SpagoBI Liferay-Tomcat Installation Manual 1.0.1

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1 Version

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2Document goal

This document provides a step by step description for SpagoBI installation and configuration on a Tomcat Server 5.5.17 with Liferay Portal 4.2.2 installed. To get a working copy of Tomcat Server 5.5.17 with Liferay Portal 4.2.2 you can download, from Liferay site (http://www.liferay.com/), the file liferay-portal-tomcat-4.2.2.zip and simply unzip it into your file system.

3 References

Some of the concepts of this document refer to the following documentation:

- SpagoBI business intelligence platform framework (available at http://spagobi.eng.it/)
- Liferay Portal (available at http://www.liferay.com)
- Spago framework (available at http://spago.eng.it)
- Tomcat server (available at http://tomcat.apache.org/)

4 Install SpagoBI

We assume that you use the **java version 1.5.x** and that you have correctly installed the Liferay Portal 4.2.2 on a Tomcat 5.5.17 server; in the following we will refer to the liferay-tomcat base directory as **LIFERAY-HOME**.
To test the Liferay installation exec the command **LIFERAY-HOME/bin/startup.bat** (in a windows environment) or **LIFERAY -HOME/bin/startup.sh** (in a unix environment), wait until the command ends up with the message 'Server startup in xxxx ms' and then connect with a browser to the url http://<<localhost>>:8080, the Liferay home page should appear. Before proceed stop the server.

You can install the SpagoBI Platform following two modalities:

1) You can use maven script for create the deploy packages starting from source code, chapter 5.
2) You can donwload the distribute file that contain the compiled package, chapter 6.

The maven script create the deploy folder with proper configuration files, in this document we explain both way.

5Using maven

You can use maven to build the liferay package of spagobi, you can get maven from http://maven.apache.org/ and then you have to install it.

You can build SpagoBI by doing the following steps:

1. Down load SpagoBI-src-1.9.4.zip from URL http://forge.objectweb.org/projects/spagobi.
2. Unzip it, in the following we will refer to this folder as **Spago-SRC**
3. Open up a command prompt window and cd **Spago-SRC.**
4. execute **mvn -Pspagobi-liferay package**

This procedure will create a **Spago-SRC**/build folder that contains all the file necessary for the next steps.
Copy the contents of **Spago-SRC**/build/tomcat-server to **LIFERAY-HOME**, allow files to overwrite existing ones.
Copy the file **Spago-SRC**\SpagoBIUtilityFiles\liferay-libraries\hibernate-3.1rc2.jar to LIFERAY-HOME\webapps\spagobi\WEB-INF\lib .

5.1Configure SpagoBI Database

You can follow the 6.2 chapter of this document.

5.2Check ROLES Filter

If you modified the groups.csv file to use different roles, then you will have to modify the LIFERAY-HOME\webapps\spagobi\WEB-INF\conf\spagobi\spagobi.xml file and remove the /spagobi.* from the <ROLE-NAME-PATTERN-FILTER> element. It should look like this when you are done:
<ROLE-NAME-PATTERN-FILTER>.*</ROLE-NAME-PATTERN-FILTER>
Be sure that you change the element for the liferay security setting.

5.3Configure CMS

SpagoBI uses a content management service to store blobs and reports, etc. You need to do the following steps to set this up for liferay-tomcat.

1. create a new directory named jcrRepositoryFS under LIFERAY-HOME\webapps\spagobi

2. create a directory named repository under LIFERAY-HOME\webapps\spagobi\jcrRepositoryFS
3. copy the file SPAGO-SRC\SpagoBIProject\src\repository.xml to LIFERAY-HOME\webapps\spagobi\jcrRepositoryFS
4. edit file LIFERAY-HOME \webapps\spagobi\WEB-INF\conf\cms.xml and remove the two occurrences of ${SERVER_HOME}/sbidata/ in the <PARAMETER elements. Final should look like:

```
 <PARAMETERS>
   <PARAMETER name="repository_path" value="jcrRepositoryFS/" />
   <PARAMETER name="conf_file_path" value="jcrRepositoryFS/repository.xml" />
</PARAMETERS>
```

And then read the chapter 7 and 8 for test the installation of SpagoBI.

6Download distributed package

Connect to the SpagoBI page on the ObjectWeb community site (http://forge.objectweb.org/projects/spagobi), click on the 'File' tab, download the file called 'SpagoBIUtilityFiles-1.9.4_xxx.zip', and then unzip it.
The unzip operation produces a folder 'SpagoBIUtilityFiles' which contains 'tomcat-5.5-liferay', 'jboss-server' and other folders. The folder 'tomcat-5.5-liferay' respects the tree-folders structure of a clean Liferay-Tomcat installation; in the following we will refer to this folder as **LIFERAY-INST-FILES** and the folder "tomcat-server" as **TOMCAT-INST-FILES**.
Under the same folder 'SpagoBIUtilityFiles' you find.

6.1Install additional libraries and configuration files

SpagoBI needs some additional libraries and configuration files in order to start correctly and manage metadata.

1. Copy the content of **LIFERAY-INST-FILES**/common/lib/ext inside your **LIFERAY-HOME**/common/lib/ext directory (*).
2. Delete **hsql.jar** file in **LIFERAY-HOME**/common/lib/ext.
3. Copy the **TOMCAT-INST-FILES**/sbidata folder into your **LIFERAY-HOME.** The folder contains the root folder of the cms repository and hsqldb metadata database.

6.2Install the Metadata Database

SpagoBI metadata are stored in a database (for this release SpagoBI supports PostgresSQL, Oracle, MySQL, HSQLDB and SQLServer).

SpagoBI Utility files package contains an hsql database that can be used to test SpagoBI without installing a database server. After the execution of the activities listed in the previous paragraph the hsqldb script is stored into **TOMCAT-INST-FILES**/sbidata/database.
HSQL database is very useful for test purpose but is very weak in a production environment. Anyway, if you want to use HSQLDB, just exec the command **LIFERAY-HOME**/sbidata/database /start.bat (on a windows platform) or **LIFERAY-HOME**/sbidata/database/start.sh (on a unix platform). The command starts an HSQLDB server with a 'spagobi' databases already populated with the necessary data. **Remember that every time you start the Liferay server to work with SpagoBI the database server must be running.**

If you don't want to use hsqldb you have the possibility to choose between PostgresSQL, Oracle, MySQL and SQLServer. If you don't have anyone of these database servers installed you need to install one of them. Once you have a functional database server you must create a new database for the metadata (spagobi is the database name suggested).
Once completed the operation above it's possible to proceed with the creation and initial population of the metadata database launching the right script for your database server. For each database server supported you need to download from the SpagoBI Repository a zip archive containing the sql script to create the schema, the comments of the table and finally to populate the schema with initial data. So, connect to http://forge.objectweb.org/projects/spagobi, select the file tab and then download the file called <<*name of you database*>>-dbscript-1.9.4.zip. Into the zip file there are some sql script files, you must execute the creation and insertion script with a client for your database server. In every archive exists also a drop script but this one is useful only if you need to clean your database deleting all the spagobi metadata tables. *Example: if you have a postgresql database server you need to download the relative archive (postgres-dbscript-1.9.4.zip) and run in the following order the scripts PG_create.sql and PG_insert.sql.*

6.2.1 Install the database driver

Based on the database server you chose for the SpagoBI metadata you must install the right database driver. The drivers package can be obtained from database vendor sites and for the current SpagoBI release we test the following versions:

- Postgresql : postgresql-8.0-311.jdbc2.jar
- Oracle: ojdbc14.jar
- MySQL: mysql-connector-java-3.1.10-bin.jar
- HSQLDB: hsqldb1_8_0_2.jar (contained into LIFERAY-INST-FILES/common/lib/ext)
- SQLServer: sqljdbc.jar

The driver jar, corresponding to the database you use, have to be put under **LIFERAY-HOME**/common/lib/ext. If you decide to use the SpagoBI hsqldb database you have to do nothing because the hsqldb driver has been already copied into **LIFERAY-HOME**/common/lib/ext (install libraries and configuration files paragraph)

6.2.2Configuring Datasource as JNDI Resource

SpagoBI needs a connection to the metadata database. This connection can be configured as a direct jdbc connection or as link to a server jndi datasource. The second option is surely better and it's covered into this manual. To configure the JNDI global datasource resource do the following steps:

- Edit the file **LIFERAY-INST-FILES**/conf/server.xml.
- Search for the string "<Context path="/spagobi" " (not commented) ;
- Copy entirely the <Resource> tag
- Edit the file **LIFERAY -HOME**/conf/server.xml
- Inside tag named '<host> paste the piece of xml copied previously

The xml copied configures a new jndi datasource for the metadata database. The default values are for the SpagoBI hsql database and, if you are using another database server, you need to change them. Based on your database change the value of:

- DriverClassName
- url
- username
- password

6.3Install SpagoBI platform

Connect to http://forge.objectweb.org/projects/spagobi, select the file tab and then download the 'SpagoBI-bin-1.9.4_xxx.zip'. Extract from the zip archive the file **spagobi.war** and copy it into **LIFERAY-HOME**/webapps folder.

Start the server (with liferay-home/bin/startup.bat or .sh) and after stop it (this operation will explode the spagobi.war just copied). Don't worry about the exception in this first launch.

- Delete LIFERAY-HOME/webapps/spagobi/WEB-INF/conf/spago/spagobi.xml and rename LIFERAY-HOME/webapps/spagobi/WEB-INF/conf/spago/spagobi-liferay.xml in "spagobi.xml"
- Edit the file spagobi.xml (ex spagobi-liferay.xml) contained into LIFERAY-HOME/webapps/spagobi/WEB-INF/conf/spagobi and search the tag <SPAGOBI_CONTEXT_PATH> and replace the value with your SpagoBI installation URL (you have simply to change the server name and port). Example: if you have installed SpagoBI on a server call myhost and the server is listening on port 5000 the value must be http://myhost:5000.
- Edit the file spagobi.xml contained into LIFERAY-HOME/webapps/spagobi/WEB-INF/conf/spagobi and search the tag <LANGUAGE_SUPPORTED> and set to true the 'default' attribute of the children LANGUAGE tag, corresponding to your language. Be sure that one and only one of the LANGUAGE tags have the 'default' attribute set to true.
- Delete LIFERAY-HOME/webapps/spagobi/WEB-INF/web.xml and rename LIFERAY-HOME/webapps/spagobi/WEB-INF/liferay-web.xml in "web.xml"

- Delete LIFERAY-HOME/webapps/spagobi/WEB-INF/conf/cms.xml and rename LIFERAY-HOME/webapps/spagobi/WEB-INF/conf/cms-liferay.xml in "cms.xml"
- Copy the file **SpagoBIUtilityFiles**\liferay-libraries\hibernate-3.1rc2.jar to LIFERAY-HOME\webapps\spagobi\WEB-INF\lib .
- Copy the file **SpagoBIUtilityFiles**\liferay-libraries\commons-lang-2.1.jar to LIFERAY-HOME\webapps\spagobi\WEB-INF\lib .
- Copy the file **SpagoBIUtilityFiles**\liferay-libraries\commons-logging-1.0.4.jar to LIFERAY-HOME\webapps\spagobi\WEB-INF\lib .
- Delete the file LIFERAY-HOME\webapps\spagobi\WEB-INF\lib\commons-logging-1.0.jar .

Some of this steps are made by MAVEN script: "mvn -Pspagobi-liferay package".

6.3.1Configure Hibernate

SpagoBI uses Hibernate to manage metadata. Since SpagoBI can use different databases, hibernate must be configured in order to use the correct settings and sql dialect. Into the folder liferay-home/webapps/spagobi/WEB-INF/classes there are four hibernate configuration files, one for each database supported:

- hibernate.cfg.postgres.xml (postgres database)
- hibernate.cfg.ora.xml (oracle database)
- hibernate.cfg.mysql.xml (mysql database)
- hibernate.cfg.hsql.xml (hsql database)
- hibernate.cfg.sqlserver.xml (sqlserver database)

You must define which file must be used based on your database:

- edit the file liferay-home/webapps/spagobi/WEB-INF/conf/spagobi/spagobi.xml
- search for the tag <HIBERNATE-CFGFILE>
- change its value putting the name of the correct hibernate configuration file (the default is for hsqldb)

6.3.2 Configure Quartz

The SpagoBI scheduler feature is based on Quartz technology. Quartz is a library which can store its metadata into a database. For the SpagoBI installation the quartz metadata database can be the same as the SpagoBI one. In order to configure it do the following steps:

- edit the file LIFERAY-HOME/webapps/spagobi/WEB-INF/classes/quartz.properties
- search the string 'job store delegate class'. Under this split line there's the same property repeated four times (org.quartz.jobStore.driverDelegateClass)
- based on your SpagoBI database you have to uncomment the right one and obviously to comment the others (to comment a row just place a # at the beginning)

After this step remember to restart the Liferay server.

6.4Install Cms Repository

SpagoBI needs a connection to a content management system (cms) compliant to the jsr 170 specification in order to store and version the BI documents. The connection is represented by a jsr 170 ‘Repository’ object which allows to open working session into the cms. SpagoBI can be configured to initialize directly the repository or to get it as a jndi resource. To configure the JNDI global repository resource do the following steps:

- Edit the file LIFERAY -HOME/conf/server.xml.
- Search for the string “<Context path="/spagobi"” (not commented);
- Add a resource name="cms/spagobicms".

In the standard installation the LIFERAY_HOME/webapps/spagobi/WEB-INF/conf/**cms.xml** file copied contains two parameters which have to be configured

- ConfigFilePath (path of the jackrabbit configuration file)
- RepHomeDir (path to the folder which will be the root of the repository)

You have simply to replace the string ‘${SERVER_HOME}’ with the path of your Liferay tomcat installation directory. Example: if your Lifeary tomcat is installed into a directoy C:\Programs\liferay-tomcat you have to replace ‘${SERVER_HOME}’ with ‘/Programs/liferay-tomcat’.

In chapter 6.1 you have already copied the necessary files in the folder /sbidata/, then check that the file **cms.xml** contains the following fragment of xml:

```
<PARAMETER name="repository_path" value="$
{SERVER_HOME}/sbidata/jcrRepositoryFS/" />
<PARAMETER name="conf_file_path" value="${SERVER_HOME}/sbidata/repository.xml" />
```

TIPS: you can put the jcrRepositoryFS folder under the webapps/spagobi/ then you can use a relative path.

6.5Install Security component

For Integrate SpagoBI in Liferay we have already write a simple integration component that use the Liferay API for read the user and their properties and roles.

This component is not present in SpagoBI-bin-1.9.4_***.zip file then you have to download the file LiferayPortalSecurityProvider-bin-1.9.4_***.zip that contains sbi.security.liferay-1.9.4.jar, then you have to put this file in folder LIFERAY_HOME/webapps/spagobi/WEB-INF/lib

6.6 Install Engines

6.6.1 Install SpagoBIJasperReportEngine

- Connect to http://forge.objectweb.org/projects/spagobi, select the file tab and then download the file 'SpagoBIJasperReport-bin-1.9.4_xxx.zip'. Extract from the zip archive the file SpagoBIJasperReportEngine.war and copy it into the LIFERAY_HOME/webapps folder;
- Edit LIFERAY_HOME/conf/server.xml and check if the tag "<Context path="/SpagoBIJasperReportEngine"" exist.
- Using the SpagoBI administration portlet define a new External Engine with:
  - document type: Report
  - engine type: External
  - driver class: it.eng.spagobi.drivers.jasperreport.JasperReportDriver
  - url: http://<server>:<port>/SpagoBIJasperReportEngine/JasperReportServlet.

6.6.2 Install SpagoBIJPivotEngine

- Connect to http://forge.objectweb.org/projects/spagobi, select the file tab and then download the file 'SpagoBIJPivotEngine-bin-1.9.4_xxx.zip'. Extract from the zip archive the file SpagoBIJPivotEngine.war and copy it into the LIFERAY-HOME/webapps folder.
- Edit LIFERAY_HOME/conf/server.xml and check if the tag "<Context path="/SpagoBIJPivotEngine"" exist.
- Using the SpagoBI administration portlet define a new External Engine with:
  - document type: On-line analytical processing
  - engine type: External
  - driver class: it.eng.spagobi.drivers.jpivot.JPivotDriver
  - url: http://<server>:<port>/SpagoBIJPivotEngine/JPivotServlet.

6.6.3 Install SpagoBIQbeEngine

- Connect to http://forge.objectweb.org/projects/spagobi, select the file tab and then download the file 'SpagoBIQbeEngine-bin-1.9.4_xxx.zip'. Extract from the zip archive the file SpagoBIQbeEngine.war and copy it into the LIFERAY-HOME/webapps folder.
- If you want (advised) change the password of the administrator user (look at the section 'How to configure SpagoBIQbeEngine administrator users' of the How To documentation file to learn how to do it)
- Edit LIFERAY_HOME/conf/server.xml and check if the tag "<Context path="/SpagoBIQbeEngine"" exist.
- Using the SpagoBI administration portlet define a new External Engine with:
  - document type: Datamart Model
  - engine type: External
  - driver class: it.eng.spagobi.drivers.qbe.QbeDriver

ourl:http://<server>:<port>/SpagoBIQbeEngine/servlet/AdapterHTTP?ACTION_NAME =SPAGO_BI_START_ACTION&NEW_SESSION=TRUE (without any space)

6.6.4 Install SpagoBIBirtReportEngine

▪Connect to http://forge.objectweb.org/projects/spagobi, select the file tab and then download the file 'SpagoBIBirtReportEngine-bin-1.9.4_xxx.zip'. Extract from the zip archive the file SpagoBIBirtReportEngine.war and copy it into the LIFERAY-HOME/webapps folder.
▪Edit LIFERAY_HOME/conf/server.xml and check if the tag "<Context path="/SpagoBIBirtReportEngine"" exist.
▪Using the SpagoBI administration portlet define a new External Engine with:

- odocument type: Report
- oengine type: External
- odriver class: it.eng.spagobi.drivers.birt.BirtReportDriver
- ourl: http://<server>:<port>/SpagoBIBirtReportEngine/BirtReportServlet.

6.6.5 Install SpagoBIWekaEngine

▪Connect to http://forge.objectweb.org/projects/spagobi, select the file tab and then download the file 'SpagoBIWekaEngine-bin-1.9.4_xxx.zip'. Extract from the zip archive the file SpagoBIWekaEngine.war and copy it into the LIFERAY -HOME/webapps folder.
▪Edit LIFERAY_HOME/conf/server.xml and check if the tag "<Context path="/SpagoBIWekaEngine"" exist.
▪Using the SpagoBI administration portlet define a new External Engine with:

- odocument type: Data mining model
- oengine type: External
- odriver class: it.eng.spagobi.drivers.weka.WekaDriver
- ourl: http://<server>:<port>/SpagoBIWekaEngine/WekaServlet.

6.6.6 Install SpagoBIGeoEngine

▪Connect to http://forge.objectweb.org/projects/spagobi, select the file tab and then download the file 'SpagoBIGeoEngine-bin-1.9.4_xxx.zip'. Extract from the zip archive the file SpagoBIGeoEngine.war and copy it into the LIFERAY -HOME/webapps folder.
▪Edit LIFERAY_HOME/conf/server.xml and check if the tag "<Context path="/SpagoBIWekaEngine"" exist.
▪Using the SpagoBI administration portlet define a new External Engine with:

- odocument type: Map
- oengine type: External
- odriver class: it.eng.spagobi.drivers.geo.GeoDriver
- ourl: http://<server>:<port>/SpagoBIGeoEngine/servlet/AdapterHTTP?ACTION_NAME=GEO_ACTION&NEW_SESSION=TRUE

6.6.7 Install SpagoBIJPXMLAEngine

- Connect to http://forge.objectweb.org/projects/spagobi, select the file tab and then download the file 'SpagoBIJPXMLAEngine-bin-1.9.4_xxx.zip'. Extract from the zip archive the file SpagoBIJPXMLAEngine.war and copy it into the LIFERAY-HOME/webapps folder.
- The driver is the same of SpagoBIJPivotEngine: control that the file sbi.driver.jpivot-1.9.4.jar is present inside folder LIFERAY-HOME/webapps/spagobi/WEB-INF/lib, if it is missing you have to connect to http://forge.objectweb.org/projects/spagobi, select the file tab and then download the file 'SpagoBIJPivotDriver-bin-1.9.4_xxx.zip'. Extract from the zip archive the file sbi.drivers.jpivot-1.9.4.jar and copy it inside LIFERAY-HOME/webapps/spagobi/WEB-INF/lib.
- Edit LIFERAY_HOME/conf/server.xml and check if the tag "<Context path="/SpagoBIKPXMLAEngine"" exist.
- Using the SpagoBI administration portlet define a new External Engine with:
  - document type: On-line analytical processing
  - engine type: External
  - driver class: it.eng.spagobi.drivers.jpivot.JPivotDriver
  - url: http://<server>:<port>/SpagoBIJPXMLAEngine/JPivotServlet

Note that SpagoBIJPXMLAEngine is a client web application for a XMLA server. The installation steps of a XMLA server are not included in this document.

6.6.8Install SpagoBITalendEngine

- Connect to http://forge.objectweb.org/projects/spagobi, select the file tab and then download the file 'SpagoBITalendEngine-bin-1.9.4_xxx.zip'. Extract from the zip archive the file SpagoBITalendEngine.war and rename it as SpagoBITalendEngine.zip. Create a new folder named SpagoBITalendEngine and unzip the file SpagoBITalendEngine.zip inside it. Delete the SpagoBITalendEngine.zip file and copy the new SpagoBITalendEngine directory into LIFERAY-HOME/webapps folder.
- Edit file talend.properties in LIFERAY-HOME/webapps/SpagoBITalendEngine/WEB-INF/classes and substitute ${SPAGOBI_TALEND_ENGINE_HOME} with the actual path of LIFERAY-HOME/webapps/SpagoBITalendEngine in the runtimeRepository.rootDir property definition (it is the root path of the repository containing the jobs);(*)
- Edit file talend.perl.properties in LIFERAY-HOME/webapps/SpagoBITalendEngine/WEB-INF/classes and adjust your Perl installation directory (mandatory if you want to executed Perl based jobs);(*)
- Using the SpagoBI administration portlet define a new External Engine with:
  1. document type: ETL
  2. engine type: External
  3. driver class: it.eng.spagobi.drivers.talend.TalendDriver
  4. url:http://<server>:<port>/SpagoBITalendEngine/JobRunService.

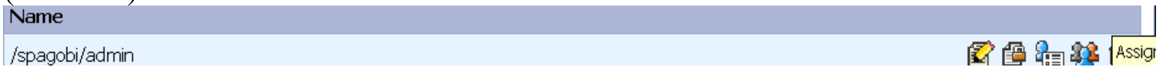
(*) Pay attention at the path form, also for Windows system it must contain only / separator and it must start with / (no c:\ for example).

After the execution of the previous steps you should be able to connect to Liferay portal, imports SpagoBI portlets and define your own portal pages. (look at Liferay documentation for information and instructions).

7Configure Liferay Roles

When you have done all the installation step you have to configure Liferay and synchronize the role in SpagoBI; SpagoBI allows you to configure different parameters based on roles in the portal.
The Liferay security API doesn't allow to read all Liferay's roles (for examples eXo allow it) but just the users role, then you have to configure manually the role in SpagoBI database or you can use the synchronization functionality add roles manually in **groups.csv**; you can find this in file in sbi.security.liferay-1.9.4.jar.
Each line of this file is the form of <ROLENAME>;<ROLE DESCRIPTION>
You need to decide what roles you want to have and make sure you any roles you intend to use also added to liferay. (You can use the defaults as exist in this file, or you can define your own.)
Make whatever modifications you want to the file, save it, and then we will proceed to added the roles to liferay.
N.B. you can delete **groups.csv** in sbi.security.liferay-1.9.4.jar and manage then in /webapp/spagobi/WEB-INF/classes.
For using SpagoBI portlet you have to login with user that have at least one SpagoBI role.

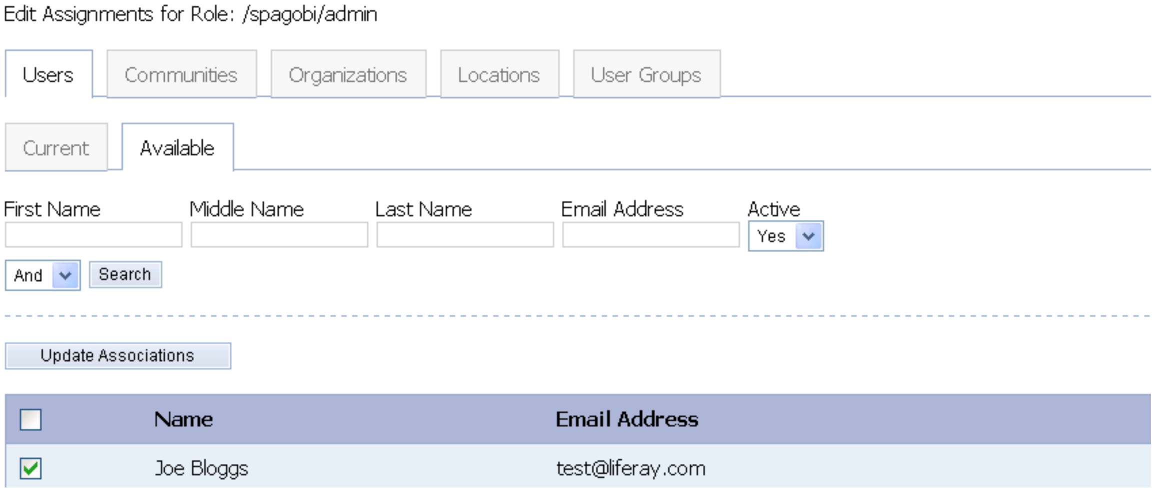
Sign in to liferay using the default test user (test@liferay.com password:test), this will log you on as an admin user whose name is Joe Bloggs. Use the "Enterprise Admin Portal" to add the roles that you will be using (from the groups.csv file) or simply /spagobi/admin for the first test. After you add the roles, assign the appropriate users to the roles. (I just assigned Joe Bloggs to all the new roles) following this steps:
-From the role list click on the assign icon (three heads) on the line that contains the role in question (as below)



Name
/spagobi/admin

-On the next page, click the Available tab to display all users.

-The select the users you want to associate with this role, and press the "update associations" button.



Edit Assignments for Role: /spagobi/admin

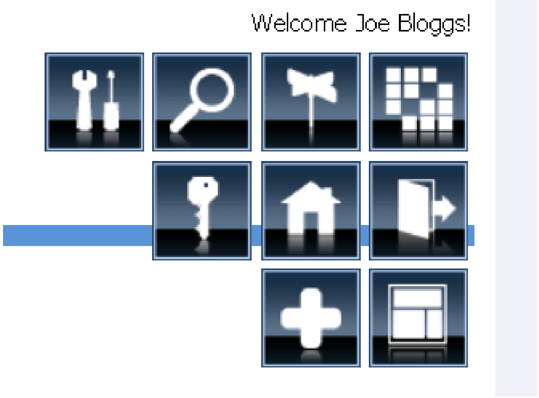
☐	Name	Email Address
☑	Joe Bloggs	test@liferay.com

Repeat this for all the roles (from groups.csv) that you intend to use.

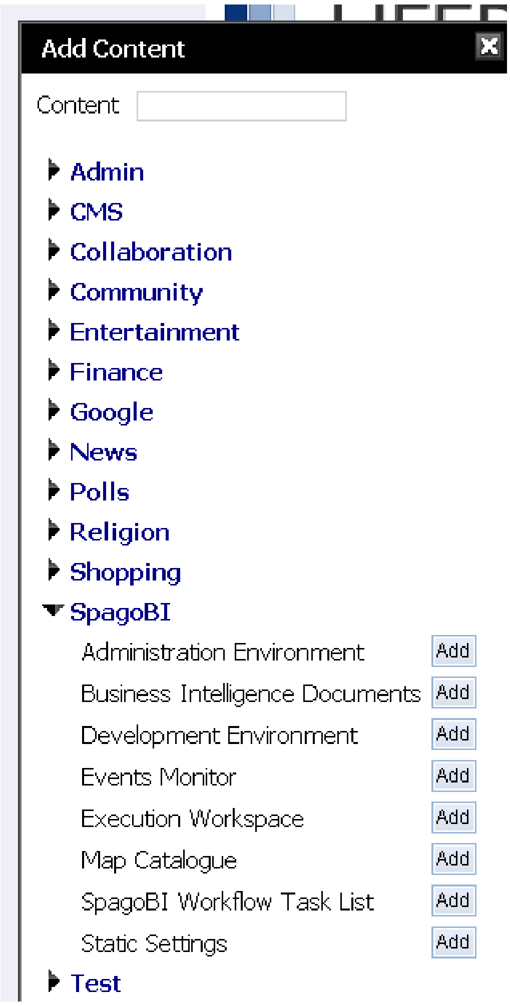
8Getting Started with SpagoBI

Now you are ready to try to use spagobi with liferay. The following steps will hopefully get you started.

1. Bring up the database (run SPAGODB\start.bat)
2. Bring up liferay (LIFERAY-HOME\bin\startup.bat) and wait till it is ready.
3. Point your browser to localhost:8080
4. Sign on to test@liferay.com (password: test). (User Joe Bloggs)
5. I find it useful to use a new page for the Spago stuff, so if you want to, click on new page and give the page a name.
6. Add the spagobi portals to the page by clicking on the "+" icon that expands when you hover over the icon under the "Welcome Joe Bloggs" text.



7. When you press the "+" icon, you should get a list of portals you can add to the page.



You should add at all the portals to the page.