

## Designing, deploying and monitoring BPEL processes with Spagic3

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## 1 Purpose

The purpose of this document is to provide an introduction on using the Spagic3 platform: it does so with walkthrough of the design, deployment and the monitoring stages of a sample BPEL process.

For this purpose, Spagic Studio integrates on the Eclipse platform, the BPEL Designer to model the processes and Apache ODE runtime to execute them.

Installation and configuration of the BPEL Designer in Spagic Studio and ODE are outside the scope of this document.

## 2 Versions History

<b>Version/Release n° :</b>	1.0	<b>Date</b>	23/09/2009
<b>Description</b>	First release (English version)		

### 3 Introduction

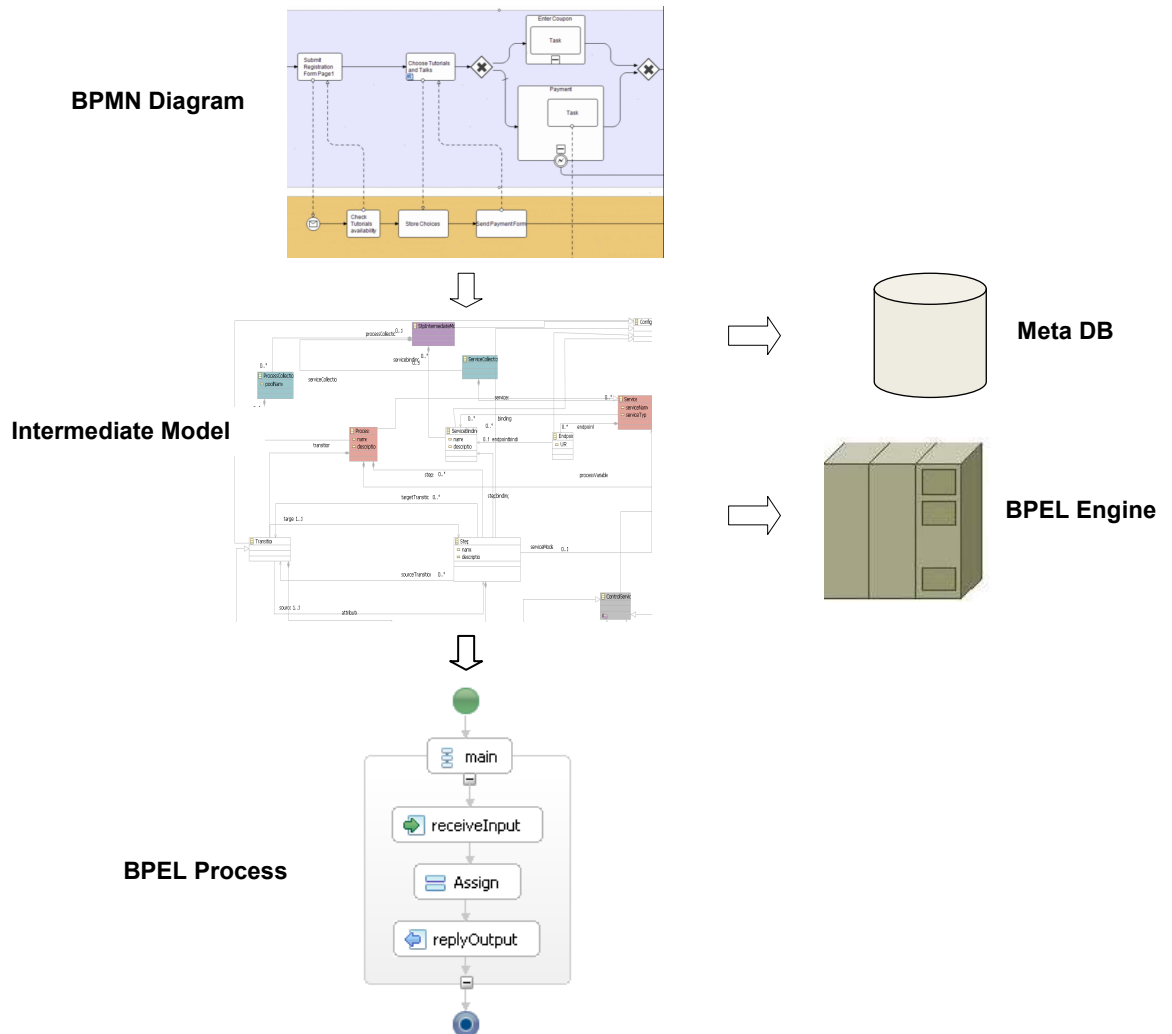
Spagic3 platform allows designing, executing and monitoring BPEL processes.

Spagic 3 allows creating BPEL processes either from BPMN diagrams or, new to this version, by using the integrated BPEL designer.

In fact, in **previous versions**, to design a BPEL process in order you had to:

- model a BPMN diagram representing the process, using the BPMN editor integrated in the platform,
- generate the intermediate model by the BPMN diagram,
- generate the BPEL process by the intermediate model,
- complete the BPEL process with technical configurations and data, using the BPEL designer editor integrated in the platform,
- deploy the intermediate model into meta database,
- generate the service assembly and publish it in servicemix, where it is executed and monitored.

The process executions are displayed through the console. The following figure shows the flow:



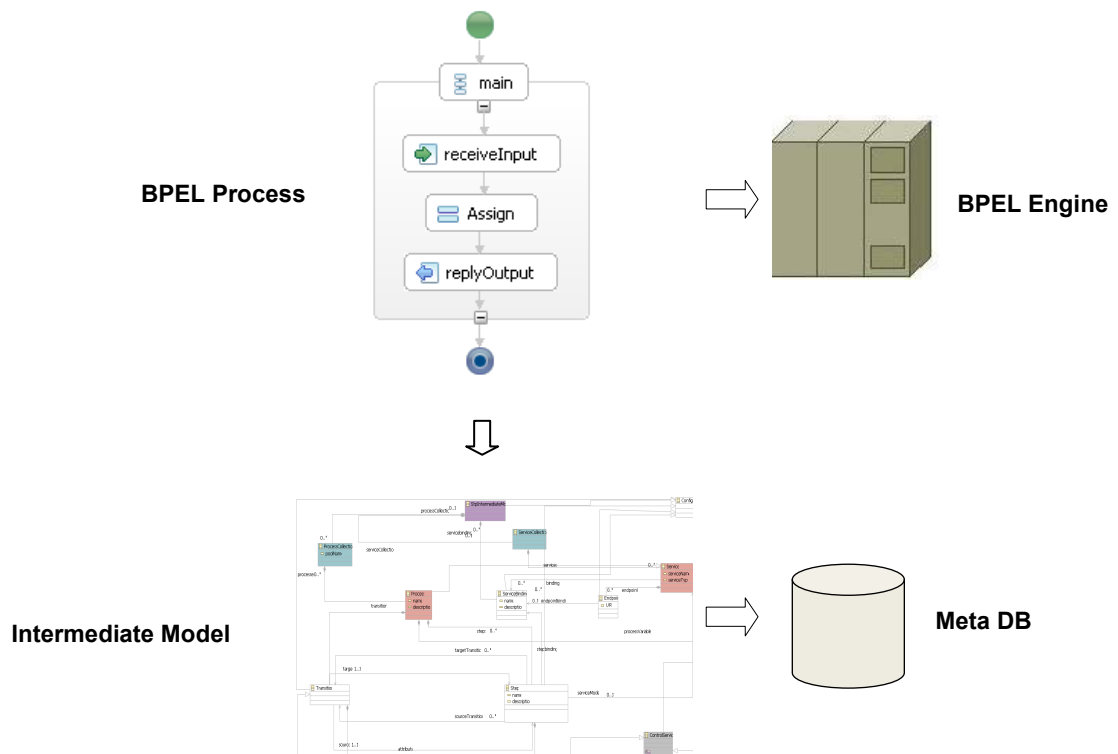
In **Spagic3**, to design a BPEL process you can:

- model the BPEL process using the BPEL designer editor,
- deploy the process into the Apache ODE, the BPEL engine, where it is executed and monitored.

The intermediate model generation is transparent to the user.

The process executions are displayed through the console.

The following figure shows the flow:



This document is organized as follows:

- A section that shows how to design a process and also a how to configure the port, the binding and the deployment descriptor associated;
- A section that explains how to execute it;
- A section that introduces the console to monitor the process execution;
- A section with some examples associated with the main BPEL constructs.

For more details about Spagic Console, see the document *Spagic Studio User Guide.doc*

For more details about Spagic Studio environment see the document *Spagic Studio User Guide.doc*.

## 4 Requirements

Required Tools	URL for download/Notes	Required for Spagic Studio	Required for Spagic Console
Database	MySQL Oracle H2	✓	✓
Apache ODE 1.3.3	<a href="http://ode.apache.org/">http://ode.apache.org/</a>		✓
GraphViz	<a href="http://www.graphviz.org/">http://www.graphviz.org/</a>	✓	
JDK 1.5.0_11 or later	<a href="http://java.sun.com/">http://java.sun.com/</a>	✓	✓
Apache Tomcat 6.0.x	<a href="http://tomcat.apache.org">http://tomcat.apache.org</a>		✓
Mozilla Firefox 3.x	<a href="http://www.mozilla.com">http://www.mozilla.com</a>		✓

## 5 Developing a Process

Spagic Studio is an Eclipse environment that allows the use of a single interface in order to create components and processes managing the entire development cycle. For the details, see the documents *Spagic Studio User Guide*.

Spagic Studio integrates the Bpel Designer to design BPEL processes.

In this section we'll shortly describe all steps to develop a BPEL process using a simple example.

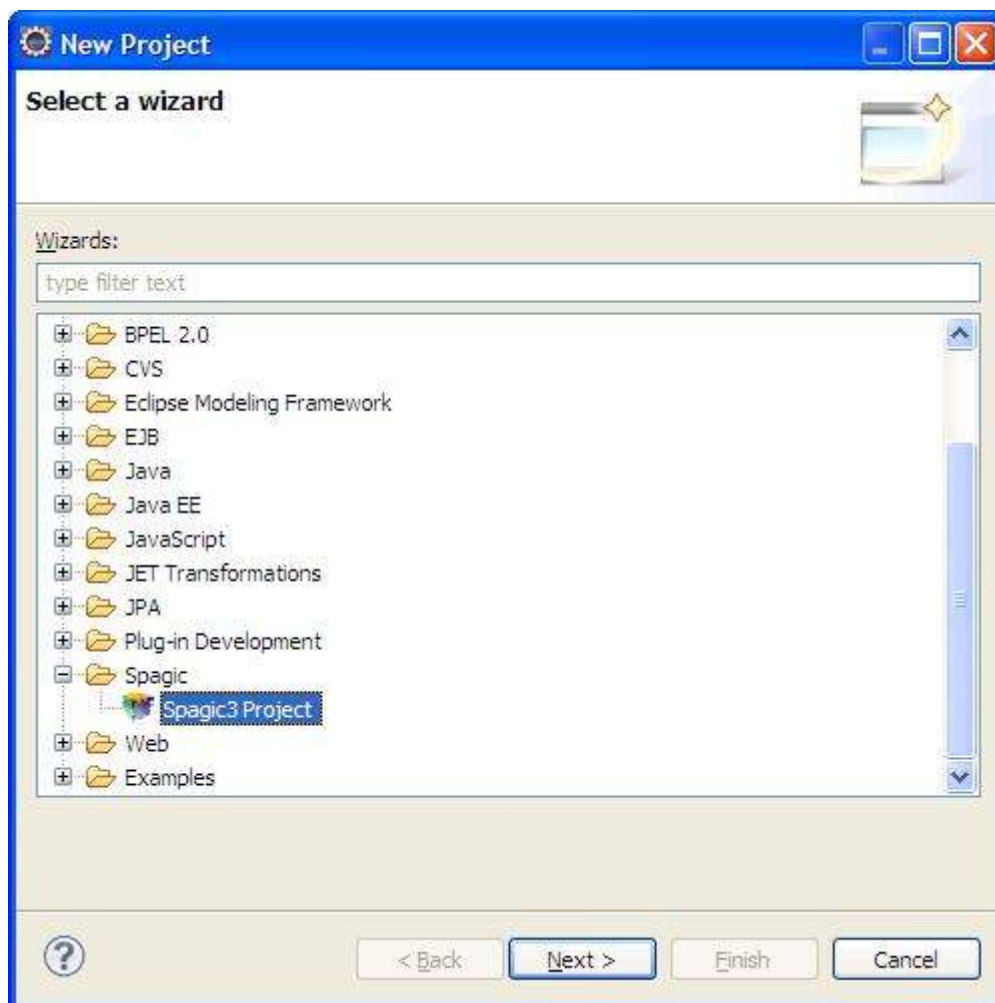
### 5.1 Create a Spagic3 project

Open Spagic Studio and create a workspace for working, for example call it *SpagicDemo*.

As first step, configure the Spagic General Preferences from *Window->Preferences-> Spagic General Preferences*; set the attributes for:

- the graphviz application in the main page, section *Graph Viz*;
- the ODE urls in *Spagic BPEL* tab;
- the metaDB in *Spagic Meta Database* tab.

To create a new project, select *File->New->Project->Spagic->Spagic3 Project*, insert a Project Name, *StartSpagic*, click *Finish*.

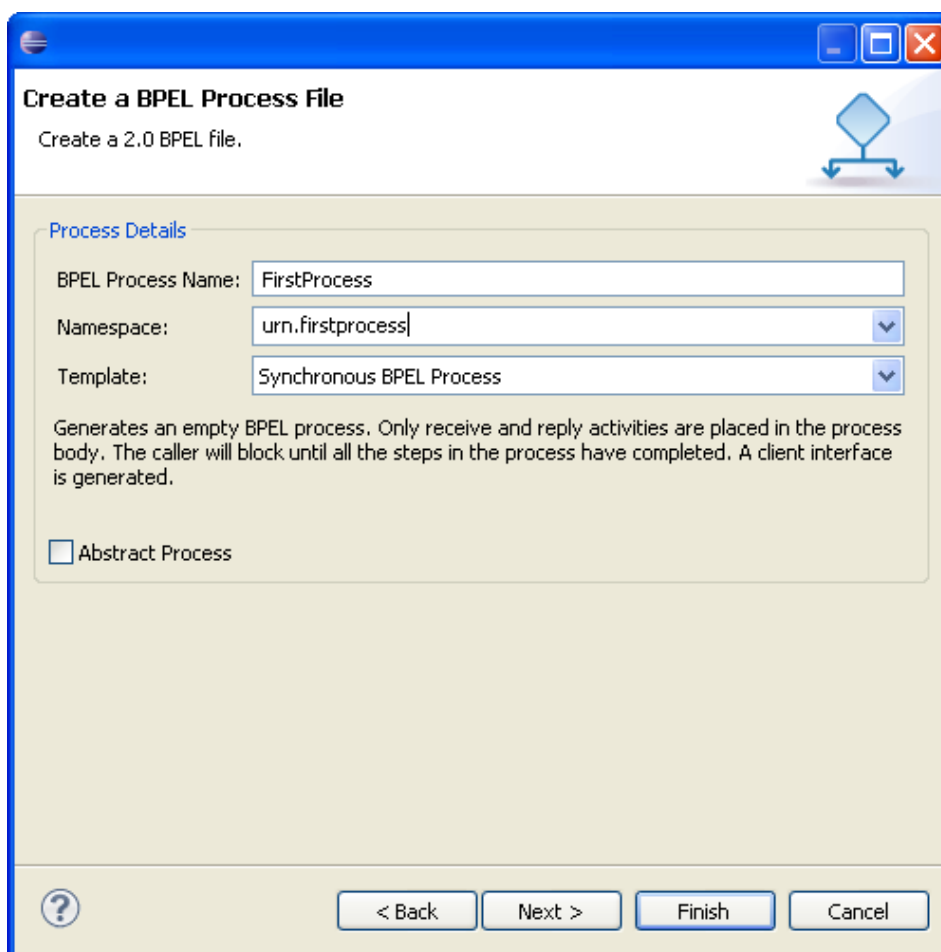


In the workspace, the project just created has a standard structure containing the followings directories:

*Connectors, Processes, Resources, Services.*

## 5.2 Design the process

To define a new process, select the *Processes* folder, open the context menu and *New->Other->BPEL2.0->New BPEL Process File*, click *Next*. Insert the *BPEL Process Name*, for example *FirstProcess*, the *Namespace*, for example *urn.firstprocess* and select the template *Synchronous BPEL Process* as shown in the following screenshot.



**Create a BPEL Process File**  
Create a 2.0 BPEL file.

**Process Details**


BPEL Process Name:

Namespace:

Template:

Generates an empty BPEL process. Only receive and reply activities are placed in the process body. The caller will block until all the steps in the process have completed. A client interface is generated.

☐ Abstract Process



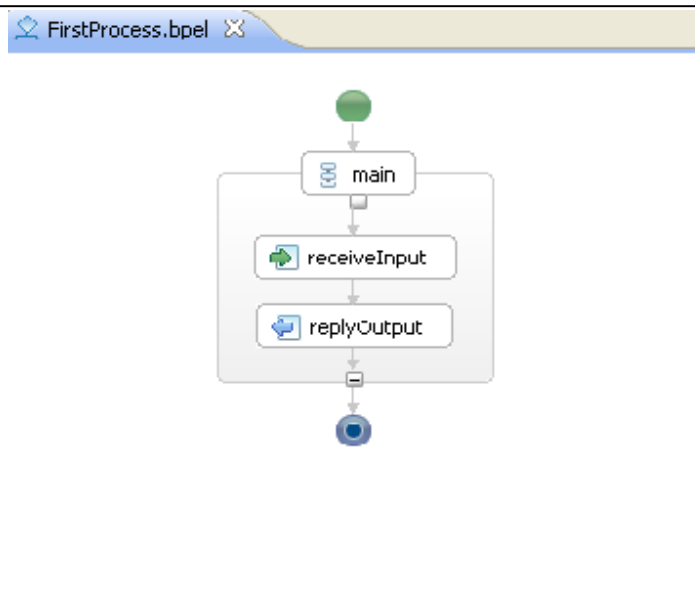
Click *Next*, select *SpagicDemo* folder, then *Processes* folder, click *Finish*.

Spagic Studio will show in the BPEL Designer editor the process just created.

The result should be similar to the following screenshot.



## BPEL processes with Spagic3



To complete the process, select, from the palette located at the right of the editor, under the category *Actions*, an *Assign* activity and put it to the editing area, between *receiveInput* and *replyOutput*.

Select the *Assign* activity in the editor area, right-click, select *Show in Properties*. In the *Details* page, we create an assignment, selecting *New*, then select *From Variable* and specify the payload for the *input*. Select *To Variable* and specify the payload for the *output*. Click *Yes*, when the dialog relative the Initialization variables is displayed. Save the process.



### 5.3 Configure Port and Binding

In order to execute the process, we have to define a Port and a Binding. Double-click on the file *FirstProcessArtifact.wsdl* to open the Wsdl editor. Select the editor area, open the context menu, and select *Add Service*. Configure the name as *FirstService*. Rename the *NewPort* in *FirstPort* and configure this as shown in the following screenshot.

## BPEL processes with Spagic3

port

General

Documentation

Extensions

Name:

FirstPort

Binding:

Address:

http://localhost:8080/ode/processes/first

Protocol:

SOAP

Save the wsdl file.

Select the editor area, open the context menu, and select *Add Binding*. Configure the name as *FirstBinding*, in *Port Type* select *FirstProcess*, click *Generate Binding Content*, in the dialog select the *Protocol* SOAP, and click *Finish*.

binding

General

Documentation

Extensions

Name:

FirstBinding

PortType:

FirstProcess

Protocol:

SOAP

Generate Binding Content...

In the editor area, select the *FirstPort* and configure his *Binding* selecting *FirstBinding*.

port

General

Documentation

Extensions

Name:

FirstPort

Binding:

FirstBinding

Address:

http://localhost:8080/ode/processes/first

Protocol:

SOAP

Save the wsdl file.

The result should be similar to the following screenshot.

FirstProcess.bpel

FirstProcessArtifacts.wsdl

FirstService

FirstPort

http://localhost:8080/ode...

FirstProcess

process

input

payload

FirstProcessRequest

output

payload

FirstProcessResponse

Design

Source

Problems

Javadoc

Declaration

Error Log

Properties

port

General

Documentation

Extensions

Name:

FirstPort

Binding:

FirstBinding

Address:

http://localhost:8080/ode/processes/first

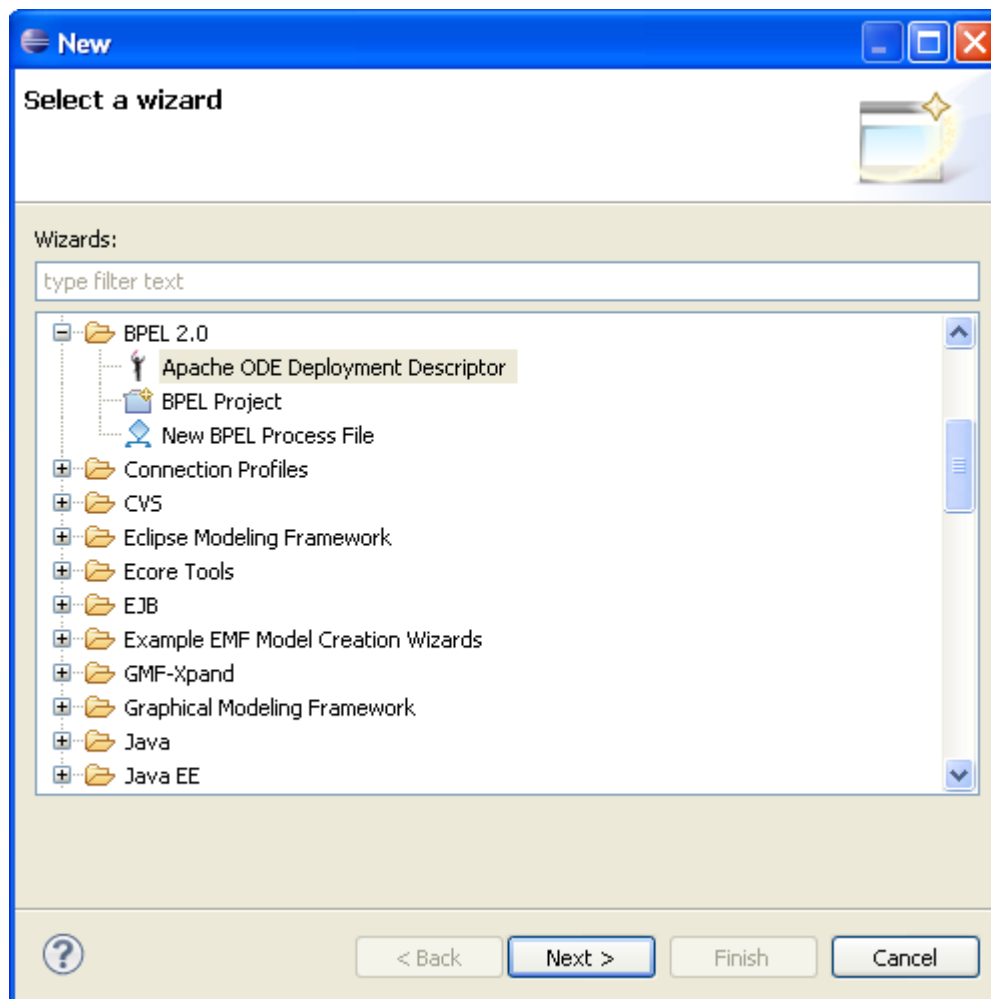
Protocol:

SOAP

## 5.4 Configure the deployment descriptor

In order to deploy the process, we have to generate and configure an ODE deployment descriptor file.

Select the *Processes* folder, open the context menu, and select *New -> Other -> BPEL2.0 -> Apache ODE Deployment Descriptor*.



Click *Next*, check that the BPEL Project has been set to */SpagicDemo/Processes*. Click *Finish*.

In the *Processes* folder, the *deploy.xml* file has just been generated. Right-click on *deploy.xml* file, select *Open With -> ODE Deployment Descriptor Editor*. Associate the port *FirstPort* to *client* partner link, as shown in the following screenshot. Save the file.

## BPEL processes with Spagic3

FirstProcess.bpel
FirstProcessArtifacts.wsdl
\*deploy.xml

Process FirstProcess - urn.firstprocess

**General**

This process is activated

☐ Run this process in memory

**Inbound Interfaces (Services)**

The table contains interfaces the process provides. Specify the service, port and binding you want to use for each PartnerLink listed

Partner Link	Associated Port	Related Service	Binding Used
client	FirstPort	{urn.firstprocess}FirstService	FirstBinding

**Outbound Interfaces (Invokes)**

The table contains interfaces the process invokes. Specify the service, port and binding you want to use for each PartnerLink listed

Partner Link	Associated Port	Related Service	Binding Used
--------------	-----------------	-----------------	--------------

**Process-level Monitoring Events**

☐ None
☒ All
☐ Selected

☐ Instance life cycle  
☐ Activity life cycle  
☐ Data handling  
☐ Scope handling  
☐ Correlation

**Scope-level Monitoring Events**

FirstProcess

## 5.5 Publish the process

After designing the process, you have to publish it: this operation execute the following steps:

- generates the Intermediate Model associated to BPEL process,
- creates a .zip containing .bpel, .wsdl, deploy.xml,
- deploys the process into Apache ODE,
- retrieves the version process from ODE and set it into the Intermediate Model,
- saves the process information (properties, flow...) into the MetaDB.

**Before the publishing, assure that Apache ODE 's running.**

To publish the process, select the .bpel file, open the context menu and select *Spagic BPEL->ODE Deploy*.



## BPEL processes with Spagic3

When the dialog appears, click **Ok**.

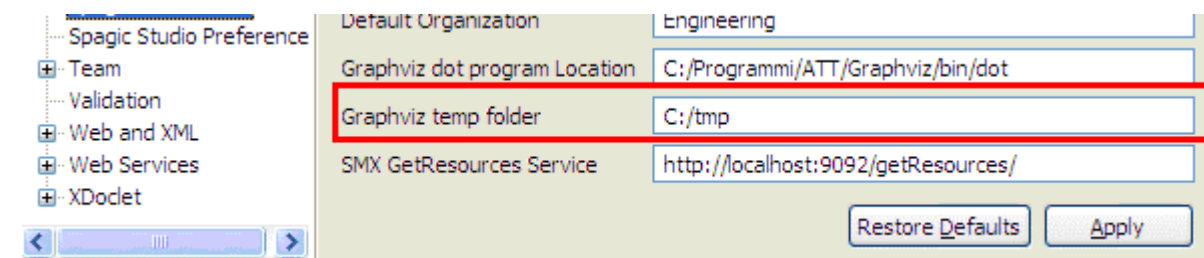
When the publishing is completed, the following dialog will be displayed.



In the Apache ODE console, the deployment is displayed in this way:

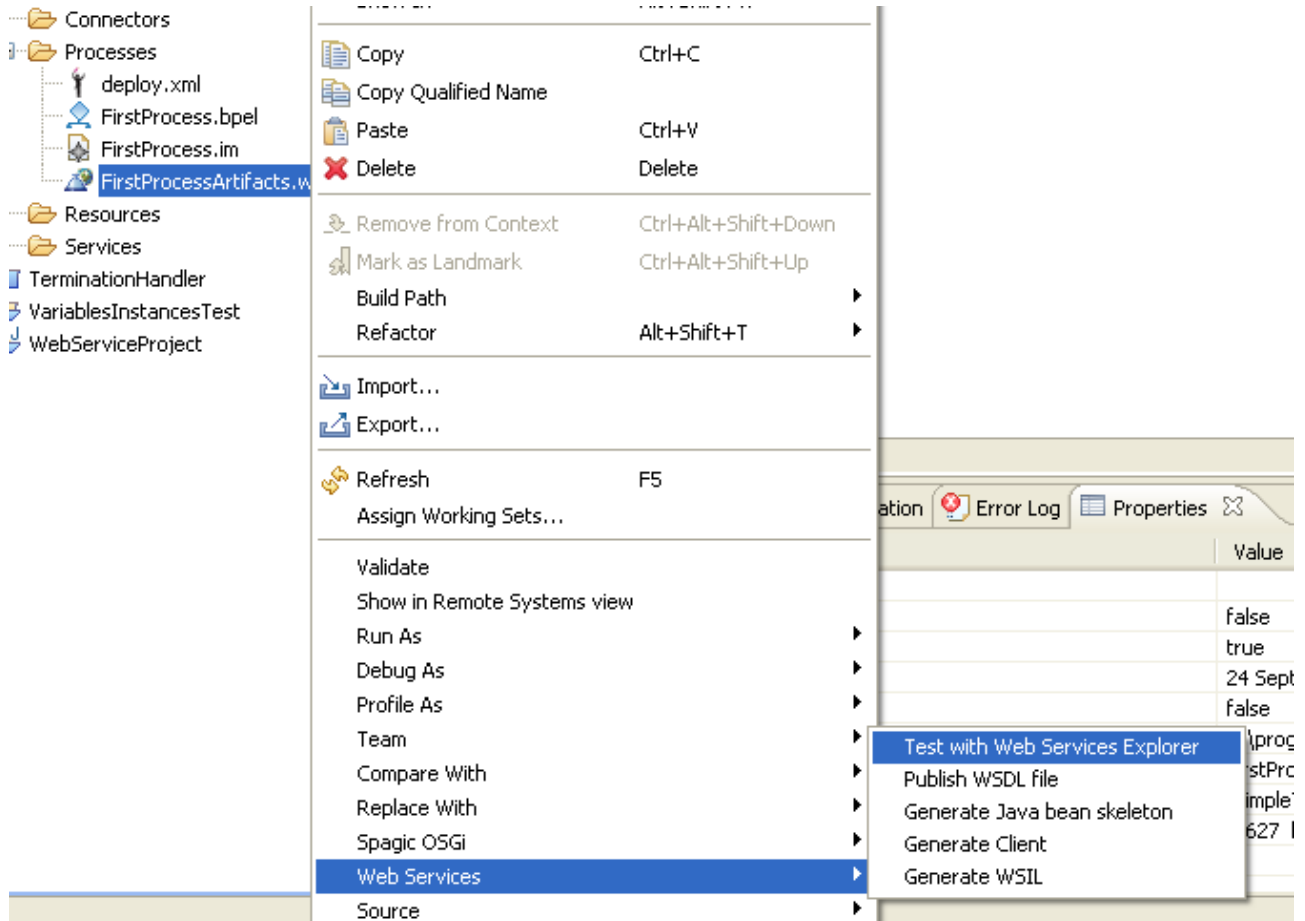
```
Tomcat
DEBUG - GeronimoLog.debug(66) ! Destroying service {urn.firstprocess}FirstService port FirstPort
DEBUG - GeronimoLog.debug(66) ! Couldn't find service {urn.firstprocess}FirstService port FirstPort to destroy
DEBUG - GeronimoLog.debug(66) ! Created Axis2 service {urn.firstprocess}FirstService
DEBUG - GeronimoLog.debug(66) ! Activated {urn.firstprocess}FirstProcess-1 myrole client: EPR is org.apache.od
e.bpel.epr.WSAPoint@848c58
DEBUG - GeronimoLog.debug(66) ! Activated {urn.firstprocess}FirstProcess-1
DEBUG - GeronimoLog.debug(66) ! Rehydrating process {urn.firstprocess}FirstProcess-1
DEBUG - GeronimoLog.debug(66) ! Creating new process DAO for {urn.firstprocess}FirstProcess-1 {guid=hqejbhcnph
r4mdbo7cekv5}...
DEBUG - GeronimoLog.debug(66) ! Creating process DAO for {urn.firstprocess}FirstProcess-1 {guid=hqejbhcnphr4m
dbo7cekv5}
INFO - GeronimoLog.info(79) ! Created new process DAO for {urn.firstprocess}FirstProcess-1 {guid=hqejbhcnphr4m
dbo7cekv5}
INFO - GeronimoLog.info(79) ! Created new process DAO for {urn.firstprocess}FirstProcess-1 {guid=hqejbhcnphr4m
dbo7cekv5}
INFO - GeronimoLog.info(79) ! Registered process {urn.firstprocess}FirstProcess-1.
DEBUG - GeronimoLog.debug(66) ! <Re>scheduling cron scheduled jobs on store event: <ProcessStoreEvent#ACTUATE
D:{urn.firstprocess}FirstProcess-1>
INFO - GeronimoLog.info(79) ! Cancelling PROCESS CRON jobs for: {urn.firstprocess}FirstProcess-1
INFO - GeronimoLog.info(79) ! Scheduling PROCESS CRON jobs for: {urn.firstprocess}FirstProcess-1
INFO - GeronimoLog.info(79) ! Deployment of artifact FirstProcess-1 successful.
DEBUG - GeronimoLog.debug(66) ! Deployed package: FirstProcess-1
DEBUG - GeronimoLog.debug(66) ! Deployed PID: {urn.firstprocess}FirstProcess-1
DEBUG - GeronimoLog.debug(66) ! The system is checking for the operation using the following WSAAction: urn:an
onOutInOp
DEBUG - GeronimoLog.debug(66) ! Checking for Operation using SOAP message body's first child's local name : li
stProcesses
DEBUG - GeronimoLog.debug(66) ! Found operation org.apache.axis2.description.InOutAxisOperation@4737a3
DEBUG - GeronimoLog.debug(66) ! Process store event: <ProcessStoreEvent#SCHEDULE_SETTINGS_CHANGED:{urn.firstpr
ocess}FirstProcess-1>
DEBUG - GeronimoLog.debug(66) ! Ignoring store event: <ProcessStoreEvent#SCHEDULE_SETTINGS_CHANGED:{urn.firstp
rocess}FirstProcess-1>
DEBUG - GeronimoLog.debug(66) ! <Re>scheduling cron scheduled jobs on store event: <ProcessStoreEvent#SCHEDULE
_SETTINGS_CHANGED:{urn.firstprocess}FirstProcess-1>
INFO - GeronimoLog.info(79) ! Cancelling PROCESS CRON jobs for: {urn.firstprocess}FirstProcess-1
INFO - GeronimoLog.info(79) ! Scheduling PROCESS CRON jobs for: {urn.firstprocess}FirstProcess-1
INFO - GeronimoLog.info(79) ! Refreshing SYSTEM CRON jobs.
INFO - GeronimoLog.info(79) ! SYSTEM CRON configuration found cron jobs: []
INFO - GeronimoLog.info(79) ! Refreshing SYSTEM CRON jobs.
INFO - GeronimoLog.info(79) ! SYSTEM CRON configuration found cron jobs: []
INFO - GeronimoLog.info(79) ! Refreshing SYSTEM CRON jobs.
```

If you have some errors, verify that Apache ODE is running and you've installed *graphviz* tool and you've created the temporary directory that should be configured in the *Spagic General Preferences*, in the item *Graphviz temp folder*.



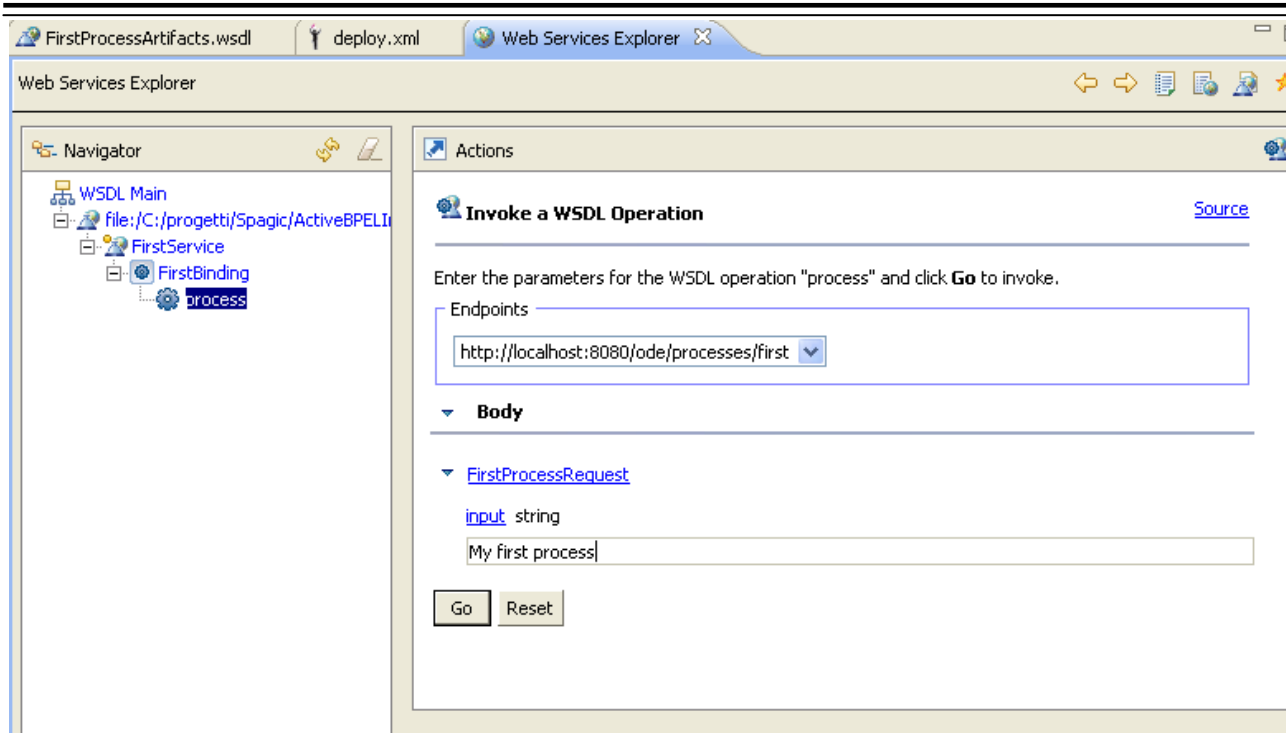
## 6 Run the Process

To run the process select the *FirstProcessArtifact.wsdl*, right-click, select *Web Services->Test with Web Services Explorer*.

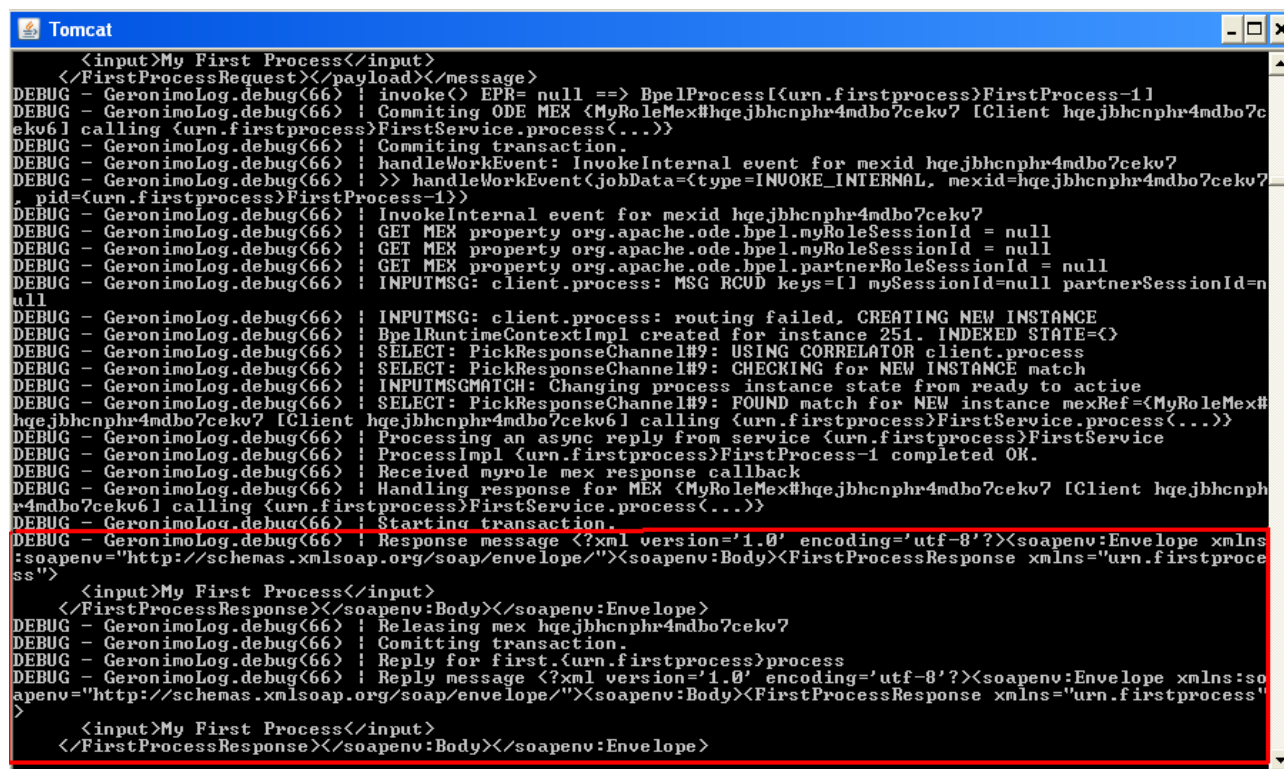


Navigate the tree on the left until you find *process*, select it, and insert in the *input* field "*My first BPEL process*". Click *Go*.

## BPEL processes with Spagic3



In Apache ODE, the result should be similar to the following screenshot.





## 7 Monitor the Process

Spagic Console is a web application to monitor, through Ajax interface, the system information (system monitoring), the services, and the processes (services monitoring).

It's recommended to use the Firefox Mozilla 3.x.


For more details about Spagic Console please read the document *Spagic Studio User Guide.doc*.

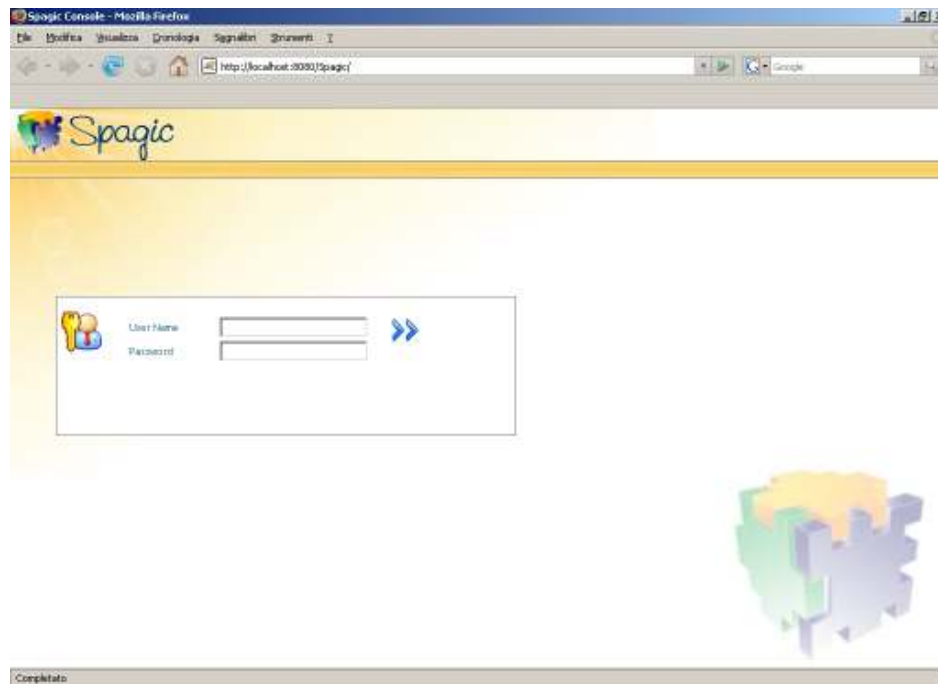
Start the Tomcat where you've installed the Spagic Console.

### 7.1 Authentication

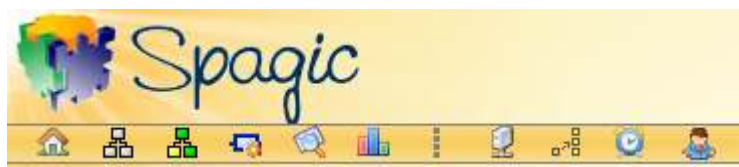
The URL to launch the Spagic Console is: <http://localhost:8080/Spagic/>.

The first page visualized by the web application is the authentication page.


Insert the user *spagic* and the password *spagic* and then click the button .





The next page contains the application menu.

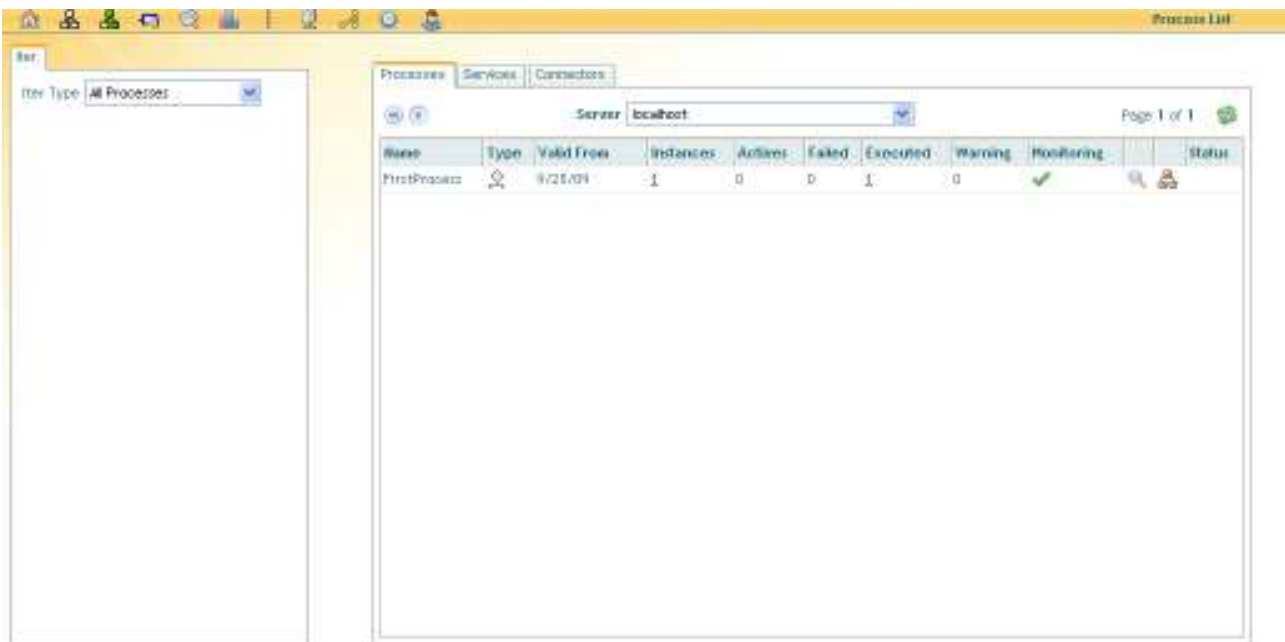


## 7.2 Process List

Select the icon **Process List** () to view all processes and their configuration, properties, and static flow diagram. The list contains the following attributes:

- *Name*: process name.
- *Type*: process technology.
- *Valid From*: start validity date.
- *Instances*: number of process instances.
- *Actives*: number of active processes.
- *Failed*: number of failed processes.
- *Warning*:
-  : displays the process detail containing the *description*, *version*, *organization*, *service name*.
-  : displays the process graph.


The process list should contain only *FirstProcess*: the process just deployed and launched.



The screenshot shows the 'Process List' window in Spagic3. On the left, there is a sidebar with 'Item Type' set to 'All Processes'. The main area displays a table of processes. The table has columns: Name, Type, Valid From, Instances, Actives, Failed, Executed, Warning, Monitoring, and Status. The 'Server' dropdown is set to 'localhost'. The table shows one process, 'FirstProcess', with 1 instance, 0 actives, 0 failed, 1 executed, and 0 warnings. The 'Monitoring' column shows a green checkmark, and the 'Status' column shows a green circle with a checkmark.

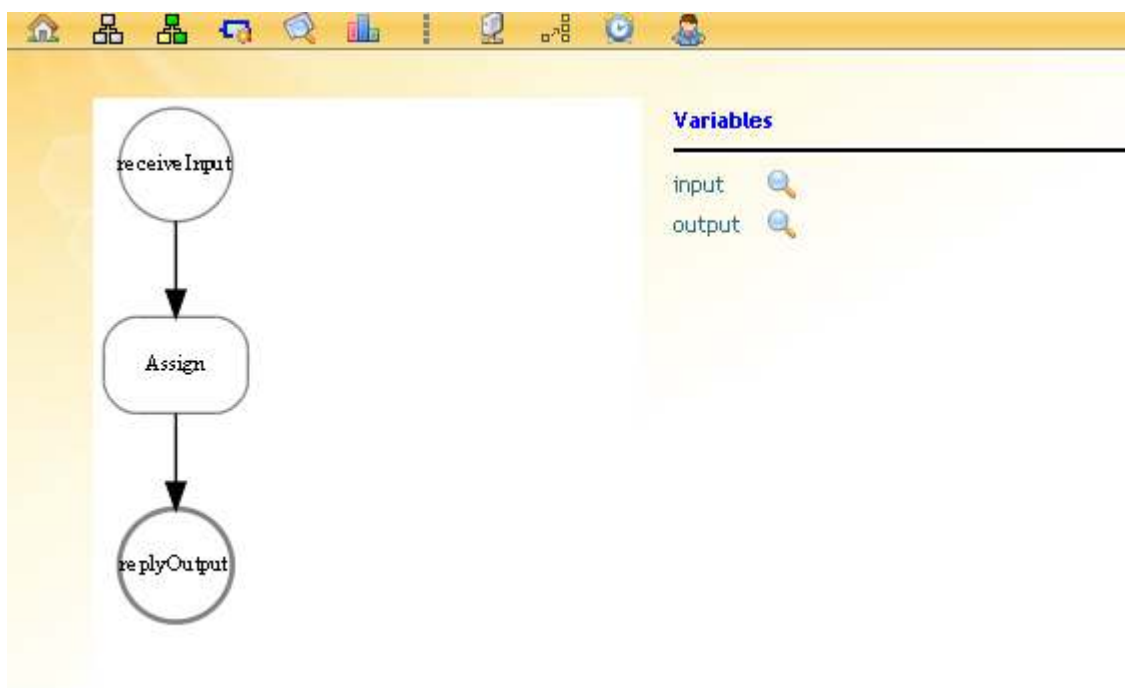
Name	Type	Valid From	Instances	Actives	Failed	Executed	Warning	Monitoring	Status
FirstProcess		9/25/09	1	0	0	1	0	✓	✓

## 7.2.1 Process Graph

Selecting the icon  from the process list, it's possible to display the process graph and on right side the list of global variables defined in the process. In this case *input* and *output*.

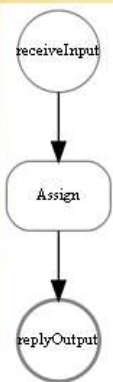
In most cases, the activities designed with the BPEL designer editor correspond to the steps visualized in the console, excepting the sequence and the scope activities; these are displayed only if an event handler or a fault handler has been associated to them. In these cases, the step names have been renamed using a prefix *start-* and a suffix *end-* specifying the start and the end activity. See the Samples section for more details.

Selecting the elements on the graph it's possible to display a window containing *Name*, step *Description*, *Service* and its *Properties*.



Selecting the elements on the graph it's possible to display a window containing *Name*, step *Description*, *Service* and its *Properties*.


## BPEL processes with Spagic3




```

graph TD
    receiveInput((receiveInput)) --> Assign([Assign])
    Assign --> replyOutput((replyOutput))
        
```

**Variables**

input 

output 

**Detail**

Namespace: urn:firstprocess


Name: FirstProcess.Assign\_v\_1


Description:

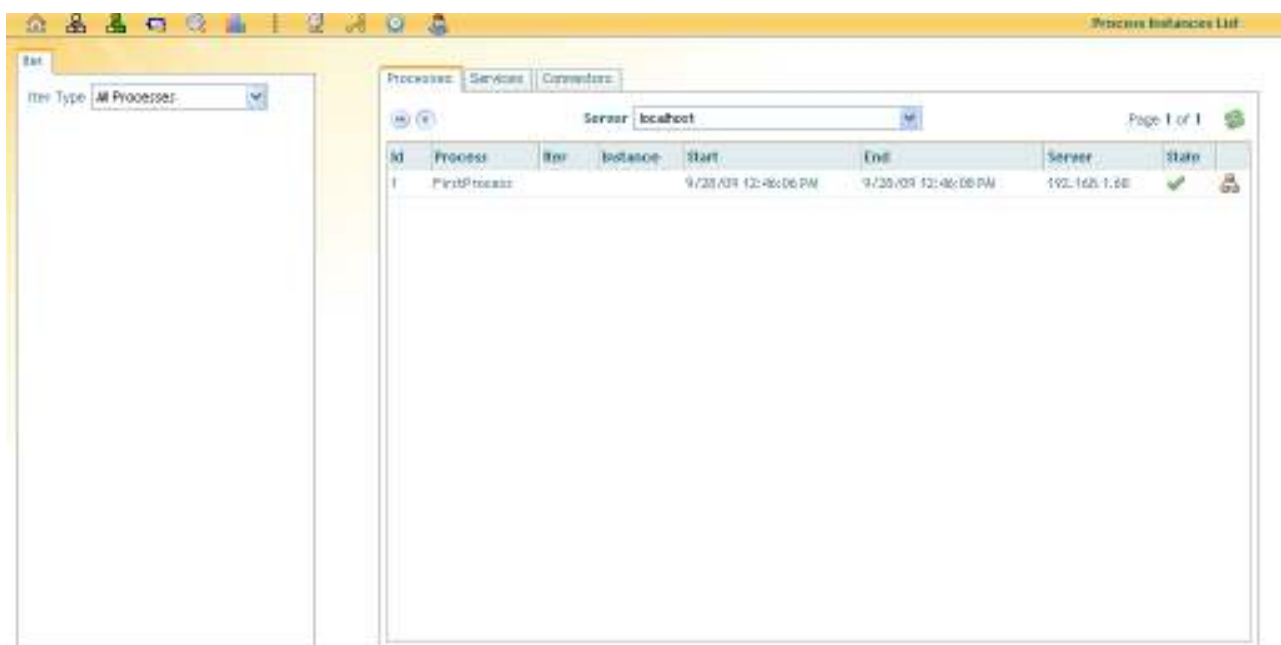
**Properties**

AssignmentFrom_1	<tns:FirstProcessResponse xmlns:tns="urn:firstproc
AssignmentFrom_2	input
AssignmentTo_1	output
AssignmentTo_2	output
im.servicebindingname	AutoGeneratedBinding
im.serviceentity	ServiceGeneric
im.servicename	GenericService
originalName	Assign
totalAssignments	2
validate	no


## 7.3 Process Instances List

Selecting the icon **Process Instances List** () the process instances list is showed. The list contains:


- *Id*: identifier of process instance.
- *Process*: process name.
- *Iter*: name of the iter (optional) associated to the process instance.
- *Instance*: attributes identifying the iter instance (optional).
- *Start*: start execution time.
- *End*: end execution time.
- *Server*: server IP address that executed the process.
- *State*: instance state. It can be *active* (yellow ✓), *executed* (green ✓) or *fault* (red ✕).
-  : visualizes the process execution detail.



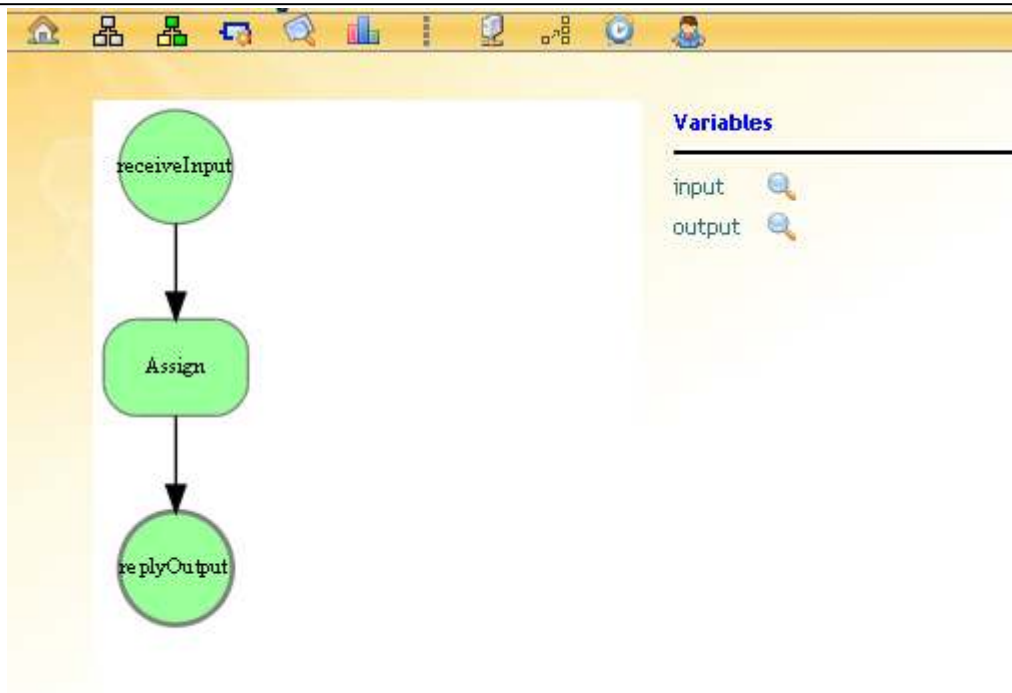
The screenshot shows the 'Process Instances List' window. On the left, there is a sidebar with 'Item Type' set to 'All Processes'. The main area has tabs for 'Processes', 'Services', and 'Connectors'. Below the tabs, there is a search bar for 'Server' with 'localhost' entered. A table displays the process instances. The table has columns: Id, Process, Iter, Instance, Start, End, Server, State, and an icon column. One instance is listed with Id '1', Process 'FirstProcess', Start time '9/23/09 12:46:06 PM', End time '9/23/09 12:46:06 PM', Server '192.168.1.88', and State 'executed' (green checkmark). The icon column shows a small icon for each instance.


Id	Process	Iter	Instance	Start	End	Server	State	
1	FirstProcess			9/23/09 12:46:06 PM	9/23/09 12:46:06 PM	192.168.1.88	executed	

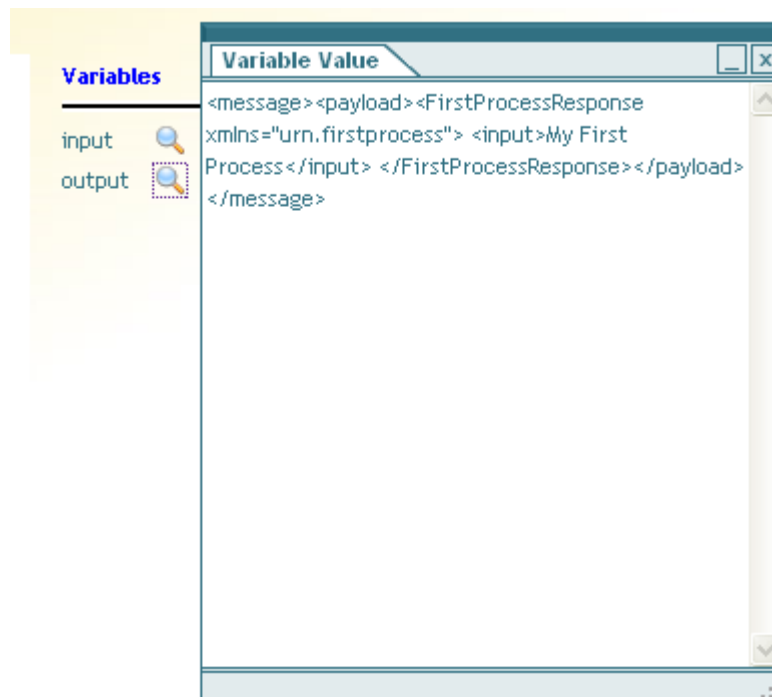
### 7.3.1 Process Instance Graph

Selecting the  icon from the process instances list it's possible to display the graph representing the execution of the process.

The color of the component represents the component state: the green color means *executed*, the yellow color means *active* and the red means error.



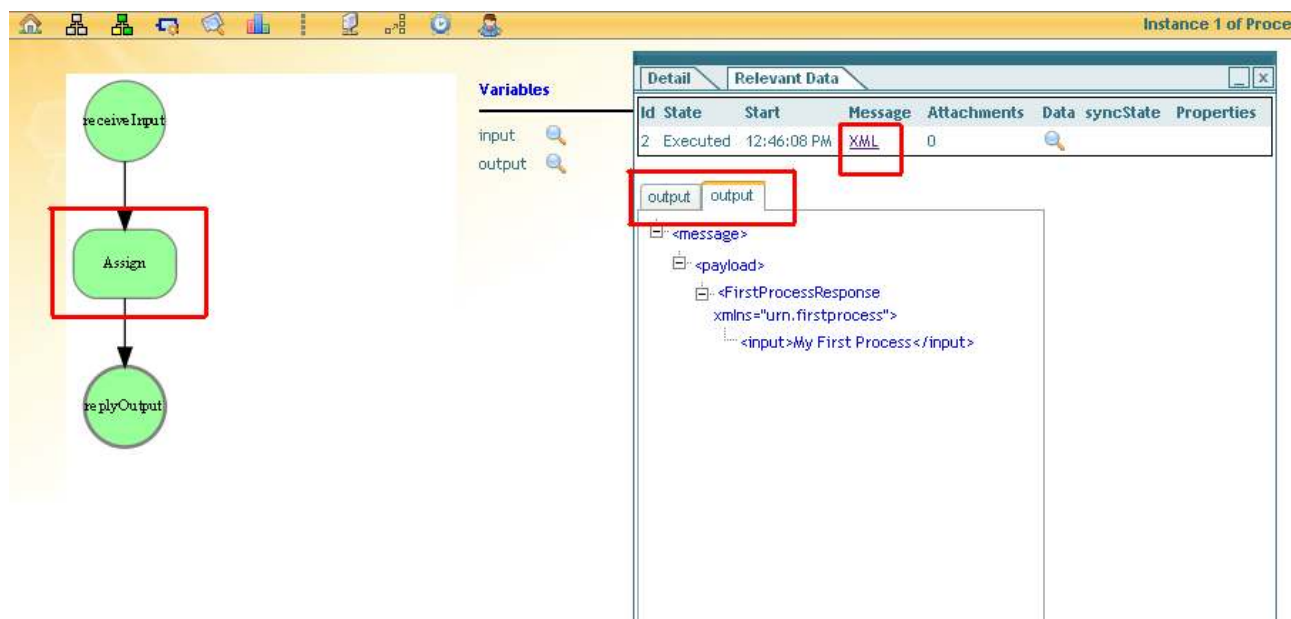
Selecting the  icon corresponding to the variable on the right side, the variable runtime value will be displayed. If the process has been executed, the last value of the variable will be displayed.



Selecting the elements on the graph it's possible to visualize the window containing *Detail* and *Relevant Data*. The *Relevant Data* tab contains the messages having as destination the component selected. Selecting the *XML* link in the list, all the variable modifications will be visualized. For example, selecting the *Assign* step, then the *Relevant Data*

## BPEL processes with Spagic3

tab and XML message, the console will display the two changes to variable *output* executed in this step: the first for initialization, the second for the assignment from *input* variable to *output* variable.



The screenshot displays the Spagic3 interface for monitoring a BPEL process instance. On the left, a process diagram shows a flow from 'receiveInput' to 'Assign' (highlighted with a red box) and then to 'replyOutput'. In the center, the 'Variables' panel lists 'input' and 'output'. On the right, the 'Relevant Data' panel shows the execution details for 'Instance 1 of Process'.

Id	State	Start	Message	Attachments	Data	syncState	Properties
2	Executed	12:46:08 PM	XML	0			

Below the table, the 'output' variable is expanded, showing its XML content:

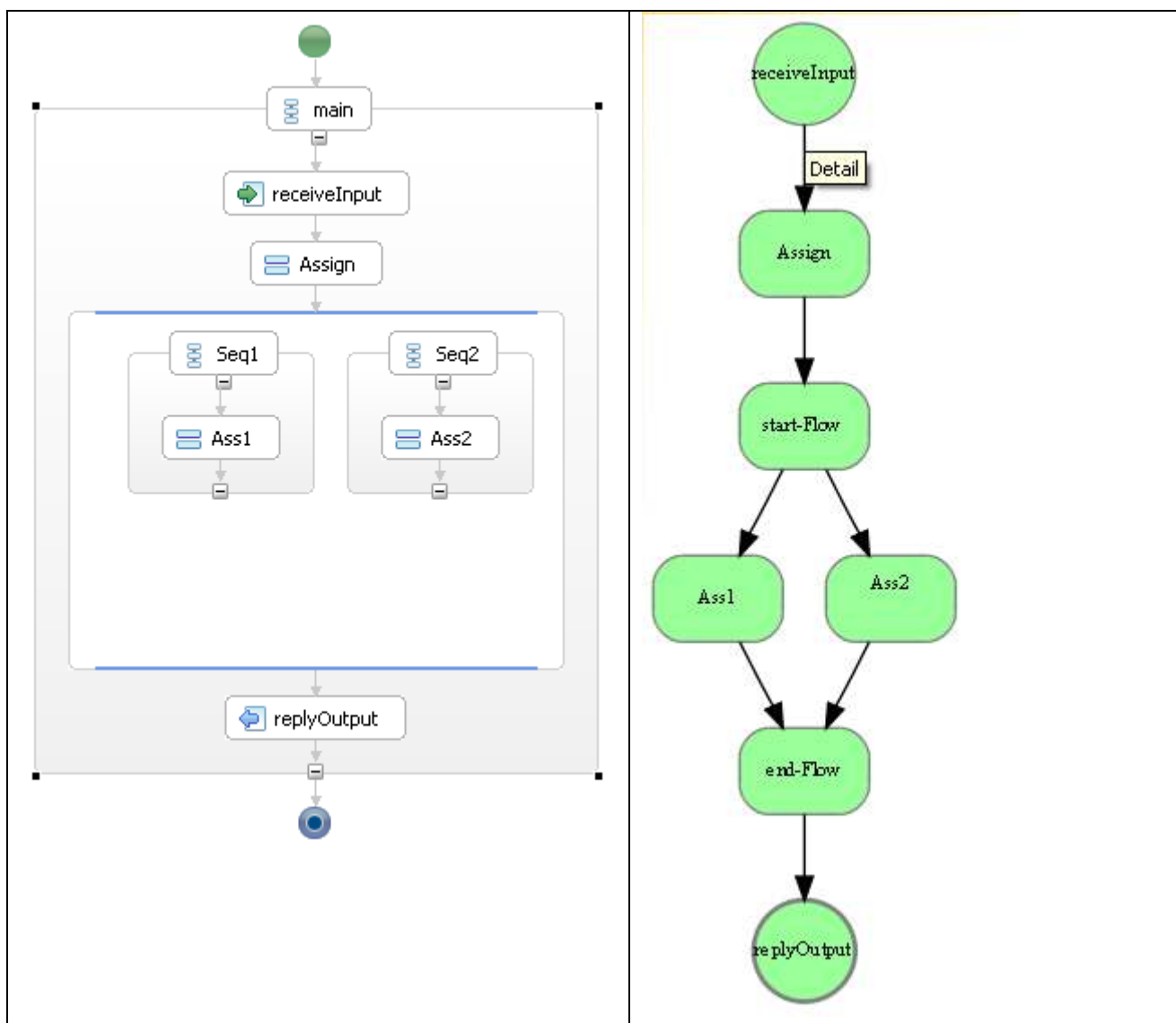
```
<message>
  <payload>
    <FirstProcessResponse
      xmlns="urn:firstprocess">
      <input>My First Process</input>
    </FirstProcessResponse>
  </payload>
</message>
```

## 8 Samples

This section will show some examples of the BPEL constructs and their corresponding mapping in the console.

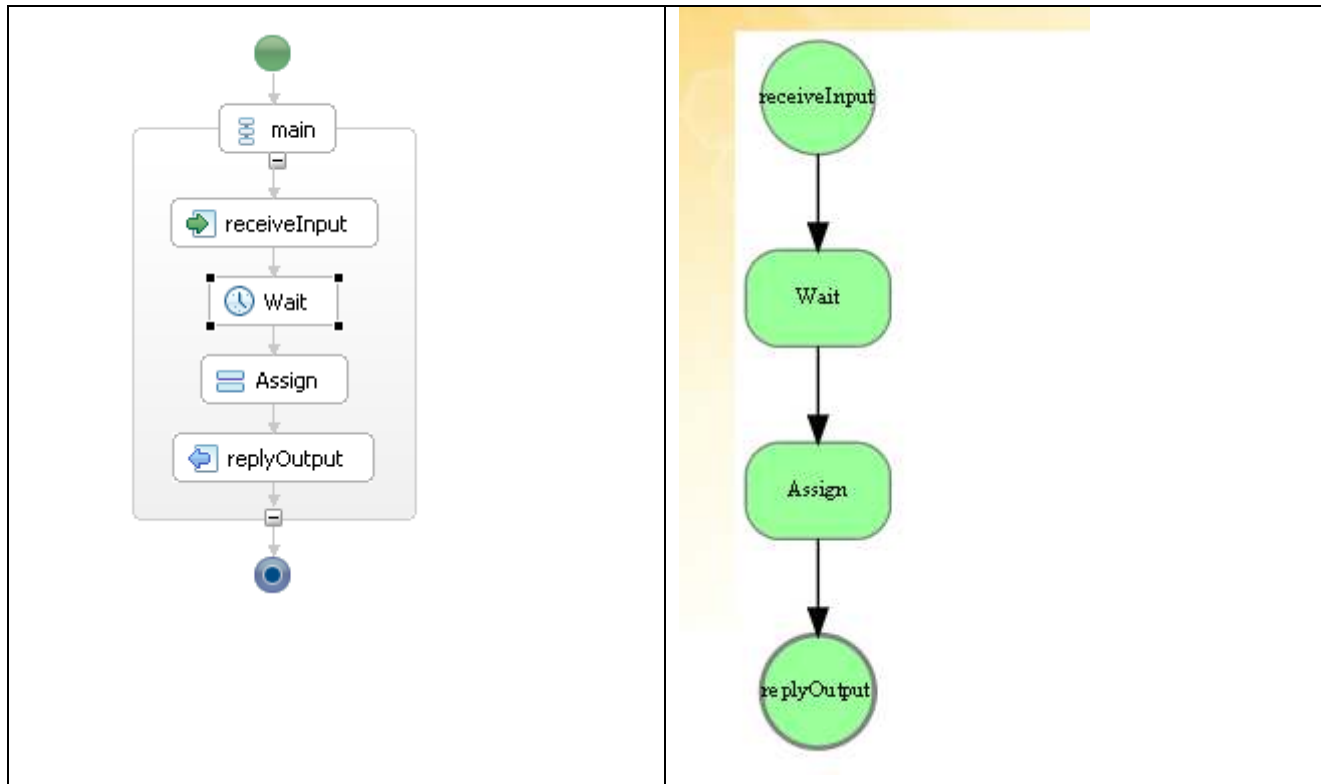
### 8.1 Flow activity

The flow activity has been represented with a step *start-Flow* that identifies the start and a step *end-Flow* that identifies the end. The names *start-Flow* and *end-Flow* have been built from the original activity name adding the prefix *start-* and the suffix *end-*.



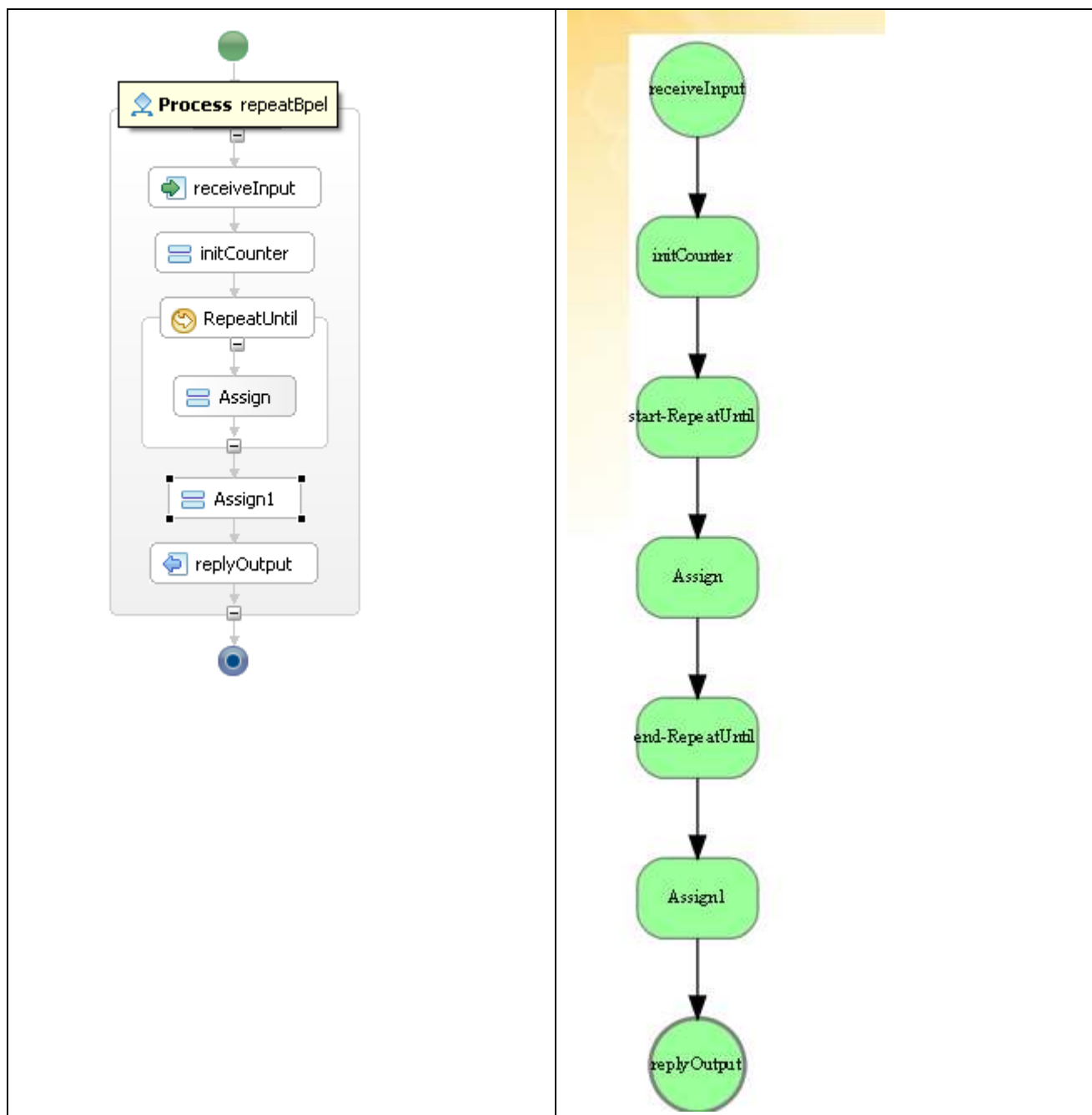


## 8.2 Wait activity

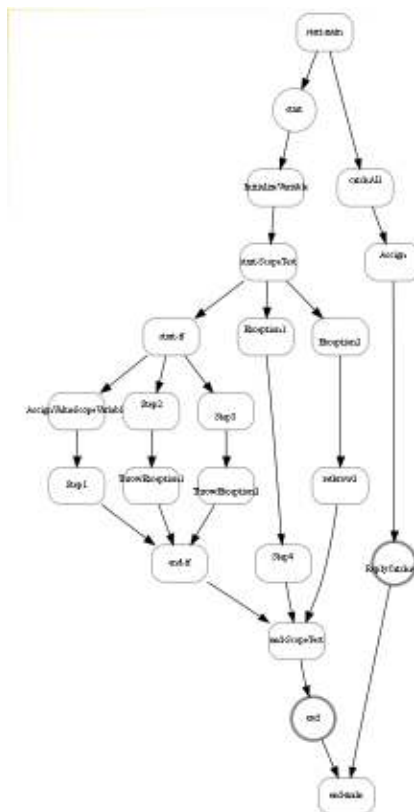
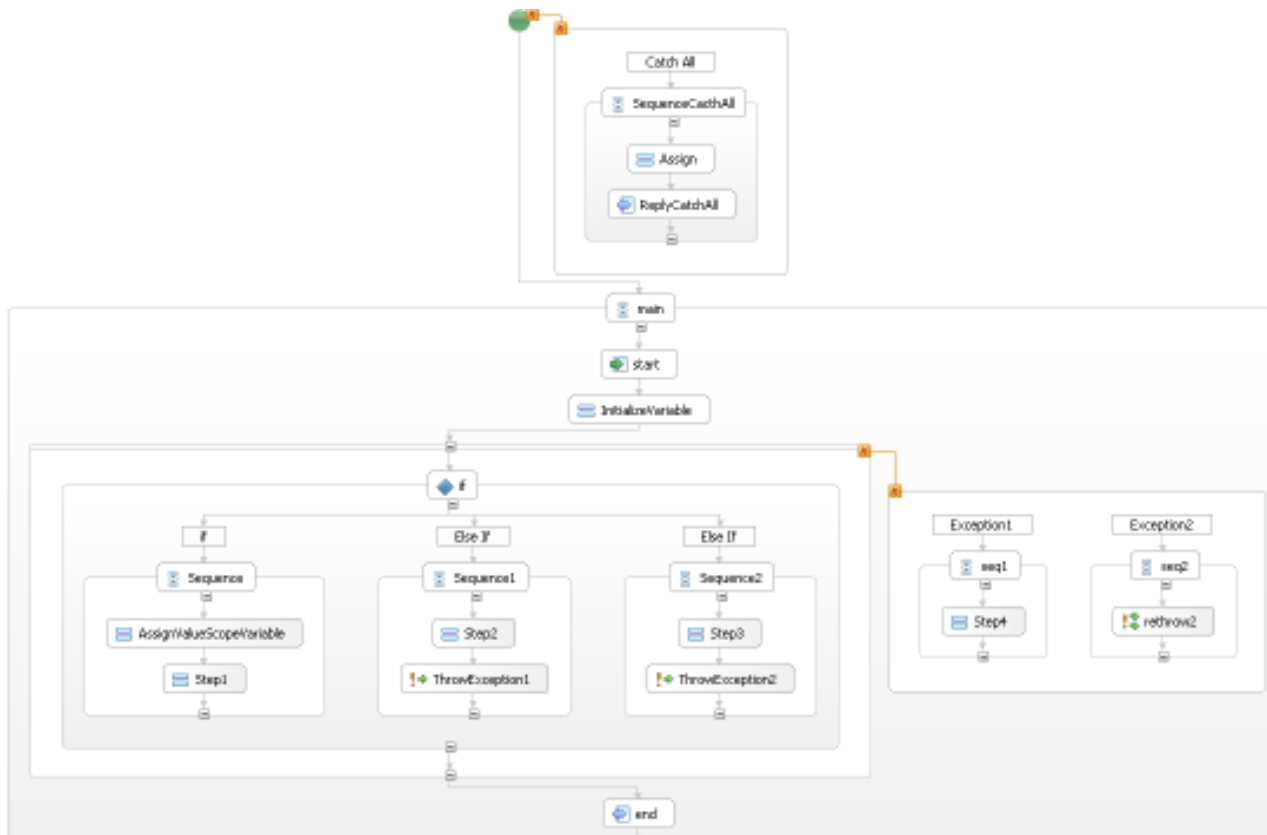


### 8.3 Repeat Until activity

The *Repeat Until* has been mapped with two steps that identify the start and the end of the cycle. The names *start-Repeat* and *end-RepeatUntil* have been built from the original activity name adding the prefix *start-* and the suffix *end-*.



## 8.4 IfElse, Throw, Fault Handler



## 9 Related documents

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this document.

1. *Spagic JBI Components.doc*: detail document about ServiceMix and Spagic JBI components.
2. *Spagic Console.doc*: detail document about *Spagic Console* monitoring application.
3. *Spagic Studio User Guide.doc*: detail document about *Spagic Studio* environment.