



**Ontology Management Cell  
Installation Guide (Linux)**

**Release 1.3**

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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/nbc/>). 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 to learn how to deploy an i2b2 cell.

## Document Version History

<b>Date</b>	<b>Revision</b>	<b>Description</b>	<b>Author(s)</b>
10/26/2007	1.0	Version 1.0	Lori Phillips
06/26/2008	1.1	Release 1.3	Lori Phillips
10/20/2008	1.2	Added info for two projects	Lori Phillips

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# 1

## Prerequisites

### **Required Software**

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

#### **a. Java JDK**

##### **JDK 5.0 (recommended)**

Download JDK 5.0 Update 11 (jdk-1\_5\_0\_11-linux-i586.bin) from <http://java.sun.com/products/archive/>

a) Install the SDK into a directory of your choice (/opt/java/jdk1.5.0\_11, YOUR\_JAVA\_HOME\_DIR)

#### **b. JBoss 4.2.2GA**

Download 'jboss-4.2.2.GA.zip', from <http://labs.jboss.com/jbossas/downloads>.

a) Unzip jboss-4.2.2.GA.zip into a directory of your choice (/opt/jboss-4.2.2.GA or YOUR\_JBOSS\_HOME\_DIR)

b) Set JBoss JVM to run with 1GB extended memory.

Edit 'YOUR\_JBOSS\_HOME\_DIR/bin/run.conf' and change the JAVA\_OPTS memory settings to that shown below. (-Xms512m, -Xmx1024m)

```
#
# 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"
fi
```

---

c) If default port 8080 is unavailable (another application is using this port), edit ‘YOUR\_JBOSS\_HOME\_DIR/server/default/deploy/jboss-web.deployer/server.xml’ file to reconfigure 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" connectionTimeout="20000"  
    disableUploadTimeout="true" />
```

```
<!--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"/>
```

### c. Apache Ant 1.6.5

Download 'Apache Ant version 1.6.5' (apache-ant-1.6.5-bin.zip) from <http://archive.apache.org/dist/ant/binaries/>

a)Unzip into a directory of your choice (/opt/apache-ant-1.6.5 or YOUR\_ANT\_HOME\_DIR)

### d. Apache Axis2 1.1

Download 'Apache Axis2 version 1.1', from <http://ws.apache.org/axis2/download/1.1/download.cgi> and select the download type WAR (Web Archive) Distribution.(axis2.war)

a)Create folder i2b2.war inside  
‘YOUR\_JBOSS\_HOME\_DIR/server/default/deploy’

b)Unzip axis2.war inside  
‘YOUR\_JBOSS\_HOME\_DIR/server/default/deploy/i2b2.war’ folder.

---

### **e. Oracle Express Edition**

a) Download Oracle Database 10g Express Edition (Universal) 'oracle 10g EE' 'oracle-xe-univ-10.2.0.1-1.0.i386.rpm' from <http://www.oracle.com/technology/software/products/database/xe/htdocs/102xeinstallsoft.html>

b) Run 'rpm -i oracle-xe-univ-10.2.0.1-1.0.i386.rpm' as root

Run '/etc/init.d/oracle-xe configure' as root to configure the database

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

Select 'Y'es to start on boot when asked

c) To verify that Oracle was properly installed, open a browser and enter <http://yourHost:yourPort/apex>. You should see an Oracle Database Express Edition login screen.

### **f. CVS client**

If installing application source code from CVS, make sure \$CVSROOT variable is pointed to phsi2b2appdev's /cvs/repository (ext:tomcat@phsi2b2appdev.mgh.harvard.edu:/cvs/repository)

### **g. Update your environment variables**

Be sure to set the JAVA\_HOME, ANT\_HOME and JBOSS\_HOME variables to the JAVA, ANT and JBOSS home directories you set up in steps a-c respectively. Examples are shown below.

```
# Sample environment variables
JAVA_HOME=/opt/java/jdk1.5.0_11
ANT_HOME=/opt/apache-ant-1.6.5
JBOSS_HOME=/opt/jboss-4.2.2.GA
PATH=$PATH:$ANT_HOME/bin:$JAVA_HOME/bin
export JBOSS_HOME
export ANT_HOME
export JAVA_HOME
```

### **h. Data installation or upgrade has already been performed.**

---

# 2

## Install

### *Installing the Ontology Management Application*

#### **1. Download and extract the core server source code to a target area.**

If this has been downloaded in a previous installation (e.g. PM or CRC), there is no need to repeat this step.

- a) Set up a target source\_directory.
- b) Extract the core server source code to the target source\_directory

#### **2. Ensure that JBOSS is not running**

- a) 'cd \$JBOSS\_HOME/bin/'
- b) './shutdown.sh -S'

#### **3. Deploy edu.harvard.i2b2.common**

If this has been deployed in a previous installation (e.g. CRC), there is no need to repeat this step.

- a) 'cd source\_directory/edu.harvard.i2b2.common'
- b) 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
```

- c) 'ant clean deploy jboss\_pre\_deployment\_setup'

---

#### 4. Deploy edu.harvard.i2b2.ontology

a) 'cd source\_directory/edu.harvard.i2b2.ontology'

b) 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
```

c) Edit the etc/spring/ontology\_application\_directory.properties file and specify a location for the application properties directory. This location can be anything you desire but must be a directory path that your linux user has access permission for.

```
edu.harvard.i2b2.ontology.applicationdir= YOUR_JBOSS_HOME_DIR
/server/default/conf/ontologyapp
```

d) Edit the etc/spring/ontology.properties file and set database and project management properties

Set metadata bootstrap database schema name to the location of the ONT\_DB\_LOOKUP table

```
#####
# METADATA schema name
#####
ontology.bootstrapdb.metadataschema=i2b2hive
```

Set the Project Management property settings

```
ontology.ws.pm.url=http://localhost:7070/axis2/rest/PMService/
getServices
# Flag to bypass project management cell
ontology.ws.pm.bypass=false
ontology.ws.pm.bypass.role=ADMIN
ontology.ws.pm.bypass.project=Demo
```

- 
- e) Edit etc/jboss/ont-ds.xml and configure your data sources:  
OntologyBootStrapDS points to the location of your ONT\_DB\_LOOKUP table. Any additional data source specified in the lookup table must be specified here as well (shown below as "OntologyDemoDS" for project Demo and "OntologyDemo2DS" for project Demo2).

Data source samples for both sqlserver and oracle are provided in ont-ds.xml. Copy and modify the samples in ont-ds.xml as needed to create the three data sources shown below. Comment out or remove any unused samples.

```
<datasources>
  <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</user-name>
    <password>i2b2hive_password</password>
  </local-tx-datasource>
  <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</user-name>
    <password>i2b2metadata_password</password>
  </local-tx-datasource>
  <local-tx-datasource>
    <jndi-name>OntologyDemo2DS</jndi-name>
    <driver-class>oracle.jdbc.driver.OracleDriver
    </driver-class>
    <connection-url>jdbc:oracle:thin:@localhost:1521:xe
    </connection-url>
    <user-name>i2b2metadata2</user-name>
    <password>i2b2metadata2_password</password>
  </local-tx-datasource>
</datasources>
```

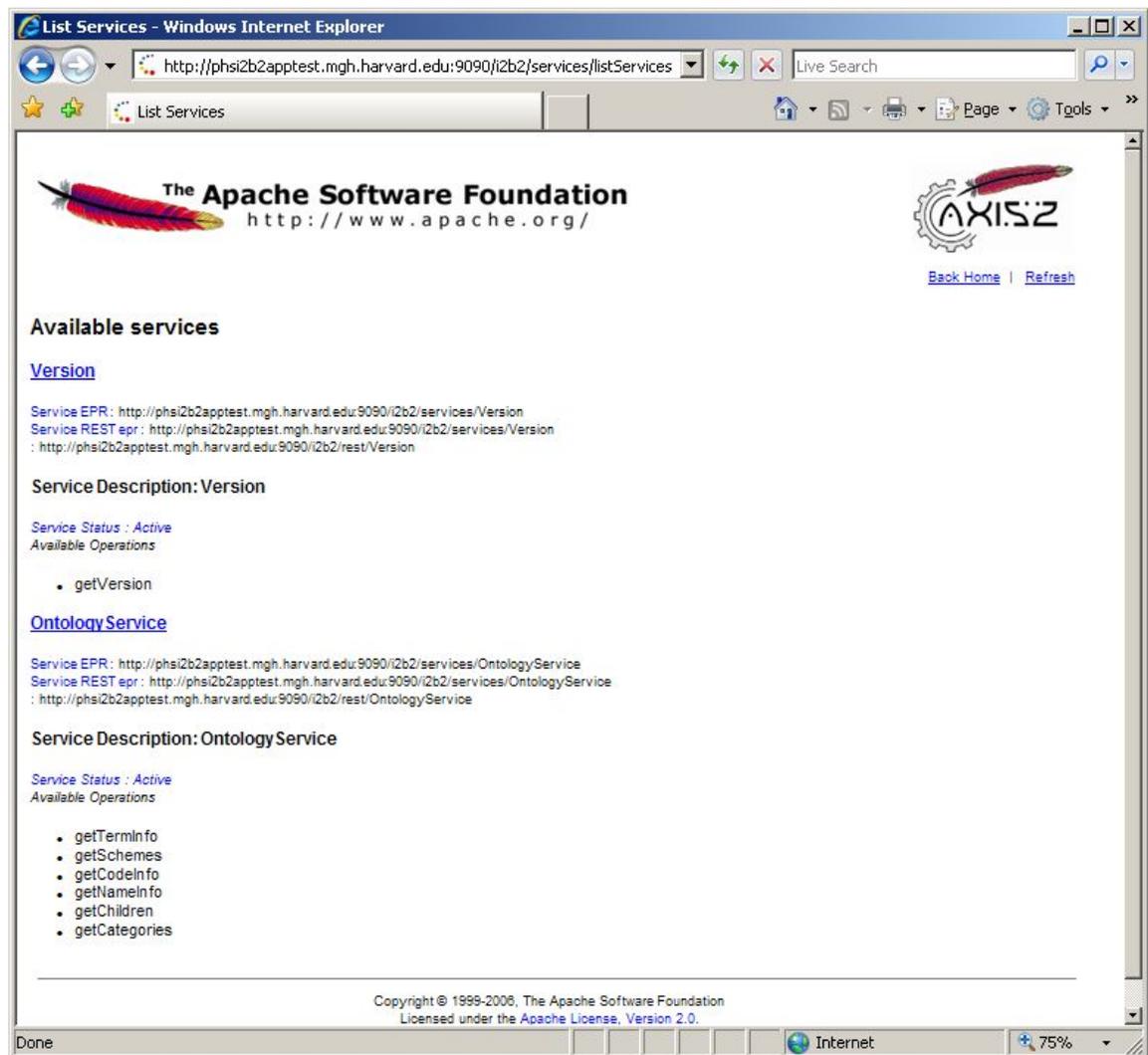
- f) 'ant -f master\_build.xml clean build-all deploy'

## 5. Start JBOSS

a) Run ‘\$JBOSS\_HOME/bin/run.sh -b 0.0.0.0’

## 6. Verify webservice is running

a) Check url ‘http://yourHost:9090/i2b2/services/listServices’ in browser.  
Verify that OntologyService is listed as active.



---

## Changing Server log level

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

- a) 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>
```

To switch back to DEBUG mode, comment out the 'Threshold' param and wait a minute. THERE IS NO NEED TO RESTART JBOSS.

# 3

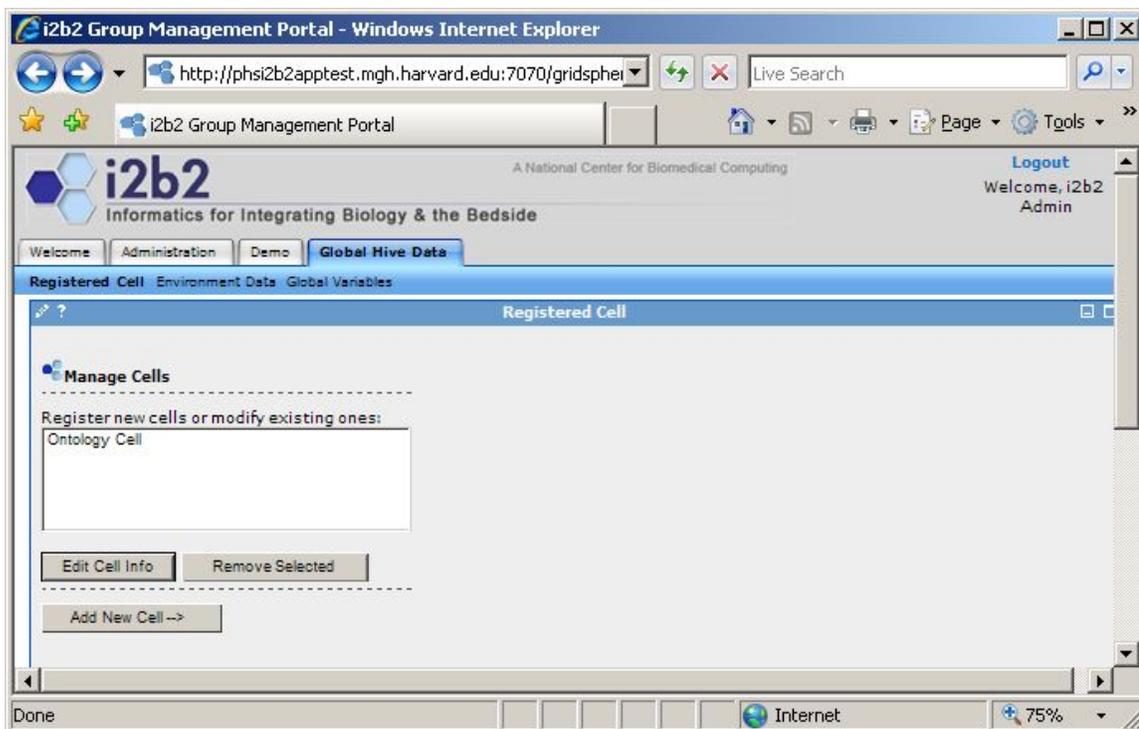
## Verify Installation

### ***Ontology (ONT) Cell Sanity Test via the i2b2Workbench***

#### **1. Configure the i2b2Workbench to communicate with your ONT cell.**

This step is addressed in section 5, Global Hive Data of the Project Management (PM) Cell/gridsphere installation and set up. Please refer to this document if the Ontology Cell has not yet been configured.

To verify this data, go to the site <http://tomcatHost:tomcatPort/gridsphere>. Once logged on, select 'Global Hive Data' from the primary navigation tab and 'Registered Cell' from the secondary navigation menu. If the Ontology Cell has been configured you will see the following:



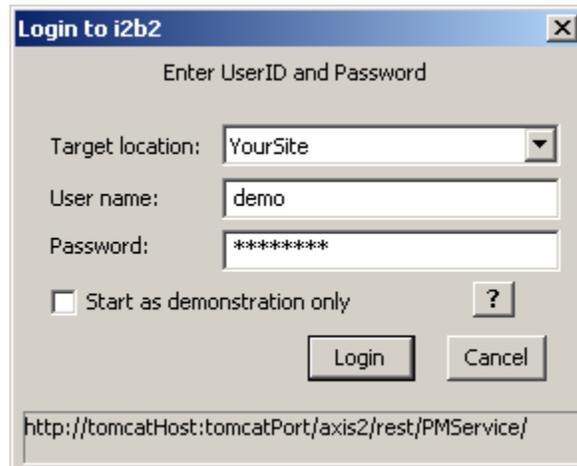
To verify cell data, select cell name and click on Edit Cell Info.

---

## 2. Launch the i2b2Workbench (double-click on i2b2Workbench.exe)

Login to i2b2:

- a. Select your target location (YourSite)
- b. Enter a valid username and password that you set up in gridsphere (demo/demouser)
- c. The URL at the bottom of the login screen should be the address of your PM cell. If not, return to PM Cell installation procedures, section 7, Verify Installation.



Login to i2b2

Enter UserID and Password

Target location: YourSite

User name: demo

Password: \*\*\*\*\*

Start as demonstration only

?

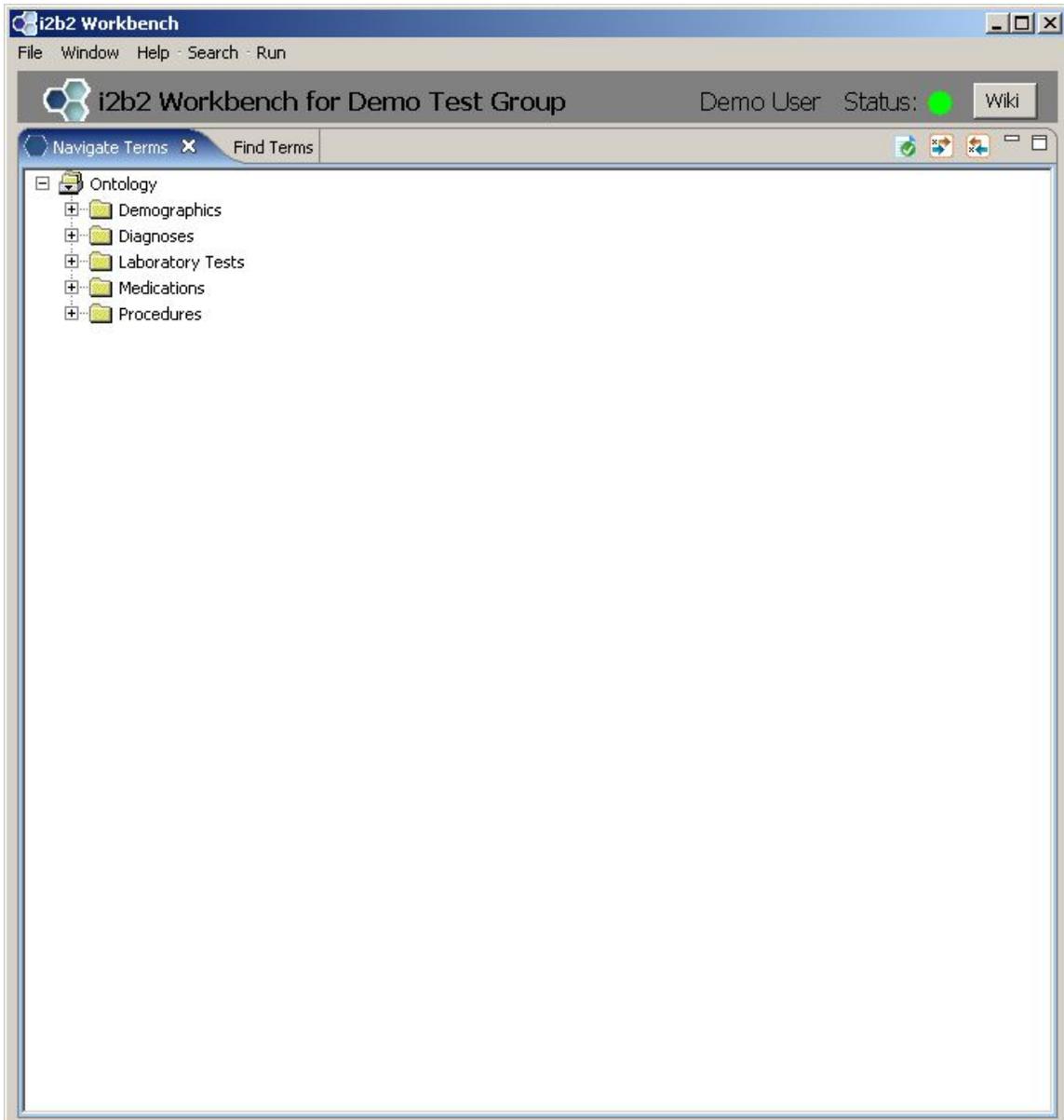
Login Cancel

http://tomcatHost:tomcatPort/axis2/rest/PMService/

---

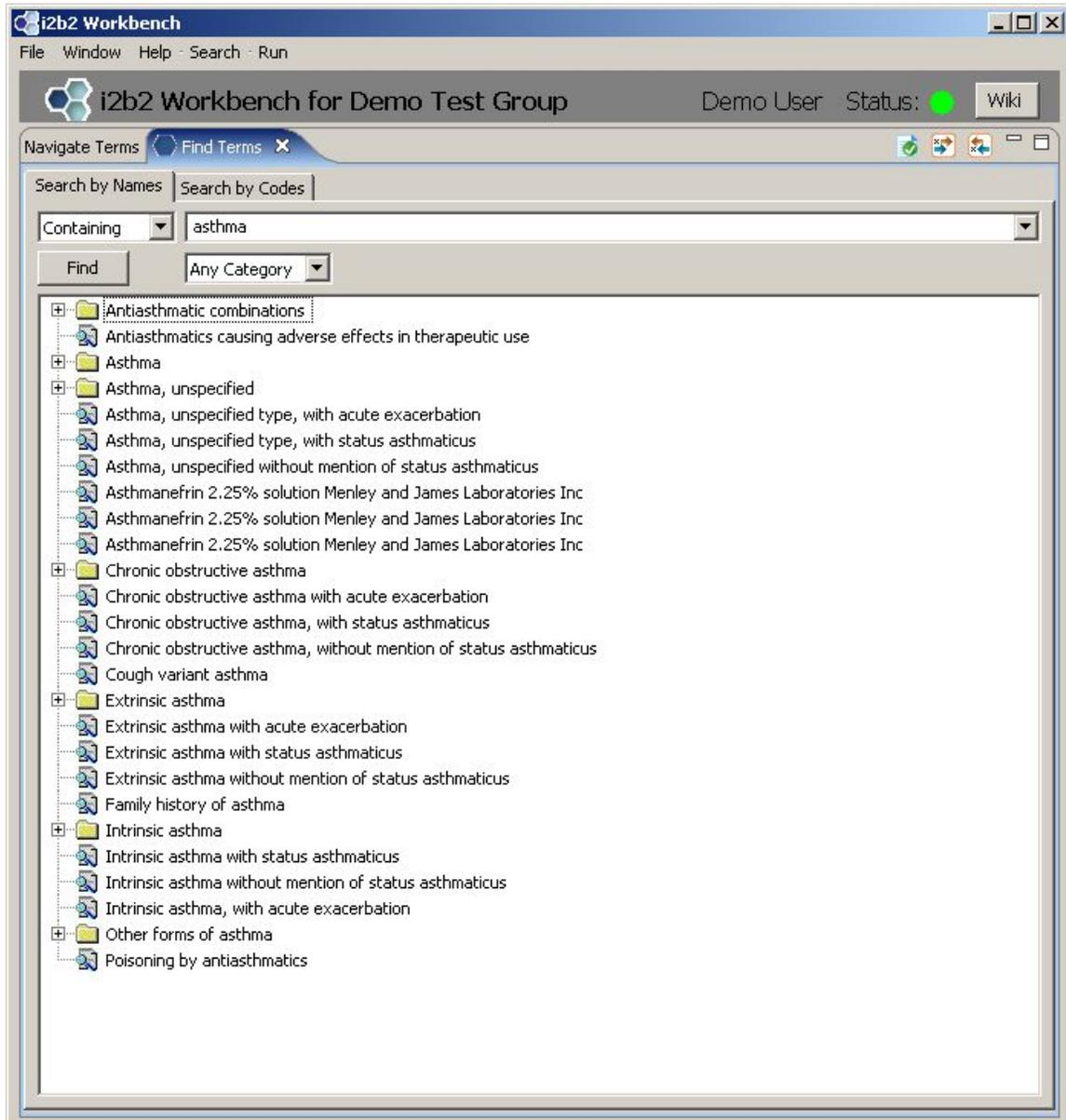
### 3. Open the Navigate Terms view in the workbench

If all is configured properly, you will be greeted with a top level folder called “Ontology”. Double click on this folder to expand.



#### 4. Open the Find Terms view in the workbench

Enter a diagnostic term to search on such as “asthma”. Click on the Find button. If all is configured properly, you will see a list of entries each containing the work ‘asthma’.



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## 5. Possible problems

### a. Error message appears in view window.

- ‘Ontology cell is unavailable’:

Ontology cell address in gridsphere is incorrect (see step 1 of this section) or  
Ontology Cell may be down:  
Check url ‘<http://yourHost:9090/i2b2/services/listServices>’ in a browser.  
Verify that OntologyService is listed as active.

- ‘Remote server is unavailable’:

Server may be down.  
Check url ‘<http://yourHost:9090/i2b2/services/listServices>’  
Verify that OntologyService is listed as active.

- ‘PM service is not responding’:

Project Management Cell is down or its address was not configured properly in  
section 2 step 4d.

- ‘Database error’:

There are problems connecting to the database or table\_access data is incorrect.  
Verify database configuration parameters in section 2 steps 4c-e.

---

# 4

## 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.i2b2.*` package namespace.