# Installing a Database

## Introduction

In this assignment you are going to install a relational database server and client. Together the server and client implement a Relational Database Management System (RDBMS). We will then use the RDBMS to demonstrate some basic operations common when using a RDBMS. We'll create a database, connect to it, create a table, insert a couple of records, and retrieve them with various criteria.

### Learning objectives

- Downloading and installing a database server and client
- Creating database schemas
- Creating database tables
- Inserting data into database tables
- Retrieving data from database tables
- Exporting data from a database

## Downloading and Installing a Database Server and Client

Navigate to the ***MySQL Community Downloads*** website shown below

https://dev.mysql.com/downloads/mysql/

Choose your operating system, e.g., ***Microsoft Windows***, ***macOS***, etc., and then follow instructions below for your particular OS

### Installing MySQL Server and Workbench on Microsoft Windows

On ***Microsoft Windows*** install the ***MySQL Community Server*** as follows

1. In the ***MySQL Community Downloads*** screen, under ***Select Operating System***, select ***Microsoft Windows***
2. Under ***Recommended Download***, click on the ***MySQL Installer for Windows***
3. Next to the ***Windows (x86, 32-bit), MSI Installer***, click the ***Download*** button
4. In the ***Login Now*** or ***Sign Up*** screen, click on ***No thanks, just start my download***
5. If the browser asks What you want to do when installer is done downloading, select ***Run***. Otherwise, run the MSI installer once it's done downloading
6. If the ***User Account Control*** window asks ***Do you want to allow this app to make changes to your device?*** answer ***Yes***

In the ***MySQL Installer*** follow these steps

1. In the ***Choosing a Setup Type*** screen, select ***Custom*** and click ***Next***

2. In the ***Select Products and Features*** screen, under ***Available Products*** expand ***MySQL Servers***, and choose the latest server, e.g., ***MySQL Server 8.0.22***, click the right arrow to add it to ***Products/Features To Be Installed***
3. In the ***Select Products and Features*** screen, under ***Available Products*** expand ***Applications*** and then under ***MySQL Workbench***, select the latest client, e.g., ***MySQL Workbench 8.0***, click the right arrow to add it to ***Products/Features To Be Installed***
4. After adding ***MySQL Server*** and ***MySQL Workbench*** to ***Products/Features To Be Installed***, click ***Next***
5. In the ***Installation*** screen, click ***Execute***. Wait while the products are downloaded and installed
6. Once all product installation ***Status*** is ***Complete***, click ***Next***
7. In the ***Product Configuration*** screen, click ***Next***

Configure ***MySQL Community Server*** as follows

1. In the ***High Availability*** screen, select ***Standalone MySQL Server***, and click ***Next***
2. In the ***Type*** and **Networking** screen, leave the defaults and click **Next**
3. In the **Authentication Method** screen, select ***Use Strong Password Encryption for Authentication*** and click ***Next***
4. In the **Accounts and Roles** screen, enter a password for the root account. Let's all use the same password: ***P@ssw0rd*** so we don't forget. That's a capital "***P***" followed by an "***@***" (at character), the letters "**ssw**", followed by the number "**0**" (zero), followed by the letters "**rd**". If you forget the root password, you will need to reinstall the database server, so don't forget it!. Click ***Next***
5. In the ***Windows Service*** screen, select the following checkboxes and then click ***Next***
    a. ***Configure MySQL Server as a Windows Server***
    b. ***Start the MySQL Server at System Startup***
6. In the ***Apply Configuration*** screen click **Execute** and then **Finish**

Here's a video you can follow along: https://youtu.be/2HQC94la6go

## Installing MySQL Server on macOS

On ***macOS*** install the ***MySQL Community Server*** as follows

1. In the ***MySQL Community Downloads*** screen, under ***Select Operating System***, select ***macOS***
2. Next to the ***macOS 10.15 (x86, 64-bit), DMG Archive***, click the ***Download*** button
3. In the ***Login Now*** or ***Sign Up*** screen, click on ***No thanks, just start my download***
4. Wait for the ***DMG*** installer to download into your ***Downloads*** folder

From your Downloads folder, double click the downloaded ***DMG*** archive to run it and follow these steps

1. In the ***DMG*** window, double click the ***PKG*** file to run the installer
2. If the installer tries to determine if the software can be installed, click on ***Continue***
3. In the ***Introduction*** screen, click ***Continue***
4. In the ***License*** screen, click ***Continue*** and then ***Agree***
5. In the ***Installation*** screen, click ***Install***
6. If ***macOS*** asks for your password, type it in to allow the installation to start, and click ***Install Software***
7. In the ***Configuration*** screen, select ***Use Strong Password Encryption*** and click ***Next***
8. Enter a password for the root user. Let's all use the same password: ***P@ssw0rd*** so we don't forget. That's a capital "***P***" followed by an "***@***" (at character), the letters "***ssw***", followed by the number "***0***" (zero), followed by the letters "***rd***". If you forget the root password, you will need to reinstall the database server, so don't forget it!. Click ***Start MySQL Server once the installation is complete***. Click ***Finish***

9. If ***macOS*** asks for your password again, type it in to complete the installation to start, and click OK
10. In the ***Summary*** screen, click ***Close***

Starting and stopping the server from macOS ***System Preferences***

1. To start and stop the server, go to ***macOS System Preferences***, e.g., select ***Apple Menu*** at the top left, then ***System Preferences***
2. In the ***System Preferences*** screen, scroll to the bottom and find the new ***MySQL*** icon
3. Double click the ***MySQL*** icon to open its preferences screen
4. In the ***MySQL*** preferences screen, in the ***Instances*** tab, notice the server can be stopped with the ***Stop MySQL Server*** button. Make sure the checkbox ***Start MySQL when your computer starts up***, is checked

## Installing MySQL Workbench on macOS

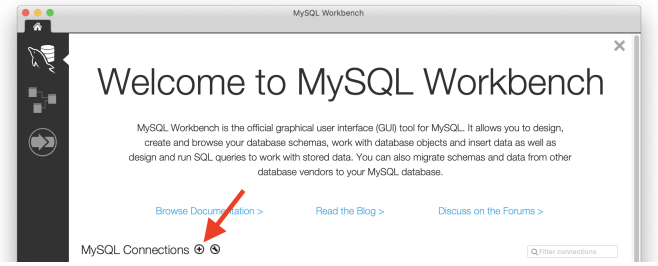
MySQL Workbench is a client software that provides a user interface to easily interact with the MySQL database server. Download the software from

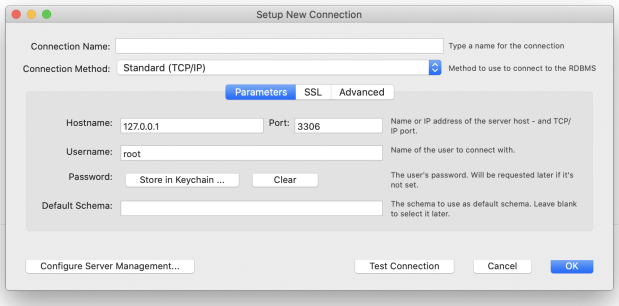
https://dev.mysql.com/downloads/workbench/

***Select Operating System*** as ***macOS*** and click the ***Download*** button. Skip the ***Login*** and ***Sign Up*** if you want by clicking the ***No thanks, just start my download*** link. Once the download completes, open the downloaded DMG file, execute the package file, and follow the installation instructions

# Creating a Database Connection

Make sure the ***MySQL Community Server*** is up and running as described earlier. Also start the ***MySQL Workbench*** and create a connection as follows:




1. From the ***Welcome*** screen, click on the plus button next to ***MySQL Connections***
2. In the ***Setup New Connection*** screen, give the connection a name, e.g., ***db_connection***
3. For the ***Hostname*** you can leave the default ***127.0.0.1*** or you can replace it with ***localhost***. Both refer to the computer you are currently working on
4. For the ***Port***, leave the default ***3306***. That's the default port the server will be listening at
5. For ***Username***, use the default root
6. For ***Password***, use the password you created when installing the server
7. Click on ***Test Connection*** to test the connection
8. Click on ***OK*** to create the connection

To connect to the database server, click on the new connection, e.g., ***db_connection***. Next time you want to connect to the database, you can use the same connection.

# Creating a Schema

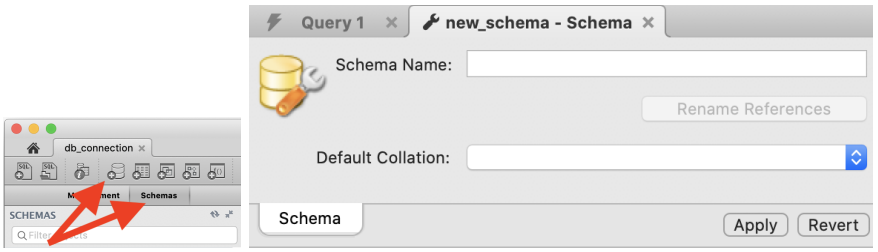
Now let's create a schema for this course.

Make sure your ***MySQL Community Server*** is running and you are connected from the ***MySQL Workbench*** database client.

To create the schema click the ***Schemas*** tab and then the ***Create a new schema*** icon

In the ***new_schema*** screen, type ***db_design*** in the ***Schema Name*** field then click on ***Apply***. This is the name of the new schema we're going to use throughout the semester

***macOS***

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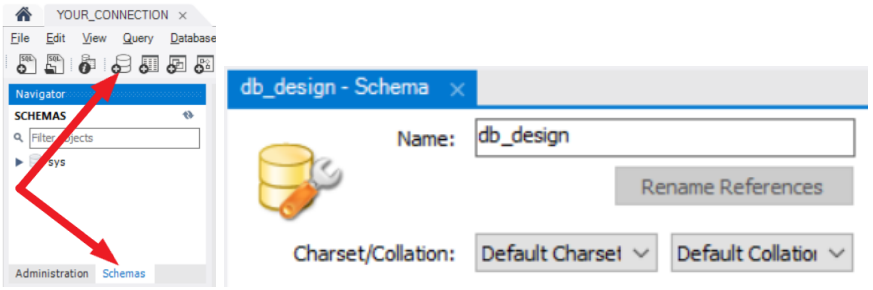
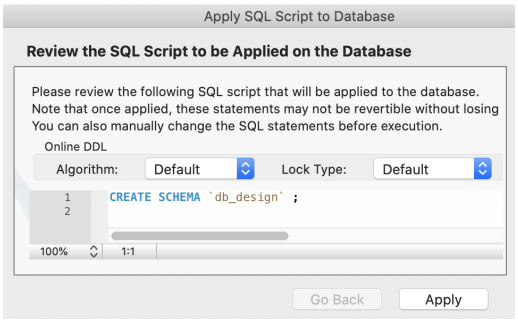
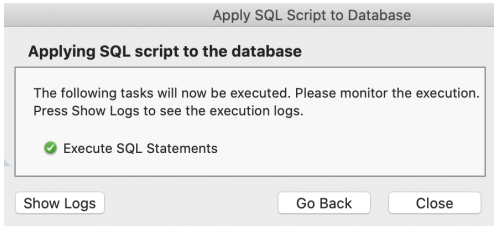
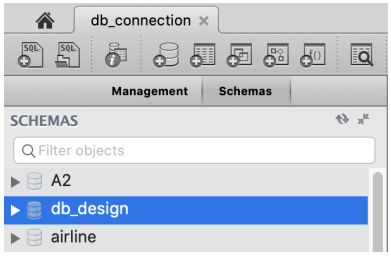



In the ***Apply SQL Script to Database***, review the SQL ***CREATE SCHEMA*** command and press ***Apply*** and then ***Close***. This is the SQL command that will be sent to the server to create the schema. The new schema appears on the left side under the ***Schemas*** tab. Double click on the new schema to make it the default schema to work with from now on




# Creating a Table with the MySQL Workbench Client User Interface

Let's create a table to hold information about ***users*** that might be using some application you are building. Each ***user*** might have a first name, last name, and a unique identifier (id) and represent it as:

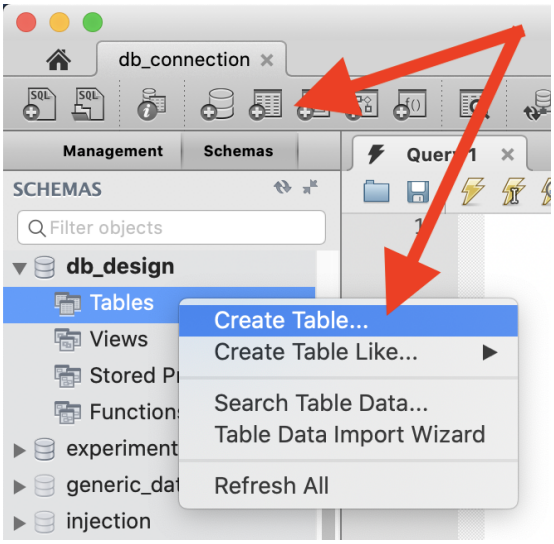
**users(id, fist_name, last_name)**

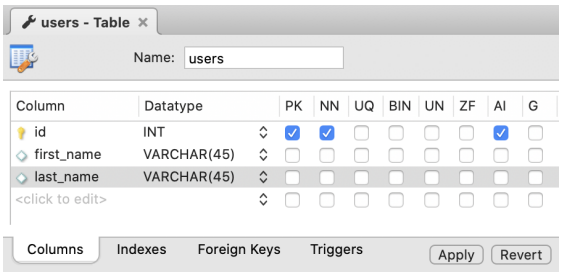
To create a table follow these steps:

1. Double click on the schema to make it the default schema, e.g., double click on ***db_design***
2. Expand the schema by clicking the triangle icon on the left of the schema so it shows the ***Tables***, ***Views***, etc.
3. Create a table in either two ways
    a. Right click on ***Tables*** and select ***Create Table***
    b. ***OR*** click the ***Create a new table*** icon in the toolbar at the top

In the new table screen, e.g., ***users***, configure the new table as follows:

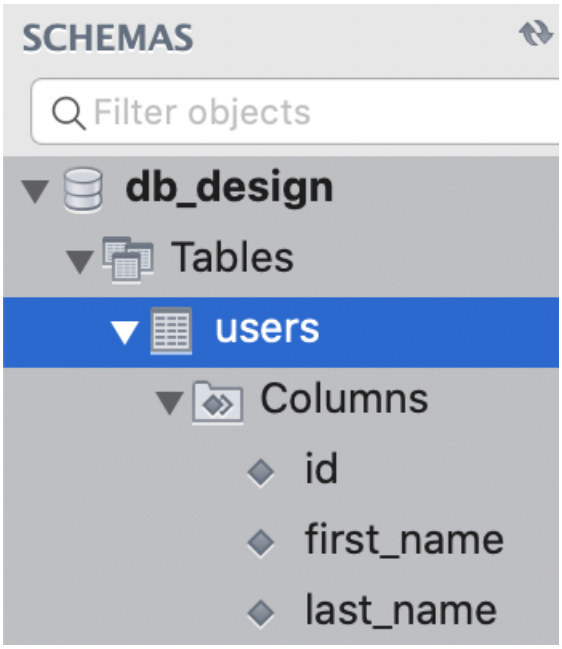
1. In the ***Name*** field, type the name of the new table, e.g, ***users***
2. Under the ***Column*** column, double click to add a new field
3. Add a field that uniquely identifies a user, e.g., ***id***, select ***INT*** as it's ***Datatype***, and select checkboxes: ***PK*** (Primary Key), ***NN*** (Not Null), and ***AI*** (Auto Increment). press ***Enter***
4. Add another field to capture the first name of the user, e.g, ***fisrt_name***, and select ***VARCHAR(45)*** as it's ***Datatype***. Press ***Enter***
5. Add another field to capture the last name of the user, e.g, ***last_name***, and select ***VARCHAR(45)*** as it's ***Datatype***. Press ***Enter***
6. Click the ***Apply*** button to save your changes
7. Review the SQL ***CREATE TABLE*** code and click ***Apply***, and then ***Close***. This is the code that ***Workbench*** will send to the database server to create the ***users*** table. NOTE: you could have typed the SQL code from scratch and executed it
8. The new table will appear under the ***Tables*** in the current, default schema, ***db_design***




```
1  CREATE TABLE `db_design`.`users` (
2    `id` INT NOT NULL AUTO_INCREMENT,
3    `first_name` VARCHAR(45) NULL,
4    `last_name` VARCHAR(45) NULL,
5    PRIMARY KEY (`id`));
```

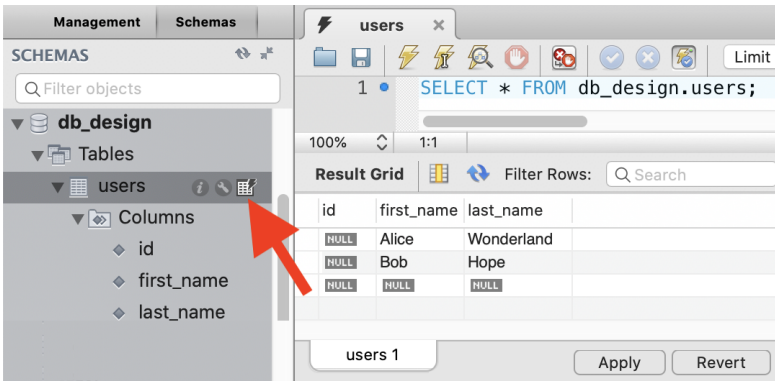
Go Back | Apply




# Inserting Data with the MySQL Workbench Client User Interface

Let's now insert a couple of records into the new table. We'll create user ***Alice*** and ***Bob*** as follows:

1. Hover over the table and click the ***data grid*** icon to see all records in the table
2. A ***SELECT **** command retrieves all records from the database server, which might be none at first
3. The ***Result Grid*** below shows all current records, and also allows entering new records
4. Double click a field under the ***first_name*** column to enter a new first name, e.g., ***Alice***, and press Enter
5. Double click a field under the ***last_name*** column to enter a the last name, e.g., ***Wonderland***, and press Enter
6. Double click in a new field under the ***first_name*** column to enter a new course name, e.g., ***Bob***, and press Enter
7. Double click a field under the ***last_name*** column to enter a new last name, e.g., ***Hope***, and press Enter





8. Don't enter any values under the ***id*** column since these were configured to Auto Increment
9. Click ***Apply*** to review the SQL ***INSERT*** commands, and then click ***Apply*** and ***Close*** to execute the code and insert the new records. NOTE: we could have created these commands from scratch
10. Insert another user using your first name and last name

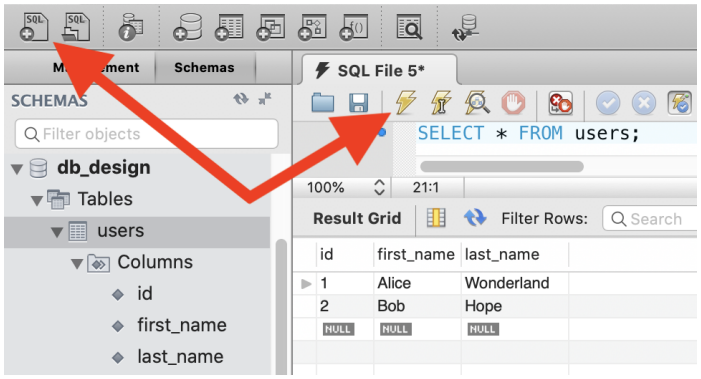
# Retrieving all Records

Now that we have data stored in the database, let's retrieve and display it as follows:

1. Double click the schema you want to work with, e.g., ***db_design***
2. Click the ***New SQL Tab*** icon
3. In the new ***SQL File*** screen, type the following SQL code that retrieves all records from the ***users*** table:

   ***SELECT * FROM users;***

4. Click on the ***lightning bolt*** icon to execute the SQL code
5. All the records, if any, will be displayed in the ***Result Grid*** under the SQL File
6. Save the file as ***select-all-users.sql***



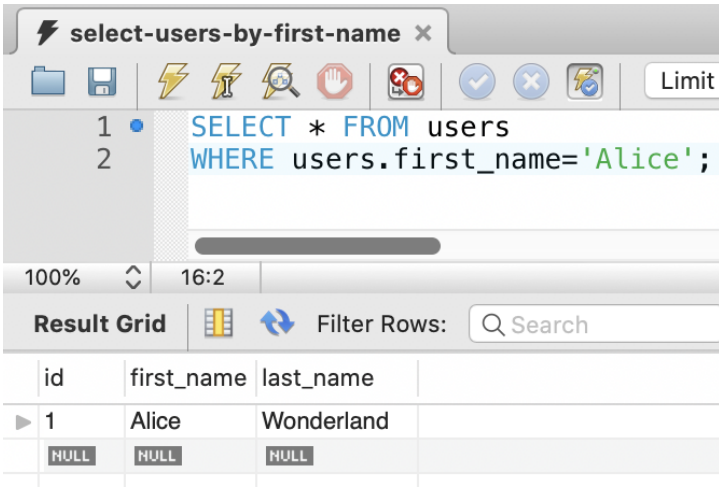
# Retrieving a Record by Some Criteria

Let's now practice retrieving records based on some criteria, for instance, retrieve a user record by their first name. Follow the steps below:

1. Double click the schema you want to work with, e.g., ***db_design***
2. Click the ***New SQL Tab*** icon
3. In the new ***SQL File*** screen, type the following SQL code that retrieves all records from the ***users*** table whose first name is ***Alice***:

   ***SELECT * FROM users***
   ***WHERE users.first_name='Alice';***

4. Click on the ***lightning bolt*** icon to execute the SQL code




5. All the records in the users table whose first name field is ***'Alice'***, will be displayed in the ***Result Grid*** under the SQL File
6. Save the file as ***select-users-by-first-name.sql***

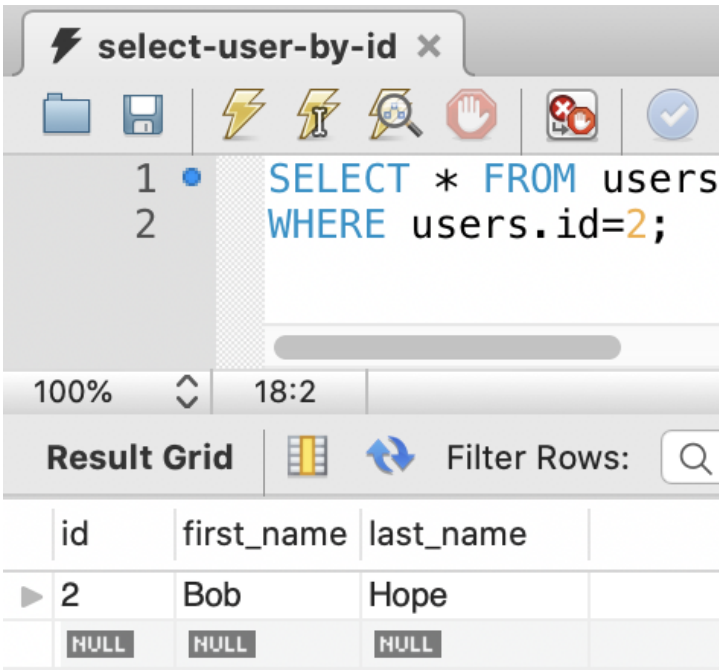
# Retrieving a Single Record by its Primary Key

Let's now practice retrieving a single record by its primary key as follows:

1. Double click the schema you want to work with, e.g., ***db_design***
2. Click the ***New SQL Tab*** icon
3. In the new ***SQL File*** screen, type the following SQL code that retrieves a single record from the ***users*** table where the primary key, ***id***, is equal to 2:

   ***SELECT * FROM users***
   ***WHERE users.id=2;***

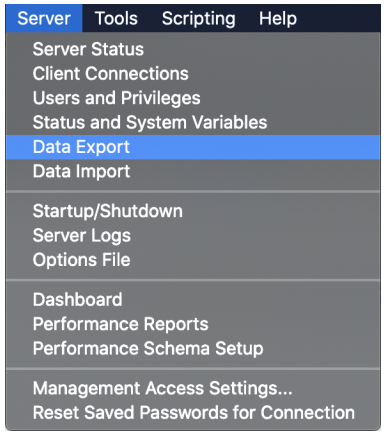
4. Click on the ***lightning bolt*** icon to execute the SQL code
5. A single record should appear whose primary key ***id*** is 2, displayed in the ***Result Grid*** under the SQL File
6. Save the file as ***select-user-by-id.sql***

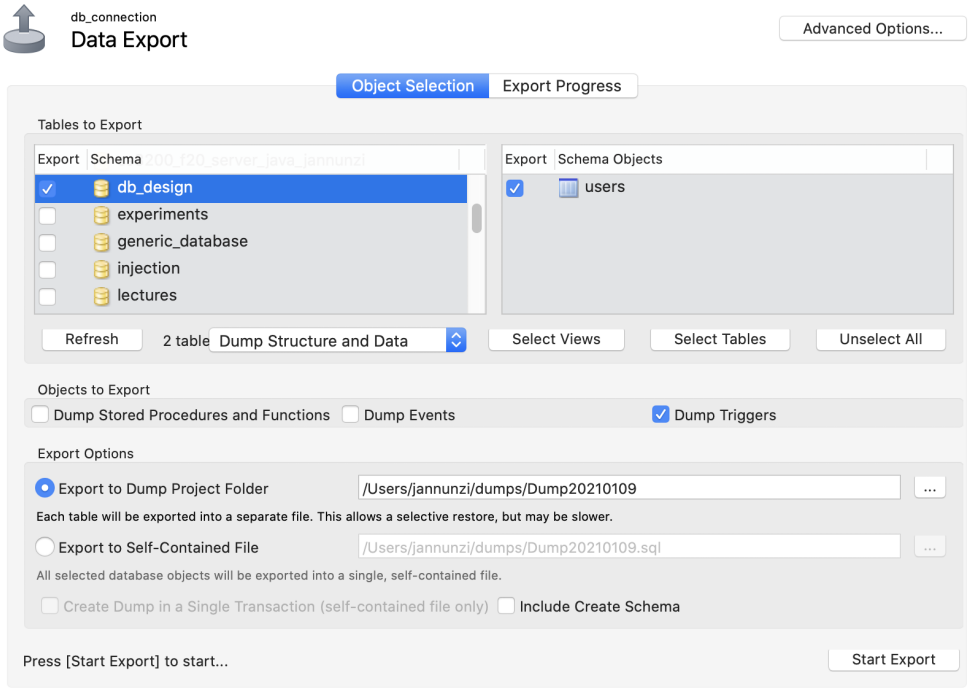


# Exporting Data from a Database

Let's now practice on how to export the contents of the database as follows:

1. Double click the schema you want to work with, e.g., ***db_design***
2. From the main menu, select ***Server*** and then ***Data Export***
3. In the ***Data Export*** screen, select the ***Object Selection*** tab
4. In the ***Tables to Export*** section, select the schema you want to export, e.g., ***db_design***
5. All the tables in the selected schema appear on the right side of ***Tables To Export***, e.g., ***users***
6. Select all the tables you want to export, e.g., ***users***
7. Under the ***Export Options*** section, make sure ***Export to Dump Project Folder*** is selected
8. The data will be exported as a file into the folder shown, e.g, ***/Users/jannunzi/dumps/Dump20210106***. Remember this folder location since you'll need to navigate to it later
9. Click on ***Start Export***




Once the export process has completed, use the filesystem to navigate to the folder where the export was saved to, e.g., ***/Users/jannunzi/dumps/Dump20210106***. There should be a new file called ***db_design_users.sql***. The name of the file is based on the name of the schema, ***db_design***, and the name of the table selected for export, e.g., ***users***.

# Deliverables

On Canvas or Blackboard, submit all the SQL files generated throughout this assignment:

1. select-all-users.sql
2. select-users-by-first-name.sql
3. select-user-by-id.sql
4. db_design_users.sql