



tranSMART Open Source Installation Guide

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Edition 1.3



Patient	MRN	DOS	Age	Sex	DOB
MRH-TEST, SJA	100000001	8/15/71	37	F	8/15/71
	100000002	7/28/79	29	M	7/28/79
	100000003	7/28/79	29	F	8/15/71



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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>
2. Change your working directory to `/usr/local`:

```
cd /usr/local
```
3. 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`
4. 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>

2. Change your working directory to `/usr/local`:

```
cd /usr/local
```

3. 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
```

5. 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 be modified accordingly:

- `src.properties`

```
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

2. Click **Global Hive Data**.

3. 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>

2. 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 &
```

2. 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
```

2. 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
```

3. 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
```

4. 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")
```

5. 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()
```

2. 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)
```

3. 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
```

2. 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

2. 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.

2. Restart Tomcat.

Configuration

1. Download or copy the file `tranSMARTConfig.jar` from
<http://transmartproject.org/download/tranSMARTConfig.jar>
2. Unzip it under `/home/appuser`.
3. 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 Troubleshooting

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.

