

Business Process Implementation, Execution and Programming

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Download the slides from

<http://jarrar-courses.blogspot.com/2015/01/dataandbusinessprocessmodelling.html>

Some content in this lecture are based on [2]

Reading and practice

[1] Every material in these slides.

[2] Activiti user manual (<http://activiti.org/userguide/index.html>)

[3] Optional: relevant material from “Activiti in Action: Executable business processes in BPMN 2.0 by Tijs Rademakers. ISBN: 9781617290121, July 2012”

Keywords: Data Engineering, Data Modeling, Conceptual Data Modeling, ORM, Object Role Modeling, Information Modeling, Schema engineering, Business Rules, integrity constraints, Derivation rules, Logic, verbalization of business rules, rules contradictions, rules implications, Business Process Engineering, Business Process Management, Business Process Modelling, Process Mapping, Process identification, process re-engineering, process re-engineering, Process Optimization, Process execution.

هندسة البيانات، مخطط بيانات المفاهيمية، النمذجة المفاهيمية للبيانات، هندسة العمليات، إعادة هندسة العمليات الإدارية

Concepts, Languages & Architectures of Business Process Management

- Lecture I: what is Business Process Management
- Part II: Business Process Model and Notation
- Part III: Business Process Design and Re-engineering
- **Part IV: Business Process Automation**

Business Process Automation

Several frameworks exist for business process automation.

The chosen framework in this course is Activiti BPM engine.

There are other technologies, such as:

- Business Process Innovation- BP3
- Oracle
- Microsoft
- IBM
- TIBCO
- Software Agile
- SAP
- JBoss

Activiti BPM Engine

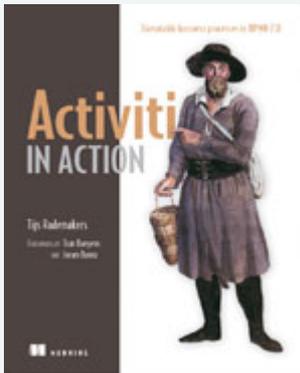


- ✓ BPMN 2.0 compliant process engine
 - ✓ Targeted for business people, developers, system admin(s).
 - ✓ Open source Java framework distributed under Apache license
-
- ✓ Light-weight workflow and business process execution engine
 - ✓ Can run embedded in any java application, or standalone on a server/cluster.

Activiti in Action

In addition to Activiti user manual (<http://activiti.org/userguide/index.html>)

The Activiti in Action book provide solid introduction to BPMN 2.0 from a developer perspective.



Activiti in Action

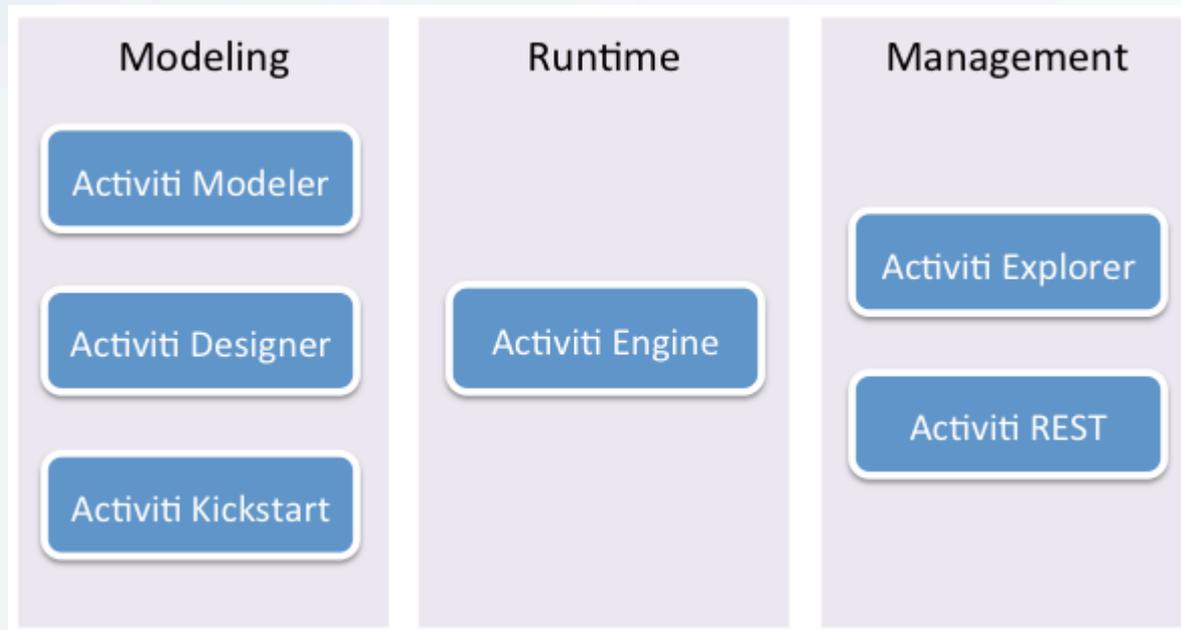
Executable business processes in BPMN 2.0

By Tijs Rademakers

ISBN: 9781617290121, July 2012

Activiti Component Architecture

High level of Activiti components architecture that help to understand how Activiti BPM Java workflow engine operate.



Activiti Download

Open below URL and download latest Activiti version (5.17).

<http://activiti.org/download.html>

Activiti Downloads

Latest Release

Download	Size	License	Date
activiti-5.17.0.zip	70 MB	Apache license	18 December 2014

Installation instructions

Just unzip to a directory of choice and then check out the readme.html that includes pointers to the docs and the release notes. The userguide (docs/userguide/index.html) includes instructions on how to get started simple and quick.

Getting started pointers

- [10 Minute Tutorial](#)
- [The User Guide](#)
- [Javadocs](#)

Related Downloads

- [Download JDK](#)
- [Download Eclipse](#)

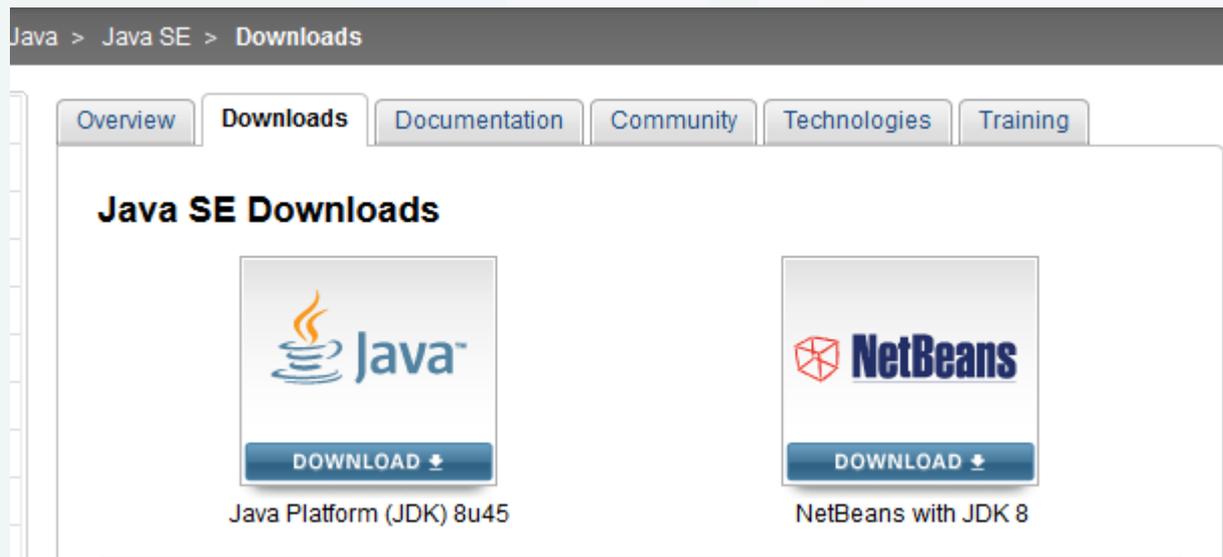
Java SE Development Kit (JDK)

Download JDK on your machine, any later version than 1.6

<http://www.oracle.com/technetwork/java/javase/downloads/index.html>

Then add bin folder to the path of OS system variables following standard oracle documentation

<https://www.java.com/en/download/help/path.xml>



Eclipse

Download Eclipse IDE for Java EE Developers that match your operating system (32 Bit or 64 Bit)

<http://www.eclipse.org/downloads/>

Package Solutions

Filter Packages ▼



Eclipse IDE for Java EE Developers, 254 MB

Downloaded 1,275,122 Times

Tools for Java developers creating Java EE and Web applications, including a Java IDE, tools for Java EE, JPA, JSF, Mylyn...



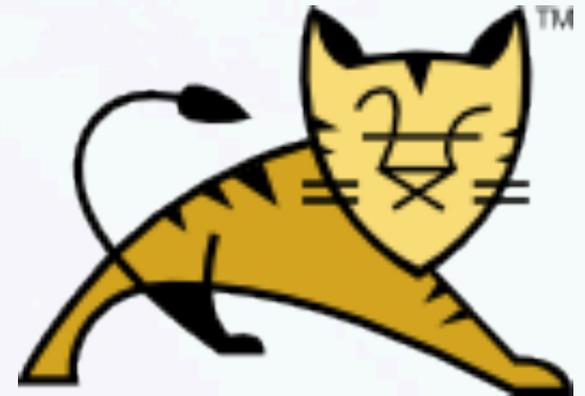
Windows 32 Bit
Windows 64 Bit

Application Server - Tomcat

Download latest version of tomcat web container that suite your machine.

<http://tomcat.apache.org/download-70.cgi>

Other application servers: Oracle WebLogic, IBM WebSphere, ...



7.0.61

Please see the [README](#) file for packaging information. It explains what every distribution contains.

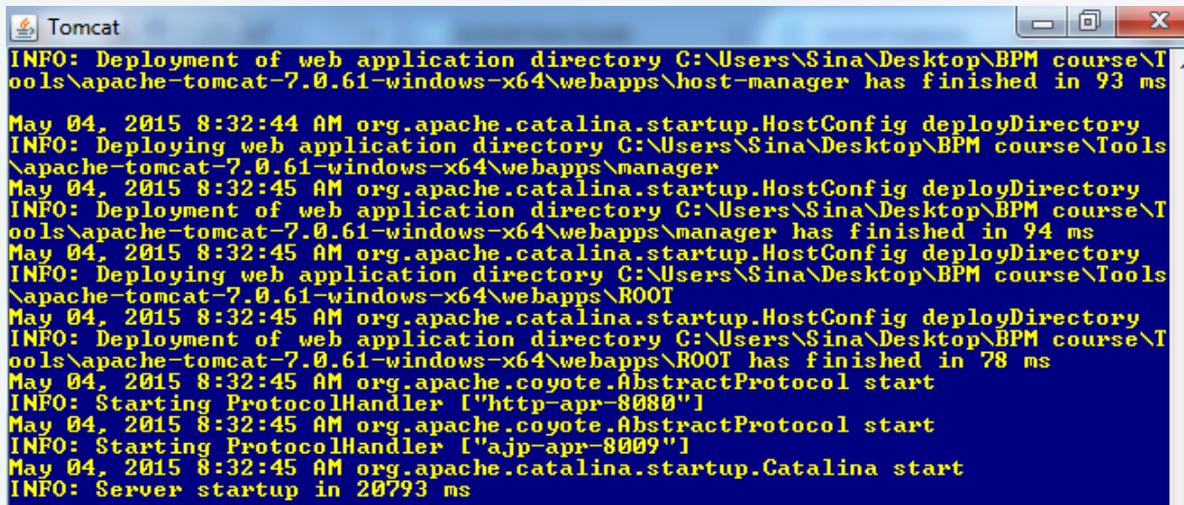
Binary Distributions

- Core:
 - [zip](#) ([pgp](#), [md5](#), [sha1](#))
 - [tar.gz](#) ([pgp](#), [md5](#), [sha1](#))
 - [32-bit Windows zip](#) ([pgp](#), [md5](#), [sha1](#))
 - [64-bit Windows zip](#) ([pgp](#), [md5](#), [sha1](#))
 - [64-bit Itanium Windows zip](#) ([pgp](#), [md5](#), [sha1](#))
 - [32-bit/64-bit Windows Service Installer](#) ([pgp](#), [md5](#), [sha1](#))

Getting Started With Activiti

Lets start with Activiti demo.

- ✓ Environment setup is ready (JAVA_HOME system variable is defined, downloaded Tomcat and Activiti).
- ✓ Copy activiti-explorer.war from “war” folder in Activity, to “webapp” folder of Tomcat
- ✓ Run startup.bat or startup.sh depending on your OS
- ✓ After Tomcat started up, hit the following link
<http://localhost:8080/activiti-explorer/>

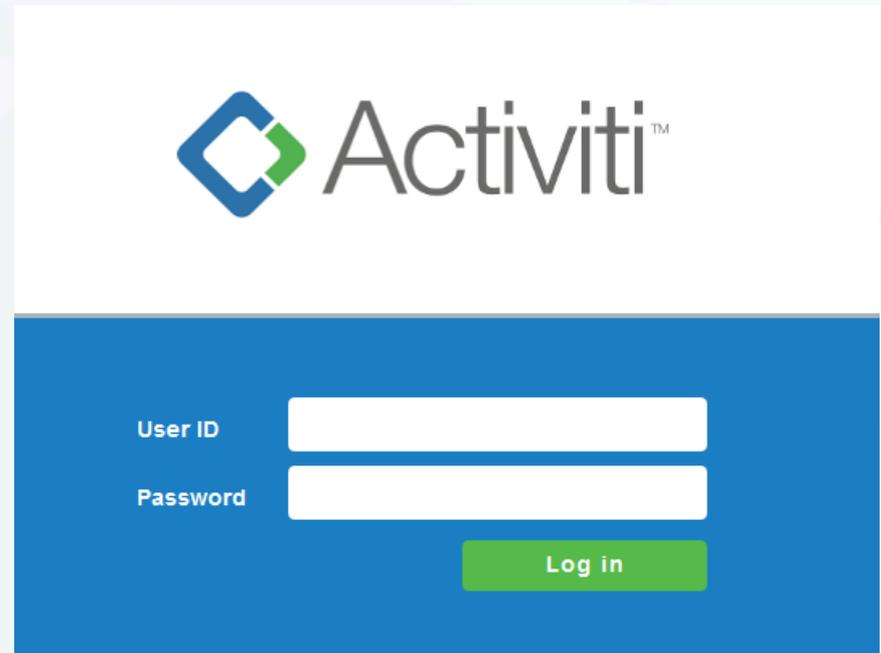


```
Tomcat
INFO: Deployment of web application directory C:\Users\Sina\Desktop\BPM course\Tools\apache-tomcat-7.0.61-windows-x64\webapps\host-manager has finished in 93 ms
May 04, 2015 8:32:44 AM org.apache.catalina.startup.HostConfig deployDirectory
INFO: Deploying web application directory C:\Users\Sina\Desktop\BPM course\Tools\apache-tomcat-7.0.61-windows-x64\webapps\manager
May 04, 2015 8:32:45 AM org.apache.catalina.startup.HostConfig deployDirectory
INFO: Deployment of web application directory C:\Users\Sina\Desktop\BPM course\Tools\apache-tomcat-7.0.61-windows-x64\webapps\manager has finished in 94 ms
May 04, 2015 8:32:45 AM org.apache.catalina.startup.HostConfig deployDirectory
INFO: Deploying web application directory C:\Users\Sina\Desktop\BPM course\Tools\apache-tomcat-7.0.61-windows-x64\webapps\ROOT
May 04, 2015 8:32:45 AM org.apache.catalina.startup.HostConfig deployDirectory
INFO: Deployment of web application directory C:\Users\Sina\Desktop\BPM course\Tools\apache-tomcat-7.0.61-windows-x64\webapps\ROOT has finished in 78 ms
May 04, 2015 8:32:45 AM org.apache.coyote.AbstractProtocol start
INFO: Starting ProtocolHandler ["http-apr-8080"]
May 04, 2015 8:32:45 AM org.apache.coyote.AbstractProtocol start
INFO: Starting ProtocolHandler ["ajp-apr-8009"]
May 04, 2015 8:32:45 AM org.apache.catalina.startup.Catalina start
INFO: Server startup in 20793 ms
```

Process Engine User Console

The process engine user console (<http://localhost:8080/activiti-explorer/>) can be used for variety of purposes, but not limited to what below:

- Start new processes
- Assign tasks
- View and claim tasks
- Monitor process execution lifecycle
- ... and more



The screenshot shows the Activiti user console login interface. At the top, there is the Activiti logo, which consists of a blue and green diamond shape followed by the word "Activiti" in a grey sans-serif font. Below the logo, the page has a dark blue background. On the left side, there are two labels: "User ID" and "Password". To the right of each label is a white rectangular input field. Below these two input fields, there is a green rectangular button with the text "Log in" in white.

Users for Activiti Demo

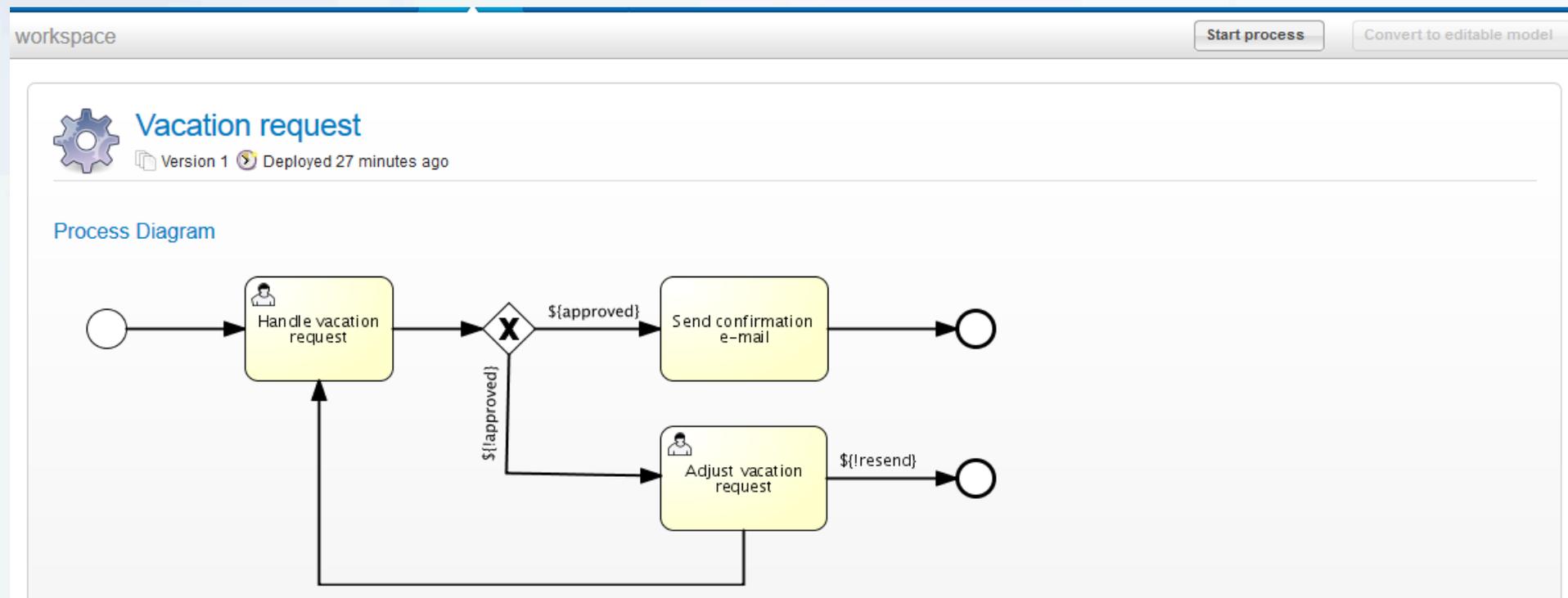
Below are the demo users with their roles.

Roles and users are usually defined (if needed) during the development phase to implement a process using Activiti.

Username	Password	Role
kermit	kermit	admin
gonzo	gonzo	manager
fizzie	fizzie	user

Demo Example: Vacation Request

Login using the user account, go to processes page. Then choose Vacation request from the sidebar and click on start process.



Vacation Request Lifecycle

- Fill the form and click on start process.
- Login with manager role, you will see one request under management page under Queued tab of Tasks menu.
- Click on Claim, then complete the form with manager decision (Approve or Reject)
- Try different manager decision(s) to understand how this process work.

Activiti Modeler

The Activiti modeler is available as an Eclipse plugin, where you can draw business processes to be executed using this engine.

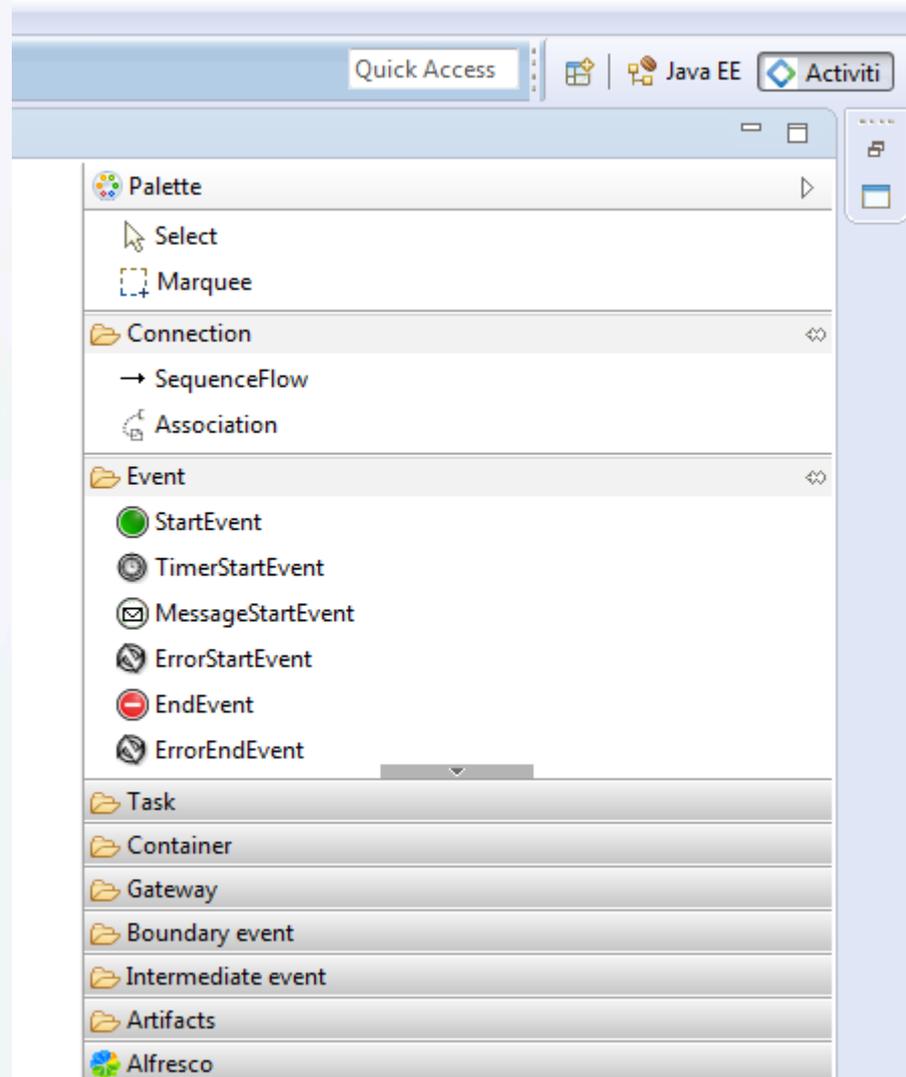
After opening Eclipse, go to Help then Install New Software.

Add repository for Activiti site (
<http://activiti.org/designer/update/>)

Select Activiti BPMN Designer and install it.

Activiti Designer

The designer contains a wide set of BPMN 2.0 constructs that you can use to model and execute BPMN-like workflows.

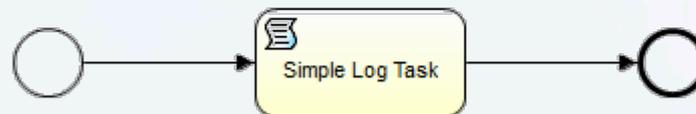


Activiti Example: Model and Implement Process

Goal: getting started with Activiti engine and designer, deployment, process instance(s).

User case: Simple log process that will print a line when a process instance is initiated.

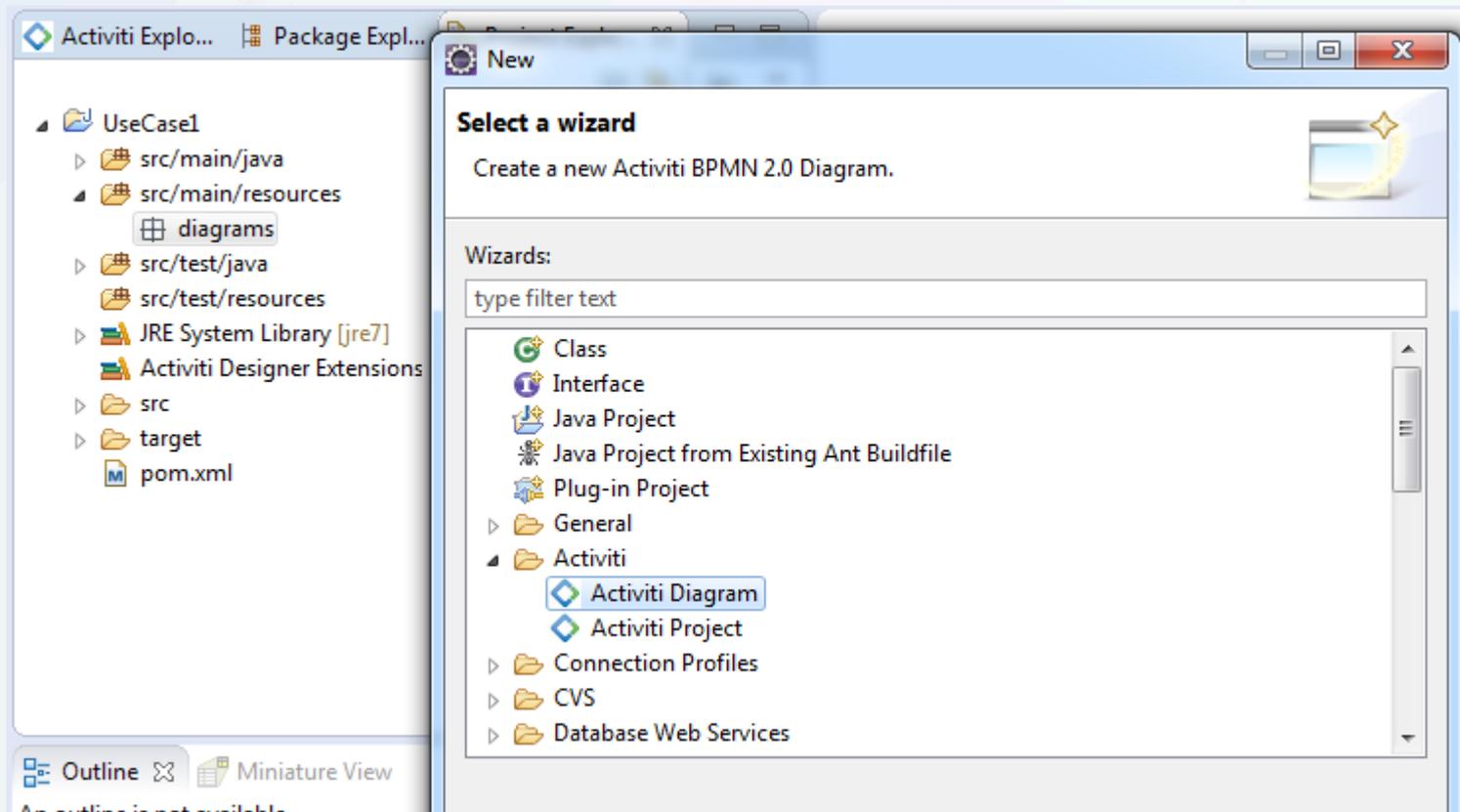
Process diagram is below



Project and Diagram

Create Activiti Project in eclipse

Then create Activiti Diagram under src/main/resources/diagrams



Using Activiti Process Designer

Draw then implement below process using start event, script task and end event.

The screenshot displays the Activiti Process Designer interface for a process named "SimpleLogProcess". The main canvas shows a process flow starting with a start event (circle), followed by a "Simple Log Task" (rounded rectangle with a script icon), and ending with an end event (circle). The task is highlighted with orange selection handles.

On the right side, the "Palette" contains various BPMN elements:

- Select
- Marquee
- Connection
- Event
- Task
 - UserTask
 - ScriptTask
 - ServiceTask
 - MailTask
- Container
- Gateway
- Boundary event
- Intermediate event
- Artifacts
- Alfresco

At the bottom, the "Properties" panel is open, showing the configuration for the selected "Simple Log Task":

- Script language: groovy
- Script: println "Hello!"

Model and Create Deployment Artifact

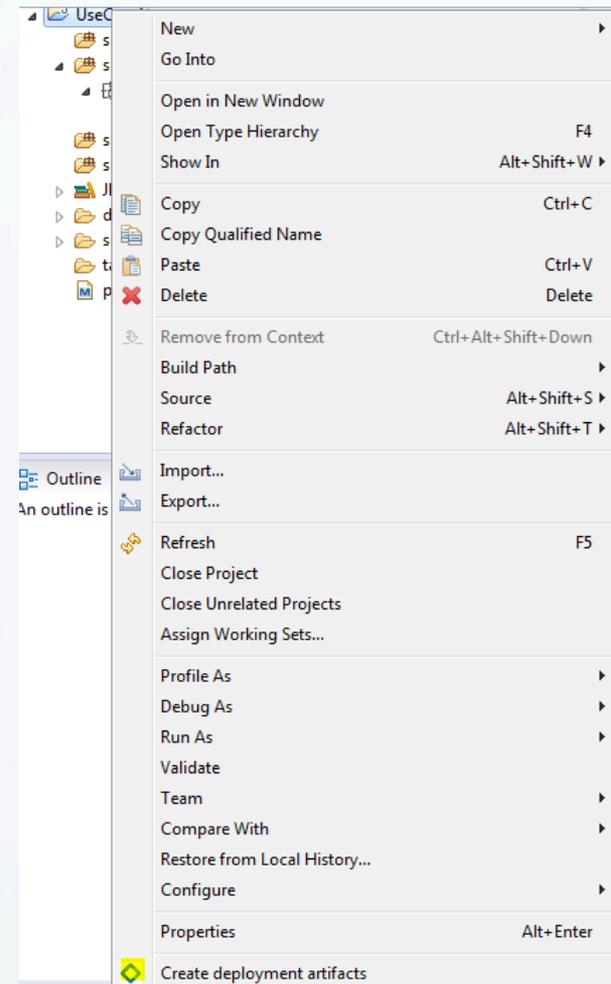
Using package explorer, right click on project and click on create deployment artifacts.

This action will generate a .bp deployment file under project/deployment/

After that, deploy the .bp to Activiti engine through the deployment page when login as admin.

After starting the process, the text is printed out to Tomcat console.

```
11:07:24,587 [http-apr-8080-exec-9] INFO org.activiti.engine.impl.bpmn.deployer
.BpmnDeployer - Processing resource SimpleLogProcess.bpmn20.xml
11:09:00,616 [http-apr-8080-exec-9] INFO org.activiti.engine.impl.bpmn.deployer
.BpmnDeployer - Processing resource SimpleLogProcess.bpmn20.xml
Hello!
```



Exercise

Configure all Activiti related Java frameworks on your machine, then run the demo.

Understand the lifecycle of vacation request process.

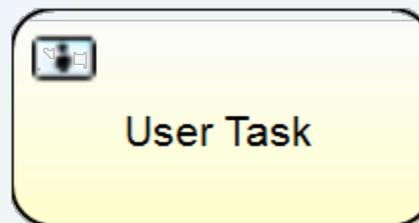
Implement the simple log process, deploy, and start it on your machine.

User (Human) Task

In process model, a user task is used to identify the work is being done by a human actor.

In such processes, when the process instance execution arrive at a user task, a new task instantiated and assigned to the list of user(s) or group(s) assigned to that particular task.

User task is visualized in Activiti as below.



Creating Users Group

In order to create groups:

1. Login to Activiti explorer with the admin user.
2. Open Manage menu, then go to Groups tab
3. Click on Create group

The screenshot displays the Activiti Explorer web application interface. The browser address bar shows the URL `localhost:8080/activiti-explorer/#group/admin`. The application header includes the 'Activiti Explorer' logo and navigation tabs for 'Tasks', 'Processes', 'Reports', and 'Manage'. The 'Manage' tab is active, and the 'Groups' sub-tab is selected. A 'Create group' button is visible in the top right corner. The main content area shows a list of groups on the left and the details for the 'Admin' group on the right. The 'Admin' group details include:

- Id:** admin (with an 'Edit details' button)
- Name:** Admin (with a 'Delete group' button)
- Type:** security-role

The footer of the application contains the text: © Activiti.org. All rights reserved.

Creating Users Group (2)

Create user groups using settings below.

Create group ×

Id*

Name

Type

Create group ×

Id*

Name

Type

Create group ×

Id*

Name

Type

Creating Users

In order to create users:

1. Login to Activiti explorer with the admin user.
2. Open Manage menu, then go to Users tab
3. Click on Create user and define users as below (choose password same as user ID)

Create user

Id*

Password*

First name

Last name

Email

Create user

Id*

Password*

First name

Last name

Email

Create user

Id*

Password*

First name

Last name

Email

Associate User to Group

To associate user to specific group, open user profile and click on (+) sign to link user to certain group as below in our case:

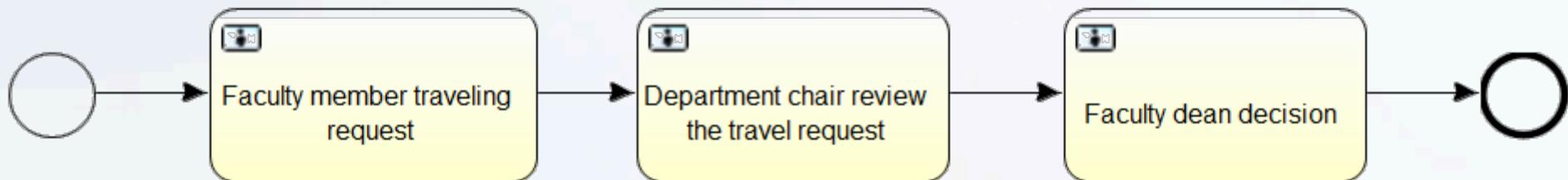
- Add Yazan to dean group.
- Add Natalie to department chair group.
- Add Najeeb to faculty member group.

The screenshot shows a user management interface. On the left, a list of users is displayed, with 'Najeeb Jubran (najeeb)' highlighted. A dialog box titled 'Select groups for user najeeb' is open, showing a table of available groups. The 'facultyMember' group is selected and highlighted in blue. A 'Select' button is visible at the bottom right of the dialog box.

ID	NAME	TYPE
departmentChair	Department Chair	assignment
engineering	Engineering	assignment
facultyDean	Faculty Dean	assignment
facultyMember	Faculty Member	assignment
management	Management	assignment
marketing	Marketing	assignment
sales	Sales	assignment

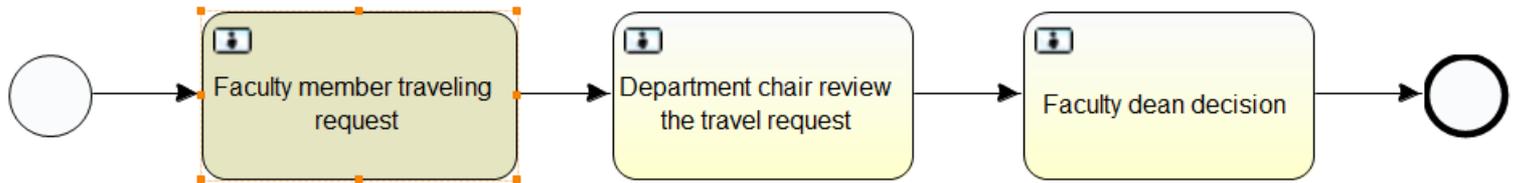
Example

Implementation of the simplified process below of “Faculty Traveling Permission”



User Task Main Configuration

User task can be configured for a specific assignee, user(s) and/or group(s)



Properties		
General	Assignee	<input type="text"/>
Main config	Candidate user...mma separated)	<input type="text"/>
Documentation	Candidate grou...mma separated)	facultyMember
Form	Form key	<input type="text"/>
Listeners	Due date (variable)	<input type="text"/>
Multi instance	Priority	<input type="text"/>

Activiti Modeler: User Task Form

Create traveling request form with settings below, consider all are required.

- Motivation of type string
- Days off: long type
- Start date: date

The screenshot displays the 'Form property configuration' dialog box in the Activiti Modeler. The dialog is centered over a diagram element (a circle with an arrow). The dialog has the following fields and settings:

- Id:** motivation
- Name:** Motivation
- Type:** string
- Expression:** (empty)
- Variable:** (empty)
- Default:** (empty)
- Date pattern:** (empty)
- Readable:** True
- Writeable:** True
- Required:** True
- Form values:** A table with columns 'Id' and 'Name'. The table is currently empty.

At the bottom of the dialog are 'OK' and 'Cancel' buttons. To the right of the dialog, a portion of the 'Form values' table is visible, showing buttons for 'New', 'Edit', 'Remove', 'Up', and 'Down'. In the background, the Activiti Modeler interface is visible, including a 'Properties' panel on the left and a 'Task' element in the diagram on the right.

Department Chair and Faculty Dean Forms

Department Chair Form

Form properties:

Id	Name	Type	Expression	Variable	Default	Pattern	Required	Readable	Writea...	Form values
comments	Comments	string					true	true	true	

Faculty Dean Decision Form

Form properties:

Id	Name	Type	Expression	Variable	Default	Pattern	Required	Readable	Writea...	Form v
approve	Approve	boolean		approve			true	true	true	