Installation Guide

Installation Guide for i2b2 on OMOP

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Introduction

Project Summary

The data models of i2b2 and OMOP have many similarities. We take advantage of these similarities to construct an evolution of the i2b2 software that is able to adapt to the OMOP data model.   This adaption of i2b2 allows the query formulation Application Programming Interface (API) to be implemented over an OMOP data source. Therefore, most of the functionality of i2b2 Software is preserved on OMOP data sources, and as a result the SHRINE and SMART-on-FHIR tools that rely on the i2b2 API are also able to run on the OMOP data model.

The standard i2b2 data model is comprised of a central fact table (observation_fact) surrounded by multiple dimension tables arranged in a star schema. In the Observational Medical Outcomes Partnership Common Data Model (OMOP CDM), rather than a central fact table, we have a collection of them distinguished by domain: procedures, condition, drug, measurement, observation, etc. In this project, we modify the CRC to run queries against multiple domain fact tables as dictated by the metadata.

The i2b2 1.7.09-RC1 software and data packages are designed to run with **OMOP version 5**. The sample metadata provided is intended to run queries against the **CMS SynPUF 1K data set** provided by OMOP. It is recommended that users of this software are familiar with OMOP and it is required that the synPUF data is installed.

About this Guide

The i2b2 on OMOP project enables the classic i2b2 Software to run against a database that uses the OMOP CDM (multiple fact tables). This guide along with the provided source code will help configure your system for OMOP CDM processing.

The **i2b2 on OMOP Installation Guide** is designed to assist users with installing and setting up an existing i2b2 environment to work with the OMOP CDM data.

Assumptions

This installation guide assumes the following:

- You have a working version of i2b2 that is running release 1.7.09 or higher.

- The i2b2 Admin module has been installed.

- Your CDM tables have been loaded with the CMS SynPUF 1k data set provided by OMOP

- The i2b2 data tables will be installed on the same database and schema as your OMOP CDM tables.

> ⚠️ **Important**
> If you are new to i2b2 or not familiar with how to install and setup the i2b2, we highly recommend you look at the i2b2 Installation Guide and go through the steps to setup the i2b2 demo environment.

Installation Process

It is important you follow this guide in the order the steps are written. Some steps need to occur before others in order to prevent issues down the road.

Order of Installation

☑
Step 1: Software and system requirements

☑
Step 2: Data Installation

☑
Step 3: Configuring and Setting up the Software

Requirements

i2b2 Requirements

i2b2 Software Requirements

In regards to the i2b2 on OMOP project, the i2b2 Software requirements are very simple;

- Your i2b2 server needs to be running on version 1.7.09 in order to query multiple OMOP CDM tables.

- Admin module needs to be installed on your i2b2 server.

> **Note**
> The current 1.7.09 release is a release candidate and the link to download it can be found on the Release 1.7.09-RC1 page.

i2b2 Database Requirements

Download the data package to install the crcdata, metadata and workdata tables.

Your existing installation of the hivedata and pmdata tables will be used; so unless you are setting up a completely new instance of i2b2 you do not need to setup these tables.

OMOP Requirements

OMOP CDM - Data Requirements

- OMOP CDM version 5 is implemented.

- i2b2 tables reside in the same database and schema as your CDM tables.

- CMS SynPUF 1K data set is loaded into the CDM tables.

Data Installation

About this chapter

The data installation chapter outlines the process of installing the i2b2 data that is specific to the i2b2 on OMOP project. This process involves creating tables, procedures, views as well as loading data into the tables. The i2b2 data being loaded is based off the CMS SynPUF 1k sample data that is provided by OMOP.

In this chapter we will be using the scripts provided in the data package to create tables and load them with sample data.

Pre-requisites

Before moving forward with the installation of the i2b2 on OMOP tables the following requirements must be met:

☑
Your i2b2 **hivedata** and **pmdata** tables have been installed and loaded with the data provided in the standard i2b2 data file.

☑
 Installed your CDM tables and loaded data from the SynPUF sample data file.

> *The OHDSI maintains the CDM tables, for additional information on setting up these tables, please see the OMOP CDM page.*

☑
 Your CDM database or schema have been setup.

☑
 A database user has been setup.

- This user is needed to create and load data into the new i2b2 tables.

- It is also used by the i2b2 Cells when they need to contact the database or schema.

⚠️ **Important**
The i2b2 tables need to reside within the same location as your CDM tables. During the installation you need to know the following information about your CDM database.

- The url for the location of the database

- Name of your CDM database / schema.

- The username and password for the database user.

Data Installation Overview

Assumptions

- The data in this package is based on the **CMS SynPUF 1K data set** provided by OMOP.

- The *project* for this installation will be called **omop**.

- The PM Cell and hive are already installed.

> 🛈 **Note**
>
> You will need to know the domain that was defined during the PM Cell installation.

Order of Installation

It is important the tables, procedures, and views are installed in the order defined below. Failure to do so will result in errors when running the scripts.

CRC Tables

☑
crcdata: create tables

☑
crcdata: create stored procedures

☑
crcdata: load data

☑
crcdata: create OMOP views

Ontology Tables

☑
metadata: create tables

☑
metadata: load data

Workplace Tables

☑

workdata: create tables

☑

workdata: load data

Directory Structure and Schema Mapping

Directory Structure for the i2b2 on OMOP data package

Once you have extracted the files from the i2b2 omop data package you will notice the following directory structure in your i2b2 data directory:

Main Directory for New Data Installs (i2b2 on OMOP): *YOUR_I2B2_OMOP_DATA_DIR*\i2b2_omop_data\

Directory	Description
crcdata	Contains the data installation files for the Data Repository (CRC) Cell. These CRC tables are specific to the i2b2 on OMOP project.
metadata	Contains the data installation files for the Ontology (ONT) Cell. These tables are also specific to the i2b2 on OMOP project.
workdata	Contains the data installation files for the Workplace Framework (Work) Cell. These tables are not specific to the i2b2 on OMOP project.

In each of the above directories you will find the following:

Directory or File	Description
\scripts\	This directory contains all the scripts used to create the tables, stored procedures, and views
\omop\scripts\	This directory contains all the scripts used to insert the sample data into the tables
db.properties	Properties file to define the database setup parameters *(type, username, driver, etc.)*

Schema Mapping

In the classic i2b2, there are multiple database or schemas that are typically defined in the i2b2 database. Each of the schemas correlate to the appropriate data tables. However, in the i2b2 on OMOP project there is only one schema. This means all the crcdata, metadata, and workdata tables will reside in a single database or schema, which is the one for your CDM tables.

Schema for i2b2 on OMOP

Directory Folder	Schema	Project

Crcdata	*Your_CDM_Schema*	omop
Metadata	*Your_CDM_Schema*	omop
Workdata	*Your_CDM_Schema*	omop

Example of classic i2b2 Schema Mapping

Directory Folder	Schema	Project
Crcdata	i2b2demodata	Demo
Hivedata	i2b2hive	
Imdata	i2b2imdata	
Metadata	i2b2metadata	Demo
Pmdata	i2b2pm	
Workdata	i2b2workdata	Demo

Extract i2b2 data package for OMOP

Extract the i2b2 Data Package for the i2b2 on OMOP project

In the *Requirements Chapter* of this install document you downloaded a zip file that contained the i2b2 on OMOP data package. This zip file contains only those data installation scripts needed to create the i2b2 tables and load sample data for this project.

Steps to extract the code

1. Create a local data directory for the i2b2 on OMOP data.

2. Locate the **i2b2_omop_data.zip** file you downloaded earlier in the *Requirements Chapter*.

3. Extract the data package into the local data directory you just created.

> ✅ **Tip**
> You will want to make note of this new data directory as it will be needed further along in the i2b2 installation. In the installation document whenever you see **YOUR_I2B2_OMOP_DATA_DIR** it will need to be replaced with the location of the i2b2 data files you just extracted.
>
> For your convenience an installation worksheet to track the setup locations has been provided in the Appendices Chapter of the i2b2 Installation Guide.

Crcdata Tables

Overview of CRC Data Installation

The crcdata tables are part of the Data Repository (CRC) Cell. The following outlines the steps that will be taken during this stage of the installation.

Step 1: Change your working directory

Step 2: Set the database properties for the crcdata

Step 3: Create the Data Repository (CRC) tables, indexes and sequences

Step 4: Create the stored procedures

Step 5: Load sample data into the tables

Step 6: Create the OMOP views

Working Directory - crcdata

Step 1: Change Working Directory

During the **CRC Data Installation** we will be working with the **crcdata directory**. Within this directory are the files you will be editing to define the database properties, create the crcdata tables and load the sample data provided with the i2b2 on OMOP data package.

Working directory for crcdata: *YOUR_I2B2_OMOP_DATA_DIR*\i2b2_omop_data*{oracle|sqlserver}*\CRCdata

How to Change Directories

If you are not familiar with how to change your directory in either a windows command prompt or a terminal window, you can enter the following:

Change Directory Command
cd *YOUR_I2B2_OMOP_DATA_DIR*\i2b2_omop_data*{oracle|sqlserver}*\CRCdata

Make sure you replace the following when entering the above command:

- **YOUR_I2B2_OMOP_DATA_DIR** is the location where you unzipped the i2b2 omop data package.

- **oracle/sqlserver** is the type of database management system used for your CDM database.

> ⚠️ **Important**
>
> The change directory command shown above is written for Windows. The command itself is the same for both Linux and Windows with the only exceptions being the slashes in the path name and Linux does not include the "drive".
>
> - *Linux Path:* use a forward slash.
>
> - *Windows Path:* use a backward slash.

    EXAMPLES:

        Linux Command: CD /opt/data/i2b2_omop_data/oracle/CRCdata

        Windows Command: CD C:\opt\data\i2b2_omop_data\oracle\CRCdata

Set Database Properties - crcdata

Step 2:   Set the database properties for the crcdata tables

In the Directory Structure and Schema section of this installation guide we reviewed how the data installation files are structured within the i2b2_omop_data package. Each set of data tables (crcdata, metadata, and workdata) has its own data files for installing the appropriate data. Within each of these directories is a file called **db.properties** that needs to be updated with your environment variables before we can begin installing the **crcdata tables**.

Steps for setting database properties

Assumptions:

- You are logged into the command line application for your environment. *(Linux: Terminal or Shell | Windows: Command Prompt).*

- You are familiar with the commands to open a file for editing. (commands are specific to the editor you use)

- You have already changed your working directory to the one that is appropriate for this installation.

1. Open the **db.properties** file.

2. Set the following properties for the DBMS at your site:

Database Properties File
Oracle Database
db.type=oracle
db.username=*YourCdmDatabaseUser*
db.password=*PasswordForYourCdmDatabaseUser*
db.server=*LocationOfYourCdmDatabase*:1521:xe
db.driver=oracle.jdbc.driver.OracleDriver
db.url=jdbc:oracle:thin:@*LocationOfYourCdmDatabase*:1521:xe
db.project=OMOP
PostgreSQL Database
db.type=postgresql
db.username=*YourCdmDatabaseUser*
db.password=*PasswordForYourCdmDatabaseUser*
db.driver=org.postgresql.Driver
db.url=jdbc:postgresql://*LocationOfYourCdmDatabase*/*YourCdmDatabase*
db.project=OMOP

SQL Server Database

db.type=sqlserver

db.username=*YourCdmDatabaseUser*

db.password=*PasswordForYourCdmDatabaseUser*

db.driver=com.microsoft.sqlserver.jdbc.SQLServerDriver

db.url=jdbc:sqlserver://*LocationOfYourCdmDatabase*:1433;database=*NameOfYourCdmDatabase*

db.project=OMOP

3. Save the changes and close the file.

> ✅ **Tip**
>
> To save yourself steps, DO NOT close your Command Prompt window as you will be continuing to use it throughout the remainder of the installation.

Create crcdata tables

Step 3:   Create the Data Repository (CRC) tables, indexes and sequences

The **third step** in the crcdata installation process is to create the crcdata tables, indexes and sequences by running the following command:

Select the command line that is appropriate for your environment.

Linux Run Command
ant -f data_build.xml create_crcdata_tables

Windows Run Command
%ANT_HOME%\bin\ant.bat -f data_build.xml create_crcdata_tables

> **Note**
>
> If the command %ANT_HOME% does not work it may be because you did not set your environment variables *(For more information, see the Requirements Chapter in the i2b2 Installation Guide)*. If you do not wish to set this variable then you will need to replace %ANT_HOME% with the full path to your Ant directory.

Create crcdata stored procedures

Step 4:   Create the Data Repository (CRC) stored procedures

The **fourth step** in the crcdata installation process is to create the stored procedures for the tables

Select the command line that is appropriate for your environment.

Linux Run Command
ant -f data_build.xml create_procedures

Windows Run Command
%ANT_HOME%\bin\ant.bat -f data_build.xml create_procedures

Load crcdata tables

Step 5:   Load sample data into the tables

The **fifth step** in the crcdata installation process is to load the data into the tables by running the following command:

Select the command line that is appropriate for your environment.

Linux Run Command
ant -f data_build.xml db_load_crc_data

Windows Run Command
%ANT_HOME%\bin\ant.bat -f data_build.xml db_load_crc_data

> **ⓘ Note**
> The loading of the Crcdata may take an extended period of time (over several hours) due to the amount of sample data provided.

Create OMOP views

Step 6:   Create the OMOP views

The **sixth** and **final step** in the crcdata installation process is to create the OMOP view by running the following command:

Select the command line that is appropriate for your environment.

Linux Run Command
ant -f data_build.xml create_omop_views

Windows Run Command
%ANT_HOME%\bin\ant.bat -f data_build.xml create_omop_views

Metadata Tables

Overview of Metadata Installation

The metadata tables are part of the Ontology (ONT) Cell. The following outlines the steps that will be taken during this stage of the installation.

Step 1: Change your working directory

Step 2: Set the database properties for the metadata tables

Step 3: Create the metadata tables

Step 4: Load sample data into the tables

Working Directory - metadata

Step 1: Change Working Directory

During the **Metadata Installation** we will be working with the **metadata directory**. Within this directory are the files we will be editing to define the database properties, create the metadata tables and load the sample data provided with the i2b2 on OMOP data package.

Working directory for metadata: *YOUR_I2B2_OMOP_DATA_DIR*\i2b2_omop_data*{oracle|sqlserver}*\metadata

How to Change Directories

If you are not familiar with how to change your directory in either a windows command prompt or a terminal window, you can enter the following:

Change Directory Command
cd ***YOUR_I2B2_OMOP_DATA_DIR***\i2b2_omop_data***{oracle|sqlserver}***\metadata

Make sure you replace the following when entering the above command:

- ***YOUR_I2B2_OMOP_DATA_DIR*** is the location where you unzipped the i2b2 omop data package.

- ***oracle|sqlserver*** is the type of database management system used for your CDM database.

> ⚠️ **Important**
>
> The change directory command shown above is written for Windows. The command itself is the same for both Linux and Windows with the only exceptions being the slashes in the path name and Linux does not include the "drive".
>
> - *Linux Path:* use a forward slash.
>
> - *Windows Path:* use a backward slash.

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EXAMPLES:

       Linux Command: CD /opt/data/i2b2_omop_data/oracle/metadata

       Windows Command: CD C:\opt\data\i2b2_omop_data\oracle\metadata

To change your working directory to the metadata directory enter the following command:

Change Directory Command
CD *YOUR_I2B2_DATA_DIR*\i2b2_omop_data\{*oracle|sqlserver*}\metadata

⚠️ **Important**

The change directory command shown above is written for Windows. The command itself is the same for both Linux and Windows with the only exceptions being the slashes in the path name and Linux does not include the "drive".

- *Linux Path:* use a forward slash.

- *Windows Path:* use a backward slash.

EXAMPLES:

       Linux Command: CD /opt/data/i2b2_omop_data/oracle/metadata

       Windows Command: CD C:\opt\data\i2b2_omop_data\oracle\metadata

Set Database Properties - metadata

Step 2: Set the database properties for the metadata tables

In the Directory Structure and Schema section of this installation guide we reviewed how the data installation files are structured within the i2b2_omop_data package. Each set of data tables (crcdata, metadata, and workdata) has its own data files for installing the appropriate data. Within each of these directories is a file called **db.properties** that needs to be updated with your environment variables before we can begin installing the **metadata tables**.

Steps for setting database properties

Assumptions:

- You are logged into the command line application for your environment. *(Linux: Terminal or Shell | Windows: Command Prompt).*

- You are familiar with the commands to open a file for editing. (commands are specific to the editor you use)

- You have already changed your working directory to the one that is appropriate for this installation.

Instructions:

1. Open the **db.properties** file.

2. Set the following properties for the DBMS at your site:

Database Properties File
Oracle Database
db.type=oracle
db.username=*YourCdmDatabaseUser*
db.password=*PasswordForYourCdmDatabaseUser*
db.server=*LocationOfYourCdmDatabase*:1521:xe
db.driver=oracle.jdbc.driver.OracleDriver
db.url=jdbc:oracle:thin:@*LocationOfYourCdmDatabase*:1521:xe
db.project=OMOP
PostgreSQL Database

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db.type=postgresql

db.username=*YourCdmDatabaseUser*

db.password=*PasswordForYourCdmDatabaseUser*

db.driver=org.postgresql.Driver

db.url=jdbc:postgresql://*LocationOfYourCdmDatabase*/*YourCdmDatabase*

db.project=OMOP

SQL Server Database

db.type=sqlserver

db.username=*YourCdmDatabaseUser*

db.password=*PasswordForYourCdmDatabaseUser*

db.driver=com.microsoft.sqlserver.jdbc.SQLServerDriver

db.url=jdbc:sqlserver://*LocationOfYourCdmDatabase*:1433;database=*NameOfYourCdmDatabase*

db.project=OMOP

3. Save the changes and close the file.

✅ **Tip**

To save yourself steps, DO NOT close your Command Prompt window as you will be continuing to use it throughout the remainder of the installation.

Create metadata tables

Step 3:   Create the metadata tables

The **third step** in the metadata installation process is to create the metadata tables by running the following command:

Select the command line that is appropriate for your environment.

Linux Run Command
ant -f data_build.xml create_omop_metadata_tables

Windows Run Command
%ANT_HOME%\bin\ant.bat -f data_build.xml create_omop_metadata_tables

> **Note**
> If the command %ANT_HOME% does not work it may be because you did not set your environment variables *(For more information, see the Requirements Chapter in the i2b2 Installation Guide)*. If you do not wish to set this variable then you will need to replace %ANT_HOME% with the full path to your Ant directory.

Load metadata tables

Step 4:   Load sample data into the tables

The **fourth** and **final step** in the metadata installation process is to load the data into the tables by running the following command:

Select the command line that is appropriate for your environment.

Linux Run Command
ant -f data_build.xml db_metadata_load_data_omop

Windows Run Command
%ANT_HOME%\bin\ant.bat -f data_build.xml db_metadata_load_data_omop

> **Note**
> The loading of the metadata may take an extended period of time (over several hours) due to the amount of sample data provided.

Workdata Tables

Overview of Workdata Installation

The workdata tables are part of the Workplace (WORK) Cell. The following outlines the steps that will be taken during this stage of the installation.

Step 1: Change your working directory

Step 2: Set the database properties for the workdata tables

Step 3: Create the workdata tables

Step 4: Load sample data into the tables

Working Directory - workdata

Step 1: Change Working Directory

During the **Work Data Installation** we will be working with the **workdata directory**. Within this directory are the files you will be editing to define the database properties, create the workdata tables and load the sample data provided with the i2b2 on OMOP data package.

Working directory for workdata: *YOUR_I2B2_OMOP_DATA_DIR*\i2b2_omop_data*{oracle|sqlserver}*\workdata

How to Change Directories

If you are not familiar with how to change your directory in either a windows command prompt or a terminal window, you can enter the following:

Change Directory Command
cd **YOUR_I2B2_OMOP_DATA_DIR**\i2b2_omop_data**{oracle|sqlserver}**\workdata

Make sure you replace the following when entering the above command:

- **YOUR_I2B2_OMOP_DATA_DIR** is the location where you unzipped the i2b2 omop data package.

- **oracle|sqlserver** is the type of database management system used for your CDM database.

> ⚠️ **Important**
>
> The change directory command shown above is written for Windows. The command itself is the same for both Linux and Windows with the only exceptions being the slashes in the path name and Linux does not include the "drive".
>
> - *Linux Path:* use a forward slash.
>
> - *Windows Path:* use a backward slash.

EXAMPLES:

>   *Linux Command:* CD /opt/data/i2b2_omop_data/oracle/workdata

>   *Windows Command:* CD C:\opt\data\i2b2_omop_data\oracle\workdata

Set Database Properties - workdata

Step 2:   Set the database properties for the workdata tables

In the Directory Structure and Schema section of this installation guide we reviewed how the data installation files are structured within the i2b2_omop_data package. Each set of data tables (crcdata, metadata, and workdata) has its own data files for installing the appropriate data. Within each of these directories is a file called **db.properties** that needs to be updated with your environment variables before we can begin installing the **workdata tables**.

Steps for setting database properties

Assumptions:

- You are logged into the command line application for your environment. *(Linux: Terminal or Shell | Windows: Command Prompt).*

- You are familiar with the commands to open a file for editing. (commands are specific to the editor you use)

- You have already changed your working directory to the one that is appropriate for this installation.

Instructions:

1. Open the **db.properties** file.

2. Set the following properties for the DBMS at your site:

Database Properties File
Oracle Database
db.type=oracle
db.username=*YourCdmDatabaseUser*
db.password=*PasswordForYourCdmDatabaseUser*
db.server=*LocationOfYourCdmDatabase*:1521:xe
db.driver=oracle.jdbc.driver.OracleDriver
db.url=jdbc:oracle:thin:@*LocationOfYourCdmDatabase*:1521:xe
db.project=OMOP

PostgreSQL Database

db.type=postgresql

db.username=*YourCdmDatabaseUser*

db.password=*PasswordForYourCdmDatabaseUser*

db.driver=org.postgresql.Driver

db.url=jdbc:postgresql://*LocationOfYourCdmDatabase*/*YourCdmDatabase*

db.project=OMOP

SQL Server Database

db.type=sqlserver

db.username=*YourCdmDatabaseUser*

db.password=*PasswordForYourCdmDatabaseUser*

db.driver=com.microsoft.sqlserver.jdbc.SQLServerDriver

db.url=jdbc:sqlserver://*LocationOfYourCdmDatabase*:1433;database=*NameOfYourCdmDatabase*

db.project=OMOP

3. Save the changes and close the file.

✅ **Tip**

To save yourself steps, DO NOT close your Command Prompt window as you will be continuing to use it throughout the remainder of the installation.

Step 2:   Set the database properties for the workdata tables

As stated earlier each i2b2 database schema has a corresponding directory that contains the data files for installing the data. Each of these directories has a file called **db.properties** and it needs to be updated with your environment variables.

Steps for setting database properties

Assumptions:

- You are logged into the command line application for your environment. *(Linux: Terminal or Shell Windows: Command Prompt).*

- You have already changed your working directory to the one that is appropriate for this installation.

Instructions:

1. At the command prompt type the following:

Linux Command
open db.properties

Windows Command
db.properties

2. The **db.properties** file will open. Set the following properties for the DBMS at your site:

⚠️ **Important**
For the purpose of this document, when you set the database properties make sure you set the user to **i2b2demodata** and the project to **demo**.

Database Properties File
Oracle Database
db.type=oracle
db.username=i2b2demodata

db.password=demouser

db.server=*LocationOfYourDatabase*:1521:xe

db.driver=oracle.jdbc.driver.OracleDriver

db.url=jdbc:oracle:thin:@*LocationOfYourDatabase*:1521:xe

db.project=omop

PostgreSQL Database

db.type=postgresql

db.username=i2b2demodata

db.password=demouser

db.driver=org.postgresql.Driver

db.url=jdbc:postgresql://*LocationOfYourDatabase*/i2b2?searchpath=i2b2demodata

db.project=omop

SQL Server Database

db.type=sqlserver

db.username=i2b2demodata

db.password=demouser

db.driver=com.microsoft.sqlserver.jdbc.SQLServerDriver

db.url=jdbc:sqlserver://*LocationOfYourDatabase*:1433;database=demo

db.project=omop

3. Save the changes and close the file.

> ✅ **Tip**
> To save yourself steps, DO NOT close your Command Prompt window as you will be continuing to use it throughout the remainder of the installation.

Create workdata tables

Step 3:   Create the workdata tables

The **third step** in the workdata installation process is to create the workdata tables by running the following command:

Select the command line that is appropriate for your environment.

Linux Run Command
ant -f data_build.xml create_workdata_tables

Windows Run Command
%ANT_HOME%\bin\ant.bat -f data_build.xml create_workdata_tables

> ℹ️ **Note**
> If the command %ANT_HOME% does not work it may be because you did not set your environment variables *(For more information, see the Requirements Chapter in the i2b2 Installation Guide)*. If you do not wish to set this variable then you will need to replace %ANT_HOME% with the full path to your Ant directory.

Load workdata tables

Step 4:   Load sample data into the tables

The **fourth** and **final step** in the workdata installation process is to load the data into the tables by running the following command:

Select the command line that is appropriate for your environment.

Linux Run Command
ant -f data_build.xml db_workdata_load

Windows Run Command
%ANT_HOME%\bin\ant.bat -f data_build.xml db_workdata_load

Next Steps

Steps Completed

Pre-installation Requirements

i2b2 **hivedata** and **pmdata** tables were installed and loaded with the data provided in the standard i2b2

data file.

☑
CDM tables were installed and loaded with the data from the SynPUF sample data file.

☑
i2b2 tables reside in the same database / schema as your CDM tables.

Data Installation

☑
Created the crcdata tables, stored procedures and OMOP views.

☑
Loaded the crcdata tables with the sample data provided in the i2b2-OMOP data package.

☑
Created the metadata tables and loaded the sample data provided in the i2b2-OMOP data package.

☑
Created the workdata tables and loaded the sample data provided in the i2b2-OMOP data package.

Next Steps

After completing the installation of the CRC, Ontology, and Workplace tables, the next step is to **configure the i2b2 software** to query multiple fact tables.

The procedures for this step are outlined in the Software Configuration section.

Software Configuration

Order of Configuration

☑
Update crc.properties file

☑
Configure data sources

☑
Update data lookup *(db_lookup)* tables

☑
Setup a new project / add service account to project

Update CRC Properties File

CRC Properties Configuration

In order for the CRC to know there are multiple fact tables the **queryprocessor.multifacttable** property in the **crc.p roperties** file needs to be updated. By default this property is set to false, however for the i2b2 on OMOP project this needs to be set to true.

Property: queryprocessor.multifacttable

Value	Behavior
false	The CRC will continue to work as it does in the classic i2b2. Only one fact table (observation_fact) will be queried ("single" mode)
true	The CRC will work in both modes; single or multiple fact tables.

Update crc.properties file

1. Open the **crc.properties** file and scroll to the section called **Derived/Multi fact table parameter**.

2. Edit the *queryprocessor.multifacttable* property to tell the CRC to query multiple fact tables.

Multi-fact table parameter
Derived/Multi fact table parameter queryprocessor.multifacttable=true

3. Save your changes and close the file.

> **ℹ Note**
>
> If the above parameter does not exist in the crc.properties file, then you will need to add it in order for the CRC to be able to query multiple fact tables.

Configure Data Sources

Configure CRC data source

Earlier during the data installation you created new crcdata tables and in order for the CRC to communicate with the database it needs to know where these tables reside. This information is configured in the **crc-ds.xml** file.

> As part of the i2b2 on OMOP project there are specific crcdata tables that were created earlier in this installation process. Other than the metadata table, all other tables were created when you initially setup your i2b2 database using the standard i2b2 Installation Guide.

Steps to configure data sources

The following steps define how to add the data source for the new crcdata tables. The steps include example configurations for Oracle, PostgreSQL, and SQL Server.

> **Only 1 CRCBootStrapDS can reside in the _crc-ds.xml_ file**
>
> - If your file does contain the CRCBootStrapDS you can proceed with this section of the installation guide.
>
> - If your file does not contain the CRCBootStrapDS, you can go to the CRC Data Source Configuration chapter of the i2b2 Installation guide.

Step 1: Locate and open your **crc-ds.xml** file

File Location
YOUR_I2B2_SRC_DIR\edu.harvard.i2b2.crc\etc\

Step 2: Add a new datasource and update the following information: (see examples shown below)

☐ Set the *jndi-name* and *pool-name* to **OMOP_CDM**_{*ORACLE | POSTGRESQL | SQLSERVER*}.

☐ Update the *connection-url* to point to the location of the database containing the crcdata tables.

☐ Update the *user-name* and *password* to accurately reflect the database user you setup during the Data Installation.

☐ Verify the *jdbc driver* in the connection-url, *driver-class*, and *driver* accurately reflect the type of database you are connecting to.

Step 3: Save the changes and close the file.

Oracle Database

```
<datasource jta="false" jndi-name="java:/OMOP_CDM_ORACLE"
 pool-name="OMOP_CDM_ORACLE" enabled="true" use-ccm="false">
 <connection-url>jdbc:oracle:thin:@localhost:1521:XE</connection-url>
 <driver-class>oracle.jdbc.OracleDriver</driver-class>
 <driver>ojdbc6.jar</driver>
 <security>
  <user-name>i2b2demodata</user-name>
  <password>demouser</password>
 </security>
 <validation>
  <validate-on-match>false</validate-on-match>
  <background-validation>false</background-validation>
 </validation>
 <statement>
  <share-prepared-statements>false</share-prepared-statements>
 </statement>
</datasource>
```

PostgreSQL Database

```
<datasource jta="false" jndi-name="java:/OMOP_CDM_POSTGRESQL"
 pool-name="OMOP_CDM_POSTGRESQL" enabled="true" use-ccm="false">
 <connection-url>jdbc:postgresql://localhost:5432/i2b2</connection-url>
 <driver-class>org.postgresql.Driver</driver-class>
 <driver>postgresql-9.2-1002.jdbc4.jar</driver>
 <security>
  <user-name>i2b2demodata</user-name>
  <password>demouser</password>
 </security>
 <validation>
  <validate-on-match>false</validate-on-match>
  <background-validation>false</background-validation>
 </validation>
 <statement>
  <share-prepared-statements>false</share-prepared-statements>
 </statement>
</datasource>
```

SQL Server Database

```
<datasource jta="false" jndi-name="java:/OMOP_CDM_SQLSERVER"
 pool-name="OMOP_CDM_SQLSERVER" enabled="true" use-ccm="false">
 <connection-url>jdbc:sqlserver://localhost:1433</connection-url>
 <driver-class>com.microsoft.sqlserver.jdbc.SQLServerDriver</driver-class>
 <driver>sqljdbc4.jar</driver>
 <security>
  <user-name>i2b2demodata</user-name>
  <password>demouser</password>
 </security>
 <validation>
  <valid-connection-checker
class-name="org.jboss.jca.adapters.jdbc.extensions.mssql.MSSQLValidConnectionChecker">
</valid-connection-checker>
  <validate-on-match>false</validate-on-match>
 </validation>
 <statement>
  <share-prepared-statements>false</share-prepared-statements>
 </statement>
</datasource>
```

Update DB Lookup Tables

Update Database Lookup tables

Each i2b2 cell has a DB_LOOKUP table that is part of the i2b2 hive. An i2b2 cell looks to its corresponding DB_LOOKUP table to find the database or schema for a particular project. These tables were created when you installed the hivedata tables as part of the i2b2 classic installation.

In the 1.7.07 release of the i2b2 software, we introduced the ability to easily manage your DB_LOOKUP tables from within the i2b2 Admin Module. The steps shown below will walk you through the process of adding a new CRC_DB_LOOKUP, ONT_DB_LOOKUP, and WORK_DB_LOOKUP to point to your CDM database schema and omop project.

Assumptions:

- The DB_LOOKUP tables are installed.

- The i2b2 Administration Module is installed on your web server and configured correctly.

- Your i2b2 user has administrative privileges and you are able to log into the i2b2 Admin Module.


Tip

For additional information on installing the DB_LOOKUP tables or i2b2 Admin Module, please see the following sections of the i2b2 Installation Guide.
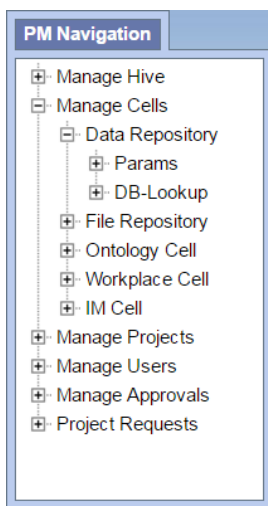
- Hivedata Tables
- i2b2 Administration Module Install

Instructions: CRC_DB_LOOKUP

1. Log into your i2b2 Admin Module

2. In the **Navigation** panel on the left, expand **Manage Cells** to display a list of your i2b2 cells currently configured.
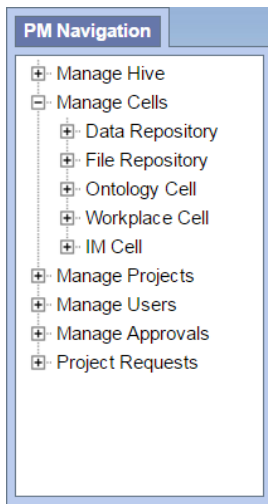
3. Expand the entry for your **Data Repository** and you will see **DB-Lookup** listed.

4. Click on **DB-Lookup** and the *DB-Lookup List* page will display on the right.

5. In the DB-Lookup List page click on **Add New DB-Lookup**.

6. The DB-Lookup enter / edit page will display.

7. Add the following information:

Name:	A name for this entry
Project Path:	/OMOP/
DB Schema:	full schema of your CDM database
JNDI Data Source:	java:/OMOP_CDM_{ORACLE	POSTGRESQL	SQLSERVER}
Tooltip:	
Comment:	
DB Server:	Select the appropriate type of database for your environment

8. Click on **Save** to file the changes to the *CRC_DB_LOOKUP* table.

Instructions: ONT_DB_LOOKUP

The steps to update the ONT_DB_LOOKUP table are, for the most part the same as the CRC_DB_LOOKUP table. The only notable exceptions are:

(1) Expand the Ontology Cell instead of the Data Repository Cell

(2) The **Project Path** does not contain a leading forward slash

Name:	A name for this entry
Project Path:	OMOP/
DB Schema:	full schema of your CDM database
JNDI Data Source:	java:/OMOP_CDM_{ORACLE	POSTGRESQL	SQLSERVER}
Tooltip:	
Comment:	
DB Server:	Select the appropriate type of database for your environment

Instructions: WORK_DB_LOOKUP

The steps to update the WORK_DB_LOOKUP table are, for the most part the same as the CRC_DB_LOOKUP table. The only notable exceptions are:

    (1) Expand the Workplace Cell instead of the Data Repository Cell

    (2) The **Project Path** does not contain a leading forward slash

Name:	A name for this entry
Project Path:	OMOP/
DB Schema:	full schema of your CDM database
JNDI Data Source:	java:/OMOP_CDM_{ORACLE	POSTGRESQL	SQLSERVER}
Tooltip:	
Comment:	
DB Server:	Select the appropriate type of database for your environment

Setup a Project

The last step in the Software Configuration process is to setup your new OMOP project in the i2b2 Admin Module. In addition to setting up the project you will also need to add yourself and other users to the project so you can log into the i2b2 Web Client.

Requirements

For the purpose of this guide, set the **Project Path** as '/OMOP'.

> ⚠️ **Important**
>
> If you are setting up your production environment, you do not need to define the project path as '/OMOP'. However, you need to make sure the Project Path you define here matches the Project Path in your DB_LOOKUP tables. If this information does not match then the i2b2 cells will not be able to locate the correct database tables. Instructions on Setting up Projects and Users

Setting up a Project / User

The standard i2b2 Installation Guide provides the most up to date information on setting up **Projects**, **Users**, and **access levels** to the project. The table below contains links to the specific chapters that will assist you in the final steps.

Chapter	Description
Managing i2b2 Users	Information on adding, editing, and deleting users and / or user parameters.
Add a New User	Steps on how to add a new user. *A user has to be setup in i2b2 before they can be added to a project.*
Managing Projects	Information on adding, editing, deleting projects, project users, user roles, as well as parameters for each of these.
Add a New Project	Steps on how to add a new project.
Add a User to a Project	How to add a new user to a project.
Add User Roles for a Project	Define what level of access (*User Role*) the user will have for this project.

> In order for the CRC to run queries, the **AGG_SERVICE_ACCOUNT** has to have access to the new project you just created. Make sure you add this user to your project before trying to run a query. For information on how to add a user to a project please see the Project Users chapter of the i2b2 Installation Guide.

Additional Resources

i2b2 Resources

- i2b2 Installation Guide

OMOP Resources

For more information about the OMOP project, see https://www.ohdsi.org/

Information about CDM v5 and download the CMS SynPUF 1K sample data, see https:///www.ohdsi.org/data-standardization/