Informatics for Integrating Biology and the Bedside

i2b2 Installation/Upgrade Guide (Linux)

Project Management (PM) Cell

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i2b2 Software Version:	*1.5*

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ABOUT THIS GUIDE

Informatics for Integrating Biology and the Bedside (i2b2) is one of the sponsored initiatives of the NIH Roadmap National Centers for Biomedical Computing (http://www.bisti.nih.gov/ncbc/).

One of the goals of i2b2 is to provide clinical investigators broadly with the software tools necessary to collect and manage project-related clinical research data in the genomics age as a cohesive entity; a software suite to construct and manage the modern clinical research chart. This guide with the provided source code will help you deploy the i2b2 CRC cell.

1. PREREQUISITES

1.1   Required Software

If you installed the prerequisite software from the Hive Installation Guide you may skip this section.

1.1.1 Java JDK

JDK 6.0 is recommended and can be downloaded from the java website:
http://java.sun.com/products/

1. Install the SDK into a directory of your choice.

    Example: /opt/java/jdk1.6.0 or *YOUR_JAVA_HOME_DIR*

1.1.2 JBoss 4.2.2GA

Download JBoss (jboss-4.2.2.GA.zip) from the jboss website:
http://labs/jboss.com/jbossas/downloads

2. Unzip jboss-4.2.2.GA.zip into a directory of your choice.

    Example: /opt/jboss-4.2.2.GA or *YOUR_JBOSS_HOME_DIR*

3. Set JBoss JVM to run with 1GB of extended memory.

4. Edit '*YOUR_JBOSS_HOME_DIR*/bin/run.conf' and change the JAVA_OPTS memory setting to those shown below. (-Xms512m -X, x1024m)

    ```
    #
    # Specify options to pass to the Java VM.
    #
    if [ "x$JAVA_OPTS" = "x" ]; then
        JAVA_OPTS="-Xms512m –Xmx1024m
        -Dsun.rmi.dgc.client.gcInterval=3600000
        -Dsun.rmi.dgc.server.gcInterval=3600000"
    ```

5. If default port 8080 is unavailable because another application is using this port then edit the server.xml file ('*YOUR_JBOSS_HOME_DIR*/server/default/deploy/jboss-web.deployer/server.xml') to reconfigure the following two items:

    a. The non-SSL HTTP/1.1 Connector to another port such as 9090

    ```
    < ! –Define a non-SSL HTTP/1.1 Connector on port 9090 - >
    <Connector port="9090" address="${jboss.bind.address}"
            maxThreads="250" maxHttpHeaderSize="8192"
    ```

```
emptySessionPath="true" protocol="HTTP/1.1"
enableLookups="false" redirectPort="8443"
acceptCount="100" connectionTimout="20000"
disableUploadTimeout="true" />
```

b. The AJP 1.3 Connector to another port such as 9009

```
< ! –Define an AJP 1.3 Connector on port 9009 - >
<Connector port="9009" address="${jboss.bind.address}"
        maxThreads="250" maxHttpHeaderSize="8192"
        protocol="AJP/1.3" emptySessionPath="true"
        enableLookups="false" redirectPort="8443" />
```

1.1.3 Apache Ant 1.6.5

Download *Apache Ant version 1.6.5* (apache-ant-1.6.5-bin.zip) from the following Apache website: http://archive.apache.org/dist/ant/binaries/

6. Unzip the file into a directory of your choice.

   Example*:* /opt/apache-ant-1.6.5 or *YOUR_ANT_HOME_DIR*

1.1.4 Apache Axis2 1.1

Download *Apache Axis2 version 1.1* from the following Apache website:
http://ws.apache.org/axis2/download/1_1/download.cgi

Select the download type of WAR (Web Archive) Distribution (axis2.war).

1. Create a folder called **i2b2.war** inside
   'YOUR_JBOSS_HOME_DIR/server/default/deploy' folder.

2. Unzip axis2.war inside
   'YOUR_JBOSS_HOME_DIR/server/default/deploy/i2b2.war' folder.

1.1.5 Oracle Express Edition

Download *Oracle Database 10g Express Edition (Universal)* (oracle-xe-univ-10.2.0.1-1.0.i386.rpm) from the following Oracle website:
http://www.oracle.com/technology/software/products/database/xe/htdocs/102xelinsoft.html

1. Run *rpm –i oracle-xe-univ-10.2.0.1-1.0.i386.rpm* as root.

   a. Configure the database by running '/etc/init.d/oracle-xe configure' as root

b. Select HTTP and listener ports (use defaults 8080/1521 if they are available).

   c. Select 'Y'es to start on boot when asked.

2. Verify Oracle was properly installed.

   a. Open a browser

   b. Enter http://*yourHost:yourPort*/apex

   c. You should see an Oracle Database Express Edition login screen.

1.1.6 Update Environment Variables

Be sure to set the JAVA_HOME, JBOSS_HOME, and ANT_HOME variables to the JAVA, JBOSS, and ANT home directories you set up in the previous sections.

Example:

```
# Sample environment variables
JAVA_HOME=/opt/java/jdk1.6.0
JBOSS_HOME=/opt/jboss-4.2.2.GA
ANT_HOME=/opt/apache-ant-1.6.5
PATH=$PATH:$ANT_HOME/bin:$JAVA_HOME/bin
export JAVA_HOME
export JBOSS_HOME
export ANT_HOME
```

2. INSTALL/UPGRADE

2.1 Install or Upgrade the Project Management (PM) Cell

The 1.5 version of the i2b2 Project Management cell now runs on the same JBoss platform as the Ontology and Data Repository cells. As a result, all users need to perform the following installation procedures.

2.1.1 Download and Extract Source Code

The following outlines the steps to download and extract the core server source code to a target area.

☞ *You can skip this step if the core server source code was downloaded during a previous installation (e.g. PM or ONT).*

Steps:

1. Set up a target source_directory.
2. Extract core server source code into the target source_directory.

2.1.2 Stop Services

In order to install the PM properly it is important that certain services are **not** running. These services are further defined below.

2.1.2.1 JBOSS

Verify JBOSS is not running.

- ▪ ./$JBOSS_HOME/bin/shutdown.sh -S

2.1.3 Deploy edu.harvard.i2b2.common

The following outlines the steps to deploy **edu.harvard.i2b2.common**.

☞ *You can skip this step if edu.harvard.i2b2.common was deployed during a previous installation (e.g. ONT).*

Steps:

1. cd source_directory/edu.harvard.i2b2.common

2. Edit the **build.properties** file and set *jboss.home* and *axis2.war.name properties*.

   ```
   jboss.home=YOUR_JBOSS_HOME_DIR
   axis2.war.name=i2b2.war
   ```

3. Run *ant clean dist deploy jboss_pre_deployment_setup*

2.1.4 Deploy edu.harvard.i2b2.pm

1. cd source_directory/edu.harvard.i2b2.pm

2. Edit the **build.properties** file and set *jboss.home* and *axis2.war.name* properties

   ```
   jboss.home=YOUR_JBOSS_HOME_DIR
   axis2.war.name=i2b2.war
   ```

3. Edit **etc/jboss/pm-ds..xml** and configure your data sources:

   a. PMBootStrapDS points to the location of your PM table.

      Data source samples for both sqlserver and oracle are provided in **pm-ds.xml**. Copy and modify the samples in pm-ds.xml as needed to create the data sources shown below. If using **Oracle** rename *PMBootStrapDS_ORACLE* to *PMBootStrapDS*, else if using **SqlServer** name *PMBootStrapDS_SQLSERVER* to *PMBootStrapDS*.

```
<datasources>
    <local-tx-datasource>
        <jndi-name>PMBootStrapDS_ORACLE</jndi-name>
        <driver-class>oracle.jdbc.driver.OracleDriver</driver-class>
        <connection-url>jdbc:oracle:thin:@localhost:1521:xe</connection-url>
        <user-name>i2b2pm</user-name>
        <password>i2b2pm_password</password>
    </local-tx-datasource>
    <local-tx-datasource>
        <jndi-name>PMBootStrapDS_SQLSERVER</jndi-name>
        <driver-class>com.microsoft.sqlserver.jdbc.SQLServerDriver</driver-class>
```

```
<connection-url>jdbc:sqlserver://localhost:1433</connection-url>
<user-name>uname</user-name>
<password>pswd</password>
<metadata>
    <type-mapping>MS SQLSERVER2000</type-mapping>
</metadata>
    </local-tx-datasource>
</datasources>
```

4. Run ant -f master_build.xml clean build-all deploy

2.1.5 Install the WebClient

1. Copy the *admin* directory, which is in the root directory of the core server source code to your httpd directory; on Centos Linux this is typically located in */var/www/html*.

   The webclient is pre-configured for a localhost domain of 'i2b2demo'. If you are upgrading from a system with a different domain or want to specify a different domain, edit the file admin/i2b2_config_data.js accordingly.

   ```
   {name: "localhost",
       domain: "yourDomain",
       debug: true,
       urlCellPM: "http://localhost:9090/i2b2/rest/PMService/"
   }
   ```

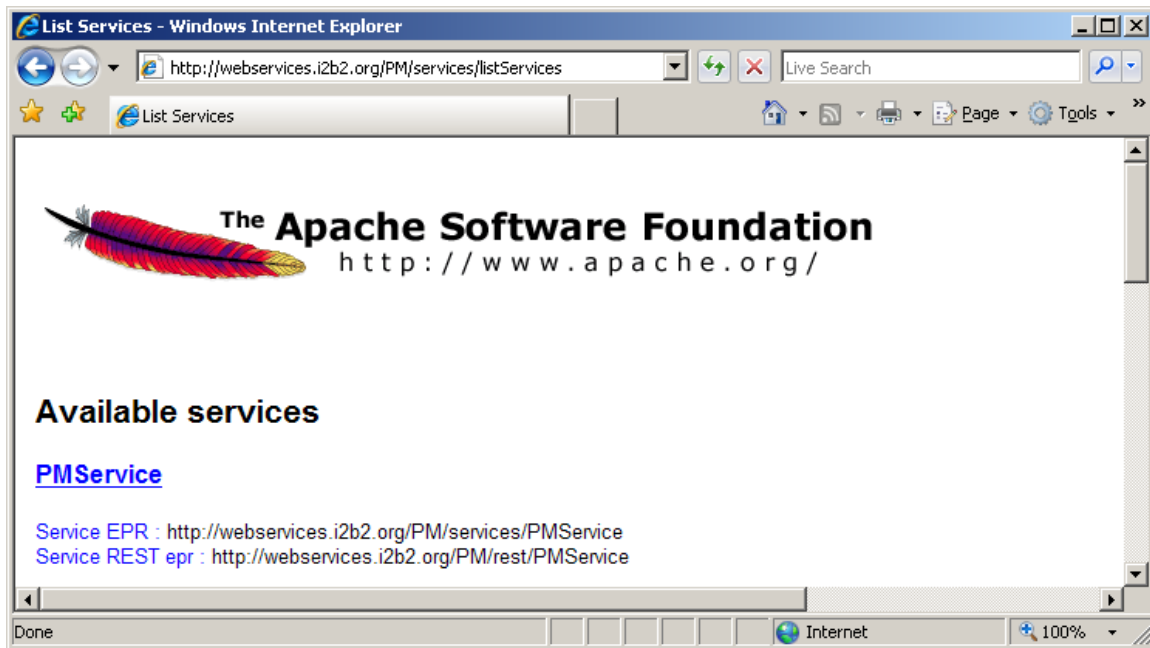2. If your http server is not running, start it now.

2.1.6 Start Services

2.1.6.1 START JBOSS

To start JBOSS run the following: *$JBOSS_HOME/bin/run.sh -b 0.0.0.0*

2.1.6.2 WEB SERVICE

The following are the steps to take to verify the web service is running.

1. In a browser, check the following URL:

   *http://**yourHost**:9090/i2b2/services/listServices*

2. Verify PMService is listed as active.

2.1.7 Configure the PM cell data.

Those users that have previously installed an earlier version of the PM cell should proceed to section 3, Upgrade. Otherwise if you are installing the cell for the first time, proceed to section 4, New Install.

2.2 Changing Server log level

By default JBOSS log will be in **DEBUG** mode, changing it to **INFO** mode will increase server performance.

1. Edit $JBOSS_HOME /server/default/conf/jboss-log4j.xml file and add the 'Threshold' param.

```
<appender name="FILE" class="org.jboss.logging.appender.DailyRollingFileAppender">
```

```
<errorHandler class="org.jboss.logging.util.OnlyOnceErrorHandler"/>
<param name="File" value="${jboss.server.home.dir}/log/server.log"/>
<param name="Append" value="false"/>
<param name="Threshold" value="INFO"/>
<!-- Rollover at midnight each day -->
<param name="DatePattern" value="'.'yyyy-MM-dd"/>
    <layout class="org.apache.log4j.PatternLayout">
    <!-- The default pattern: Date Priority [Category] Message\n -->
    <param name="ConversionPattern" value="%d %-5p [%c] %m%n"/>
. . .
    </layout>
</appender>
```

2. To switch back to DEBUG mode, *comment out* the 'Threshold' <param> and wait a minute.

☞ *There is no need to restart JBOSS.*

3. UPGRADE PROJECT MANAGEMENT

3.1 Upgrading PM Data from Release 1.3 (Typical)

In Release 1.3 the PM data was stored in gridsphere. In this release the PM cell data is stored in Oracle (or SQLServer). The following procedure extracts the PM cell data from gridsphere so it may be imported into the new PM tables.

3.1.1 Shutdown 1.3 PM

The following are the steps to shutdown the PM 1.3 running on Tomcat.

1. cd/opt/apache-tomcast-5.5.26/bin
2. ./shutdown.sh

3.1.2 Data Extraction

1. Go to the default directory in jboss.

   cd $JBOSS_HOME/server/default

2. Run the data extraction script.

   The data extraction script takes 4 arguments.
   a. Destination database (SQLSERVER or ORACLE)
   b. Destination sql script (contains extracted PM data)
   c. Location of Release 1.3 Users Database

   default: ***YOUR_TOMCAT_HOME_DIR***/webapps/gridsphere/WEB-INF/CustomPortal/database

   d. Location of Release 1.3 i2b2 Database

   default: ***YOUR_TOMCAT_HOME_DIR***/webapps/default/WEB-INF/database

   'java -classpath lib/hsqldb.jar:deploy/i2b2.war/WEB-INF/services/ProjectManagement.aar
   edu.harvard.i2b2.pm.upgrade.UpgradeFrom13 ORACLE

/tmp/upgrade.sql /opt/apache-tomcat-5.5.26/webapps/gridsphere/WEB-INF/CustomPortal/database /opt/apache-tomcat-5.5.26/webapps/default/WEB-INF/database'

3.1.3 Run Upgrade Script

Run the upgrade script on your new PM database.

The file */tmp/upgrade.sql* contains the Cell, User, Global Data, Project and Hive Data that was extracted from the 1.3 gridsphere and upgraded to 1.5. Please review this file and then run it against your newly created 1.5 PM database using your database vendor specific query tool or a third party tool.

☞ *All users will default to the data role of DATA_OBFSC and an Administrator will need to assign the proper DATA roles to its users.*

The administration role is upgraded from 1.3, but if no users have ADMIN access you will need to add the role 'ADMIN' and 'MANAGER' to a user before you can login to the webclient and access the Admin section.

3.2 Upgrade PM: 1.3 PM Cell and Other Cells on Different Servers

The following steps are to be followed when upgrading from 1.3 when the 1.3 PM cell and other cells do not exist on the same server.

1. Copy the following two files from the default Directory in jboss:

    lib/hsqldb.jar

    deploy/i2b2.war/WEB-INF/services/ProjectManagement.aar

    To a temporary directory on the 1.3 PM server (such as /tmp)

2. Run the upgrade script.

    The upgrade script takes 4 arguments.

    a. Destination database (SQLSERVER or ORACLE)
    b. Destination SQL script (contains extracted PM data)
    c. Location of Users Database

default: ***YOUR_TOMCAT_HOME_DIR***/webapps/gridsphere/WEB-INF/CustomPortal/database

d. Location of i2b2 Database

default: ***YOUR_TOMCAT_HOME_DIR***/webapps/default/WEB-INF/database

'java -classpath /tmp/hsqldb.jar:/tmp/ProjectManagement.aar
edu.harvard.i2b2.pm.upgrade.UpgradeFrom13 ORACLE
/tmp/upgrade.sql /opt/apache-tomcat-5.5.26/webapps/gridsphere/WEB-INF/CustomPortal/database /opt/apache-tomcat-5.5.26/webapps/default/WEB-INF/database'

3.2.1 Run Upgrade Script

Run the upgrade script on your new PM database.

The file */tmp/upgrade.sql* contains the Cell, User, Global Data, Project and Hive Data that was extracted from the 1.3 gridsphere and upgraded to 1.5. Please review this file and then run it against your newly created 1.5 PM database using your database vendor specific query tool or a third party tool.

☞ ***All users will default to the data role of DATA_OBFSC and an Administrator will need to assign the proper DATA roles to its users.***

The administration role is upgraded from 1.3, but if no users have ADMIN access you will need to add the role 'ADMIN' and 'MANAGER' to a user before you can login to the webclient and access the Admin section.
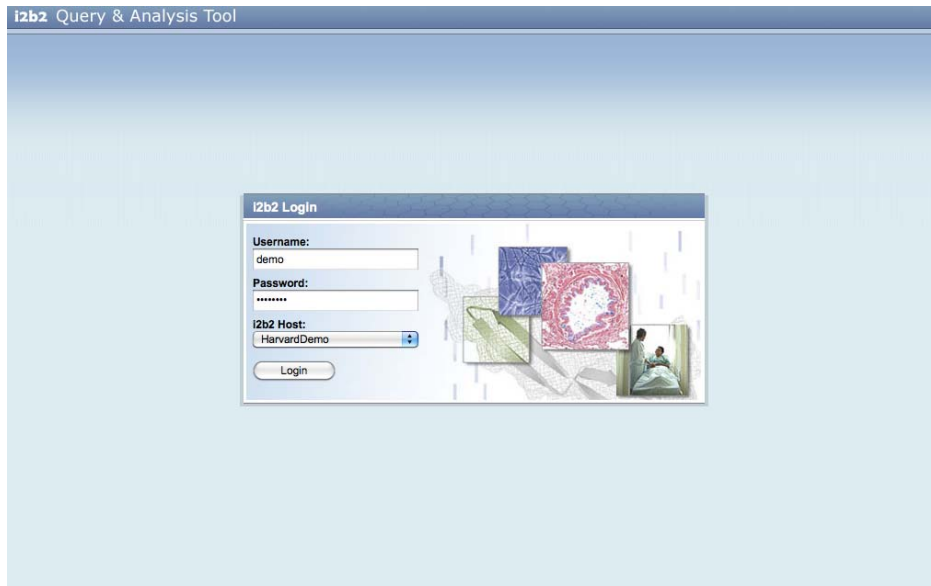
4. INITIAL SETUP

4.1   Administration of the i2b2 Project Management application

Go to the site ***http://jbossHost/admin***

1. You will see a login screen. Log in with a user you know has ADMIN role.

☞ ***For those installing for the first time, use the default ADMIN user of 'i2b2' and password of 'demouser'.***
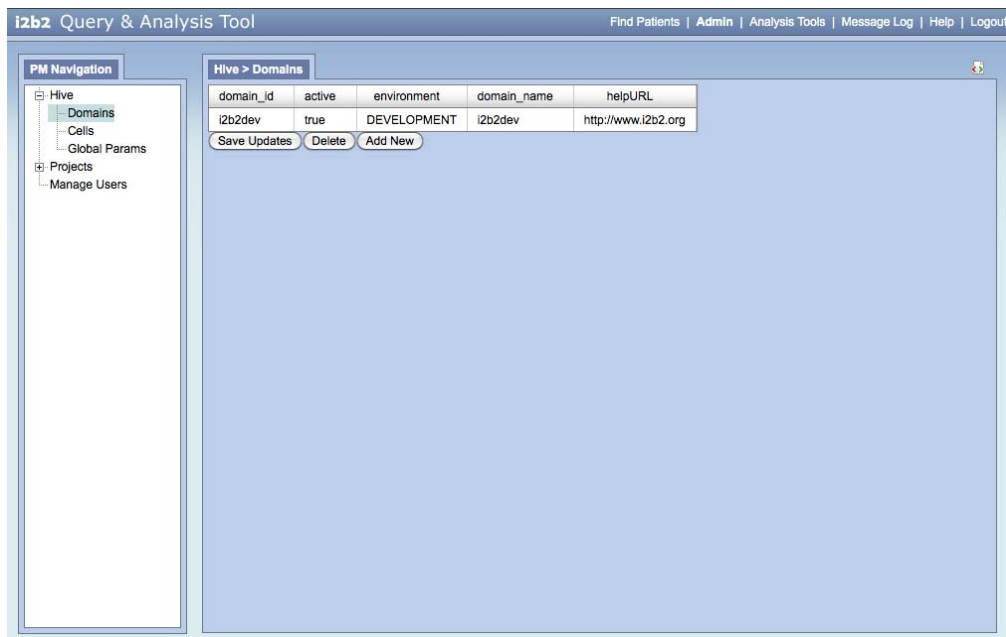

2. Once logged on you will be presented with a admin setup. You should see the following:

3. Click the 'Hive" in the PM Navigation. This is where you can modify the domain, cells and global parameters. Click on 'Domain' to see the domain information.

5. CREATING USERS

5.1 User creation in the i2b2 Project Management Module

1. Continuing with the web client, select 'Manage User' from the primary navigation. You should see the following:


2. Click on the '***Add New***' link, and fill in the required fields for the user you wish to add, such as the username, password, email address. Click the 'Save Update' button once you are complete. Repeat the process for as many users you wish to

3. To remove a user from the system, click on the row associated with that user, and click on the '***Delete***' button.

4. To add a parameter to the user, select the row that contains the user you wish to add the parameter to and a new table will appear below. Follow the same procedure by select '***Add New***' to add a parameter to that user.

6. HIVE DATA

6.1 Registered Cell

1. Continuing with the web client, select 'Hive' from the primary navigation, than 'Cells' from the secondary navigation. You should see the following:
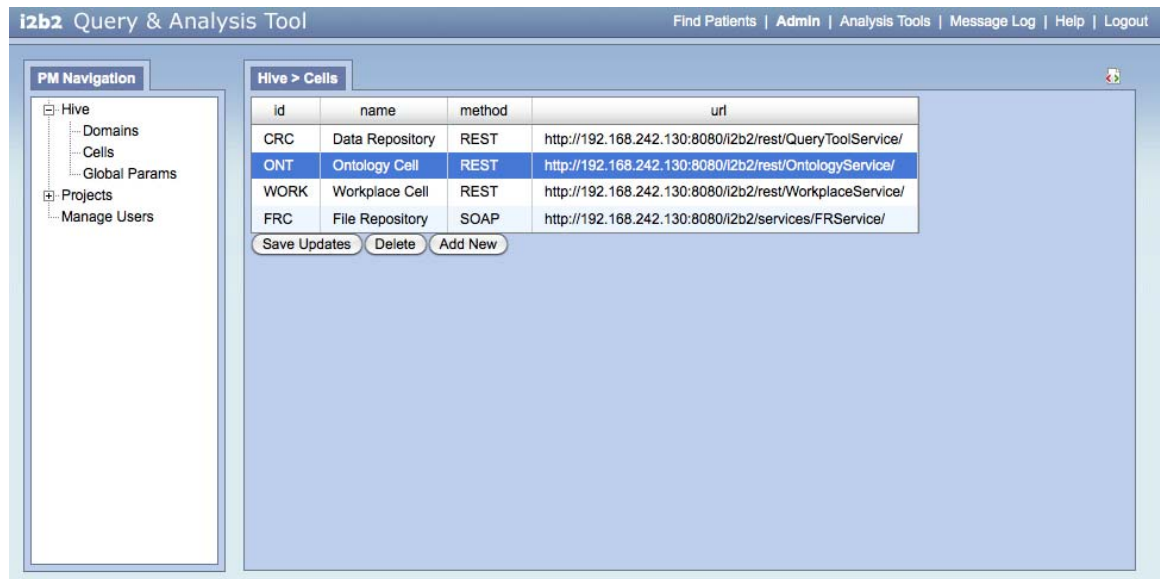
2. Click on the URL column on the row that has the CRC on it. Change the 192.168.242.130 to the IP or domain name that the CRC is installed on. Click the 'Save Update' button once you are complete. Repeat the process for the rest of the cells.

3. To add a new cell, click on the 'Add New' button and fill out the new information for that cell. Click the 'Save Update' button when complete.

4. To add a parameter to the cell, select the row that contains the cell you wish to add the parameter to and a new table will appear below. Follow the same procedure by select 'Add New' to add a parameter to that cell.

7. PROJECT DATA

7.1 Existing Projects

1. Continuing with the web client, select 'Projects from the primary navigation, than 'i2b2demodata' from the secondary navigation. This is where you can update the information associated with the project. You should see the following:

2. You can have cells that are associated with only this specific project, by selecting the cells in the third level in the tree. And likewise, there will be parameters associated with that cell.

3. Parameters for this project can be added or deleted by selecting the Params from the tree.

4. The last item in the tree is Users, This item allows you to associate Users to a project. In the table, enter the username that you want to grant permission to and than select the roles. You need to select an Administration Role which is the first three roles and a Data Track which is the remaining roles. In the example below, User and Data_Agg was selected. The user mem61 will inherit Data_Obfsc   automatically.

8. VERIFY INSTALLATION

8.1 PM Cell Sanity Test via the i2b2Workbench

8.1.1 Configure the i2b2Workbench to communicate with your PM cell.

The i2b2Workbench may be configured via the *i2b2Workbench.properties* file. This file is found in the top level directory of the binary package (see file */i2b2Workbench/i2b2Workbench.properties*).

Sample contents of this file are shown below:

```
writeTimelineFile=yes
applicationName=i2b2
messageversion=1.1
I2b2.1=HarvardDemo,REST,http://webservices.i2b2.org/i2b2/rest/PMService/
#I2b2.2=YourSite,REST,http://JbossHost:JbossPort/i2b2/rest/PMService/
```

The last lines in this file provide the location of the target PM cells. Its structure is as follows:

Identifier	Label	Protocol	URL
I2b2.1	HarvardDemo	REST	http://webservices.i2b2.org/i2b2/rest/PMService/
#I2b2.2	YourSite	REST	http://host:port/i2b2/rest/PMService

To set up the system to point to your target PM cell, remove the comment tag ('#') in the I2b2.2 identifier, provide a meaningful label and configure the URL for the location of your PM cell.

Upgrade: Users who upgraded from 1.3 to 1.5, will need to modify the i2b2Workbench.properties file because the PM port and in the URL (axis2 -> i2b2) has changed.
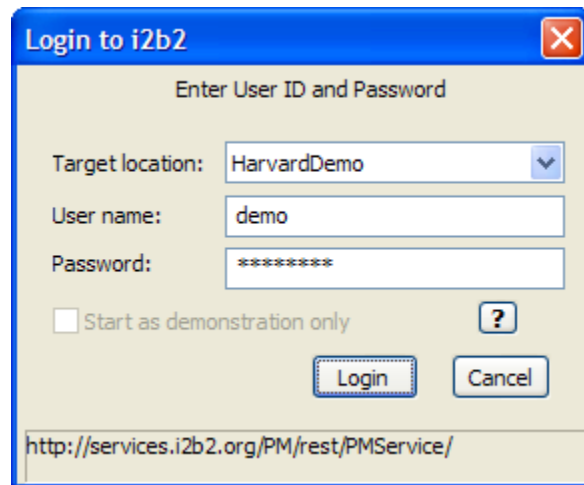
Caveats: The Identifier should have the same prefix as the application name. ("I2b2.x")   The label is just a meaningful description of the target PM cell. Supported

communication protocols are 'REST'. The sample PM cell provided in our delivery uses the 'REST' protocol. The URL points to the location of the target PM cell.

### 8.1.2 Launch the i2b2Workbench

The following outlines the steps to log into the i2b2 Workbench.

5. Go to the location (folder) in which the i2b2 Workbench was installed.

6. Double click on **i2b2Workbench.exe**.

7. The **Login dialog box** will open.

8. Select your **target location** (YourSite)

9. Enter you **User name** (ID) and **Password**. (demo/demouser)

10. The *URL at the bottom of the login screen* should be the address of your PM cell. If it isn't then edit the *i2b2Workbench.properties* file to point to the correct location of your PM cell.

    i2b2.1=**YourSite**,REST,http://*jbossHost*:port/i2b2/rest/PMService/

11. The **Choose a Project** dialog box will open.

☞ *The project dialog box will only appear if you have access to multiple projects. If you only have access to one project you will be brought to the Welcome page.*
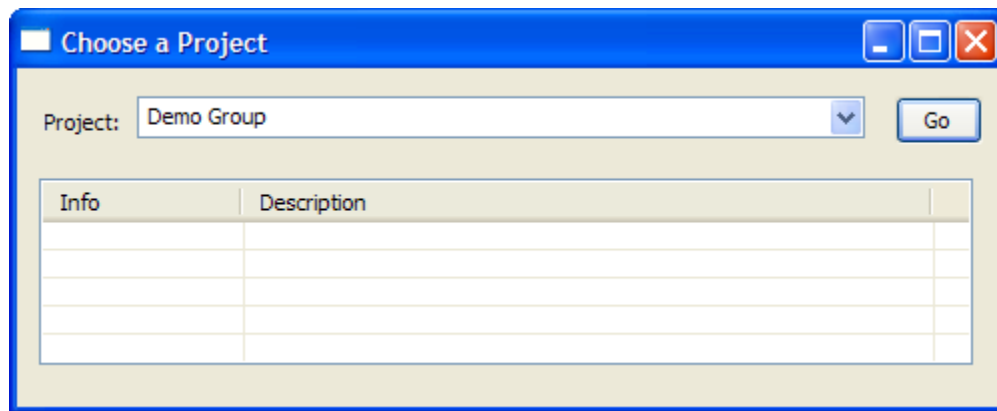
12. Select the project you want to log into.
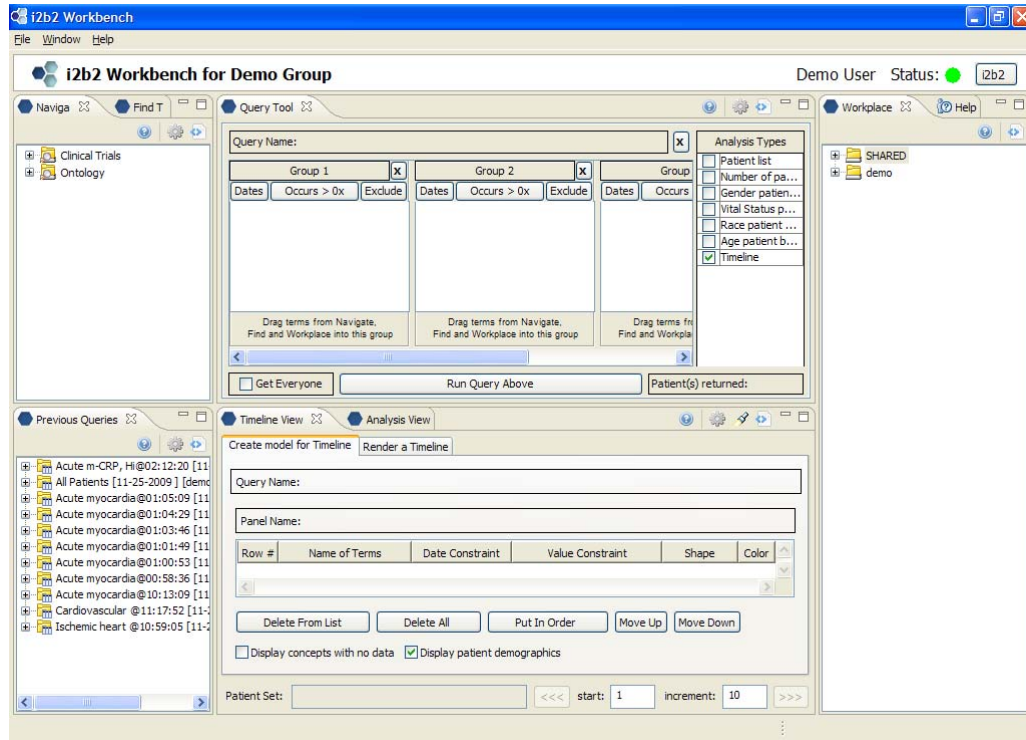
13. The **Welcome** page will open.

☞ *The welcome page will open the first time you login. All subsequent logins will bring you directly to the desktop. You can access the welcome page anytime by selecting it from the Help menu on the toolbar.*
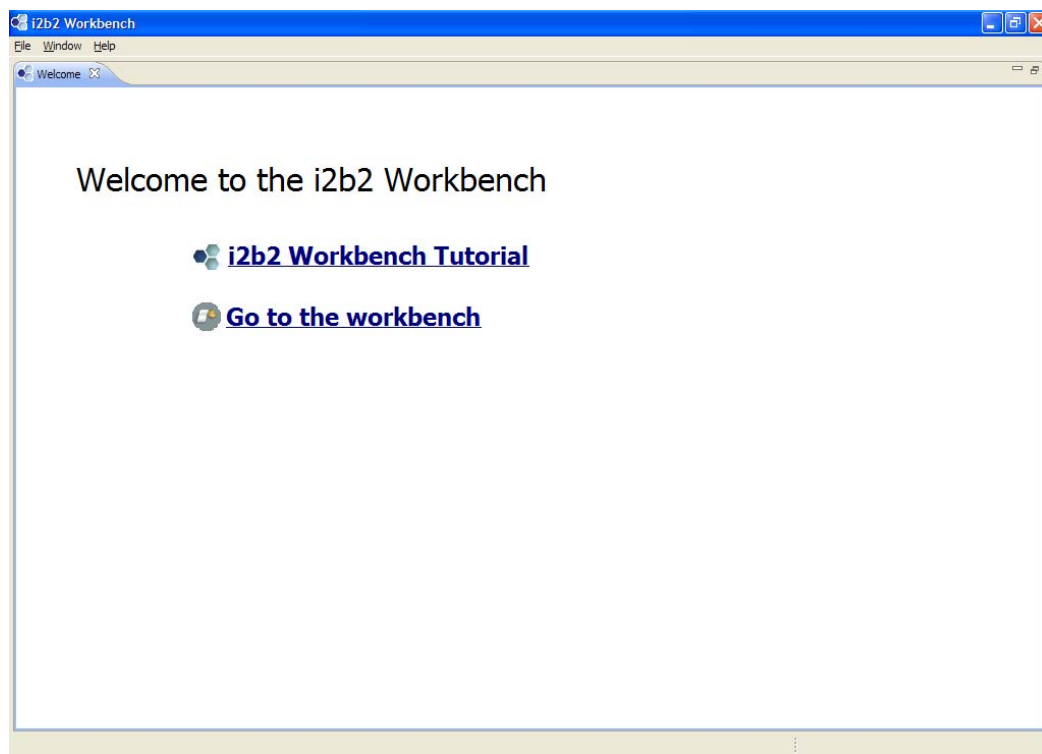
14. Click on Go to the workbench.

15. The **desktop** of the i2b2 Workbench will open.

8.1.3 Possible problems

1. Error Message: "*Project Management Cell is unavailable for login.*"

    The possible cause for this error message may be one of the following:
    - The PM cell URL in the i2b2Workbench.properties file is incorrect.
    - The PM cell is not running

        a. In a browser, check the site

            http://JBossHost:JBossPort/axis2/services/listServices
        b. The PMService should be listed as active.

2. Error Message: "*Supplied password does not match user password or Username does not exist.*"

      a. Verify that the user exists in the webclient

      b. Verify that the correct password was entered

3. 'Your site' target location label does not appear or No target locations appear.

      a. "Revisit the **i2b2Workbench.properties** file.

          ▪ Verify that the '#' symbol was removed from the start of the line pointing to your target location.

          ▪ Verify that all parameters are listed and are correct.

          ▪ Verify that applicationName matches prefix of target identifier.

          (e.g. i2b2, I2b2.x)

```
I2b2.2=YourSite,REST,http://JBossHost:JBossPort/i2b2/rest/PMService/
```

4. Error message: "*applicationName is missing from properties file*"

      a. Revisit the **i2b2Workbench.properties** file.

      b. Verify that applicationName property has been entered and is correct.

          It should match the prefix of the target identifiers.

5. Error message: "*PM Target location not specified properly*"

      a. Revisit the i2b2Workbench.properties file.

      b. Verify that the PM target location parameters have proper number of elements and that the information is correct.

6. Error message: "*No PM Target locations were provided that have prefix of 'appName'*"

      a. Revisit the **i2b2Workbench.properties** file.

      b. Verify that the *PM target location identifiers* have the same prefix as the application name. (e.g 'i2b2', 'I2b2.x')

7. Error message: "PM Cell's getVersion operation is not responding"

      a. Revisit the **i2b2Workbench.properties** file.

      b. Verify that the PM target location URL is correct and valid.

- If PM target location URL is valid; check that it supports the getVersion operation. If not, this PM cell does not support messaging version 1.1 and should not be used with this version of the i2b2Workbench.

8. Error message: "messageversion property is missing from properties file"
    a. Revisit the ***i2b2Workbench.properties*** file.
    b. Verify that '*messageversion*' property has been entered and is correct.

9. webclient is not running.

   Is your httpd server running?

LICENSE

The i2b2 source code is licensed under the i2b2 Software License Software. This includes but not limited to all code in the edu.harvard.mgh.i2b2.* package namespace.