SpagoBI Installation Manual

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Update description:	Final		

2 Document goal

This document provides a detailed description for SpagoBI installation and configuration on a eXo-Tomcat server. SpagoBI can be installed in two different ways:

- using the SpagoBIDemo Installer that simply install a preconfigured SpagoBI portal into an eXo Tomcat server. The installer will configure the portal, the application and some examples. The Demo Installer can be downloaded from the SpagoBI repository.
- For a custom installation reading this document and following all the steps described. The document is divided into three parts, the first talk about the installation of the SpagoBI core, the second talk about the eXo portal integration and the third talk about the solution to some commons configuration problems.

3 References

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

- SpagoBI business intellligence platform framework (available at http://spagobi.eng.it/)
- Exo Portal Platform (avaiable at http://www.exoplatform.com)
- Spago framework (avaiable at http://spago.eng.it)

4 Installing SpagoBI Core

For the rest of the document the EXO-HOME name will be used to indicate the filesytem root directory of spagobi.

4.1 Installing the Metadata Database

SpagoBI metadata is stored in a database (for this release SpagoBI support PostgresSQL, Oracle, and MySQL) . If you don't have anyone of the database servers supported 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 an example database name suggested).
Once completed the operation above it's possible to proceed with the creation and initial population of the metadata database lauching the right script for your database server. For each database server supported you can download from the SpagoBI Repository a zip archive containing the sql script for crete the schema, the comments of the table and finally to popule the schema with initial data.

For example, if you have a postgres database server you need to download the ..... archive and exec in the following order the scripts contained:

- PG_create.sql
- PG_insert.sql

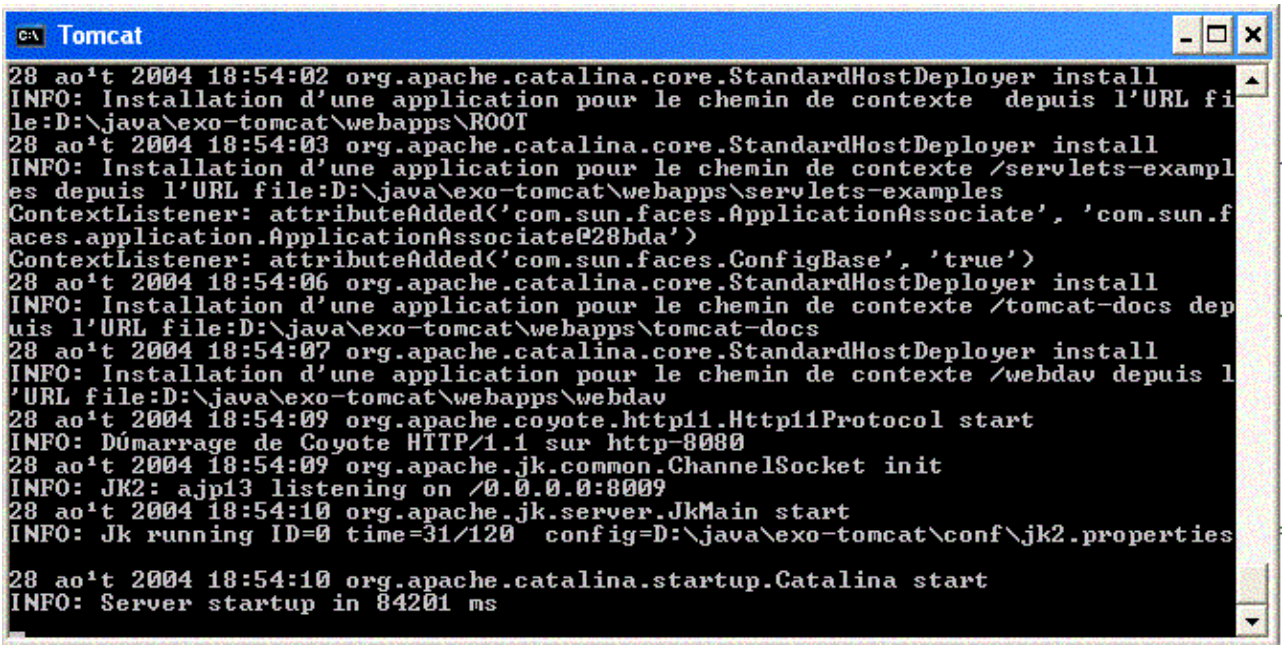
In every archive exists also a ..... script but this one is useful only if you need to clean your database deleting all the spagobi metadata tables.

4.2 Preparing the cms repository

SpagoBI need a content management system (CMS) for storing the contents that need to be versioned, like for example the definition of the business object (reports, olap, ...). SpagoBI use an apache open source implementation of CMS, called JackRabbit, and it's configured to store the contents into a filesystem directory. For this reason you must create a new empty folder in your filesystem (also if distributed) which will be the root of the cms repository.

4.3 Install eXo Platform

This part is taken from the exo-platform documentation and reports only the foundamental steps necessary to install SpagoBI. You can look at the eXo platform documentation for a more complete and accurate eXo istallation and tuning guide.
Download exoplatform express edition 1.0 (exoplatform-tomcat-1.0.zip) from exoplatform site (www.exoplatform.com) . Once the package is downloaded you just have to unzip it in a free choice folder(/pathFolder) and after go to /pathFolder/bin. In the bi n direcotry if you use Windows you can just double click on startup.bat or, if you use uinux base system (Linux, Mac OS ...) just run ./startup.sh. If all goes well you should have a similar console:



For users which use Windows OS and want to start eXo tomcat as a MS Windows service:

- deploy it in a directory hierarchy that does not contain any spaces.
- do not forget to set the following system properties
  - CATALINA_OPTS=-Dorg.apache.commons.logging.Log="org.apache.commons.logging.impl.SimpleLog $CATALINA_OPTS"
  - CATALINA_OPTS=-Djava.security.auth.login.config="$CATALINA_HOME/conf/jaas.conf $CATALINA_OPTS"

The default distribution comes with the HSQL java database embded. If you wish to use the eXo Platform in production we recommend you to choose another database. Change the database is quite simple, you just need to change an XML file (that configures the J2EE Datasources) and add the database driver in the classpath of your application server.
The xml file to change is the Tomcat 5 context file of the portal application wich is located into the EXO_HOME/conf/Catalina/localhost folder and it's default name is portal.xml. Because user have the possibility to add new portal applications it's necessary to remember that every portal context file must be changed.
Every portal context can define more than one datasource (the default portal defines two datasource, one for the portal metadata and one for workflow) so pay attention to change all your configuration.
For a complete explanation of the context changes to made you can look at the Tomcat 5 documentation in the jndi resources section but, in order to aid you, eXo distribution, for the default portal context, provides several template files like portal.xml.mysql or portal.xml.postgresql. Pick up the one you want and rename it to portal.xml (overide the default one that contains hsql configuration). Of course, you will have to customize your personal database information like username, password and DB URI by editing the file. Finally add the database driver in EXO_HOME/common/lib directory.

4.4 Patch eXo-tomcat to use Hibernate3 into a portlet

For an explanation of why this patch is necessary see the SpagoBI document **Use Hibernate3 in exo-platform 1.0.pdf.** Remove following jars from EXO-HOME\common\lib

- asm-1.4.1.jar,
- asm-util-1.4.1.jar
- cglib-full-2.0.1.jar

and add the following:

- asm.jar
- asm-attrs.jar
- cglib-2.1.jar

4.5 Install the database driver

Before to proceede with persistence configurattion we must install the database drivers packages in the portal server. Because SpagoBI can be configured to connect to different database server, one for the metadata and one for datawarehouse for example, you must obtain the specific drivers for

every database server used by SpagoBI. The drivers package can be obtainend from database vendors site 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

4.6 Install and configure the cms

SpagoBI needs to configure the CMS Repository as a JNDI resource and so it's necessary to put into the EXO-HOME/commons/lib directory the libraries:

- eng.jackrabbit-0.16.4.1-dev.jar
- eng.jcr.1.0.jar

These libraries can be founded into the directory UtilityFiles/cmsCommonLib of the SpagoBI distribuition and it's not possible to replace them with other versions for classloading problems. SpagoBI uses the Apache Jackrabbit cms implementation which needs a configuration file for the repository, so it provides one configuration file “repository.xml” into the spagobi war at the /WEB-INF/classes location that you must put into the EXO-HOME/conf directory.
In order to configure the cms repository like a JNDI resource it's necessary also to put into EXO-HOME/commons/lib directory the library log4j-1.2.8.jar, used by the cms implementation, and to replace the commons-collections-2.1.1.jar library with the commons-collections-3.1.jar.
Finally it's necessary to configure the security permission: edit the jaas.config file into the Exo-HOME/conf directory and add the following instructions:

```
Jackrabbit {
      org.apache.jackrabbit.core.security.SimpleLoginModule required
      anonymousId="anonymous";
};
```

4.7 Configure JNDI Resources

SpagoBI usez the metadata database connection pool and cms repository object as JNDI Resources so you must configure these resources into your eXo platform server. Edit the server.xml file into EXO-HOME/conf directory and add, into the <GlobalNamingResources> tag, the following xml:

```
<!-- For database connection pool -->
<Resource name="jdbc/spagobi" auth="Container" type="javax.sql.DataSource"/>
<ResourceParams name="jdbc/spagobi">
      <parameter>
            <name>factory</name>
            <value>org.apache.commons.dbcp.BasicDataSourceFactory</value>
      </parameter>
      <parameter>
            <name>driverClassName</name>
            <value>fill with the name of the jdbc drivers</value>
      </parameter>
      <parameter>
            <name>url</name>
```

```
            <value>fill with the database connection string</value>
      </parameter>
      <parameter>
            <name>username</name>
            <value>fill with your database user</value>
      </parameter>
      <parameter>
            <name>password</name>
            <value>fill with your database user password</value>
      </parameter>
```

The following parameters are not mandatory but aid to tuning the connection pool, it's also possible to add other more specific parameters (look at the Apache DBCP project for more information)

```
      <parameter>
            <name>maxActive</name>
            <value>20</value>
      </parameter>
      <parameter>
            <name>maxIdle</name>
            <value>10</value>
      </parameter>
      <parameter>
            <name>maxWait</name>
            <value>-1</value>
      </parameter>
</ResourceParams>


<!-- For cms Repository -->
<Resource name="cms/spagobicms" auth="Container"
          type="it.eng.javax.jcr.Repository"/>
<ResourceParams name="cms/spagobicms">
      <parameter>
            <name>factory</name>
            <value>org.apache.jackrabbit.core.jndi.BindableRepositoryFactory
            </value>
      </parameter>
      <parameter>
            <name>configFilePath</name>
            <value>fill with the exo platform server root directory path
                  + /conf/repository.xml
            </value>
      </parameter>
      <parameter>
            <name>repHomeDir</name>
            <value>fill with the path of the cms root directory
                    previously created (see point 5.2)
            </value>
      </parameter>
</ResourceParams>
```

When the server starts it will create a Connection pool and Cms repository JNDI resources but they aren't already visible to the SpagoBI application and so you must put into the EXO-HOME/conf

directory the following files, which can be founded into the UtilityFiles/exoTomcatContexts directory of the SpagoBI distribuition.

- spagobi.xml
- SpagoBIJasperReportEngine.xml
- SpagoBIJPivotEngine.xml

These files simply define a link to the global JNDI resources for each application.

4.8 Install and cofigure SpagoBI platform

In order to install SpagoBI simply copy the distribution file **spagobi.war** to **EXO-HOME\webapps** folder and start eXo. The SpagoBI application will be exploded. Shutdown the server to continue the SpagoBI core and components configuration.

4.8.1 Configure the Security Settings

A secutity provider is used to enable SpagoBI to use the secutity information from the underlying portal server in which SpagoBI is deployed. In particular SpagoBI asks to the secutity provider all the roles available in portal server and the profile of a given user, after authentication.
To install a security provider in SpagoBI two step are necessary:

- copy the provider jar in **\EXO-HOME\spagobi\WEB-INF\lib**
- configure the provider in **\EXO-HOME\spagobi\WEB-INF\conf\spagobi.xml**

SpagoBI distribution contains one provider for eXo Portal which is call **sbi.security.exo.jar** and can be found into the ExoPortalSecurityProvider.zip binary package. If you use eXo-tomcat copy this jar file into the spagobi directory (point 1) and configure the spagobi.xml file (point 2) by adding the following section (or controlling that it exists):

```
<SECURITY>
      <PORTAL-SECURITY-CLASS>
            it.eng.spagobi.security.ExoPortalSecurityProviderImpl
      </PORTAL-SECURITY-CLASS>
      <USER-PROFILE-FACTORY-CLASS>
            it.eng.spagobi.security.ExoPortalUserProfileFactoryImpl
      </USER-PROFILE-FACTORY-CLASS>
      <ROLE-NAME-PATTERN-FILTER>.*</ROLE-NAME-PATTERN-FILTER>
</SECURITY>
```

SpagoBI imports the roles defined into the portal but, because you probably want to import only a subset of roles, it's possible to filter them based on their names. The filtering rule is a regular expression that can be configured into the <ROLE-NAME-PATTERN-FILTER> tag of the spagobi.xml (see previous xml envelope). Example of regular expression can be ".*" that will match all the roles, or "/spagobi/*" which will match all the roles that start with "/spagobi/" prefix.

4.8.2 Configure SpagoBI persistent layer

In SpagoBI different persistence mechanism are used to store and retrieve data. In a minimal configuration there must be at least:

- a connection with a JSR170 compliant repository.
- a connection with a relational database for metadata persistence layer

Only the second type of connection, for this release, needs some configuration into spagobi core, but before see how to configure it we must make some important consideration.

- Each content repository location is related in unique mode with the metadata database. This means that, for a particular installation, we must never change the connection to the metadata database without changing the content repository location and vice versa.
- For the connection to the relational database SpagoBI use a mix of different technologies, for example for the relational part or the metadata persistence Hibernate is used for detail and the crud operation, but the Spago Data Access Layer is used for the presenting list. This is because hibernate is useful for crud operation but Spago is very useful for list reendering.

For the persistence of the metadata SpagoBI use hibernate 3.05 and spago data-access layer. Only the first one need some additional configuration, infact, based on the type of database server used SpagoBI defines three different hibernate configuration files:

- **hibernate.cfg.xml** (Default): contains the configuration and the reference to the mapping file for postgresql
- **hibernate.cfg.mysql.xml**: contains the configuration and the reference to the mapping file for postgresql
- **hibernate.cfg.ora.xml**: contains the configuration and the reference to the mapping file for postgresql.

To specify wich file to use, edit the **\EXO-HOME\webapps\spagobi\WEB-INF\conf\spagobi\spagobi.xml** and, based on your database server, put one of the file names above in **HIBERNATE-CFGFILE** element, for example:

```
<HIBERNATE-CFGFILE>
      hibernate.cfg.mysql.xml
</HIBERNATE-CFGFILE>
```

4.9 Drivers and Engines

SpagoBI is a platform designed to support different products (open source or not) for producing business intelligence artefacts. Those external products in SpagoBI are called **engines**. Examples of engines are Jasper Report, Crystal Clear, Business Object, Jpivot etc. Pratically speaking an engine is a a web application that, once invoked with an url request, produces a business intelligence artefacts.
Each single engine has different syntax, parameters, and configuration to produce output but on the other side SpagoBI is a generic platform where business inteligence documents are stored and described (in metadata database and in jcr repository) in generic way. For this reason an integration layer between SpagoBI and ech specific engine is needed. The piece of software that implements this integration layer is called **driver** and his function is to build the correct url request, for the engine which it is associated, starting from the data definition into the SpagoBI platform.
SpagoBI platform implements an administration service that allows the administrator users to define one or more logical names for each engine application and associate to each of them the complete class name of the engine driver and the engine url.

4.9.1 Install an engine

A SpagoBI engine is a web application that from a request url produce a business intelligence output artefacts like a report for example. It's possible to connect to some engines produced by other software company (Crystal Clear or Oracle Reports for example) or to produce a new engine web application, like the SpagoBIJasperReport Engine. In both cases in order to install an engine you must deploy it into an application server which may not be the same of the one where SpagoBI is deployed.
After the engine istallation you must confiure it into the SpagoBI engines service (the administration portlet) which allows you to give a logical name to each engine application and defining the calling url and the driver class name to adapt SpagoBI objects to specification and requirements of the engine.

4.9.2 Install a driver

To install a driver in SpagoBI you must simply put the driver packaged in \EXO-HOME\spagobi\WEB-INF\lib folder. Pay attention that the driver installation is not enough to use it in SpagoBI. To enable the drivers it's necessary to associate it to an engine, using the SpagoBI Engine Service in the administration portlet.

4.9.3 The Jasper Report Engine Installation

SpagoBI provides a report engine that uses the open source jasper report library to produce reports and it consists in a simple web application that will be invoked by SpagoBI using the specific Jasper Report Driver. You can find both the driver (**SpagoBIJasperReportDriver.zip**) and the engine web application (**SpagoBIJasperReportEngine.zip**) in the SpagoBI distribution.
To start using the Jasper Report Engine do the following steps:

- install the driver on SpagoBI: extract from the SpagoBIJasperReportDriver.zip the jar file **sbi.drivers.jasperreport.jar** and put it into the \EXO-HOME\spagobi\WEB-INF\lib folder.
- install the engine application: extract from the SpagoBIJasperReportEngine.zip the war file SpagoBIJasperReportEngine.war and deploy it in an application server. It's possible to install the web application in the same or in a different server in which SpagoBI is deployed, this is because it is a J2EE compliant web application.
- configure the engine into the SpagoBI engine administration service registering the complete name of the driver class and the engine application url.

4.9.4 The Jpivot Engine Installation

SpagoBI provides an Olap Analysis and Pivoting engine that uses the open source jpivot product an it consists in a web application that will be invoked by SpagoBI using the specific Jpivot Engine Driver. You can find both the driver (**SpagoBIJPivotEngineDriver.zip**) and the engine web application (**SpagoBIJPivotEngine.zip**) in the SpagoBI distribution.
To start using the Jasper Report Engine do the following steps:

- install the driver on SpagoBI: extract from the SpagoBIJPivotEngineDriver.zip the jar file **sbi.drivers.jpivot.jar** and put it into the \EXO-HOME\spagobi\WEB-INF\lib folder.
- install the engine application: : extract from the SpagoBIJPivoEngine.zip the war file SpagoBIJPivotEngine.war and deploy it in an application server. It's possible to install it in

the same or in a different server in which SpagoBI is deployed because it is a J2EE compliant web application.

- configure the engine into the SpagoBI engine administration service registering the complete name of the driver class and the engine application url.

4.9.5 Configure connections for Jasper Report and Jpivot Engines

Both Jasper Report and Jpivot Engines need a connection to a database metadata for retrive the data to fill the report or the olap model. The connection to database for these two engines can be configured in two different xml file:

- **JasperReportApplication\WEB-INF\classes\engine-config.xml** for Jasper Report engine
- **JpivotApplication\WEB-INF\classes\connections-config.xml** for Jpivot Engine

These two files have the same sintax apart from the initial xml envelope which for the first is <ENGINE-CONFIGURATION> and for the second is <CONNECTIONS-CONFIGURATION>. Into the external envelop both file defines the connection in the same way which is described after.
Each request to an engine will use one of all the connections defined, if the request contains a "connectionName" parameter the engine try to use the connection with name equals to the parameter value, if the request as no "connectionName" parameter, or the name specified doesn't exist, the engine will use the default connection.
The connection configuration can be of two types, the first try to retrive the connection from a jndi connection pool, the second try to establish a direct connection to a database using the standard jdbc mechanism of driver and database url string.
The two different configuration are presented below:

```
<CONNECTION name="fill with the connection logical name"
            isDefault="true/false" isJNDI="true"
            initialContext="fill with the root jndi context
                            example java:comp/env"
            resourceName="fill with the jndi resource name"/>
<CONNECTION name="fill with the connection logical name"
            isDefault="true/false" isJNDI="false"
            driver="complete driver class name"
            user="database user name" password="database user password"
            jdbcUrl="database connection string"/>
```

5 Using SpagoBI with eXo Portal Server

SpagoBI consists of a set of portlets compliant to the jsr 168 specificantion and so to stat use it it's necessary to import the portlets into a portal server. This document talk about the installation in a eXo tomcat portal server and so in the rest of this section will be describe an example of SpagoBI configuration for it. Remember that it's possible to configure pages and portlets of a portal server in a infinite number of different combinations so this explaniation want only to be an example to introduce you to the SpagoBI portlets.

5.1 Import SpagoBI portlets

To import spagobi portlets inside exo platform open exo and connect with the administrator account, which is usually admin/exo (see Figure 1). Once successfully connected, click the portlet registry (***Portal/Portlet Registry***) in navigation bar on the left. (see Figure 2)
In the portlet registry user interface it's possible to import portlets and to do this simply click on the Import Portlets button. If all is ok you can see the spagobi portlets on the left where all available portlets in the portal are shown.

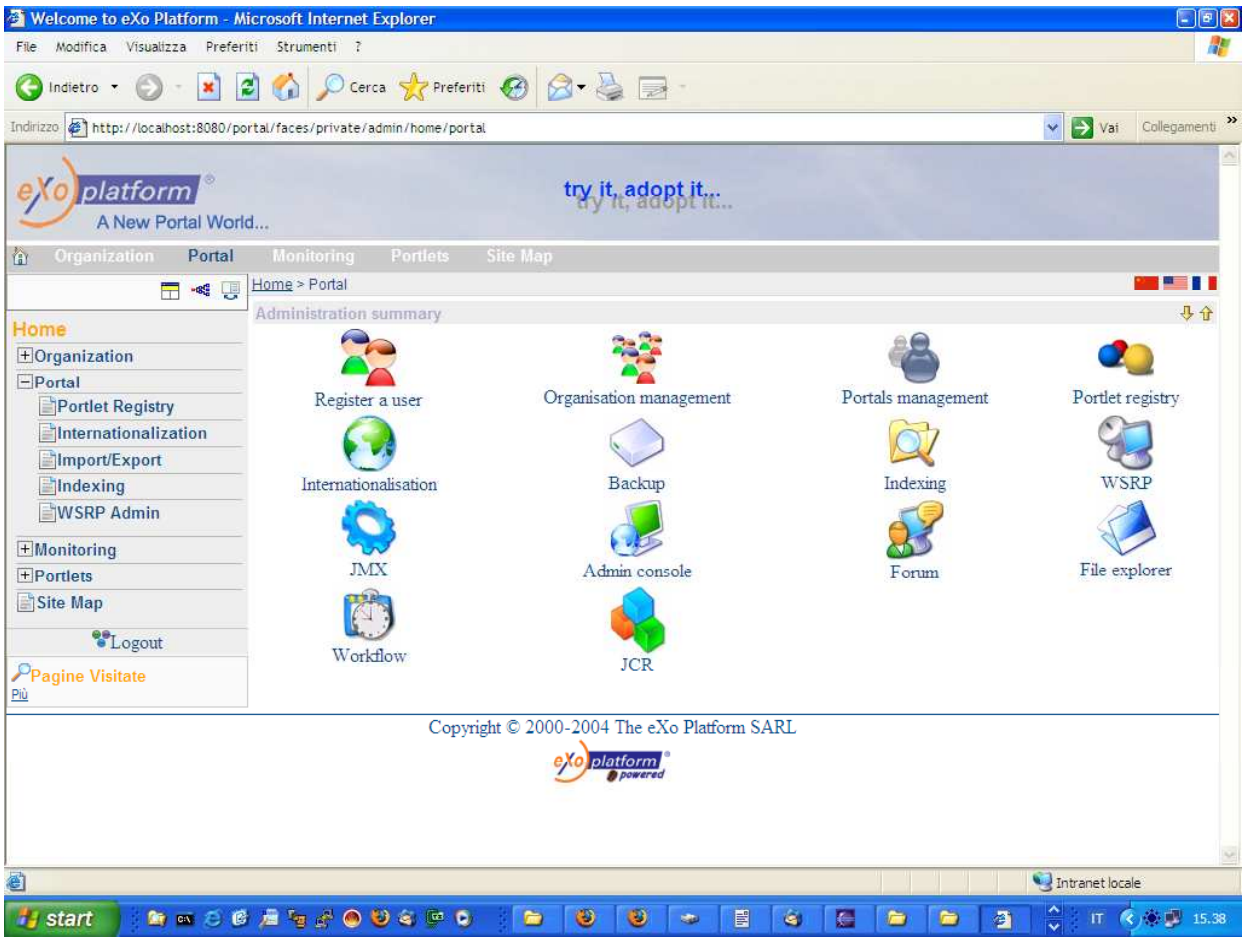


Figura 1

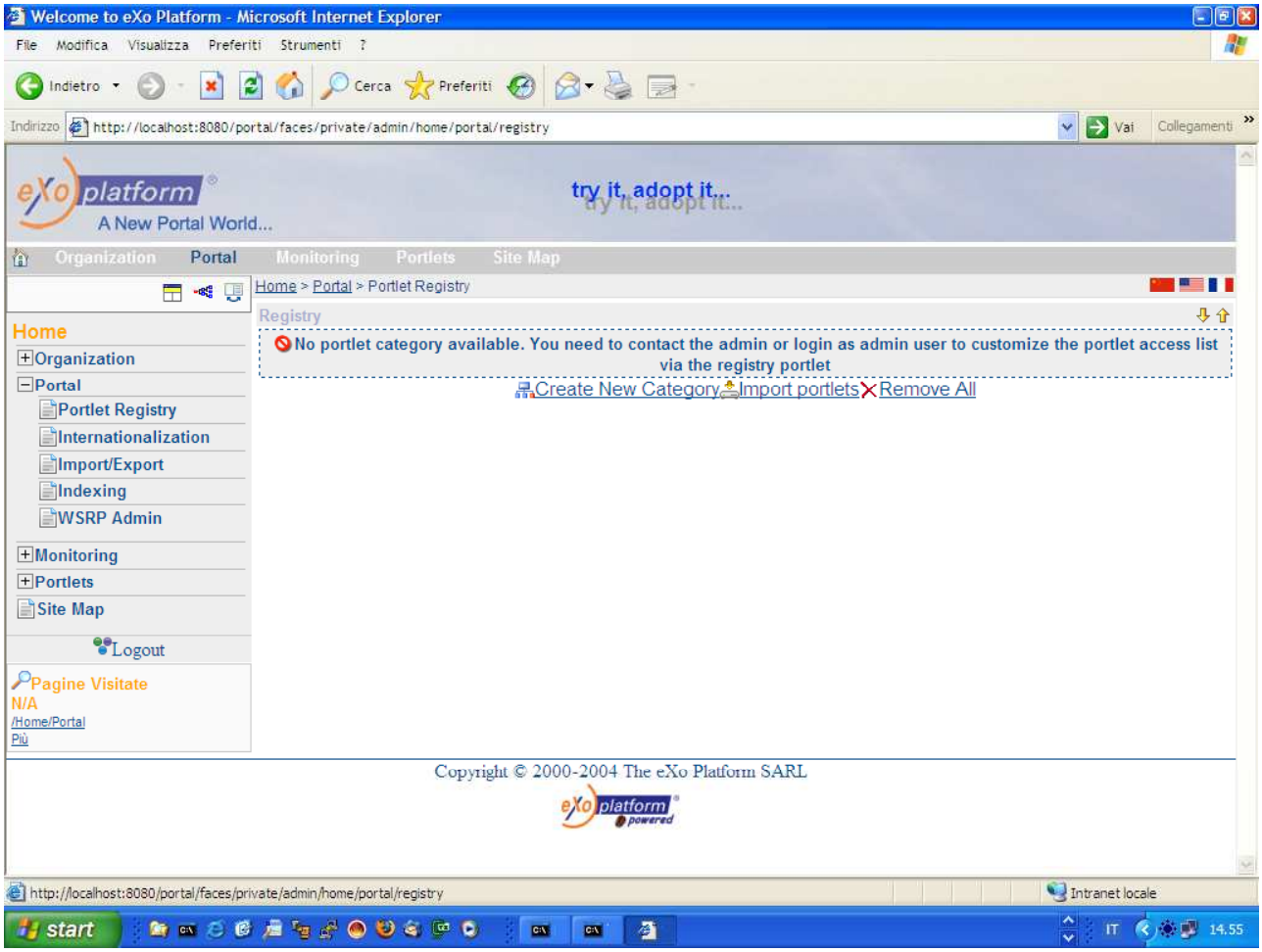


Figura 2

5.2 Configure Roles and Accounts

SpagoBI is an application designed to be used by users that have different roles in organizations. In particular spagobi will be used by:

- business documents developers.
- business testers.
- final users (usually company managers and final users of reports and olap analysis)

in a simple configuration you can provide tree portal roles, one for each category previous defined. To configure roles in eXo Portal connect to eXo with administrator account and go to Portal from left navigation bar (see Figure 1). Then click on ***Organisation management*** (see Figure 3).

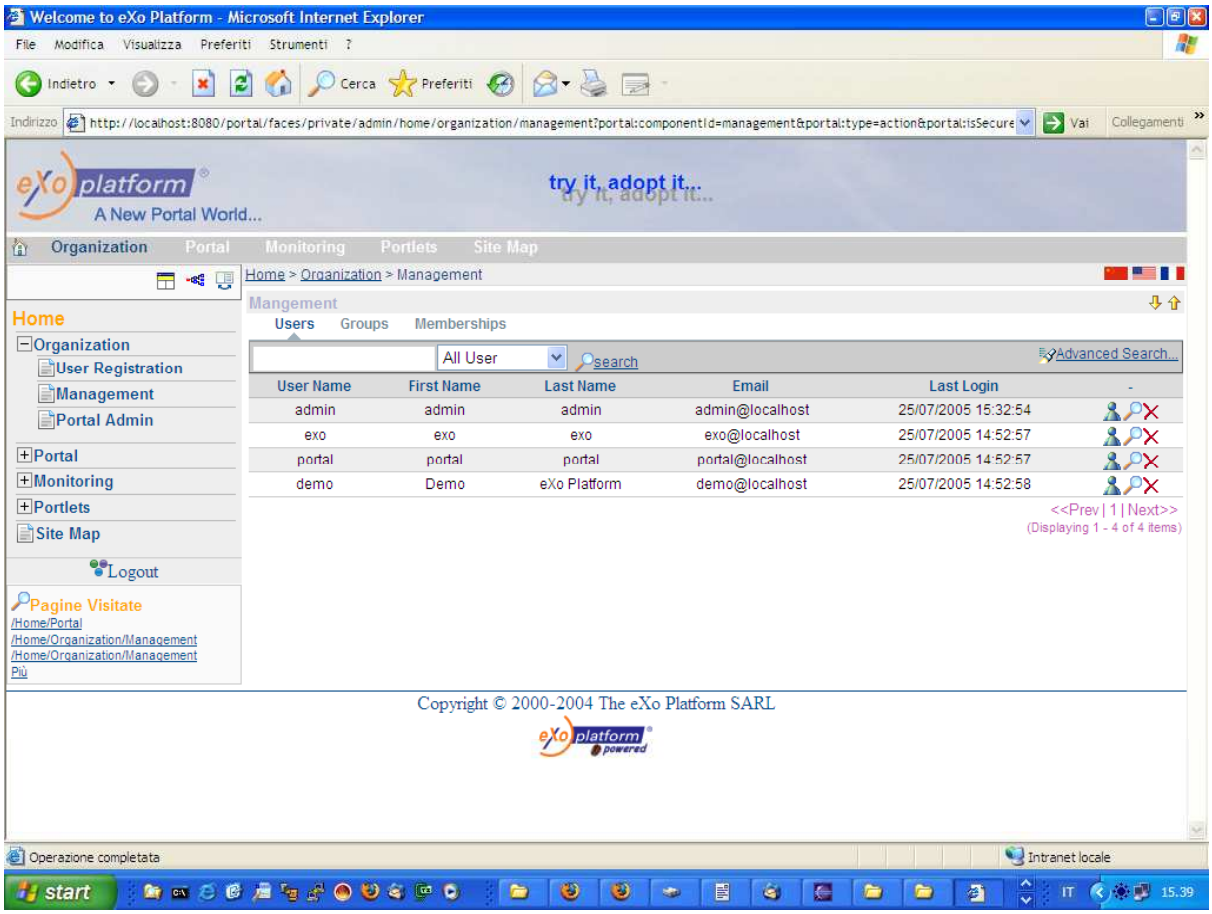


Figura 3

To define a new role click on ***Group*** an then on ***Add Group*** (see Figure 4) and insert three groups:

- biusers
- bitesters
- bidevs

Once finished with the groups (roles) define at least three users. Always in the ***Organisation Management*** go on the users tab (see Figure 5) and define the following users (remember passwords)

- dev/dev
- user/user
- test/test

After the user definitions make the following associations from ***Organisation Management Tab*** (see Figure 6)**.**

- Assign dev user to biusers group
- Assign test user to bitesters group
- Assign user user to biusers group

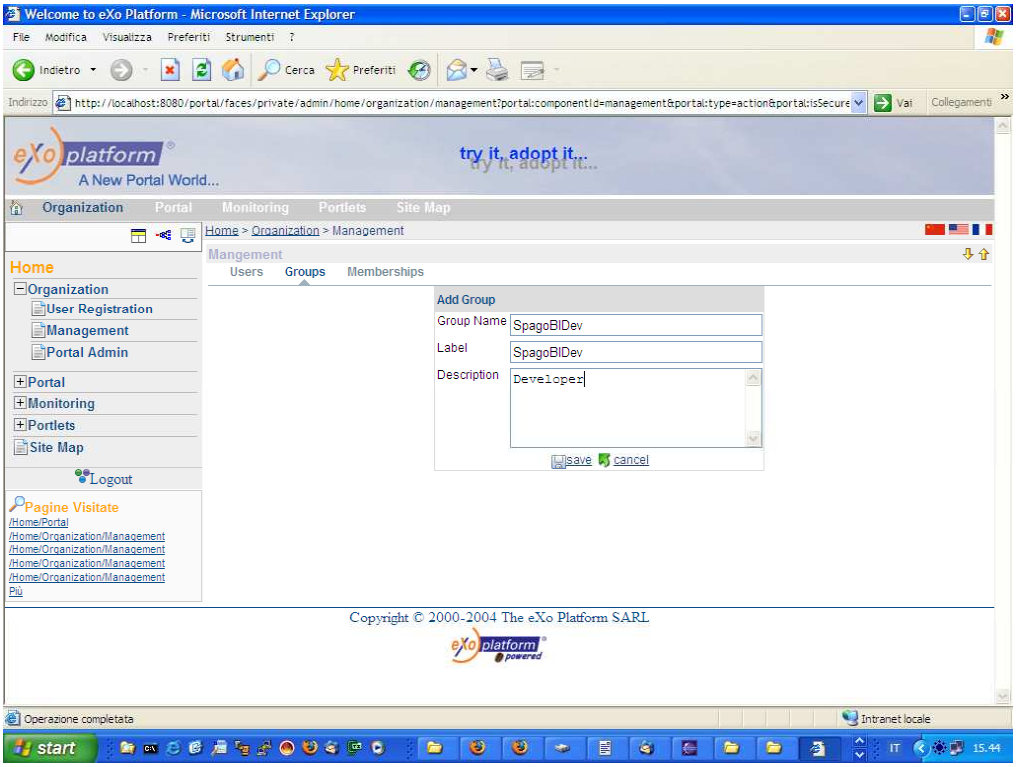


Figura 4

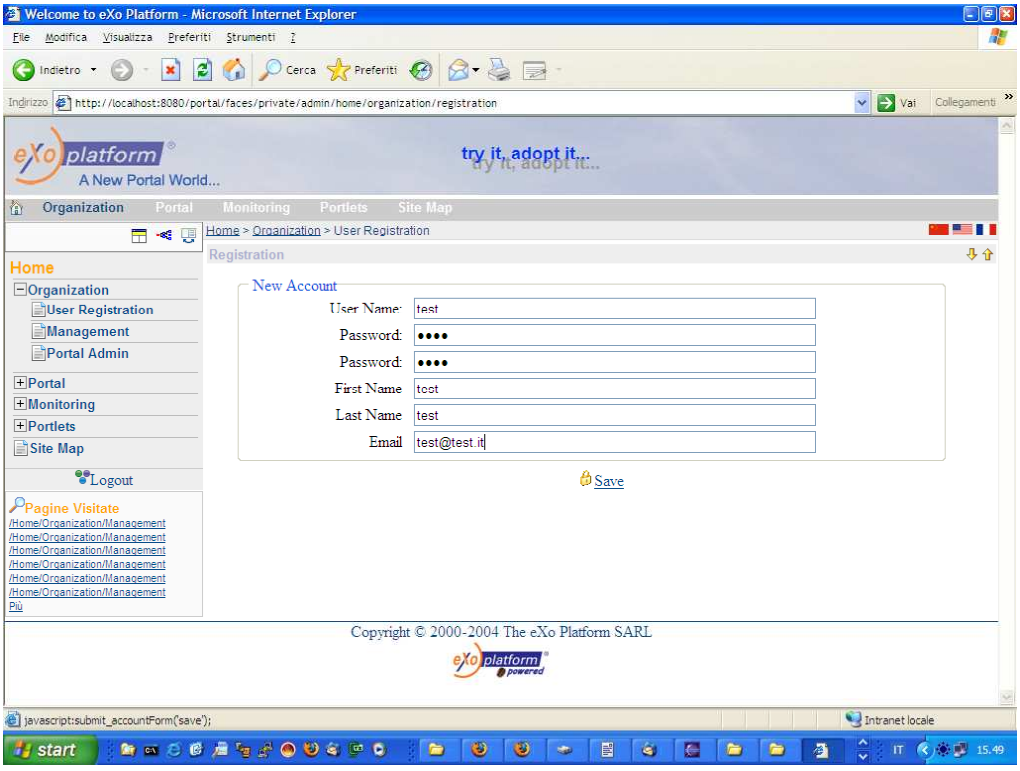


Figura 5

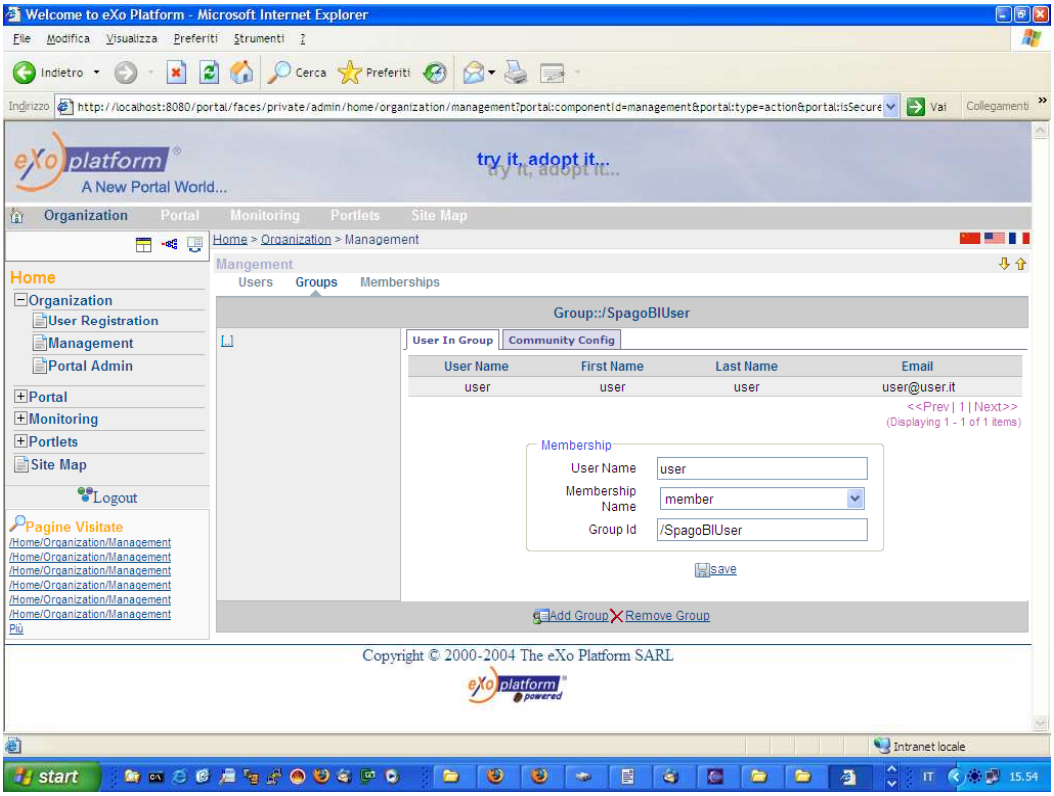


Figura 6

5.3 Configure Portal Pages for each user

After the user and group/role configuration proceed to customize the portal in order to define the home page for each users that logs into SpagoBI. The home page must contains the correct SpagoBI portlet based on the four general roles, admin, developer, tester and user.

- The developer user (dev) must see the SpagoBI development portlet.
- The tester and the final user must see the SpagoBI Functionality portlet. (Note that is the spagobi admin, in our configuration admin/exo, that map a portal role to a tester or to a final user when the functionality tree is created and configured)
- The admin user must see the SpagoBI Admin Portlet.

To configure the portal pages for each users, log yourself into exo portal server as admin/exo (see Figure 1), go to ***Portal*** and click on ***Portals Management Button*** (see Figure 7). Here you can edit and change the portal configuration for each user, so:

- For admin add everywhere you want the SpagoBISettings Portlet.
- For Testers and Users add everywhere you want the SpagoBIFunctionality portlet.
- For developers add everywhere you want the SpagoBIDevelopment Portlet.

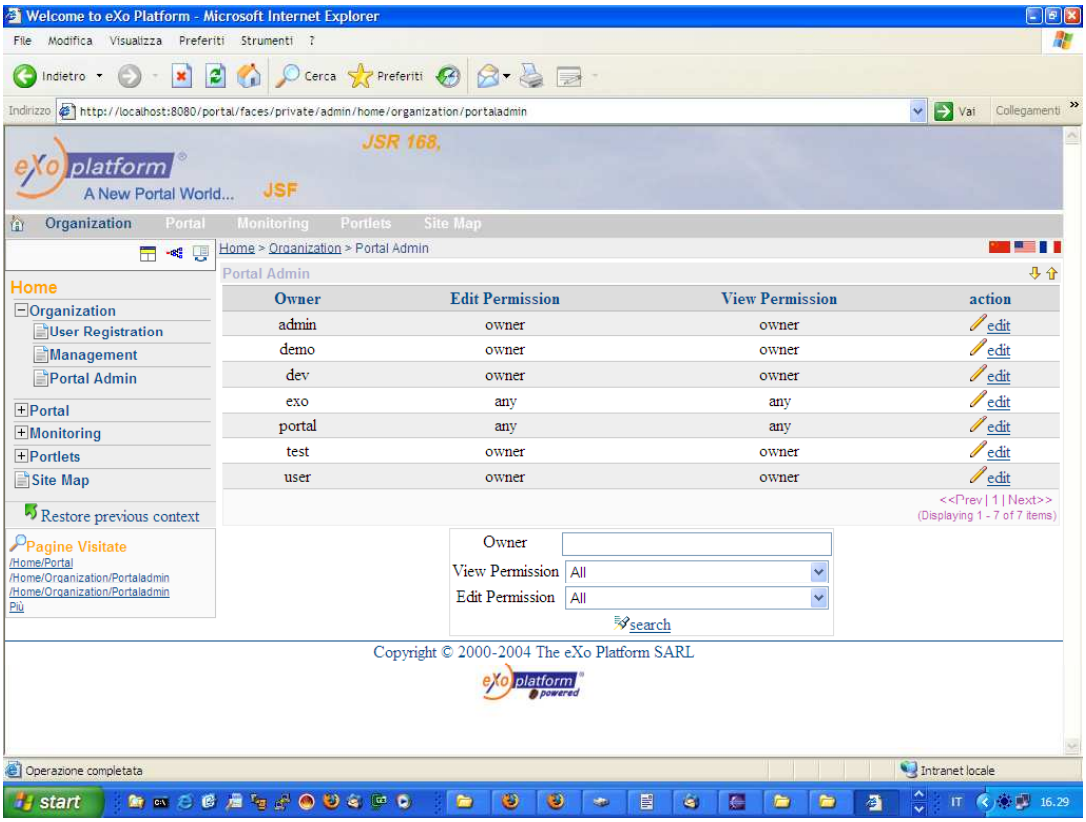


Figura 7

5.3.1 Configure Portal for administrators

Connect as admin/exo and from Portal/Organisation Management (see Figure 7) click on edit button for admin user. Now it's possible to change the portal of the admin (refer to eXo documentation) and add the SBISetting Portlet where you prefer. If you do all correctly when someone log in as the admin user the SBISetting portlets must be visible. (see Figure 8)

5.3.2 Configure Portal for developers

Connect as admin/exo and from Portal/Organisation Management (see Figure 7) click on edit button for dev user. Now it's possible to change the portal of the developer role (refer to eXo documentation) and add the SBIDevelopmentContext Portlet where you prefer. If you do all correctly when someone log in as the dev user the SBIDevelopmentContext portlet must be visible. (see Figure 9).

5.3.3 Configure Portal for final users and testers

Connect as admin/exo and from Portal/Organisation Management (see Figure 7) click on edit button for test and final user. Now it's possible to change the portal for final users and testers (refer to eXo documentation) and add the SBIFunctionality Portlet where you prefer. If you do all correctly when someone log in as the tester or final user the SBIFunctionality Portlet portlet must be visible.

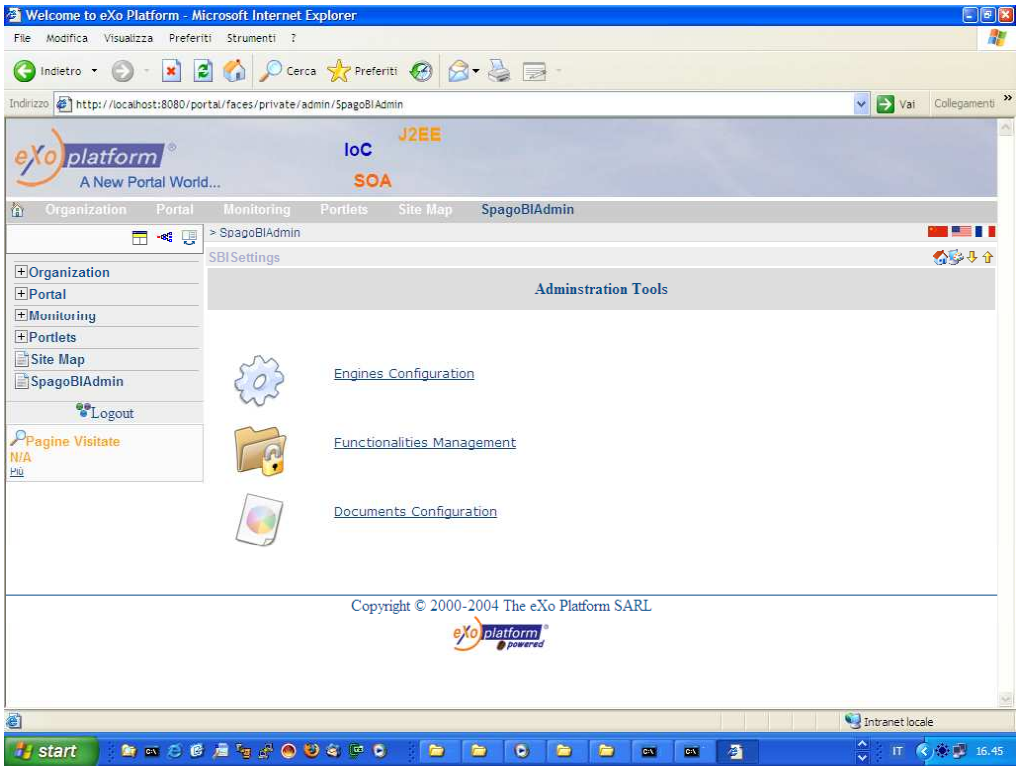


Figura 8

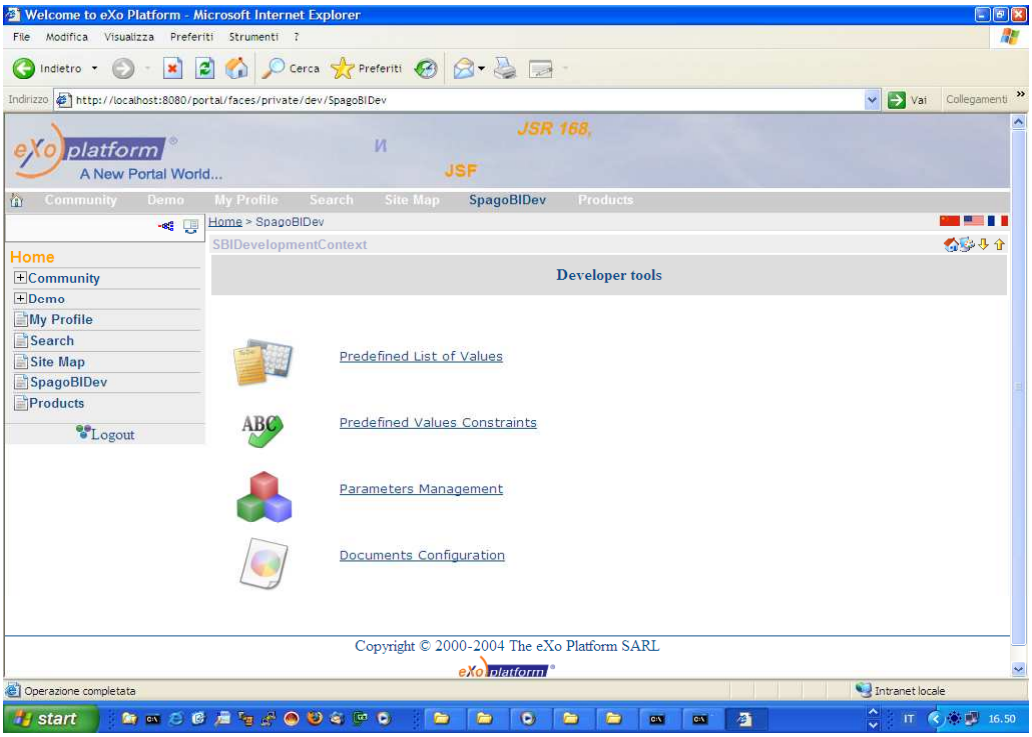


Figura 9

6 Common Problems

6.1 Add new database connection to SpagoBI

In order to add a new database connection to SpagoBI you need to change the file data_access.xml in EXO_HOME/webapps/spagobi/WEB-INF/conf directory. This file contains all the configurations for every database accessible to SpagoBI. It's possible to retrive the datasource from a jndi tree or to create a new one defining the implementation class and his parameter.
For the jndi configuration you need to modify the EXO-HOME/conf/server.xml file in order to add a new global name datasource (see “Configuring JNDI Resources” section), add into the EXO-TOMCAT/conf/locahost/Catalina/spagobi.xml file the link to the global datasource, and after, in the data_access.xml, put the following xml envelope:

```
<CONNECTION-POOL connectionPoolName="spagobi"
                 connectionPoolFactoryClass=
                 "it.eng.spago.dbaccess.pool.JNDIConnectionPoolFactory"
                 connectionPoolType="native">
      <CONNECTION-POOL-PARAMETER
            parameterName="initialContext"
            parameterValue="java:comp/env"/>
      <CONNECTION-POOL-PARAMETER
            parameterName="resourceName"
            parameterValue="name of the jndi resource"/>
      <CONNECTION-POOL-PARAMETER
            parameterName="driverVersion"
            parameterValue="2.1"
            parameterType=""/>
      <CONNECTION-POOL-PARAMETER
            parameterName="sqlMapperClass"
            parameterValue=
            "it.eng.spago.dbaccess.sql.mappers.OracleSQLMapper"
            parameterType=""/>
</CONNECTION-POOL>
```

If you wanto to configure a new datasource without defining it like a jndi resource you need to put into the data_access.xml the following xml envelope:

```
<CONNECTION-POOL connectionPoolName="spagobi"
                 connectionPoolFactoryClass="it.eng.spago.dbaccess.pool.DBCPCon
                 nectionPoolFactory" connectionPoolType="native">
      <CONNECTION-POOL-PARAMETER parameterName="connectionString"
            parameterValue="connection string for the database"
            parameterType=""/>
      <CONNECTION-POOL-PARAMETER parameterName="driverClass"
            parameterValue="complete driver class name" parameterType=""/>
      <CONNECTION-POOL-PARAMETER parameterName="driverVersion"
            parameterValue="2.1" parameterType=""/>
      <CONNECTION-POOL-PARAMETER parameterName="user"
```

```
            parameterValue="user name" parameterType=""/>
      <CONNECTION-POOL-PARAMETER parameterName="userPassword"
            parameterValue="password" parameterType=""/>
      <CONNECTION-POOL-PARAMETER parameterName="poolMinLimit"
            parameterValue="1" parameterType=""/>
      <CONNECTION-POOL-PARAMETER parameterName="poolMaxLimit"
            parameterValue="10" parameterType=""/>
      <CONNECTION-POOL-PARAMETER parameterName="cacheTimeToLiveTimeout"
            parameterValue="10" parameterType="" />
      <CONNECTION-POOL-PARAMETER parameterName="cacheInactivityTimeout"
            parameterValue="10" parameterType="" />
      <CONNECTION-POOL-PARAMETER parameterName="sqlMapperClass"
            parameterValue="it.eng.spago.dbaccess.sql.mappers.OracleSQLMapper"
            parameterType=""/>
</CONNECTION-POOL>
```

Each datasource defined must also be registered into the Connection Manager otherwise SpagoBI isn't able to connect to it, so remember for each one of them to put into the <CONNECTION-MANAGER> tag of the data_access.xml one tag with his name.

```
<CONNECTION-MANAGER>
      <REGISTER-POOL registeredPoolName="name pool 1"/>
      ....
      <REGISTER-POOL registeredPoolName=”name pool n"/>
</CONNECTION-MANAGER>
```

All the datasources configured and registered will be accessible to SpagoBI and it's possible to use them like connection name for the query lov. If you need to define a datasource in a different manner you can look at the Spago framework documentation for data_access configuration.

6.2 Add a new language

The static interface of spagoBI supports multi-language and the default languages are english and italian. If you need to add a new language you must:

- add the new language to the exo portal (see eXo platform documentation).
- edit the EXO-TOMCAT/webapps/spagobi/WEB-INF/classes/messages_en_US.properties file, traduce the label values contained into your language and save it in the same folder renaming it in the following manner: messages_{languageCode}_{countryCode}.properties.
- Edit the file EXO-TOMCAT/webapps/spagobi/WEB-INF/conf/spagobi/spagobi.xml and add to the tag <LANGUAGE_SUPPORTED> an xml envelope like this: <LANGUAGE default="false" language="**language_code**" country="**country_code**" />