Informatics for Integrating Biology and the Bedside

i2b2 Installation/Upgrade Guide (Linux)

Project Management (PM) Cell

Table of Contents

DOCUMENT MANAGEMENT

Revision Number	Date	Author	Description of change
1.6.1	07/22/10	Janice Donahoe	Created 1.6 version of document.
1.6.2	09/29/10	Janice Donahoe	Updated screen shots to reflect changes to webclient.
1.6.3	09/23/11	Mike Mendis	Added screen shots and text for new admin
1.6.4	10/11/11	Mike Mendis	Added AD and LDAP
1.6.5	03/13/12	Janice Donahoe	Added information about upgrade and admin users

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 PM 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 1.6 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*
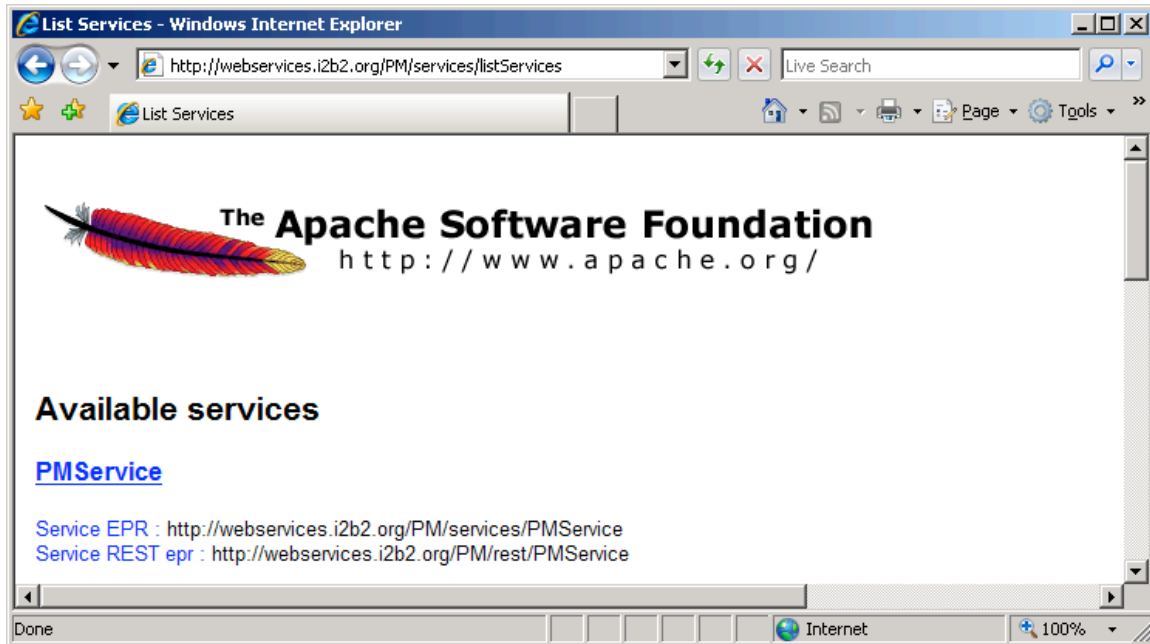
2.1.6.2 WEB SERVICE

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 Upgrade PM: 1.5 PM Cell and Other Cells on Different Servers

The following steps are to be followed when upgrading from 1.5 when the 1.5 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 1.5 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'

3.1.1 Run Upgrade Script

Run the upgrade script on your new PM database.

3.1.1.1 USER ROLES

An *administrator* ("Admin User") is defined as anyone who is given administrative access to the i2b2. This administrative access is given by associating the project '@' with the user.

It is important to note that Administrators are not project specific, this role carries across projects.

TO UPDATE EXISTING ADMIN USERS

The administration role is different from 1.5 where the role was associated with a specific project. In 1.6, the administration role is only associated with the null project which is represented as an "@" in the PROJECT_USER_ROLES table. The admin role needs to be updated in that the project_id has to be replaced with an '@' for all rows in the table that have users that should remain admins. This needs to done only once for each user that you want to continue to have administrative privileges.

You can run the following script if you want to enable **ALL** previous admins to be administrators in the 1.6 version of i2b2

UPDATE PM_PROJECT_USER_ROLES SET PROEJECT_ID = '@' WHERE USER_ROLE_CD = 'ADMIN';

A typical row in the PROJECT_USER_ROLES table would appear as:

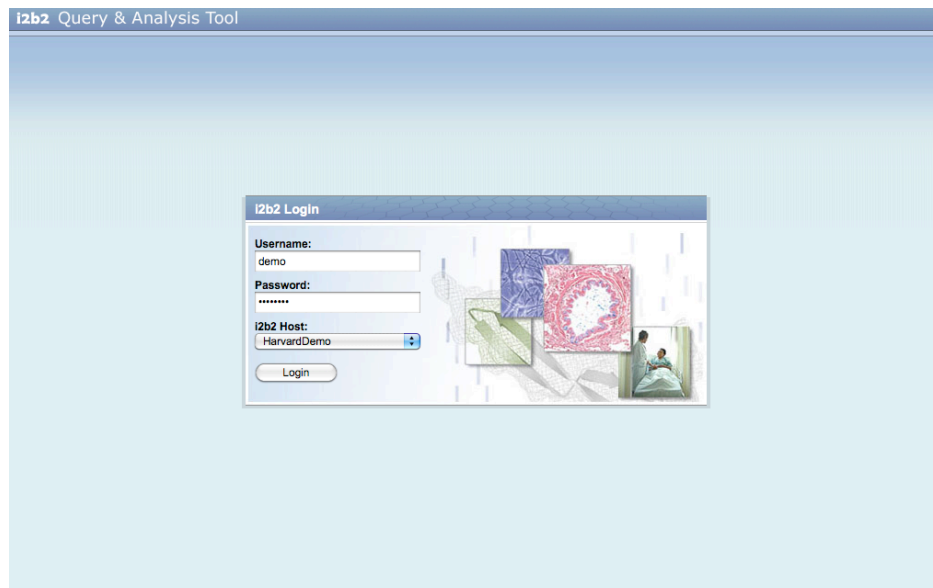| PROJECT_ID	USER_ID	USER_ROLE_CD	STATUS_CD
@	I2b2	ADMIN	A

4. INITIAL SETUP

4.1   Administration of the i2b2 Project Management application
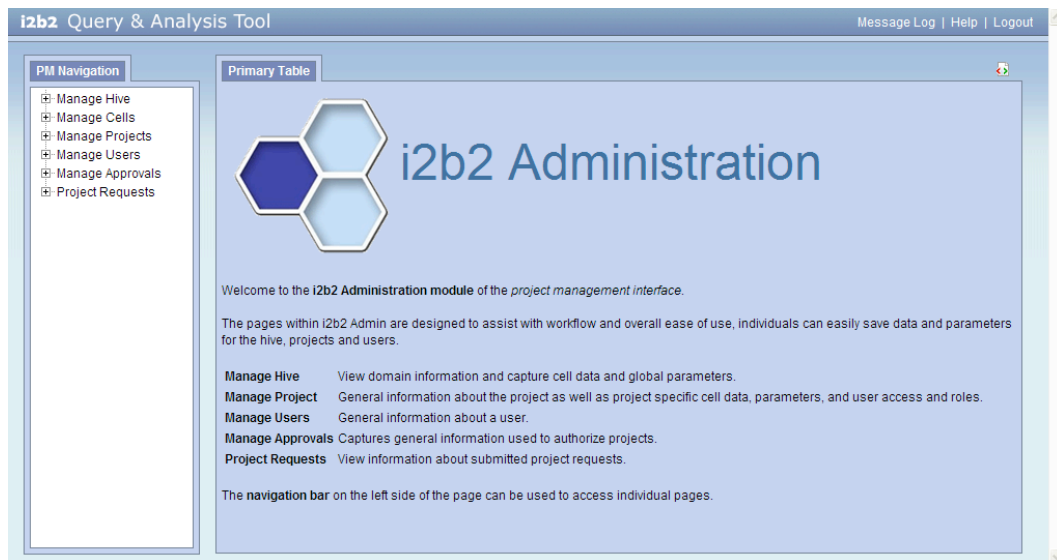
Go to the site ***http://jbossHost/admin***

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. AUTHENTICATION IN I2B2

The following allow a specific user to user either Active Directory or LDAP. If you wish to make the all the users in the i2b2 instance use one of the following, than enter the parameters in the PM_Hive_Params table instead. You will need to manually edit the database for this.

5.1   Active Directory i2b2 Project Management Module

Parameter Name	Values
authentication_method	NTLM
domain	Ex: i2b2.org
domain_controller	Ex: pdc.i2b2.org

*Red denotes required parameter

4. Log into the i2b2 Administration page: http://<your_i2b2_domain>/admin

5. Expand Manage Users and expand a user you wish to configure for Active Directory authentication.

6. Expand Params and click on Add New Parameter under Parameter List on the right window pane.

7. Enter the following:
   Parameter Name: authentication_method
   Parameter Value: NTLM
   Parameter Data Type: Text:

8. Click on Save.

9. Repeat step 3 and enter the following for the PDC domain of your company's NT domain

10. Enter the following:
    Parameter Name: domain
    Parameter Value: *< PDC domain >*
    Parameter Data Type: Text:

11. Click on Save.

12. Repeat step 3 and enter the following for the connection URL of your company's NT domain

13. Enter the following:
    Parameter Name: domain_controller
    Parameter Value: *< NT ip/host domain >*
    Parameter Data Type: Text:

14. Click on Save.

5.2 LDAP i2b2 Project Management Module

Parameter Name	Values
authentication_method	LDAP
connection_url	Ex: ldap://ldap.server.company.com:389
search_base	Ex: OU=People,DC=company,DC=com
distinguished_name	"cuser", "dn:", "uid="
security_authentication	"none", "simple", "DIGEST-MD5", "CRAM-MD5", "EXTERNAL"
ssl	"true"
security_layer	"auth-conf", "auth-int", "auth-conf,auth-int", "auth-int,auth-conf"
privacy_strengh	"high", "medium", "low", "high,medium", "high,low", "medium,low"
max_buffer	"65536"

***Red denotes required parameter**

1. Log into the i2b2 Administration page: http://<your_i2b2_domain>/admin

2. Expand Manage Users and expand a user you wish to configure for LDAP authentication.

3. Expand Params and click on Add New Parameter under Parameter List on the right window pane.

4. Enter the following:
   Parameter Name: authentication_method
   Parameter Value: LDAP
   Parameter Data Type: Text:

5. Click on Save.

6. Repeat step 3 and enter the following for the connection URL of your company's LDAP server (values in <> are examples):
   Parameter Name: connection_url
   Parameter Value: < ldap://ldap.company.com:389>
   Parameter Data Type: Text

7. Click on Save.

8. Repeat step 3 and enter the following:
   Parameter Name: search_base
   Parameter Value: <OU=People,DC=company,DC=com>
   Parameter Data Type: Text

9. Click on Save.

10. Repeat step 3 and enter the following:
    Parameter Name: distinguished_name
    Parameter Value: <uid=>
    Parameter Data Type: Text

11. Click on Save.

12. Repeat step 3 and enter the following:
    Parameter Name: security_authentication
    Parameter Value: <simple>
    Parameter Data Type: Text

13. Click on Save.

14. For DIGEST-MD5, add the optional settings for the security layer, privacy strength, or max buffer. If these values are not set, the default values will be used.

6. CREATING USERS

6.1 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:
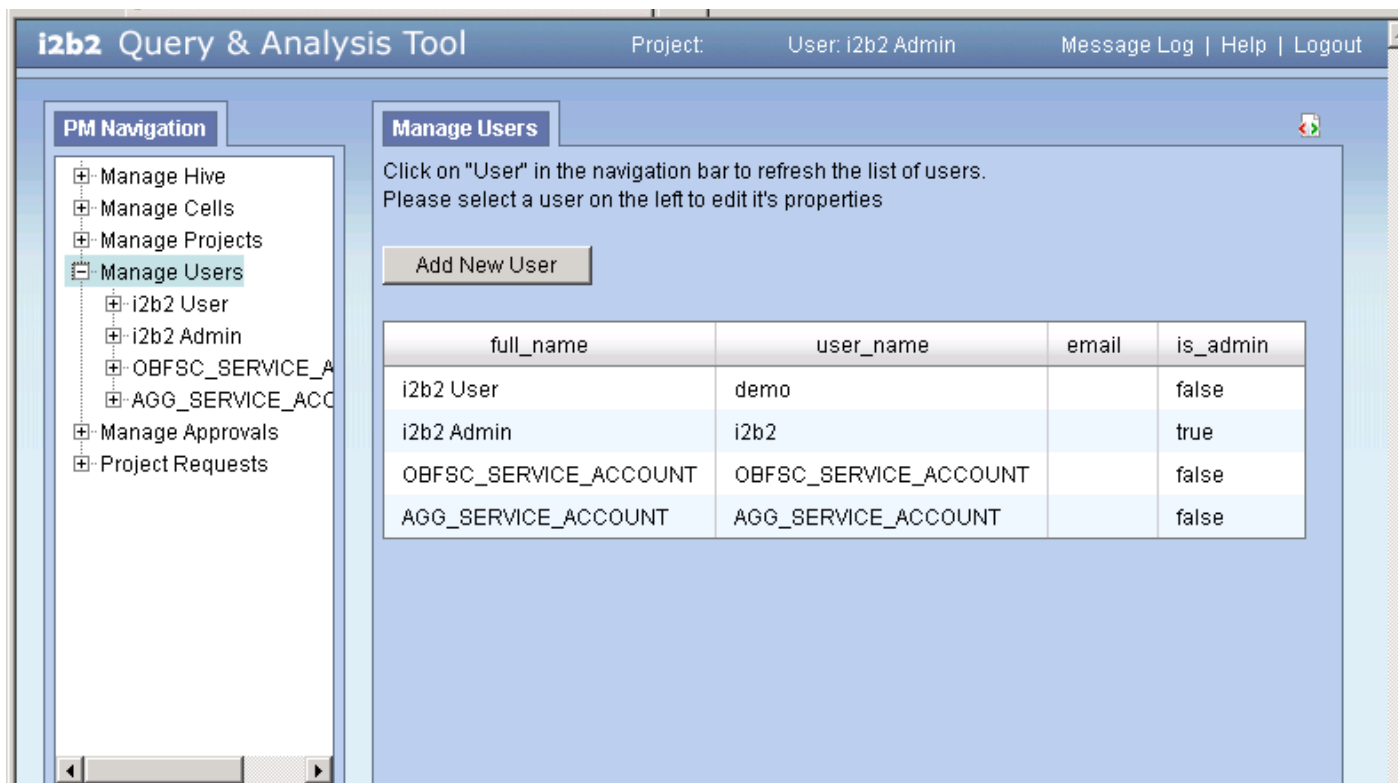

2. Click on the '***Add New User***' button, and fill in the required fields for the user you wish to add, such as the username, password, email address. Click the '***Save***' button once you are complete. Repeat the process for as many users you wish to.

3. If the '**Is Admin**' is set to true than that user can login as an Administrator.

4. To remove a user from the system, select the User listed in the Navigation bar on the left. Once the User page opens click on the '***Delete***' button.

5. To add a parameter to the user; in the Navigation bar on the left, select the user you wish to add the parameter to and "Params" will appear below the user name in the left navigation bar. Click on "Params" and a new page will display. Follow

the same procedure by selecting '***Add New Parameter***' to add a parameter to that user.

7. HIVE DATA

7.1 Registered Cell

1. Continuing with the web client, select 'Manage Cells' from the navigation bar on the left. You should see the following:
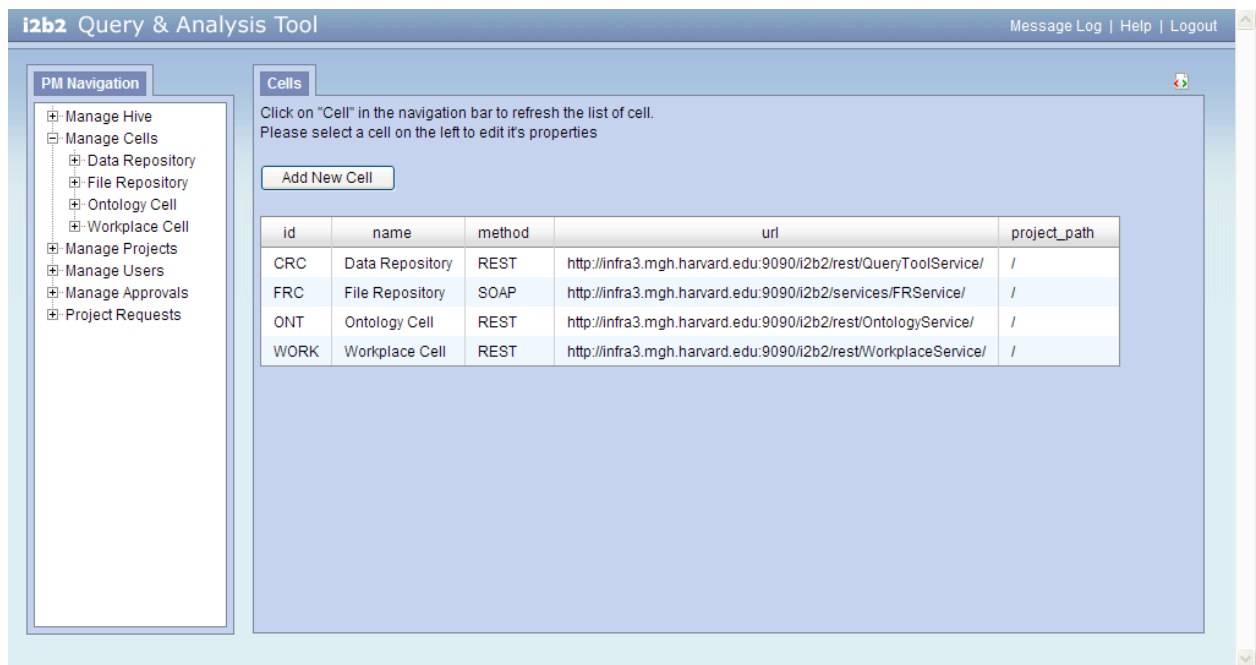
2. In the left navigation bar, click on the Data Repository cell (CRC) and the edit page will appear for that cell. In the URL modify the IP to the IP or domain name that the CRC is installed on. Click on the **Save** button when you are finished. Repeat the process for the rest of the cells.

3. To add a new cell, click on the **Add New Cell** button and enter the information for the new cell. Click on the **Save** button when you are finished.

4. To add a parameter to the cell; in the Navigation bar on the left, select the cell you wish to add the parameter to and "Params" will appear below the cell name in the left navigation bar. Click on "Params" and a new page will display. Follow the same procedure by selecting '**Add New Parameter**' to add a parameter to that user

8. PROJECT DATA

8.1 Existing Projects

1. Continuing with the web client, select '***Manage Projects***' from the navigation bar on the left. 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 Path that is the first roles, a Data Path which is the second roles and Custom Path are optional. In the example below, User and Data_Agg was selected. The user obfsc will inherit Data_Obfsc automatically.
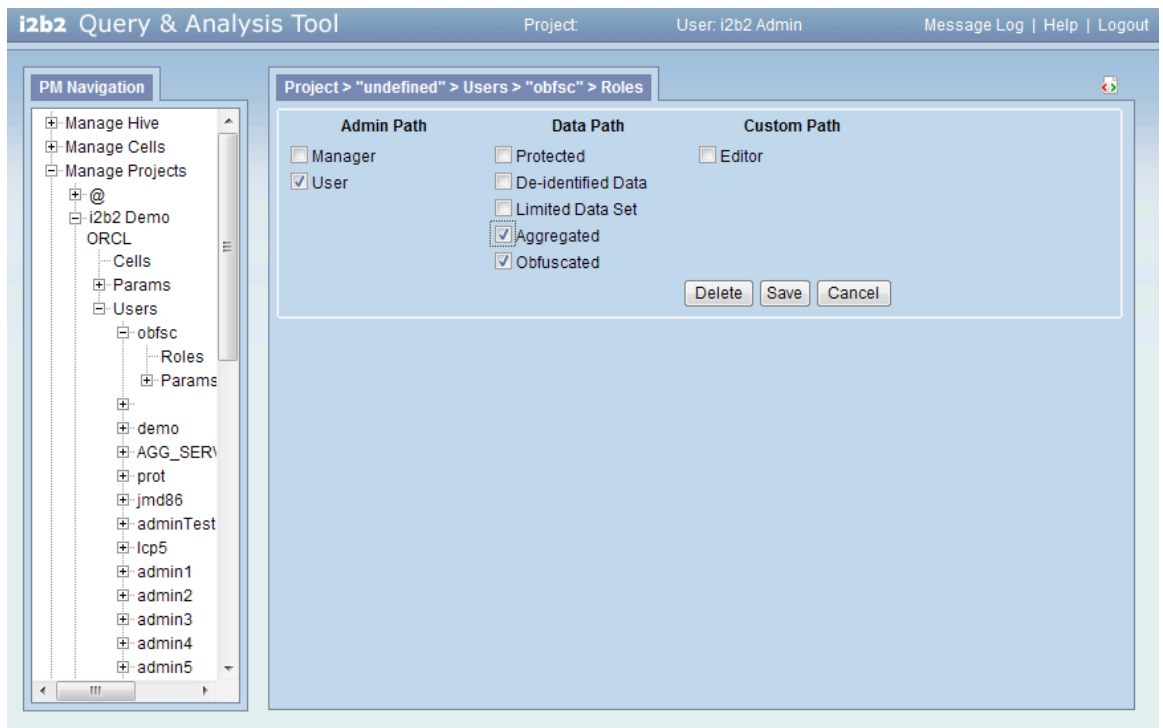
9. VERIFY INSTALLATION

9.1 PM Cell Sanity Test via the i2b2Workbench

9.1.1 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.

9.1.2 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.
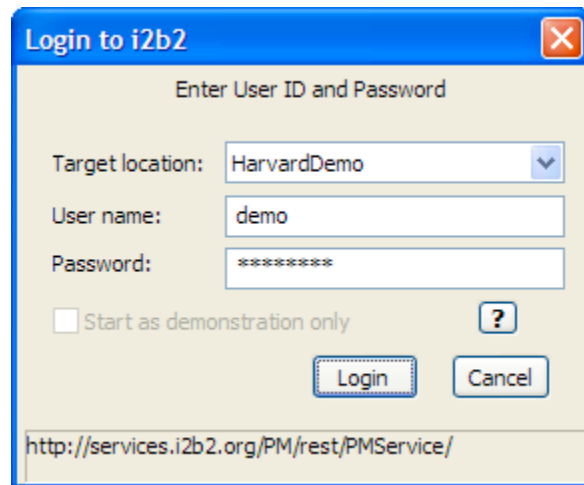
8. Select your **target location** (YourSite)

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.*
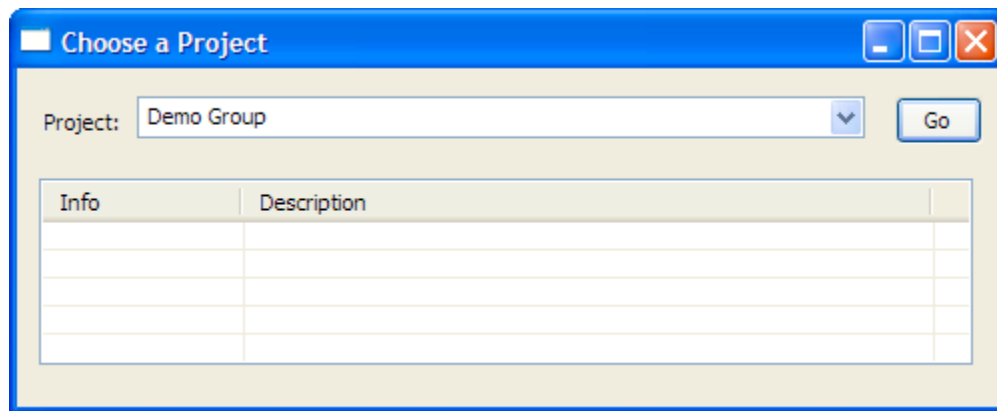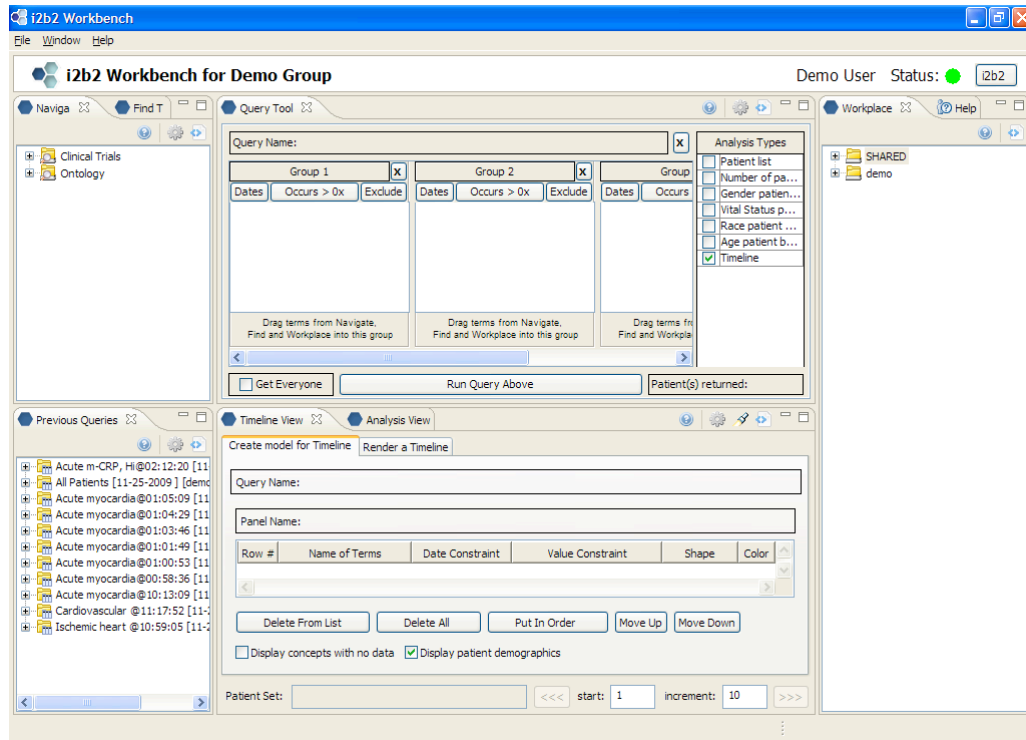
12. Select the project you want to log into.

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.*
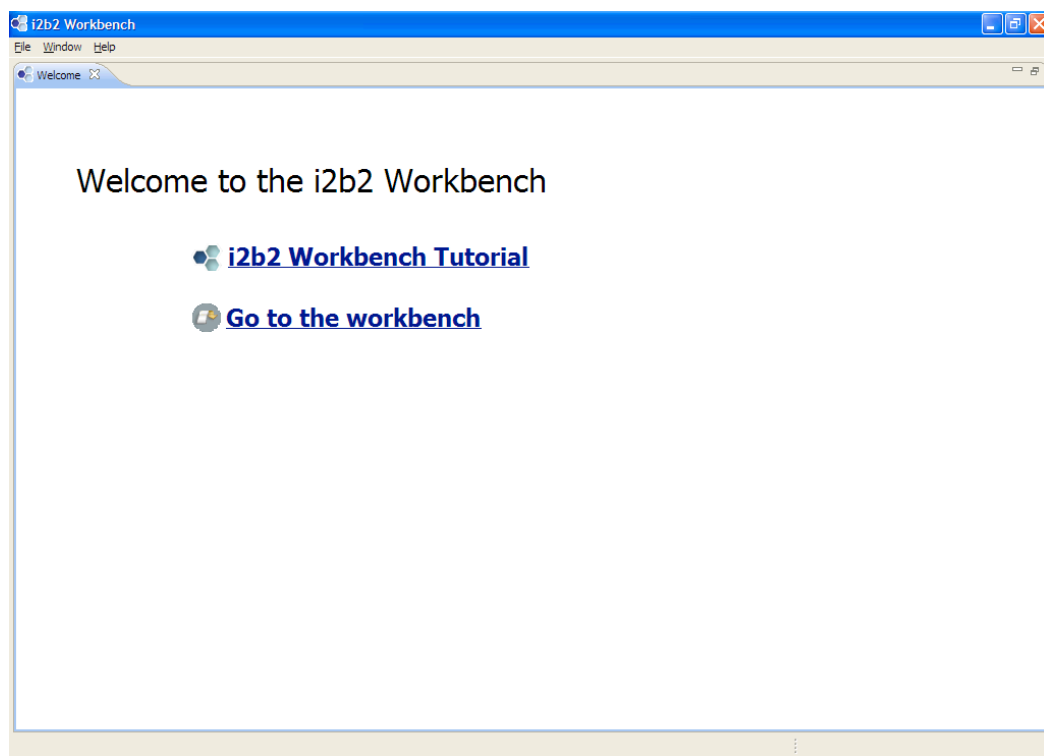
14. Click on Go to the workbench.

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

9.1.3 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.