported:</p> <ul style="list-style-type: none">• string• boolean• short• integer• long• float• double• byte <p>Note: The DynamicProperty will overwrite the value of a property (with the same name) added using the JMS Application Property.</p> <p>Also, DynamicProperties will be added to the outgoing message.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
MessageID	string	The unique identifier of the message.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
JMSInvalidInputException	Input to the activity is not valid.
JMSMessageCreateException	The JMS message could not be created.
JMSSessionCreateException	The JMS session could not be created.
JMSSendException	The JMS send operation failed.
JMSActivityException	This activity fails.

JMS Topic Publisher

Activity



The JMS Topic Publisher sends a message to the specified JMS topic.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
JMS Connection	No	The JMS connection. See JMS Connection on page 389 for more information about creating a JMS connection.
Destination Topic	Yes	<p>Name of the topic of the outgoing message.</p> <p>The syntax of the topic name is specific to the JMS provider you are using. See your JMS provider documentation for more information about topic names.</p> <p>Note: If you are using TIBCO Enterprise Message Service as your JMS provider, you can use the Browse button next to this field after specifying a valid connection in the JMS Connection field. The Browse button displays a list of configured destinations in the JMS server that are appropriate for this activity.</p>

Field	Global Var?	Description
Message Type	No	<p>The type of the message. This can be one of the following:</p> <ul style="list-style-type: none"> • Simple — A message with no body portion. • Bytes — A stream of bytes. • Map — A set of name/value pairs. The names are strings, and the values are simple data types (Java primitives), an array of bytes (use the Binary datatype to map this data), or a string. Each item can be accessed sequentially or by its name. • Object — A serializable Java object. • Object Ref — An object reference to a Java object. • Stream — A stream of Java primitives, strings, or arrays of bytes. Each value must be read sequentially. • Text — The message is a <code>java.lang.String</code>. • XML Text — The message is XML text.

Advanced

The Advanced tab has the following fields.

Field	Global Var?	Description
Reply-to Topic	Yes	<p>The name of the topic to which replies should be sent. This field is optional, and replies are sent to the topic specified on the Configuration tab by default.</p> <p>Note: If you are using TIBCO Enterprise Message Service as your JMS provider, you can use the Browse button next to this field after specifying a valid connection in the JMS Connection field. The Browse button displays a list of configured destinations in the JMS server that are appropriate for this activity.</p>

Field	Global Var?	Description
Delivery Mode	Yes	<p>The delivery mode of the message. Can be one of the following:</p> <ul style="list-style-type: none">• <code>PERSISTENT</code> — signifies the messages are stored and forwarded.• <code>NON_PERSISTENT</code> — messages are not stored and may be lost due to failures in transmission.• <code>EMS_RELIABLE_DELIVERY</code> — this mode is only available when using TIBCO Enterprise Message Service. See the TIBCO Enterprise Message Service documentation for more information about this mode.
JMSExpiration (secs)	Yes	<p>Corresponds to JMSExpiration property that specifies how long the message can remain active (in seconds).</p> <p>If set to 0, the message does not expire.</p> <p>This field is set in seconds, but the JMSExpiration property is displayed in milliseconds.</p>
Priority	Yes	<p>Priority of the message. You may set the priority to a value from 0-9. The default value is 4.</p>
Type	Yes	<p>The value to supply to the JMSType header property.</p>
JMS Application Properties	No	<p>Any application-specific message properties to include in the message. This is specified by the JMS Application Properties shared configuration resource.</p> <p>Once specified, these properties appear on the Output tab as OtherProperties.</p>
Override Transaction Behavior	Yes	<p>Overrides the default behavior of a transaction group. If this activity is in a transaction group, the JMS message is normally committed or rolled back with the other participants in the transaction.</p> <p>If this checkbox is checked, the JMS message does not participate in the transaction.</p>

Input Editor

The Input Editor tab defines the schema to use for outgoing messages whose message type is Map, Stream, or XML Text. Map messages are name/value pairs, and the schema allows you to define the structure of the outgoing message. Once defined, the schema on the Input Editor tab becomes the structure used for the body of the message displayed on the Input tab.

See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Input Editor tab.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
destinationTopic	string	The topic to which to send the request. This input item overrides the Destination Topic field on the Configuration tab.
replyToTopic	string	The topic to which replies should be sent for this request. This input item overrides the Reply-to destination on the Advanced tab.
JMSExpiration	integer	Specifies how long the message can remain active (in seconds). If set to 0, the message does not expire.
JMSPriority	string	The priority of the message. This item overrides the priority set on the Advanced tab.

Input Item	Datatype	Description
JMSDeliveryMode	string	<p>The delivery mode of the message. Can be one of the following:</p> <ul style="list-style-type: none">• PERSISTENT — signifies the messages are stored and forwarded.• NON_PERSISTENT — messages are not stored and may be lost due to failures in transmission.• When using TIBCO Enterprise Message Service, the JMSDeliveryMode header can be RELIABLE_DELIVERY. See the TIBCO Enterprise Message Service documentation for more information about this mode.
JMSCorrelationID	string	<p>This ID is used to link a response message with its related request message. This is usually the message ID of a request message when this field is found in a reply message.</p>
JMSType	string	<p>The type of the message. This item overrides the value specified on the Advanced tab.</p>
JMSProperties	complex	<p>The message properties for the message. See JMS Properties on page 399 for more information about message properties.</p> <p>Only properties applicable to this type of message are displayed.</p>
OtherProperties	complex	<p>If the JMS Application Properties field is specified on the Advanced tab, the OtherProperties group lists the application-specific properties in the selected JMS Application Properties shared configuration resource.</p>
Body	depends upon message type	<p>The body of the message.</p>

Input Item	Datatype	Description
DynamicProperties	complex	<p>The dynamic properties is an additional parameter to add runtime property to the Outgoing JMS Messages which is specified in the Input tab. This is an optional element with only one instance. Dynamic property can have multiple property elements.</p> <p>Each property element denotes a single dynamic property and can contain the following elements:</p> <p>Name — Required. Name of the property with one instance.</p> <p>Value — Required. Value of the property with one instance.</p> <p>Type — Optional. Type of the property. If not provided, it will be considered as string.</p> <p>Following Types are supported:</p> <ul style="list-style-type: none"> • string • boolean • short • integer • long • float • double • byte <p>Note: The DynamicProperty will overwrite the value of a property (with the same name) added using the JMS Application Property.</p> <p>Also, DynamicProperties will be added to the outgoing message.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
MessageID	string	The unique identifier of the message.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
JMSInvalidInputException	Input to the activity is not valid.
JMSMessageCreateException	The JMS message could not be created.
JMSSessionCreateException	The JMS session could not be created.
JMSSendException	The JMS send operation failed.

JMS Topic Requestor

Activity



The JMS Topic Requestor activity is used to communicate with a JMS application’s request-response service. This service invokes an operation with input and output. The request is sent to a JMS topic and the JMS application returns the response to the request.



This activity uses temporary destinations to ensure that reply messages are received only by the process that sent the request.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
JMS Connection	No	The JMS connection. See JMS Connection on page 389 for more information about creating a JMS connection.
Destination Topic	Yes	<p>Name of the topic of the outgoing message.</p> <p>The syntax of the topic name is specific to the JMS provider you are using. See your JMS provider documentation for more information about topic names.</p> <p>Note: If you are using TIBCO Enterprise Message Service as your JMS provider, you can use the Browse button next to this field after specifying a valid connection in the JMS Connection field. The Browse button displays a list of configured destinations in the JMS server that are appropriate for this activity.</p>

Field	Global Var?	Description
Message Type	No	<p>The type of the message. This can be one of the following:</p> <ul style="list-style-type: none">• Simple — A message with no body portion.• Bytes — A stream of bytes.• Map — A set of name/value pairs. The names are strings, and the values are simple data types (Java primitives), an array of bytes (use the Binary datatype to map this data), or a string. Each item can be accessed sequentially or by its name.• Object — A serializable Java object.• Object Ref — An object reference to a Java object.• Stream — A stream of Java primitives, strings, or arrays of bytes. Each value must be read sequentially.• Text — The message is a <code>java.lang.String</code>.• XML Text — The message is XML text.

Advanced

The Advanced tab has the following fields.

Field	Global Var?	Description
Delivery Mode	Yes	<p>The delivery mode of the message. Can be one of the following:</p> <ul style="list-style-type: none"> PERSISTENT — signifies the messages are stored and forwarded. NON_PERSISTENT — messages are not stored and may be lost due to failures in transmission. EMS_RELIABLE_DELIVERY — this mode is only available when using TIBCO Enterprise Message Service. See the TIBCO Enterprise Message Service documentation for more information about this mode.
JMSExpiration (secs)	Yes	<p>Corresponds to JMSExpiration property that specifies how long the message can remain active (in seconds).</p> <p>If set to 0, the message does not expire.</p> <p>This field is set in seconds, but the JMSExpiration property is displayed in milliseconds.</p>
Priority	Yes	<p>Priority of the message. You may set the priority to a value from 0-9. The default value is 4.</p>
Type	Yes	<p>The value to supply to the JMSType header property.</p>
JMS Application Properties	No	<p>Any application-specific message properties to include in the message. This is specified by the JMS Application Properties shared configuration resource.</p> <p>Once specified, these properties appear on the Output tab as OtherProperties.</p>

Input Editor/Output Editor

The Input Editor/Output Editor tabs define the schema to use for messages of type Map, Stream, or XML Text. Map messages are name/value pairs, and the schema allows you to define the structure of the outgoing request and the incoming reply. The schema defined on the Input Editor tab becomes the body of the message on the Input tab. The schema defined on the Output Editor tab becomes the body of the message on the Output tab.

See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Input/Output Editor tab.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
destinationTopic	string	The topic to which to send the request. This input item overrides the Destination Topic field on the Configuration tab.
JMSExpiration	integer	Specifies how long the message can remain active (in seconds). If set to 0, the message does not expire.
JMSPriority	string	The priority of the message. This item overrides the priority set on the Advanced tab.

Input Item	Datatype	Description
JMSDeliveryMode	string	<p>The delivery mode of the message. Can be one of the following:</p> <ul style="list-style-type: none"> • <code>PERSISTENT</code> — signifies the messages are stored and forwarded. • <code>NON_PERSISTENT</code> — messages are not stored and may be lost due to failures in transmission. • When using TIBCO Enterprise Message Service, the <code>JMSDeliveryMode</code> header can be <code>RELIABLE_DELIVERY</code>. See the TIBCO Enterprise Message Service documentation for more information about this mode.
JMSCorrelationID	string	<p>This ID is used to link a response message with its related request message. This is usually the message ID of a request message when this field exists in a reply message, but you can set this element to any value.</p>
JMSType	string	<p>The type of the message. This item overrides the value specified on the Advanced tab.</p>
requestTimeout	integer	<p>The time to wait (in seconds) for the synchronous request-reply operation to complete. An error is returned if the operation does not complete in this time limit.</p>
replyToTopic	string	<p>The destination to use for replies for this activity.</p> <p>Note: If more than one job has the same <code>replyToDestination</code> (for example, you specify a constant in this field), then the correct reply may not be received by each job. Make certain that you specify an expression in this field that assigns a different <code>replyToDestination</code> to each process instance.</p>

Input Item	Datatype	Description
JMSProperties	complex	<p>The message properties. See JMS Properties on page 399 for more information about message properties.</p> <p>Only properties applicable to this type of message are displayed.</p>
OtherProperties	complex	<p>If the JMS Application Properties field is specified on the Advanced tab, the OtherProperties group lists the application-specific properties in the selected JMS Application Properties shared configuration resource.</p>
Body	depends upon message type	<p>The body of the message.</p>

Input Item	Datatype	Description
DynamicProperties	complex	<p>The dynamic properties is an additional parameter to add runtime property to the Outgoing JMS Messages which is specified in the Input tab. This is an optional element with only one instance. Dynamic property can have multiple property elements.</p> <p>Each property element denotes a single dynamic property and can contain the following elements:</p> <p>Name — Required. Name of the property with one instance.</p> <p>Value — Required. Value of the property with one instance.</p> <p>Type — Optional. Type of the property. If not provided, it will be considered as string.</p> <p>Following Types are supported:</p> <ul style="list-style-type: none">• string• boolean• short• integer• long• float• double• byte <p>Note: The DynamicProperty will overwrite the value of a property (with the same name) added using the JMS Application Property.</p> <p>Also, DynamicProperties will be added to the outgoing message.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
JMSHeaders	complex	<p>The message header fields for the message. See JMS Properties on page 399 for more information about message header fields.</p> <p>Only properties applicable to this type of message are displayed.</p>
JMSProperties	complex	<p>The message properties for the message. See JMS Properties on page 399 for more information about message properties.</p> <p>Only properties applicable to this type of message are displayed.</p>
OtherProperties	complex	<p>If the JMS Application Properties field is specified on the Advanced tab, the OtherProperties group lists the application-specific properties in the selected JMS Application Properties shared configuration resource.</p>
Body	depends upon message type	<p>The body of the message.</p>

Output Item	Datatype	Description
DynamicProperties	complex	<p>The dynamic properties is an additional parameter to add runtime property to the Outgoing JMS Messages which is specified in the Input tab. This is an optional element with only one instance. Dynamic property can have multiple property elements.</p> <p>Each property element denotes a single dynamic property and can contain the following elements:</p> <p>Name — Required. Name of the property with one instance.</p> <p>Value — Required. Value of the property with one instance.</p> <p>Type — Optional. Type of the property. If not provided, it will be considered as string.</p> <p>Following Types are supported:</p> <ul style="list-style-type: none">• string• boolean• short• integer• long• float• double• byte <p>Note: The DynamicProperty will overwrite the value of a property (with the same name) added using the JMS Application Property.</p> <p>The DynamicProperties will be also added to the outgoing message.</p>

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
JMSInvalidInputException	Input to the activity is not valid.
JMSMessageCreateException	The JMS message could not be created.
JMSSessionCreateException	The JMS session could not be created.
JMSSendException	The JMS send operation failed.
JMSReceiveException	The JMS receive operation failed.
ActivityTimedOutException	This activity has reached the specified time out and the response has not been received.

JMS Topic Subscriber

Process Starter



Starts a process based on the receipt of a message for the specified JMS topic.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
JMS Connection	No	The JMS connection. See JMS Connection on page 389 for more information about creating a JMS connection.
Destination Topic	Yes	<p>Name of the topic of the incoming message.</p> <p>The syntax of the topic name is specific to the JMS provider you are using. See your JMS provider documentation for more information about topic names.</p> <p>Note: If you are using TIBCO Enterprise Message Service as your JMS provider, you can use the Browse button next to this field after specifying a valid connection in the JMS Connection field. The Browse button displays a list of configured destinations in the JMS server that are appropriate for this activity.</p>

Field	Global Var?	Description
Message Type		<p>The type of the message. This can be one of the following:</p> <ul style="list-style-type: none">• Simple — A message with no body portion.• Bytes — A stream of bytes.• Map — A set of name/value pairs. The names are strings, and the values are simple data types (Java primitives), an array of bytes (use the Binary datatype to map this data), or a string. Each item can be accessed sequentially or by its name.• Object — A serializable Java object.• Object Ref — An object reference to a Java object.• Stream — A stream of Java primitives, strings, or arrays of bytes. Each value must be read sequentially.• Text — The message is a <code>java.lang.String</code>.• XML Text — The message is XML text.
Durable Subscription	Yes	<p>Specifies a durable subscription.</p> <p>You must specify a name in the Subscription name field that is registered with the JMS application as the durable subscription name.</p>
Subscription Name	Yes	<p>The subscription name registered with the JMS application for durable subscriptions. This field is only available when the Durable Subscription field is checked.</p> <p>Once a durable subscription is created, it can only be removed by accessing the administration tool of the JMS provider. See the documentation of your JMS provider for more information about managing durable subscriptions.</p>

Field	Global Var?	Description
Suppress Local Messages	Yes	<p>Specifies to not receive messages on the specified topic name when the message origin is the JMS application on the same connection as the process engine.</p> <p>If your process definition publishes and subscribes to messages with the same topic name, this option is useful if you want to specify whether to receive messages sent by the same JMS application that published the message.</p> <p>Checking this field prevents the process from receiving messages sent by the same connection. Unchecking this option specifies messages sent by the same connection should be received.</p>

Field	Global Var?	Description
Acknowledge Mode	Yes	<p>The acknowledge mode for the incoming messages. It can be one of the following:</p> <ul style="list-style-type: none">• Auto — the message is automatically acknowledged when it is received.• Client — the message will be acknowledged at a later point by using the Confirm activity. If the message is not confirmed before the process instance ends, the message is redelivered and a new process instance is created to handle the new incoming message. Ensure that your process definition confirms the message when using this acknowledge mode.• TIBCO EMS Explicit — (only available for TIBCO Enterprise Message Service) a message which is not acknowledged using the Confirm activity before the process instance ends, will be redelivered instead of all messages in the session. The session is not blocked and one session handles all incoming messages for each process instance. <p>Note — In the TIBCO ActiveMatrix BusinessWorks 5.10 release, there is a change in the behavior of this feature. Now only the messages that are not confirmed, would be redelivered.</p> <ul style="list-style-type: none">• TIBCO EMS Explicit Dups OK — (only available for TIBCO Enterprise Message Service) a message which is not acknowledged using the Confirm activity before the process instance ends, will be redelivered instead of all messages in the session. The session is not blocked and one session handles all the incoming messages for each process instance. The messages however, would be lazily acknowledged.• TIBCO EMS No Acknowledge — messages delivered using this mode do not require acknowledgement. Therefore messages in this mode will not be redelivered regardless of whether the delivery was successful. This mode is only available when using TIBCO Enterprise Message Service.

Field	Global Var?	Description
Acknowledge Mode	Yes	<ul style="list-style-type: none"> Dups OK — the message is acknowledged automatically when it is received. JMS provides this mode for lazy acknowledgement, but TIBCO ActiveMatrix BusinessWorks acknowledges messages upon receipt. Transactional — this mode is used when a transaction that can process JMS messages is included in the process definition. The message is acknowledged when the transaction commits. See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about creating transactions that JMS activities can participate in. Local Transactional — this mode is used when a transaction involves only JMS messages. See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about creating transactions that JMS activities can participate in.
Max Sessions (Read Only)	No	<p>When the Acknowledge Mode field is set to "Client", "Transactional" or "Local Transactional", this read-only field appears to notify you that only one session can receive incoming topic messages until the message is confirmed.</p> <p>When a JMS topic message is received, the session is blocked until the message is acknowledged. Because all sessions subscribed to JMS topics receive the same messages, only one session can actively listen for new messages until each message is confirmed.</p>

Advanced

The Advanced tab has the following fields.

Field	Global Var?	Description
Message Selector	Yes	<p>A string to determine whether a message should be received. The syntax of the message selector is determined by the JMS provider, but it is usually a subset of SQL92 (where message properties are used instead of table column names).</p> <p>See your JMS provider documentation for more information and syntax for a message selector string.</p>
JMS Application Properties	No	<p>Any application-specific message properties to include in the message. This is specified by the JMS Application Properties shared configuration resource.</p> <p>Once specified, these properties appear on the Output tab as OtherProperties.</p>
Receiver Timeout (seconds)	No	<p>Specifies the polling interval to check for new messages. This default interval is set by the custom engine property <code>bw.plugin.jms.receiverTimeout</code>. If no value is specified for the property, the default polling interval is one second.</p> <p>Set a value in this field to specify the polling interval (in seconds) for this activity. The value in this field overrides the default polling interval.</p>
Precreate Transactions	No	<p>When checked, this field specifies that the transaction is created before a message arrives at the JMS receiver.</p>
XA Transaction Manager Reference	No	<p>Specifies the XA Transaction Manager Configuration used to create the XA transaction. This field is available when Precreate Transactions field is checked.</p>

Misc

The Misc tab contains the following fields:

Field	Description
Sequencing Key	<p>This field can contain an XPath expression that specifies which processes should run in order. Process instances with sequencing keys that evaluate to the same value are executed sequentially in the order the process instances were created.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about controlling the execution order of process instances and about XPath expressions.</p>
Custom Id	<p>This field can contain an XPath expression that specifies a custom ID for the process instance. This ID is displayed in the View Service dialog of TIBCO Administrator, and it is also available in the <code>\$_processContext</code> process variable.</p>

Output Editor

The Output Editor tab defines the schema to use for incoming messages whose message type is Map, Stream, or XML Text. Map messages are name/value pairs, and the schema allows you to define the structure of the incoming message. Once defined, the schema on the Output Editor tab becomes the structure used for the body of the message displayed on the Output tab.

See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Output Editor tab.

Output

The output for the activity is the following.

Output Item	Datatype	Description
JMSHeaders	complex	<p>The message header fields for the message. See JMS Properties on page 399 for more information about message header fields.</p>

Output Item	Datatype	Description
JMSProperties	complex	The message properties for the message. See JMS Properties on page 399 for more information about message properties.
OtherProperties	complex	If the JMS Application Properties field is specified on the Advanced tab, the OtherProperties group lists the application-specific properties in the selected JMS Application Properties shared configuration resource.
Body	depends upon the message type	The body of the message.

Output Item	Datatype	Description
DynamicProperties	complex	<p>The dynamic properties is an additional parameter to add runtime property to the Outgoing JMS Messages which is specified in the Input tab. This is an optional element with only one instance. Dynamic property can have multiple property elements.</p> <p>Each property element denotes a single dynamic property and can contain the following elements:</p> <p>Name — Required. Name of the property with one instance.</p> <p>Value — Required. Value of the property with one instance.</p> <p>Type — Optional. Type of the property. If not provided, it will be considered as string.</p> <p>Following Types are supported:</p> <ul style="list-style-type: none"> • string • boolean • short • integer • long • float • double • byte <p>Note: The DynamicProperty will overwrite the value of a property (with the same name) added using the JMS Application Property.</p> <p>The DynamicProperties will be also added to the outgoing message.</p>

Reply To JMS Message

Activity



The Reply To JMS Message activity sends a reply to a previously received JMS queue or topic message. Activities that can receive JMS messages are listed on the Configuration tab. The activity that you select determines which message the reply message is in response to.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Reply To	No	A drop-down list of activities that can receive JMS queue or topic messages. The activity you select determines the message this activity replies to. The reply-to queue or topic name from the message in the selected activity is used to send the reply message.

Field	Global Var?	Description
Message Type	No	<p>The type of the message. This can be one of the following:</p> <ul style="list-style-type: none"> • Simple — A message with no body portion. • Bytes — A stream of bytes. • Map — A set of name/value pairs. The names are strings, and the values are simple data types (Java primitives), an array of bytes (use the Binary datatype to map this data), or a string. Each item can be accessed sequentially or by its name. • Object — A serializable Java object. • Object Ref — An object reference to a Java object. • Stream — A stream of Java primitives, strings, or arrays of bytes. Each value must be read sequentially. • Text — The message is a <code>java.lang.String</code>. • XML Text — The message is XML text.

Advanced

The Advanced tab has the following fields.

Field	Global Var?	Description
Delivery Mode	Yes	<p>The delivery mode of the message. It can be one of the following:</p> <ul style="list-style-type: none">• <code>PERSISTENT</code> — signifies the messages are stored and forwarded.• <code>NON_PERSISTENT</code> — messages are not stored and may be lost due to failures in transmission.• <code>EMS_RELIABLE_DELIVERY</code> — this mode is only available when using TIBCO Enterprise Message Service. See the TIBCO Enterprise Message Service documentation for more information about this mode.
JMSExpiration (secs)	Yes	<p>Corresponds to JMSExpiration property that specifies how long the message can remain active (in seconds).</p> <p>If set to 0, the message does not expire.</p> <p>This field is set in seconds, but the JMSExpiration property is displayed in milliseconds.</p>
Priority	Yes	<p>Priority of the message. You may set the priority to a value from 0-9. The default value is 4.</p>
Type	Yes	<p>The value to supply to the JMSType header property.</p>
JMS Application Properties	No	<p>Any application-specific message properties that will be part of the message. This is specified by the JMS Application Properties shared configuration resource.</p> <p>Once specified, these properties appear on the Output tab as "OtherProperties".</p>

Input Editor

The Input Editor tab defines the schema to use for outgoing replies where the message type is Map, Stream, or XML Text. Map messages are name/value pairs, and the schema allows you to define the structure of the outgoing message. Once defined, the schema on the Input Editor tab becomes the structure used for the body of the message displayed on the Input tab.

See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Input Editor tab.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
Delivery mode	Long	<p>The delivery mode of the message. Can be one of the following:</p> <p>PERSISTENT — signifies the messages are stored and forwarded.</p> <p>NON_PERSISTENT — messages are not stored and may be lost due to failures in transmission.</p> <p>EMS_RELIABLE_DELIVERY — this mode is only available when using TIBCO Enterprise Message Service. See the TIBCO Enterprise Message Service documentation for more information about this mode.</p>
JMSExpiration (secs)	String	<p>Corresponds to JMSExpiration property that specifies how long the message can remain active (in seconds).</p> <p>If set to 0, the message does not expire.</p> <p>This field is set in seconds, but the JMSExpiration property is displayed in milliseconds.</p>

Input Item	Datatype	Description
JMSPriority	string	Priority of the message. You may set the priority to a value from 0-9. This item overrides the value specified on the Configuration tab.
JMSCorrelationID	string	<p>This ID is used to link a response message with its related request message. This property is usually set to the message ID of the message you are replying to, but any value can be used. For example, you may use another field in the body of the message (such as orderID) to correlate request and reply messages.</p> <p>The JMSCorrelationID of the reply message is set in this input element. If this element is not set, the correlation ID is set as follows:</p> <ul style="list-style-type: none">• If the JMSCorrelationID input element is not set, the value of the JMSCorrelationID property in the message you are replying to is used.• If neither this input element nor the JMSCorrelationID of the message you are replying to are set, the message ID of the message you are replying to is used.• If none of the above values are set, the JMSCorrelationID of the reply message is set to null.
JMSType	string	The type of the message. This item overrides the value specified on the Advanced tab.
JMSProperties	complex	<p>The message properties for the message. See JMS Properties on page 399 for more information about message properties.</p> <p>Only properties applicable to this type of message are displayed.</p>

Input Item	Datatype	Description
OtherProperties	complex	If the JMS Application Properties field is specified on the Advanced tab, the OtherProperties group lists the application-specific properties in the selected JMS Application Properties shared configuration object.
Body	depends upon message type	The body of the message.

Input Item	Datatype	Description
DynamicProperties	complex	<p>The dynamic properties is an additional parameter to add runtime property to the Outgoing JMS Messages which is specified in the Input tab. This is an optional element with only one instance. Dynamic property can have multiple property elements.</p> <p>Each property element denotes a single dynamic property and can contain the following elements:</p> <p>Name — Required. Name of the property with one instance.</p> <p>Value — Required. Value of the property with one instance.</p> <p>Type — Optional. Type of the property. If not provided, it will be considered as string.</p> <p>Following Types are supported:</p> <ul style="list-style-type: none">• string• boolean• shortx• integer• long• float• double• byte <p>Note: The DynamicProperty will overwrite the value of a property (with the same name) added using the JMS Application Property.</p> <p>Also, DynamicProperties will be added to the outgoing message.</p>

Output

The activity has no output.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
<code>JMSInvalidInputException</code>	Input to the activity is not valid.
<code>JMSMessageCreateException</code>	The JMS message could not be created.
<code>JMSSessionCreateException</code>	The JMS session could not be created.
<code>JMSSendException</code>	The JMS send operation failed.

Wait for JMS Queue Message

Activity



The Wait for JMS Queue Message waits for the receipt of a message for the specified JMS queue.

See [Scalability With Incoming Events on page 226](#) in *TIBCO ActiveMatrix BusinessWorks Process Design Guide* for information on running the "Wait for..." activities in a multi-engine mode. See [Using Wait for JMS Queue Message Activity in Multi-Engine Design on page 477](#) for more details on using the activity in a multi-engine design.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
JMS Connection	No	The JMS connection. See JMS Connection on page 389 for more information about creating a JMS connection.
Destination Queue	Yes	<p>Name of the queue of the incoming message.</p> <p>The syntax of the queue name is specific to the JMS provider you are using. See your JMS provider documentation for more information about queue names.</p> <p>Note: If you are using TIBCO Enterprise Message Service as your JMS provider, you can use the Browse button next to this field after specifying a valid connection in the JMS Connection field. The Browse button displays a list of configured destinations in the JMS server that are appropriate for this activity.</p>

Field	Global Var?	Description
Message Type		<p>The type of the message. This can be one of the following:</p> <ul style="list-style-type: none">• Simple — A message with no body portion.• Bytes — A stream of bytes.• Map — A set of name/value pairs. The names are strings, and the values are simple data types (Java primitives), an array of bytes (use the Binary datatype to map this data), or a string. Each item can be accessed sequentially or by its name.• Object — A serializable Java object.• Object Ref — An object reference to a Java object.• Stream — A stream of Java primitives, strings, or arrays of bytes. Each value must be read sequentially.• Text — The message is a <code>java.lang.String</code>.• XML Text — The message is XML text.

Field	Global Var?	Description
Acknowledge Mode	Yes	<p>The acknowledge mode for the incoming messages. It can be one of the following:</p> <ul style="list-style-type: none">• Auto — the message is automatically acknowledged when it is received.• Client — the message will be acknowledged at a later point by using the Confirm activity. If the message is not confirmed before the process instance ends, the message is redelivered. Ensure that your process definition confirms the message when using this acknowledge mode.• TIBCO EMS Explicit — (only available for TIBCO Enterprise Message Service) a message which is not acknowledged using the Confirm activity before the process instance ends, will be redelivered instead of all messages in the session. The session is not blocked and one session handles all incoming messages for each process instance. <p>Note — In the TIBCO ActiveMatrix BusinessWorks 5.10 release, there is a change in the behavior of this feature. Now only the messages that are not confirmed, would be redelivered.</p> <ul style="list-style-type: none">• TIBCO EMS Explicit Dups OK — (only available for TIBCO Enterprise Message Service) a message which is not acknowledged using the Confirm activity before the process instance ends, will be redelivered instead of all messages in the session. The session is not blocked and one session handles all the incoming messages for each process instance. The messages however, would be lazily acknowledged.• TIBCO EMS No Acknowledge — the message is not acknowledged when it is received.• Dups OK — the message is acknowledged automatically when it is received. JMS provides this mode for lazy acknowledgement, but TIBCO ActiveMatrix BusinessWorks acknowledges messages upon receipt.• Transactional — this mode is used when a transaction that can process JMS messages is included in the process definition. The message is acknowledged when the transaction commits. See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about creating transactions that JMS activities can participate in.

Advanced

The Advanced tab has the following fields.

Field	Global Var?	Description
Message Selector	Yes	<p>A string to determine whether a message should be received. The syntax of the message selector is determined by the JMS provider, but it is usually a subset of SQL92 (where message properties are used instead of table column names).</p> <p>See your JMS provider documentation for more information and syntax for a message selector string.</p>
JMS Application Properties	No	<p>Any application-specific message properties that will be part of the message. This is specified by the JMS Application Properties shared configuration resource.</p> <p>Once specified, these properties appear on the Output tab as "OtherProperties".</p>
Receiver Timeout (seconds)	No	<p>Specifies the polling interval to check for new messages. This default interval is set by the custom engine property <code>bw.plugin.jms.receiverTimeout</code>. If no value is specified for the property, the default polling interval is one second.</p> <p>Set a value in this field to specify the polling interval (in seconds) for this activity. The value in this field overrides the default polling interval.</p>

Message Event

The Event tab has the following fields.

Field	Description
Candidate Event Key	<p>Expression built from the data of the incoming file change event. This expression must evaluate to a string and it is compared to the "key" field of the activity's input. If the Candidate Event Key and the activity key match, then the process accepts the incoming message.</p> <p>For example, you may have JMS Queue Sender activity earlier in the process diagram and you are expecting a message in response to the sent message. Place the JMSCorrelationID from the header of the incoming message into the Candidate Event Key field, then place the JMSMessageID from the header of the sent message in the "key" field on the input tab.</p> <p>This expression is specified in XPath, and only data from the incoming event is available for use in this XPath expression. See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about XPath expressions.</p>
Event Timeout (msec)	<p>A message may arrive before this activity is executed. This field specifies the amount of time (in milliseconds) a message waits if it is received before this activity is executed. If the event timeout expires, an error is logged and the event is discarded.</p> <p>If no value is specified in this field, the message waits indefinitely. If zero is specified, the event is discarded immediately, unless this activity has already been executed.</p>



When building an expression in the Candidate Event Key field, only data from the incoming event is available. This is because you want to place an expression containing incoming event data in the Candidate Event Key field. When the results of this expression match the results of the expression in the "key" item on the Input tab, the Wait For JMS Queue Message activity proceeds.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
key	string	The value that is compared to the Candidate Event Key field of the Event tab to determine if this message applies to this process. See Message Event on page 466 for an example of using the Candidate Event Key field with the key input item.
processTimeout	integer	The time (in milliseconds) to wait for the incoming message. An error is returned if the message is not received in this time limit.

Output Editor

The Output Editor tab defines the schema to use for incoming messages whose message type is Map, Stream, or XML Text. Map messages are name/value pairs, and the schema allows you to define the structure of the incoming message. Once defined, the schema on the Output Editor tab becomes the structure used for the body of the message displayed on the Output tab.

See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Output Editor tab.

Output

The output for the activity is the following.

Output Item	Datatype	Description
JMSHeaders	complex	The message header fields for the message. See JMS Properties on page 399 for more information about message header fields.

Output Item	Datatype	Description
JMSProperties	complex	The message properties for the message. See JMS Properties on page 399 for more information about message properties.
OtherProperties	complex	If the JMS Application Properties field is specified on the Advanced tab, the OtherProperties group lists the application-specific properties in the selected JMS Application Properties shared configuration resource.
Body	depends upon the message type	The body of the message.

Output Item	Datatype	Description
DynamicProperties	complex	<p>The dynamic properties is an additional parameter to add runtime property to the Outgoing JMS Messages which is specified in the Input tab. This is an optional element with only one instance. Dynamic property can have multiple property elements.</p> <p>Each property element denotes a single dynamic property and can contain the following elements:</p> <p>Name — Required. Name of the property with one instance.</p> <p>Value — Required. Value of the property with one instance.</p> <p>Type — Optional. Type of the property. If not provided, it will be considered as string.</p> <p>Following Types are supported:</p> <ul style="list-style-type: none">• string• boolean• short• integer• long• float• double• byte <p>Note: The DynamicProperty will overwrite the value of a property (with the same name) added using the JMS Application Property.</p> <p>The DynamicProperties will be also added to the outgoing message.</p>

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
ActivityTimedOutException	The activity has reached the event or process timeout.

Wait for JMS Topic Message

Activity



The Wait for JMS Topic Message waits for the receipt of a message for the specified JMS topic.

See [Scalability With Incoming Events on page 226](#) in *TIBCO ActiveMatrix BusinessWorks Process Design Guide* for information on running the "Wait for..." activities in a multi-engine mode.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
JMS Connection	No	The JMS connection. See JMS Connection on page 389 for more information about creating a JMS connection.
Destination Topic	Yes	<p>Name of the topic of the outgoing message.</p> <p>The syntax of the topic name is specific to the JMS provider you are using. See your JMS provider documentation for more information about topic names.</p> <p>Note: If you are using TIBCO Enterprise Message Service as your JMS provider, you can use the Browse button next to this field after specifying a valid connection in the JMS Connection field. The Browse button displays a list of configured destinations in the JMS server that are appropriate for this activity.</p>

Field	Global Var?	Description
Message Type	No	<p>The type of the message. This can be one of the following:</p> <ul style="list-style-type: none">• Simple — A message with no body portion.• Bytes — A stream of bytes.• Map — A set of name/value pairs. The names are strings, and the values are simple data types (Java primitives), an array of bytes (use the Binary datatype to map this data), or a string. Each item can be accessed sequentially or by its name.• Object — A serializable Java object.• Object Ref — An object reference to a Java object.• Stream — A stream of Java primitives, strings, or arrays of bytes. Each value must be read sequentially.• Text — The message is a <code>java.lang.String</code>.• XML Text — The message is XML text.
Durable Subscription	Yes	<p>Specifies a durable subscription.</p> <p>You must specify a name in the Subscription name field that is registered with the JMS application as the durable subscription name.</p>
Subscription Name	Yes	<p>The subscription name registered with the JMS application for durable subscriptions. This field is only available when the Durable subscription field is checked.</p> <p>Once a durable subscription is created, it can only be removed by accessing the administration tool of the JMS provider. See the documentation of your JMS provider for more information about managing durable subscriptions.</p>

Field	Global Var?	Description
Suppress Local Messages	No	<p>Specifies to not receive messages on the specified topic name when the message origin is the JMS application on the same connection as the process engine.</p> <p>If your process definition publishes and subscribes to messages with the same topic name, this option is useful if you want to specify whether to receive messages sent by the same JMS application that published the message.</p> <p>Checking this field prevents the process from receiving messages sent by the same connection. Unchecking this option specifies messages sent by the same connection should be received.</p>

Field	Global Var?	Description
Acknowledge Mode	Yes	<p>The acknowledge mode for the incoming messages. It can be one of the following:</p> <ul style="list-style-type: none">• Auto — the message is automatically acknowledged when it is received.• TIBCO EMS Explicit — (only available for TIBCO Enterprise Message Service) a message which is not acknowledged using the Confirm activity before the process instance ends, will be redelivered instead of all messages in the session. The session is not blocked and one session handles all incoming messages for each process instance. <p>Note — In the TIBCO ActiveMatrix BusinessWorks 5.10 release, there is a change in the behavior of this feature. Now only the messages that are not confirmed, would be redelivered.</p> <ul style="list-style-type: none">• TIBCO EMS Explicit Dups OK — (only available for TIBCO Enterprise Message Service) a message which is not acknowledged using the Confirm activity before the process instance ends, will be redelivered instead of all messages in the session. The session is not blocked and one session handles all the incoming messages for each process instance. The messages however, would be lazily acknowledged.• Dups OK — the message is acknowledged automatically when it is received. JMS provides this mode for lazy acknowledgement, but TIBCO ActiveMatrix BusinessWorks acknowledges messages upon receipt.

Advanced

The Advanced tab has the following fields.

Field	Global Var?	Description
Message Selector	Yes	<p>A string to determine whether a message should be received. The syntax of the message selector is determined by the JMS provider, but it is usually a subset of SQL92 (where message properties are used instead of table column names).</p> <p>See your JMS provider documentation for more information and syntax for a message selector string.</p>
JMS Application Properties	No	<p>Any application-specific message properties to include in the message. This is specified by the JMS Application Properties shared configuration resource.</p> <p>Once specified, these properties appear on the Output tab as OtherProperties.</p>
Receiver Timeout (seconds)	No	<p>Specifies the polling interval to check for new messages. This default interval is set by the custom engine property <code>bw.plugin.jms.receiverTimeout</code>. If no value is specified for the property, the default polling interval is one second.</p> <p>Set a value in this field to specify the polling interval (in seconds) for this activity. The value in this field overrides the default polling interval.</p>

Message Event

The Event tab has the following fields.

Field	Description
Candidate Event Key	<p>Expression built from the data of the incoming file change event. This expression should evaluate to a string and it is compared to the "key" field of the activity's input. If the Candidate Event Key and the activity's key match, then the process accepts the incoming message.</p> <p>For example, you may have JMS Topic Publisher activity earlier in the process diagram and you are expecting a message in response to the sent message. You would place the JMSCorrelationID from the header of the incoming message into the Candidate Event Key field. You would then place the JMSMessageID from the header of the outgoing message earlier in the process in the "key" field on the input tab.</p> <p>This expression is specified in XPath, and only data from the incoming event is available for use in this XPath expression. See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about XPath expressions.</p>
Event Timeout (msec)	<p>A message may arrive before this activity is executed. This field specifies the amount of time (in milliseconds) a message waits if it is received before this activity is executed. If the event timeout expires, an error is logged and the event is discarded.</p> <p>If no value is specified in this field, the message waits indefinitely. If zero is specified, the event is discarded immediately, unless this activity has already been reached.</p>



When building an expression in the Candidate Event Key field, only data from the incoming event is available. This is because you want to place an expression containing incoming event data in the Candidate Event Key field. When the results of this expression match the results of the expression in the "key" item on the Input tab, the Wait For JMS Topic Message activity proceeds.

Using Wait for JMS Queue Message Activity in Multi-Engine Design

All "wait for ..." activities start listening from the time the bwengine loads and can be configured to filter static data. These activities cannot filter dynamic data.

The activity pulls all the messages that are in the queue upon startup and processes them according to the Event key. Any messages that were picked up but do not match the key are discarded. A Wait for JMS Queue Message Activity cannot be used with the Candidate Event key as the key is applied after receiving the message from the queue.

In a multi-engine environment, when new messages arrive on the queue, the messages are dispatched among all active listeners in a round-robin fashion. Thus an engine may potentially pick up the message which was intended for some other engine, and later discard the message because of a mismatch in the Event key.

It is recommended that you use the Wait for JMS Queue Message activity with the Message Selector in a multi-engine mode. The Message Selector is applied while browsing the queue before picking up the messages.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
key	string	The value that is compared to the Candidate Event Key field of the Event tab to determine if this message applies to this process. See Message Event on page 476 for an example of using the Candidate Event Key field with the key input item.
processTimeout	integer	The time (in milliseconds) to wait for the incoming message. An error is returned if the message is not received in this time limit.

Output Editor

The Output Editor tab defines the schema to use for incoming messages whose message type is Map, Stream, or XML Text. Map messages are name/value pairs, and the schema allows you to define the structure of the incoming message. Once defined, the schema on the Output Editor tab becomes the structure used for the body of the message displayed on the Output tab.

See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Output Editor tab.

Output

The output for the activity is the following.

Output Item	Datatype	Description
JMSHeaders	complex	The message header fields for the message. See JMS Properties on page 399 for more information about message header fields.
JMSProperties	complex	The message properties for the message. See JMS Properties on page 399 for more information about message properties.
OtherProperties	complex	If the JMS Application Properties field is specified on the Advanced tab, the OtherProperties group lists the application-specific properties in the selected JMS Application Properties shared configuration resource.
Body	depends upon the message type	The body of the message.

Output Item	Datatype	Description
DynamicProperties	complex	<p>The dynamic properties is an additional parameter to add runtime property to the Outgoing JMS Messages which is specified in the Input tab. This is an optional element with only one instance. Dynamic property can have multiple property elements.</p> <p>Each property element denotes a single dynamic property and can contain the following elements:</p> <p>Name — Required. Name of the property with one instance.</p> <p>Value — Required. Value of the property with one instance.</p> <p>Type — Optional. Type of the property. If not provided, it will be considered as string.</p> <p>Following Types are supported:</p> <ul style="list-style-type: none">• string• boolean• short• integer• long• float• double• byte <p>Note: The DynamicProperty will overwrite the value of a property (with the same name) added using the JMS Application Property.</p> <p>The DynamicProperties will be also added to the outgoing message.</p>

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
ActivityTimedOutException	The activity has reached the event or process timeout.

Chapter 10 **Mail Palette**

The Mail palette is used to receive incoming email or send outgoing email.

Topics

- [Receive Mail, page 482](#)
- [Send Mail, page 491](#)

Receive Mail

Process Starter



The Receive Mail process starter polls a POP3 mail server for new mail. When new mail is detected and retrieved, the Receive Mail process starter starts a new process for the process definition it resides in and passes the mail data to the next activity in the process flow.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Host	Yes	Host name or IP address for the mail server. The default port (110) is used to connect to POP3 the server. If your server is configured to use a different port, you can specify it in this field using the syntax: <code><hostName> : <portNumber></code> For example, <code>myMailServer.myCo.com:76</code>
User Name	Yes	User name to use when logging into the POP3 server.
Password	Yes	Password to use when logging into the POP3 server.
Polling Interval (sec)	Yes	Polling interval (in seconds) to check for new mail. The default, if no polling interval is specified, is 5 seconds.

Field	Global Var?	Description
Delete Mail	Yes	<p>If checked, mail will be deleted from the POP3 server once the process starter has retrieved it.</p> <p>Note: If you choose to delete mail, you should place a Checkpoint activity immediately after the Receive Mail process starter to ensure the message is not lost in the event of machine failure.</p> <p>Alternatively, you can choose to leave this field unchecked, and then later in the process definition perform a checkpoint then use the Confirm activity to confirm the message. The Confirm activity will delete the message from the mail server.</p>
SSL	Yes	<p>The Use SSL checkbox specifies that a Secure Sockets Layer (SSL) should be used to specify client SSL configuration. When this field is checked, the Configure SSL button is enabled.</p>
Upgrade Configuration	No	<p>This field only appears in Mail palette resources placed into process definitions prior to release 5.2.0. In previous releases, attachments were lists in the input of the activity. In release 5.2.0 or later, a new schema is used to handle MIME attachments.</p> <p>If you have a Mail palette resource created prior to release 5.2.0, this field should be unchecked to maintain backward compatibility. This field does not appear for new resources created in release 5.2.0 or later. Unchecking this field disables the Advanced and Output Headers tab and changes the output schema.</p>

Configure SSL Button

The Configure SSL button allows you to configure the SSL parameters when the transport supports SSL. Check SSL to display Configure SSL dialog. Provide values in the following fields to configure SSL.

Field	Description
Trusted Certificates Folder	Specifies a folder in the project containing one or more certificates from the trusted certificate authorities. This folder is checked when a client connects to ensure that the server's certificate is from a trusted certificate authority. This prevents connections from rogue servers.
Identity	An Identity resource that contains the HTTP server's digital certificate and private key. See <i>TIBCO Designer Palette Reference</i> for more information.
Verify Host Name	Specifies whether to verify that the host you are connecting to is the expected host. The host name in the host's digital certificate is compared against the value you specify in the Expected Host Name field. If the host name does not match the expected host name, the connection is refused.
Strong Cipher Suites Only	Specifies that only cipher suites with strong encryption should be used, if they are available on the host you are connecting to.

Test Connection Button

The Test Connection button tests the connection to the specified mail server. You can use this button to ensure that your Receive Mail activity is properly configured to receive mail from the specified mail server. This button is only enabled when the Host, Username, and Password fields on the Configuration tab are populated.

Advanced

The Advanced tab contains the following fields:

Field	Description
Provide Raw Message	<p>When checked, this field specifies that the whole message is to be provided in binary form. The output schema changes to include an element named <code>rawMessage</code> that contains the message instead of <code>bodyText</code> and <code>mimeEnvelopeElements</code>.</p> <p>The Receive Mail process starter uses the <code>javax.mail</code> API. This API assumes that the content type of the message is <code>multipart/mixed</code>. When the multipart subtype is not <code>mixed</code> (such as <code>multipart/signed</code> or <code>multipart/alternative</code>) or when another content type is used (for example <code>application/*</code>), the <code>javax.mail</code> API may not correctly parse the message. Checking this field allows you to send the raw message to a Java Code activity that uses the Java Activation framework to implement the appropriate handlers to process the message. For more information on how the Java Activation framework can be used for this purpose, please consult the API documentation for <code>javax.activation</code> and <code>javax.mail</code>.</p> <p>You can also feed the binary message to the <code>javax.mail.MimeMessage</code> constructor in the form of a <code>java.io.InputStream</code> to construct a <code>MimeMessage</code> object. In that case, the default <code>javax.mail</code> API handler is used.</p>
Write to File	<p>Checking this field specifies that incoming messages whose body and attachments (or raw message size if the Provide Raw Message field is checked) exceed the specified threshold size should be written to a file instead of stored in memory. This allows you to accept large incoming messages without consuming a great deal of memory. When this field is checked, the Directory and Threshold Size fields appear.</p> <p>Leaving this field unchecked specifies that incoming messages should be kept in memory.</p> <p>Note: Once written, the files created by using this option are not deleted automatically. You must manage the storage used by these files and delete them when they are no longer used.</p>

Field	Description
Directory	The directory to write messages that are above the specified threshold. The process engine does not attempt to create the directory if the specified directory does not exist. Therefore, create the directory before starting the process engine.
Create Non-Existing Directories	<p>When checked, all directories in the path specified in the Directory field are created, if they do not already exist.</p> <p>If this field is unchecked and there are one or more directories in the specified path in the Directory field that do not exist, an exception is raised.</p>
Threshold Message Data Size	<p>The maximum size (in bytes) of an incoming message that can be kept in memory. Messages larger than the specified size are written to a file in the specified directory. The file's name is output so that subsequent activities in the process definition can access the file and read its contents.</p> <p>Specifying zero (0) in this field causes all incoming messages to be saved to a file.</p>

Output Headers

Incoming messages may have custom headers. The Output Headers tab allows you to define a custom schema for the headers of the incoming mail messages. You can specify any standard header supported by the `javax.mail` package. For example, X-Mailer or X-Priority. Values of headers in the incoming message will populate the corresponding output headers of the same name that you have defined.

See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Output Headers tab.

Misc

The Misc tab contains the following fields:

Field	Description
Sequencing Key	<p>This field can contain an XPath expression that specifies which processes should run in order. Process instances with sequencing keys that evaluate to the same value will be executed sequentially in the order the process instance was created.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about controlling the execution order of process instances and about XPath expressions.</p>
Custom Id	<p>This field can contain an XPath expression that specifies a custom ID for the process instance. This ID is displayed in the View Service dialog of TIBCO Administrator, and it is also available in the <code>\$_processContext</code> process variable.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
from	string	The email address of the sender of the email.
to	string	The recipient list of the email.
cc	string	The cc (carbon copy) list of the email.
replyTo	string	The reply to list of the email.
subject	string	The subject of the email.
sentdate	string	The date the email was sent.

Output Item	Datatype	Description
Fields available when the Upgrade Configuration field is checked		
Headers	complex	<p>This element contains the schema you defined on the Output Headers tab. You can specify custom headers that can be included in incoming mail messages.</p> <p>You can specify any standard header supported by the <code>javax.mail</code> package. For example, X-Mailer or X-Priority. Values of headers in the incoming message will populate the corresponding output headers of the same name that you have defined.</p>
rawMessage	binary	<p>The content of the message in binary form. This element is only available when the Provide Raw Message field on the Advanced tab is checked.</p>
bodyText	string	<p>The text of the email message. The Provide Raw Message field on the Advanced tab must be unchecked for this field to appear.</p>
mimeEnvelopeElement	complex	<p>This element contains the message attachments. This element contains a repeating element named <code>mimePart</code> that contains each mime attachment. The Provide Raw Message field on the Advanced tab must be unchecked for this field to appear.</p>

Output Item	Datatype	Description
mimeHeaders	complex	<p>This element contains the mime header for each mimePart. Mime headers can contain the following information:</p> <ul style="list-style-type: none">• content-disposition• content-type• content-transfer-encoding• content-id• other mime header information <p>See http://www.faqs.org/rfcs/rfc2045.html for more information about MIME headers and their syntax.</p> <p>Note: When the content type is specified as "text/*" (for example, "text/xml"), the attachment content is expected to be in either the textContent output element or the file name storing the attachment is expected to be in the fileName output element. When the content type is anything other than "text/*", the attachment content is expected to be in either the binaryContent output element or the file name storing the attachment is expected to be in the fileName output element.</p>

Output Item	Datatype	Description
binaryContent textContent fileName	choice	<p>This element contains the mime attachment. The element can be one of the following:</p> <ul style="list-style-type: none">binaryContent — content of the attachment when the attachment is binary data.textContent — content of the attachment when the attachment is text data.fileName — the file name of the attachment when the attachment is stored in the file system (see Advanced tab for more information).

Fields available when the Upgrade Configuration field is unchecked		
bodyText	string	The text of the email message.
attachmentNames	string	<p>A list of names for each attachment to the message. These names are typically the file names of the attachments.</p> <p>Note: The attachmentNames and attachmentData elements are corresponding lists. That is, for each item in the attachmentName element, there must be a corresponding item in the same position in the attachmentData list. For example, if there are three attachments, both elements must contain three items and item in the attachmentNames element corresponds to the element in the same position in the attachmentData list.</p>
attachmentData	binary	A list of attachments to the message.
contentType	string	The MIME content type specified in the message.

Send Mail

Activity



The Send Mail activity sends an email by way of a SMTP server.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Host	Yes	<div>Host name for the SMTP server.</div> <div>The default port (25) is used to connect to the SMTP server. If your server is configured to use a different port, you can specify it in this field using the syntax:</div> <div><hostName> : <portNumber></div> <div>For example, myMailServer.myCo.com:37</div>
SSL	No	The Use SSL checkbox specifies that Secure Sockets Layer (SSL) should be used to specify a client SSL configuration. When this field is checked, the Configure SSL button is enabled.
Authenticate	No	<div>Specifies whether you want to supply a user name and password to authenticate to the mail server. When checked, the User Name and Password fields appear.</div> <div>Note: The mail server must be configured to require authentication for sending mail. If the mail server is not configured to require authentication, the user name and password are ignored.</div>

Field	Global Var?	Description
User Name	Yes	User name to use when authenticating to the mail server.
Password	Yes	Password to use when authenticating to the mail server. Passwords entered in this field will be encrypted when stored in the project.
Upgrade Configuration	No	<p>This field only appears in Mail palette resources placed into process definitions prior to release 5.2.0. In previous releases, attachments were lists in the input of the activity. In release 5.2.0 or later, a new schema is used to handle MIME attachments.</p> <p>If you have a Mail palette resource created prior to release 5.2.0, this field should be unchecked to maintain backward compatibility. This field does not appear for new resources created in release 5.2.0 or later. Unchecking this field disables the Input Headers tab and changes the input schema.</p>

Configure SSL Button

The Configure SSL button allows you to configure the SSL parameters when the transport supports SSL. Check SSL to display Configre SSI dialog. Provide values in the following fields to configure SSL.

Field	Global Var?	Description
Trusted Certificates Folder	No	Folder in the project containing one or more certificates from trusted certificate authorities. This folder is checked when an invocation is made to the partner service to ensure that the server is trusted. This prevents connections to rogue servers.
Identity	No	<p>This is an identity resource that contains the client's digital certificate and private key.</p> <p>See <i>TIBCO Designer Palette Reference</i> for more information.</p>

Field	Global Var?	Description
Verify Host Name	No	Specifies whether to verify that the host you are connecting to is the expected host. The host name in the host's digital certificate is compared against the value you specify in the Expected Host Name field. If the host name does not match the expected host name, the connection is refused.
Strong Cipher Suites Only	No	Specifies that only cipher suites with strong encryption should be used, if they are available on the host you are connecting to.

Support for STARTTLS

Some Mail servers (such as Microsoft Exchange 2010) support SMTP over SSL using STARTTLS feature. TIBCO ActiveMatrix BusinessWorks supports this using the property, `bw.plugin.mail.enableStartTLS` which is set to default as `"true"`. Select the 'Use SSL' checkbox when using such servers and provide the Trusted Certificates folder.

When not using such servers, provide this engine property for SMTP with value as `"false"`.

Advanced

The Advanced tab has the following fields.

Field	Global Var?	Description
Allow Non-Standard Email IDs	No	<p>By default, email IDs specified in the to, from, cc, bcc, or replyTo input elements must conform to the RFC 822 standard for email addresses.</p> <p>Checking this box allows you to specify email IDs that do not conform to the RFC 822 standard. This is useful if you want to send mail to a server that has extensions for sending email to devices such as a fax machine.</p> <p>For more information about email address syntax, see http://www.faqs.org/rfcs/rfc822.html.</p> <p>Note: When this field is unchecked, not all of the RFC 822 syntax rules are enforced. For example, addresses composed of simple names (with no "@domain" part) are allowed. For more information on enforcing RFC 822, see the description of the <code>strict</code> flag of the <code>parse</code> method of <code>javax.mail.internet.InternetAddress</code> at http://java.sun.com/products/javamail/javadoc/s/javax/mail/internet/InternetAddress.html.</p>

Input Headers

You may want to add custom headers to outgoing mail messages. The Input Headers tab allows you to define a custom schema for the headers of the outgoing mail message. You can specify any standard header supported by the `javax.mail` package. For example, X-Mailer or X-Priority.

See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Input Headers tab.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
username	string	<p>Username to use when authenticating to the mail server.</p> <p>Note: The mail server must be configured to require authentication for sending mail. If the mail server is not configured to require authentication, the username and password elements are ignored.</p>
password	string	Password to use when authenticating to the mail server.
from	string	The email address of the sender.
to	string	<p>The recipient list for the email. This is a repeatable element, so that you can send mail to more than one recipient.</p> <p>You can also supply a list of recipients in a single string by using either a comma or a semicolon (but not both in the same string) to separate the recipients.</p>
cc	string	<p>The cc (carbon copy) list for the email. This is a repeatable element, so that you can place more than one recipient on the CC list.</p> <p>You can also supply a list of CC recipients in a single string by using either a comma or a semicolon (but not both in the same string) to separate the CC recipients.</p>
bcc	string	<p>The bcc (blind carbon copy) list for the email. This is a repeatable element, so that you can place more than one recipient on the BCC list.</p> <p>You can also supply a list of BCC recipients in a single string by using either a comma or a semicolon (but not both in the same string) to separate the BCC recipients.</p>

Input Item	Datatype	Description
replyTo	string	<p>The reply to list for the email. This is a repeatable element, so that you can place more than one recipient on the reply to list.</p> <p>You can also supply a reply to list in a single string by using either a comma or a semicolon (but not both in the same string) to separate the addresses in the list.</p>
subject	string	The subject of the email.
sentdate	string	<p>The date stamp for the email.</p> <p>Note: The email server supplies the actual date stamp for the email, so this input item is ignored. This item is deprecated and may be removed in a future release. Do not attempt to place a value in this input item.</p>
Fields available when the Upgrade Configuration field is checked		
bodyElement	complex	<p>This element contains a choice element. You can either supply the bodyText element or the fileName element.</p> <p>The bodyText element is a string containing the body of the message. The fileName element is the path and name of a file containing the body of the message.</p>
Headers	complex	<p>This element contains the schema you defined on the Input Headers tab. You can specify custom headers for outgoing mail messages.</p> <p>You can specify any standard header supported by the javax.mail package. For example, X-Mailer or X-Priority.</p> <p>If you want to use attachments, make sure the Content-Type header is specified as multipart/* (where * is a valid subtype of multipart).</p>

Input Item	Datatype	Description
mimeEnvelope Element	complex	This element contains the message attachments. This element contains a repeating element named mimePart that contains each mime attachment.
mimeHeaders	complex	<p>This element contains the mime header for each mimePart. Mime headers can contain the following information:</p> <ul style="list-style-type: none"> • content-disposition — To suggest a filename for an attachment, use "<code>*;filename=<filename></code>" in this element. Note: E-mail servers may alter or choose to ignore the suggested name. • content-type • content-transfer-encoding • content-id • other mime header information <p>See http://www.faqs.org/rfcs/rfc2045.html for more information about MIME headers and their syntax.</p> <p>Note: When the content type is specified as "text/*" (for example, "text/xml"), the attachment content is expected to be in either the textContent input element or the file name storing the attachment is expected to be in the fileName input element. When the content type is anything other than "text/*", the attachment content is expected to be in either the binaryContent input element or the file name storing the attachment is expected to be in the fileName input element.</p>

Input Item	Datatype	Description
binaryContent textContent fileName	choice	<p>This element contains the mime attachment. The element can be one of the following:</p> <ul style="list-style-type: none">• binaryContent — content of the attachment when the attachment is binary data.• textConetnt — content of the attachment when the attachment is text data.• fileName — the file name of the attachment written to the disk.

Fields available when the Upgrade Configuration field is unchecked		
bodyText	string	The text of the email message.
attachmentNames	string	<p>A list of names for each attachment to the message. These names are typically the file names of the attachments.</p> <p>Note: The attachmentNames and attachmentData elements are corresponding lists. That is, for each item in the attachmentName element, there must be a corresponding item in the same position in the attachmentData list. For example, if there are three attachments, both elements must contain three items and item in the attachmentNames element corresponds to the element in the same position in the attachmentData list.</p>
attachmentData	binary	A list of attachments to the message.
contentType	string	The MIME content type for the message. You can specify a character encoding in this element for the encoding of the body of the message.

Output

This activity produces no output.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
InvalidInputException	Input is not valid.
UnknownHostException	Mail server host name could not be resolved. The exception contains the mail server host name.
SendFailedException	The send operation failed for any reason.

Chapter 11 Parse Palette

The Parse palette provides shared configuration resources and activities for parsing and rendering formatted text. This is useful if you want to transform formatted lines of text into a data schema. This is also useful if you want to transform a data schema into a formatted text string.

The text lines can be formatted either by delimiters separating each field or offsets can be specified to determine where each field begins and ends.

Topics

- [Data Format, page 502](#)
- [Parse Data, page 508](#)
- [Render Data, page 514](#)

Data Format

Shared Configuration

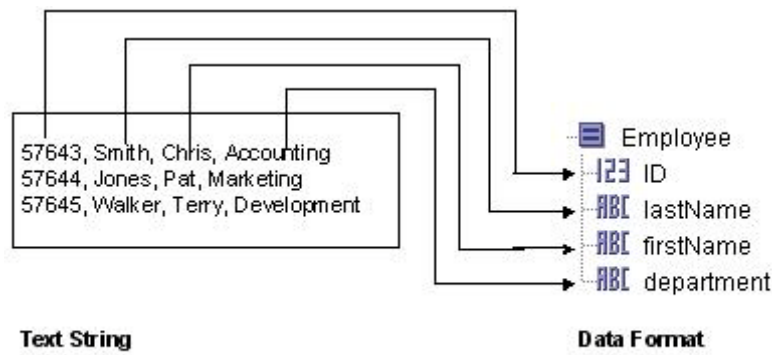


The Data Format resource contains the specification for parsing or rendering a text string using the [Parse Data](#) and [Render Data](#) activities. This shared configuration resource specifies the type of formatting for the text (delimited columns or fixed-width columns), the column separator for delimited columns, the line separator, and the fill character and field offsets for fixed-width columns. You must also specify the data schema to use for parsing or rendering the text.

When parsing text, each column of an input line is transformed into the corresponding item in the specified data schema. The first column of the text line is turned into the first item in the data schema, the second column is transformed into the second item, and so on. Each line is treated as a record, and multiple lines result in a repeating data schema containing the lines of the input text string.

[Figure 19](#) illustrates how an input text string is parsed into a specified data schema.

Figure 19 Parsing a text string into a data schema



When rendering text, each record in the input data schema is transformed into a line of output text. The first item of the data schema is transformed into the first column of the text line, the second item is transformed into the second column, and so on. Each record in a repeating data schema is transformed into a separate line in the output text string. Rendering a data schema into a text string is exactly the opposite process of parsing a text string into a data schema. Rendering is the reverse of the process illustrated in [Figure 19](#).

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the resource.
Description	Short description of the shared resource.
Format Type	<p>The type of formatting for the text. The text can be either "Delimiter separated" or "Fixed format".</p> <p>In delimiter-separated text, each column is separated by a delimiter character, specified in the Col Separator field. Each line is separated by the character specified in the Line Separator field. See Delimiter Separated Fields on page 506 for more information.</p> <p>In Fixed format text, each column occupies a fixed position on the line. For fixed format text, you must specify the Fill Character, the line length, and the column offsets. See Field Offsets on page 506 for more information.</p>
Col Separator	<p>This field specifies one or more separator characters between columns when "Delimiter separated" is specified in the Format Type field.</p> <p>When rendering text, each element in the input data schema is separated by the column separator in the output text string. If more than one character is specified in this field, the Render Data activity places the entire string specified in this field between each column. For example, if ":" ; " is specified in this field, then ":" ; " appears between each column in the rendered string.</p> <p>When parsing text, each column becomes an element in the output data schema. If more than one character is specified in this field, the Parse Data activity uses the rule specified in the Col Separator Parse Rule field to determine how to parse the data.</p>

Field	Description
Col Separator Parse Rule	<p>Specifies the rule to use for multiple column separator characters when parsing data. The choices are the following:</p> <ul style="list-style-type: none">• Treat all characters as entered as a single column separator string <p>The characters entered into the Col Separator field are treated as a single string that acts as a separator. For example, if the specified Col Separator is " : ; ", then Apple : ; Orange : ; Pear is treated as three columns.</p> <ul style="list-style-type: none">• Treat each character entered as a potential column separator <p>Any of the characters will act as a column separator. For example, if the specified Col Separator is " : ; ", then Apple ; Orange : Pear is treated as three columns.</p>
Line Separator	<p>Specifies the character(s) that determine the end of each line. This field allows you to define a custom line separator. By default, new line, carriage return and line feed are defined and can be selected from the drop down list.</p> <p>When parsing text, each line is treated as a new record in the output data schema. When rendering text, each data record is separated by the line separator character in the output text string.</p> <p>The last line in your input file must be terminated by the specified line separator.</p> <p>Note that BusinessWorks does not support specifying the line separator as part of the data.</p>

Field	Description
Fill Character	<p>When processing fixed format columns, this is the type of character that is used to fill the empty space in a column and between columns. This is only available when "Fixed format" is specified in the Format Type field. This fill character is only used by the Render Data activity.</p> <p>You can select one of the following for this field:</p> <ul style="list-style-type: none">• Space — fills with a space• Dash — fills will a dash• Others — allows you to specify your own custom fill character in the Fill With field. <p>For example, you have a column that holds an integer and the specified width is 10. One row has the value "588" for that column. Because the width of 588 is three and the column width is 10, the remaining 7 characters are filled with the specified fill character.</p>
Fill With	<p>This field is only available when Others is selected in the Fill Character field. This field specifies the fill character to use to pad unused characters in fixed-width columns.</p> <p>Only one character can be specified. The first character is the fill character and any other characters specified in this field are ignored.</p>

Data Format

The Data Format tab allows you to define a custom schema for the text.

You can define your own datatype on this tab, and you can reference XML schema or ActiveEnterprise classes stored in the project. Once defined, the data specified on the Data Format tab is used to parse a text string into the specified schema or render the specified schema as a text string.



Data Format does not support nested schema. You can only specify basic plain schema with **no** nesting.

See [Appendix A, Specifying Data Schema, on page 743](#) for a description of how to define a schema.

Delimiter Separated Fields

When processing delimiter-separated text, each field in the input line is separated by the delimiter specified by the Column Separator field. Leading and trailing spaces are stripped from each field and the specified Line Separator determines when a new record starts. [Figure 19](#) illustrates an series of input lines containing comma-separated fields, each record on one line.

In some situations, you may not be able to choose a column separator character that does not appear in any column data. For example, if you choose a comma as the column separator, there may be commas in some of the column values. To process data that contains column separator characters in a column, you can surround the column with double quotes (" "). Double quotes also allow you to include leading and trailing spaces as well as line breaks in a field. If you want to have a double quote appear in a field, escape the double quote by using two consecutive double quotes. That is, use "" to represent a double quote in a field.

The following data illustrates input lines with each field separated by commas. Some fields, however, contain commas, leading or trailing spaces, double quotes, and line breaks.

```
57643, Smith, "Chris", Accounting , "Statement: Be prepared!"
57644, Jones, "Pat ", Marketing , "Statement: To paraphrase
JFK, ""Ask not what your company can do for you,
ask what you can do for your company.""
57645, Walker, "Terry", Development , "Statement: My goal is to be
CEO someday."
```

Notice that Pat Jones' statement spans two lines and contains double quotes as well as a comma. The entire field is surrounded by double quotes, so it is still treated as part of the same record.

Field Offsets

When processing fixed format text, you must specify the line length and the column offsets. This allows a Parse Data or Render Data activity to determine where columns and lines begin and end. The Field Offsets tab allows you to specify the format of fixed-width text.

The line length is the total length of each input line, including the line separator character(s). Include the appropriate number of characters for the selected line separator on the Configuration tab to the total length of each line.

The column offset is the starting and ending character position on each line for the column. Each line starts at 0 (zero). For each column of the line, you must specify the name of the data item associated with this column (this is the same name you specified for the corresponding element in the data schema), the starting offset for the column, and the ending offset for the column.



It is a good idea to have each column offset begin where the last column offset ended. Many fixed format data files are used by databases (for example, ISAM files) or are generated by automated processes. These types of files have rigid file record formats and may not have additional padding space between columns.

When you define each column offset to begin where the last column offset ends, the data can be read more quickly by TIBCO ActiveMatrix BusinessWorks because the bytes of the input records can be read in sequentially.

Consider the following text file. The first two lines of the file indicate offset numbers (each 0 indicates another 10 characters), and the fill character between columns is spaces:

```

0           12           30           45
0123456789012345678901234567890123456789012345678901234567
57643      Smith      Chris      Account
57644      Jones      Pat        Marketing
57645      Walker     Terry      Development
  
```

Figure 20 illustrates the Field Offset tab for the file above. Notice that the line length is specified as 60, even though the offsets end at character number 58. The line separator is specified as "Carriage Return/Line Feed (windows)", so this adds two additional characters for a total line length of 60.

Figure 20 Fixed-width text strings and field offsets

name	start	end
ID	0	12
lastName	12	30
firstName	30	45
department	45	58

Parse Data

Activity



The Parse Data activity takes a text string or input from a file and processes it, turning it into a schema tree based on the specified [Data Format](#) shared configuration.

You can use any mechanism to obtain or create a text string for processing. For example, you can use the [Read File](#) activity to obtain text from a file, or you can retrieve a text field from an adapter message. You can also specify a text file to read using this activity.

You might use this activity in a number of situations. For example, you may have a file that consists of multiple lines of comma-separated values (as in data obtained from a spreadsheet). You may also want to insert that data into a database table. To do this, read and parse the file into a data schema with the Parse Data activity. Then use a [JDBC Update](#) activity to insert the data schema into a database table.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Data Format	No	The Data Format shared configuration to use when parsing the text input. See Data Format on page 502 for more information.
Input Type	No	Specifies the type of input for this activity. Input can either be a text string or a file. If the input is a text string, supply the string to the <code>textString</code> input item. If the input is a file, supply the file name and location to the <code>fileName</code> input item.
Encoding	Yes	The encoding of the input file. This field is only available when "File" is chosen in the Input Type field. Any valid Java encoding name can be used.

Field	Global Var?	Description
Skip Blank Lines	No	<p>Skips any empty records when parsing the text input.</p> <p>When this field is unchecked, parsing stops at the first blank line encountered in the input.</p>
Manually Specify Start Record	No	<p>Allows you to specify the record in the input where you want to start parsing.</p> <p>This is useful if you have a large number of records and you want to read the input in parts (to minimize memory usage). Checking this checkbox causes the <code>startRecord</code> input item to appear. See Parsing a Large Number of Records on page 512 for more information on how to read the input stream in parts.</p>
Strict Validation	No	<p>Validates every input line for the specified number of fields for the "Fixed Format" text.</p> <p>For example, if the format states that there are three fields per line and this field is checked, all lines in the input must contain three fields.</p>
Continue on Error	No	<p>Continues parsing the next record in the input after encountering an error, if any.</p> <p>If an error occurs, the error information is separated from the output of the successfully parsed records and is provided in the output schema of the activity. See Output on page 511 for more information on how the error information for the records that failed parsing is provided.</p> <p>When this field is unchecked, parse data activity quits parsing if an error is encountered while parsing the records in the input.</p> <p>Irrespective of whether this field is checked or not, the Parse Data activity quits when any data validation errors occur.</p>

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
text	string	The text string to parse. This input item is only available when "String" is specified in the Input Type field on the Configuration tab.
fileName	string	The location and name of the file to read. The file's contents is used as the input text string for this activity. This input item is only available when "File" is specified in the Input Type field on the Configuration tab.
startRecord	number	<p>The line number of the input stream where you want to begin parsing. All lines before the specified line are ignored. This input item is only available if the Manually Specify Start Record field on the Configuration tab is checked.</p> <p>The input stream begins with line number 1 (one).</p> <p>This is useful if you want to read the input stream in parts to minimize memory usage. See Parsing a Large Number of Records on page 512 for more information.</p>

Input Item	Datatype	Description
noOfRecords	number	<p>The number of records to read from the input stream. Specify "-1" if you want to read all records in the input stream.</p> <p>This is useful if you want to read the input stream in parts to minimize memory usage. See Parsing a Large Number of Records on page 512 for more information.</p>
SkipHeaderCharacters	integer	<p>The number of characters to skip when parsing. This allows you to skip over any file headers or other unwanted information.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
Rows	complex	<p>This output item contains the list of parsed lines from the input. This is useful to determine the number of records parsed by this activity.</p> <p>The schema specified by the Data Format resource is contained in this output item.</p>
schema	complex	<p>The schema containing the data from the parsed input text. This output item contains zero or more parsed records.</p>

Output Item	Datatype	Description
ErrorRows		<p>This output item is available when Continue on Error is checked, and error(s) while parsing the records in the input.</p> <p><<raw input data is put in the error string>></p> <p>This field contains the list of error lines for the records from the input that failed parsing.</p>
EOF	boolean	<p>true if no more records are available for parsing. false if there are more records available.</p> <p>This output item is useful for checking if there are no more records in the input stream when you are reading the input in parts to preserve memory. See Parsing a Large Number of Records on page 512 for more information.</p>

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
FileNotFoundException	The specified input file cannot be located.
BadDataFormatException	The input format is not valid.

Parsing a Large Number of Records

The input for this activity is placed in a process variable and takes up memory as it is being processed. If you are reading a large number of records from a file, the process may consume significant machine resources. To avoid using too much memory, you may want to read the input in parts, parsing and processing a small set of records before moving on to the next set.

To process a large number of records, follow this procedure:

1. Create a Parse Data activity.
2. Specify the fields on the Configuration tab. Check the checkbox for the Manually Specify Start Record field.
3. Select the Parse Data activity and click the group icon on the tool bar to create a group containing the Parse Data activity. See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about working with groups.
4. Specify "Repeat Until True Loop" as the Group action, and specify an index name (for example, "i").
5. The loop should exit when the EOF output item for the Parse Data activity is set to true. For example, the condition for the loop could be set to the following: `string($ParseData/Output/done) = string(true())`
6. Set the `noOfRecords` input item for the Parse Data activity to the number of records you want to process for each execution of the loop.
7. If you do not check the Manually Specify Start Record field on the Configuration tab of the Parse Data activity, the loop processes the specified `noOfRecords` with each iteration until there are no more input records to parse.

You can optionally check the Manually Specify Start Record field to specify the `startRecord` on the Input tab. If you do this, you must create an XPath expression to properly specify the starting record to read with each iteration of the loop. For example, the count of records in the input starts at zero, so the `startRecord` input item could be set to the current value of the loop index minus one. For example, `$i - 1`.

The procedure above is a general guideline for creating a loop group for parsing a large set of input records in parts. You may want to modify the procedure to include additional processing of the records, or you may want to change the XPath expressions to suit your business process.

Render Data

Activity



Render Data

The Render Data activity takes an instance of a data schema and renders it as a text string. The schema processed is based on a specified [Data Format](#) shared configuration.

You may want to use this activity in a number of situations. For example, you may retrieve a result set from a database table. You may then want to format this result set as a formatted text string (with line breaks between each row in the result set), and then write that text string out to a file. You would use the Render Data activity to render the data schema as a formatted text string. Then you would use the Write File activity to write the string to a file.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Data Format	No	The Data Format shared configuration to use when rendering the text output. See Data Format on page 502 for more information.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
Rows	complex	The element containing the list of items to render.

Input Item	Datatype	Description
root	complex	The elementcomplex containing data schema (specified by the Data Format field on the Configuration tab) to render as a text string. This is a repeating element so that you can render more than one output record.

Output

The output for the activity is the following.

Output Item	Datatype	Description
text	string	The output text string as a result of rendering the specified data schema. Line breaks separate records of the data schema.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
BadDataFormatException	The output format is not valid.

Chapter 12 Policy Palette

The Policy palette allows you to specify security policies for inbound and outbound SOAP messages. The security policies follow the Web Services Security: SOAP Message Security 1.0 (WS-Security 2004) OASIS Standard 200401. You can find out more about this standard at <http://docs.oasis-open.org/wss/2004/01/>.

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about using the resources in the Policy palette.

Topics

- [Security Policy, page 518](#)
- [Security Policy Association, page 525](#)

Security Policy

Shared Configuration



The Security Policy shared configuration resource specifies a security policy that can be used for inbound or outbound SOAP messages. The security policy can include any combination of the following characteristics:

- Authentication — whether messages must be authenticated. Authentication can be performed either with usernames and passwords or by way of X.509 compliant certificates.
- Integrity — whether messages must be validated with a signature to ensure the message has not been altered since its creation.
- Confidentiality —whether messages should be encrypted or decrypted.
- Timeout — whether messages should expire after a certain time.

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about using security policies for web services.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the resource.
Description	No	Short description of the shared resource.
Policy Type	No	Specifies the type of communication this policy applies to. Select one of the following from the list of choices: <ul style="list-style-type: none">• inbound• outbound• inbound fault• outbound fault
Authentication	No	Check this box if you want to specify that authentication should be part of this policy. Checking this box makes the fields on the Authentication tab available for editing.

Field	Global Var?	Description
Integrity	No	Check this box if you want to specify that messages should be signed or that signed messages should be verified. Checking this box makes the fields on the Integrity tab available for editing.
Confidentiality	No	Check this box if you want to specify that messages should be encrypted and decrypted. Checking this box makes the fields on the Confidentiality tab available for editing.
Timeout	No	Check this box if you want to add or verify timestamps on messages. Checking this box makes the fields on the Timeout tab available for editing.
Custom Password Lookup	No	<p>Check the box in this field if you want to use your own custom password lookup class. By default, authentication is performed through TIBCO Administrator. This field allows you to specify a class for looking up passwords in your system, such as a database, file system, or LDAP system.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about custom password lookup.</p>
Custom Password Callback Java Class	No	<p>This field specifies an AliasLibrary resource containing your custom password lookup class and any referenced classes (such as third-party libraries to access an LDAP server).</p> <p>Use the Browse button to locate the AliasLibrary resource storing your class, then use the Show Class Browser button in the Class field to locate your class.</p>

Authentication

The Authentication tab specifies the characteristics for authenticating to the SOAP message server. Inbound messages can be authenticated against a list of trusted certificates. Outbound messages can specify the identity to use to authenticate to the external SOAP server.

The Authentication tab has the following fields.

Field	Global Var?	Description
Inbound or Inbound Fault Policy Type Fields		
Supported Security Tokens	No	Specifies the security tokens you want to allow in inbound messages. You can select one or more of the following supported types: <ul style="list-style-type: none">X.509 TokenUsernamePassword Token
Trusted Certificates Folder	No	Specifies the folder containing the trusted certificates for binary security token authentication.
Outbound or Outbound Fault Policy Type Fields		
Security Token	No	Specifies the type of security tokens you want to allow in inbound messages. You can select one of the following supported types: <ul style="list-style-type: none">X.509 TokenUsernamePassword Token
X.509 Identity	No	When X.509 Token is selected in the Security Token field, this field specifies the Identity resource containing the X.509 compliant identity file. See <i>TIBCO Designer Palette Reference</i> for more information about Identity resources.
Username Password Identity	No	When UsernamePassword Token is selected in the Security Token field, this specifies the Identity resource that contains the username and password. See <i>TIBCO Designer Palette Reference</i> for more information about Identity resources.
Password Type	No	Specifies whether you want to use text or digest passwords.

Integrity

The Integrity tab specifies the characteristics of the signatures attached to the messages. Signatures can be used to ensure that messages are not altered after creation. The integrity of inbound messages can be checked against the trusted root certificates and public certificates. Outbound messages can specify the certificate to be used to sign the outgoing message.

The Integrity tab has the following fields.

Field	Global Var?	Description
Inbound or Inbound Fault Policy Type Fields		
Supported Signature Methods	No	Algorithm used to check the signatures of incoming messages. You can select one or more of the following: <ul style="list-style-type: none">SHA1MD5SHA256SHA384SHA512
Supported Security Tokens	No	Is the security token to use for the signature. You can select one or more of the following: <ul style="list-style-type: none">X.509 TokenUsernameToken
Trusted Certificates Folder	No	Is the folder containing the trusted certificates for signature verification. Note: The certificates in the trusted folder are only necessary when the authenticating user is the same as the user who signed the message. In this case, the message contains the public key, the receiver must verify against the trusted certificate. However, if the authenticating user is not the same as the user who signed the message, the user must define a subject key identity that holds the public key.

Field	Global Var?	Description
Subject Key Identity	No	Specifies an Identity resource containing a keystore that holds an X.509 certificate. The inbound message must match the subject key contained in the certificate.
Outbound or Outbound Fault Policy Type Fields		
Signature Method	No	Algorithm used to create signatures for outgoing messages. You can select one or more of the following: <ul style="list-style-type: none">• SHA1• MD5• SHA256• SHA384• SHA512
Security Token	No	Is the type of security token to use for the signature. You can select one or more of the following: <ul style="list-style-type: none">• X.509 Token• UsernameToken
Username Password Identity	No	When UsernameToken is selected in the Security Token field, this shows the Identity resource that contains the username and password. See <i>TIBCO Designer Palette Reference</i> for more information about Identity resources.
Password Type	No	Specify whether you want to use text or digest passwords.
X.509 Identity	No	When X.509 Token is selected in the Security Token field, this field indicates the Identity resource containing the X.509 compliant identity file. See <i>TIBCO Designer Palette Reference</i> for more information about Identity resources.

Field	Global Var?	Description
Certificate Alias	No	When the Identity resource specified in the X.509 Identity field is a JKS keystore, specify the certificate alias in this field to identify the private/public key pair.

Confidentiality

The Confidentiality tab specifies the encryption characteristics of messages. Inbound messages can be decrypted based on algorithms specified in the message security header and the defined private key. Outbound messages can be encrypted based on algorithms stored in a public key.

The Confidentiality tab has the following fields.

Field	Global Var?	Description
Inbound or Inbound Fault Policy Type Fields		
Supported Encryption Algorithm	No	<p>Symmetric key algorithm used to decrypt incoming messages. You can select one or more of the following:</p> <ul style="list-style-type: none"> • 3DES • AES-128 • AES-256
Private key Identifier Type	No	<p>Specifies whether the private key is one of the following:</p> <ul style="list-style-type: none"> • X.509 Token
X.509 Identity	No	When X.509 Token is selected in the Private Key Identifier Type field, this field specifies the Identity resource containing the X.509 compliant private key file to use to decrypt the message. See <i>TIBCO Designer Palette Reference</i> for more information about Identity resources.

Field	Global Var?	Description
Outbound or Outbound Fault Policy Type Fields		
Encryption Algorithm	No	Algorithm used to encrypt outgoing messages. You can select one of the following: <ul style="list-style-type: none">• 3DES• AES-128• AES-256
Public Key	No	Identity resource containing the X.509 compliant public key file to use to encrypt the message. See <i>TIBCO Designer Palette Reference</i> for more information about Identity resources.

Timeout

The Timeout tab specifies the characteristics of message timeout. Inbound messages can be rejected after the specified number of seconds. Outbound messages can be set to expire after the specified number of seconds.

The Timeout tab has the following fields.

Field	Global Var?	Description
Inbound or Inbound Fault Policy Type Fields		
Reject After (seconds)	No	The creation time of incoming messages is compared to the time the message was received. If the difference in time is greater than the number of seconds specified in this field, the message is rejected.
Outbound or Outbound Fault Policy Type Fields		
Expire In (seconds)	No	Outgoing and error messages will expire after the specified number of seconds.

Security Policy Association

Shared Configuration



The Security Policy Association shared configuration resource associates a [Security Policy](#) with a particular Service operation or SOAP resource in your project. This allows you to specify security policies for inbound or outbound SOAP messages on a per-operation or per-activity basis.

When a security policy is attached to a resource that receives SOAP messages (for example, [SOAP Event Source](#), or the reply message of a [SOAP Request Reply](#) activity), the associated security policy is used for the incoming message. For example, if authentication is specified in the security policy, then the identity of the sender of incoming messages is checked against a list of trusted identities.

When a security policy is attached to a resource that sends SOAP messages (for example, [SOAP Request Reply](#), [SOAP Send Fault](#), or [SOAP Send Reply](#)), the security the associated security policy is used for the outgoing message. For example, if encryption is specified in the security policy, the outgoing message is encrypted before it is sent.



Security Policy Association shared configuration resources are not referenced by resources in process definitions. Therefore, they are not automatically included in Enterprise Archive files. You must manually add Security Policy Association resources to the Shared Archive within an Enterprise Archive for the associations to work properly in a deployed project. See *TIBCO ActiveMatrix BusinessWorks Administration* for more information about adding resources to the Shared Archive.



To run a project with security policy associations successfully, ensure that all the policy associations in the project are valid. Any invalid associations must be removed from the project before running the project.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the resource.
Description	No	Short description of the shared resource.

Field	Global Var?	Description
Apply Policy To	No	<p>The SOAP resources or Service operations to which you want to apply a Security Policy. Use the Select button to choose the desired SOAP resources or Service operations.</p> <p>Only the appropriate policy fields are available based on the selected resource. For example, when you select a SOAP Event Source, only the Inbound Message Policy field is available.</p>
Inbound Message Policy	No	A Security Policy resource that specifies the security characteristics you want to apply to inbound messages.
Outbound Message Policy	No	A Security Policy resource that specifies the security characteristics you want to apply to outbound messages.
Inbound Fault Message Policy	No	A Security Policy resource that specifies the security characteristics you want to apply to inbound fault messages.
Outbound Fault Message Policy	No	A Security Policy resource that specifies the security characteristics you want to apply to outbound fault messages.

Inbound

The Inbound tab has the following fields.

Field	Global Var?	Description
Message Elements for Signature	No	Specifies an XPath expression to select the elements within the SOAP message that are expected to have a signature. If the incoming message does not have a signature for the selected elements, an exception is thrown.

Field	Global Var?	Description
Message Elements for Encryption	No	Specifies an XPath expression to select the elements within the SOAP message that are expected to be encrypted. If the elements selected in the incoming message are not encrypted, an exception is thrown.

Outbound

The Outbound tab has the following fields.

Field	Global Var?	Description
Message Elements for Signature	No	Specifies an XPath expression to select the elements of outgoing messages for which you want to include a signature, if a signature is specified in the selected Security Policy resource.
Message parts for Encryption	No	Specifies an XPath expression to select the elements of outgoing message parts that you want to encrypt, if confidentiality is specified in the selected Security Policy resource.

Support for Unqualified Elements

To use unqualified elements:

Create a new Security Policy Association with the required fields.

Or

Edit the existing Security Policy Association by:

- Removing the unqualified element.
- Modifying the inbound/outbound field.
- Save the project.
- Add the unqualified element again.

Chapter 13 Rendezvous Palette

The Rendezvous palette allows you to send and receive TIBCO Rendezvous messages. For more information about TIBCO Rendezvous, see the TIBCO Rendezvous documentation.

Topics

- [RawRVMsg2 Schema, page 530](#)
- [Datatype Conversion, page 532](#)
- [Raw TIBCO Rendezvous Message Support, page 536](#)
- [Field Names In Messages, page 538](#)
- [Internationalization Support, page 539](#)
- [Publish Rendezvous Message, page 540](#)
- [Rendezvous Subscriber, page 543](#)
- [Rendezvous Transport, page 547](#)
- [Reply to Rendezvous Request, page 552](#)
- [Send Rendezvous Request, page 554](#)
- [Wait for Rendezvous Message, page 559](#)

RawRVMsg2 Schema

TIBCO ActiveMatrix BusinessWorks includes an XSD file that defines a generic message structure and some additional TIBCO Rendezvous message types. You can use this schema to send or receive a message with an arbitrary structure (raw TIBCO Rendezvous messages). This schema also describes the datatypes for fields that use the TIBRVMSG_XML, TIBRVMSG_IPADDR32, and TIBRVMSG_IPPORT16 TIBCO Rendezvous datatypes.

If you want to send or receive raw TIBCO Rendezvous messages, or you want to use the TIBRVMSG_XML, TIBRVMSG_IPADDR32, or TIBRVMSG_IPPORT16 datatypes in a message, you must include this schema in your project.

The RawRVMsg2 Schema

The following is the RawRVMsg2 schema:

```
<?xml version="1.0" encoding="UTF-8" ?>
<xsd:schema xmlns:prefix0="http://xmlns.tibco.com/2003/5/bw/plugins/tibrv"
targetNamespace="http://xmlns.tibco.com/2003/5/bw/plugins/tibrv"
xmlns:xsd="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified">
  <xsd:element name="msg">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="field" minOccurs="0" maxOccurs="unbounded">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="name" type="xsd:string"/>
              <xsd:element name="id" minOccurs="0" type="xsd:unsignedShort"/>
              <xsd:choice>
                <xsd:element name="simple" type="xsd:anySimpleType"/>
                <xsd:element ref="prefix0:msg"/>
              </xsd:choice>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>

  <xsd:simpleType name="ipPort">
    <xsd:restriction base="xsd:unsignedShort"/>
  </xsd:simpleType>
  <xsd:simpleType name="ipAddr">
    <xsd:restriction base="xsd:string"/>
  </xsd:simpleType>
  <xsd:simpleType name="tibrvXml">
    <xsd:restriction base="xsd:string"/>
  </xsd:simpleType>
</xsd:schema>
```

Adding the RawRVMsg2 Schema to Your Project

The `RawRVMsg2.xsd` file specifies the RawRVMsg2 schema. To add this schema to your project, perform the following procedure:

1. Locate the `bw/5.1/lib/palettes/plugins.jar` file in your TIBCO ActiveMatrix BusinessWorks installation directory.
2. The `RawRVMsg2.xsd` file is contained in the `plugins.jar` file. You can extract this file in a number of ways, depending upon your operating system. For example, on Windows, you can open up `plugins.jar` using WinZip and extract the `RawRVMsg2.xsd` file. On UNIX, you can use Java's facilities to `un-jar` the file and copy the `RawRVMsg2.xsd` file.
3. Once you have obtained the `RawRVMsg2.xsd` file, copy this file into your TIBCO ActiveMatrix BusinessWorks project directory. You can copy this file into the root project directory or to a subdirectory in your project.
4. Open your project, and the RawRVMsg2 schema should be located in the folder where you placed it. If you already have your project open in TIBCO Designer, you can choose **Resources > Refresh** from the menu to display the newly placed file in your project tree.

Datatype Conversion

When sending or receiving TIBCO Rendezvous messages, TIBCO ActiveMatrix BusinessWorks converts the fields of the message to the correct datatypes. Data in incoming TIBCO Rendezvous messages is converted to TIBCO ActiveMatrix BusinessWorks datatype (and represented in the activity's output). Data in an outgoing message is converted to TIBCO Rendezvous datatypes.

The following tables describe the corresponding datatypes between TIBCO ActiveMatrix BusinessWorks and TIBCO Rendezvous, depending upon whether TIBCO ActiveMatrix BusinessWorks is sending or receiving the message.

Table 6 TIBCO Rendezvous to TIBCO ActiveMatrix BusinessWorks datatype conversion

TIBCO Rendezvous Datatype	XSD Datatype
TIBRVMSG_BOOL	boolean
TIBRVMSG_I8	byte
TIBRVMSG_I16	short
TIBRVMSG_I32	int
TIBRVMSG_I64	long
TIBRVMSG_U8	unsignedByte
TIBRVMSG_U16	unsignedShort
TIBRVMSG_U32	unsignedInt
TIBRVMSG_U64	unsignedLong
TIBRVMSG_F32	float
TIBRVMSG_F64	double
TIBRVMSG_OPAQUE	hexBinary or base64Binary, depending upon what is defined in the schema.
TIBRVMSG_DATETIME	date
TIBRVMSG_STRING	string

Table 7 TIBCO ActiveMatrix BusinessWorks to TIBCO Rendezvous datatype conversion

XSD Datatype	TIBCO Rendezvous Datatype
boolean	TIBRVMSG_BOOL
byte	TIBRVMSG_I8

Table 7 TIBCO ActiveMatrix BusinessWorks to TIBCO Rendezvous datatype conversion

XSD Datatype	TIBCO Rendezvous Datatype
short	TIBRVMSG_I16
int	TIBRVMSG_I32
long	TIBRVMSG_I64
integer	TIBRVMSG_I64
unsignedByte	TIBRVMSG_U8
unsignedShort	TIBRVMSG_U16
unsignedInt	TIBRVMSG_U32
unsignedLong	TIBRVMSG_U64
float	TIBRVMSG_F32
double	TIBRVMSG_F64
hexBinary	TIBRVMSG_OPAQUE
base64Binary	TIBRVMSG_OPAQUE
date	TIBRVMSG_DATETIME
dateTime	TIBRVMSG_DATETIME
time	TIBRVMSG_STRING
string	TIBRVMSG_STRING

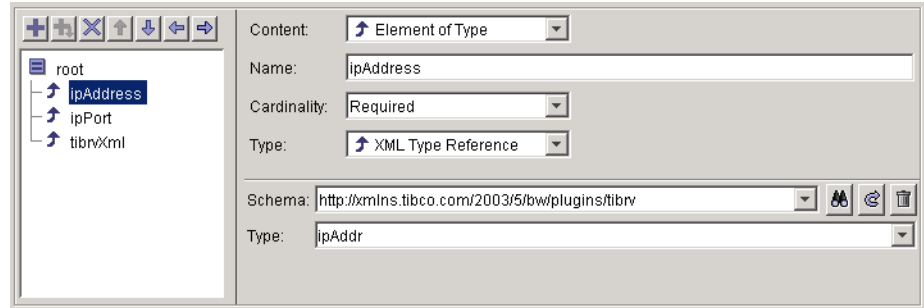
TIBRVMSG_XML, TIBRVMSG_IPADDR32, and TIBRVMSG_IPPORT16 Datatypes

If you want to use the TIBRVMSG_XML, TIBRVMSG_IPADDR32, or TIBRVMSG_IPPORT16 datatypes, you must first add the RawRVMsg2.xsd file into your project. See [RawRVMsg2 Schema on page 530](#) for more information about adding this schema to your project.

Once the RawRVMsg2 schema is in your project, you can reference the ipPort and ipAddr datatypes contained in that schema. These types correctly convert data of type TIBRVMSG_XML, TIBRVMSG_IPADDR32, or TIBRVMSG_IPPORT16 when sending or receiving TIBCO Rendezvous messages.

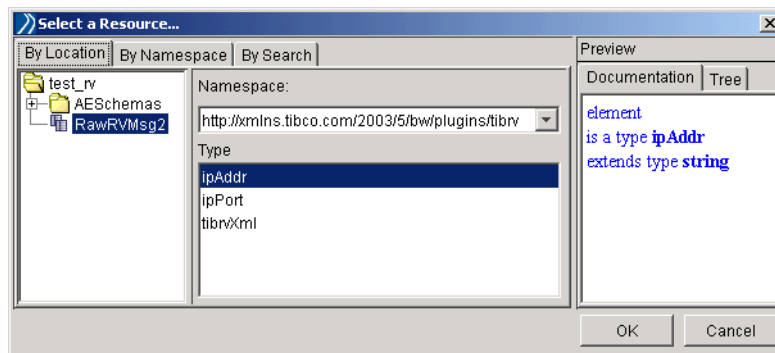
For example, you want to send a message with two fields, ipAddress, ipPort, and tibrvXml. [Figure 21](#) illustrates an Input Editor tab that defines the message structure.

Figure 21 Using the ipPort and ipAddr datatypes



In the content field, Element of Type is chosen. In the Type field, XML Type Reference is chosen to indicate you want to reference a datatype defined in a schema resource. Use the Browse button in the Schema field to locate the RawRVMsg2 schema and select the appropriate type for the field. [Figure 22](#) illustrates selecting the correct type from the RawRVMsg2 schema.

Figure 22 Selecting a type from the RawRVMsg2 schema



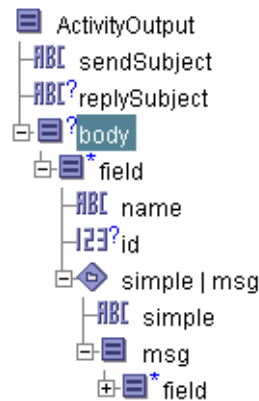
Raw TIBCO Rendezvous Message Support

In some situations, you may want to send or receive TIBCO Rendezvous messages without specifying the exact input or output schema. For example, an application may send messages with three different structures on the same subject name. You are interested in receiving all messages, but you only want to process messages when the field named "orderType" has a value of "incomingOrder". TIBCO ActiveMatrix BusinessWorks supplies a generic TIBCO Rendezvous message schema for handling incoming messages without specifying their structure.

The RawRVMsg2 schema describes a generic message structure. The structure contains a root element named msg. In the msg element is a repeatable element named field. Each field contains a name, id, and a choice element. The choice element contains the data of the field. A field's data can be either a scalar value or another message.

Figure 23 illustrates the generic TIBCO Rendezvous message schema used in a Rendezvous Subscriber process starter.

Figure 23 Schema for RawRVMsg2.xsd



Before using the RawRVMsg2 schema, you must add the schema to your project. See [RawRVMsg2 Schema on page 530](#) for more information about adding this schema to your project.

Using the RawRVMsg2 Schema

Once you have the RawRVMsg2 schema in your project, you can reference it in any Input Editor or Output Editor tab on any activity in the TIBCO Rendezvous palette. To use the RawRVMsg2 schema, perform the following;

1. Create a root element in the Input/Output Editor tab with the **Add Child** button.



You can only use the `msg` element of the `RawRVMsg2` schema on the root element in the schema you create in the Input or Output Editor tab. Do not attempt to use this schema for any element that is not the root of the schema.

2. Select XML Element Reference in the Content field on the right.
3. Use the **Browse Resources** button in the Schema field to locate and select the `RawRVMsg2` schema.

Once the schema is selected, it becomes the schema for incoming or outgoing message bodies.

You can use XPath expressions to extract the desired field from the generic `RawRVMsg2` schema. For example, your process begins with a Rendezvous Subscriber activity and you want to perform processing on incoming messages that have a field named "orderType" with a value of "incomingOrder", you would use the following XPath expression to determine which messages meet that criteria:

```
$Rendezvous-Subscriber/ActivityOutput/body/pfx:field/pfx:name
    = "orderType"
and
$Rendezvous-Subscriber/ActivityOutput/body/pfx:field/pfx:simple
    = "incomingOrder"
```

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about XPath.

Field Names In Messages

A TIBCO Rendezvous message can contain field names that are not compliant with XML or ActiveEnterprise naming rules. For example, XML element names cannot begin with a number, nor can they contain special characters, such as # or ^. When activities in the TIBCO Rendezvous palette send or receive messages, element names in the input or output schemas for the activity must comply with XML and ActiveEnterprise naming rules. Any elements in referenced schemas in the input or output schemas are automatically altered so that they comply with XML and ActiveEnterprise naming rules. The XML-Compliant Field Names field allows you to handle incoming or outgoing messages when the field names are not valid XML or ActiveEnterprise names.

When the XML-Compliant Field Names field is unchecked, any field names in incoming or outgoing messages that do not comply with XML or ActiveEnterprise naming rules are altered so that they comply with the rules. When the field is checked, field names in the message are left unaltered.

When publishing a message, unchecking the XML-Compliant Field names field ensures that field names in the message sent over the transport to the receiving application are altered when necessary to comply with XML or ActiveEnterprise naming rules. Checking the field allows you to send the message with the original field names intact; no alterations are made to the field names. This is useful in the case where you reference a schema in the Input Editor that contains invalid XML or ActiveEnterprise names (such as a TIBCO ActiveEnterprise schema that contains special characters). The receiving application will receive the message with the original field names, if the XML-Compliant Field Names field is unchecked.

When receiving a message, unchecking the XML-Compliant Field Names field ensures that field names in the incoming message are altered to comply with XML and ActiveEnterprise naming rules. If the message contains fields that do not comply to XML and ActiveEnterprise naming rules, the output schema of the subscriber activity must specify the correct altered name in order to match the altered name of the field in the incoming message. See the description of the `ae2xsd` utility in the *TIBCO Runtime Agent Administrator's Guide* for more information about how to convert a TIBCO ActiveEnterprise schema into a valid XSD. Using this utility will allow you to see how field names will be altered to comply with XML and ActiveEnterprise naming rules. Unchecking the field leaves the field names of the message intact.



Unchecking the XML-Compliant Field Names field involves extra processing of incoming and outgoing messages. If you are certain that messages contain only field names that comply with XML naming rules, you can uncheck this field to improve performance.

Internationalization Support

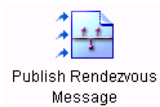
TIBCO Rendezvous activities use the TIBCO Messaging Encoding as the wire format encoding when testing processes in TIBCO Designer and when the project is running as a legacy local-file based project. The default TIBCO Messaging Encoding value is ISO8859-1, which only supports English and other western European languages that belong to ISO Latin-1 character set.

You must set the TIBCO Messaging Encoding to UTF-8 if you want to send and receive characters not in the ASCII and Latin-1 character set. When creating a new project, you can set the TIBCO Messaging Encoding in the Save Project dialog or on the Project Settings tab. See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information.

After the project is deployed in a TIBCO Administrator domain, the messaging encoding set at design time is overridden by the TIBCO Administrator domain's encoding property. All the TIBCO components working in the same domain must always use the same encoding for intercommunication. See *TIBCO Administrator Server Configuration Guide* for more information.

Publish Rendezvous Message

Activity



The Publish Rendezvous Message activity publishes a TIBCO Rendezvous message on the given subject with the given message content.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Subject	Yes	The subject on which to publish the TIBCO Rendezvous message. You can override this value by specifying a subject on the Input tab.
Transport	No	The TIBCO Rendezvous transport parameters. These are specified as a Rendezvous Transport shared configuration resource. See Rendezvous Transport on page 547 for more information about shared configuration resources.
Pre-register Listener	Yes	<p>When using TIBCO Rendezvous Certified Messaging (RVCN), this field specifies the cmname(s) of the RVCN subscriber(s). This allows the publisher to pre-register with any expected listeners. If multiple cmnames are specified, separate each cmname with a comma.</p> <p>See the TIBCO Rendezvous documentation for more information about RVCN.</p>
XML Format	No	If checked, the body of the TIBCO Rendezvous message is placed into a single field named "xml". This field is a byte array containing the body of the message. The datatype of the field is TIBRVMSG_XML.

Field	Global Var?	Description
XML-Compliant Field Names	No	Specifies whether the field names of the outgoing message should be altered so that they comply with XML and ActiveEnterprise naming rules. Only field names that do not comply with XML and ActiveEnterprise naming rules are altered when this field is unchecked. When checked, field names are left unaltered.

Input Editor

The Input Editor tab allows you to define a custom schema for the body of the TIBCO Rendezvous message. See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Input Editor tab.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
subject	string	The subject of the TIBCO Rendezvous message.
replySubject	string	The subject to send replies for this TIBCO Rendezvous message. This is useful if you want to use the Wait for Rendezvous Message activity later in the process to receive replies to the message.

Input Item	Datatype	Description
preRegisterListener	string	<p>When using TIBCO Rendezvous Certified Messaging (RVCM), this field specifies the cmname(s) of the RVCM subscriber(s). This allows the publisher to pre-register with any expected listeners. If multiple cmnames are specified, separate each cmname with a comma. Any listeners preregistered on the Transport tab are also preregistered with the listeners specified in this element.</p> <p>See the TIBCO Rendezvous documentation for more information about RVCM.</p>
body	complex	The body of the TIBCO Rendezvous message.

Output

This activity produces no output.

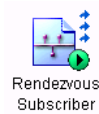
Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
TransportException	The transport cannot be created.
SerializationException	The message cannot be serialized.
RVPluginException	An error occurred when sending the message.

Rendezvous Subscriber

Process Starter



The Rendezvous Subscriber process starter creates a process when a TIBCO Rendezvous message on the given subject is received.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Subject	Yes	The subject on which to listen for the TIBCO Rendezvous message.
Transport	Yes	The TIBCO Rendezvous transport parameters. These are specified as a Rendezvous Transport shared configuration resource. See Rendezvous Transport on page 547 for more information about shared configuration resources.
XML Format	No	<p>If checked, the body of the incoming TIBCO Rendezvous message is expected to be a single field named "xml". This field is a byte array containing the body of the message.</p> <p>TIBCO ActiveMatrix BusinessWorks automatically deserializes the xml field and represents the message as a schema tree in this activity's output.</p>

Field	Global Var?	Description
Needs Output Validation	No	<p>Specifies that you would like the incoming message to be validated against the schema specified on Output Editor tab. An error is returned if an incoming message does not match the specified schema.</p> <p>Validation does affect system performance, and you may want to uncheck this field to handle incoming messages more quickly. If you uncheck this field, no validation is performed and any incoming message that does not match the specified schema is processed.</p> <p>You should only uncheck this field if you can guarantee that incoming messages conform to the expected schema.</p>
Needs Output Filtration	No	<p>Specifies that only fields that match the name and datatype of the schema elements specified on the Output Editor tab should be processed. Any elements that do not match the specified schema are ignored and not included in this activity's output.</p> <p>This is useful if you need only a subset of the fields of an incoming message. Any unnecessary fields are not included in the activity output. This can save memory, and consequently improve performance.</p> <p>Note: This option is only valid when the XML Format field is unchecked. Do not check this checkbox when the XML Format field is also checked.</p>
XML-Compliant Field Names	No	<p>Specifies whether the field names of the incoming message should be altered so that they comply with XML and ActiveEnterprise naming rules. Only field names that do not comply with XML and ActiveEnterprise naming rules are altered when this field is unchecked. When checked, field names are left unaltered.</p>

Field	Global Var?	Description
Raw-RV-Object Mode	No	<p>Checking this field disables the XML Format, Needs Output Validation, Needs Output Filtration, and XML-Compliant Field Names fields.</p> <p>Specifies that the body of the RV message should be output as a Java object reference. A subsequent Java Code activity in the process definition can accept the reference as an input parameter and then construct the RV message from the object. To use the Java object, the Java code activity must cast the object reference as a byte array. For example:</p> <pre>TibrvMsg tibrvMsg = new TibrvMsg ((byte[])in_var_1);</pre> <p>Where <code>in_var_1</code> is the input parameter for the Java Code activity that is mapped to the object reference of the object containing the RV message.</p>

Misc

The Misc tab contains the following fields:

Field	Description
Sequencing Key	<p>This field can contain an XPath expression that specifies which processes should run in order. Process instances with sequencing keys that evaluate to the same value will be executed sequentially in the order the process instance was created.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about controlling the execution order of process instances and about XPath expressions.</p>

Field	Description
Custom Id	This field can contain an XPath expression that specifies a custom ID for the process instance. This ID is displayed in the View Service dialog of TIBCO Administrator, and it is also available in the <code>\$_processContext</code> process variable.

Output Editor

The Output Editor tab allows you to define a custom schema for the body of the TIBCO Rendezvous message. See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Output Editor tab.

Output

The output for the activity is the following.

Output Item	Datatype	Description
sendSubject	string	The subject of the received message.
replySubject	string	The reply subject of the TIBCO Rendezvous message.
certifiedSender	string	This element is only available when RVCM transports are used. This element contains the CM name of the message sender.
certifiedSequenceNumber	integer	This element is only available when RVCM transports are used. This element contains the sequence number of the message.
body	complex	<p>The body of the TIBCO Rendezvous message.</p> <p>If the Raw-RV-Object Mode field is checked on the Configuration tab, the body is output as an object reference.</p>

Rendezvous Transport

Shared Configuration



The Rendezvous Transport resource describes a TIBCO Rendezvous transport. This resource is used when specifying activities from the Rendezvous palette. See the TIBCO Rendezvous documentation for more information about specifying these fields.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the resource.
Description	No	Short description of the shared resource.
Daemon	Yes	<p>In the case of TIBCO Rendezvous daemon running on the same machine as TIBCO ActiveMatrix BusinessWorks process engine, this is not specified. If Rendezvous is running on a different machine, then the Daemon field is specified as the remote host name followed by the socket number.</p> <p>For example:</p> <p><code>ssl:acct:5785</code></p>
Network	Yes	<p>This field contains the host name, IP address, network name, or interface name.</p> <p>For example:</p> <p><code>;224.34.103.4</code></p>
Service	Yes	<p>This is the TIBCO Rendezvous service name in one of the following formats:</p> <p><code><service name></code></p> <p>or</p> <p><code><port number></code></p>

Field	Global Var?	Description
SSL	No	The Use SSL checkbox specifies that Secure Sockets Layer (SSL) should be used when communicating with the TIBCO Rendezvous daemon. When this field is checked, the Configure SSL button is enabled. See Configure SSL Button on page 548 for more information about configuring SSL parameters.

Configure SSL Button

The Configure SSL button allows you to configure the SSL parameters for communicating with the TIBCO Rendezvous daemon. See the TIBCO Rendezvous documentation for more information about how SSL is configured for TIBCO Rendezvous daemons and clients.

The SSL Configuration for TIBCO RV dialog has the following fields:

Field	Description
Daemon Certificate	<p>File containing one or more certificates from trusted certificate authorities. This file is checked when connecting to a daemon to ensure that the connection is to a daemon that is trusted. This prevents connections to rogue TIBCO Rendezvous daemons that attempt to impersonate trusted daemons.</p> <p>You can retrieve a daemon’s certificate using the administration interface in TIBCO Rendezvous. See the TIBCO Rendezvous documentation for more information about obtaining certificates through the administration interface. Once retrieved, you can select a folder in your project and import this certificate into the folder using the Tools>Trusted Certificates>Import Into PEM Format menu item.</p> <p>BusinessWorks supports the use of global variables to configure certificates at deployment time. You can declare a global variable and set the absolute path to a Certificate in PEM format. This eliminates the need to embed certificates in BusinessWorks projects.</p>

Field	Description
Identity	<p>This is an Identity resource used to authenticate to the TIBCO Rendezvous daemon. The Browse button allows you to select from a list of appropriately configured Identity resources. Only Identity resources whose Type field is set to Identity File or Username/Password are listed.</p> <p>See <i>TIBCO Designer Palette Reference</i> for more information.</p>

Advanced

The Advanced tab has the following fields.

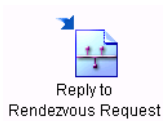
Field	Global Var?	Description
RV Type	No	<p>The type of TIBCO Rendezvous connection to use. This can be reliable (standard RV transport), certified (RVCM), or Distributed Queue (RVCMQ).</p> <p>Note: Use Confirm activity in the process when using RV Certified messaging.</p> <p>The fields of the Advanced tab correspond to the value selected for this field.</p>
Certified Transport		
CM Name	Yes	The name of the delivery-tracking session. This name is in the same format as TIBCO Rendezvous subject names.
Ledger File	Yes	The name and location of the persistent ledger file that tracks certified messages. If not specified, the certified message ledger is kept in process memory only.
Sync Ledger File	Yes	Specifies whether to keep the ledger file synchronous with the current messages.

Field	Global Var?	Description
Relay Agent	Yes	Name of the relay agent to use. Relay agents are useful when clients are disconnected from the network from time to time. The relay agents store inbound certified messages and labeled messages (and other messages related to certified delivery features) on behalf of their disconnected client programs. When a client is connected, it receives inbound messages immediately.
Require Old Message	Yes	Check this box if you want to require the retention of messages for which delivery has not been confirmed. These messages will be resent.
Message Timeout (sec)	Yes	The time limit (in seconds) for certified message delivery.
Distributed Queue Transport		
CMQ Name	Yes	The name of the distributed queue. This name is in the same format as TIBCO Rendezvous subject names
Worker Weight	Yes	The weight of the worker (this pertains to the worker processing queue requests, not to BusinessWorks process engines). Relative worker weights assist the scheduler in assigning tasks. When the scheduler receives a task, it assigns the task to the available worker with the greatest worker weight.
Worker Tasks	Yes	Sets the task capacity for the worker (this pertains to the worker processing queue requests, not to BusinessWorks process engines). Task capacity is the maximum number of tasks that a worker can accept. When the number of accepted tasks reaches this maximum, the worker cannot accept additional tasks until it completes one or more of them.
Worker Complete Time	Yes	The amount of time the scheduler waits for a worker process to complete. If the worker process does not complete in the specified period, the scheduler reassigns the message to another worker.

Field	Global Var?	Description
Scheduler Weight	Yes	Weight represents the ability of this member to fulfill the role of scheduler, relative to other members with the same name. Cooperating distributed queue transports use relative scheduler weight values to elect one transport as the scheduler; members with higher scheduler weight take precedence. Acceptable values range from 1 to 65535.
Scheduler Heartbeat	Yes	The scheduler sends heartbeat messages at this interval (in seconds). All members with the same name must specify the same value for this parameter. The value must be strictly positive.
Scheduler Activation	Yes	When the heartbeat signal from the scheduler has been silent for this interval (in seconds), the member with the greatest scheduler weight takes its place as the new scheduler. All members with the same name must specify the same value for this parameter. The value must be positive

Reply to Rendezvous Request

Activity



The Reply to Rendezvous Request activity is used to send a reply to a received TIBCO Rendezvous message.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Reply For	No	The TIBCO Rendezvous activity or process starter that received the request. This is a selection list of available activities that can receive TIBCO Rendezvous messages.
Reply Subject	Yes	The reply subject of the received TIBCO Rendezvous message. You can override this value by specifying a subject on the Input tab.

Input Editor

The Input Editor tab allows you to define a custom schema for the body of the TIBCO Rendezvous message. See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Input Editor tab.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
replySubject	string	The reply subject of the TIBCO Rendezvous message.
body	complex	The body of the TIBCO Rendezvous message.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
RVPluginException	An error occurred when sending the reply message.

Send Rendezvous Request

Activity



The Send Rendezvous Request activity publishes a TIBCO Rendezvous message on the given subject with the given message content, and it expects a reply to the message on the given reply subject and with the given reply message content. This activity waits for a reply on the reply subject and outputs the content of the reply.



This activity uses the INBOX mechanism to ensure that reply messages are received only by the process that sent the request.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Subject	Yes	The subject on which to publish the TIBCO Rendezvous message. You can override this value by specifying a subject on the Input tab.
Transport	No	The TIBCO Rendezvous transport parameters. These are specified as a Rendezvous Transport shared configuration resource. See Rendezvous Transport on page 547 for more information about shared configuration resources.
Request Timeout (msec)	Yes	The amount of time to wait (in milliseconds) for a reply to the TIBCO Rendezvous message. If no reply is received in the given time limit, an error is returned.

Field	Global Var?	Description
Pre-register Listener	Yes	<p>When using TIBCO Rendezvous Certified Messaging (RVCM), this field specifies the cmname(s) of the RVCM subscriber(s). This allows the sender to pre-register with any expected listeners. If multiple cmnames are specified, separate each cmname with a comma.</p> <p>See the TIBCO Rendezvous documentation for more information about RVCM.</p>
XML Format	No	<p>If checked, the bodies of the TIBCO Rendezvous request and reply messages are sent as a single field named "xml". This field is a byte array containing the body of the message.</p> <p>TIBCO ActiveMatrix BusinessWorks automatically deserializes the reply message and represents the data of the message as a schema tree based on the schema specified in the Output Editor tab.</p>
Needs Output Validation	No	<p>Specifies that you would like the reply message to be validated against the schema specified on Output Editor tab. An error is returned if a reply message does not match the specified schema.</p> <p>Validation does affect system performance, and you may want to uncheck this field to handle reply messages more quickly. If you uncheck this field, no validation is performed and any reply message that does not match the specified schema is processed.</p> <p>You should only uncheck this field if you can guarantee that reply messages conform to the expected schema.</p>

Field	Global Var?	Description
Needs Output Filtration	No	<p>Specifies that only fields in the reply message that match the name and datatype of the schema elements specified on the Output Editor tab should be processed. Any elements that do not match the specified schema are ignored and not included in this activity's output.</p> <p>This is useful if you need only a subset of the fields of a reply message. Any unnecessary fields are not included in the activity output. This can save memory, and consequently improve performance.</p> <p>Note: This option is only valid when the XML Format field is unchecked. Do not check this checkbox when the XML Format field is also checked.</p>
XML-Compliant Field Names	No	<p>Specifies whether the field names of the outgoing message should be altered so that they comply with XML and ActiveEnterprise naming rules. Only field names that do not comply with XML and ActiveEnterprise naming rules are altered when this field is unchecked. When checked, field names are left unaltered.</p>

Input/Output Editor

The Input Editor and Output Editor tabs allow you to define custom schemas for the body of the outgoing TIBCO Rendezvous request and body of the incoming TIBCO Rendezvous response. See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Input/Output Editor tab.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
subject	string	The subject of the TIBCO Rendezvous message.
body	complex	The body of the TIBCO Rendezvous message.
replySubject	string	The reply subject for this activity. Note: The reply messages may not be received by the correct job if more than one job has the same reply subject (for example, if a constant is specified in this field). Use the Publish Rendezvous Message and Wait for Rendezvous message instead if you want to receive replies on a single subject.
timeout	number	The amount of time to wait (in milliseconds) for a reply to the TIBCO Rendezvous message. If no reply is received in the given time limit, an error is returned.

Output

The output for the activity is the following.

Output Item	Datatype	Description
replyMessageReplySubject	string	A reply message can optionally have a reply subject, presumably so that the two applications can communicate with further messages. This element contains the reply subject set on the reply message, if one is set. If no reply subject is set on the reply message, this element is not populated.
body	complex	The body of the TIBCO Rendezvous reply message.

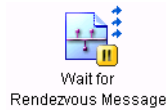
Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
TransportException	The transport cannot be created.
SerializationException	The message cannot be serialized.
RVPluginException	An error occurred when sending the message.
ActivityTimedOutException	A timeout has been reached.

Wait for Rendezvous Message

Activity



The Wait for Rendezvous Message activity waits to receive a TIBCO Rendezvous message with the given subject.

See [Scalability With Incoming Events on page 226](#) in *TIBCO ActiveMatrix BusinessWorks Process Design Guide* for information on running the "Wait for..." activities in a multi-engine mode.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Subject	Yes	The subject on which to listen for the TIBCO Rendezvous message.
Transport	Yes	The TIBCO Rendezvous transport parameters. These are specified as a Rendezvous Transport shared configuration resource. See Rendezvous Transport on page 547 for more information about shared configuration resources.
XML Format	No	<p>If checked, the body of the incoming TIBCO Rendezvous message is expected to be a single field named "xml". This field is a byte array containing the body of the message.</p> <p>TIBCO ActiveMatrix BusinessWorks automatically deserializes the xml field and represents the message as a schema tree in this activity's output.</p>

Field	Global Var?	Description
Needs Output Validation	No	<p>Specifies that you would like the incoming message to be validated against the schema specified on Output Editor tab. An error is returned if an incoming message does not match the specified schema.</p> <p>Validation does affect system performance, and you may want to uncheck this field to handle incoming messages more quickly. If you uncheck this field, no validation is performed and any incoming message that does not match the specified schema is processed.</p> <p>You should only uncheck this field if you can guarantee that incoming messages conform to the expected schema.</p>
Needs Output Filtration	No	<p>Specifies that only fields that match the name and datatype of the schema elements specified on the Output Editor tab should be processed. Any elements that do not match the specified schema are ignored and not included in this activity's output.</p> <p>This is useful if you need only a subset of the fields of an incoming message. Any unnecessary fields are not included in the activity output. This can save memory, and consequently improve performance.</p> <p>Note: This option is only valid when the XML Format field is unchecked. Do not check this checkbox when the XML Format field is also checked.</p>
XML-Compliant Field Names	No	<p>Specifies whether the field names of the incoming message should be altered so that they comply with XML and ActiveEnterprise naming rules. Only field names that do not comply with XML and ActiveEnterprise naming rules are altered when this field is unchecked. When checked, field names are left unaltered.</p>

Event

The Event tab has the following fields.

Field	Description
Candidate Event Key	<p>Expression built from the data of the incoming message. This expression should evaluate to a string and it is compared to the "key" field of the activity's input. If the Candidate Event Key and the activity's key match, then the process accepts the incoming message.</p> <p>For example, you may have a Publish Rendezvous Message activity that sends a message with a particular ID. You are expecting a reply message that contains that same ID so that you can determine the message is a response to your sent message. You would specify the field of the incoming message that contains your ID in the Candidate Event Key. You would then use the message ID of the message you sent earlier in the process as the "key" field in the input.</p> <p>This expression is specified in XPath, and only data from the incoming event is available for use in this XPath expression. See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about XPath expressions.</p>
Event Timeout (msec)	<p>A message may arrive before this activity is executed. This field specifies the amount of time (in milliseconds) a message waits if it is received before this activity is executed. If the event timeout expires, an error is logged and the event is discarded.</p> <p>If no value is specified in this field, the message waits indefinitely. If zero is specified, the event is discarded immediately, unless this activity has already been reached.</p>



When building an expression in the Candidate Event Key field, only data from the incoming event is available. This is because you want to place an expression containing incoming event data in the Candidate Event Key field. When the results of this expression match the results of the expression in the "key" item on the Input tab, the Wait For Rendezvous Message activity proceeds.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
key	string	The value that is compared to the Candidate Event Key field of the Event tab to determine if this message applies to this process. See Event on page 561 for an example of using the Candidate Event Key field with the key input item.
processTimeout	integer	The time (in milliseconds) to wait for the incoming message. An error is returned if the message is not received in this time limit.

Output Editor

The Output Editor tab allows you to define a custom schema for the body of the TIBCO Rendezvous message. See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Output Editor tab.

Output

The output for the activity is the following.

Output Item	Datatype	Description
sendSubject	string	The subject of the received message.
replySubject	string	The reply subject of the TIBCO Rendezvous message.

Output Item	Datatype	Description
certifiedSender	string	This element is only available when RVCN transports are used. This element contains the CM name of the message sender.
certifiedSequenceNumber	integer	This element is only available when RVCN transports are used. This element contains the sequence number of the message.
body	complex	The body of the TIBCO Rendezvous message. The elements contained in this element are specified on the Configuration tab.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
ActivityTimedOutException	A timeout has been reached.

Chapter 14 **RMI Palette**

Remote Method Invocation (RMI) is a protocol for calling operations on remote Java objects. TIBCO ActiveMatrix BusinessWorks can act as server for incoming RMI calls, or TIBCO ActiveMatrix BusinessWorks can use RMI to retrieve a remote object. For client interactions, either a remote Java object on an RMI server or an Enterprise Java Bean (EJB) can be retrieved. For server interactions, a client can make an RMI call to TIBCO ActiveMatrix BusinessWorks that initiates a process instance.

This chapter assumes that you are familiar with the RMI protocol. For more information, see: <http://java.sun.com/docs/books/tutorial/rmi/index.html>.

Topics

- [RMI Overview, page 566](#)
- [RMI Lookup, page 568](#)
- [RMI Server, page 570](#)

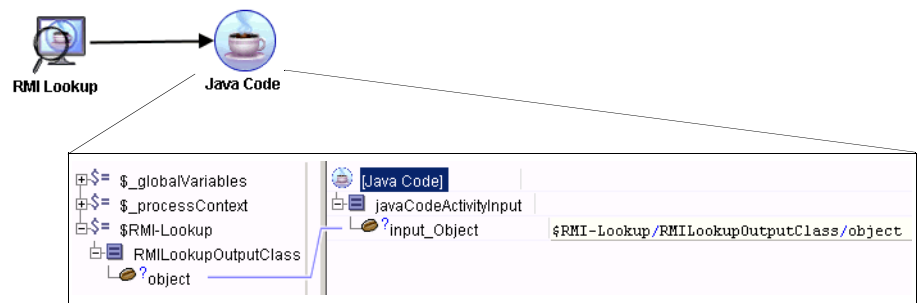
RMI Overview

You can use the resources in the RMI palette to either retrieve a remote Java object or to create a process definition that starts a process instance for each incoming RMI call. This section describes the uses of the resources in the RMI palette.

Using RMI to Call a Remote Object

The [RMI Lookup](#) activity allows you to use a registry server to retrieve a Java object that implements a client stub of a remote object. You can then pass the object to a [Java Code](#) or [Java Method](#) activity and invoke methods on the object. [Figure 24](#) illustrates using the RMI Lookup activity to obtain a client stub for a remote Java object and then mapping that object to an input parameter for the Java Code activity.

Figure 24 Using the RMI Lookup activity



The object obtained by the lookup activity is an instance of the server's stub class for the actual server object interface. To call methods on this object with a Java Code activity, use the stub class interface to cast the object before making the calls. Similarly, the Java Method activity should specify the stub class interface in its Class field. The generated client stub's .jar file must be either in the TIBCO ActiveMatrix BusinessWorks classpath or in an AliasLibrary resource before it can be used by the Java Method activity.

Acting as a RMI Server

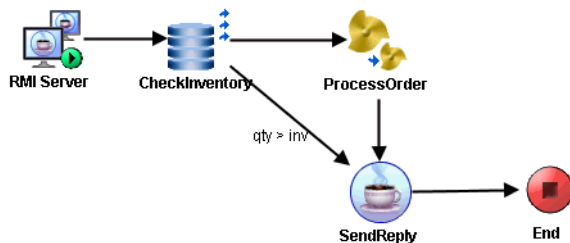
The [RMI Server](#) process starter registers the specified object name with the specified registry server. Then, requests from RMI clients for the object are directed to the RMI Server process starter. A new process instance is created to handle each incoming request.

The RMI Server process starter can output two Java objects, one for the request and one for the reply. Either the request or reply objects can be nil. Optionally, you can also specify an output schema in the Output Editor tab of the RMI Server process starter. This allows you to specify fields that are expected in the request object and the data from the request object is used to populate the desired output schema. You can then process the request based on the specified output schema, and you can also access the actual request object by passing it to a Java Code or [Java Method](#) activity.

When the client is expecting a reply, you can use the Java Code or Java Method activities to invoke the appropriate methods on the reply object.

[Figure 25](#) illustrates using the RMI Server process starter.

Figure 25 Using the RMI Server process starter



RMI Lookup

Activity



The RMI Lookup activity retrieves a reference to a remote object from the specified registry server. The object reference output by this activity can be passed to a [Java Code](#) or [Java Method](#) activity to invoke methods on the remote object.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Alias Library	No	Use this field to specify an AliasLibrary resource that is used to locate the Java class files. See <i>TIBCO Designer Palette Reference</i> for more information about AliasLibrary resources.
Remote Object Name	Yes	Name of the remote object you want to retrieve.
Registry Host Name	Yes	Host name of the registry server. The registry server provides the remote object reference for making the call to the remote object.
Registry Server Port	Yes	Port number for the registry server.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
remoteObjectName	string	Name of the remote object whose client stub you want to retrieve. The value specified in this element overrides any value specified in the Remote Object Name field on the Configuration tab.

Output

The output for the activity is the following.

Output Item	Datatype	Description
object	Java Object	An object reference for the specified remote Java object.

RMI Server

Process Starter



The RMI Server process starter registers the specified remote object name with the specified registry server and then creates process instances to handle incoming requests for the object. The process definition acts as the implementation of the specified object.

You can specify an output schema on the Output editor tab to extract expected fields from the incoming request object. The data in the output schema is then available to subsequent activities in the process definition. The request and reply Java objects are also output and available to activities that can accept Java objects as input (for example, [Java Code](#) or [Java Method](#)). You can send a reply to the client by invoking the appropriate methods on the reply object, if the client requires a reply.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Alias Library	No	Use this field to specify an AliasLibrary resource that is used to locate the Java class files. See <i>TIBCO Designer Palette Reference</i> for more information about AliasLibrary resources.
Remote Object Name	Yes	Name of the Java object that this process definition implements.
Registry Host Name	Yes	Host name of the registry server with which you want to register the specified object.
Registry Server Port	Yes	Port number for the registry server.

Misc

The Misc tab contains the following fields:

Field	Description
Sequencing Key	<p>This field can contain an XPath expression that specifies which processes should run in order. Process instances with sequencing keys that evaluate to the same value will be executed sequentially in the order the process instance was created.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about controlling the execution order of process instances and about XPath expressions.</p>
Custom Id	<p>This field can contain an XPath expression that specifies a custom ID for the process instance. This ID is displayed in the View Service dialog of TIBCO Administrator, and it is also available in the <code>\$_processContext</code> process variable.</p>

Output Editor

The Output Editor tab allows you to define a custom schema for expected fields in the request object. See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Output Editor tab.

Output

The output for the activity is the following.

Output Item	Datatype	Description
request	Java Object	An object reference to the request object sent in the RMI request. The client might not send any data in the request, and in that case, this element will be nil.
reply	Java Object	An object reference to the reply object required by the client. The client might not require a reply, and in that case, this element will be nil.

Output Item	Datatype	Description
<data>	varies	The output schema specified on the Output Editor tab. Data from the request object is extracted into the elements of this output schema. This allows you to easily access data from the request object without passing the object to a Java Code or Java to XML activity.

Chapter 15 **Service Palette**

The Service palette contains resources for implementing Services. Services implement a set of interfaces and expose one or more endpoints. Services provide an abstraction so that you can implement a more generic service-oriented architecture (SOA). This allows you to decouple a service from its underlying transport and implementation.

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about services.

Topics

- [Context Resource, page 574](#)
- [Get Context, page 575](#)
- [Invoke Partner, page 576](#)
- [Partner Link Configuration, page 578](#)
- [Receive Partner Notification, page 592](#)
- [Service, page 595](#)
- [Set Context, page 618](#)

Context Resource

Shared Configuration



The Context Resource shared configuration resource allows you to specify a schema to hold context data from an incoming request or outgoing replies to a service. This allows you to pass on data, such as the username and password sent by the requesting application, to operation implementations without requiring the implementations to be aware of which transport the request was bound to. Also, you can pass data from the process that implements an operation back to the Service for any outgoing reply message. The Context Resource can also be used to store SOAP headers or message attachments.

For example, your operation implementation may require the user ID of the requestor or the public certificate of the user making the request. Also, you may want to set outgoing reply header values based on data from the process that implements the operation.

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about context separation for Service resources and operation implementations.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the resource.
Description	No	Short description of the shared resource.

Schema

The Schema tab allows you to define a custom schema to hold the data of the context. You can define your own datatype on this tab, and you can reference an XML schema stored in the project. See [Appendix A, Specifying Data Schema, on page 743](#) for a description of how to define a schema.

Get Context

Activity



The Get Context activity retrieves the value of the specified [Context Resource](#). This is useful if your process definition requires some context information from an incoming request.

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about context separation for Service resources and operation implementations.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Context Configuration	No	The Context Resource whose value you would like to retrieve.

Output

The output for the activity is the following.

Output Item	Datatype	Description
<schema>	varies	The value of the context resource specified in the Context Configuration field of the Configuration tab is the output for this activity. The schema for the output is determined by the schema specified for the context resource.

Invoke Partner

Activity



The Invoke Partner activity can be used in a BusinessWorks Process Definition to invoke external services over SOAP.

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about services, partners and invoking partner services.

Configuration

The Configuration tab has the following fields

Field	Global Var?	Description
Name	No	The name to appear as the label for the invoke partner activity in the process definition.
Description	No	Short description of the activity.
Partner	No	The partner whose service is to be invoked by the activity. You can select the partner from the drop down menu that lists all the available partners in the process.
Operation	No	Select the operation that is to be invoked from the drop down menu. The drop down menu lists all the available operations for the selected partner.

Input

The input for the invoke partner service has the following fields

Input Item	Datatype	Description
input message	complex	The input message of the operation. This element contains all the input message parts for the operation.

Output

The output for the invoke partner service has the following fields

Output Item	Datatype	Description
output message	complex	The output message for the operation. This element contains all the output message parts for the operation.

Error Output

The Error Output tab lists the possible SOAP Fault messages that can be thrown by the invoked operation on the selected external service. These SOAP Fault messages are defined in the abstract WSDL. If no SOAP fault messages are defined in the abstract WSDL, there will be no exceptions or fault messages listed in the error output tab.

See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.



Unlike the SOAP Request Reply activity where you can define dynamic endpoint URL, you cannot define dynamic endpoint URL for the invoke partner activity.

Partner Link Configuration

Shared Resource



The Partner Link Configuration associates abstract partner portTypes with concrete port bindings. This allows you to easily link to new partner services without changing processes that invoke the partners.

See [Partners on page 3](#) for more information about partners and Partner Link Configuration resources.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the resource.
Description	No	Short description of the resource.

Field	Global Var?	Description
Partner Links		Use the + button to add partner links to the list, use the X button to delete partner links from the list, use the arrow buttons to move partner links up and down in the list. Specify the following in the columns of the table for each partner:
	No	<ul style="list-style-type: none"> Name — Double-click on this field to specify a name for the partner.
	Yes	<ul style="list-style-type: none"> Timeout — Double-click on this field to specify a timeout in milliseconds (msec) for invocations of this partner. By default, the timeout is zero (0) which provides an unlimited amount of time for invocations.
	No	<ul style="list-style-type: none"> Service Endpoint — The endpoint of the service. You can use concrete WSDL resources with port bindings or you can specify local service resources with Local specified in the endpoint binding.
	No	<ul style="list-style-type: none"> Endpoint Type — By default the field selection is SOAP. It can be used when we check enable for AMX checkbox and change to AMX endpoint. This endpoint of the service populated from the concrete WSDL.
Attachment Style	No	This field allows you to choose the attachment style for the outbound/response messages. Two attachment styles are available: SwA and MTOM. The attachment style MTOM is available only if the activity uses SOAP 1.2 and is not displayed when SOAP 1.1 is used.
Operations	No	This field allows you to choose the attachment style for the outbound/response messages. Two attachment styles are available: SwA and MTOM. The attachment style MTOM is available only if the activity uses SOAP 1.2 and is not displayed when SOAP 1.1 is used.

Field	Global Var?	Description
SOAP Action	Yes	<p>The soapAction that is expected from incoming SOAP requests. This field is required, and by default, the operation name is used as the soapAction. Each operation in an interface must have a unique value for SOAP Action.</p> <p>See the SOAP specification for more information about soapAction.</p> <p>Note - When Partner Link Configuration is created, these fields get populated with the values from concrete WSDL. You can override these values in Partner Link Configuration. If the concrete WSDL is changed after configuring Partner Link Configuration, the changes will not be visible in the Partner Link Configuration.</p>

Additional Configuration for HTTP Endpoints

EndPoint URI	No	<p>It will have the endpoint of the service populated from the concrete WSDL.</p> <p>Note - When Partner Link Configuration is created, this field get populated with the values from concrete WSDL. You can override these values in Partner Link Configuration. If the concrete WSDL is changed after configuring Partner Link Configuration , the changes will not be visible in the Partner Link Configuration.</p>
Use HTTP Proxy	No	<p>Specifies to use a proxy server to gain access outside of a firewall.</p>
Proxy Name	No	<p>Host name or IP address of the proxy server.</p>

Field	Global Var?	Description
HTTP Authentication	No	<p>Specifies what authentication should be used. An authentication can be of the following three types:</p> <ul style="list-style-type: none"> NONE — is default. BASIC — to continue with the current implementation of using username and password credentials. The Identity field appears when this field is enabled. NTLM — Identity and Domain fields appear when NTLM is selected. Identity is a reference of the Username and Password combination.
Identity	No	<p>When Basic and NTLM authentication (username and password) is required, provide an Identity resource in this field that contains the appropriate username and password.</p> <p>See <i>TIBCO Designer Palette Reference</i> for more information.</p>
Domain	No	<p>Specifies the domain to be used for Authentication. The user name and password specified in the Identity field must exist in the domain.</p>
SSL	No	<p>When SSL is required for authentication to the service, click the Configure SSL button to supply the appropriate properties. See HTTP SSL Configuration Fields on page 581 information more information.</p>

HTTP SSL Configuration Fields

Trusted Certificates Folder	No	<p>Folder in the project containing one or more certificates from the trusted certificate authorities. This folder is checked when an invocation is made to the partner service to ensure that the server is trusted. This prevents connections to rogue servers.</p>
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Field	Global Var?	Description
Identity	No	This is an identity resource that contains the client's digital certificate and private key. See <i>TIBCO Designer Palette Reference</i> for more information.
Strong Cipher Suites Only	No	Specifies that only cipher suites with strong encryption should be used, if they are available on the host you are connecting to.
Additional Configuration for JMS Endpoints		
JNDI Tab Context URL	Yes	URL for the JNDI connection to the JMS server (<code>javax.naming.Context.PROVIDER_URL</code>).
JNDI Tab User Name	Yes	User name for logging into the JNDI server (<code>javax.naming.Context.SECURITY_PRINCIPAL</code>). If the JNDI provider does not require access control, this field can be empty.
JNDI Tab Password	Yes	Password for logging into the JNDI server (<code>javax.naming.Context.SECURITY_CREDENTIALS</code>). If the JNDI provider does not require access control, this field can be empty.
JNDI Tab Connection Factory	Yes	The <code>QueueConnectionFactory</code> or <code>TopicConnectionFactory</code> object stored in JNDI. This object is used to create a queue connection with a JMS application. The value for this field is taken from the WSDL file, if it is available in the <code><jms:connectionFactory></code> element in the service specification. You can override the supplied value, if you want to use a different connection factory. See your JNDI provider documentation for more information about creating and storing <code>QueueConnectionFactory</code> objects.

Field	Global Var?	Description
JNDI Tab SSL	No	When SSL is required for authentication to the service, click the Configure SSL button to supply the appropriate SSL information. See JMS SSL Configuration Fields on page 585 for more information.
JMS Tab Use Shared JMS Configuration	No	Check this field if you want to specify a JMS Connection shared configuration resource to override the JMS transport parameters in the concrete WSDL. When checked, the JMS Connection field appears. Note - When selected, the JNDI fields get disabled.
JMS Tab JMS Connection	No	This field only appears when the Use Shared JMS Configuration field is selected. This field allows you to specify a JMS Connection shared configuration resource that contains the connection information you want to use.
JMS Tab User Name	Yes	User name to use when logging into the JMS server. If the JMS provider does not require access control, this field can be empty.
JMS Tab Password	Yes	Password to use when logging into the JMS server. If the JMS provider does not require access control, this field can be empty.

Field	Global Var?	Description
JMS Tab JMS Destination	Yes	<p>This field is available when a JMS transport is selected.</p> <p>This field specifies the name of the destination for incoming JMS messages for this service. The syntax of the destination name is specific to the JMS provider you are using. See your JMS provider documentation for more information about destination names.</p> <p>Note: If you are using TIBCO Enterprise Message Service as your JMS provider, you can use the Browse button next to this field after specifying a valid connection in the JMS Connection field. The Browse button displays a list of configured destinations in the JMS server that are appropriate for this activity.</p>
JMS Tab Delivery Mode	No	<p>The delivery mode of the message. It can be one of the following:</p> <ul style="list-style-type: none">• Persistent — signifies the messages are stored and forwarded.• Non-Persistent — messages are not stored and may be lost due to failures in transmission.• TIBCO EMS Reliable— this mode is only available when using TIBCO Enterprise Message Service. See the TIBCO Enterprise Message Service documentation for more information about this mode.
JMS Tab Expiration	No	<p>Corresponds to JMSExpiration property that specifies how long the message can remain active (in seconds). If set to 0, the message does not expire.</p> <p>This field is set in seconds, but the JMSExpiration property is displayed in milliseconds.</p>

Field	Global Var?	Description
JMS Tab Priority		Priority of the message. You may set the priority to a value from 0-9. The default value is 4.

Note - When Partner Link Configuration is created, these fields get populated with the values from concrete WSDL. You can override these values in Partner Link Configuration. If the concrete WSDL is changed after configuring Partner Link Configuration, the changes will not be visible in the Partner Link Configuration.

JMS SSL Configuration Fields

Basic Tab Trusted Certificates Folder	No	Folder in the project containing one or more certificates from trusted certificate authorities. This folder is checked when an invocation is made to the partner service to ensure that the server is trusted. This prevents connections to rogue servers.
Basic Tab Identity	No	This is an identity resource that contains the client's digital certificate and private key. See <i>TIBCO Designer Palette Reference</i> for more information.
Advanced Tab Trace	No	Specifies whether SSL tracing should be enabled during the connection. If checked, the SSL connection messages are logged and sent to the console.
Advanced Tab Debug Trace	No	Specifies whether SSL debug tracing should be enabled during the connection. Debug tracing provides more detailed messages than standard tracing.

Field	Global Var?	Description
Advanced Tab Verify Host Name	No	<p>This field specifies to check the host name of the server against the host name listed in the server’s digital certificate. This provides additional verification that the host name you believe you are connecting to is in fact the desired host.</p> <p>If the host name specified in the endpoint binding is not an exact match to the host name specified in the server’s digital certificate, the connection is refused.</p> <p>Note: If an equivalent host name (for example, an IP address) is specified in the endpoint binding, but the name is not an exact match of the hostname in the host’s digital certificate, the connection is refused.</p>
Advanced Tab Expected Host Name	No	<p>Specifies the name of the host you are expecting to connect to. This field is only relevant if the Verify Host Name field is also checked.</p> <p>If the name of the host in the host’s digital certificate does not match the value specified in this field, the connection is refused.</p> <p>This prevents hosts from attempting to impersonate the host you are expecting to connect to.</p>

Field	Global Var?	Description
Advanced Tab Strong Cipher Suites Only	No	<p>When checked, this field specifies that the minimum strength of the cipher suites used can be specified with the <code>bw.plugin.security.strongcipher.minstrength</code> custom engine property. See <i>TIBCO ActiveMatrix BusinessWorks Administration</i> for more information about this property. The default value of the property disables cipher suites with an effective key length below 128 bits.</p> <p>When this field is unchecked, only cipher suites with an effective key length of up to 128 bits can be used.</p>

Advanced SOAP Settings

For each operation, you can specify advanced configuration options. To access the advanced configuration options, perform the following:

1. Select Partner Link.
2. Select the operation.

The Advanced SOAP Settings dialog appears. The following sections describe the tabs on this dialog.

Input Headers

The Input Headers tab allows you to specify a SOAP message parts used for any SOAP Undescribed headers expected in the Outgoing Request.

Use the +, X, and arrow keys to add, delete and move the input header messages in the list.

The Input Headers tab has the following fields.

Field	Description
Part Name	This field contains a drop-down list with all parts of the specified SOAP message. You can specify a cardinality for the part, if applicable.

Field	Description
Message Name	<p>The message in a WSDL file to use as the Undescribed input header for the outgoing SOAP request. This WSDL file does not have to be the same as the file used for output headers or the file used to configure the port type and operation of the incoming request.</p> <p>Use the Browse button in this field to search for valid WSDL File resources and to select the desired message in the WSDL File.</p>
Undescribed	Select this checkbox to declare the header as Undescribed header.
Cardinality	This field contains a drop-down list with two options: Repeating and Optional.

Output Headers

The Output Headers tab allows you to specify a SOAP message part used for any SOAP undescribed headers expected in the Incoming Response.

Use the +, X, and arrow keys to add, delete and move the input header messages in the list.

The Output Headers tab has the following fields.

Field	Description
Part Name	This field contains a drop-down list with all parts of the specified SOAP message. You can specify a cardinality for the part, if applicable.
Message Name	<p>The message in a WSDL file to use as the undescribed output header for the SOAP incoming response. This WSDL file does not have to be the same as the file used for input headers or the file used to configure the port type and operation of the incoming request.</p> <p>Use the Browse button in this field to search for valid WSDL File resources and to select the desired message in the WSDL File.</p>

Field	Description
Undescribed	Select this checkbox to declare the header as Undescribed header.
Cardinality	This field contains a drop-down list with two options: Repeating and Optional.

Input Context

The Input Context tab allows you to specify a Context Resource that contains transport-specific data. The data you provide to the context resource is available to the process definition that implements the operation.

The Input Context tab has the following fields.

Field	Description
Context	The Context Resource that specifies the schema you want to use. The schema of this resource should include elements for each data element you want to provide to the output Headers for the message.
Mapping Panel	The mapping panel is similar to the mapping panel provided in the Input tab of activities. This panel allows you to map transport-specific information. Using this you can send the information as part of the Undescribed header in a SOAP Request message to the Service. The mapping panel appears only when a Context resource is specified in the Context field.

Output Context

The Output Context tab allows you to specify a Context Resource that contains data the process definition implementing the operation has provided. The data can then be mapped to Undescribed Headers of the output message returned to the client.

The Output Context tab has the following fields.

Field	Description
Context	The Context Resource that specifies the schema you want to use. The schema of this resource should include elements for each data element you want to provide to the output Undescribed Headers for the message.
Expose Security Checkbox	Selecting this checkbox meant for Security Context Propagation and Security Context, makes it available as a transport data in the mapping panel.
Mapping Panel	The mapping panel is similar to the mapping panel provided in the Input tab of activities. This panel allows you to map Input Context data provided by the implementation of the operation to the transport-specific Undescribed headers of the reply message sent to the client. The mapping panel appears only when a Context resource is specified in the Context field.

Fault Context

The Fault Context tab allows you to select a shared Context Resource that is set with SOAP fault attributes. The data can then be mapped to Fault elements of the Fault message returned to the client.

The Fault Context tab has the following fields.

Field	Description
Context	<p>The Context Resource that specifies the SOAP fault schema you want to use. The schema of this resource should include elements for each data element you want to provide the Fault elements for the fault message.</p> <p>Note: For Fault Context propagation you must map Fault elements to the Context data.</p>

Field	Description
Expose Security Context	Selecting this checkbox meant for Security Context Propagation and Security Context, makes it available as a transport data in the mapping panel.
Mapping Panel	<p>The mapping panel is similar to the mapping panel provided in the Input Context tab of activities. This panel allows you to map data provided by the implementation of the operation to the transport-specific Undescribed headers of the reply message sent to the client. The mapping panel appears only when a Context resource is specified in the Shared Context field.</p> <p>The Transport Data shows the Global Variables and the Context Data shows the Context resource element.</p>

Receive Partner Notification

Activity



The Receive Partner Notification activity can be used in an ActiveMatrix BusinessWorks Process Definition to invoke notification services over SOAP. The notification service sends a message that is received by the invoker.

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about services, partners and invoking partner services.



The Receive Partner Notification activity supports only SOAP over JMS messages.

Configuration

The Configuration tab has the following fields

Field	Global Var?	Description
Name	No	The name to appear as the label for the receive partner notification activity in the process definition.
Description	No	Short description of the activity.
Partner	No	<p>The partner whose service is to be invoked by the activity.</p> <p>The drop down menu lists all the partners with port types having atleast one notification service i.e., OUT-only MEP.</p>
Operation	No	Select the operation that is to be invoked from the drop down menu. The drop down menu lists all the available OUT only operations for the selected partner.

Misc

The Misc tab contains the following fields:

Field	Description
Sequencing Key	<p>This field can contain an XPath expression that specifies which processes should run in order. Process instances with sequencing keys that evaluate to the same value will be executed sequentially in the order the process instance was created.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about controlling the execution order of process instances and about XPath expressions.</p>
Custom Id	<p>This field can contain an XPath expression that specifies a custom ID for the process instance. This ID is displayed in the View Service dialog of TIBCO Administrator, and it is also available in the <code>\$_processContext</code> process variable.</p>

Output

The output for the receive partner notification activity is the following:

Output Item	Datatype	Description
output message	complex	The output message for the operation contains the output message parts as defined for the selected operation.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity.

See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
<code>InvalidEnvelopeException</code>	The incoming message contains an invalid envelope.

Exception	Thrown When...
InternalException	There is an error during the internal processing.
ConfigurationException	There is an error in the configuration.
DeserializationException	The incoming message cannot be deserialized.

Service

Shared Configuration



A Service shared configuration resource describes an interface and its associated operations. The also specifies a set of endpoint bindings that expose the service to potential clients over specific transports.



The user interface for the Service shared configuration resource can change depending upon the additional products you have installed. For example, the TIBCO BusinessWorks BPEL Extension offers more options when configuring the Service resource. When you install a product that extends the Service resource, a new field named Implementation Type appears that allows you to specify the type of service you want to configure depending upon the product you select. See the documentation for the products you have installed for more information about configuring a Service resource using those products. This section describes the base TIBCO ActiveMatrix BusinessWorks Service resource.

Before creating a Service resource, you will need to create the following resources:

- A WSDL file that contains an abstract interface description. The interface can include one or more operations.
- Process definitions will provide the implementation for each operation in the service's interface. You can specify the same process definition for more than one operation.
- Either an HTTP Connection or JMS Connection shared configuration resource that specifies the transport used by clients of the service.
- If you want to pass context information from the incoming request (for example, user name or security certificate), create a [Context Resource](#) that specifies the context data you want to use.



During deployment, Service resources must be added to a Process Archive. Although it is possible to add a Service resource to a Shared archive, the resource will not properly function when located in a Shared Archive. Add your Service resources only to Process Archives.

Also when creating your enterprise archive file, the menu item Tools > Create Project EAR only adds processes with process starters to the Process Archive for the project. You must add any Service resources to the Process Archive by selecting the Processes tab and clicking the Add a Process Starter to this archive button.

To define a Service resource, follow this general procedure:

1. Provide an abstract WSDL file (see [WSDL on page 712](#)) that describes the interface to the service.
2. For each operation in the interface, specify a process definition that implements the operation.
3. Specify one or more endpoint bindings to expose the service to potential clients.
4. For each endpoint binding, specify a transport configuration (either HTTP Connection or JMS Connection).
5. Specify any transport-specific information, such as endpoint URL for HTTP transports or JMS Destination Name for JMS transports.
6. Specify any SOAP details, such as SOAP Version or encoding for each operation.
7. Specify attachments, headers, or context information for input and output messages, if necessary.




Only Bytes Message must be used when using MTOM attachments.

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about services.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the resource.
Description	No	Short description of the resource.

Field	Global Var?	Description
Enable for AMX	No	<p>Selecting this checkbox allows you to configure this Service resource in ActiveMatrix. It also allows you to configure an ActiveMatrix endpoint for the existing services.</p> <p>Note: Select this checkbox only if you want to expose your Service to the ActiveMatrix world.</p> <p> If this checkbox is checked and unchecked, you will loose the Partner Link Configuration information from the partner binding table.</p> <p>Tabs visible after selecting the checkbox are:</p> <ul style="list-style-type: none"> • Services • References • Properties • WSDL Source • Overview <p>Following tabs are visible when this checkbox is <i>not</i> selected (by default):</p> <ul style="list-style-type: none"> • Configuration • Partner Binding • WSDL Source • Overview
Implementation	No	<p>This field allows you to add abstract WSDL files that describe the service. Click the + button to add a WSDL file. Click the X button to remove a WSDL file. Click the Rename Current Service Port to change the name of the currently selected service port.</p>

Field	Global Var?	Description
Service Port Sub-Tabs		
Each service port will have a sub-tab containing the configuration for the service port.		
Interface Namespace	No	Namespace for the interface file of the service. You can click the Go To Referenced Resource to view the interface file.
Operations Sub-Tab		
This sub-tab contains a table of all operations defined in the interface file. This table allows you to specify the resource that implements each operation.		
Operation Name	No	Name of the operation. This column is a read-only list of operations contained in the interface file.
Operation Implementation	No	<p>Double click on this field and use the Browse button to locate the resource that implements each operation. Process definitions that implement an operation must have an input, output, and error schemas that match the input, output, and fault messages of the operation.</p> <p>You can leave the implementation for an operation unspecified. In this case, an exception is thrown when a client attempts to invoke the unimplemented operation.</p> <p>Note: You can drag and drop a process definition from the project tree to the operation implementation cell. If the signature of the operation matches the process definition, the process be inserted. If the process definition or the WSDL changes, the icon for the process definition in the cell changes to a warning triangle indicating the operation and implementation signatures no longer match.</p>

Field	Global Var?	Description
Endpoint Bindings Sub-Tab		
This sub-tab allows you to specify one or more endpoints that expose the service as well as the transport bindings for each endpoint.		
Use the + button to add endpoints, use the X button to delete endpoints, and use the arrow buttons to move the selected endpoint in the list.		
Endpoint Name	No	Specify a name for the endpoint in this field.
Endpoint Type	No	Specify the type of endpoint by selecting from the list of types. <ul style="list-style-type: none"> Local — A local endpoint is available to consumers within the same process engine. This type of endpoint provides a highly efficient way for local services to invoke each other without incurring the overhead of using a network transport. SOAP — A SOAP endpoint is used to expose the service by way of the SOAP protocol to other partner services or web clients
Transport Sub-Tab		
Transport	No	Use the Browse button to select a transport. In this release, HTTP Connection or JMS Connection resources can be used as transports.
Use Basic Authentication	Yes	<p>This field is available when an HTTP transport is selected.</p> <p>When checked, this field specifies that incoming SOAP requests must supply a valid username and password.</p> <p>The user name and password specified in the incoming request must exist in the domain (users are created and managed in the domain using TIBCO Administrator).</p>

Field	Global Var?	Description
Endpoint URI	No	<p>This field is available when an HTTP transport is selected.</p> <p>This field specifies the Endpoint URI that clients can use to access the service.</p>
JMS Destination	No	<p>This field is available when a JMS transport is selected.</p> <p>This field specifies the name of the destination for incoming JMS messages for this service. The syntax of the destination name is specific to the JMS provider you are using. See your JMS provider documentation for more information about destination names.</p> <p>Note: If you are using TIBCO Enterprise Message Service as your JMS provider, you can use the Browse button next to this field after specifying a valid connection in the JMS Connection field. The Browse button displays a list of configured destinations in the JMS server that are appropriate for this activity.</p>
JMS Destination Type	No	<p>This field is available when a JMS transport is selected.</p> <p>This field specifies whether the JMS Destination is a Topic or a Queue.</p>
JMS Message Type	No	<p>This field is available when a JMS transport is selected.</p> <p>This field specifies the type of incoming messages on the specified destination. It can be either Text Message or Bytes message.</p>

Field	Global Var?	Description
Acknowledge Mode	No	<p>This field is available when a JMS transport is selected.</p> <p>This field specifies the acknowledgement mode to be used for incoming messages. It can be one of the following:</p> <ul style="list-style-type: none"> • Auto — the message is automatically acknowledged when it is received. • Client — the message will be acknowledged when the process implementing the operation ends successfully. • Dups OK — the message is acknowledged automatically when it is received. JMS provides this mode for lazy acknowledgement, but TIBCO ActiveMatrix BusinessWorks acknowledges messages upon receipt. • TIBCO EMS Explicit — (only available for TIBCO Enterprise Message Service) a message which is not acknowledged using the Confirm activity before the process instance ends, will be redelivered instead of all messages in the session. The session is not blocked and one session handles all incoming messages for each process instance. <p>Note — In the TIBCO ActiveMatrix BusinessWorks 5.10 release, there is a change in the behavior of this feature. Now only the messages that are not confirmed, would be redelivered.</p> <ul style="list-style-type: none"> • TIBCO EMS Explicit Dups OK — (only available for TIBCO Enterprise Message Service) a message which is not acknowledged using the Confirm activity before the process instance ends, will be redelivered instead of all messages in the session. The session is not blocked and one session handles all the incoming messages for each process instance. The messages however, would be lazily acknowledged.

Field	Global Var?	Description
Max Sessions	No	<p>This field is available when a JMS transport is selected and Client is selected as the Acknowledge Mode. If the JMS Destination Type is Topic, this field is read-only. If the JMS Destination Type is Queue, the value of this field can be altered.</p> <p>This field specifies the maximum number of JMS sessions to create for incoming queue messages.</p> <p>When a JMS queue message is received, the session is blocked until the message is acknowledged. Because the acknowledgement can come at a later time when the process ends, this field allows you to specify a maximum number of new sessions to be created for handling incoming messages.</p> <p>Once the maximum number of sessions is reached, no new incoming messages can be processed. Once an incoming message is confirmed, the total number of active sessions is decreased and another incoming message can be processed.</p>
Operations	No	<p>This field is available when a JMS transport is selected and Topic is selected as the JMS destination type.</p>
SOAP Details Sub-Tab		
Default Style	No	<p>The SOAP binding style for operations that do not explicitly set their binding style. You can specify either Document or RPC style.</p>
SOAP Version	No	<p>Specify either SOAP 1.1 or SOAP 1.2 for the version of the SOAP specification to which incoming messages should comply.</p> <p>See SOAP Specification Compliance on page 622 for more information.</p>

Field	Global Var?	Description
Operations	No	Select each operation from the drop down list to specify the SOAP Action, Style, or Encoding for the operation.
SOAP Action	No	<p>The soapAction that is expected from incoming SOAP requests. This field is required, and by default, the operation name is used as the soapAction. Each operation in an interface must have a unique value for SOAP Action.</p> <p>See the SOAP specification for more information about soapAction.</p>
Style	No	The SOAP binding style for the selected operation. You can specify either Document or RPC style, or you can specify that the value in the Default Style field should be used.
Encoding	No	<p>The encoding type for the body of the SOAP input and output messages. This can be either literal or encoded.</p> <p>Encoded messages support more complex datatypes such as SOAP arrays.</p> <p>When encoded is specified, you can optionally specify the namespace for input, output, and fault messages.</p>
Input Message Namespace	No	The namespace for input messages.
Output Message Namespace	No	The namespace for output messages.
Fault Message Namespace	No	The namespace for fault messages.

Advanced SOAP Settings

For each operation, you can specify advanced configuration options. To access the advanced configuration options, perform the following:

1. Click the Endpoint Bindings Tab.

- 2. Select the desired endpoint and click the SOAP Details sub-tab.
- 3. Select the operation in the Operations field.
- 4. Click the **Advanced** button next to the operation name.


The Advanced SOAP Settings dialog appears. The following sections describe the tabs on this dialog.

Input Attachments

See [Messages With Attachments on page 663](#) for more information about message attachments.

The Input Attachments tab has the following fields.

Field	Description
Mime Content Type	<p>The table containing this column allows you to specify the mime content type of each message part. This is especially useful for describing parts that contain attachments. See the mime specification for more information on the valid syntax of the content type.</p> <p>If specified, the content type appears in the WSDL for the specified part.</p> <p>Use the X, +, and arrow keys to delete, add, and move parts in the list.</p>
Message Part	<p>The message part that you would like to specify the content type for. This field is a drop down list of message parts.</p>

Field	Description
Write to File	<p>Checking this field specifies that incoming messages whose attachments exceed the specified threshold size should be written to a file instead of stored in memory. This allows you to accept large incoming attachments without consuming a great deal of memory. When this field is checked, the Directory and Threshold Size fields appear.</p> <p>Leaving this field unchecked specifies that attachments of incoming messages should be kept in memory.</p> <p>Once written, the files created by using this option are not deleted automatically. You must manage the storage used by these files and delete them when they are no longer used.</p> <p> Although Write to File exists for SwA and MTOM, Soap over JMS completely depends on the heap size configuration as JMS specifications do not support writing JMS messages in parts as is the case with Soap over HTTP, which can be written over wire in parts. Hence, writing large JMS messages to JMS after configuring Write to File, completely depends on the Heap size.</p>
Directory	<p>This field only appears when the Write to File field is checked.</p> <p>The directory to write attachments that are above the specified threshold. The process engine does not attempt to create the directory if the specified directory does not exist. Therefore, create the directory before starting the process engine.</p>

Field	Description
Threshold Data Size (bytes)	<p>This field only appears when the Write to File field is checked.</p> <p>The maximum size (in bytes) of an incoming message attachment that can be kept in memory. Attachments larger than the specified size are written to a file in the specified directory. The file's name is output so that subsequent activities in the process definition can access the file and read its contents.</p> <p>Specifying zero (0) in this field causes all incoming messages to be saved to a file.</p>

Input Headers

The Input Headers tab allows you to specify a SOAP message parts used for any SOAP headers expected in the incoming request. The specified input headers are also included in the concrete bindings in the generated WSDL file.

Use the +, X, and arrow keys to add, delete and move the input header messages in the list.

The Input Headers tab has the following fields.

Field	Description
Message Name	<p>The message in a WSDL file to use as the input header for the incoming SOAP request. This WSDL file does not have to be the same as the file used for output headers or the file used to configure the port type and operation of the incoming request.</p> <p>Use the Browse button in this field to search for valid WSDL File resources and to select the desired message in the WSDL File.</p>
Part Name	<p>This field contains a drop down list with all parts of the specified SOAP message. You can specify a namespace or encoding for the part, if applicable.</p>
Namespace	<p>Namespace for the selected input header message.</p>

Field	Description
Encoding	Encoding to use for the selected input header message.
Undescribed	Select this checkbox to declare the header as Undescribed header.
Cardinality	This field contains a drop-down list with two options: Repeating and Optional.

Output Attachments

See [Messages With Attachments on page 663](#) for more information about message attachments.

The Output Attachments tab has the following fields.

Field	Description
Attachment Style	This field allows you to choose the attachment style for the outbound/response messages. Two attachment styles are available: SwA and MTOM. The attachment style MTOM is available only if the activity uses SOAP 1.2 and is not displayed when SOAP 1.1 is used.

Attachments	
Mime Content Type	<p>The table containing this column allows you to specify the mime content type of each message part. This is especially useful for parts that contain attachments. See the mime specification for more information on the valid syntax of the content type.</p> <p>If specified, the content type appears in the WSDL for the specified part.</p> <p>Use the X, +, and arrow keys to delete, add, and move parts in the list.</p>
Message Part	The message part that you would like to specify the content type for. This field is a drop down list of message parts.

Output Headers

The Output Headers tab allows you to specify a SOAP message parts used for any SOAP headers expected in the outgoing reply. The specified output headers are also included in the concrete bindings in the generated WSDL file.

Use the +, X, and arrow keys to add, delete and move the input header messages in the list.

The Output Headers tab has the following fields.

Field	Description
Message Name	<p>The message in a WSDL file to use as the output header for the SOAP request. This WSDL file does not have to be the same as the file used for input headers or the file used to configure the port type and operation of the incoming request.</p> <p>Use the Browse button in this field to search for valid WSDL File resources and to select the desired message in the WSDL File.</p>
Part Name	<p>This field contains a drop-down list with all parts of the specified SOAP message. You can specify a namespace or encoding for the part, if applicable.</p>
Encoding	<p>Encoding to use for the selected output header message.</p>
Undescribed	<p>Select this checkbox to declare the header as Undescribed header.</p>
Cardinality	<p>This field contains a drop-down list with two options: Repeating and Optional.</p>

Fault Headers

This Fault Headers tab enables the user to configure headers for declared faults. With this you will be able to configure different schemas to be mapped to the headers for different Fault messages.

This Fault Headers tab has the following fields.

Field	Description
soapFaults	The Faults available for configuration are listed in the soapFaults drop-down.
Part Name	This field contains a drop-down list with all parts of the specified soapFault message.
Message Name	<p>The message in a WSDL file to use as the fault header for the incoming soapFault request.</p> <p>Use the Browse button in this field to search for valid WSDL File resources and to select the desired fault message in the WSDL File.</p>

Input Context

The Input Context tab allows you to specify a [Context Resource](#) that contains transport-specific data. The data you provide to the context resource is available to the process definition that implements the operation.

The Input Context tab has the following fields.

Field	Description
Shared Context	The Context Resource that specifies the schema you want to use. The schema of this resource should include elements for each data element from the transport information you want to provide to a process definition that implements the operation.

Field	Description
Expose Security Context	<p>This field is available for either HTTP or JMS transports. This field is only available when a Context resource is specified in the Shared Context field.</p> <p>Places the information from the user’s security context (either authentication or SSL certificate information) into the Context/SecurityContext element of the Input Context.</p> <p>This is a fairly expensive operation and SSL certificates can consume memory resources, so check this option only if you require information from the user’s security context for later use in your process definition.</p>
Mapping Panel	<p>The mapping panel is similar to the mapping panel provided in the Input tab of activities. This panel allows you to map transport-specific information from the incoming request to the data elements of the specified Context Resource. The mapping panel appears only when a Context resource is specified in the Shared Context field.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about mapping and transforming input data.</p>

When the Expose Security Context field is checked, the following schema is available in the Mapping Panel field.

Element	Datatype	Description
Context	complex	This element holds the optional SecurityContext element and the RemoteAddress and RemoteHost elements described below.

Element	Datatype	Description
SecurityContext	complex	<p>This output element is only available when the Expose Security Context field is checked on the Configuration tab. This element contains information about the requestor's authentication or certificate information, depending upon the security scheme used. See the description of the following elements contained in the SecurityContext element for more information.</p>
Transport	complex	<p>This element is only available when HTTP is the transport, this element is not available when JMS is the transport.</p> <p>This element contains the transport-level security context. This includes the following:</p> <ul style="list-style-type: none"> • CertificateToken— complex element containing the subject, issuer, serial number, fingerprint, and X509 certificate. • UsernameToken — complex element containing the username, password, and nonce (random number, if one is set by the calling application).
WSSE	complex	<p>This element contains the WSS policy security context. This includes the Authentication and Signature elements. See the description of these elements below.</p>

Element	Datatype	Description
Authentication	complex	<p>This element contains the authentication information from the client. The type of information in this elements depends upon how the client authenticated. This element can contain one of the following:</p> <ul style="list-style-type: none">UsernameToken — complex element containing the username, password, and nonce (random number, if one is set by the calling application).KeyInfo — the client’s public key.
Signature	complex	<p>This element contains information from the user’s digital signature. This element contains the following:</p> <ul style="list-style-type: none">Value — this element contains the raw signature sent by the client.Token — either a UsernameToken or a KeyInfo element. A UsernameToken element contains the username, password, and nonce, if available. A KeyInfo element contains information about the client’s digital certificate or public key.
RemoteAddress	String	<p>IP address of the remote host that sent the HTTP request.</p> <p>This element is only available when HTTP is the specified transport. This element is not available for the JMS transport.</p>

Element	Datatype	Description
RemoteHost	String	<p>Host name of the remote host that sent the HTTP request. This element is only available when the Enable DNS Lookups field is checked on the Advanced tab of the HTTP Connection used by this activity.</p> <p>This element is only available when HTTP is the specified transport. This element is not available for the JMS transport.</p>

Output Context

The Output Context tab allows you to specify a [Context Resource](#) that contains data the process definition implementing the operation has provided. The data can then be mapped to Headers of the output message returned to the client.

The Output Context tab has the following fields.

Field	Description
Shared Context	<p>The Context Resource that specifies the schema you want to use. The schema of this resource should include elements for each data element you want to provide to the output Headers for the message.</p>
Mapping Panel	<p>The mapping panel is similar to the mapping panel provided in the Input tab of activities. This panel allows you to map data provided by the implementation of the operation to the transport-specific headers of the reply message sent to the client. The mapping panel appears only when a Context resource is specified in the Shared Context field.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about mapping and transforming input data.</p>

Fault Context

The Fault Context tab allows you to select a fault context resource that is set with SOAP fault attributes. The data can then be mapped to Fault Elements of the Fault message returned to the client.

The Fault Context tab has the following fields.

Field	Description
Shared Context	The Context Resource that specifies the SOAP fault schema you want to use for mapping with the Fault Elements.
Mapping Panel	<p>The mapping panel is similar to the mapping panel provided in the Input tab of activities. This panel allows you to map data provided by the implementation of the operation to the transport-specific Fault Elements of the fault message sent to the client. The mapping panel appears only when a Context resource is specified in the Shared Context field.</p> <p>The Context Data shows the Context resource element.</p>

Partner Binding

The Partner Binding tab allows you to bind partners invoked by all operations in a service on the Partner Binding tab of the Service. Only partners that require binding appear on this tab. The Partner Binding tab has the following fields:

Field	Description
Partner Bindings	<p>The Partner Bindings field allows you to specify binding information for partner definitions. The Partner Name and Process fields in the table are non-editable.</p> <p>Partner Name - name of the partner as specified in the Process Definition.</p> <p>Process - The process in which the partner is declared.</p> <p>PortType Namespace - is a non-editable field displaying the PortType Namespace corresponding to the Port Type selected.</p> <p>Partner Link - the partner link configuration for the partner. This field can optionally be specified by double-clicking on the field and browsing the list of available partner link resources in the project.</p>
Dynamic Call Processes	<p>The Dynamic Call Processes field allows you to specify a list of processes that can be dynamically invoked by processes invoked by all operations in the service. You can add or remove processes from the list.</p>



Processes declared in the Dynamic Call Processes field are automatically included in Enterprise Archive (EAR) files.

WSDL Source

The WSDL Source tab displays the concrete WSDL interface file that is generated based on the information specified on the Configuration tab of this resource. This tab has the following fields.

Field	Global Var?	Description
Service URI	No	<p>The Service URI portion of the URL that can be used to retrieve the WSDL file. For clients to retrieve WSDL files from TIBCO ActiveMatrix BusinessWorks, you must define a process definition that accepts HTTP requests and uses the Retrieve Resources activity to generate the WSDL file. See Using Retrieve Resources on page 624 for more information.</p> <p>The URL to retrieve WSDL files is the following:</p> <pre>http://<host>:<port>/<serviceURI>?wsdl</pre> <p>where <serviceURI> is the value in this field.</p>
Target Namespace	No	<p>Target namespace of the Service.</p> <p>Note: The Target Namespace of the service should be an abstract WSDL if embedding Interface or Types.</p>
Embed In WSDL	No	<p>Check one or more of the following to embed the selected item(s) in the concrete WSDL file instead of using import statements:</p> <ul style="list-style-type: none">Interface — When checked, specifies that all referenced WSDL files should be included inline in the concrete WSDL file. Otherwise, all referenced WSDL files are imported. <p>Note: To use Abstract WSDL in the Partners tab of the Client Process Definition containing Invoke Partner activity, uncheck Interface.</p> <ul style="list-style-type: none">Types — When checked, specifies that all referenced XSD files should be included inline in the concrete WSDL file. Otherwise, all referenced XSD files are imported.JNDI Properties — When checked, specifies that JDNI properties should be included inline in the service specification in the WSDL Source tab.

Field	Global Var?	Description
WSDL Code	No	<p>This field displays the concrete WSDL file that describes this service.</p> <p>Click the Save WSDL File button to save the concrete WSDL file to disk, if desired.</p>

Overview

The Overview tab provides a tree view of the service that you can expand and collapse to view the exposed endpoints and operations for the service.

Set Context

Activity



The Set Context activity allows you to set the value of a [Context Resource](#) shared configuration resource. This is useful if you want to supply data from the process definition implementing an operation to the service agent. For example, you may want to set some headers of the outgoing reply message.

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about context separation for Service resources and operation implementations.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Context Configuration	No	The Context Resource whose value you would like to change.
Output New Value	No	When checked, the new value of the context resource is placed into this activity’s output. The value is then available to subsequent activities in the process definition. If not checked, this activity has no output.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
<schema>	varies	The schema of the context resource specified in the Context Configuration field on the Configuration tab is the input schema for this activity.

Output

The output for the activity is the following.

Output Item	Datatype	Description
<schema> or no output	varies	When the Output New Value field on the Configuration tab is unchecked, this activity has no output. When the field is checked, the new value of the context resource is output. The schema for the output is determined by the schema specified for the context resource.

Chapter 16 SOAP Palette

Simple Object Access Protocol (SOAP) is a lightweight, XML-based protocol for the exchange of information between applications. The SOAP palette, along with the [WSDL Palette](#) allow you to implement web services. The SOAP palette allows you do the following:

- create web services by using process definitions
- generate WSDL files for web service clients
- invoke one-way, request/reply web services
- use either HTTP or JMS as the transport for web services
- send or receive SOAP requests with attachments

Topics

- [SOAP Specification Compliance, page 622](#)
- [Retrieve Resources, page 624](#)
- [SOAP Event Source, page 631](#)
- [SOAP Request Reply, page 655](#)
- [SOAP Send Fault, page 673](#)
- [SOAP Send Reply, page 676](#)
- [SOAP Messages Over the JMS Transport, page 678](#)
- [MimeParser, page 682](#)

SOAP Specification Compliance

The SOAP specification is maintained by the World Wide Web Consortium (W3C). You can find the SOAP specification at www.w3.org/TR/SOAP. TIBCO ActiveMatrix BusinessWorks can send and receive messages that comply with either the 1.1 or 1.2 version of the SOAP specification. For SOAP 1.2 messages, not all of the features described in the specification are available in TIBCO ActiveMatrix BusinessWorks.

Receiving SOAP Messages with the SOAP Event Source

The SOAP Event Source process starter can be configured to receive either SOAP 1.1 or 1.2 compliant messages. You specify the version of the incoming messages in the SOAP Version field on the Configuration tab of the SOAP Event Source. SOAP Reply and SOAP Fault activities in the same process definition will use the same SOAP message version as specified in the SOAP Event Source. SOAP Event Source can handle inbound SOAP messages with attachments with either SwA or MTOM attachment styles.

Using the SOAP Request/Reply Activity

The SOAP Request/Reply activity sends either a SOAP 1.1 or 1.2 compliant message depending upon the SOAP version specified in the WSDL file. If a SOAP 1.2 message is required, TIBCO ActiveMatrix BusinessWorks sends a message that complies with the SOAP 1.2 specification. When the SOAP server returns a Fault message, the SOAP 1.2 fault message is mapped to the TIBCO ActiveMatrix BusinessWorks fault schema as described in [Fault Schemas on page 622](#).

Fault Schemas

The specification of the schema for SOAP Fault messages has changed between release 1.1 and 1.2 of the SOAP specification. TIBCO ActiveMatrix BusinessWorks uses the same schema for SOAP Fault messages regardless of the version of the specification. Because of this, the content of Fault messages that comply with SOAP 1.2 is mapped to the TIBCO ActiveMatrix BusinessWorks SOAP Fault schema.

Table 8 describes the relationship of the data elements between the TIBCO ActiveMatrix BusinessWorks SOAP Fault schema and the SOAP Fault 1.1 and 1.2 schemas..

Table 8 SOAP Fault schema relationship

TIBCO ActiveMatrix BusinessWorks SOAP Fault Schema Element	SOAP Fault Schema Element 1.1	SOAP Fault Schema Element 1.2
faultcode	faultcode	Code/Value Note: Code/Subcode will not be present.
faultstring	faultstring	Reason/Text[1] Note: There will be only one Text element within the Reason element.
faultfactor	faultfactor	Role
detail	detail	Detail

Retrieve Resources

Activity



The Retrieve Resources activity generates a WSDL file containing a concrete service description of any process definition that has a [SOAP Event Source](#) process starter. This allows clients to access the WSDL for a web service that is implemented by a TIBCO ActiveMatrix BusinessWorks process definition. The client can then use the WSDL file to invoke the web service.

The Retrieve Resources activity can also be used to retrieve any other resources, including XSDs and WSIL.

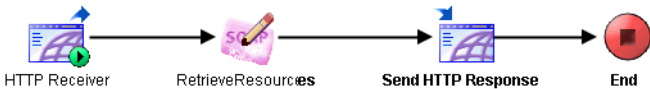
Using Retrieve Resources

This activity is normally used in conjunction with an [HTTP Receiver](#) process starter and a [Send HTTP Response](#) activity. The HTTP Receiver process starter can receive an HTTP request and pass it along to the Retrieve Resources activity. When a request is made to retrieve a WSDL file for a process definition that has a [SOAP Event Source](#) process starter, Retrieve Resources creates a WSDL file dynamically. This file contains the concrete service definition of the specified BusinessWorks process definition. The WSDL file or other requested resources are then placed into the output for this activity.

You can then pass the output of the Retrieve Resources activity to the Send HTTP Response activity to send the response back to the requestor.

[Figure 26](#) illustrates a process definition using the Retrieve Resources activity.

Figure 26 Process definition using the Retrieve Resources activity



The HTTP Receiver process starter can be configured to use the HTTPS protocol for SSL communication when retrieving resources. See [HTTP Receiver on page 225](#) for more information.

When sending the HTTP response, set the Headers/Content-Type item on the Input tab to the appropriate type for the type of resource retrieved. Use "text/xml" when this activity is used to retrieve a WSDL file. See [Format of URLs for HTTP Requests on page 625](#) for more information on the format of the URL for the HTTP request for retrieving resources.

See the descriptions of the Input and Output tabs for this activity for more information about binding the HTTP request to this activity's input and binding this activity's output to an HTTP response.

If you want to test a process definition containing this activity, you must load the process definition containing this activity along with the process definition containing the SOAP Event Source process starter into the test window. For more information about loading multiple process definitions when testing, see *TIBCO ActiveMatrix BusinessWorks Process Design*.

Format of URLs for HTTP Requests

To use the Retrieve Resources activity, the HTTP request must have one of the following forms:

- `http://<host>:<port>/<path>/<resourceName>?wsdl`
- `http://<host>:<port>/<path>/<resourceName>`
- `http://<host>:<port>/inspection.wsdl`

Option	Description
<code><host></code>	Host name of the machine that is listening for the HTTP request.
<code><port></code>	Port is the port number on the machine for incoming HTTP requests. This is specified on the Configuration tab of the HTTP Receiver process starter.
<code><path></code>	<p>The location of the resource in the TIBCO ActiveMatrix BusinessWorks project tree.</p> <p>Note: Any special characters in the path or resource name (such as &, =, or space) are mangled in the generated WSDL file. It is a good idea to avoid special characters in the folder and resource names.</p>
<code><resourceName></code>	<p>The name of the resource to retrieve.</p> <p>If you are retrieving a WSDL file for a process definition, use the name of the process definition followed by <code>?wsdl</code>.</p> <p>If you are retrieving other resources (such as XSD files, images, and so on), specify the name of the resource, such as <code>mySchema.xsd</code>, <code>myProcess.process</code>, or <code>myImage.gif</code>.</p> <p>Note: Use <code>resourceName.serviceagent</code> to reference a Receive Partner Notification resource</p>

Option	Description
inspection.wsil	Used to retrieve a Web Services Inspection Language (WSIL) file containing a list of all configured web services. Any process definitions with SOAP Event Source process starters in the project will be contained in the WSIL file.

Examples

The following is an HTTP request that retrieves the WSDL file for the process named GetPurchaseOrder stored in the folder Purchasing:

```
http://purch:8877/Purchasing/GetPurchaseOrder?wsdl
```

The following is an HTTP request that retrieves a WSIL file containing all process definitions with SOAP Event Source process starters:

```
http://purch:8877/inspection.wsil
```

The following is an HTTP request that retrieves the PurchaseOrder.xsd file:

```
http://purch:8877/Purchasing/Schemas/PurchaseOrder.xsd
```

The following is an HTTP request that retrieves the WSDL file for the Service resource named BuyerService :

```
http://server:8877/BuyerService.serviceagent?wsdl
```

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
resourcePath	string	<p>The resource name (and its location in the project tree) that you want to retrieve.</p> <p>This overrides to the <code><path></code> and <code><resourceName></code> portion of the incoming HTTP request that is used to retrieve TIBCO ActiveMatrix BusinessWorks resources. See Format of URLs for HTTP Requests on page 625 for a description of the URL format for HTTP requests.</p>
filter	string	<p>This overrides the query string of the incoming HTTP request to specify the type of filter to use when retrieving resources. The only available filter is "wsdl" to retrieve the concrete WSDL for a process definition that implements a SOAP service.</p> <p>You can use this input element to allow incoming HTTP requests to omit the query string when retrieving concrete WSDL files. You can specify an XPath expression in this element that examines the incoming request and sets this element to "wsdl" when the incoming request matches a process definition name.</p>
hostname	string	<p>The hostname to specify for the concrete service endpoint in the dynamically generated WSDL file.</p> <p>Note: This value is used when creating the import statements (WSDL descriptions, WSIL, and XSDs).</p>
port	string	<p>The port number to specify for the concrete service endpoint in the dynamically generated WSDL file.</p> <p>Note: This value is used when creating the import statements (WSDL descriptions, WSIL, and XSDs).</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
outputClass	complex	The root class for the output of the Retrieve Resources activity. This class contains all output items for the activity.
resourceData	string	<p>The resource that can be used by a client to invoke the specified process as a web service.</p> <p>You can pass this data back to the HTTP requestor by using a Send HTTP Response activity and binding this value to the asciiContent of the response.</p>
resourceBytes	binary	<p>The retrieved resource as binary data. This is useful if binary data, such as an image, is part of the resource.</p> <p>If the retrieved resource is only binary data, the resourceData string element is not available.</p> <p>You can pass this data back to the HTTP requestor by using an HTTP Send Response activity and binding this value to the binaryContent of the response.</p>

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
ServerException	An error occurred and the resource could not be sent to the client.

Built-in Resource Provider

TIBCO ActiveMatrix BusinessWorks provides an alternative way to retrieve resources using a feature called Built-in Resource Provider.

This feature enables the BusinessWorks engine to listen on a configured port and retrieve resources such as a WSDL file, XSD file, Process file, Image file, and so on. This out-of-the-box solution performs tasks similar to that of the Retrieve Resource activity, but eliminates the need to create a process definition to use the Retrieve Resource activity. Refer to [Figure 26, Process definition using the Retrieve Resources activity, on page 624](#) for details about the process definition.

Since the feature works the same as Retrieve Resource activity, the client side functionalities with respect to Retrieve Resource activity remain the same.

However, the only exception is that this feature does not support Client authentication for SSL.

TIBCO BusinessWorks provides parameters to enable or disable the feature, and override the defaults configuration. You can set these values in the `bwengine.xml` to be reflected in the TIBCO Administrator after deploying the project.

`bw.platform.services.retreiveresources.Enabled`

This property specifies whether the Built-in Resource Provider feature is enabled or not. Setting it to true enables the feature. By default it is set to false.

`bw.platform.services.retreiveresources.Httpport`

This property specifies the port number that is configured to listen for incoming HTTP requests. This property is set to 8010 by default.

`bw.platform.services.retreiveresources.isSecure`

This property specifies if the incoming requests must use the HTTPS (secure socket layer) protocol. The HTTPS protocol authenticates the server to the client. By default, this property is set to false.

`bw.platform.services.retreiveresources.enableLookups`

This property, when set to true, enables the HTTP client to look up a Domain Name System and resolve the IP address to a DNS Name.

Setting this property to true adversely affects the throughput. Hence this property can be enabled only when required. By default, this property is set to false.

bw.platform.services.retreiveresources.defaultEncoding

This property specifies the encoding to use for the URL if no charset is specified in the Content Type header of the message. By default, this property is set to ISO-8859-1.

bw.platform.services.retreiveresources.identity

This property specifies the Identity resource that contains the HTTP Server's digital certificate and private key. This property is available when the `bw.platform.services.retreiveresources.isSecure` property is set to true.

bw.platform.services.retreiveresources.Hostname

This property specifies the hostname to which the request will be sent. It is useful to identify the exact host in a multi-host configuration to whom the request will be sent. By default, this property is set to `localhost`.



When an Enterprise Archive file, generated with TIBCO BusinessWorks 5.4.x or earlier versions, is deployed in TIBCO Administrator, the built-in resource provider parameters are not available in TIBCO Administrator.

To enable specifying the built-in resource provider parameters, recreate the Enterprise Archive file with TIBCO ActiveMatrix BusinessWorks 5.6.0 and deploy in TIBCO Administrator.

SOAP Event Source

Process Starter



The SOAP Event Source process starter creates a process instance for incoming SOAP requests. SOAP is a standard protocol for invoking web services. This allows you to create a web service using process definitions.

At runtime, a client can retrieve the WSDL file for a process containing this process starter using an HTTP request (see the description of the [Retrieve Resources](#) activity for more information). Once the WSDL file is retrieved, the client can perform a SOAP request to invoke the web service.

WSDL File and SOAP Event Source

A WSDL File specifies the characteristics (input message, output message, fault message, and so on) of a web service. The SOAP Event Source process starter configuration determines the concrete WSDL file that describes the web service that the process definition implements.

The Configuration tab of this process starter requires that you specify a Port Type. This port type is taken from a WSDL file resource. Instead of creating a new WSDL File resource, you can use an existing concrete service description. However, the concrete description of the service will be generated based on the configuration of this process starter.



Only Bytes Message must be used when using MTOM attachments.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.

Field	Global Var?	Description
Port Type	No	<p>The Port Type field is a two-part field. The first part is the namespace of the stored WSDL file that contains the service description. This is specified or imported as a WSDL File resource. See Chapter 19, WSDL Palette, on page 711 for more information about specifying abstract and concrete service descriptions.</p> <p>The second part of the Port Type field is the name of the port type in the WSDL file that contains the operation you want to implement with this process definition. This is a drop down list that is populated after the WSDL file is specified.</p>
Operation	No	<p>The operation that this process definition implements.</p> <p>The drop down list in this field is populated with the operations contained in the specified port type in the specified WSDL.</p> <p>You can choose one operation to implement per process definition. If you want to implement multiple operations, you must create a process definition for each.</p>
Transport	No	<p>The transport used by the incoming SOAP request. The transport can be one of the following:</p> <ul style="list-style-type: none">• HTTP — specify a HTTP Connection shared configuration resource.• JMS — specify a JMS Connection shared configuration resource <p>Both HTTP and JMS allow you to use the SSL protocol for secure connections.</p>
SOAP Version	No	<p>Specify either SOAP 1.1 or SOAP 1.2 for the version of the SOAP specification to which incoming messages should comply.</p> <p>See SOAP Specification Compliance on page 622 for more information.</p>

Field	Global Var?	Description
Expose Security Context	No	<p>Places the information from the user's security context (either authentication or SSL certificate information) into the Context/SecurityContext output element.</p> <p>This is a fairly expensive operation and SSL certificates can consume memory resources, so check this option only if you require information from the user's security context for later use in your process definition.</p>

Transport Details

The Transport Details tab allows you to specify additional configuration information based on the type of transport used for the SOAP request. See [SOAP Messages Over the JMS Transport on page 678](#) for more information about SOAP over the JMS transport.

The Transport Details tab contains the following fields:

Field	Global Var?	Description
HTTP Transport		
Use Basic Authentication	No	<p>When checked, this field specifies that incoming SOAP requests must supply a valid username and password.</p> <p>The user name and password specified in the incoming request must exist in the domain (users are created and managed in the domain using TIBCO Administrator).</p>
Endpoint URI	No	Specify endpoint URI here. This is optional.

Field	Global Var?	Description
JMS Transport		
JMS Destination	No	<p>Name of the JMS destination for incoming requests.</p> <p>The syntax of the destination name is specific to the JMS provider you are using. See your JMS provider documentation for more information about destination names.</p> <p>Note: If you are using TIBCO Enterprise Message Service as your JMS provider, you can use the Browse button next to this field after specifying a valid connection in the JMS Connection field and a destination type in the JMS Destination Type field. The Browse button displays a list of configured destinations in the JMS server that are of the specified type.</p>
JMS Destination Type	No	<p>Specify either Queue or Topic as the destination type.</p>
Durable Subscription	No	<p>This field is only available when Topic is selected in the JMS Destination Type field.</p> <p>This field specifies a durable subscription.</p> <p>You must specify a name in the Subscription name field that is registered with the JMS application as the durable subscription name.</p>
Subscription Name	No	<p>This field is only available when Topic is selected in the JMS Destination Type field.</p> <p>This field specifies the subscription name registered with the JMS application for durable subscriptions. This field is only available when the Durable subscription field is checked.</p> <p>Once a durable subscription is created, it can only be removed by accessing the administration tool of the JMS provider. See the documentation of your JMS provider for more information about managing durable subscriptions.</p>

Field	Global Var?	Description
JMS Message Type	Yes	<p>The type of the message. This can be one of the following:</p> <ul style="list-style-type: none"> Bytes Message — A stream of bytes. Text Message — The message is a <code>java.lang.String</code>.
Acknowledge Mode	Yes	<p>The acknowledge mode for the incoming messages. It can be one of the following:</p> <ul style="list-style-type: none"> Auto — the message is automatically acknowledged when it is received. Client — the message will be acknowledged at a later point by using the Confirm activity. If the message is not confirmed before the process instance ends, the message is redelivered. Ensure that your process definition confirms the message when using this acknowledge mode. Dups OK — the message is acknowledged automatically when it is received. JMS provides this mode for lazy acknowledgement, but TIBCO ActiveMatrix BusinessWorks acknowledges messages upon receipt. TIBCO EMS Explicit — (only available for TIBCO Enterprise Message Service) a message which is not acknowledged using the Confirm activity before the process instance ends, will be redelivered instead of all messages in the session. The session is not blocked and one session handles all incoming messages for each process instance. <p>Note — In the TIBCO ActiveMatrix BusinessWorks 5.10 release, there is a change in the behavior of this feature. Now only the messages that are not confirmed, would be redelivered.</p> <ul style="list-style-type: none"> TIBCO EMS Explicit Dups OK — (only available for TIBCO Enterprise Message Service) a message which is not acknowledged using the Confirm activity before the process instance ends, will be redelivered instead of all messages in the session. The session is not blocked and one session handles all the incoming messages for each process instance. The messages however, would be lazily acknowledged.

Field	Global Var?	Description
Max Sessions	No	<p>This field is available when Client is selected as the Acknowledge Mode. If the JMS Destination Type is Topic, this field is read-only. If the JMS Destination Type is Queue, the value of this field can be altered.</p> <p>This field specifies the maximum number of JMS sessions to create for incoming queue messages.</p> <p>When a JMS queue message is received, the session is blocked until the message is acknowledged. Because the acknowledgement can come at a later time when the process ends, this field allows you to specify a maximum number of new sessions to create to handle incoming messages.</p> <p>Once the maximum number of sessions is reached, no new incoming messages can be processed. Once an incoming message is confirmed, the total number of active sessions is decreased and another incoming message can be processed.</p>

Messages With Attachments

SOAP messages can have message parts that contain attachments. For a message part to contain an attachment, specify the Special Type in the Type field of the Part Details section of the [Message](#) resource when creating a WSDL file configuration. See [Chapter 19, WSDL Palette, on page 711](#) for more information about creating WSDL files.

Depending on the SOAP version being used, messages with attachments can conform to one of the following styles:

- Messages with Attachments (SwA) - available with SOAP version 1.1 and 1.2.
- Message Transmission Optimization Mechanism (MTOM) - available only with SOAP 1.2.

Messages with Attachments (SwA)

SOAP clients that send messages with attachments in the SwA style must conform to the SOAP Messages with Attachments specification (<http://www.w3.org/TR/SOAP-attachments>).

The output schema element for a message part that contains an attachment will hold the content ID of the attachment instead of holding the actual attachment data. The actual data for attachments is always contained within the `mimeEnvelopeElement` of the output schema for this resource. This element contains a repeating element named `mimePart` that holds the list of attachments in the SOAP message. The attachment list can be correlated to the message parts containing the attachments by using the `content-id` `mimeHeader` element.

Message Transmission Optimization Mechanism (MTOM)

Message Transmission Optimization Mechanism (MTOM) provides another way of sending binary content or attachment processing by serializing SOAP messages with attachments. Optimization is only available for element content that is in a canonical lexical representation of `xs:base64Binary` data type. MTOM conforms to the specification <http://www.w3.org/TR/soap12-mtom>.

For an outbound SOAP Message with MTOM attachments sent by SOAP Request Reply or SOAP Send Reply activities, any element of type `xs:base64Binary` (or an extension of `xs:base64Binary`) in the SOAP response message is treated as an MTOM attachment and appears as a separate MIME part on the wire.

For an inbound SOAP Message with MTOM attachments received by the SOAP Event Source or SOAP Request Reply activities, the SOAP message will have a XOP include reference to the attachment. Any XOP include reference in the SOAP message will be replaced by the corresponding attachment’s content encoded in Base64. Any MIME attachment that is not referenced from the SOAP Message using XOP include reference will be ignored by the MTOM Processing layer.

Note that the attachment is a part of the SOAP Infoset.


See *TIBCO ActiveMatrix BusinessWorks Process Design Guide* for more information about MTOM.

Advanced

The Advanced tab contains the following fields:

Field	Description
General Sub-Tab	
SOAP Action	The soapAction that is expected from incoming SOAP requests. See the SOAP specification for more information about soapAction.

Field	Description
WSDL Namespace	The namespace for the concrete WSDL file specified by this activity.
Style	The SOAP binding style. You can specify either Document or RPC style.
Encoding	<p>The encoding type for the body of the SOAP input and output messages. This can be either literal or encoded.</p> <p>Encoded messages support more complex datatypes such as SOAP arrays.</p> <p>When encoded is specified, you can optionally specify the namespace for input, output, and fault messages.</p>
Input Message Namespace	The namespace for input messages.
Output Message Namespace	The namespace for output messages.
Fault Message Namespace	The namespace for fault messages.
Embed Interface	When checked, specifies that all referenced WSDL files should be included inline in the concrete WSDL file. Otherwise, all referenced WSDL files are imported.
Embed Types	When checked, specifies that all referenced XSD files should be included inline in the concrete WSDL file. Otherwise, all referenced XSD files are imported.
Embed JNDI Properties	When checked, specifies that JDNI properties should be included inline in the service specification in the WSDL Source tab.

Field	Description
Input Attachments Binding Sub-Tab	
Mime Content Type	<p>The table containing this column allows you to specify the mime content type of each message part. This is especially useful for describing parts that contain attachments. See the mime specification for more information on the valid syntax of the content type.</p> <p>If specified, the content type appears in the WSDL for the specified part.</p> <p>Use the X, +, and arrow keys to delete, add, and move parts in the list.</p>
Message Part	<p>The message part that you would like to specify the content type for. This field is a drop down list of message parts.</p>
Write to File	<p>Checking this field specifies that incoming messages whose attachments exceed the specified threshold size should be written to a file instead of stored in memory. This allows you to accept large incoming attachments without consuming a great deal of memory. When this field is checked, the Directory and Threshold Size fields appear.</p> <p>Leaving this field unchecked specifies that attachments of incoming messages should be kept in memory.</p> <p>Once written, the files created by using this option are not deleted automatically. You must manage the storage used by these files and delete them when they are no longer used.</p> <p> Although Write to File exists for SwA and MTOM, Soap over JMS completely depends on the heap size configuration as JMS specifications do not support writing JMS messages in parts as is the case with Soap over HTTP, which can be written over wire in parts. Hence, writing large JMS messages to JMS after configuring Write to File, completely depends on the Heap size.</p>

Field	Description
Directory	The directory to write attachments that are above the specified threshold. The process engine does not attempt to create the directory if the specified directory does not exist. Therefore, create the directory before starting the process engine.
Create Non-Existing Directories	<p>When checked, all directories in the path specified in the Directory field are created, if they do not already exist.</p> <p>If this field is unchecked and there are one or more directories in the specified path in the Directory field that do not exist, an exception is raised.</p>
Threshold Data Size (bytes)	<p>The maximum size (in bytes) of an incoming message attachment that can be kept in memory. Attachments larger than the specified size are written to a file in the specified directory. The file's name is output so that subsequent activities in the process definition can access the file and read its contents.</p> <p>Specifying zero (0) in this field causes all incoming messages to be saved to a file.</p>

Output Attachments Binding Sub-Tab

Attachment Style	This field allows you to choose the attachment style for the outbound /response messages. Two attachment styles are available: SwA and MTOM. The attachment style MTOM is available only if the activity uses SOAP 1.2 and is not displayed when SOAP 1.1 is used.
Mime Content Type	<p>The table containing this column allows you to specify the mime content type of each message part. This is especially useful for parts that contain attachments. See the mime specification for more information on the valid syntax of the content type.</p> <p>If specified, the content type appears in the WSDL for the specified part.</p> <p>Use the X, +, and arrow keys to delete, add, and move parts in the list.</p>

Field	Description
Message Part	The message part that you would like to specify the content type for. This field is a drop down list of message parts.
Input Headers Sub-Tab <p>The Input Headers sub-tab allows you to specify a SOAP message parts used for any SOAP headers expected in the incoming request. The specified input headers are also included in the concrete bindings in the generated WSDL file.</p> <p>When an incoming request supplies a header, the SOAP Event Source process starter places the information contained in the header into the output process variables for the SOAP Event Source. The header information is then available to subsequent activities in the process definition.</p> <p>Use the +, X, and arrow keys to add, delete and move the input header messages in the list.</p>	
Message Name	<p>The message in a WSDL file to use as the input header for the incoming SOAP request. This WSDL file does not have to be the same as the file used for output headers or the file used to configure the port type and operation of the incoming request.</p> <p>Use the Browse button in this field to search for valid WSDL File resources and to select the desired message in the WSDL File.</p>
Part Name	This field contains a drop down list with all parts of the specified SOAP message. You can specify a namespace or encoding for the part, if applicable.
Binding	Binding used for the part. This field must be "soap".

Field	Description
Ouput Headers Sub-Tab	
<p>The Output Headers sub-tab allows you to specify a SOAP message parts used for any SOAP headers expected in the outgoing reply. The specified output headers are also included in the concrete bindings in the generated WSDL file.</p> <p>Use the +, X, and arrow keys to add, delete and move the input header messages in the list.</p>	
Message Name	<p>The message in a WSDL file to use as the output header for the SOAP request. This WSDL file does not have to be the same as the file used for input headers or the file used to configure the port type and operation of the incoming request.</p> <p>Use the Browse button in this field to search for valid WSDL File resources and to select the desired message in the WSDL File.</p>
Part Name	<p>This field contains a drop down list with all parts of the specified SOAP message. You can specify a namespace or encoding for the part, if applicable.</p>
Binding	<p>Binding used for the part. This field must be "soap".</p>

WSDL Source

This tab displays the WSDL file that can be used to call the web service implemented by this process definition. This information is presented for display purposes only, and this file cannot be edited. You can copy this WSDL file and send it to anyone who wants to invoke the web service.

Normally, an application would use a web request to retrieve the WSDL file of a web service (see the description of the [Retrieve Resources](#) activity for more information about sending a WSDL file as a response to a web request). This tab allows you to see the WSDL file that contains the concrete service description for this process.

Misc

The Misc tab contains the following fields:

Field	Description
Sequencing Key	<p>This field can contain an XPath expression that specifies which processes should run in order. Process instances with sequencing keys that evaluate to the same value will be executed sequentially in the order the process instance was created.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about controlling the execution order of process instances and about XPath expressions.</p>
Custom Id	<p>This field can contain an XPath expression that specifies a custom ID for the process instance. This ID is displayed in the View Service dialog of TIBCO Administrator, and it is also available in the <code>\$_processContext</code> process variable.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
inputMessage or <operationName>	depends upon type specified in WSDL	<p>The message parts specified in the WSDL file for the incoming SOAP request.</p> <p>The incoming request could contain multiple parts and attachments, and each part would be a message defined in the WSDL file.</p> <p>In case of MTOM attachments, the attachments appear embedded in the message.</p>

Output Item	Datatype	Description
mimeEnvelopeElement	complex	This element contains the message attachments when MIME attachments with SwA style are used. This element contains a repeating element named mimePart that contains each MIME attachment.
mimeHeaders	complex	<p>This element contains the mime header for each mimePart. Mime headers can contain the following information:</p> <ul style="list-style-type: none">• content-disposition• content-type• content-transfer-encoding• content-id• other mime header information <p>Note: When the content type is specified as "text/*" (for example, "text/xml"), the attachment content is expected to be in either the textContent output element or the file name storing the attachment is expected to be in the fileName output element. When the content type is anything other than "text/*", the attachment content is expected to be in either the binaryContent output element or the file name storing the attachment is expected to be in the fileName output element.</p>

Output Item	Datatype	Description
binaryContent textContent fileName	choice	<p>This element contains the mime attachment. The element can be one of the following:</p> <ul style="list-style-type: none"> • binaryContent — content of the attachment when the attachment is binary data. • textContent — content of the attachment when the attachment is text data. • fileName — the file name of the attachment when the Write to File field is checked on the Input Attachment Bindings sub-tab of the Advanced tab.
headers	complex	The header data supplied by the SOAP request. The structure of this input item is defined by the schema on the Input Headers sub-tab of the Advanced tab.
Header.<partName>	complex	<p>Headers can contain multiple parts. The headers element contains all header parts supplied by the incoming SOAP request. These parts are specified on the Input Headers sub-tab of the Advanced tab. The header parts are stored in an element named Header . <partName> where <partName> is the name of the part specified on the Input Headers tab.</p> <p>Each Header . <partName> element also contains an attribute named @mustUnderstand. This boolean value is set to true in the incoming request if the client specifies that the server must understand the header part.</p>
Context	complex	This element holds the optional SecurityContext element and the RemoteAddress and RemoteHost elements described below.

Output Item	Datatype	Description
SecurityContext	complex	<p>This output element is only available when the Expose Security Context field is checked on the Configuration tab. This element contains information about the requestor's authentication or certificate information, depending upon the security scheme used. See the description of the following elements contained in the SecurityContext element for more information.</p>
Transport	complex	<p>This element is only available when HTTP is the transport, this element is not available when JMS is the transport.</p> <p>This element contains the transport-level security context. This includes the following:</p> <ul style="list-style-type: none">• CertificateToken— complex element containing the subject, issuer, serial number, fingerprint, and X509 certificate.• UsernameToken — complex element containing the username, password, and nonce (random number, if one is set by the calling application).
WSSE	complex	<p>This element contains the WSS policy security context. This includes the Authentication and Signature elements. See the description of these elements below.</p>

Output Item	Datatype	Description
Authentication	complex	<p>This element contains the authentication information from the client. The type of information in this elements depends upon how the client authenticated. This element can contain one of the following:</p> <ul style="list-style-type: none"> UsernameToken — complex element containing the username, password, and nonce (random number, if one is set by the calling application). KeyInfo — the client's public key.
Signature	complex	<p>This element contains information from the user's digital signature. This element contains the following:</p> <ul style="list-style-type: none"> Value — this element contains the raw signature sent by the client. Token — either a UsernameToken or a KeyInfo element. A UsernameToken element contains the username, password, and nonce, if available. A KeyInfo element contains information about the client's digital certificate or public key.
RemoteAddress	string	<p>IP address of the remote host that sent the HTTP request.</p> <p>This element is only available when HTTP is the specified transport. This element is not available for the JMS transport.</p>

Output Item	Datatype	Description
RemoteHost	string	<p>Host name of the remote host that sent the HTTP request. This element is only available when the Enable DNS Lookups field is checked on the Advanced tab of the HTTP Connection used by this activity.</p> <p>This element is only available when HTTP is the specified transport. This element is not available for the JMS transport.</p>
TransportProperties - HTTP Transport		
Method	string	<p>The HTTP method to use for the request. All HTTP 1.1 methods are supported, but the CONNECT method is unnecessary because TIBCO ActiveMatrix BusinessWorks automatically uses the correct method when connecting by way of a proxy server.</p> <p>If no method is specified in this element, the GET method is used by default.</p>
RequestURI	string	The address portion of the request. This is the portion of the URI before the question mark (?).
HTTPVersion	string	Version field of the HTTP request.
Command	string	Command portion of the HTTP request.
QueryString	string	The query string portion of the request. This is the portion after the question mark (?).
Header	complex	The header fields to send for the request. This element is specified on the Input Headers tab, and you can use this input item to supply values for the header when sending the request.

Output Item	Datatype	Description
Protocol	string	Can be either HTTP or HTTPS depending upon the protocol used by the request.
Port	integer	The port number that the HTTP server uses for incoming requests. Specifying a value for this input item overrides any value specified on the Configuration tab.
Headers	Complex	
Accept	string	<p>This field specifies media types that are acceptable for response messages for the incoming request. For example, <code>text/*</code>, <code>text/html</code>. Media types are described in the HTTP specification.</p> <p>If no Accept header field is present, then it is assumed that the client accepts all media types.</p>
Accept-Charset	string	<p>This field specifies the character sets that are acceptable for response messages for the incoming request. For example, <code>iso-8859-5</code>, <code>unicode-1-1</code>. Character sets are described in the HTTP specification.</p> <p>If no Accept-Charset header is present, then it is assumed that the client accepts any character set.</p>
Accept-Encoding	string	This field specifies the content-coding values that are acceptable for response messages. For example, <code>compress</code> , <code>gzip</code> . See the HTTP specification for more information about this header field.
Content-Type	string	This field indicates the media type of the entity body sent to the receiver. Media types are described in the HTTP specification. An example of the media type is <code>text/html; charset=ISO-8850-4</code> .

Output Item	Datatype	Description
Content-Length	string	This field indicates the size of the entity body (in decimal number of OCTETs) sent to the receiver and takes into account the encoding of the message body.
Connection	string	This field allows the requestor to specify options desired for this connection. For example, the option close specifies that the requestor would like the connection to be closed when the request is complete.
Cookie	string	See the HTTP specification for more information about this field.
Pragma	string	This field is used to include implementation-specific directives that might apply to the receiver. See the HTTP specification for more information about using this field.
TransportProperties - JMS Transport		
JMSHeaders		
JMSDestination	string	Destination where a message is sent.
JMSReplyTo	string	The JMS application where the reply message should be sent.

Output Item	Datatype	Description
JMSDeliveryMode	string	<p>The delivery mode of the message. Can be one of the following:</p> <ul style="list-style-type: none"> • <code>PERSISTENT</code> — signifies the messages are stored and forwarded. • <code>NON_PERSISTENT</code> — messages are not stored and may be lost due to failures in transmission. • When using TIBCO Enterprise Message Service, the <code>JMSDeliveryMode</code> header can be <code>RELIABLE_DELIVERY</code>. See the TIBCO Enterprise Message Service documentation for more information about this mode.
JMSMessageID	string	The unique ID of the message.
JMSTimestamp	long	The time a message was handed off to a JMS provider to be sent. The time is expressed as the amount of time, in milliseconds, since midnight, January 1, 1970, UTC.
JMSExpiration	long	<p>The expiration time of the message. The time is expressed as the amount of time, in milliseconds since midnight, January 1, 1970, UTC. If set to 0, the message does not expire.</p> <p>For outgoing messages, this is set by specifying the <code>JMSExpiration</code> field on the activity's Advanced tab.</p>
JMSRedelivered	boolean	Typically this item is set when the JMS provider has delivered the message at least once before.

Output Item	Datatype	Description
JMSPriority	integer	<p>The priority of the message. Priority is a value from 0-9. Higher numbers signify a higher priority (that is, 9 is a higher priority than 8).</p> <p>For outgoing messages, the default priority is 4. This is set on the activity's Advanced tab.</p>
JMSCorrelationID	string	<p>This ID is used to link a response message with its related request message. This is usually the message ID of a request message when this field is found in a reply message.</p> <p>See the following topics for more information about JMSCorrelationID:</p> <ul style="list-style-type: none">• JMS Queue Requestor on page 411• JMS Queue Sender on page 420• JMS Topic Publisher on page 428• JMS Topic Requestor on page 435• Reply To JMS Message on page 454
JMSType	string	<p>The JMS provider-supplied string to describe the type of the message. Some JMS providers use this property to define messages in the provider's repository. See your JMS provider documentation for more information about the use of this field.</p>
JMSProperties		
JMSXUserID	string	<p>The ID of the user sending the message.</p> <p>This property is optionally set on incoming messages by the JMS application. This property is not set on outgoing messages.</p>

Output Item	Datatype	Description
JMSXAppID	string	<p>The ID of the application sending the message.</p> <p>This property is optionally set on incoming messages by the JMS application. This property is not set on outgoing messages.</p>
JMSXProducerTXID	string	<p>The transaction identifier of the transaction where this message was produced.</p> <p>This property is optionally set on incoming messages by the JMS application. This property is not set on outgoing messages.</p>
JMSXConsumerTXID	string	<p>The transaction identifier of the transaction where this message was consumed.</p> <p>This property is optionally set on incoming messages by the JMS application. This property is not set on outgoing messages.</p>
JMSXRcvTimestamp	integer	<p>The time the JMS server delivered the message to the consumer. The time is expressed as the amount of time, in milliseconds since midnight, January 1, 1970, UTC.</p> <p>This property is optionally set on incoming messages by the JMS server. This property is not set on outgoing messages.</p>
JMSXDeliveryCount	integer	<p>The number of delivery attempts for this message.</p>
JMSXGroupID	string	<p>The identity of the message group this message is a part of.</p> <p>You can set this property on outgoing messages to group messages into a numbered sequence.</p>

Output Item	Datatype	Description
JMSXGroupSeq	integer	The sequence number of this message in its group. You can set this property on outgoing messages to group messages into a numbered sequence.

Error Output

The Error Output tab lists the following possible exceptions that can be thrown by this activity.

Activity Errors
InvalidEnvelopeException
InternalException
ConfigurationException
DeserializationException
ServerException

SOAP Request Reply

Activity



The SOAP Request Reply activity performs a request on the specified web service and optionally expects a reply from the web service. You can invoke both document and RPC web services with this activity.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Service	No	<p>This two-part field specifies the namespace and the name of the web service. The service specified must be a concrete service that has a binding to an actual network endpoint.</p> <p>You can use the Browse button to bring up the Select a Resource dialog. This dialog allows you to select the available services and operations from the specified WSDL file. The Port, Operation, and Endpoint URL fields will then be populated by the choices made in this dialog.</p>
Port	No	The port in the WSDL file containing the desired operation. The drop down list in this field is populated based on the specified service.
Operation	No	The operation that this activity invokes. This field is automatically populated when an operation is selected using the Select a Resource dialog (see the Service field for more information).
SOAP Action	Yes	The soapAction header for the operation. See the SOAP specification for more information about soapAction.

Field	Global Var?	Description
Timeout (sec)	Yes	The time to wait (in seconds) for the operation to complete. Note: You can also select Timeout as milliseconds (msec). Seconds (sec) is default.
Attachment Style	No	This field allows you to choose the attachment style. Two attachment styles are available: SwA and MTOM. The attachment style MTOM is available only if the activity uses SOAP 1.2 and is not displayed when SOAP 1.1 is used.

Reload Button

The Reload Button reloads the WSDL file. If the WSDL file has changed since it was last loaded, the configuration, input, output, and error output are updated with the changes.

Test Transport Connection

The Test Transport Connection button is only available when the transport is JMS. This button tests the connection to the JMS server.

Transport Details

The Transport Details tab allows you to specify additional configuration information based on the type of transport used for the SOAP request. When HTTP is the transport, the HTTP sub-tab appears on this tab. When JMS is the transport, the JNDI and JMS sub-tabs appear. See [SOAP Messages Over the JMS Transport on page 678](#) for more information about SOAP over the JMS transport.

The Transport Details tab contains the following fields:

Field	Global Var?	Description
HTTP Sub-Tab		
Endpoint URL	Yes	<p>The URL of the web service that you are sending a request to. This field is automatically populated with the choice made when selecting the service.</p> <p>You can specify URLs that use the HTTPS (secure sockets) protocol. If you specify HTTPS as the protocol, the SSL field becomes enabled.</p>
Use HTTP Proxy	No	When checked, this field specifies that an HTTP proxy server is used to connect to the SOAP server. Enabling this field causes the Proxy field to appear.
Proxy	No	Appears when the Use HTTP Proxy field is enabled. This field specifies the Proxy Configuration shared configuration resource that describes the HTTP proxy server. See Proxy Configuration on page 237 for more information.
HTTP Authentication	No	<p>Specifies what authentication should be used . An authentication can be of the following three types:</p> <ul style="list-style-type: none"> • NONE - is default. • BASIC - to continue with the current implementation of using username and password credentials. The Identity field appears when this field is enabled. • NTLM - Identity and Domain fields appear when NTLM is selected. Identity is a reference of the Username and Password combination.
Identity	No	This is an Identity resource that contains the client's username and password. This identity is used to perform only Basic and NTLM authentication.

Field	Global Var?	Description
Domain	No	Specifies the domain to be used for Authentication. The user name and password specified in the Identity field must exist in the domain.
JNDI Sub-Tab		
Context URL	Yes	<p>This is the URL to the JNDI service provider (<code>javax.naming.Context.PROVIDER_URL</code>). The value for this field is taken from the WSDL file, if it is available in the <code><jndi:context></code> element in the service specification. You can override the supplied value, if you want to use a different JNDI service provider.</p> <p>See your JNDI provider documentation for the syntax of the URL.</p>
User Name	Yes	User name to use when logging into the JNDI server (<code>javax.naming.Context.SECURITY_PRINCIPAL</code>). If the JNDI provider does not require access control, this field can be empty.
Password	Yes	Password to use when logging into the JNDI server (<code>javax.naming.Context.SECURITY_CREDENTIALS</code>). If the JNDI provider does not require access control, this field can be empty.
Context Factory	Yes	<p>The initial context factory class for accessing JNDI (<code>javax.naming.Context.INITIAL_CONTEXT_FACTORY</code>). The value for this field is taken from the WSDL file, if it is available in the <code><jndi:context></code> element in the service specification. You can override the supplied value, if you want to use a different context factory.</p> <p>Note: TIBCO ActiveMatrix BusinessWorks attempts to find the class. However, you may need to add the Java file supplied by your JNDI service provider to the CLASSPATH environment variable to use JNDI.</p>

Field	Global Var?	Description
Connection Factory	Yes	<p>The QueueConnectionFactory object stored in JNDI. This object is used to create a queue connection with a JMS application. The value for this field is taken from the WSDL file, if it is available in the <jms:connectionFactory> element in the service specification. You can override the supplied value, if you want to use a different connection factory.</p> <p>See your JNDI provider documentation for more information about creating and storing QueueConnectionFactory objects.</p>
SSL	No	<p>Specifies whether you want to use SSL for the connection to the JNDI server. SSL is used when the Use SSL? checkbox is checked. Click the Configure SSL button to configure the SSL connection parameters. See Configure SSL on page 662 for more information.</p>
SSL Password	Yes	<p>Password to use during the SSL connection.</p>
Validate Security Context	Yes	<p>Checking this field ensures that the security context provided on this tab is the one used to connect to the JNDI server.</p> <p>Some application servers store the security context on the thread used to establish the JNDI connection. Therefore the first activity to use this resource will establish the security context, and then subsequent activities will use the same security context, unless this field is checked. Checking this field ensures that each activity that uses this resource examines the security context to determine if the activity uses the same security context as the security context established on the thread. If they are different, the activity's configured security context is used.</p> <p>Checking this field causes additional overhead for activities that use this resource. The only supported application server that requires this field to be checked is WebLogic.</p>

Field	Global Var?	Description
Properties	No	<p>Any additional properties to supply for the connection. You specify a name, datatype, and value for each property.</p> <p>These properties are typically vendor-specific. See your JNDI provider documentation for more information about the available properties.</p>
JMS Sub-Tab		
User Name	Yes	User name to use to authenticate to the JMS server.
Password	Yes	Password to use to authenticate to the JMS server.
JMS Destination	Yes	<p>Name of the JMS destination for the SOAP request.</p> <p>The syntax of the destination name is specific to the JMS provider you are using. See your JMS provider documentation for more information about destination names.</p> <p>Note: If you are using TIBCO Enterprise Message Service as your JMS provider, you can use the Browse button next to this field after specifying a valid connection in the JMS Connection field. The Browse button displays a list of configured destinations in the JMS server that are appropriate for this activity.</p>
Message Type	Yes	<p>The type of the message. This can be one of the following:</p> <ul style="list-style-type: none">• Bytes Message — A stream of bytes.• Text Message — The message is a <code>java.lang.String</code>.

Field	Global Var?	Description
Delivery Mode	Yes	<p>The delivery mode of the message. Can be one of the following:</p> <ul style="list-style-type: none"> PERSISTENT — signifies the messages are stored and forwarded. NON_PERSISTENT — messages are not stored and may be lost due to failures in transmission. EMS_RELIABLE_DELIVERY — this mode is only available when using TIBCO Enterprise Message Service. See the TIBCO Enterprise Message Service documentation for more information about this mode.
Expiration	Yes	<p>Corresponds to JMSExpiration property that specifies how long the message can remain active (in seconds).</p> <p>If set to 0, the message does not expire.</p> <p>This field is set in seconds, but the JMSExpiration property is displayed in milliseconds.</p>
Priority	Yes	<p>Priority of the message. You may set the priority to a value from 0-9. The default value is 4.</p>
Use Shared JMS Configuration	No	<p>Check this field if you want to specify a JMS Connection shared configuration resource to override the JMS transport parameters in the concrete WSDL. When checked, this JMS Connection field appears.</p>
JMS Connection	No	<p>This field only appears when the Use Shared JMS Configuration field is checked. This field allows you to specify a JMS Connection shared configuration resource that contains the connection information you want to use to override the JMS transport parameters in the concrete WSDL.</p>

Configure SSL

This button allows you to configure the SSL connection parameters for connecting to the SOAP server. This button brings up a dialog with the following fields:

Field	Description
Trusted Certificates Folder	Folder in the project containing one or more certificates from trusted certificate authorities. This folder is checked when connecting to a server to ensure that the connection is to a server that is trusted. This prevents connections to rogue servers that attempt to impersonate trusted servers.
Identity	<p>This is an Identity resource that contains the client's digital certificate and private key.</p> <p>See <i>TIBCO Designer Palette Reference</i> for more information.</p>
Verify Host Name	<p>This field specifies that the host name of the SOAP server should be checked against the host name listed in the server's digital certificate. This provides additional verification that the host name you believe you are connecting to is in fact the desired host.</p> <p>If the host name specified in the Endpoint URL field on the Configuration tab is not an exact match to the host name specified in the server's digital certificate, the connection is refused.</p> <p>Note: If you specify an equivalent hostname (for example, an IP address) in the Endpoint URL field, but the name is not an exact match of the hostname in the host's digital certificate, the connection is refused.</p>

Field	Description
Strong Cipher Suites Only	<p>When checked, this field specifies that the minimum strength of the cipher suites used can be specified with the <code>bw.plugin.security.strongcipher.minstrength</code> custom engine property. See <i>TIBCO ActiveMatrix BusinessWorks Administration</i> for more information about this property. The default value of the property disables cipher suites with an effective key length below 128 bits.</p> <p>When this field is unchecked, only cipher suites with an effective key length of up to 128 bits can be used.</p>

Messages With Attachments

SOAP messages can have message parts that contain attachments. For a message part to contain an attachment, specify the Special Type in the Type field of the Part Details section of the [Message](#) resource when creating a WSDL file configuration. See [Chapter 19, WSDL Palette, on page 711](#) for more information about creating WSDL files.

Depending on the SOAP version being used, messages with attachments can conform to one of the following styles:

- Messages with Attachments (SwA) - available with SOAP version 1.1 and 1.2.
- Message Transmission Optimization Mechanism (MTOM) - available only with SOAP 1.2.

Messages with Attachments (SwA)

SOAP clients that send messages with attachments in the SwA style must conform to the SOAP Messages with Attachments specification (<http://www.w3.org/TR/SOAP-attachments>).

The input or output schema element for a message part that contains an attachment holds the content ID of the attachment instead of holding the actual attachment data. The actual data for attachments is always contained within the `mimeEnvelopeElement` of the output schema for this resource. This element contains a repeating element named `mimePart` that holds the list of attachments in the SOAP message. The attachment list can be correlated to the message parts containing the attachments by using the content-id `mimeHeader` element.


Message Transmission Optimization Mechanism (MTOM)

Message Transmission Optimization Mechanism (MTOM) provides another way of sending binary content or attachment processing by serializing SOAP messages with attachments. Optimization is only available for element content that is in a canonical lexical representation of `xs:base64Binary` data type. MTOM conforms to the specification <http://www.w3.org/TR/soap12-mtom>.

Any element of type `xs:base64Binary` (or an extension of `xs:base64Binary`) in the SOAP response message is treated as an MTOM attachment and appears as a separate MIME part on the wire. The SOAP message will have a XOP include reference to the attachment. Any XOP include reference in the SOAP message will be replaced by the corresponding attachment's content encoded in Base64. Any MIME attachment that is not referenced from the SOAP Message using XOP include reference will be ignored by the MTOM Processing layer. Note that the attachment is a part of the SOAP Infoset. See *TIBCO ActiveMatrix BusinessWorks Process Design Guide* for more information about MTOM and Write to File.

Advanced

The Advanced tab is used to specify the behavior of attachment for the reply message. This is useful if large messages are sent and you want to write them to files instead of storing them in memory. The Advanced tab has the following fields.

Field	Description
Write to File	<p>Checking this field specifies that incoming messages whose attachments exceed the specified threshold size should be written to a file instead of stored in memory. This allows you to accept large incoming attachments without consuming a great deal of memory. When this field is checked, the Directory and Threshold Size fields appear.</p> <p>Leaving this field unchecked specifies that attachments of incoming messages should be kept in memory.</p> <p>Note: Once written, the files created by using this option are not deleted automatically. You must manage the storage used by these files and delete them when they are no longer used.</p> <div> Although Write to File exists for SwA and MTOM, Soap over JMS completely depends on the heap size configuration as JMS specifications do not support writing JMS messages in parts as is the case with Soap over HTTP, which can be written over wire in parts. Hence, writing large JMS messages to JMS after configuring Write to File, completely depends on the Heap size.</div>
Directory	<p>The directory to write attachments that are above the specified threshold. The process engine does not attempt to create the directory if the specified directory does not exist. Therefore, create the directory before starting the process engine.</p>

Field	Description
Create Non-Existing Directories	<p>When checked, all directories in the path specified in the Directory field are created, if they do not already exist.</p> <p>If this field is unchecked and there are one or more directories in the specified path in the Directory field that do not exist, an exception is raised.</p>
Threshold Size (bytes)	<p>The maximum size (in bytes) of an incoming message attachment that can be kept in memory. Attachments larger than the specified size are written to a file in the specified directory. The file's name is output so that subsequent activities in the process definition can access the file and read its contents.</p> <p>Specifying zero (0) in this field causes all incoming messages to be saved to a file.</p>

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
inputMessage or <operationName>	complex	<p>The root class for the input of the SOAP Request Reply activity. This class contains all input items for the activity.</p> <p>If this is a document request, the input is named inputMessage. If the request is an RPC, the input is the name of the operation.</p>
mimeEnvelopeElement	complex	<p>This element contains the message attachments when mime attachments are used. This element contains a repeating element named mimePart that contains each mime attachment.</p>

Input Item	Datatype	Description
mimeHeaders	complex	<p>This element contains the mime header for each mimePart. Mime headers can contain the following information:</p> <ul style="list-style-type: none">• content-disposition• content-type• content-transfer-encoding• content-id• other mime header information <p>Note: When the content type is specified as "text/*" (for example, "text/xml"), the attachment content is expected to be in either the textContent input element or the file name storing the attachment is expected to be in the fileName input element. When the content type is anything other than "text/*", the attachment content is expected to be in either the binaryContent input element or the file name storing the attachment is expected to be in the fileName input element.</p>
binaryContent textContent fileName	choice	<p>This element contains the mime attachment. The element can be one of the following:</p> <ul style="list-style-type: none">• binaryContent — content of the attachment when the attachment is binary data.• textContent — content of the attachment when the attachment is text data.• fileName — the file name of the attachment when the attachment is stored in the file system.

Input Item	Datatype	Description
_configData	complex	Specifies the values to use to override transport-specific configuration values, if desired. The content of the _configData element depends upon the type of transport used.
endpointURL	string	Available only when HTTP is the transport. Specifies the Endpoint URL of the service. Specifying a value in this input item overrides any value specified in the Endpoint URL field on the Configuration tab.
host	string	Available only when HTTP is the transport. Specifies the host machine where the SOAP service resides as <i>host:port</i> . This should be used when sending a message through a tunnel.
JMSTargetDestination	string	Available only when JMS is the transport. Specifies the JMS destination (queue) name used to send messages.
JMSPriority	number	Available only when JMS is the transport. Specifies the priority of the message.
JMSExpiration	number	Available only when JMS is the transport. Corresponds to JMSExpiration property that specifies how long the message can remain active (in seconds).
soapAction	string	Specifies the soapAction header for the operation. See the SOAP specification for more information about soapAction. Specifying a value in this input item overrides any value specified in the Action field on the Configuration tab.

Input Item	Datatype	Description
headers	complex	<p>Any input headers defined in the WSDL file. The headers are stored in an element named <code>Header</code>. <code><partName></code> where <code><partName></code> is the element name of the input header schema.</p> <p>The <code>Header</code>. <code><partName></code> element also contains an item named <code>@mustUnderstand</code>. Set this boolean value to true if you want to specify that the SOAP server must understand the header.</p>
timeout	number	The time to wait (in seconds) for the operation to complete.
JMSReplyDestination	string	<p>Available only when JMS is the transport. Specifies the JMS destination (queue) name used to send the response.</p> <p>The JMSReplyDestination specified has to be unique for every message. Set the JMSReplyDestination to a non-static variable such as Job-Id to use the same JMSReplyDestination multiple times.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
outputMessage or <code><operationName>Response</code>	complex	<p>The root class for the output of the SOAP Request Reply activity. This class contains all output items for the activity.</p> <p>If this is a document request, the output is named outputMessage. If the request is an RPC, the output is the name of the operation with "Response" appended.</p>

Output Item	Datatype	Description
headers	complex	<p>Any output headers defined in the WSDL file. The headers are stored in an element named <code>Header</code>. <code><partName></code> where <code><partName></code> is the element name of the output header schema.</p> <p>The <code>Header</code>. <code><partName></code> element also contains an item named <code>@mustUnderstand</code>. This boolean value is set to true if the server specifies that the SOAP client must understand the header.</p>
mimeEnvelopeElement	complex	<p>This element contains the reply message attachments when mime attachments are used. This element contains a repeating element named <code>mimePart</code> that contains each mime attachment.</p>

Output Item	Datatype	Description
mimeHeaders	complex	<p>This element contains the mime header for each mimePart. Mime headers can contain the following information:</p> <ul style="list-style-type: none">• content-disposition• content-type• content-transfer-encoding• content-id• other mime header information <p>Note: When the content type is specified as "text/*" (for example, "text/xml"), the attachment content is expected to be in either the textContent output element or the file name storing the attachment is expected to be in the fileName output element. When the content type is anything other than "text/*", the attachment content is expected to be in either the binaryContent output element or the file name storing the attachment is expected to be in the fileName output element.</p>
binaryContent textContent fileName	choice	<p>This element contains the mime attachment. The element can be one of the following:</p> <ul style="list-style-type: none">• binaryContent — content of the attachment when the attachment is binary data.• textContent — content of the attachment when the attachment is text data.• fileName — the file name of the attachment when the Write to File field is checked on the Output Attachment Bindings tab.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
defaultFaultElement	The server returned a default SOAP fault.
ActivityTimedOutException	The activity reached the specified timeout and a response has not been received from the server.
<customFault>	The SOAP server has returned a custom fault. These faults are defined in the WSDL file and are listed as a choice element.
Errors when HTTP is the transport	
HttpClientException	The SOAP server has reported a client error.
HttpServerException	The SOAP server has reported an internal error.
HttpCommunicationException	An HTTP communications error occurred.
Errors when JMS is the transport	
JMSMessageCreateExpction	An error occurred when creating the request message.
JMSSessionCreteException	An error occurred when creating the JMS session to send the request message.
JMSSendException	An error occurred when attempting to send the JMS message.
JMSReceiveException	An error occurred when attempting to receive the JMS reply message.

SOAP Send Fault

Activity



The SOAP Send Fault activity sends a SOAP fault to the client if an error occurs during processing of a SOAP request.

This activity is used when the SOAP Event Source process starter handles incoming SOAP requests. The WSDL file for the request can have one or more fault messages defined for an operation (see [Chapter 19, WSDL Palette, on page 711](#) for a description of creating fault schemas for operations). The SOAP Send Fault activity can use the fault schema to send application-specific data about the fault back to the client that made the SOAP request.



This activity cannot be used if the SOAP request is one way.

SOAP faults are required to send the fault code and the fault string. These values are required input items on the Input tab. For example, "Client" can be used for client faults and "Server" can be used for server faults. See the SOAP specification at www.w3.org/TR/SOAP for more information about the syntax of SOAP fault codes.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Reply To	No	The SOAP Event Source process starter.

Field	Global Var?	Description
Fault Details	No	<p>The name of the fault message to send. This field provides a drop down list of the fault messages defined in the WSDL file specified for the SOAP Event Source process starter.</p> <p>You must select one of the fault messages to return to the client, and that message becomes part of the input schema for this activity's Input tab.</p> <p>The option <Default> is always available and can be used to send the default fault message.</p>

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.



TIBCO ActiveMatrix BusinessWorks uses the same schema for Fault messages regardless of the version of the SOAP protocol. See [SOAP Specification Compliance on page 622](#) for more information.

The input for the activity is the following.

Input Item	Datatype	Description
faultcode	string	The SOAP specification defines a specific syntax for faultcodes returned by a SOAP fault. See the SOAP specification for more information on how to specify a faultcode.
faultstring	string	The faultstring is a string message to pass back to the client describing the fault.

Input Item	Datatype	Description
faultactor	string	<p>The faultactor element is intended to provide information about who caused the fault to happen in the message path. It is similar to the SOAP actor attribute but instead of indicating the destination of the header entry, it indicates the source of the fault.</p> <p>The value of the faultactor attribute is a URI identifying the source of the fault. You may use the faultactor element to indicate explicitly that this TIBCO ActiveMatrix BusinessWorks process generated the fault.</p>
detail	complex	The fault message specified by the Fault Details field on the Configuration tab. This message is used to pass application-specific data back to the client in the event of a fault.

Output

The activity has no output.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
ServerException	An error occurred and the fault could not be sent to the client.

SOAP Send Reply

Activity



The SOAP Send Reply activity sends a reply to an application that sent a SOAP request. This activity is primarily used in process definitions that implement web services. When a [SOAP Event Source](#) is used as the process starter, the SOAP Send Reply activity is used to send the reply to the request that starts the process instance.



This activity cannot be used if the SOAP request is one way.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Reply To	No	The SOAP Event Source process starter that received the request.

Transport

The Transport tab has the following fields.

Field	Global Var?	Description
JMS Application Properties	No	Any application-specific message properties that will be part of the message. This is specified by the JMS Application Properties shared configuration resource. Once specified, these properties appear on the Input tab under TransportProperties as OtherProperties.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
outputMessage or <operationName>		The output schema of the operation for the selected SOAP request. Each of the schema elements are available in this dialog for mapping.
Header.<headerPart>	complex	Headers can contain multiple parts. The headers element contains all header parts required in a SOAP reply. These parts are specified on the Output Headers tab of the SOAP Event Source activity. The header parts are stored in an element named Header . <partName> where <schema-name> is the name of the schema specified on the Output Headers tab. Each Header . <partName> element also contains an item named @mustUnderstand. This boolean value is set to true in the outgoing reply if you require that the client must understand the header part.

Output

The activity has no output.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
ServerException	An error occurred and the reply could not be sent to the client.

SOAP Messages Over the JMS Transport

The HTTP transport does not provide guaranteed message delivery. The SOAP protocol is not specific to any transport, so SOAP messages in theory can be bound to any transport. JMS provides a highly reliable transport that can guarantee message delivery. TIBCO ActiveMatrix BusinessWorks supports sending and receiving SOAP messages over the HTTP and JMS transports.

As of Release 5.3.0, there is no standard specification for SOAP messages over JMS. TIBCO has proposed a specification with the following features:

- one-way and request/response operations
- the support is based on SOAP 1.1, SOAP 1.2, and WSDL 1.1

What's in the JMS Message

The following sections describe the content of the JMS message containing a SOAP request.

JMS Header

Table 9 describes the JMS headers.

Table 9 JMS headers for SOAP messages

JMS Header	Description
Content_Type	<p>This header must be one of the following:</p> <ul style="list-style-type: none">• application/xml for SOAP 1.1 or SOAP 1.2 without attachments• multipart/related for SOAP 1.1 or SOAP 1.2 <p>Note: Content type parameters are also allowed, for example, charset=utf-8.</p>
Mime_Version	Must be the string "1.0".
SoapAction	SOAPAction value as defined in the WSDL.
JMSDestination	This contains the destination name.
JMSReplyTo	<p>This contains the reply to address to be used by service provider to return data.</p> <p>Currently, only temporary queues can be used for reply messages.</p>
JMSMessageID	This contains a message ID generated by the JMS provider.

JMS Body

The JMS message body contains a binary representation of the actual SOAP message. Below is an example of a SOAP message.

```
<?xml version="1.0" encoding="UTF-8"?>
  <SOAP-ENV:Envelope xmlns:SOAP-ENV=
    "http://schemas.xmlsoap.org/soap/envelope/">
    <SOAP-ENV:Body SOAP-ENV:encodingStyle=
      "http://schemas.xmlsoap.org/soap/encoding/">
      <ns0:getCatalog xmlns:xs=
        "http://www.w3.org/2001/XMLSchema"
        xmlns:soap-enc=
          "http://schemas.xmlsoap.org/soap/encoding/"
        xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
        xmlns:ns0="http://InputMessageNamespace"/>
    </SOAP-ENV:Body>
  </SOAP-ENV:Envelope>
```

WSDL Extensions

The following sections describe extensions to the WSDL standard to support the JMS protocol.

WSDL Binding

The WSDL Binding for SOAP over JMS varies only slightly from the SOAP over HTTP binding. The transport attribute under `soap:binding` indicates that JMS is being used. The attribute must have the value:

`http://www.tibco.com/namespaces/ws/2004/soap/binding/JMS`.

For example:

```
<soap:binding style="document"
  transport="http://www.tibco.com/namespaces/ws/2004/soap/binding/JMS"/>
```

In addition to the `soap:binding` transport information, there must be a JMS binding element that describe the message type used for transmission. Currently, the only supported message types are `ByteMessage` and `TextMessage`. This looks like the following:

```
<jms:binding messageFormat="bytes"/>
```

An example of the complete WSDL binding section is show below.

```
<wsdl:binding name="RetailJMSBinding" type="tns:RetailerPortType">
  <soap:binding style="document" transport=
    "http://www.tibco.com/namespaces/ws/2004/soap/binding/JMS"/>
  <jms:binding messageFormat="bytes"/>
  <wsdl:operation name="getCatalog">
    <wsdl:documentation>The operation has no documentation</wsdl:documentation>
    <soap:operation style="document" soapAction="RetailGetCatalog"/>
    <wsdl:input>
      <soap:body use="encoded"
        encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
        namespace="http://InputMessageNamespace" parts="" />
    </wsdl:input>
    <wsdl:output>
      <soap:body use="encoded"
        encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
        namespace="http://OutputMessageNamespace" parts="return" />
    </wsdl:output>
  </wsdl:operation>
</wsdl:binding>
```

WSDL Service

The service section of the WSDL also contains extensions to support SOAP over JMS. The extension is defined with the following form where '?' means optional.

```
<wsdl:service>
  <jndi:context />?
```

```

<jms:connectionFactory />?
<wsdl:port>
  <jndi:context />?
  <jms:connectionFactory />?
  <jms:targetAddress />
</wsdl:port>
</wsdl:service>

```

In this definition, both `jndi:context` and `jms:connectionFactory` elements can possibly appear at two locations and they must appear at least once. When they appear under `wsdl:service`, the definition applies to all ports inside the service. When they appear under `wsdl:port`, the definition applies to only that port and it overrides the definitions that appear at the service level if it exists. If they do not appear at the service level, then each port must define them.

The `jms:connectionFactory` element is the JMS connection factory name that is used to connect with JMS service, using the JNDI context supplied in the `jndi:context` element. Below is an example of using TIBCO Enterprise Message Service as the JMS provider.

```

<jms:connectionFactory>QueueConnectionFactory
</jms:connectionFactory>

```

In a simple configuration, the `jms:connectionFactory` is the same for both the Service Provider and the Service Clients. However, both provider and clients can use different connection factories, provided that they all create connections to the same JMS provider instance.

The `jms:targetAddress` element contains address information which the service provider is going to listen for messages. Below is an example of using TIBCO Enterprise Message Service as the JMS provider with a queue name of `MyQueue`.

```

<jms:targetAddress destination="queue">MyQueue</jms:targetAddress>

```

The `jndi:context` element holds one or more `jndi:property` elements. Each of the `jndi:property` elements describes a JNDI name/value pair. For example,

```

<jndi:context>
  <jndi:property name="java.naming.factory.initial"
    type="java.lang.String">
    com.tibco.tibjms.naming.TibjmsInitialContextFactory
  </jndi:property>
  <jndi:property name="java.naming.provider.url"
    type="java.lang.String">
    tibjmsnaming://localhost:7222
  </jndi:property>
</jndi:context>

```

MimeParser

Activity



MimeParser

This activity is responsible for parsing the MTOM messages into a SOAP message that contains the binary attachments as an inline data of the SOAP message. The output can be either in a **Text** or a **Binary** format.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Input Style	No	The Input message format. (Currently only MTOM is available)
Output Style	No	The Output message format. You can choose either Text or Binary format for the output messages.

Advanced

The Advanced tab contains the following field:

Field	Global Var?	Description
GenerateStrictParsingErrors	No	When checked, this field generates strict parsing validation errors.

Input

The Input tab contains the following fields:

Input Item	Datatype	Description
MimeBinaryData	Binary	Incoming binary data

Output

The Output for the activity is the following.

Output Item	Datatype	Description
SOAPOutput		
soapMessage	Binary or String	Depends upon the type specified in the Output Style format
StrictValidationErrors	Complex	This appears only when the GenerateStrictParsingErrors checkbox is selected.
ErrorString	String	Shows strict parsing validation error logs.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity.

Exception	Thrown When...
XOPParseException	Specifies XOP related exceptions found in the input.
MimeParseException	Specifies MIME related exceptions found in the input.
InvalidXMLException	Specifies invalid xml related exception found in the input.

Chapter 17 **TCP/IP Palette**

This chapter describes the resources in the TCP/IP palette.

Topics

- [Overview of the TCP/IP Palette, page 686](#)
- [Read TCP Data, page 687](#)
- [TCP Close Connection, page 690](#)
- [TCP Connection, page 691](#)
- [TCP Open Connection, page 693](#)
- [TCP Receiver, page 695](#)
- [Wait for TCP Request, page 698](#)
- [Write TCP Data, page 700](#)

Overview of the TCP/IP Palette

The TCP/IP palette provides activities and resources that can send and receive data using the TCP/IP protocol. TCP/IP is often the underlying communication layer for higher-level protocols such as HTTP or FTP. You could use the resources in the TCP palette to communicate with HTTP or FTP servers, but the activities in the [HTTP Palette](#) or [FTP Palette](#) are best suited for this purpose. This palette is intended for use when communicating with TCP/IP and there is no corresponding TIBCO ActiveMatrix BusinessWorks palette for the protocol. For example, you may have a custom application that communicates with other applications by way of TCP/IP. You could use the TCP/IP palette to handle incoming and outgoing data from this application.

Using the TCP/IP Palette Activities

The general sequence of events when using the TCP/IP palette resources is the following:

1. Create a TCP Connection shared configuration resource that describes the connection information.
2. One of the following occurs depending upon whether the process definition is a TCP/IP client or server:
 - a. When a process definition acts as a TCP/IP client communicating with a TCP/IP server, a connection must be opened using the [TCP Open Connection](#) activity.
 - b. When a process definition acts as a TCP/IP server waiting for incoming TCP/IP requests, the process either starts with a [TCP Receiver](#) process starter or has a [Wait for TCP Request](#) activity that waits for an incoming connection request.
3. In the process definition the [Read TCP Data](#) and [Write TCP Data](#) activities are used to read and write data to the TCP connection.
4. Once all processing is complete, the [TCP Close Connection](#) activity is used to close the TCP connection.

Read TCP Data

Activity



The Read TCP Data activity reads data from an open TCP connection. The connection must be opened by an activity or process starter that executed previously in the process definition. Activities that can open a TCP connection are: [TCP Receiver](#), [TCP Open Connection](#), and [Wait for TCP Request](#). The activity that opens a TCP connection places a handle to the open connection in its connectionKey output element. The connectionKey is mapped to this activity’s input.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Type	No	Type of data to be read. This can be either Text or Binary. When Text is specified, the Separator, User Defined Separator, and Encoding fields appear. When Binary is specified, the Bytes to Read field appears.
Separator	Yes	The type of separator. This activity reads data from the TCP connection until the separator or the end of the data stream is encountered.
User Defined Separator	Yes	<p>When User-defined separator is chosen from the list in the Separator field, this field appears. This field specifies the separator character to use.</p> <p>When Binary is selected in the Type field, a user-defined separator can be a string representation of a single byte value or it can be comma-separated byte values (for example, 0x0a, 0x0b, 0x0c). For valid string representations of byte values, refer to the Java documentation for the <code>decode(String n)</code> method of <code>java.lang.Byte</code>.</p>

Field	Global Var?	Description
Encoding	Yes	When text data is specified, this field determines the character encoding of the text data.
Bytes to Read	Yes	When binary data is specified, this field specifies the number of bytes that should be read by this activity. If this field is left blank, then the activity reads until the end of the data stream is encountered.
Timeout	Yes	The time to wait (in milliseconds) for this activity to complete.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
connection	binary	The handle to the connection that you want to read data from. This connection is obtained from a previously executed activity in the process definition that opened the connection.
encoding	String	When text data is being read, this specifies the character encoding of the text. This value overrides the value specified in the Encoding field on the Configuration tab.
separator	String	When text data is being read, this specifies the separator to write after the body element is written to the TCP connection. This value overrides the value specified on the Configuration tab.

Input Item	Datatype	Description
bytesToRead	number	When binary data is being read, this specifies the number of bytes that should be read. This value overrides the value specified in the Bytes to Read field on the Configuration tab.
timeout	number	Time to wait (in milliseconds) for this activity to complete.

Output

The output for the activity is the following.

Output Item	Datatype	Description
data	String	When text data is specified, this output element contains the text read from the TCP connection. The separator character, if specified, is not included in the output.
binaryData	binary	When binary data is specified, this output element contains the binary data read from the TCP connection.
endOfStreamReached	boolean	This element is set to true when the end of the data stream has been reached. This is useful when the activity is in an iteration loop and the activity is configured to read a number of bytes with each iteration. This element can be used in the condition of the loop to determine when the last set of bytes has been read.

TCP Close Connection

Activity



The TCP Close Connection activity closes a TCP connection opened by a previously executed activity or process starter. Activities that can open a TCP connection are: [TCP Receiver](#), [TCP Open Connection](#), and [Wait for TCP Request](#). The activity that opens a TCP connection places a handle to the open connection in its connectionKey output element. The connectionKey is mapped to this activity’s input.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
connection	binary	The handle to the connection that you want to close. This connection is obtained from a previously executed activity in the process definition that opened the connection.

Output

The activity has no output.

TCP Connection

Shared Configuration



The TCP Connection is a shared configuration resource that specifies the connection information for the TCP server. This resource is used when a process definition acts as a TCP client connecting to a remote server or when a process definition acts as a TCP server accepting incoming TCP connections.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Host	No	<p>When a process definition acts as a client, this field specifies the host name or host IP address of the TCP server to connect to.</p> <p>When a process definition acts as a server, this field specifies the hostname or IP address of the machine where the process engine is running. You can specify "localhost" or if the machine has more than one network interface card, you can specify the IP address of the card you want to use to accept TCP/IP connections.</p>
Port	Yes	This field specifies the port number on which a TCP server is listening for requests.

Advanced

The Advanced tab has the following fields

Field	Global Var?	Description
enableDNSLookup	No	Checking this field enables a Domain Name System (DNS) lookup so that the IP address is resolved to a DNS name. This can adversely affect throughput, so enable this field only when required.

TCP Open Connection

Activity



The TCP Open Connection activity opens a connection to a TCP server. After establishing the connection, the activity places a handle to the open connection in the connectionKey output element. This connection key can be used by subsequent activities in the process definition to read data from, write data to, or close the connection.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
TCP Connection	No	The TCP Connection shared configuration resource that describes the TCP server you want to connect to.
Local Host	No	Specifies the IP address on the local machine that you want to use for the TCP client.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
connection	complex	A complex element that contains the information about the TCP server you want to connect to.

Input Item	Datatype	Description
host	String	The name or IP address of the TCP server you want to connect to. This value overrides the value specified by the TCP Connection resource on the Configuration tab.
port	number	The port number on which the TCP server is listening for requests. This value overrides the value specified by the TCP Connection resource on the Configuration tab.

Output

The output for the activity is the following.

Output Item	Datatype	Description
connection	binary	The handle to the open connection. This connection can be used by subsequent activities in the process definition to specify the TCP connection to write data to, read data from, or close.

TCP Receiver

Process Starter



The TCP Receiver process starter starts a new process when a client requests a TCP connection. When a connection request occurs, the process starter places a handle to the open connection in the connectionKey output element. This connection key can be used by subsequent activities in the process definition to read data from, write data to, or close the connection.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
TCP Connection	No	The TCP Connection shared configuration resource that describes the port on which the local machine is listening for incoming TCP/IP requests.
Keep-Alive	No	To specify whether the TCP connections should use the keep-alive feature of sockets, select the Keep-Alive checkbox. Note - TCP Keep-Alive is different from HTTP Keep-Alive.

Setting TCP Keep-Alive Parameters

Set the following OS level parameters to make the TCP Keep-Alive work.

Operating System	Parameter Wait Time before Connection Probe	Parameter Interval between Retry Probes	Parameter for Maximum Retry Probes	Unit of Measure
AIX	tcp_keepidle	tcp_keepintvl	tcp_keepcnt	half-second
HP-UX 11i	tcp_time_wait_inteval	tcp_keepalive_interval	tcp_keepalives_kill (1)	Milliseconds

Operating System	Parameter Wait Time before Connection Probe	Parameter Interval between Retry Probes	Parameter for Maximum Retry Probes	Unit of Measure
Linux	tcp_keepalive_time	tcp_keepalive_intvl	tcp_keepalive_probes	Seconds
Solaris	tcp_time_wait_interval	tcp_keepalive_interval	NA	Milliseconds
Windows	KeepAliveTime	KeepAlive Interval	TcpMaxDataRetransmission	Milliseconds

Misc

The Misc tab contains the following fields:

Field	Description
Sequencing Key	<p>This field can contain an XPath expression that specifies which processes should run in order. Process instances with sequencing keys that evaluate to the same value will be executed sequentially in the order the process instance was created.</p> <p>See <i>TIBCO ActiveMatrix BusinessWorks Process Design</i> for more information about controlling the execution order of process instances and about XPath expressions.</p>
Custom Id	<p>This field can contain an XPath expression that specifies a custom ID for the process instance. This ID is displayed in the View Service dialog of TIBCO Administrator, and it is also available in the <code>\$_processContext</code> process variable.</p>

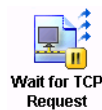
Output

The output for the activity is the following.

Output Item	Datatype	Description
connection	binary	The handle to the open connection. This connection can be used by subsequent activities in the process definition to specify the TCP connection to write data to, read data from, or close.
IP	string	IP address of the client sending the TCP request.
Host	string	Host name of the client sending the TCP request. This field is available only when the <code>enableDNSLookup</code> field in the Advanced tab of TCP Shared Connection is selected.
Port	integer	Port number of the client sending the TCP request.

Wait for TCP Request

Activity



The Wait for TCP Request activity waits for a TCP client connection request. When a connection request occurs, the activity places a handle to the open connection in the connectioney output element. This connection key can be used by subsequent activities in the process definition to read data from, write data to, or close the connection.

See [Scalability With Incoming Events on page 226](#) in *TIBCO ActiveMatrix BusinessWorks Process Design Guide* for information on running the "Wait for..." activities in a multi-engine mode.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
TCP Connection	No	The TCP Connection shared configuration resource that describes port on which the local machine is listening for incoming TCP/IP requests.
Keep-Alive	No	To specify whether the TCP connections should use the keep-alive feature of sockets, select the Keep-Alive checkbox. Note - TCP Keep-Alive is different from HTTP Keep-Alive.

Event

The Event tab has the following fields.

Field	Description
Candidate Event Key	This field cannot be used. Specifying a value in this field will not cause the value to be compared with the key field in the activity input.

Field	Description
Event Timeout (msec)	<p>A message may arrive before this activity is executed. This field specifies the amount of time (in milliseconds) a message waits if it is received before this activity is executed. If the event timeout expires, an error is logged and the event is discarded.</p> <p>If no value is specified in this field, the message waits indefinitely. If zero is specified, the event is discarded immediately, unless this activity has already been reached.</p>

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
key	string	This element cannot be used. Specifying a value for this element will not cause the value to be compared to the value of the Candidate Event Key field on the Event tab.
processTimeout	integer	The time (in milliseconds) to wait for the incoming TCP request. An error is returned if the request is not received in this time limit.

Output

The output for the activity is the following.

Output Item	Datatype	Description
connection	binary	The handle to the open connection. This connection key can be used by subsequent activities in the process definition to specify the TCP connection to write data to, read data from, or close.

Write TCP Data

Activity



The Write TCP Data activity sends data on the specified TCP connection. The connection must be opened by an activity or process starter that executed previously in the process definition. Activities that can open a TCP connection are: [TCP Receiver](#), [TCP Open Connection](#), and [Wait for TCP Request](#). The activity that opens a TCP connection places a handle to the open connection in its connectionKey output element. The connectionKey is mapped to this activity’s input.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Type	No	Type of data to be written. This can be either Text or Binary. When Text is specified, the Separator, User Defined Separator, and Encoding fields appear.
Separator	Yes	The type of separator to use. The separator is written to the TCP connection after the specified data is written.
User Defined Separator	Yes	<p>When User-defined separator is chosen from the list in the Separator field, this field appears. This field specifies the separator character to use.</p> <p>When Binary is selected in the Type field, a user-defined separator can be a string representation of a single byte value or it can be comma-separated byte values (for example, 0x0a, 0x0b, 0x0c). For valid string representations of byte values, refer to the Java documentation for the <code>decode(String n)</code> method of <code>java.lang.Byte</code>.</p>
Encoding	Yes	When text data is specified, this field determines the character encoding to use for the text data.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
connection	binary	The handle to the connection that you want to write data to. This connection is obtained from a previously executed activity in the process definition that opened the connection.
body	String or binary	The data to write to the TCP connection. The datatype of this field is either String or binary, depending upon which type of data is selected in the Type field on the Configuration tab
encoding	String	When text data is being written, this specifies the character encoding of the text. This value overrides the value specified in the Encoding field on the Configuration tab.
separator	String	When text data is being written, this specifies the separator to write after the body element is written to the TCP connection. This value overrides the value specified on the Configuration tab.

Output

The activity has no output.

Chapter 18 Transaction Palette

Transactions allow you to perform a group of activities as a single unit of work. All activities in the group either complete or commit together or one or more failures in the group cause the transaction to roll back or undo the changes made during the transaction. See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about transaction groups.

Topics

- [JTA UserTransaction Configuration, page 704](#)
- [Transaction State, page 707](#)
- [XA TransactionManager Configuration, page 709](#)

JTA UserTransaction Configuration

Shared Configuration



The JTA UserTransaction Configuration shared configuration resource contains the information required to communicate with a Java Transaction API (JTA) transaction manager. This resource is used by transaction groups that use the JTA UserTransaction type. See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about transaction groups.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Use Shared JNDI Configuration	No	<p>When this field is checked, the JNDI Configuration field appears that allows you to choose a JNDI Configuration shared configuration resource.</p> <p>When this field is unchecked, the JNDI Context Factory, JNDI Context URL, JNDI User Name, and JNDI Password fields appear.</p>
JNDI Configuration	No	<p>This field only appears when the Use Shared JNDI Configuration field is checked. This field allows you to choose a JNDI Configuration shared configuration object that specifies the JNDI connection information.</p> <p>See JNDI Configuration on page 176 for more information.</p>

Field	Global Var?	Description
JNDI Context Factory	No	<p>This field only appears when the Use Shared JNDI Configuration field is unchecked.</p> <p>The InitialContextFactory to use when connecting to the JNDI server (<code>javax.naming.Context.INITIAL_CONTEXT_FACTORY</code>).</p> <p>This field provides a drop down list of InitialContext Factories supplied by each supported application server vendor. You can supply a different InitialContextFactory other than the default options in the drop down list.</p>
JNDI Context URL	Yes	<p>This field only appears when the Use Shared JNDI Configuration field is unchecked.</p> <p>Specifies the URL of the server (<code>javax.naming.Context.PROVIDER_URL</code>). An example URL is provided when one of the supported JNDI context factory classes is selected.</p> <p>See your JNDI provider documentation for the syntax of the URL.</p> <p>When using IBM WebSphere, you should use the JNDI Configuration resource instead of specifying the JNDI configuration on this resource. See IBM WebSphere and JNDI Context Caching on page 178 for more information.</p>
JNDI User Name	Yes	<p>This field only appears when the Use Shared JNDI Configuration field is unchecked. User name to use when logging into the JNDI server (<code>javax.naming.Context.SECURITY_PRINCIPAL</code>). If the JNDI provider does not require access control, this field can be empty.</p>
JNDI Password	Yes	<p>This field only appears when the Use Shared JNDI Configuration field is unchecked. Password to use when logging into the JNDI server (<code>javax.naming.Context.SECURITY_CREDENTIALS</code>). If the JNDI provider does not require access control, this field can be empty.</p>

Field	Global Var?	Description
JNDI User Transaction Name	No	<p>The name registered with the JNDI server or application server for JTA UserTransactions. When you select one of the classes from the drop down list in the JNDI Context Factory field, an example transaction name appears in this field.</p> <p>See your JNDI provider or application server documentation for the syntax of the transaction name.</p>
Transaction Timeout (sec)	Yes	<p>Time in seconds to wait for transactions that use this resource to complete. An exception is raised if the transaction does not complete in the time specified by this field.</p> <p>Enter zero (0) in this field to use the default timeout set by the transaction manager.</p>
Connection Retries	Yes	<p>Maximum number of attempts to make to connect to the transaction manager.</p>

Test Connection Button

The Test Connection button allows you to test that the specified configuration fields result in a valid connection to the transaction manager.

Transaction State

Activity



rollback.

The Transaction State activity can be used in a transaction group to obtain the current state of the transaction or to set the transaction to a rollback only state. When a transaction is set to the rollback only state, the only outcome of the transaction that is permitted is a

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Options	No	<p>This field specifies the actions this activity can perform. Select one of the following options:</p> <ul style="list-style-type: none"> • <code>getStatus()</code> — When this option is selected, the current status of the transaction is returned in the output of this activity. • <code>setRollbackOnly()</code> — When this option is selected, the current transaction is set to a rollback only state. The only outcome allowed in this state is for the transaction to rollback. You would use this option if an error condition is detected and you want to rollback the transaction without raising an exception. You can only use this option when using a transaction manager that supports the <code>setRollbackOnly</code> method.

Input

This activity has no input.

Output

The output for the activity is the following.

Output Item	Datatype	Description
Status	integer	The numeric code that corresponds to the current status of the transaction. The numeric status codes vary for each transaction manager, but most transaction managers use the value from <code>javax.transaction.Status</code> . See the documentation for your transaction manager for a description of the possible status codes.

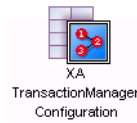
Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
<code>TransactionStateException</code>	An error occurred when attempting to retrieve or change the status of the transaction.
<code>java.lang.Exception</code>	The Java exception class.
<code>exceptionClassName</code>	The name of the exception class.
<code>exceptionMessage</code>	The text of the exception message.

XA TransactionManager Configuration

Shared Configuration



The XA TransactionManager Configuration shared configuration resource contains the information required to communicate with an XA-compliant transaction manager. This resource is used by transaction groups that use the XA Transaction type. See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about transaction groups.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Transaction Manager	No	<p>Name of the transaction manager service. Chose one of the following:</p> <ul style="list-style-type: none"> TIBCO BusinessWorks XA Transaction Manager — For more information see the documentation for this product. Arjuna Transaction Service — For more information about Arjuna, see http://www.arjuna.com/. JOTM — For more information about Java Open Transaction Manager, see http://jotm.objectweb.org/. Custom — Use this option when you are using an XA-compliant transaction manager. You must also specify the location of the transaction manager class files. You can optionally specify properties to pass to the transaction manager. <p>For more information about configuring third-party transaction managers with TIBCO ActiveMatrix BusinessWorks, see <i>TIBCO ActiveMatrix BusinessWorks Process Design</i>.</p>

Field	Global Var?	Description
Transaction Timeout (sec)	Yes	<p>Time in seconds to wait for transactions that use this resource to complete. An exception is raised if the transaction does not complete in the time specified by this field.</p> <p>Enter zero (0) in this field to use the default timeout set by the transaction manager.</p>
Custom Transaction Manager	No	<p>This field only appears when Custom is selected in the Transaction Manager field. This field allows you to select the location of the class for the implementation of the custom transaction manager.</p> <p>You can use an AliasLibrary resource to specify the location of the class files and then select that resource in the Library field. The class then appears in the Wrapper Class field.</p> <p>Alternatively, you can select the class using the browse button in the Wrapper Class field.</p>
Optional Properties	No	<p>This field only appears when you choose Custom in the Transaction Manager field. This field allows you to specify optional input parameters for the custom transaction manager implementation. You can add, remove, or move the parameters using the +, X, and arrow keys to the right of the table. Specify the name of the parameter, its datatype, and the value of the parameter.</p>

Chapter 19 WSDL Palette

The WSDL palette is used for creating, editing, validating, importing, and viewing WSDL (Web Service Description Language) files. These files are shared resources that describe web services. The WSDL palette's resources are used to create and reuse abstract definitions, namely:

- messages, which describe the data being exchanged
- portTypes, which define a set of operations
- and operations, which describe the activities supported by the web service

You can learn more about WSDL at <http://www.w3.org>.

Topics

- [WSDL, page 712](#)
- [Message, page 720](#)
- [PortType, page 723](#)
- [Operation, page 724](#)

WSDL

Resource

A WSDL file is an XML instance of the WSDL XML Schema, found at <http://schemas.xmlsoap.org/wsdl/>. A WSDL resource is composed of a series of definitions that describe the format and roles of messages used in web services. To create a new WSDL resource (with an empty set of definitions), drag the WSDL icon from the palette panel into the project panel. Once the WSDL resource has been created and selected in the project, the key components of abstract WSDL definitions — messages, portTypes, and operations — become available in the WSDL palette.

Configuration

The configuration panel is accessible when working in the model view (which loads by default). The fields in the Configuration tab are described below.

Field	Description
Resource Name	This is the name of the file when persisted. The *.wsdl suffix will be automatically added.
Description	Short description of the activity. This field is optional.
Target Namespace	This is the target name space of the WSDL document. This field will be populated by default with an example target namespace (http://xmlns.example.com). It is recommended that you enter a unique and meaningful namespace for each WSDL file. (In the WSDL source, this field represents the value of the <code>targetNamespace</code> attribute on the <code>definitions</code> element.)
Definition Name	A name for the definitions. Entries in this field are optional. Names must begin with a letter and may contain numbers, underscores, dashes, and periods. (In the WSDL source, this field represents the value of the <code>name</code> attribute for the <code>definitions</code> element.)

Field	Description
Copy From URL	<p>Once a new WSDL resource has been added to the project, you can copy the definitions of an existing WSDL file. To do so, enter the URL of the existing WSDL file to the Copy From URL field. Click Copy URL to retrieve the WSDL file and make a copy in the project. Once the copy is complete, all of the WSDL definitions are visible and editable.</p> <p>For example, if your WSDL file is located on the local MS Windows machine, you can use a URL like <code>file:///c:/wsdl/order.wsdl</code>.</p> <p>Instead of using this field, if you have the source code of your WSDL file, you can also copy it onto the clipboard and click the Display Source View button (see Toolbar on page 723 for a description of toolbar buttons). You can then paste the source of your WSDL into the source window.</p> <p>To locate a WSDL file by browsing a WSIL or UDDI registry, use the Browse UDDI button. (See Copying WSDL Definitions on page 716 for a description of the browsing interface.) Once the WSDL file has been selected, click Copy URL.</p> <p>Warning: The Copy URL and Browse UDDI buttons add the WSDL from the external resource once. There is no refresh option. If the external WSDL file changes, the Copy URL must be performed again.</p>

Toolbar

When a WSDL resource, or one of its components, is selected in your project, four extra buttons appear on the toolbar. These buttons are described in [Table 10](#).

Table 10 WSDL toolbar buttons





Button	Description
	<p>Opens the model view. The model view is the default view so, by default, this button is inactive.</p> <p>For more information on the model view, see Editing WSDL Resources on page 715.</p>

Table 10 WSDL toolbar buttons

Button	Description
	Opens the content view. For more information on the content view, see Editing WSDL Resources on page 715 .
	Opens the source view. For more information on the source view, Editing WSDL Resources on page 715 .
	Checks changes made in the content view to verify that the WSDL resource conforms to the WSDL schema. Errors are reported in an errors panel, which is displayed at the bottom of the content view.

Editing WSDL Resources

The key components (elements) of an abstract WSDL file are messages, portTypes, and operations. Three different views are available when editing the base WSDL file or one of its components. These editing views, accessed using the toolbar buttons (see [Table 10 on page 713](#)) are described below.

View	Description
Model	<p>This is the default view.</p> <ul style="list-style-type: none"> When a WSDL resource is selected, the Configuration tab provides fields for setting document level properties as well as an interface for copying existing WSDL definitions. For more information, see Configuration on page 712. <p>To add a Message or PortType component to the WSDL resource, drag the representative icon from the WSDL palette into design panel. The Message and PortType components can then be selected and edited.</p> <ul style="list-style-type: none"> When a Message component is selected in the project, the Configuration tab provides fields for naming and describing the component and a table for adding part components. For more information, see Message on page 720. When a PortType component is selected, the Configuration tab provides fields for naming and documenting the PortType component. For more information, see PortType on page 723. <p>To add an Operation component to the PortType, drag the representative icon from the WSDL palette into the design panel. The Operation component can then be selected and edited.</p> <ul style="list-style-type: none"> When an Operation component is selected, the Configuration tab provides fields for naming and describing the component and a table for specifying the messages to be used as input and output. For more information, see Operation on page 724. <p>Note: The WSDL palette’s model view enables the creation of an “abstract” WSDL file that may be used in a web service where additional SOAP endpoints and binding information will be added. To specify binding and endpoint information in the WSDL file, use the content or source view.</p>

View	Description
Content	<p>The content view provides a tabular view of the WSDL file, with the components (elements and attributes) of the WSDL file listed on the left, and the component values listed on the right.</p> <p>The content view provides access to all of the elements and attributes used to build WSDL files, which appear as choices on the factory bar located at the bottom of the view. The content view is useful when viewing concrete WSDL files or when you need to add elements to your resource that are not available in the model view - such as binding or service elements.</p> <p>The Content view provides the same editing environment used to create XML instance resources. For details on the content view, review the documentation for the Instance resource, in <i>TIBCO Designer Palette Reference</i>.</p>
Source	<p>The source view allows you to edit the source code of your document directly. If you are comfortable with WSDL syntax, editing directly in the WSDL source may be useful. To make the other panels reflect the changes you've made in the source, click 'Reparse' at the top of the panel. Any errors found upon reparse will be reported.</p>

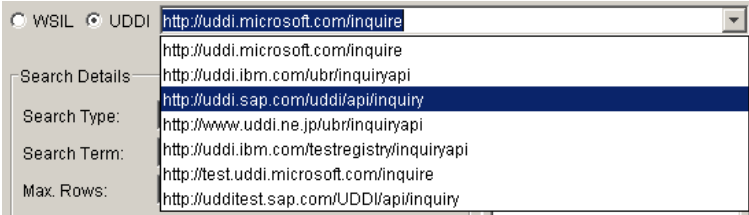
Copying WSDL Definitions

To copy the definitions of an existing WSDL file, you must first add a new WSDL resource to your project. If you know the location of the WSDL file you want to copy, enter the URL into the Copy From URL field and click Copy URL. The definitions from the external file will be copied into your WSDL resource.

If you are not sure of the location of the WSDL file, a WSIL and UDDI Registry Browser is provided, enabling you to browse well-known WSIL and UDDI directories. To access the browser, click Browse UDDI.

Use the radio buttons at the top of the browser to indicate whether you want to browse a WSIL directory or a UDDI registry. For the selected registry type, you can type in the location of the registry you want to browse in the field adjacent to the radio buttons or you can use this field's drop down menu to select from a list of popular registries, as shown in [Figure 27](#).

Figure 27 Specifying a UDDI registry



Once you have selected the registry to browse, use the Search Details section to select the type of services you want to browse. The Search Details section has the following fields.

Field	Description
Search Type	Use this field to specify the facet you want to use to locate the WSDL file. When browsing a WSIL registry, searches are conducted based on service name only. When browsing a UDDI registry, see Table 11 for a description of the available search types.
Search Term	To filter the registry's services, enter a search term corresponding to the facet selected in the Search Type field.
Max Rows	Specify the number of services you would like to be returned.
Case-sensitive	Indicate if the case of the search term should be considered when locating services.
Order Asc.	Indicate if the results should be ordered ascending. (Files are returned in descending order by default.)
Exact Match	Indicate if the search term must be matched exactly.
Timeout (msec)	Specify the amount of time permitted before a search is aborted.

Table 11 UDDI search types

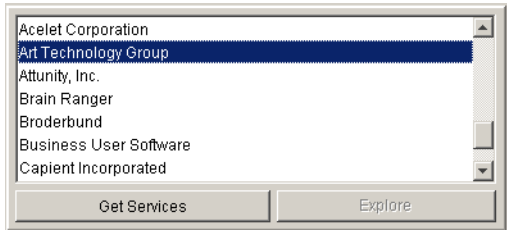
Search Type	Description
Service Name	In the Search Term field, specify a service name.
Business Name	In the Search Term field, specify business name.

Table 11 UDDI search types

Search Type	Description
Business Key	In the Search Term field, specify a uuid key for a business.
TModel Key	In the Search Term field, specify a uuid key for a tmodel.
ALL WSDLs	In the Search Term field, specify a service name. TModels of type wsdlSpec will be searched.
NAICS	In the Search Term field, specify a NAICS number. For more information, see http://www.naics.com .
ISO 3166	In the Search Term field, specify the code for a particular country. For a list of ISO 3166 codes, see http://www.iso.org/iso/en/prods-services/iso3166ma/02iso-3166-code-lists/list-en1.html
D-U-N-S	In the Search Term field, enter the nine digit D-U-N-S number. For more information, see http://www.dnb.com .
Geo Web	In the Search Term field, enter a Microsoft geoweb classification. For example, the value 514267 would return businesses from London.
SIC Code	In the Search Term field, enter the four digit SIC code. For more information, see http://www.siccode.com .
UNSPSC	In the Search Term field, enter a UNSPSC code. For more information, see http://eccma.org/unspsc/ .

Depending on the Search Type specified in the Search Details, either the Get Services or Explore buttons will become active. The Explore option returns a list of company names matching the search criteria, such as the companies with a particular NAICS or SIC code. (To see the services provided one of the companies on the list, select the company and click Get Services.) The results returned by the Explore button are shown in [Figure 28](#).

Figure 28 Companies returned by the Explore button



The Get Services option displays the WSDL files matching the search criteria in the table below the Search Details section, as shown in Figure 29.

Figure 29 List of returned services

Name	Description	WSDL or Access URL
Up to date NASCAR Winston Cup Statistics for cu...		http://www.einsteinware.com/webservices/nas...
Converts a given amount in digits to its equivalent...		http://www28.brinkster.com/hegdes/NumberT...
Converts a given amount in digits to its equivalent...		http://www28.brinkster.com/hegdes/NumberT...
Web service to calculate bond prices, yield to mat...		http://www.financialwebservices.ltd.uk/axis/ser...
Web service to calculate bond prices, yield to mat...		http://www.financialwebservices.ltd.uk/axis/ser...
ies that a given Singapore National Registration I...		http://www.rightsecurity.biz/wsdl/INRICWebServ...
ies that a given Singapore National Registration I...		http://www.rightsecurity.biz/wsdl/INRICWebServ...
Comparison of two pictures.		http://otourdes.europe.webmatrixhosting.net/E...
Comparison of two pictures.		http://otourdes.europe.webmatrixhosting.net/E...

From the list of returned WSDL files, highlight the file you want to copy and click OK. The URL for the service will appear in the Copy From URL field of the Configuration tab of the WSDL resource. Click Copy URL. The definitions from the external file will be copied into your WSDL resource.

Message

Component

The Message component is used to define the type of information being exchanged in a web service. One or more Message components can be added to a WSDL resource selected in your project.

Configuration

The configuration panel is accessible when working in the model view (which loads by default). The fields in the Configuration tab are described below.

Field	Description
Message Name	A name for the message. In the target namespace, message names must be unique and must begin with a letter and may contain numbers, underscores, dashes, and periods. (In the WSDL source, this field represents the value of the name attribute on the message element.)
Description	Optional short description of the activity. This information is added to the WSDL source as documentation.

Field	Description
Part Table	<p>Messages contain one or more parts that provide references to type information. Use this table to add part components to your message component. The Part Table contains the following columns:</p> <ul style="list-style-type: none">Name — Double click in this field to enable editing. Once activated, enter or edit the name of the part here. In the target namespace, part names must be unique and must begin with a letter and may contain numbers, underscores, dashes, and periods. (In the WSDL source, this field represents the value of the name attribute for the part element.)Type — This field displays the type information for the part. (In the WSDL source, this field represents the value of the type or element attribute of the part element.) The type may be a built-in XML Schema simple type or an element or complex type defined in an XML Schema. This field is not editable. The value for this field is specified by way of the Part Details fields. <p>When working in the Part Table, use the “+” button to create a new row, the “X” to delete rows, and the arrows to re-order parts.</p>
Part Details	<p>The Part Details options, used to specify type information for the part, appears when a row is selected in the Part Table.</p> <p>Indicate whether the reference should be to a type or element by clicking the respective radio button. Select Type to reference an XSD simple type (built-in or user-defined) or complex type. Select Element to reference an element defined in an XML Schema.</p> <p>Type information is selected using the Type drop down menu. If the XML Type Reference option is selected, or if your part references an element, use the Browse button. The Select a Resource window will appear, enabling you to select a type or element by browsing the project or namespace directories, or by searching for a specific name.</p>

Toolbar

When a Message component is selected in your project, four extra buttons appear on the toolbar. These buttons are described in [Table 10 on page 713](#).

Editing Message Components

There are three views available for editing message information. The editing views, accessed using toolbar buttons (see [Table 10 on page 713](#)), are described in [Editing WSDL Resources on page 715](#).

PortType

Component

The PortType component describes the operations that are supported by the web service. One or more PortType components can be added to a WSDL resource selected in your project. Once the portType component has been created and selected in the project, the Operation component becomes available in the WSDL palette.

Configuration

The configuration panel is accessible when working in the model view (which loads by default). The fields in the Configuration tab are described below.

Field	Description
Port Type Name	The name for the portType component. In the target namespace, portType names must be unique and must begin with a letter and may contain numbers, underscores, dashes, and periods. (This field represents the value of the name attribute for the portType element.)
Description	Optional short description of the portType activities. This information is added to the WSDL file as documentation.

Toolbar

When a PortType component is selected in your project, four extra buttons appear on the toolbar. These buttons are described in [Table 10 on page 713](#).

Editing PortType Components

The key component (element) of a PortType is an operation. Three different views are available when adding or editing operation components. These editing views, accessed using toolbar buttons (see [Table 10 on page 713](#)), are described in [Editing WSDL Resources on page 715](#).

Operation

Component

The Operation component describes the message formats for the incoming and outgoing messages required by the activities supported by the portType. One or more Operation components can be added to a PortType component selected in your project.

Configuration

The configuration panel is accessible when working in the model view (which loads by default). The fields in the Configuration tab are described below.

Field	Description
Operation Name	The name of the Operation component. In the target namespace, names must be unique and must begin with a letter and may contain numbers, underscores, dashes, and periods. (In the WSDL source, this field represents the value of the name attribute for the operation element.)
Description	Optional short description of the operation. This information is added to the WSDL resource as documentation.

Field	Description
Message Table	<p>Use this table to specify the format for the operation's input and output messages. The Message Table contains three columns:</p> <ul style="list-style-type: none"> • Message Kind — Use the drop down menu to select either input, output, or fault. By default an input message (which is accepted by the operation) and an output message (which is sent by the operation) are listed on the first two rows of the table. Because only one input and one output message is allowed per operation, any additional message rows are added as fault messages (which are used for error reporting). • Name — Double click in this field to enable editing. Once activated, enter the name of the input, output, or fault component here. (In the WSDL source, this field represents the value of the name attribute for either the input or output element.) • Message — This field displays the name of the message component that describes the desired format. (In the WSDL source, this field represents the value for the message attribute of the input or output element.) This field is not editable. The value for this field is specified using the Message Details fields. <p>When working in the Message Table, use the "+", "X", and arrows to create, delete, and re-order operation messages, respectively.</p>
Message Details	<p>When a particular row in the Message Table is selected, the namespace box defaults to the target namespace of the current WSDL file. In the field below, you can select a message component defined in this namespace using the drop down menu.</p> <p>To select a message component defined in a different WSDL resource, use the Browse button. The Select a Resource window will appear, enabling you to select a message by browsing the project or namespace directory, or by searching for a message name. When a message from a different namespace is selected, the appropriate import namespace declarations are automatically added to the document.</p>

Toolbar

When a Operation component is selected in your project, four extra buttons appear on the toolbar. These buttons are described in [Table 10 on page 713](#).

Editing Operation Components

There are three views available for editing operation information. The editing views, accessed using toolbar buttons (see [Table 10 on page 713](#)) are described in [Editing WSDL Resources on page 715](#).

Chapter 20 XML Activities Palette

The XML Activities palette provides activities for parsing XML strings into schemas and rendering schemas into XML strings.

Topics

- [Parse XML, page 728](#)
- [Render XML, page 732](#)
- [Transform XML, page 736](#)

Parse XML

Activity



The Parse XML activity takes a binary XML file or an XML string and processes it, turning it into an XML schema tree based on the XSD or DTD specified.

The preferred way to parse XML files is to use a [Read File](#) activity set to binary mode to read the XML file. Then pass the binary file contents to the Parse XML activity.

Parsing Date and Datetime Strings

In XML documents parsed by the XML Parser activity, datetime values are read in according to the ISO-8601 standard, as described in the XML Schema specification. For example, the value:

2002-02-10T14:55:31.112-08:00

is 55 minutes, 31 seconds, and 112 milliseconds after 2PM on February 10th, 2002 in a time zone that is 8 hours, 0 minutes behind UTC.

If no time zone field is present, the value is interpreted in the time zone of the machine that is performing the parsing. This can lead to complications if you are processing XML from different time zones, so you are encouraged to always use time zones.

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.

Field	Global Var?	Description
Input Style	No	<p>Can be binary, text, or dynamic.</p> <p>In binary mode (the default and preferred choice), the binary content is read. The encoding used for parsing the content is either the value specified in the forceEncoding input item, the encoding specified in the XML header of the xmlBinary input item, or UTF-8 (the default encoding, if no encoding is specified).</p> <p>In text mode, an XML string is passed as an input item.</p> <p>In dynamic mode, a choice is offered for input. You can either supply binary or text input. You can use a choice statement and set substitution in the mapping to supply the correct type of input at run time.</p>
Validate Output	No	When checked, specifies that the output of the activity should be validated against the schema specified in the Output Editor tab.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
xmlString	string	<p>The XML string to parse.</p> <p>This input element is available when the Input Style configuration field is set to text.</p>

Input Item	Datatype	Description
xmlBinary	complex	<p>Available when the Input Style configuration field is set to binary.</p> <p>This input item contains a required bytes item for which you specify the input XML bytes.</p> <p>This input item also contains an optional forceEncoding item. This specifies the encoding to use when parsing the XML. If this element is not specified, the encoding specified in the XML header of the byte element is used to parse the XML. If the encoding value is not specified in the XML header, the default encoding (UTF-8) is used.</p> <p>You can specify any valid XML encoding value listed in IANA-Charsets. See http://www.iana.org/assignments/character-sets for a complete list. Encoding names are case insensitive.</p>
xmlBinary xmlString	choice	<p>Available when the Input Style configuration field is set to dynamic.</p> <p>This allows you to specify a choice statement and set substitution and supply the correct input type at runtime.</p>

Output Editor

The Output Editor tab allows you to define a schema for the XML output. See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Output Editor tab.

Output

The output for the activity is the following.

Output Item	Datatype	Description
XML Schema	complex	The parsed XML schema is the output of this activity. The contents of the schema are determined by the schema defined on the Output Editor tab.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
XMLParseException	An exception occurred when parsing the data.
UnsupportedEncodingException	An unsupported encoding was specified in the forceEncoding input item. You can specify any encoding supported by Java on the system where TIBCO ActiveMatrix BusinessWorks is running.
MissingByteCountException	

Render XML

Activity



The Render XML activity takes an instance of an XML schema element and renders it as a stream of bytes containing XML or an XML string. The schema is processed based on the XSD file specified.

Rendering Date and Datetime Strings

WhenTIBCO ActiveMatrix BusinessWorks generates datetime strings, it always uses UTC time. For example, the time 55 minutes, 31 seconds, and 112 milliseconds after 2PM on February 10th, 2002 would be represented as the following by the Render XML activity:

2002-02-10T14:55:31.112Z

Configuration

The Configuration tab has the following fields.

Field	Global Var?	Description
Name	No	The name to appear as the label for the activity in the process definition.
Description	No	Short description of the activity.
Output Style	No	Specifies whether the output should be text or binary data.
Validate Input	No	When checked, specifies that the data input to the activity should be validated against the schema specified in the Input Editor tab.
Format Using Default Namespace Prefix	No	

Field	Global Var?	Description
Encoding	Yes	<p>This field is only available when the Output Style field is set to text. This field specifies the encoding value to place into the XML header of the rendered XML data.</p> <p>You can specify any valid XML encoding value listed in IANA-Charsets. See http://www.iana.org/assignments/character-sets for a complete list. Encoding names are case insensitive.</p>

Advanced

The Advanced tab allows you to specify which elements in the input schema can contain CDATA sections. CDATA sections allow you to enclose text within an element that should not be treated as XML.

The + button allows you to add elements of the input schema to the list. When you click the + button, a dialog appears that allows you to locate and select the input schema by location in the project or by namespace. Use the By Location tab if your input schema is located in the project directory. Use the By Namespace tab if you constructed the input schema on the Input Editor tab.

Use the X button to remove elements from the list and the up and down arrows to move elements in the list.

Input Editor

The Input Editor tab allows you to define a schema for the incoming XML data you want to render. See [Appendix A, Specifying Data Schema, on page 743](#) for a complete description of using the Input Editor tab.

Input

See *TIBCO ActiveMatrix BusinessWorks Process Design* for more information about mapping and transforming input data.

The input for the activity is the following.

Input Item	Datatype	Description
byteEncoding	string	<p>This is only available when the Output Style field on the Configuration tab is set to binary.</p> <p>This specified the encoding value to place into the XML header in the rendered XML output. This is also the encoding used to encode the binary data. If this item is not specified, the default encoding of the Java Virtual Machine used by the process engine is used to encode the binary data. This value may not be a valid XML encoding.</p> <p>You can specify any valid XML encoding value listed in IANA-Charsets. See http://www.iana.org/assignments/character-sets for a complete list. Encoding names are case insensitive.</p>
XML Schema	string	<p>The XML schema to render. The contents of the schema are determined by the schema specified on the Input Editor tab.</p>

Output

The output for the activity is the following.

Output Item	Datatype	Description
xmlString	string	<p>Available when text is selected in the Output Style field on the Configuration tab. This item contains the rendered XML string.</p>
xmlBytes	bytes	<p>Available when binary is selected in the Output Style field on the Configuration tab. This item contains a stream of bytes representing the rendered XML.</p>

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
<code>XMLRenderException</code>	An exception occurred when rendering the data.
<code>UnsupportedEncodingException</code>	An unsupported encoding was specified in the <code>byteEncoding</code> input item. You can specify any encoding supported by Java on the system where TIBCO ActiveMatrix BusinessWorks is running.
<code>MissingByteCountException</code>	

Transform XML

Activity



The Transform XML activity allows you to transform an input XML document into the output specified by the given [XSLT File](#) shared configuration resource.

Normally, transformation of data occurs by mapping process variables to an activity’s input and applying XPath expressions to perform any transformation. If you have an XSLT file that you are using for transformations, or if an outside source supplies an XSLT file, this activity allows you to use the XSLT file instead of manually creating the mappings.

For more information about creating and editing XSLT files, see the XSLT specification at <http://www.w3.org/TR/xslt>. For more information about creating an XSLT File shared configuration resource see [XSLT File on page 742](#).

See [Example of Transforming XML on page 739](#) for an example of using the Transform XML activity.

Configuration

The Configuration tab has the following fields.

Field	Description
Name	The name to appear as the label for the activity in the process definition.
Description	Short description of the activity.
Stylesheet	The XSLT File shared configuration resource to use when transforming the XML. You can also specify an XSLT stylesheet in the stylesheet input element, if desired. Stylesheets specified in the activity input will override the stylesheet specified in this field. See XSLT File on page 742 for more information.
Input and Output Style	Specifies whether the input and output is binary data, text, or an XML tree.

Field	Description
XSLT Engine	<p>Specifies the XSLT Engine to be used for the transformation. Following are the XSLT engines available in the drop down list:</p> <ul style="list-style-type: none"> — TIBCO XML - This is the default XSLT engine provided by TIBCO. — Saxon-B XSLT 2.0 - This engine provides basic conformance to XSLT 2.0. The engine provides all features of the languages except schema-aware processes. <p>See http://saxon.sourceforge.net/ for details about the Saxon-B XSLT 2.0 engine.</p>

Input

The input for the activity is the following.

Input Item	Datatype	Description
xmlBytesIn or xmlString or xmlTree	binary	<p>The XML to transform. If the input/output style is set to binary, this element is named xmlBytesIn. If the input/output style is set to text, this element is named xmlString. If the input/output style is set to tree, this element is named xmlTree.</p> <p>When an xmlTree is the input element, you can drag and drop an XML tree into the (any Element) to map a copy of an XML tree to the activity's input. See Figure 31 for an example of this.</p>
styleSheet	string	<p>This optional element contains the XSLT stylesheet to use to transform the XML input. This stylesheet overrides the stylesheet specified in the Stylesheet field on the Configuration tab.</p>

Input Item	Datatype	Description
parameter	complex	This repeating element contains the input parameters for the style sheet. Each input parameter is specified as name/value pairs. The name is a string that corresponds to the name of the parameter specified in the XSLT stylesheet parameter list.
name	string	The name of the stylesheet input parameter.
value	string	The value to supply for the specified stylesheet input parameter.
isXMLDocument	boolean	Specifies whether the parameter is an XML document.

Output

The output for the activity is the following.

Output Item	Datatype	Description
xmlString or xmlOutput or treeOutput	text or binary or complex	A binary or text value or an XML tree containing the output schema specified by the XSLT file. The element is named xmlString and is of type text when text is selected for the input/output style on the Configuration tab. The element is named xmlOutput and is of type binary when binary is selected. The element is named treeOutput and is a complex type when tree is selected.

Error Output

The Error Output tab lists the possible exceptions that can be thrown by this activity. See *TIBCO ActiveMatrix BusinessWorks Error Codes* for more information about error codes and corrective action to take.

Exception	Thrown When...
XMLTransformException	An exception occurred when transforming the data.
UnsupportedEncodingException	Data was supplied that is encoded in an unsupported encoding. You can specify any encoding supported by Java on the system where TIBCO ActiveMatrix BusinessWorks is running.
MissingByteCountException	

Example of Transforming XML

The following is an example of using the Transform XML activity to change an input XML document into the desired output schema. In this example, books are cataloged and processed. The user enters a book’s information into a web interface, and the web input form supplies a new catalog number and the date it was entered into the catalog. The process definition accepts the incoming web request, transforms the XML and adds the catalog number and date, enters the data into a database, then returns the results to the user. [Figure 30](#) illustrates the process definition for this example.

Figure 30 A process definition using the Transform XML activity



The Transform XML activity uses an XSLT file that accepts two input parameters, catalogNumber and catalogDate. These input parameters are added as elements to the Book schema. The following is the source of the XSLT File shared configuration resource for the example Transform XML activity:

```

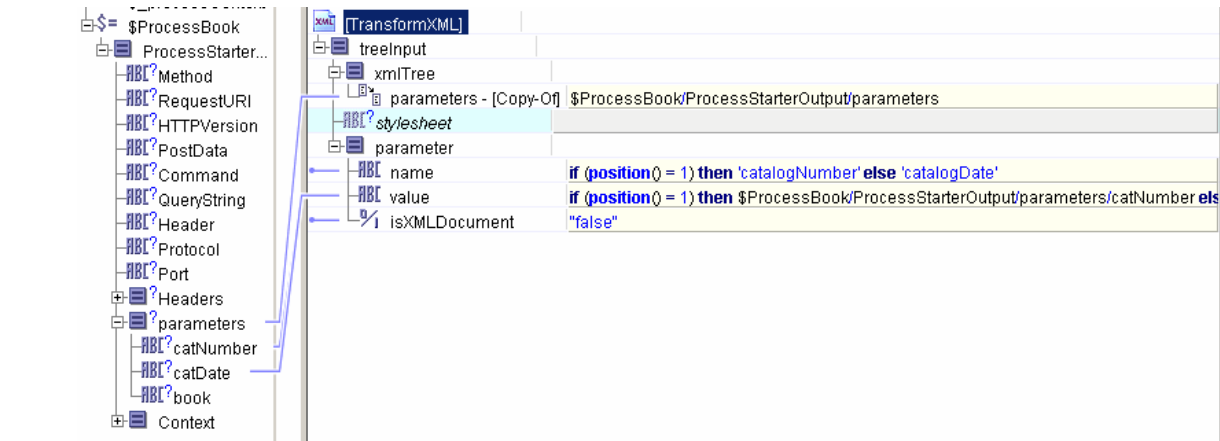
<xsl:stylesheet xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
version="1.0"
  xmlns:px="http://www.books.org">
  <xsl:param name="catalogNumber"> <!--type="string"--></xsl:param>
  <xsl:param name="catalogDate"> <!--type="string"--></xsl:param>
  <xsl:template match="/*">

```

```
<pfx:BookStore>
  <xsl:for-each select="Book">
    <xsl:call-template name="handle-book">
      <xsl:with-param name="inDate" select="$catalogDate"/>
    </xsl:call-template>
  </xsl:for-each>
</pfx:BookStore>
</xsl:template>
<xsl:template name="handle-book">
  <xsl:param name="inDate"> <!--type="string"--></xsl:param>
  <pfx:Book>
    <pfx:Title><xsl:value-of select="Title"/></pfx:Title>
    <pfx:Author><xsl:value-of select="Author"/></pfx:Author>
    <pfx:Date><xsl:value-of select="$inDate"/></pfx:Date>
    <pfx:ISBN><xsl:value-of
      select="$catalogNumber"/></pfx:ISBN>
    <pfx:Publisher><xsl:value-of
      select="TIBCO Software Inc."/></pfx:Publisher>
  </pfx:Book>
</xsl:template>
</xsl:stylesheet>
```

When you configure the Transform XML activity, you specify the incoming XML to transform any input parameters to the schema. [Figure 31](#) illustrates the input for the example Transform XML activity.

Figure 31 Input for the example Transform XML activity



The stylesheet has two input parameters. The XPath if statement is used to place the correct names and values into the correct parameters. Each parameter is specified as a name/value pair. Notice that the name of each parameter corresponds to the name specified for that parameter in the XSLT file.

The output of the Transform XML activity is a text string containing the XML. In our example process definition, we must insert the transformed data into a database table. To map the transformed data into the database UPDATE statement, the data must first be represented as a schema. To do this, we use the Parse XML activity to parse the output of Transform XML into an XML schema.

XSLT File

Shared Configuration



The XSLT File resource allows you to load an XSLT file to use to transform XML schemas using the [Transform XML](#) activity. See [Transform XML on page 736](#) for more information about using this shared configuration resource in a Transform XML activity.

A transformation expressed in XSLT is called a stylesheet. A stylesheet contains a set of template rules. Each template rule has two parts: a pattern that is matched against nodes in the source document and a template that can be instantiated to form part of the result document.

A transformation expressed in XSLT describes rules for transforming a source document into a result document. The transformation is achieved by associating patterns with templates. A pattern is matched against elements in the source document. A template is instantiated to create all or part of the result document. The structure of the result document can be completely different from the structure of the source document. In constructing the result document, elements from the source document can be filtered and reordered, and arbitrary structure can be added.

Appendix A **Specifying Data Schema**

Many activities in TIBCO ActiveMatrix BusinessWorks allow you to specify a custom data schema for input or output of the activity. This appendix describes the mechanism for specifying a custom data schema for an activity's input or output.

Topics

- [Editor, page 744](#)

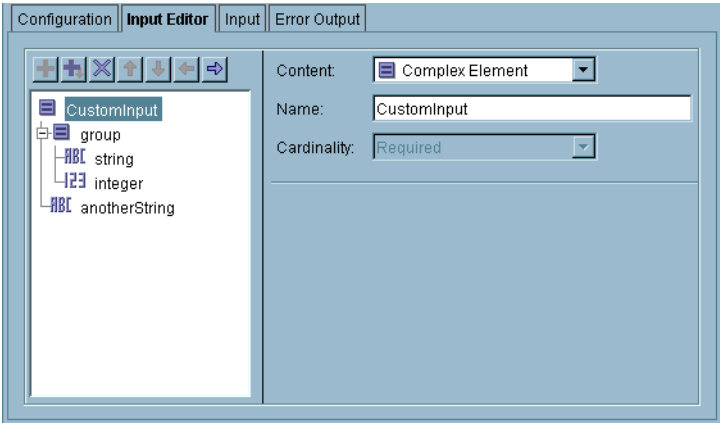
Editor

The Editor tab is used to specify a data schema for input or output of an activity. This is useful when the data does not have a well-known structure. The Editor tab is usually named for the type of schema you are creating. For example, the tab may be named "Input Editor" or "Output Editor".

For example, an email message has a well-known data structure, and therefore does not need a special datatype for its input. A JMS message, however, can have application-specific properties of any datatype. The Editor tab allows you to define the schema for any activities that require a specialized input or output schema.

You can use a simple datatype, or you can define a group of data elements on this tab. You can also reference XML schema or ActiveEnterprise classes stored in the project. Once defined, the schema appears on the appropriate tabs of the activity. The data in the schema then becomes available to other activities in the process definition.

The following illustrates the Editor tab. In this example, the Editor tab is labeled "Input Editor" indicating this is the activity's input.



To define a schema on this tab, use the icons above the schema tree to add, delete, or move data items. Then use the fields of the dialog to specify the datatype of each item.

Field	Description
Content	Defines the content of the element. The other fields that appear depend upon which content type is selected. See Table 12 for more information about the content type.

Field	Description
Name	The name of the element.
Cardinality	<p>The qualification for the data item. Data items can be specified as one of the following:</p> <ul style="list-style-type: none"> Required — the data item is required and must be supplied when the process is called. Optional (?) — the data item is optional. Repeating, Zero or More (*) — The data item is a list that has zero or more elements. Repeating, One or More (+) — The data item is a list that has one or more items.
Type	<p>The type of data. Can be any of the following:</p> <ul style="list-style-type: none"> XML Type Reference — must locate the stored XML schema definition. Any of the datatypes described in Table 13.
Schema Name	Stored XML schema that contains the element or type you want to reference.
Type Name	Type in a stored XML schema you want to reference.

[Table 12](#) describes the potential content types for data elements.

Table 12 Content types for schema elements

Content Type	Description	Other Fields for This Content Type
Complex Element	An element that contains other elements. This is like a structure in a programming language. The complex element can contain zero or more elements of other types, and it can contain other complex elements.	<p>Name</p> <p>Cardinality</p>

Table 12 Content types for schema elements

Content Type	Description	Other Fields for This Content Type
Element of Type	An element with a specified datatype. You can specify a scalar datatype (string, integer, and so on), you can reference an XML type, or specify the TIBCO ActiveEnterprise Any datatype.	Name Cardinality Type Other fields depending upon the datatype selected
XML Element Reference	A reference to an element in a stored XML schema. See TIBCO Designer documentation for more information about XML schema.	Cardinality Schema Element
Attribute of Type	An attribute with a specified datatype. You can specify a scalar datatype (string, integer, and so on), you can reference an XML type, or specify the TIBCO ActiveEnterprise Any datatype.	Name Cardinality Type Other fields depending upon the datatype selected.
Sequence	A sequence of elements. Each item in the sequence is a structure of the sub-elements of this element.	Cardinality
Choice	A choice of elements. The datatype of this element can be one of the sub-elements defined.	Cardinality
All	The datatype of this element can be all of the datatypes of the sub-elements defined.	Cardinality
XML Group Reference	A reference to an XML group in a stored XML schema. See TIBCO Designer documentation for more information about XML schema.	Cardinality Schema Model Group

Table 12 Content types for schema elements

Content Type	Description	Other Fields for This Content Type
Any Element	A reference to any XML Element. You can use the Coersion button to supply a reference to the XML Element for this item when it appears in the input or process data.	Cardinality Validation
WSDL Message	A reference to a message defined in a WSDL File resource. Use the Browse button to bring up a dialog for locating WSDL files within the project.	WSDL Message

Table 13 describes the datatypes available for data.

Table 13 Icons for schema datatypes


Icon	Description
	String or character value. You can specify the type of string as one of the following: <ul style="list-style-type: none"> String Normailzed String Token Language Name NC-Name Q-Name Name Token Name Tokens ID ID ref ID refs Entity Entites

Table 13 Icons for schema datatypes













Icon	Description
	Integer value. You can specify the size of the integer as one of the following: <ul style="list-style-type: none">• Byte• Short• Int• Long• Unsigned Byte• Unsigned Int• Unsigned Long• Integer• Positive Integer• Negative Integer• Non-positive Integer• Non-negative Integer
	Floating point number. You can specify the size of the schema item as float, double, or decimal.
	Boolean value.
	Date or Time. This can be any of the following datatypes: <ul style="list-style-type: none">• Time• Date• Date & Time• Duration• Day• Month• Year• Year & Month• Month & Day

Table 13 Icons for schema datatypes

Icon	Description
	Base 64 or hexadecimal value.
	An HTTP Uniform Resource Identifier.
	Complex element. Container for other datatypes.
	XML element or group reference.
	Sequence. Signifies that the contained sub-elements are repeated in an ordered sequence.
	Any Type. Represents a schema item with the TIBCO ActiveEnterprise datatype any. This node can be specified as any other datatype or a reference to an XML Type or AE Class.
	Any Element. Represents a schema item that can be a reference to any XML Element. You can use the Coersion button to supply a reference to the XML Element for this item.
	Choice. Specifies that the schema element can be one of a specified set of datatypes.

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