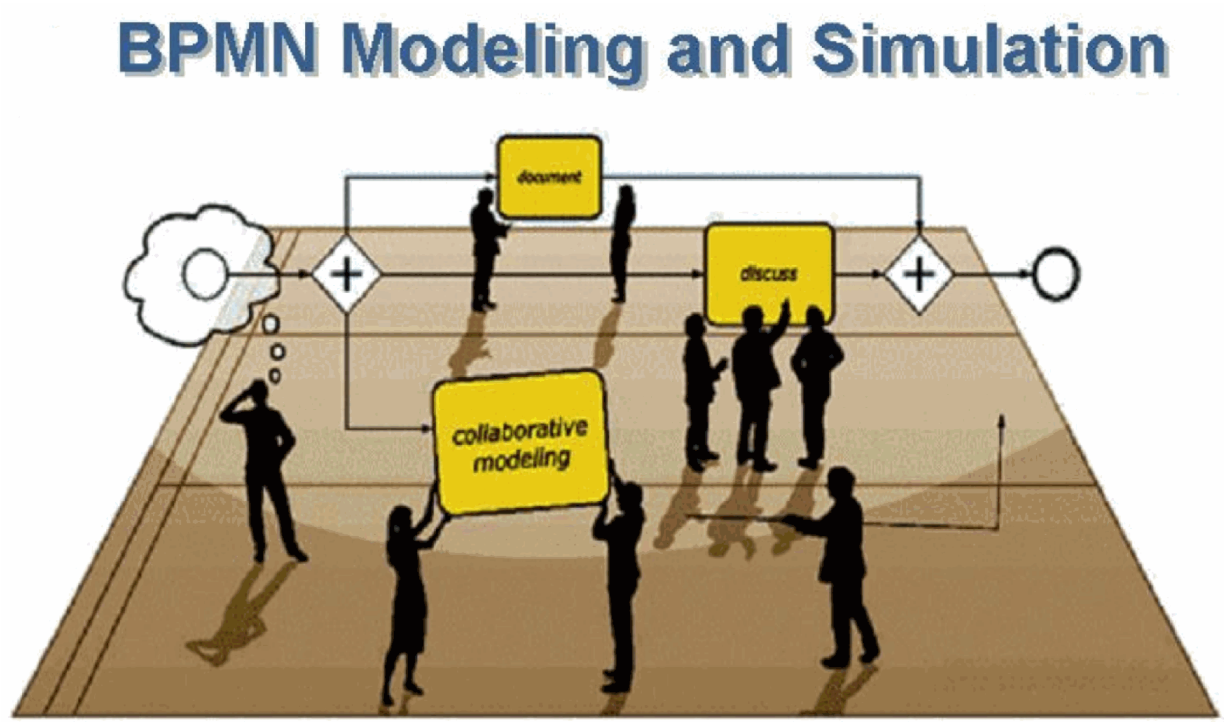
University of Pisa

MSc in Computer Engineering

Supply Chain Operation Management

"Large and complex organizations are a tangible manifestation of advanced technology, more than machinery itself." (J.K. Galbraith)



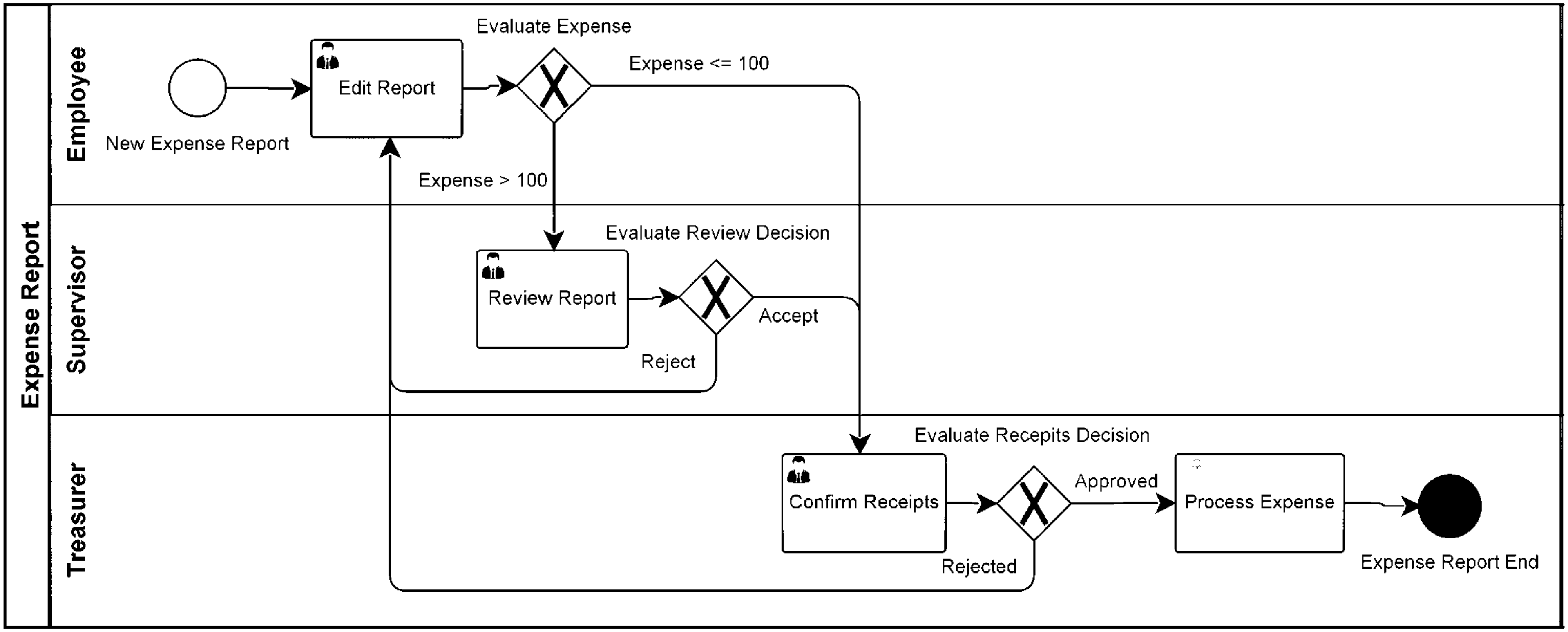
Lectures

Mario G. Cimino, Department of Information Engineering, Center for Logistics Systems

Pisa, March-May 2016, Monday 14.30-17.30, Room: ADInform2

Expense Report

In the Expense Report process, an employee sends a report to his company and requests the approval and payment of his month expenses.



a) Describe in semi-formal natural language the above BPMN process.

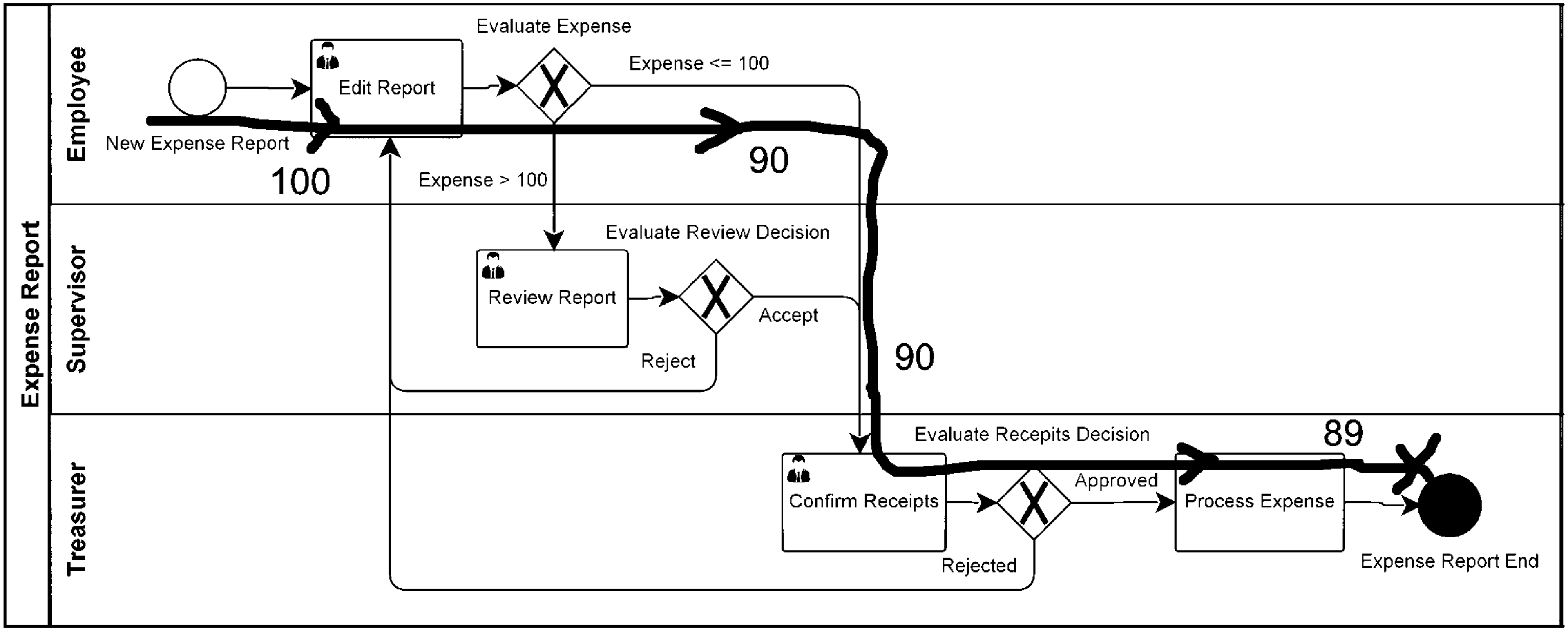
b) Given 100 starting tokens, determine the number of ending tokens for each scenario (path), considering the following proportions at teach gateway: expense > 100 (10%), supervisor rejects expense report (10%), treasurer rejects expense report (1%)

a)

```
1. A new expense report is started by the Employee
2. The Employee edits the Report (human task)
3.1 If the expense is higher than 100
3.1.1 The Supervisor reviews the Report (human task)
3.1.2.1 If the Supervisor rejects the Report → 2
3.1.2.2 If the Supervisor accepts the Report → 4
3.2 If the expense is lower or equal to 100 → 4
4. The Treasurer confirms the receipts (human task)
4.1 If the Treasurer approves the receipts
4.1.1 The Treasures process the expense → End
4.2 If the Treasurer rejects the receipts → 2
```

b)

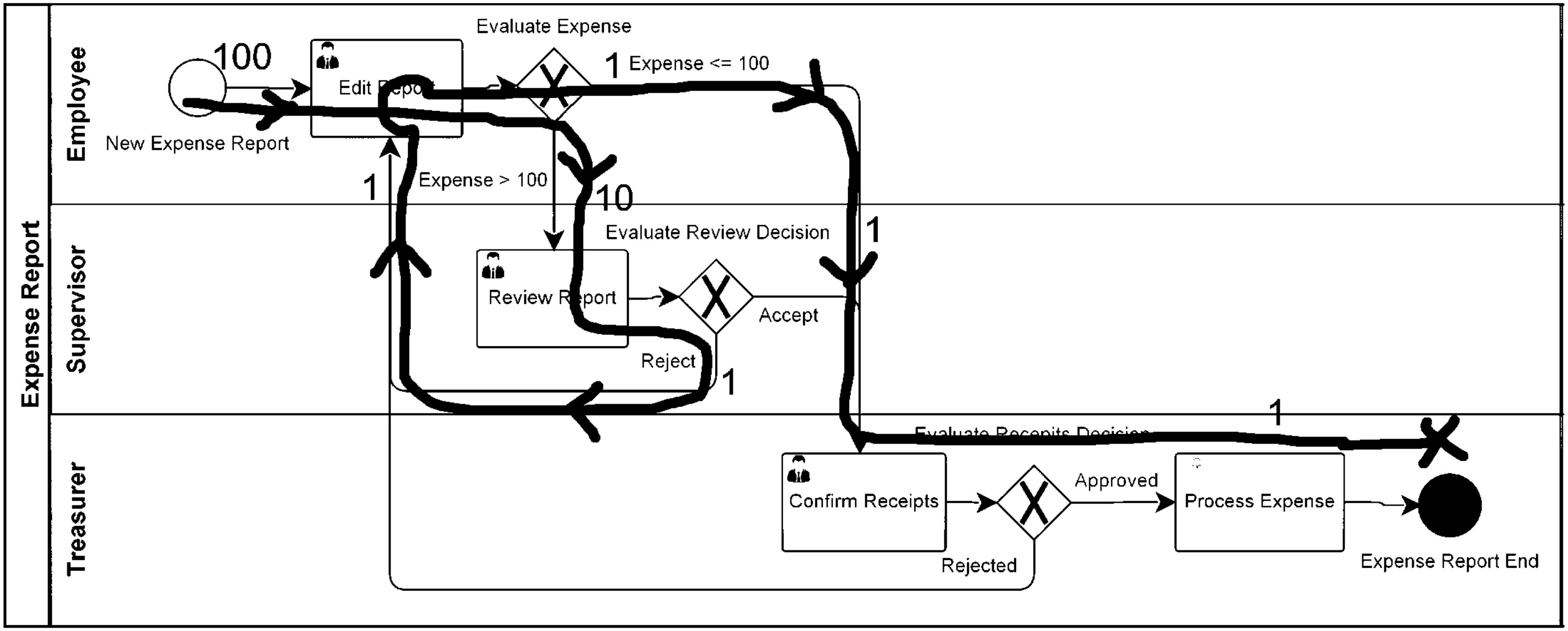
S1) EXP <= 100 & TREAS APPR: 100*0.9 & 90*0.99 = **89**



S1:89 tokens .

S2) EXP > 10 & SUP. REJ & EXP <= 100 & TREAS APPR:

100*0.1 & 10*0.1 & 1*.9 & 1*.99 = **1**

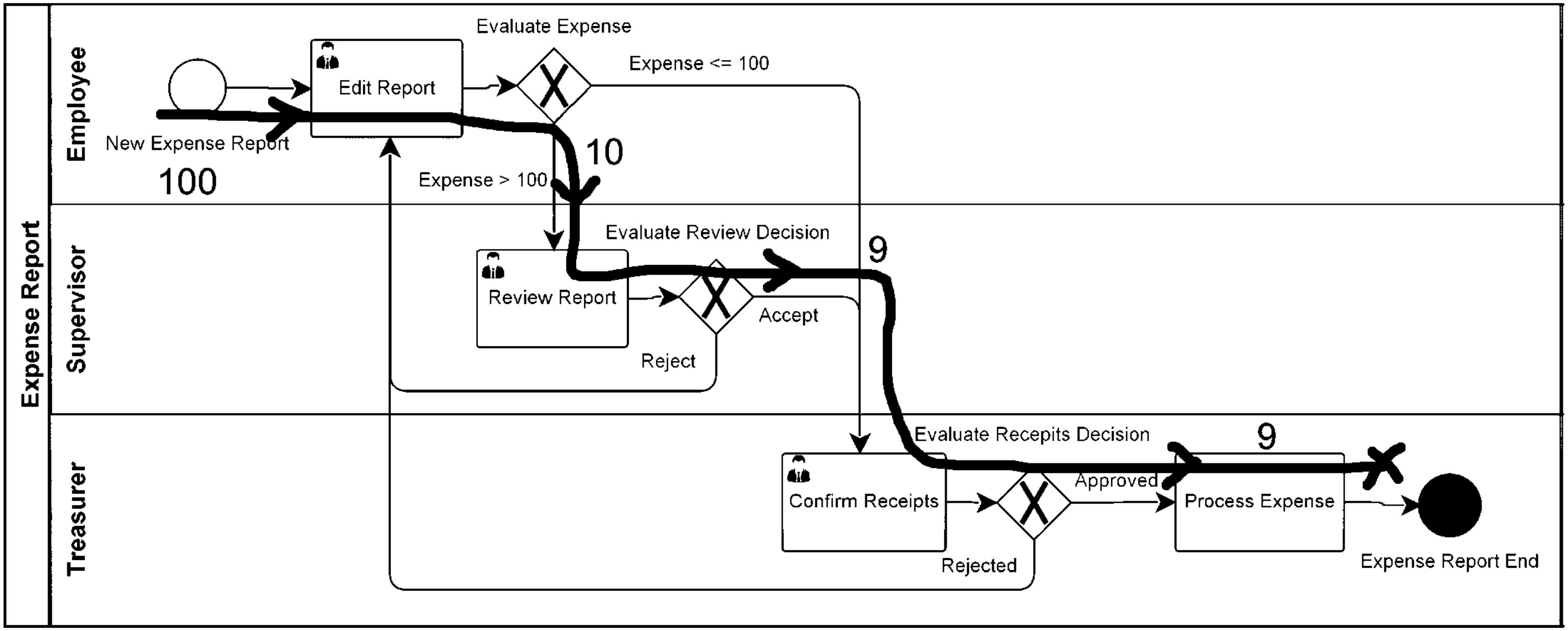


Due to the low number of tokens (100), other variants are not possible. For example, with one token arriving at the Treasurer, it is not possible to reject receipts (1*0.01=0).

S2:1 token.

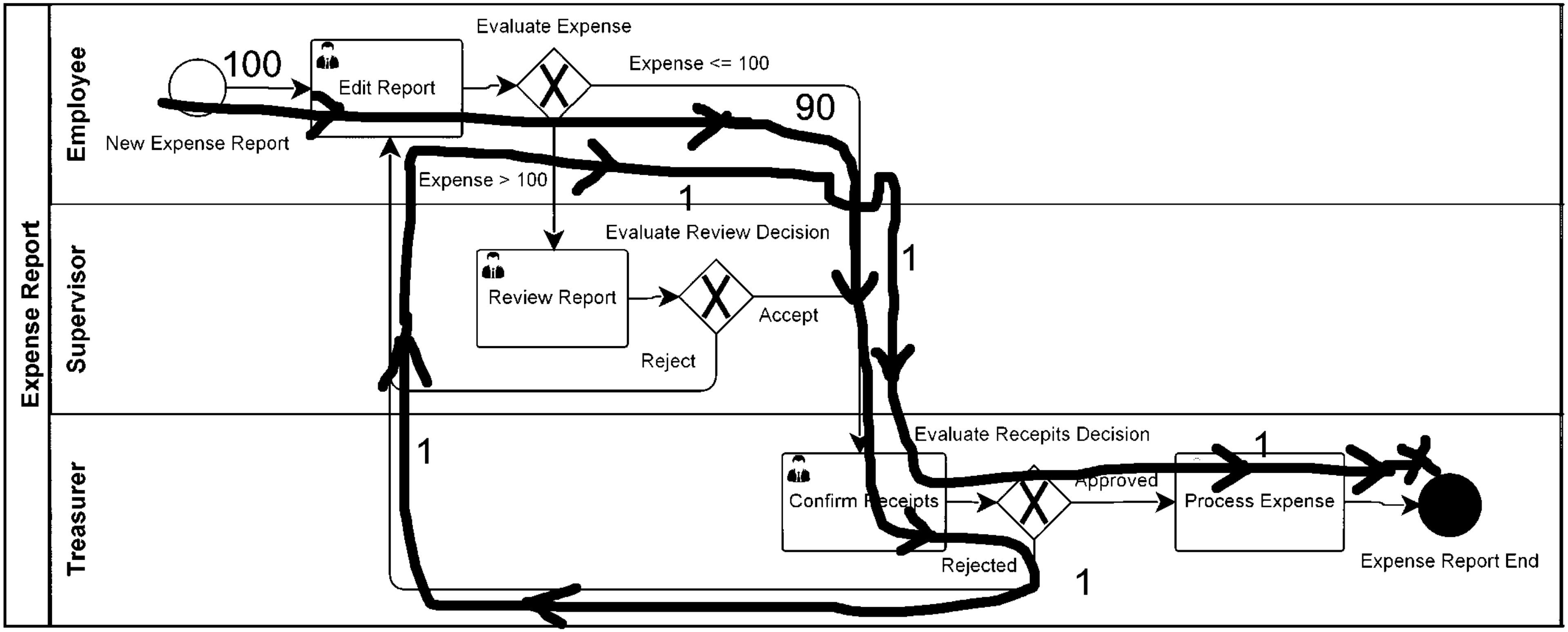
S3) EXP > 100 & SUP. ACC. & TREAS. APPR.:

100*0.1 & 10*0.9 & 9*0.99 = **9**



S3:9 tokens.

S4) EXP <= 100 & TREAS. REJ. & EXP <= 100 & TREAS. APPR.:
100*0.9 & 90*0.01 & 1*0.9 & 1*0.99 = **1**



S1:1 token.
S1+S2+S3+S4= 89 + 1 + 9 + 1 = 100.

• Note for the next tutorial.

a) download *Java 7* and *Webratio BPM 6* from the course website; install *Java 7*.
b) Install *WebRatio BPM*; to activate it: user *bpmnlogistica* and password *bpmnl0gistica*; press “Activate” (internet connection required).

http://tinyurl.com/webratio-expense-report

Getting started with BPM

by Mario Bruno

Modeler Beginner Model Interaction Flow

 Published on Oct 24, 2011

BPM BPMN

Applies to: **6.0 or higher**

Table of contents

Thank you for choosing WebRatio BPM software. If you are not familiar with WebRatio BPM, this Quick Start Guide will provide you with an introduction and an overview of the basic features.

How to install WebRatio BPM

We'd like you to be able to start using our software right away. The first step is to install and register the software.

Introduction

The WebRatio product is available for the following Operating Systems: di

- Windows XP/Vista/7
- Linux
- Mac OSX

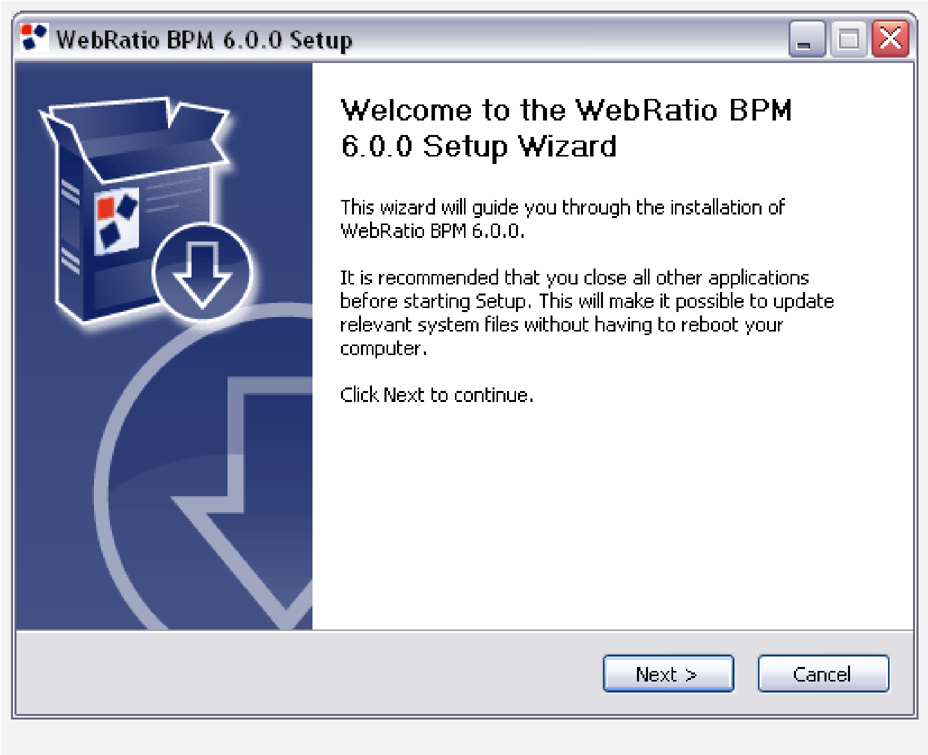
These are the minimum system requirements:

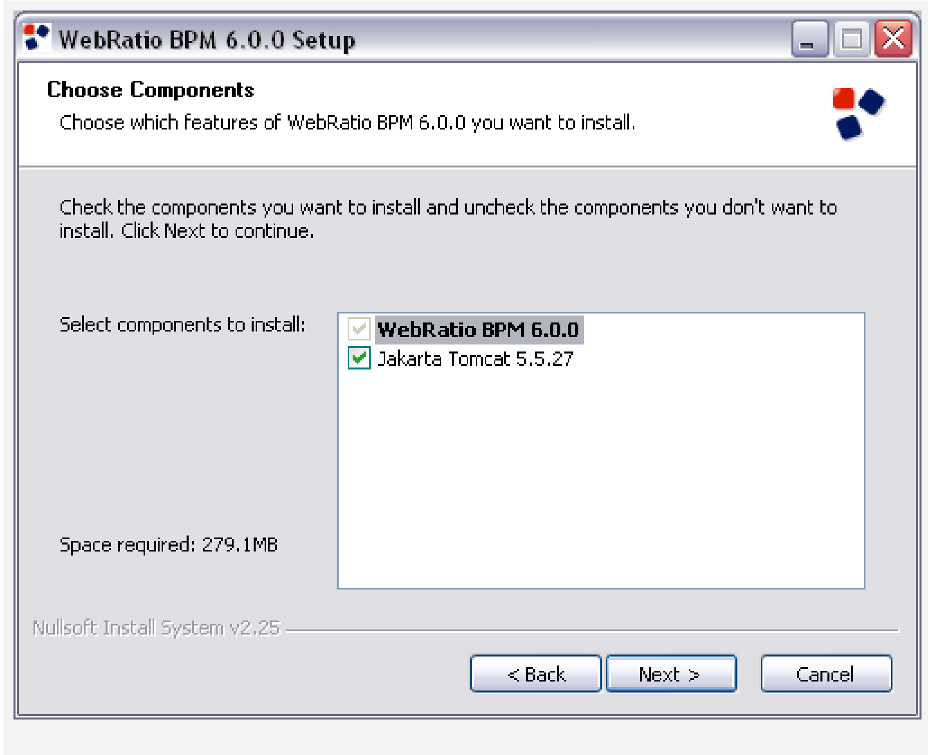
- Java Runtime Environment or Java Development Kit: 5.0 version or higher
- RAM: 512 Mb (1024Mb recommended)
- Minimum disk space: 500 Mb
- Resolution display: 1024x768 (1280x1024 or higher recommended)

The WebRatio installation files can be downloaded from the WebRatio official website. In the following sections the installation process for Windows is described.

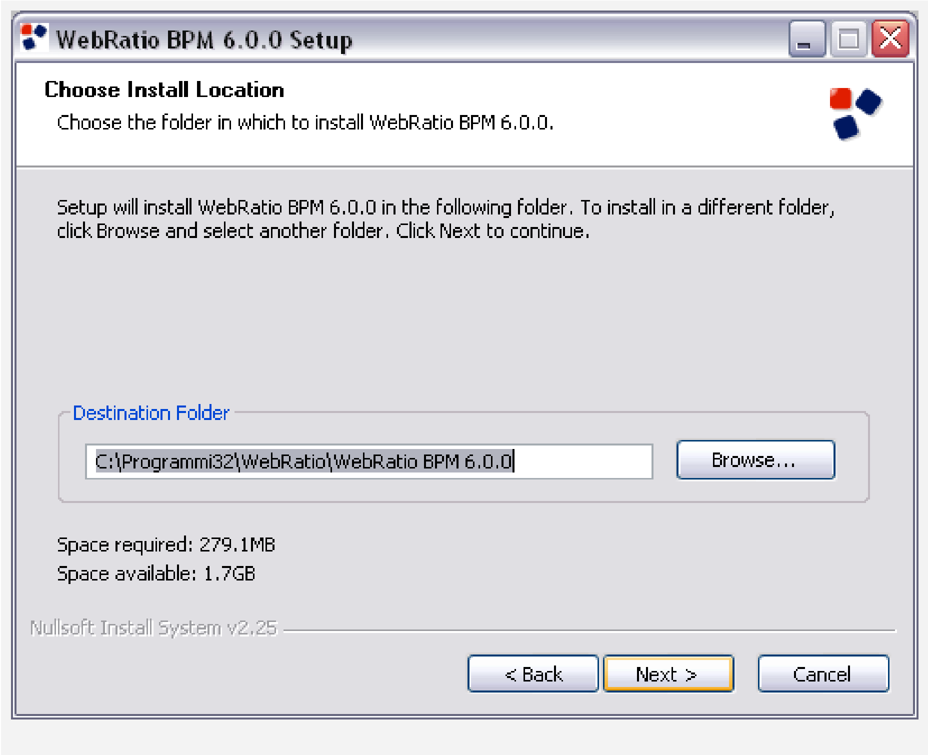
Installation Process for Windows

1. **Install Java 5.0 JRE/JDK or higher**
    1. Download the latest version of the Java 2 Runtime Environment (JRE) or Java Development Kit (JDK) from the Java official website.
    2. Double-click on the installer file and follow the installation instructions.
2. **Install WebRatio BPM software**
    1. **Download**. Download WebRatio BPM from the official website.
    2. **Start the installation**. Double-click on the WebRatio installer. You will see a window like the following.

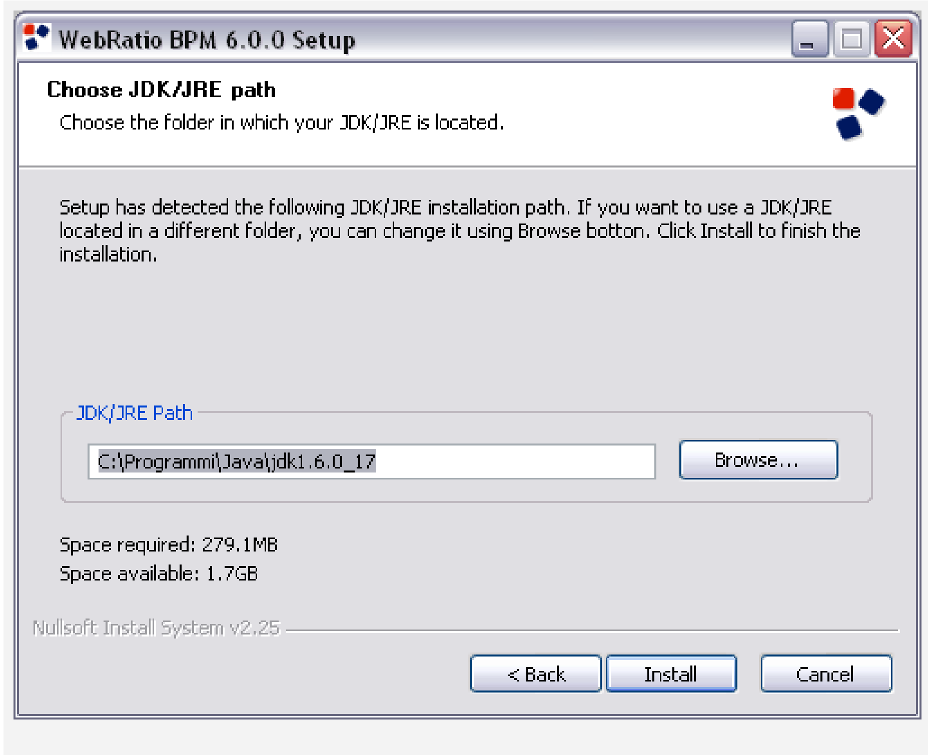




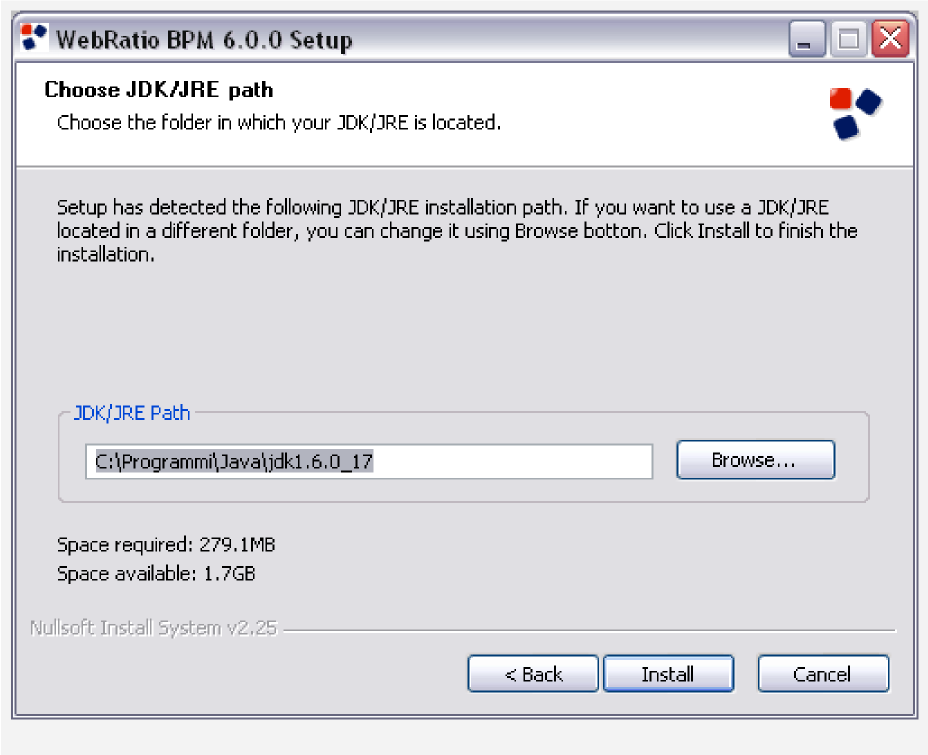
3. Click on the **Next** button to proceed with the installation.
4. **Choose components to install**
5. Click on the **Next** button to proceed with the installation.
6. **Choose the Installation Path**

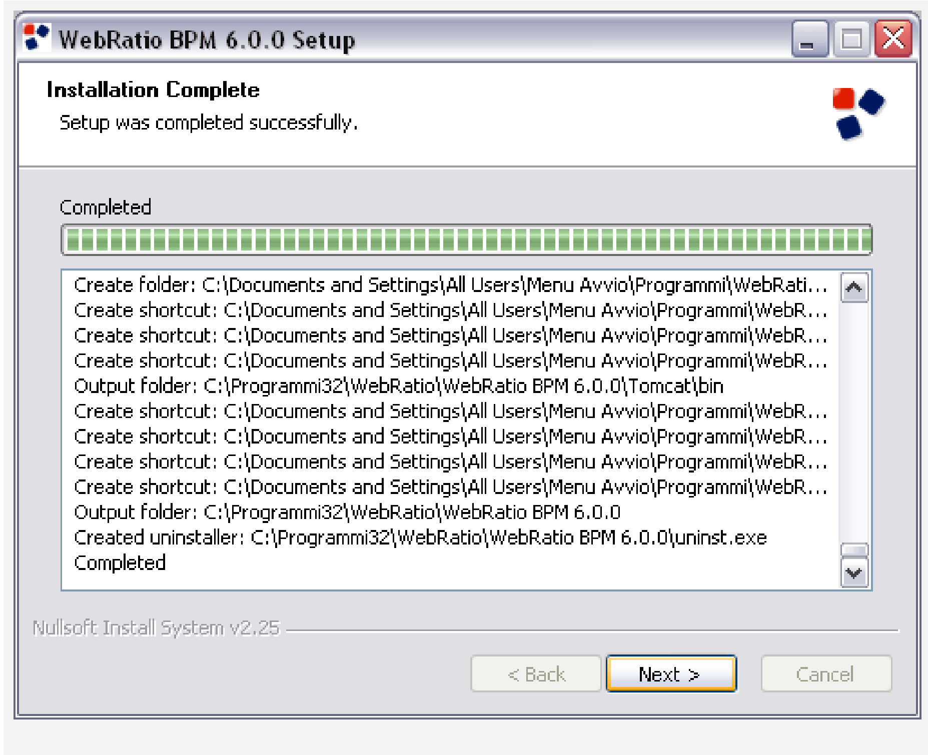


7. Click on the **Next** button to proceed with the installation.
8. **Choose the Java Path**



9. Click on the **Install** button to proceed with the installation.
10. **Complete the installation**


WebRatio BPM 6.0.0 Setup
Choose JDK/JRE path
Choose the folder in which your JDK/JRE is located.
Setup has detected the following JDK/JRE installation path. If you want to use a JDK/JRE located in a different folder, you can change it using Browse botton. Click Install to finish the installation.
JDK/JRE Path
C:\Programmi\Java\jdk1.6.0_17
Browse...
Space required: 279.1MB
Space available: 1.7GB
Nullsoft Install System v2.25
< Back
Install
Cancel


WebRatio BPM 6.0.0 Setup
Installation Complete
Setup was completed successfully.
Completed
Create folder: C:\Documents and Settings\All Users\Menu Avvio\Programmi\WebRati...
Create shortcut: C:\Documents and Settings\All Users\Menu Avvio\Programmi\WebR...
Create shortcut: C:\Documents and Settings\All Users\Menu Avvio\Programmi\WebR...
Create shortcut: C:\Documents and Settings\All Users\Menu Avvio\Programmi\WebR...
Output folder: C:\Programmi32\WebRatio\WebRatio BPM 6.0.0\Tomcat\bin
Create shortcut: C:\Documents and Settings\All Users\Menu Avvio\Programmi\WebR...
Create shortcut: C:\Documents and Settings\All Users\Menu Avvio\Programmi\WebR...
Create shortcut: C:\Documents and Settings\All Users\Menu Avvio\Programmi\WebR...
Create shortcut: C:\Documents and Settings\All Users\Menu Avvio\Programmi\WebR...
Output folder: C:\Programmi32\WebRatio\WebRatio BPM 6.0.0
Created uninstaller: C:\Programmi32\WebRatio\WebRatio BPM 6.0.0\uninst.exe
Completed
Nullsoft Install System v2.25
< Back
Next >
Cancel

About this Quick Start Guide

This guide can help you get up to speed quickly on WebRatio BPM basic features, or refresh your memory on how to use it.

Learn about WebRatio BPM, BPMN and processes

What is a process?

A **business process** or **business method** is a collection of related, structured activities or tasks that produce a specific service or product (serve a particular goal) for a particular customer or customers. It often can be visualized with a flowchart as a sequence of activities.

What is BPM?

Business process management (BPM) is a management approach focused on aligning all aspects of an organization with the wants and needs of clients. BPM enables organizations to be more efficient, more effective and more capable of change than a functionally focused, traditional hierarchical management approach.

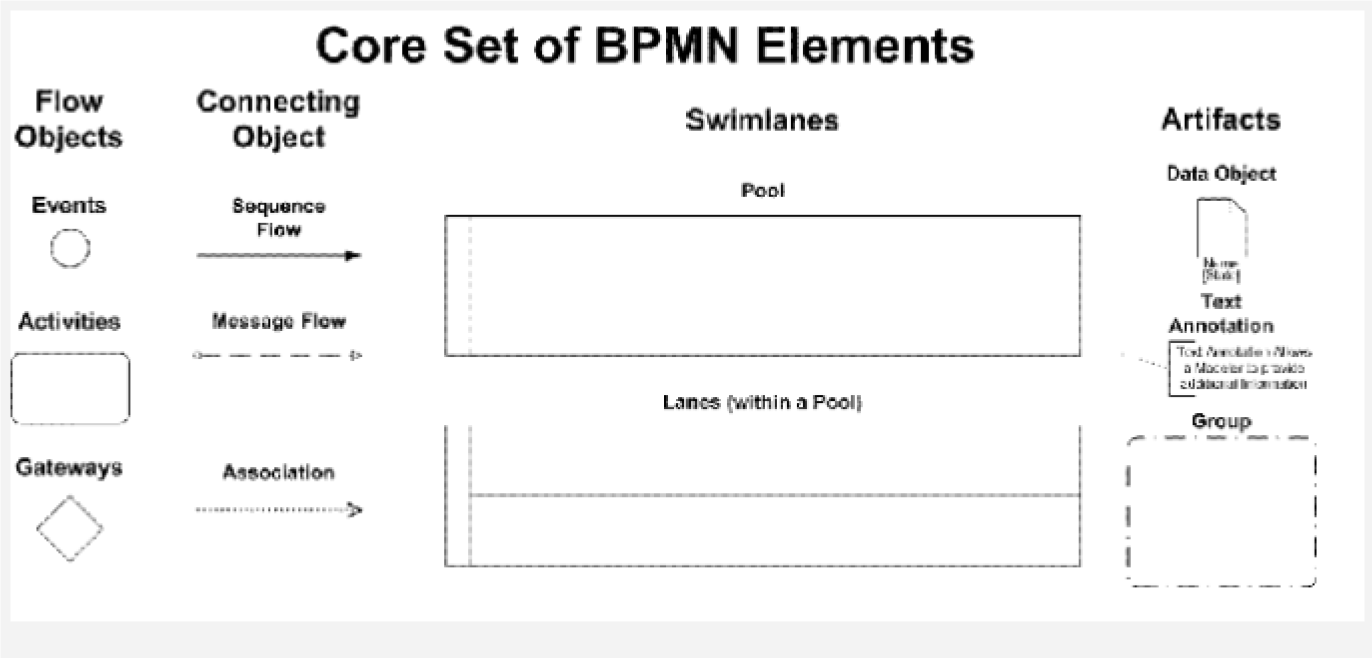
What is BPMN?

Business Process Modeling Notation (BPMN) is a graphical representation for specifying business processes in a workflow. BPMN was developed by Business Process Management Initiative (BPMI), and is currently maintained by the OMG (Object Management Group). The current version of BPMN is 1.2, with a major revision process for BPMN 2.0 in progress. The Business Process Modeling Notation (BPMN) is a standard for business process modeling, and provides a graphical notation for specifying business processes in a Business Process Diagram (BPD), based on a flowcharting technique. The objective of BPMN is to support business process management for both technical users and business users by providing a notation that is intuitive to business users yet able to represent complex process semantics. The primary goal of BPMN is to provide a standard notation that is readily understandable by all business stakeholders. These business stakeholders include the business analysts who create and refine the processes, the technical developers responsible for implementing the processes, and the business managers who monitor and manage the processes. Consequently, BPMN is intended to serve as common language to bridge the communication gap that frequently occurs between business process design and implementation.

BPMN: concepts and elements

The modeling in BPMN is made by simple diagrams with a small set of graphical elements. It should make it easy for business users as well as developers to understand the flow and the process. The four basic categories of elements are as follows:

1. **Flow Objects** : Events, Activities, Gateways
2. **Connecting Objects** : Sequence Flow, Message Flow, Association
3. **Swim lanes** : Pool, Lane
4. **Artifacts (Artifacts)** : Data Object, Group, Annotation



BPMN Notation

These four categories of elements give us the opportunity to make a simple business process diagram (BPD).

Flow Objects

Flow objects are the main describing elements within BPMN, and consist of three core elements (Events, Activities, and Gateways):

Event

An **Event** is represented with a circle and denotes something that happens (rather than Activities which are something that is done). Icons within the circle denote the type of event (e.g. envelope for message, clock for time). Events are also classified as **Catching** (as in, they might catch an incoming message to Start the process) or **Throwing** (as in, they might throw a message at the End of the process).

- *Start event*

Acts as a trigger for the process; indicated by a single narrow border; and can only be Catch, so is shown with an open (outline) icon.

- *End event*

Represents the result of a process; indicated by a single thick or bold border; and can only Throw, so is shown with a solid icon.

- *Intermediate event*

Represents something that happens between the start and end events; is indicated by a tramline border; and can Throw or Catch (using solid or open icons as appropriate) - for example, a task could flow to an event that throws a message across to another pool and a subsequent event waits to catch the response before continuing.

Activity

An Activity is represented with a rounded-corner rectangle and describes the kind of work which must be done.

- *Task*

A task represents a single unit of work that is not or cannot be broken down to a further level of business process detail without diagramming the steps in a procedure (not the purpose of BPMN)

- *Sub-process*

Used to hide or reveal additional levels of business process detail - when collapsed a sub-process is indicated by a plus sign against the bottom line of the rectangle; when expanded the rounded rectangle expands to show all flow objects, connecting objects, and artifacts. Has its own self-contained start and end events, and sequence flows from the parent process must not cross the boundary.

- *Transaction*

A form of sub-process in which all contained activities must be treated as a whole, i.e., they must all be completed to meet an objective, and if any one of them fails they must all be compensated (undone). Transactions are differentiated from expanded sub-processes by being surrounded by a tramline border.

Gateway

A Gateway is represented with a diamond shape and will determine forking and merging of paths depending on the conditions expressed.

Connecting objects

They consist of three types (Sequences, Messages, and Associations)

Sequence Flow

A Sequence Flow is represented with a solid line and arrowhead and shows in which order the activities will be performed. The sequence flow may be also have a symbol at its start, a small diamond indicates one of a number of **conditional flows** from an activity while a diagonal slash indicates the **default flow** from a decision or activity with conditional flows.

Message Flow

A Message Flow is represented with a dashed line, an open circle at the start, and an open arrowhead at the end. It tells us what messages flow across organizational boundaries (i.e., between pools). A message flow can never be used to connect activities or events within the same pool.

Association

An Association is represented with a dotted line. It is used to associate an Artifact or text to a Flow Object, and can indicate some directionality using an open arrowhead (toward the artifact to represent a result, from the artifact to represent an input, and both to indicate it is read and updated). No directionality would be used when the Artifact or text is associated with a sequence or message flow (as that flow already shows the direction).

Swim lanes

Swim lanes are a visual mechanism of organizing and categorizing activities, based on cross functional flowcharting, and in BPMN consist of two types:

Pool

Represents major participants in a process, typically separating different organizations. A pool contains one or more lanes (like a real swimming pool). A pool can be open (i.e., showing internal detail) when it is depicted as a large rectangle showing one or more lanes, or collapsed (i.e., hiding internal detail) when it is depicted as an empty rectangle stretching the width or height of the diagram.

Parameters

A pool is characterized by a set of parameters. A parameter is an information managed by the process and can be of two types:

- *Simple parameter*: defined by a name, a type (string, integer and so on), a selection policy (single or multiple) and a set of predefined values
- *Business object parameter*: defined by a reference to a more complex object defined in the workspace named "Business Object"

Business Object

A business object is a object composed by a set of properties. A property, like a parameter, is defined by a name, a type (string, integer and so on) and a set of predefined values.

Lane

Used to organize and categorize activities within a pool according to function or role, and depicted as a rectangle stretching the width or height of the pool. A lane contains the Flow Objects, Connecting Objects and Artifacts.

Artifacts

Artifacts allow developers to bring some more information into the model/diagram. In this way the model/diagram becomes more readable. There are three pre-defined Artifacts and they are:

Data Objects

Data Objects show the reader which data is required or produced in an activity.

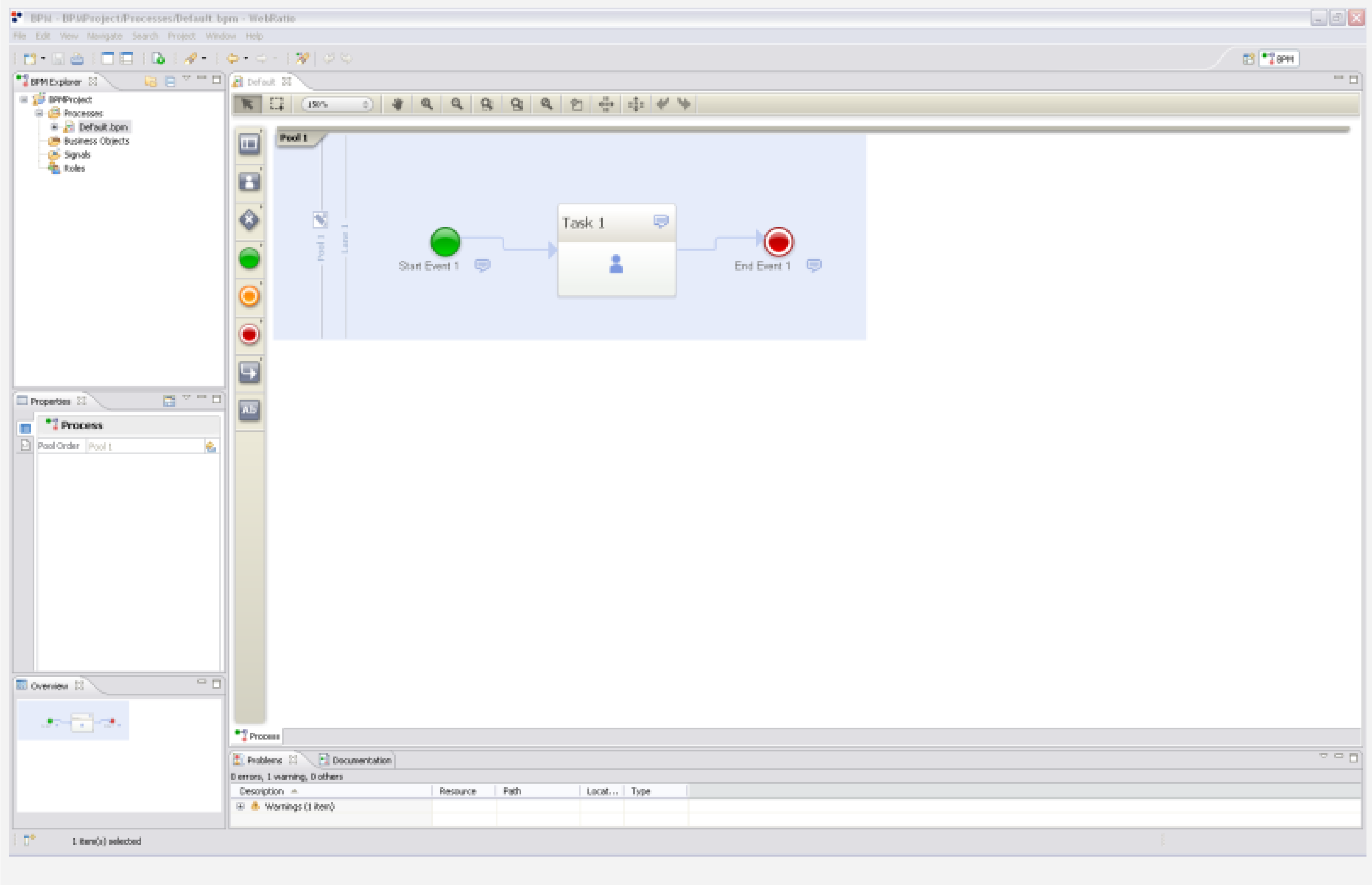
Group

A Group is represented with a rounded-corner rectangle and dashed lines. The Group is used to group different activities but does not affect the flow in the diagram.

Annotation

An Annotation is used to give the reader of the model/diagram an understandable impression.

The WebRatio BPM User Interface



The WebRatio BPM user interface is organized in different views.

1. The right upper area is named **BPM Explorer** and contains all the BPM Projects created in your workspace and shows all the processes, business objects, roles and signal defined.

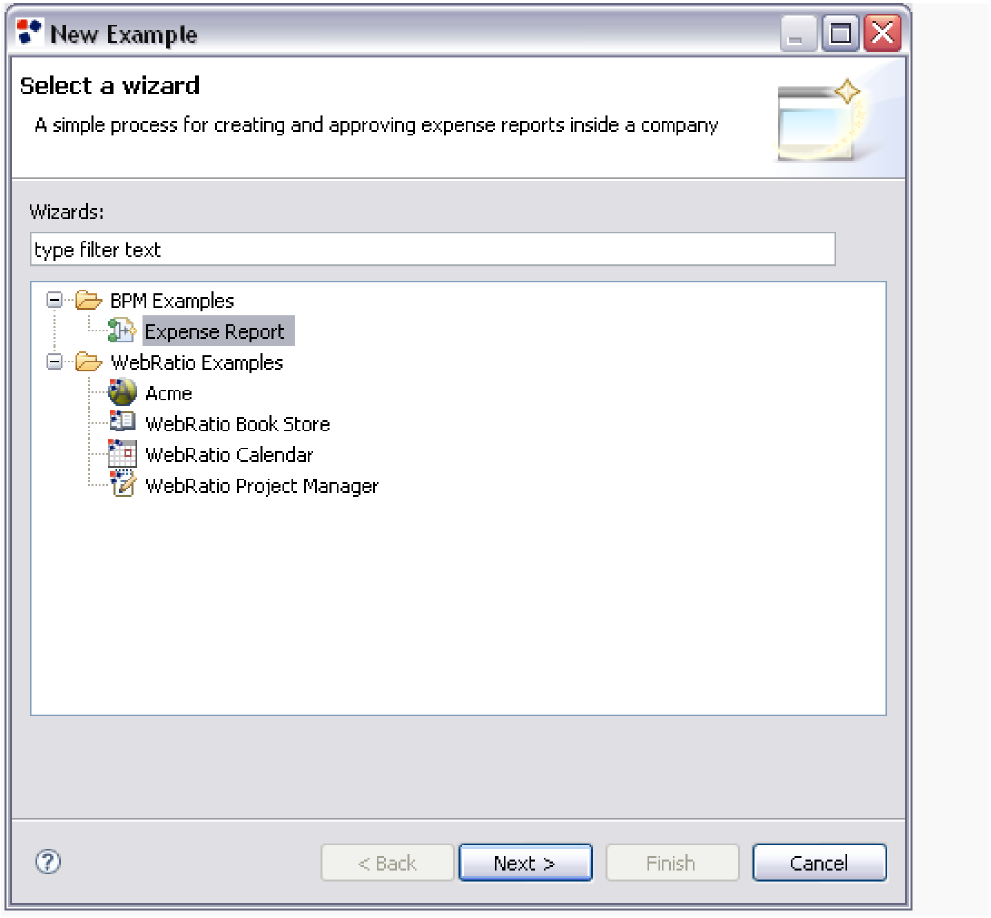
2. The main view, located in the right area, is the **Editing View** that is dedicated to the drawing of our process; in the left area of the Editing View there is a palette in which you can choose the elements of the BPMN notation you can use in your process and in the upper area there is a toolbar that permits the navigation and zooming of your process.
3. Each element is described by a set of properties that can be edited in the bottom left area named**Properties View**.
4. A set of utility views is placed in the bottom right area permitting the check of the errors in the process and the documentation process.

The Expense Report example process

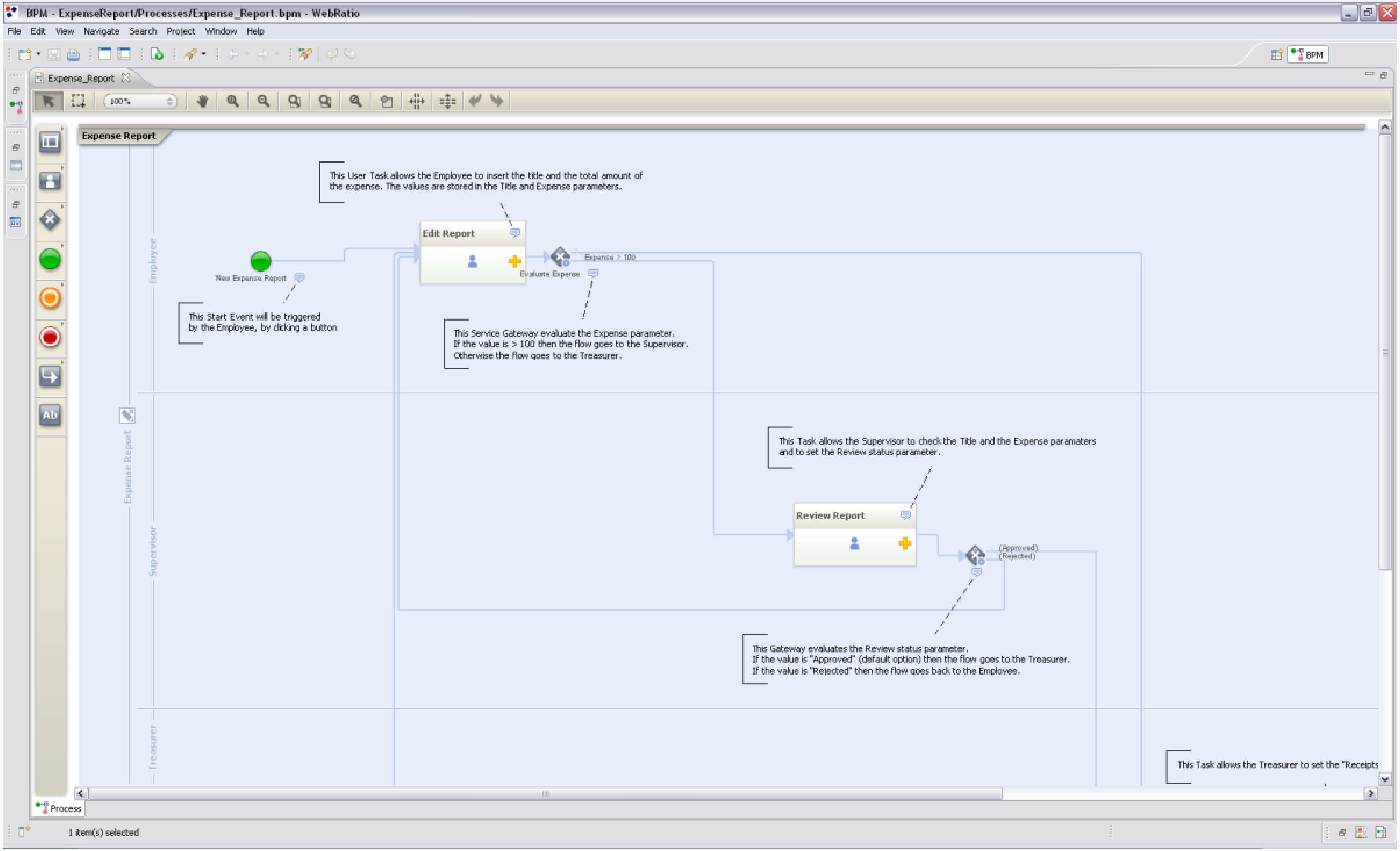
Install the example process

To install the 'Expense Report' example process just follow these steps

1. Click on **File** > **New** > **Example**
2. Click on the BPM Examples->Expense Report, and then click on the **Next** button
3. Click on the **Finish** button
4. The project is imported and opened in the BPM editor



Install "Expense Report" project



"Expense Report" project

Process Description

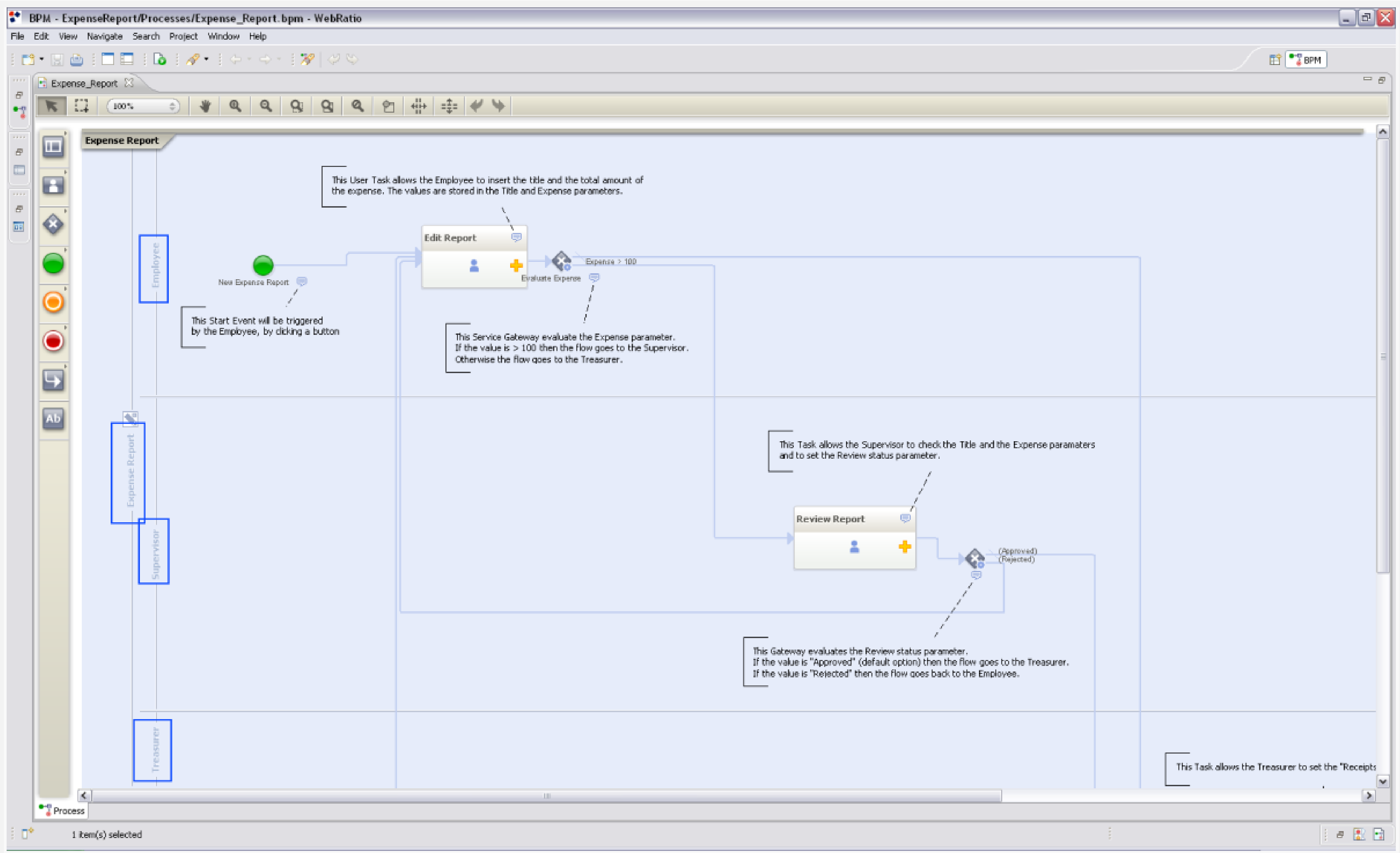
The Expense Report example project is a simple BPMN process in which an employee sends a report to his company and requests the approval and payment of his month expenses. If the expense report amount is over a certain threshold, a supervisor must approve the report, otherwise the treasurer (after a notification) can approve and store the information about the report in the company account system and start the payment. The process manages a unique parameter named 'Report' which is a reference to the Business Object 'Expense Report' characterized by:

- Title [string]: the report's title
- Expense[decimal]: the expense associated to the report
- Supervisor status [string][values: Accepted, Rejected]: the approval status specifying if the expense report has been approved or not from the supervisor
- Supervisor status note [text]: the text associated by the supervisor to the status of the report
- Treasurer status [string][values: Accepted, Rejected]: the approval status specifying it the expense report has been approved or not from the treasurer
- Treasurer status note [text]: the text associated by the treasurer to the status of the report

The process is composed by a pool named "Expense Report" in which there are three lanes:

- Employee
- Supervisor
- Treasurer

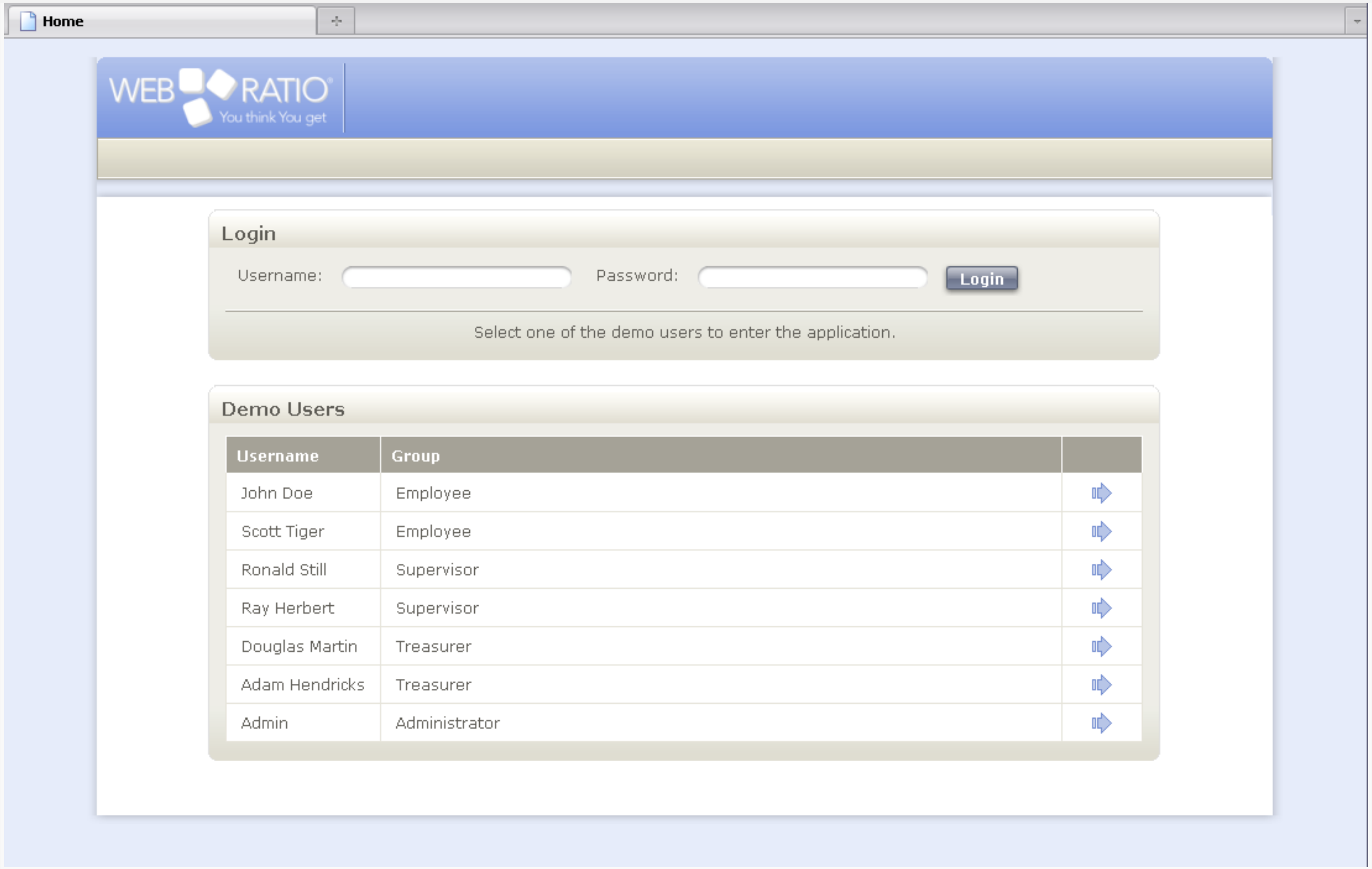
Each lane represents a role involved in the process.



Pool and Lanes

Publish the process

To publish the process:

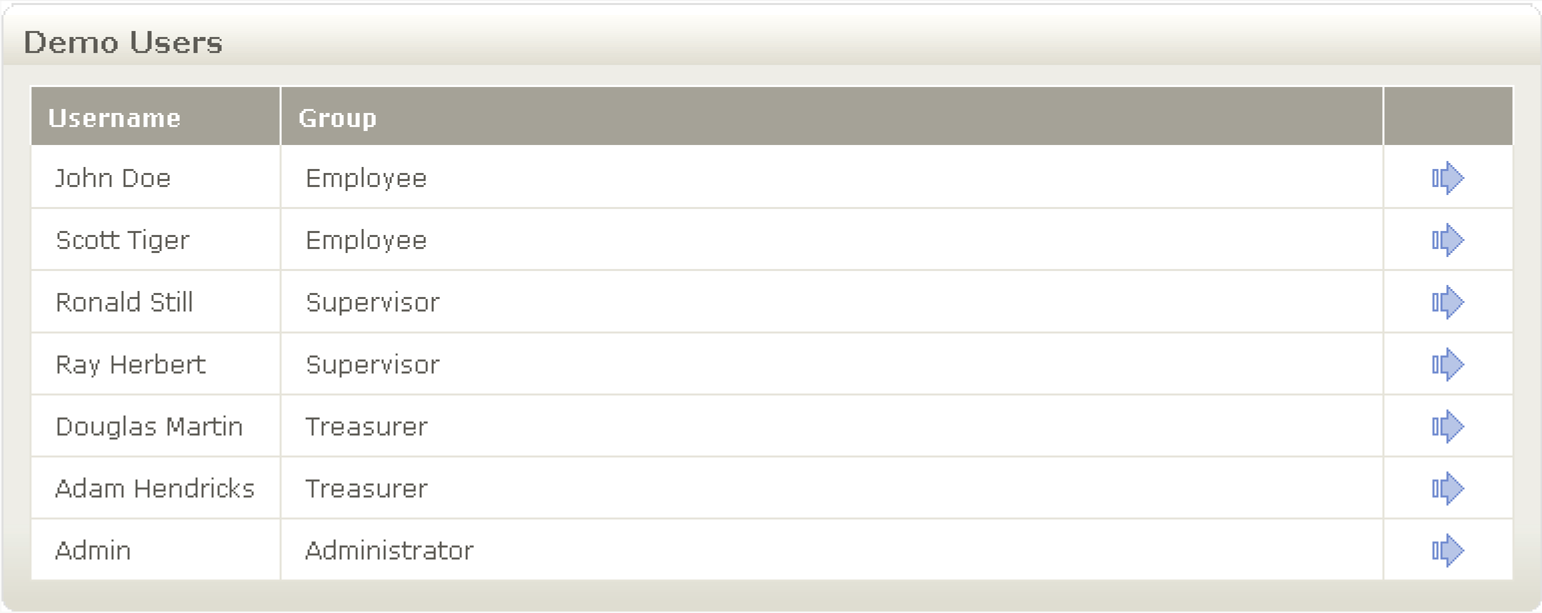


Process Published

1. Click on the "Publish Process" button placed in the toolbar
2. At the end of the publishing process a browser window is opened

For each role specified in the process the generated Web application proposes two demo users. To access the Web application:

1. Click on the "Demo Users" button to see the list of the demo users
2. Click on the button beside the "John Doe" employee user
3. Click on the "Login" button to access the Web application.

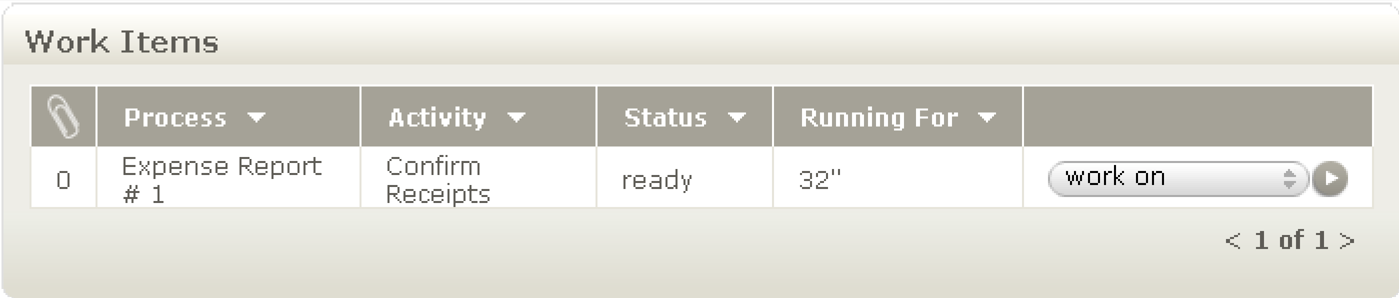


Demo Users

Login

Once logged in you are in the "Control View" area which contains all the activities related to the employee role . In this area you can:

Start Process

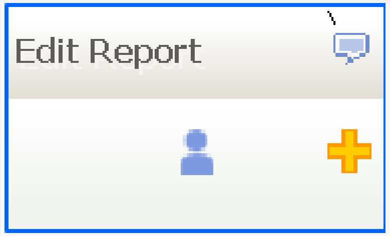


Activities

- Start a new process by clicking on one of the buttons available in the left side area
- See all the activities that are waiting to be worked by you or one of the other employees by using the list placed in the central area

Clicking on the "New Expense Report" button in the left side area of the desktop you can start a new "Expense Report" process. This button correspond to the start event named "New Expense Report" placed in the BPMN process on the Employee lane.

Once pressed the process starts and the user is redirected in a page named 'Edit Report' in which he has to specify the title and the expense amount of the report. This page corresponds to the "Edit Report" task , placed in the Employee lane just after the start event.

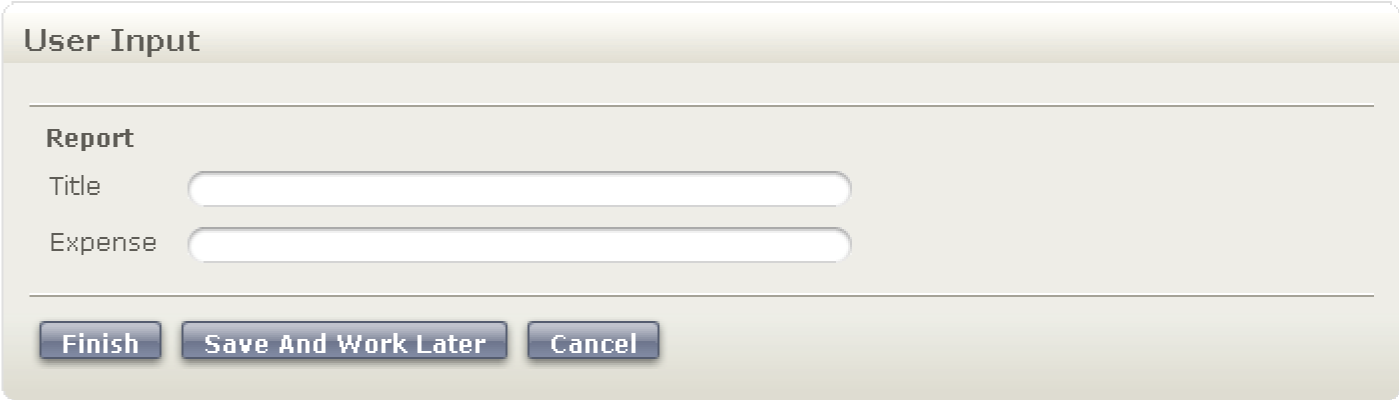


Edit Report Task

The title and expense amount information are two properties of the Business Object 'Expense Report' defined in the Activity Parameters. Using the Property View it's possible to associate these two Activity Parameters to the current task.

In the "Edit Report" page there are three buttons:

1. Cancel: cancel the changes and leave the activity as pending in the user's electronic desktop
2. Save and Work Later: save the changes and leave the activity as pending in the user's control view
3. Finish: save the changes and complete the activity and keep going in the process



Buttons

Insert 'My Report' as title and '500' as expense value, then click on the 'Save and Work Later' button to save changes and come back to your control view. In the Control View you will see a new pending work item, in the 'Work Items' list, named 'Edit Report My Report'.

Click on the play icon beside the pending work item named 'Edit Report My Report' to enter again in the task and then click on 'Finish' to complete the activity.

Now the activity is completed and the process continues its flow directly to a gateway named 'Evaluate Expense'. Since the expense amount is equal to '500' the gateway follows the gate that flows to the Supervisor area in the task 'Review Report'.

The process continues its flow right to the end event passing through the specified task and gateways.

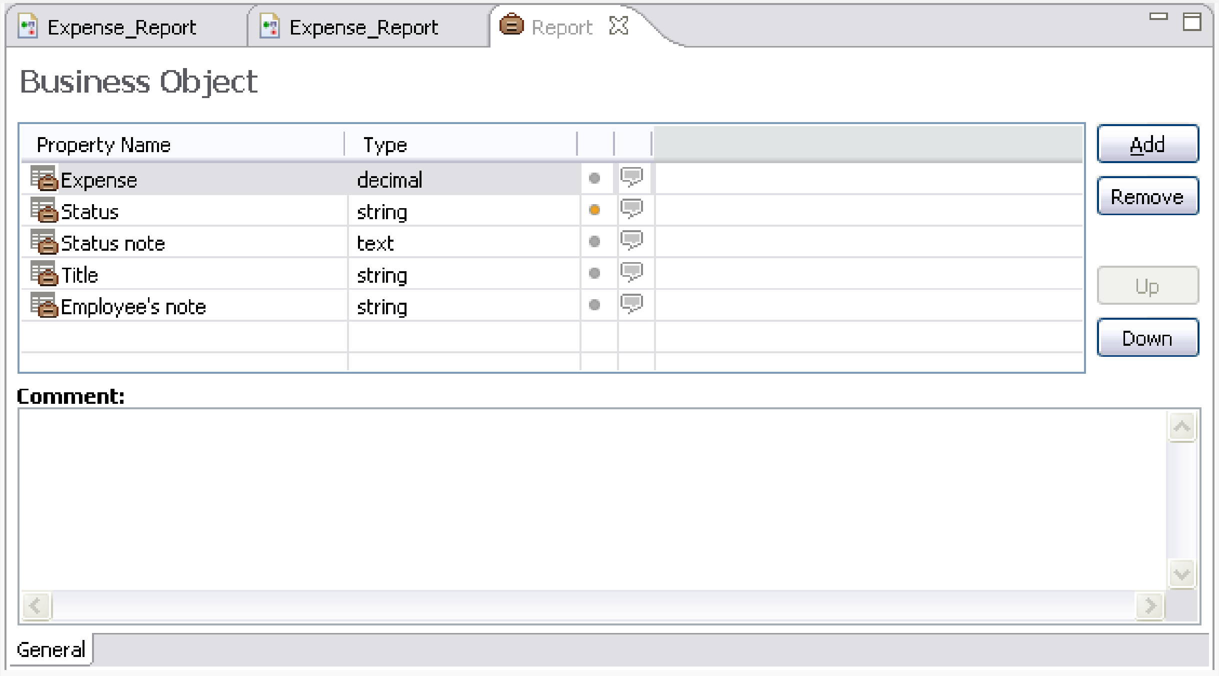
Add a new information to the 'Edit Report' task

Suppose that you want to change the process by adding a new information to the page 'Edit Report'. You want to add a new property to the Business Object 'Expense Report' named 'Note' and give to the Employee the possibility to fill this information in the task 'Edit Report'; all the other users will see this note as a report information.

Modify the Business Object

To modify a Business Object

1. Go in the BPM Explorer, open the 'Expense Report' BPM Project and the 'Business Objects' node
2. Double click the Business Object 'Expense Report'
3. In the opened editor, click on the 'Add' button to add a new property
4. Insert 'Employee's Note' as Name for the property and leave all the other options as unmodified
5. Save the changes by using CTRL-s or by clicking the icon on the toolbar

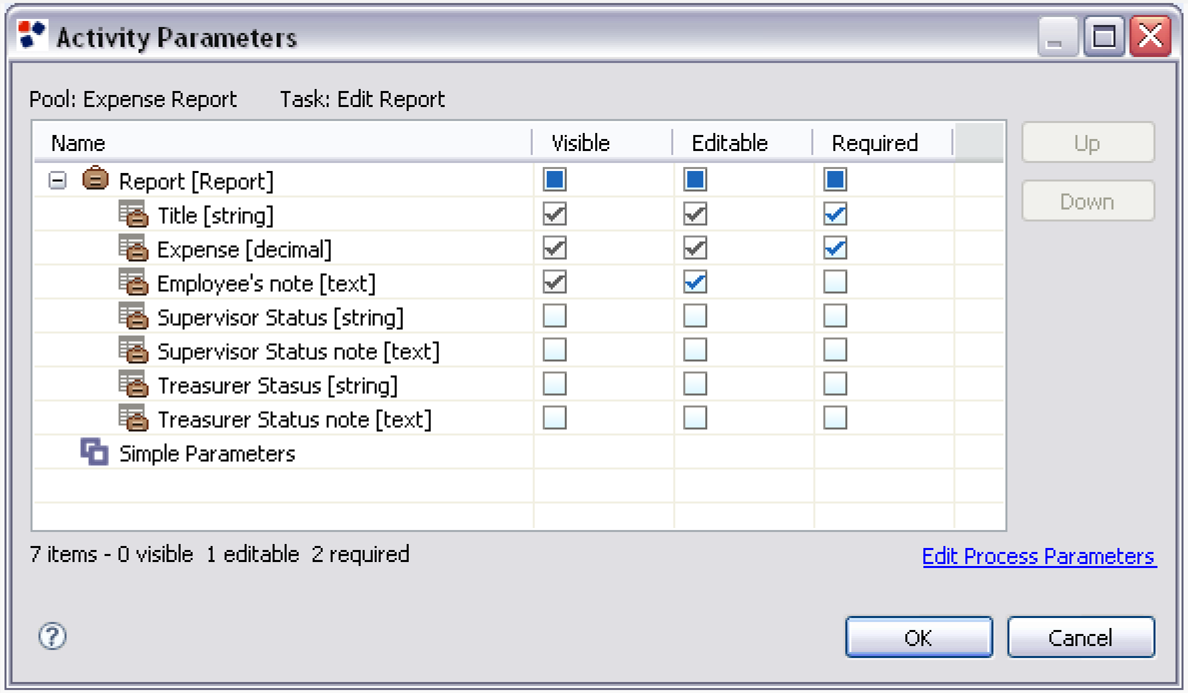


A Business Object

Add the property to the task 'Edit Report'

To add the new property as editable

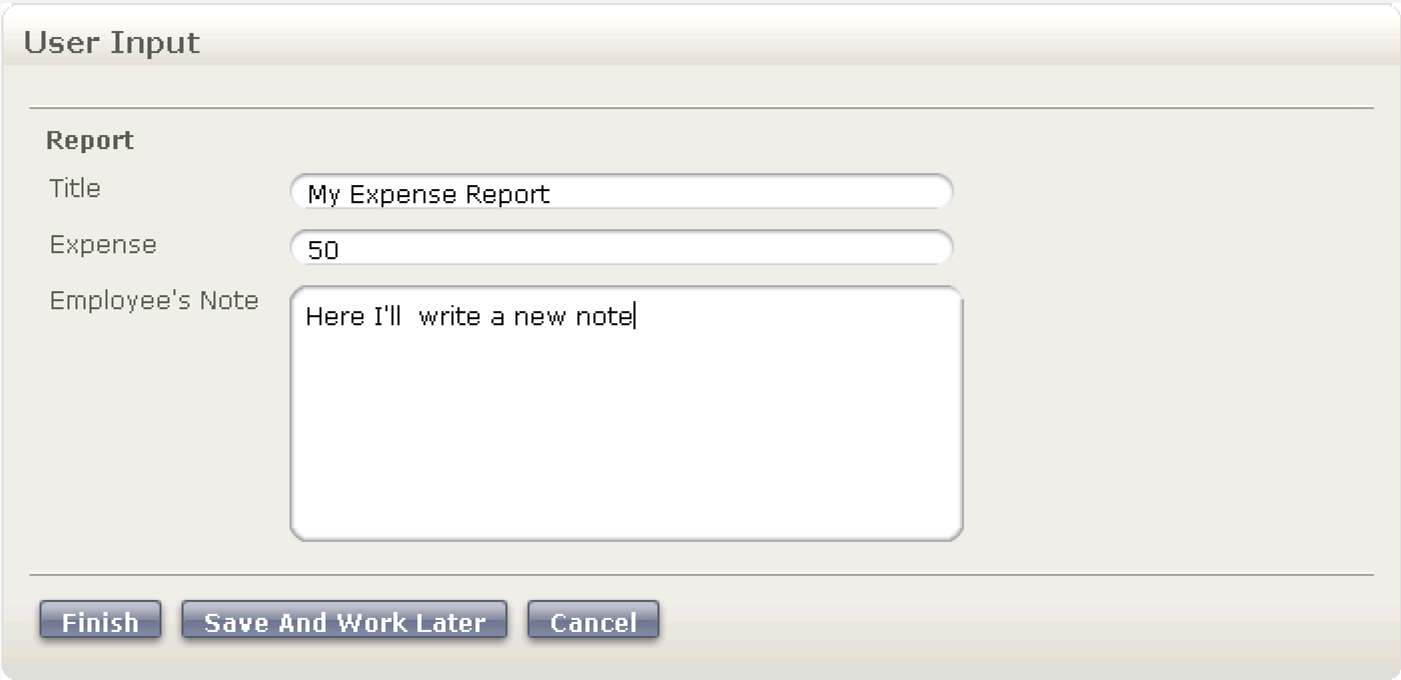
1. In the 'Expense Report' process click on the 'Edit Report' task placed in the Employee's lane
2. Go into the Properties View of the task and click on the button beside the property Activity Parameters
3. In the opened dialog, that contains the activity parameters configuration, click on the checkbox in the "Employee's note" row under the column "Editable", and then click 'Ok'



Edit Report Property

Publish the process and browse the application

1. Refer to "Publish the process" section for further details
2. Log in as "Employee" and start a new process. In the "Edit Report" activity you'll see the new parameter as a text input in the form



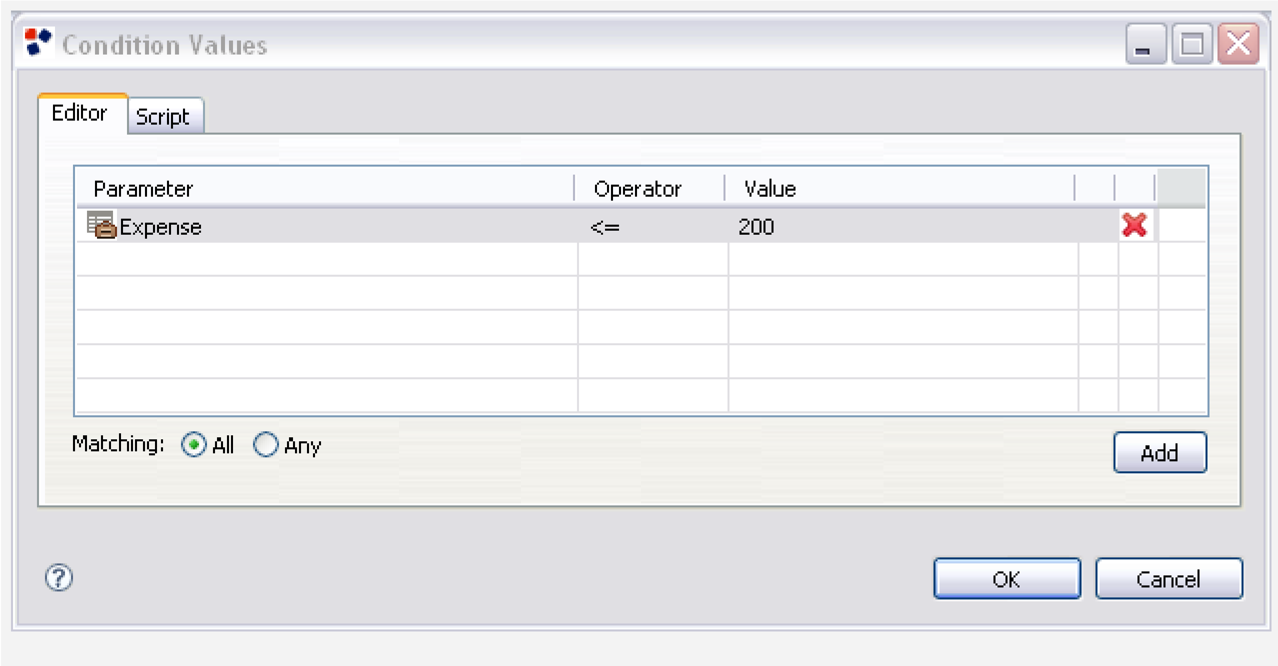
Edit Employee Note

Change the threshold for the supervisor approval

Suppose now that you want to change the threshold that decides whether a supervisor approval is necessary or not. This means that you want to change the expression associated to the gateway 'Evaluate Expenseâ€'.

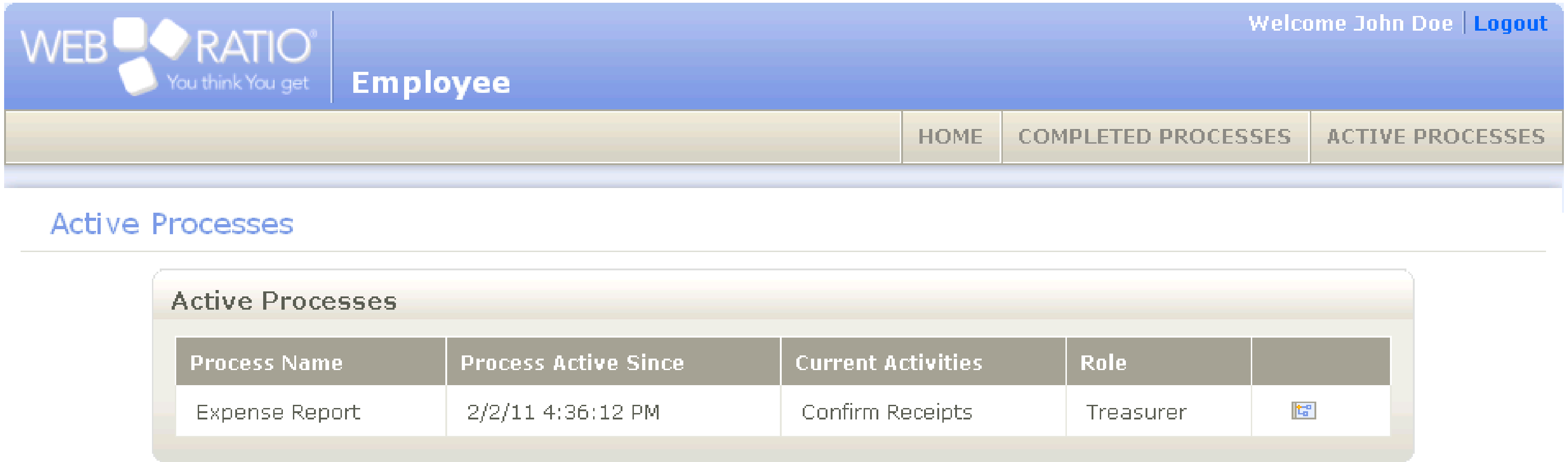
Edit the conditions

1. Click on the gateway "Evaluate Expense"
2. Go in the Properties View and click on the button beside the **Condition Values** property
3. In the opening dialog you have the list of the targets of the flow connectors outgoing from the gateway; click on the button beside the first row to open it
4. In the opening dialog you have the conditions associated to the selected target; insert in the **Value** field "200" and click **OK**
5. Click on the button beside the second row to open it
6. In the opening dialog insert in the **Value** field "200" and click **OK**



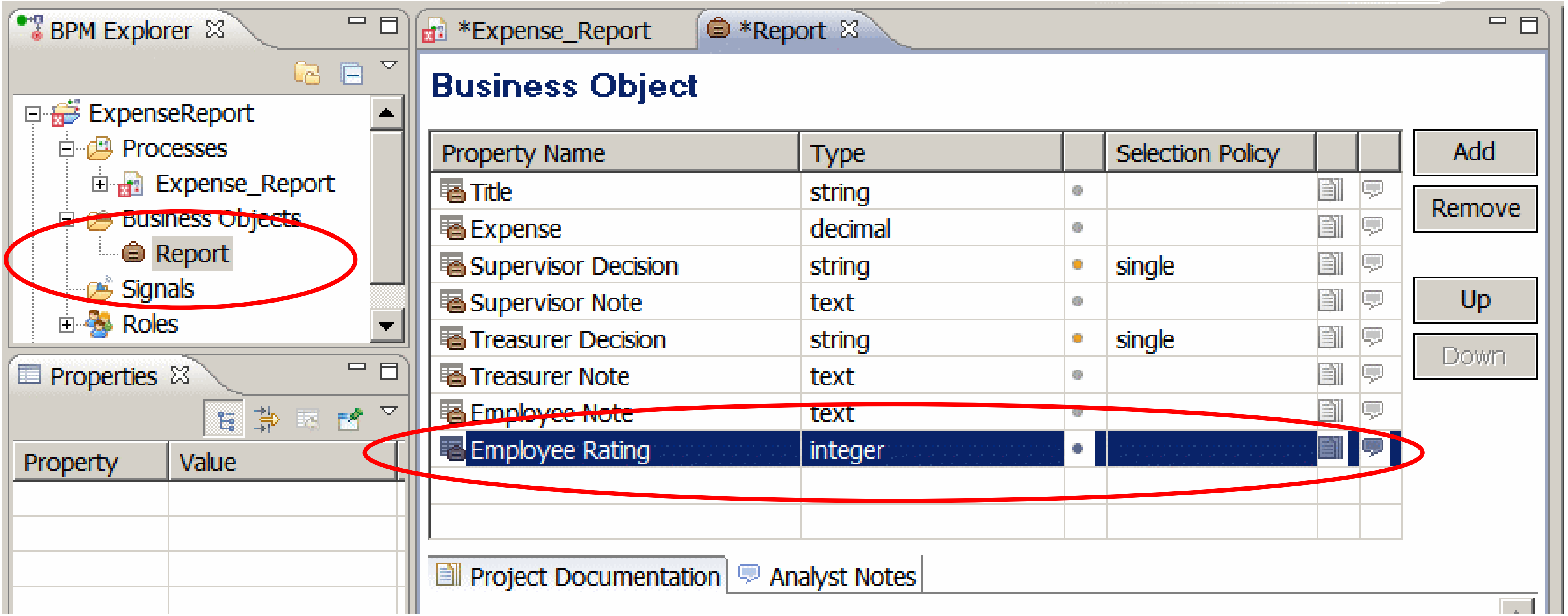
Publish the process and browse the application

1. Refer to "Publish the process" section for further details
2. Log in as "Employee" and start a new process.
3. In the "Edit Report" activity insert "100" as the "Expense" value and click **Finish**
4. Clicking on the "Active Processes" landmark item menu, a page will be open, where you can see that the process is assigned directly to the Treaurer without the need of an approval from the Supervisor

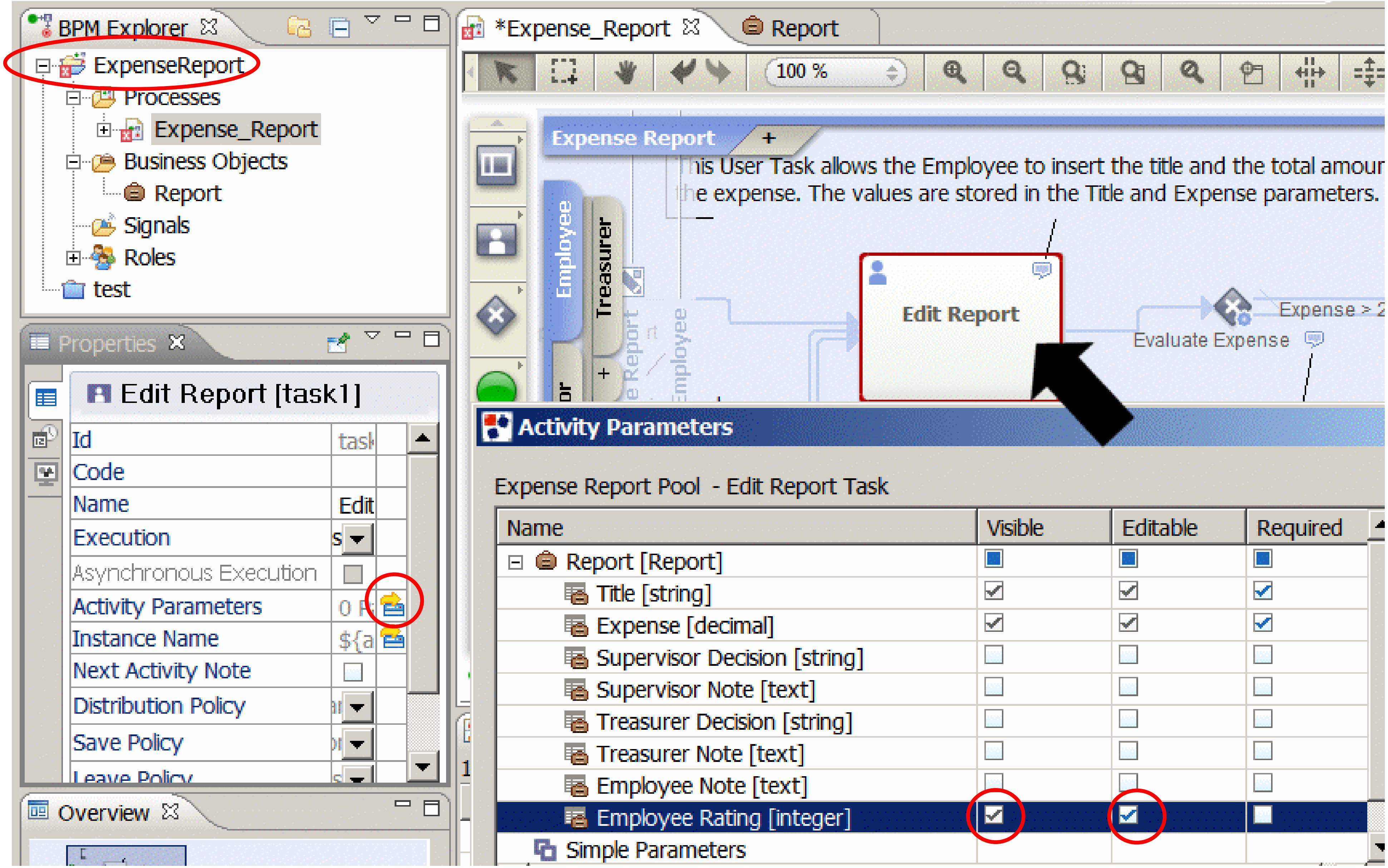


Exercise: Add numerical information to the "Edit Report" task

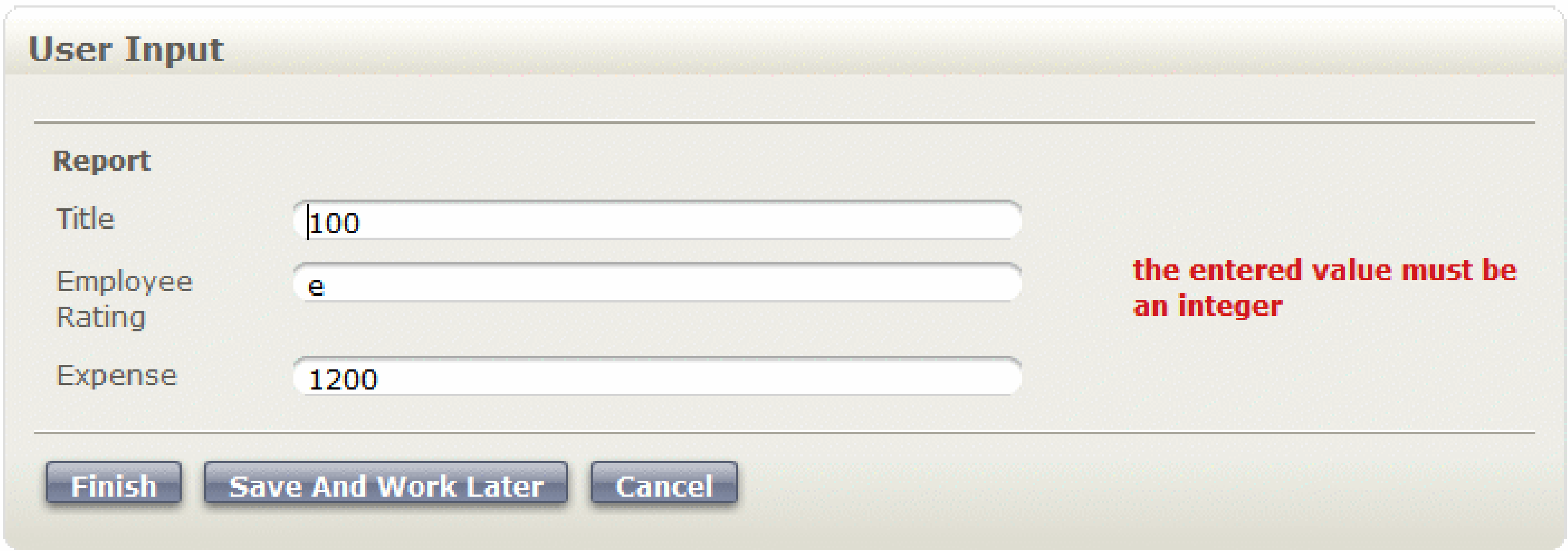
1. Add the "Rating" property: a high rating means an absolutely necessary expense; a low rating means an optional expense.
2. Modify the *Business Object*. In the BPM Explorer, expand the *Business Objects* node, double click on *Report*, click on *Add*, add a row with the *Employee Rating* property, *integer* Type. Click on the Floppy icon (top left) to save changes.
3.



4. Tomake the new field visible and editable: (i) select the Expense_report diagram, (via the *BPM Explorer*), (ii) select the *Edit Report* task, (iii) in the *Properties* tab, click on the icon close to *Activity Parameter*.
5. A table of parameters appears, check the *Visible* and *Editable* properties of *Employee Rating*.


BPM Explorer
ExpenseReport
Processes
Expense_Report
Business Objects
Report
Signals
Roles
test
Properties
Edit Report [task1]
Id
Code
Name
Execution
Asynchronous Execution
Activity Parameters
Instance Name
Next Activity Note
Distribution Policy
Save Policy
Overview
*Expense_Report
Report
100 %
Expense Report
This User Task allows the Employee to insert the title and the total amount of the expense. The values are stored in the Title and Expense parameters.
Employee
Treasurer
Edit Report
Evaluate Expense
Activity Parameters
Expense Report Pool - Edit Report Task
Name
Visible
Editable
Required
Report [Report]
Title [string]
Expense [decimal]
Supervisor Decision [string]
Supervisor Note [text]
Treasurer Decision [string]
Treasurer Note [text]
Employee Note [text]
Employee Rating [integer]
Simple Parameters

6. Click *ok*, click on the floppy icon (top-left) to save changes.
7. Select the item *Expense_Report* in the *BPM Explorer*, and Publish the process. Open the browser and point http://localhost:8080/ExpenseReport to test the new process.
8. Select *John Doe* and login. Start a new *Expense Report* instance. Note the new field *Employee Rating*, in the *Edit Report* form. Enter a letter as a value of *Employerr Rating* and click *Finish*. An error message is shown.



9. **Shut down the web application:** Windows ⇒ *Start* ⇒ *Programs* ⇒ Webratio ⇒ *Tomcat Stop*;