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Installation Guide

tranSMART Open Source

February 7, 2012   
Edition 1.3

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## Step 1. Set Up the User Environment

Create an operating system user appuser and set its home directory to /home/appuser.

## Step 2. Install the JDKs

* Download and install the latest **JDK 1.5** to the directory /usr/local.

This JDK is used for the Tomcat application server.

* Download and install the latest **JDK 1.6** to the directory /usr/local.

This JDK is used for the GenePattern server and SOLR.

## Step 3. Install Tomcat

* 1. Download or copy Tomcat with the pre-compiled i2b2 package tomcat-5.5.27.jar from

<http://transmartproject.org/download/tomcat-5.5.27.jar>

* 1. Change your working directory to /usr/local:

cd /usr/local

* 1. Unzip it under /usr/local:

jar xvf tomcat-5.5.27.jar

The Tomcat application server’s home directory becomes:

/usr/local/tomcat-5.5.27

1. Change your working directory to /usr/local/tomcat-5.5.27/bin and run the command:

chmod +x \*.sh

### Starting and Stopping Tomcat

To start Tomcat:

/usr/local/tomcat-5.5.27/bin/startup.sh

To stop Tomcat:

/usr/local/tomcat-5.5.27/bin/shutdown.sh

## Step 4. Install and Configure Jboss

* 1. Download or copy JBoss with the pre-compiled i2b2 package, jboss-4.2.2.GA.jar from

<http://transmartproject.org/download/jboss-4.2.2.GA.jar>

* 1. Change your working directory to /usr/local:

cd /usr/local

* 1. Unzip it under /usr/local:

jar xvf jboss-4.2.2.GA.jar

The JBoss application server’s home directory becomes:

/usr/local/jboss-4.2.2.GA

1. Change your working directory to /usr/local/jboss-4.2.2.GA/bin and run the command:

chmod +x \*.sh

### Configuration

Default configuration for Tomcat’s http port is 7070 and JBoss’s http port is 9090. If you are using a different port, queryprocessor.ws.pm.url, queryprocessor.ws.ontology.url, ontology.ws.pm.url and workplace.ws.pm.url in the following files under the directory /usr/local/jboss-4.2.2.GA/server/default/i2b2 need to modified accordingly:

* crc.prpoperties

queryprocessor.ws.pm.url=http://localhost:7070/axis2/rest/PMService/getServices

queryprocessor.ws.ontology.url=http://localhost:9090/i2b2/rest/OntologyService/getTermInfo

* ontology.properties

ontology.ws.pm.url=http://localhost:7070/axis2/rest/PMService/getServices

* workplace.properties

workplace.ws.pm.url=http://localhost:7070/axis2/rest/PMService/getServices

JDBC connection string’s url, username and password used in the following files under /usr/local/jboss-4.2.2.GA/server/default/i2b2 are needed to be modified as needed:

* CRCApplicationContext.xml

<bean id="TestDataSource" class="org.apache.commons.dbcp.BasicDataSource"

destroy-method="close">

<property name="driverClassName" value="oracle.jdbc.driver.OracleDriver"/>

<property name="url" value="**jdbc:oracle:thin:@localhost:1521:xe**"/>

<property name="username" value="**i2b2demodata\_username**"/>

<property name="password" value="**i2b2demodata\_password**"/>

</bean>

<bean id="CRCDataSourceLookup" class="org.apache.commons.dbcp.BasicDataSource"

destroy-method="close">

<property name="driverClassName" value="oracle.jdbc.driver.OracleDriver"/>

<property name="url" value="**jdbc:oracle:thin:@localhost:1521:xe**"/>

<property name="username" value="**i2b2hive\_username**"/>

<property name="password" value="**i2b2hive\_password**"/>

</bean>

* OntologyApplicationContext.xml

<bean id="dataSource" class="org.apache.commons.dbcp.BasicDataSource"

destroy-method="close">

<property name="driverClassName" value="oracle.jdbc.driver.OracleDriver"/>

<property name="url" value="**jdbc:oracle:thin:@localhost:1521:xe**"/>

<property name="username" value="**i2b2metadata\_username**"/>

<property name="password" value="**i2b2metadata\_password**"/>

<property name="defaultAutoCommit" value="false"/>

<property name="defaultReadOnly" value="true"/>

</bean>

* WorkplaceApplicationContext.xml

<bean id="dataSource" class="org.apache.commons.dbcp.BasicDataSource"

destroy-method="close">

<property name="driverClassName" value="oracle.jdbc.driver.OracleDriver"/>

<property name="url" value="**jdbc:oracle:thin:@localhost:1521:xe**"/>

<property name="username" value="**i2b2workdata\_username**"/>

<property name="password" value="**i2b2workdata\_password**"/>

<property name="defaultAutoCommit" value="false"/>

<property name="defaultReadOnly" value="true"/>

</bean>

Also JDBC connection string’s url, username and password used in the following files under /usr/local/jboss-4.2.2.GA/server/default/deploy are needed to be modified as needed:

* crc-ds.xml

<jndi-name>QueryToolDemoDS</jndi-name>

<connection-url>

**jdbc:oracle:thin:localhost:1521:xe**

</connection-url>

<driver-class>oracle.jdbc.driver.OracleDriver</driver-class>

<user-name>**i2b2demodata­\_username**</user-name>

<password>**i2b2demodata\_password**</password>

* crc-jms-ds.xml

<jndi-name>DefaultDS</jndi-name>

<connection-url>

**jdbc:oracle:thin:localhost:1521:xe**

</connection-url>

<driver-class>oracle.jdbc.driver.OracleDriver</driver-class>

<user-name>**i2b2hive\_username**</user-name>

<password>**i2b2hive\_password**</password>

* ont-ds.xml

<datasources>

<!-- sample oracle OntologyBootStrapDS -->

<local-tx-datasource>

<jndi-name>OntologyBootStrapDS</jndi-name>

<driver-class>oracle.jdbc.driver.OracleDriver</driver-class>

<connection-url>

**jdbc:oracle:thin:localhost:1521:xe**

</connection-url>

<user-name>**i2b2hive\_username**</user-name>

<password>**i2b2hive\_password**</password>

</local-tx-datasource>

<!-- sample oracle project data source -->

<local-tx-datasource>

<jndi-name>OntologyDemoDS</jndi-name>

<driver-class>oracle.jdbc.driver.OracleDriver</driver-class>

<connection-url>

**jdbc:oracle:thin:localhost:1521:xe**

</connection-url>

<user-name>**i2b2metadata\_username**</user-name>

<password>**i2b2metadata\_password**</password>

</local-tx-datasource>

</datasources>

* work-ds.xml

<datasources>

<!-- sample oracle WorkplaceBootStrapDS -->

<local-tx-datasource>

<jndi-name>WorkplaceBootStrapDS</jndi-name>

<driver-class>oracle.jdbc.driver.OracleDriver</driver-class>

<connection-url>

**jdbc:oracle:thin:localhost:1521:xe**

</connection-url>

<user-name> **i2b2hive\_username** </user-name>

<password>**i2b2hive\_password**</password>

</local-tx-datasource>

<!-- sample oracle project data source -->

<local-tx-datasource>

<jndi-name>WorkplaceDemoDS</jndi-name>

<driver-class>oracle.jdbc.driver.OracleDriver</driver-class>

<connection-url>

**jdbc:oracle:thin:localhost:1521:xe**

</connection-url>

<user-name>**i2b2workdata\_username**</user-name>

<password>**i2b2workdata\_password**</password>

</local-tx-datasource>

</datasources>

### Starting and Stopping JBoss

To start JBoss:

/usr/local/jboss-4.2.2.GA/bin/run.sh –b 0.0.0.0&

To stop JBoss:

/usr/local/jboss-4.2.2.GA/bin/shutdown.sh -S

## Step 5. Configure i2b2

* 1. Log into the Gridsphere portal server from the URL http://<server name>:7070/gridsphere, using the following credentials:
  + Username: root
  + Password: manager
  1. Click Global Hive Data.
  2. Click Edit Cell Info to modify the three listed cell’s base URL.

You can find more detailed information at <http://www.i2b2.org>.

## Step 6. Install and Configure SOLR

* 1. Download or copy a pre-configured SOLR package SOLR-3.1.0.jar from

<http://transmartproject.org/download/SOLR-3.1.0.jar>

* 1. Unzip this package to the /home/appuser directory as the user appuser.

SOLR will reside in /home/appuser/solr-3.1.0.

### Configuration

After unzipping the package, change JDBC connection string as needed in:

/home/appuser/solr-3.1.0/example/solr/conf/data-config.xml.

### Starting SOLR

To start SOLR:

* 1. Enter:

cd /home/appuser/solr-3.1.0/example

/usr/local/jdk1.6.0\_xx/java -jar start.jar &

* 1. Remove any current indexes and create new indexes by retrieving the information from the database. To do so, enter:

wget http://localhost:8983/solr/dataimport?command=full-import

## Step 7. Install R

* 1. Download and install the g77 Fortran compiler, the readline development libraries, the X11 development libraries, and the Cairo development libraries:

# yum install gcc-gfortran

# yum install readline-devel

# yum update libX11

# yum install libX11-devel

# yum install libXt-devel

# yum install tk-devel

# yum install cairo-devel

* 1. Download and install the latest R from <http://www.r-project.org>:

wget <http://cran.r-project.org/src/base/R-2/R-2.14.1.tar.gz>

* 1. Configure and install R.

tar xvf R-2.14.1.tar.gz

cd R-2.14.1

./configure –prefix=/usr/local/R –enable-R-shlib

make

make install

* 1. Install R packages:

The following R packages are used by the tranSMART Data Association Tool functions and need to be installed:

>install.packages("Rserve")

>install.packages("Cairo")

>install.packages("MASS")

>install.packages("stringr")

>install.packages("ggplot2")

>install.packages("plyr")

>source("http://bioconductor.org/biocLite.R")

>biocLite("impute")

>install.packages("WGCNA")

* 1. Start Rserver in **one** of these ways:
  + Enter R, then type:

>library(Rserve)

>Rserve()

* + Use the following command:

/usr/local/R/lib64/R/bin/R CMD /home/oracle/R/x86\_64-unknown-linux-gnu-library/2.13/Rserve/libs//Rserve-bin.so >> rout.log 2>&1

### Validate the R Installation

* 1. Check that all required R packages are installed:

>library()

* 1. After R and R packages are installed, create an R script with "testCairo.R":

library(ggplot2)

library(Cairo)

qplot(wt, mpg, data=mtcars)+geom\_abline(intercept=20)

#ggsave("TEST.png")

CairoPNG("TEST.png", width=4, height=4)

* 1. Run the script:

R CMD BATCH ./testCairo.R

You can find more detailed information about R installation at <http://www.r-project.org>.

## Step 8. Install GenePattern Server

If you don’t have a license from the Broad Institute for GenePattern Server, you can skip this step. For information about GenePattern Server and its license, see <http://www.broadinstitute.org/cancer/software/genepattern/>.

* 1. Download or copy the pre-built GenePattern package, gp-3.2.3.jar.
  2. Unzip it to the directory /home/appuser as **/home/appuser/gp-3.2.3**.
  3. Make the appropriate modifications to the following files:

/home/appuser/gp-3.2.3/resources/genepattern.properties

/usr/local/tomcat-5.5.27/webapps/gp/WEB-INF/web.xml

## Step 9. Install PLINK

* 1. Download PLINK from the URL <http://pngu.mgh.harvard.edu/~purcell/plink/download.shtml#download>, using the following command:

wget http://pngu.mgh.harvard.edu/~purcell/plink/dist/plink-1.07-x86\_64.zip

* 1. Unzip to /usr/local.

## Step 10. Required Schemas

tranSMART requires the following schemas:

* i2b2hive
* i2b2metadata
* i2b2demodata
* i2b2sampledata
* biomart
* biomart\_user
* beapp
* searchapp

The following schemas are needed for ETL work:

* tm\_cz
* tm\_lz
* tm\_wz

### Import the Schemas

* 1. Create the following tablespaces:
  + biomart
  + transmart
  + deapp
  + i2b2\_data
  + searchapp
  + indx
  1. Import the schemas.

The required schemas without data can be imported from Oracle 11g’s expdp dump file. The command will be like the following:

impdp <username/password> directory=<your directory name> dumpfile=transmart.dmp logfile=transmart.imp schemas=i2b2hive i2b2metadata i2b2sampledata i2b2demodata i2b2workdata biomart biomart\_user deapp searchapp

The dump file can be downloaded from

<http://transmartproject.org/download/transmart.dmp>

and its log file can be download from

<http://transmartproject.org/download/transmart.exp>

## Step 11. Install and Configure tranSMART

* 1. Create your own transmart.war file and drop it under the following directory:

/usr/local/tomcat-5.5.27/webapps

Or you can download the latest one from

<http://transmartproject.org/download/transmart.war>

If transmart.war already exists, you can delete it first.

* 1. Restart Tomcat.

### Configuration

* 1. Download or copy the file tranSMARTConfig.jar from

<http://transmartproject.org/download/tranSMARTConfig.jar>

* 1. Unzip it under /home/appuser.
  2. Make the appropriate modifications to the tranSMART external configuration files Config.groovy and DataSource.groovy. The files are in the following location:

/home/appuser/.grails/transmartAppConfig

* + DataSource.groovy

Database username here should be **biomart\_user**.

* + Config.groovy

Replace URL, absolute path and email addresses as needed.

## Step 12. Validation and Troublshooting

Before accessing tranSMART UI, make sure the following servers and services are up and running:

* Tomcat
* JBoss
* SOLR
* Rserve
* Oracle Server

Also make sure that:

* Tomcat is using JDK 1.5
* SOLR and GenePattern server can use either JDK 1.5 or JDK 1.6
* Processes for Tomcat, JBoss, SOLR and Rserve are running by appuser
* The following are owned by appuser:
  + /usr/local/tomcat-5.5.27
  + /usr/local/jboss-4.2.2.GA

If you have any issue, please follow the next page diagram and try to resolve them.

