CS 116 Lab: Wine program using MySQL:

Follow the instruction below for this lab:

If you are using the image OS file I provided at the beginning of semester, the MySQL database is already installed in the system, so there is no need to install MySQL system.

If you are NOT using the image OS file I provided, you must install mySQL database in your C++ development environment.

Once you have MySQL system installed (the image I provided already have MySQL installed), you need to follow the steps below to create cs116 database within MySQL system, and load the wine information to the cs116 database within MySQL system.

PART 0: Download the winedb.zip file and unzip it to your SQL lab folder. The zip file contains the sample C++ programs to connect to MySQL database, the winelist.txt data file.

PART 1: Setup database and import data.

1. **To login to the mysql database, use the command below:**

```
sudo mysql -u root -p
[sudo] password for cnet: ohlone
```

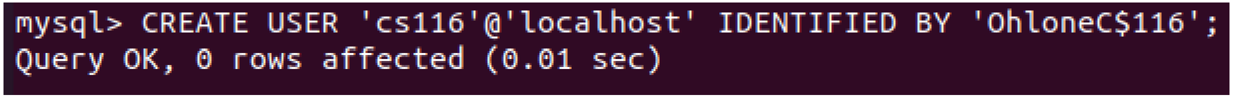
Note: the sudo password is the root password for the VM which is ohlone unless you changed.

Enter password: ***password***

Note: the password is the root password for the VM which is ohlone or password OR P@$$word1234! Or the password you changed to.

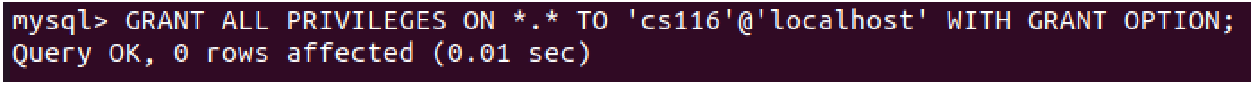
2. **Once you login to the MySQL database, you need to create a new username, cs116, by using the following MySQL commands (CREATE, GRANT, EXIT):**

   *mysql> **CREATE USER 'cs116'@'localhost' IDENTIFIED BY 'OhloneC$116';***



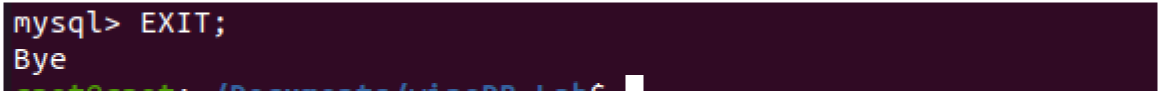
```
mysql> CREATE USER 'cs116'@'localhost' IDENTIFIED BY 'OhloneC$116';
Query OK, 0 rows affected (0.01 sec)
```

   *mysql> **GRANT ALL PRIVILEGES ON *.* TO 'cs116'@'localhost' WITH GRANT OPTION;***



```
mysql> GRANT ALL PRIVILEGES ON *.* TO 'cs116'@'localhost' WITH GRANT OPTION;
Query OK, 0 rows affected (0.01 sec)
```

   mysql> **EXIT;**

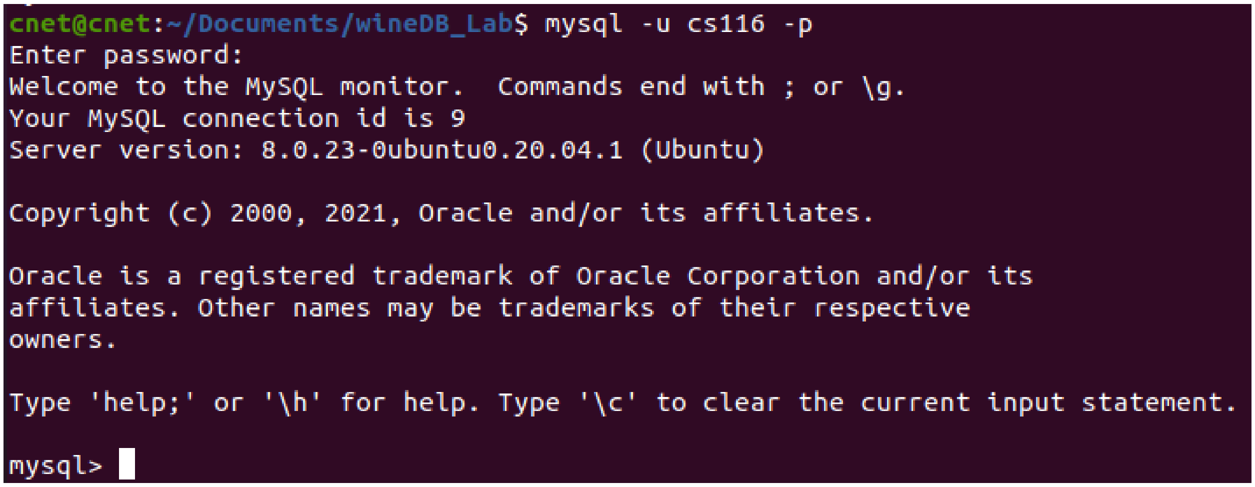


```
mysql> EXIT;
Bye
```

3. **Now you can login to MySQL using username cs116 you just created:**

   mysql -u cs116 -p

Enter password: OhloneC$116

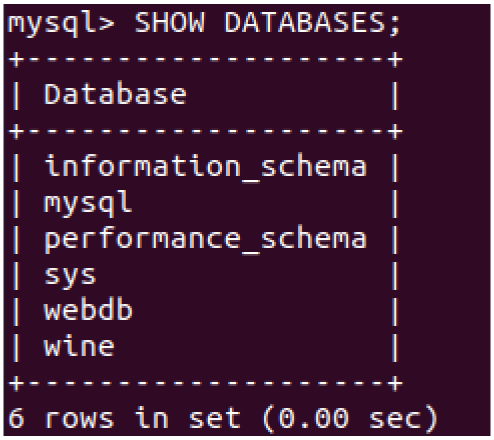


```
cnet@cnet:~/Documents/wineDB_Lab$ mysql -u cs116 -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 9
Server version: 8.0.23-0ubuntu0.20.04.1 (Ubuntu)

Copyright (c) 2000, 2021, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> 
```

It will ask you for password, use the password you set. If the password is the one you set above which is **OhloneC$116 or** the password that you set when you created the username.

4. **Once you login to MySQL system, you need to create database wine using the command below:**

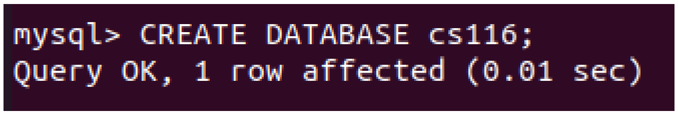
   SHOW databases;



```
mysql> SHOW DATABASES;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| mysql              |
| performance_schema |
| sys                |
| webdb              |
| wine               |
+--------------------+
6 rows in set (0.00 sec)
```

5. **Now create cs116 database with MySQL database (system):**

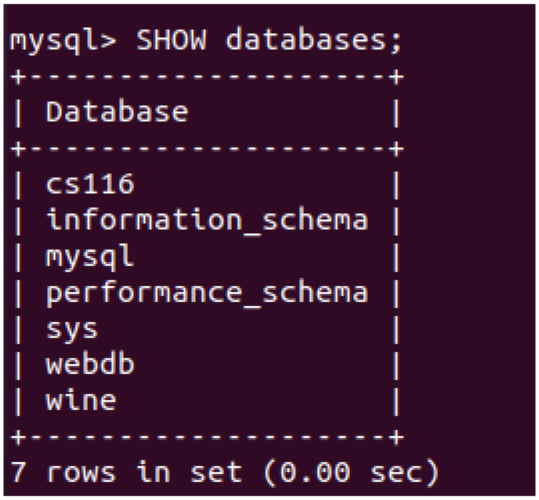
CREATE DATABASE cs116;



```
mysql> CREATE DATABASE cs116;
Query OK, 1 row affected (0.01 sec)
```

6. **Now confirm the cs116 database is created.**

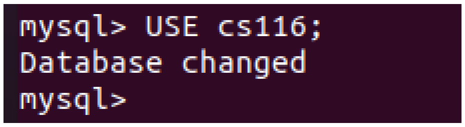
SHOW databases;



```
mysql> SHOW databases;
+--------------------+
| Database           |
+--------------------+
| cs116              |
| information_schema |
| mysql              |
| performance_schema |
| sys                |
| webdb              |
| wine               |
+--------------------+
7 rows in set (0.00 sec)
```

7. **Now use the cs116 database:**

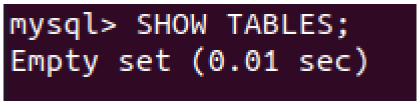
USE cs116;



```
mysql> USE cs116;
Database changed
mysql>
```

8. Now check what tables have been created in cs116. Since we just created the cs116 database, there should NOT be any tables in cs116 database yet.

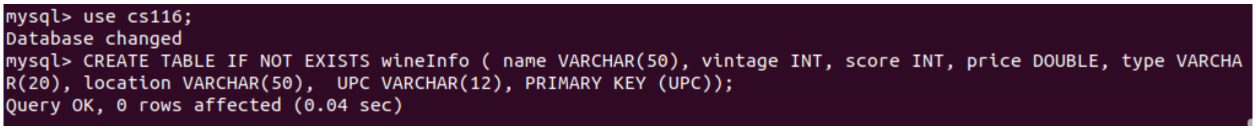
SHOW TABLES;



```
mysql> SHOW TABLES;
Empty set (0.01 sec)
```

9. Now we are going to create table, wineInfo, in the cs116 database using the SQL command below:

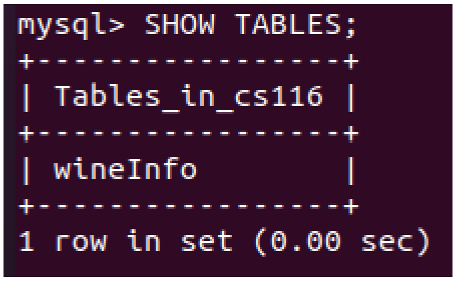
```
CREATE TABLE IF NOT EXISTS wineInfo ( name VARCHAR(50),
vintage INT, score INT, price DOUBLE, type VARCHAR(20),
location VARCHAR(50),  UPC VARCHAR(12), PRIMARY KEY
(UPC));
```



```
mysql> use cs116;
Database changed
mysql> CREATE TABLE IF NOT EXISTS wineInfo ( name VARCHAR(50), vintage INT, score INT, price DOUBLE, type VARCHA
R(20), location VARCHAR(50),  UPC VARCHAR(12), PRIMARY KEY (UPC));
Query OK, 0 rows affected (0.04 sec)
```

10. Now check to see if the table, wineInfo, has been created using SQL command below:

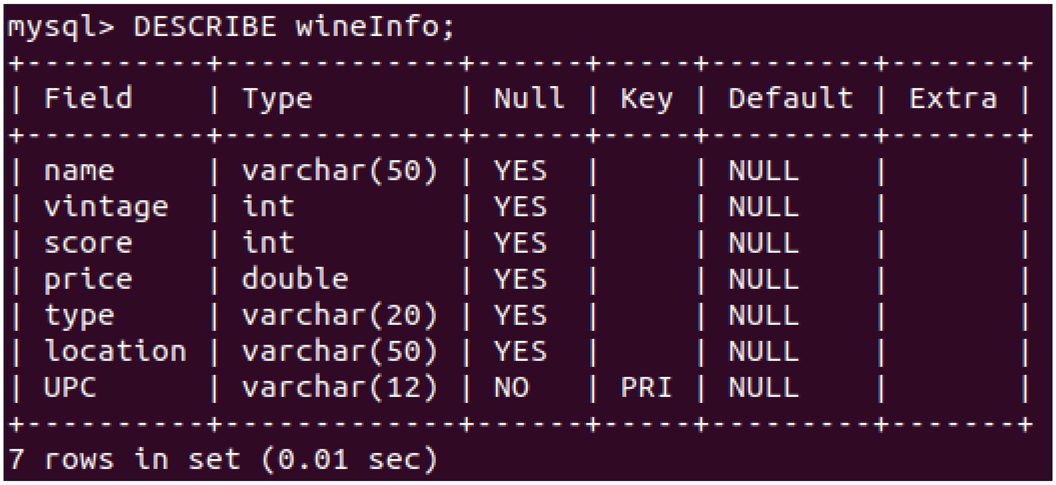
SHOW TABLES;



```
mysql> SHOW TABLES;
+-----------------+
| Tables_in_cs116 |
+-----------------+
| wineInfo        |
+-----------------+
1 row in set (0.00 sec)
```

11. Now show wineInfo table schema by using the SQL command below:

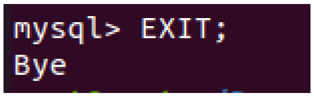
DESCRIBE wineInfo;



```
mysql> DESCRIBE wineInfo;
+----------+-------------+------+-----+---------+-------+
| Field    | Type        | Null | Key | Default | Extra |
+----------+-------------+------+-----+---------+-------+
| name     | varchar(50) | YES  |     | NULL    |       |
| vintage  | int         | YES  |     | NULL    |       |
| score    | int         | YES  |     | NULL    |       |
| price    | double      | YES  |     | NULL    |       |
| type     | varchar(20) | YES  |     | NULL    |       |
| location | varchar(50) | YES  |     | NULL    |       |
| UPC      | varchar(12) | NO   | PRI | NULL    |       |
+----------+-------------+------+-----+---------+-------+
7 rows in set (0.01 sec)
```

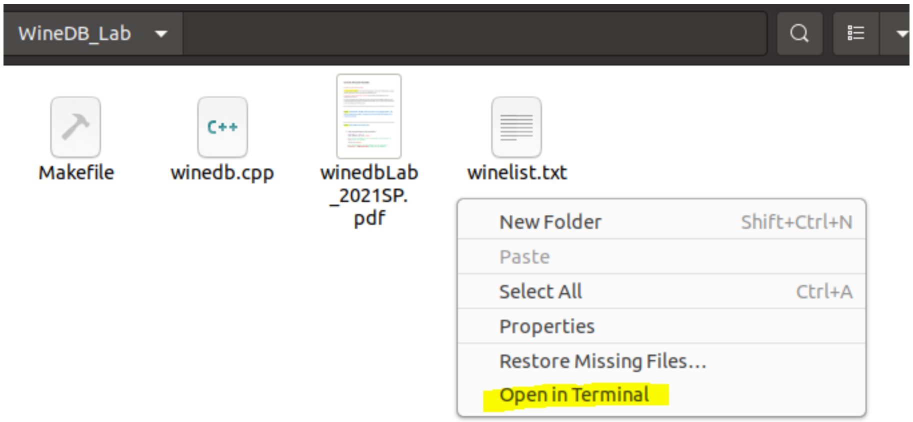
12. Now you have successfully create cs116 database, and wineInfo table within cs116 database. EXIT MySQL system using the SQL command below:

EXIT;

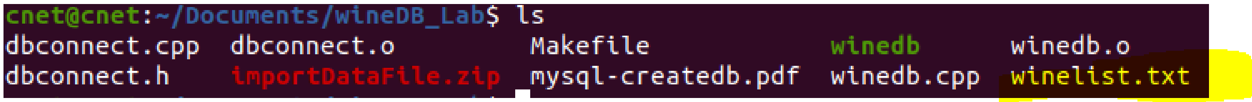


```
mysql> EXIT;
Bye
```

13. Now we are ready to load (import) wine data to the wineInfo table within the cs116 database. You need to make sure the winelist.txt file is in the current local directory where you started running the mysql login command. You can open the terminal window from the file explorer/folder where the *winelist.txt* is located.



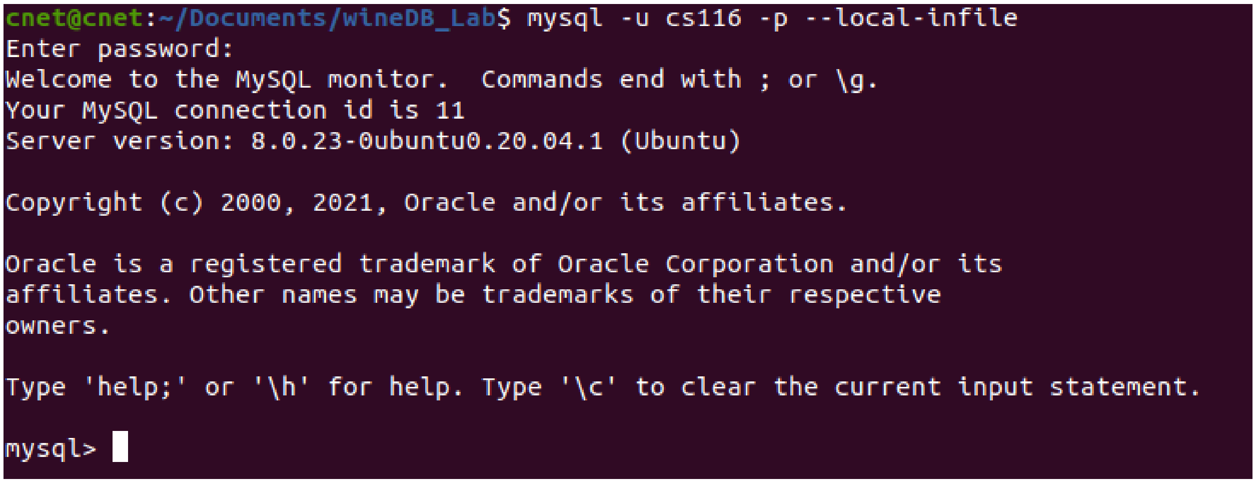
You need to login using the SQL command below to load a local text file that contains the wine data. For example, if the text file is wine.txt, you need to make sure the wine.txt is in the same directory where you run the SQL login command below:



```
cnet@cnet:~/Documents/wineDB_Lab$ ls
dbconnect.cpp  dbconnect.o        Makefile           winedb      winedb.o
dbconnect.h    importDataFile.zip mysql-createdb.pdf winedb.cpp  winelist.txt
```

14. **Now you can login to MySQL and import the winelist.txt file.**

mysql -u cs116 -p --local-infile



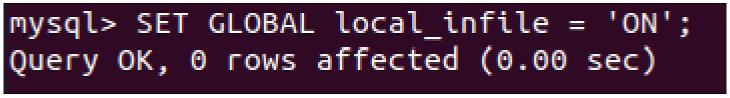
```
cnet@cnet:~/Documents/wineDB_Lab$ mysql -u cs116 -p --local-infile
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 11
Server version: 8.0.23-0ubuntu0.20.04.1 (Ubuntu)

Copyright (c) 2000, 2021, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> 
```

The cs116 password is **OhloneC$116** or the password you created for mysql user name.

Please note use option --local-infile to (use double dash --) enables load local files. Make sure the winelist.txt file is in the same directory when you started (run) the mysql login command.

15. **You need to enable local_infile upload by using the command below:**

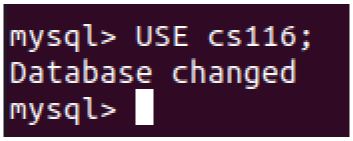
SET GLOBAL local_infile = 'ON';



```
mysql> SET GLOBAL local_infile = 'ON';
Query OK, 0 rows affected (0.00 sec)
```

16. **Now you need to change the working database to cs116 by using the SQL command below:**

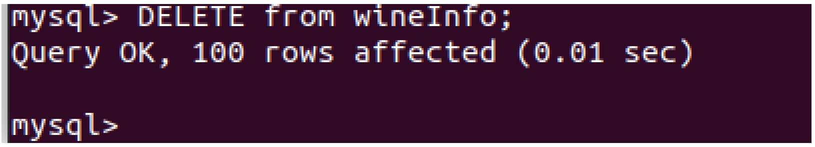
USE cs116;



```
mysql> USE cs116;
Database changed
mysql> 
```

17. **DELETE existing data from wineInfo table using command below. This will delete ALL records from wineInfo table.**

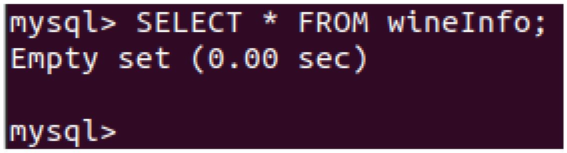
DELETE from wineInfo;



```
mysql> DELETE from wineInfo;
Query OK, 100 rows affected (0.01 sec)

mysql>
```

18. If the delete was successful, you will see the table is empty now.

    *SELECT * FROM wineInfo;*



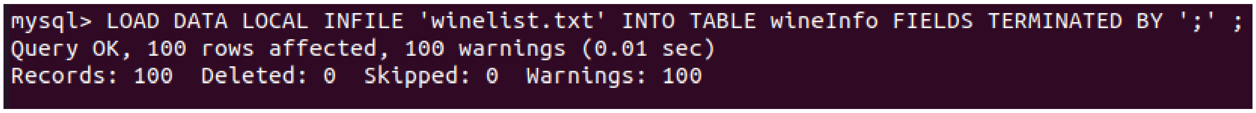
```
mysql> SELECT * FROM wineInfo;
Empty set (0.00 sec)

mysql>
```

19. Now you are ready to import the wine data from the winelist.txt file.

    You need to make sure the winelist.txt file is in the current local directory where you started running the mysql login command.

    Now we are ready to load the winelist.txt file to the wineInfo table within the cs116 database by using the SQL statement below:

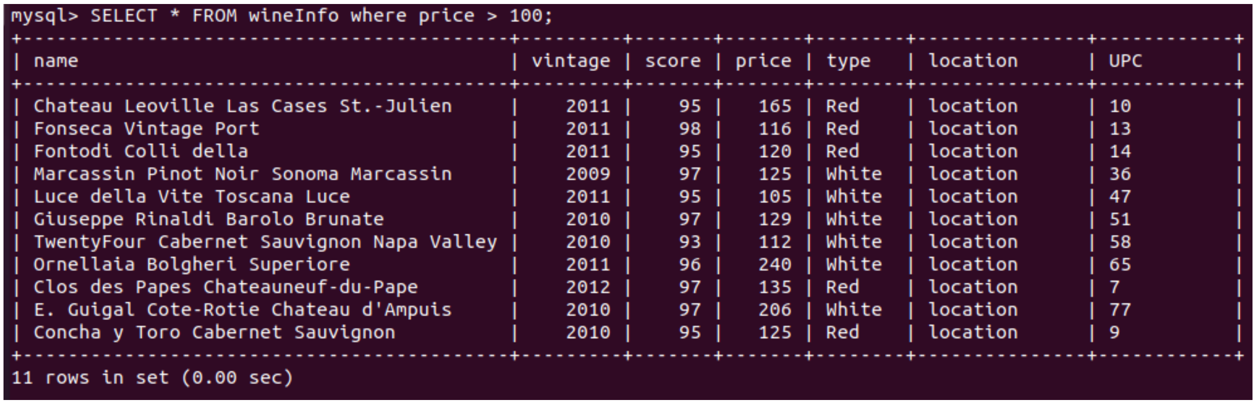
LOAD DATA LOCAL INFILE 'winelist.txt' INTO TABLE wineInfo FIELDS TERMINATED BY ';' ;



```
mysql> LOAD DATA LOCAL INFILE 'winelist.txt' INTO TABLE wineInfo FIELDS TERMINATED BY ';' ;
Query OK, 100 rows affected, 100 warnings (0.01 sec)
Records: 100  Deleted: 0  Skipped: 0  Warnings: 100
```

20. Now you can check if the data is loaded correctly by using the SQL command below:

*SELECT * FROM wineInfo where price > 100;*



```
mysql> SELECT * FROM wineInfo where price > 100;
+-------------------------------------------+---------+-------+-------+-------+--------------+-----------+
| name                                      | vintage | score | price | type  | location     | UPC       |
+-------------------------------------------+---------+-------+-------+-------+--------------+-----------+
| Chateau Leoville Las Cases St.-Julien     |    2011 |    95 |   165 | Red   | location     | 10        |
| Fonseca Vintage Port                      |    2011 |    98 |   116 | Red   | location     | 13        |
| Fontodi Colli della                       |    2011 |    95 |   120 | Red   | location     | 14        |
| Marcassin Pinot Noir Sonoma Marcassin     |    2009 |    97 |   125 | White | location     | 36        |
| Luce della Vite Toscana Luce              |    2011 |    95 |   105 | White | location     | 47        |
| Giuseppe Rinaldi Barolo Brunate           |    2010 |    97 |   129 | White | location     | 51        |
| TwentyFour Cabernet Sauvignon Napa Valley |    2010 |    93 |   112 | White | location     | 58        |
| Ornellaia Bolgheri Superiore              |    2011 |    96 |   240 | White | location     | 65        |
| Clos des Papes Chateauneuf-du-Pape        |    2012 |    97 |   135 | Red   | location     | 7         |
| E. Guigal Cote-Rotie Chateau d'Ampuis     |    2010 |    97 |   206 | White | location     | 77        |
| Concha y Toro Cabernet Sauvignon          |    2010 |    95 |   125 | Red   | location     | 9         |
+-------------------------------------------+---------+-------+-------+-------+--------------+-----------+
11 rows in set (0.00 sec)
```

If your SELECT result is similar to above, that means you have successfully setup the wineInfo table within cs116 database in MySQL database system.

PART 2: Using MySQL database and SQL examples

Below is a sample of SQL select statement:

Get all the Red wines

SELECT name, vintage, score, price, type FROM wineInfo WHERE type = 'Red';

Get all the wines that are not Red

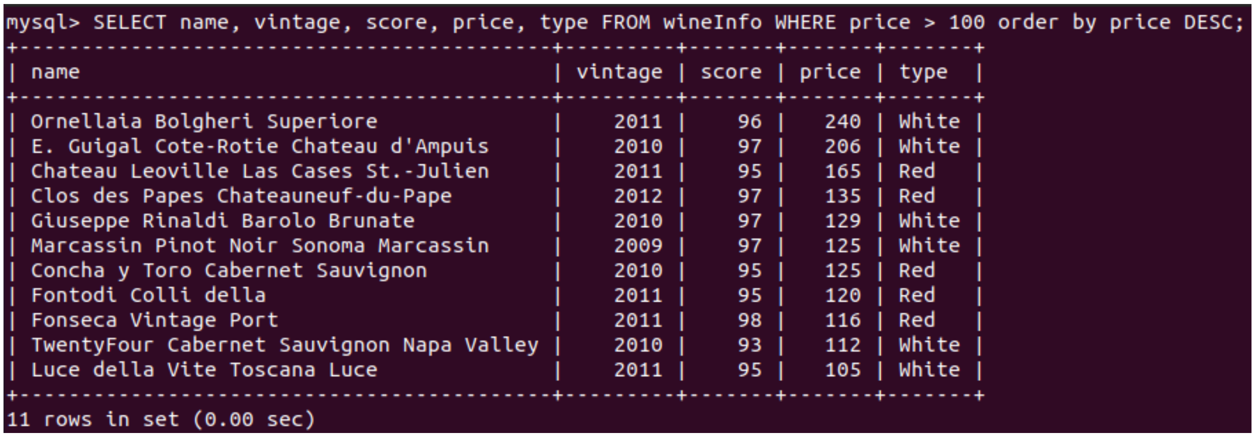
SELECT name, vintage, score, price, type FROM wineInfo WHERE type != 'Red';

Get all the wines that the vintage is between 2009 and 2010

SELECT name, vintage, score, price, type FROM wineInfo WHERE vintage >= 2009 and vintage <= 2010;

Get all the wines that the price is above 100 and sorted by price with highest price listed 1st

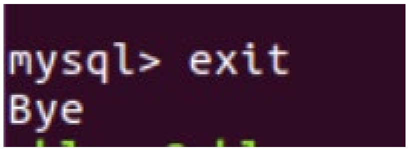
SELECT name, vintage, score, price, type FROM wineInfo WHERE price > 100 order by price DESC;



```
mysql> SELECT name, vintage, score, price, type FROM wineInfo WHERE price > 100 order by price DESC;
+-------------------------------------------+---------+-------+-------+-------+
| name                                      | vintage | score | price | type  |
+-------------------------------------------+---------+-------+-------+-------+
| Ornellaia Bolgheri Superiore              |    2011 |    96 |   240 | White |
| E. Guigal Cote-Rotie Chateau d'Ampuis     |    2010 |    97 |   206 | White |
| Chateau Leoville Las Cases St.-Julien     |    2011 |    95 |   165 | Red   |
| Clos des Papes Chateauneuf-du-Pape        |    2012 |    97 |   135 | Red   |
| Giuseppe Rinaldi Barolo Brunate           |    2010 |    97 |   129 | White |
| Marcassin Pinot Noir Sonoma Marcassin     |    2009 |    97 |   125 | White |
| Concha y Toro Cabernet Sauvignon          |    2010 |    95 |   125 | Red   |
| Fontodi Colli della                       |    2011 |    95 |   120 | Red   |
| Fonseca Vintage Port                      |    2011 |    98 |   116 | Red   |
| TwentyFour Cabernet Sauvignon Napa Valley |    2010 |    93 |   112 | White |
| Luce della Vite Toscana Luce              |    2011 |    95 |   105 | White |
+-------------------------------------------+---------+-------+-------+-------+
11 rows in set (0.00 sec)
```

Now you have successfully setup your wineInfo table within wine database in MySQL.

To exit mySQL command line interface, you can use ‘exit’



```
mysql> exit
Bye
```

PART 3: Using MySQL database in your C++ program

Use C++ program to read wine information from wine database.

We will use the MySQL database within C++ program to retrieve the wineInfo data from wine database.

C++ Program:

I have provided some C++ sample files you can use for this lab. You **shouldn’t** change dbconnect.cpp and dbconnect.h files. No need to document the dbconnect.cpp and dbconnect.h files. But, you must document all other functions that you write for this lab.

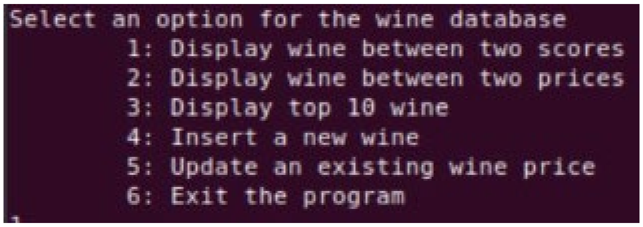
You can use winedb.cpp as an example to create your program. Program winedb.cpp has all the basic information on how to open the SQL database, and read the wine information from the wine table in mySQL database.

You MUST try to break down your programs into functions to make it easier to read and place similar code into a function so it can be re-used in your program. All functions must have proper function header documentation. **DON’T put all the program in a single main() program.** **Points will be taken off if all of your codes are in the main() program.**

For this C++ wine program, you need read the wine info from the SQL database, and include the features below. Read the wine info from MySQL and display the output:

For Outputs: (MUST INCLUDE YOUR NAME AS PART OF THE PROGRAM OUTPUT – PrintMeFirst() function)

- Your program needs to have a **user menu** to display user sections defined below, and after each selection, your program will display the user menu again and ask user to choose a selection. The program will exit once the user select "Quit". **YOU CAN'T USE THE COMMAND LINE AS SHOWED IN MY EXAMPLE. ALL SQL STATEMENTS MUST BE DONE WITHIN YOUR C++ PROGRAM as part of the menu driven program.**
- **You user menu should look similar to the one below:**



```
Select an option for the wine database
        1: Display wine between two scores
        2: Display wine between two prices
        3: Display top 10 wine
        4: Insert a new wine
        5: Update an existing wine price
        6: Exit the program
```

- **Test and capture screenshot for selection 1, 2 and 3 before doing 4 and 5.**

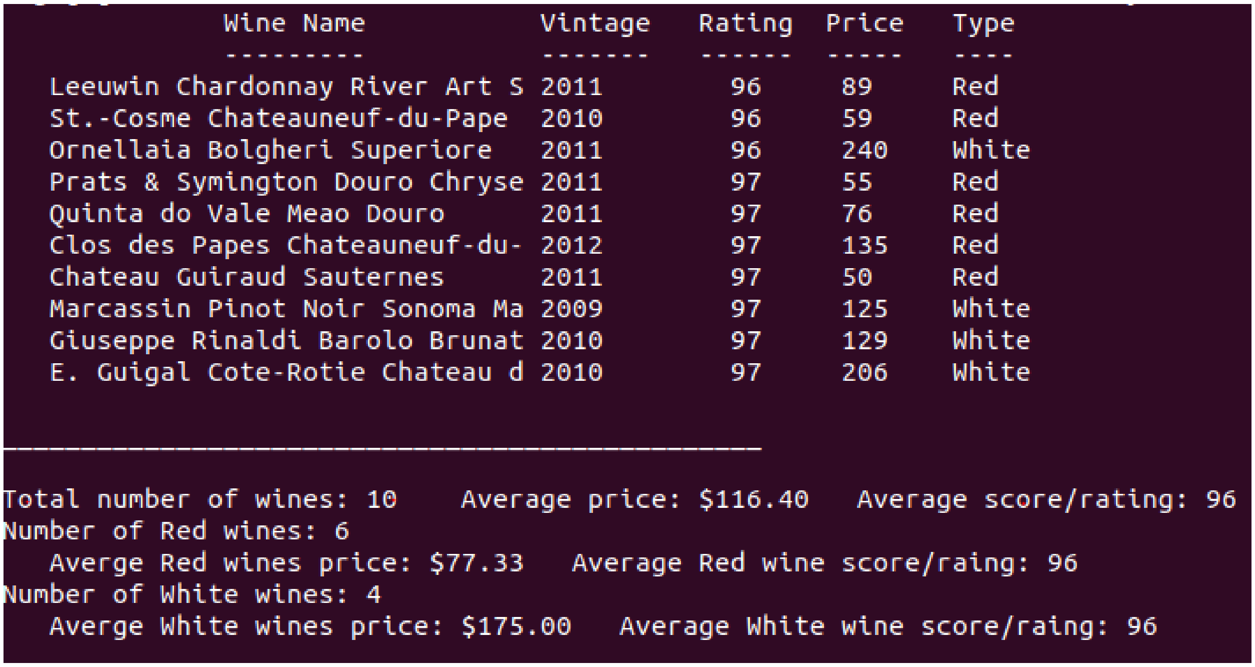
1. Display all the wine has a score between x and y

The score (valid input is between 0 and 100) between x and y.
The output must be sorted by score.

- Test Case #1: For x: use nintynine (This is not a valid input, so your program will reject this input and ask user to re enter the input). You must also check validity for y as well
- Test Case #2: For x = 120 (this is not a valid input, since the range must be between 0 and 100). You must also check validity for y as well
- Test case #3, **if user enters range between 96 and 97**, display all the wines with the scores between 96 and 97 sorted by score with lowest score on the top, also display the total number of wine between the selected range, average price for the selected wines, total number of red wines and white wines. **You need to check the validity of all user's input.**

- **You must print out the SQL statement after you print out the wine info for each selection, so I know what SQL statement you used. Print out SQL statement you used after the Average price output**

Output should be similar as below: (Your program output must be nicely formatted)



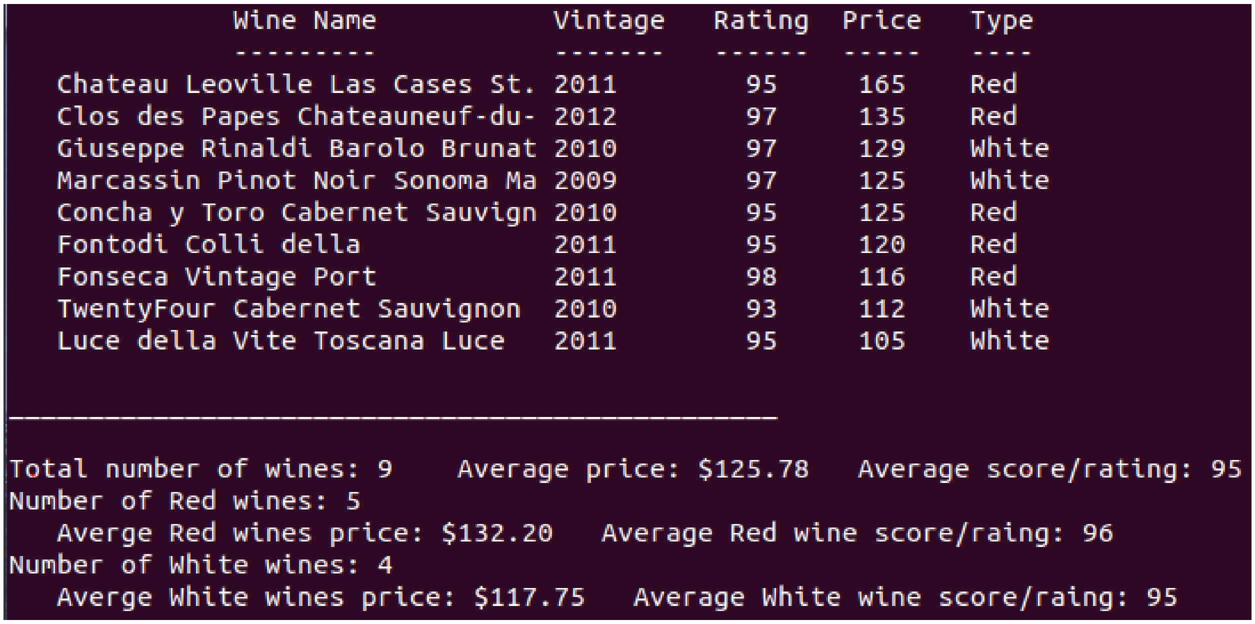
```
              Wine Name             Vintage    Rating  Price    Type
              ---------             -------    ------  -----    ----
   Leeuwin Chardonnay River Art S 2011        96      89      Red
   St.-Cosme Chateauneuf-du-Pape  2010        96      59      Red
   Ornellaia Bolgheri Superiore   2011        96      240     White
   Prats & Symington Douro Chryse 2011        97      55      Red
   Quinta do Vale Meao Douro      2011        97      76      Red
   Clos des Papes Chateauneuf-du- 2012        97      135     Red
   Chateau Guiraud Sauternes      2011        97      50      Red
   Marcassin Pinot Noir Sonoma Ma 2009        97      125     White
   Giuseppe Rinaldi Barolo Brunat 2010        97      129     White
   E. Guigal Cote-Rotie Chateau d 2010        97      206     White


________________________________________________

Total number of wines: 10    Average price: $116.40   Average score/rating: 96
Number of Red wines: 6
   Averge Red wines price: $77.33   Average Red wine score/raing: 96
Number of White wines: 4
   Averge White wines price: $175.00   Average White wine score/raing: 96
```

2. Display all the wine has a price between x and y

Print out all the wine in the selected range, also print out the total number of wine between the selected range and average price for the selected wines.

- **Test case, if user enters range between 100 and 200, only wines with the price between 100 and 200 and sorted by price with highest price listed 1st then highest score will be printed.**, and also display the total number of wine between the selected range, average price for the selected wines, total number of red wines and white wines**.** **You need to check the validity of all user's input.**
- **You must print out the SQL statement after you print out the wine info for each selection, so I know what SQL statement you used. Print out SQL statement you used after the Average price output**

Output should be similar as below:



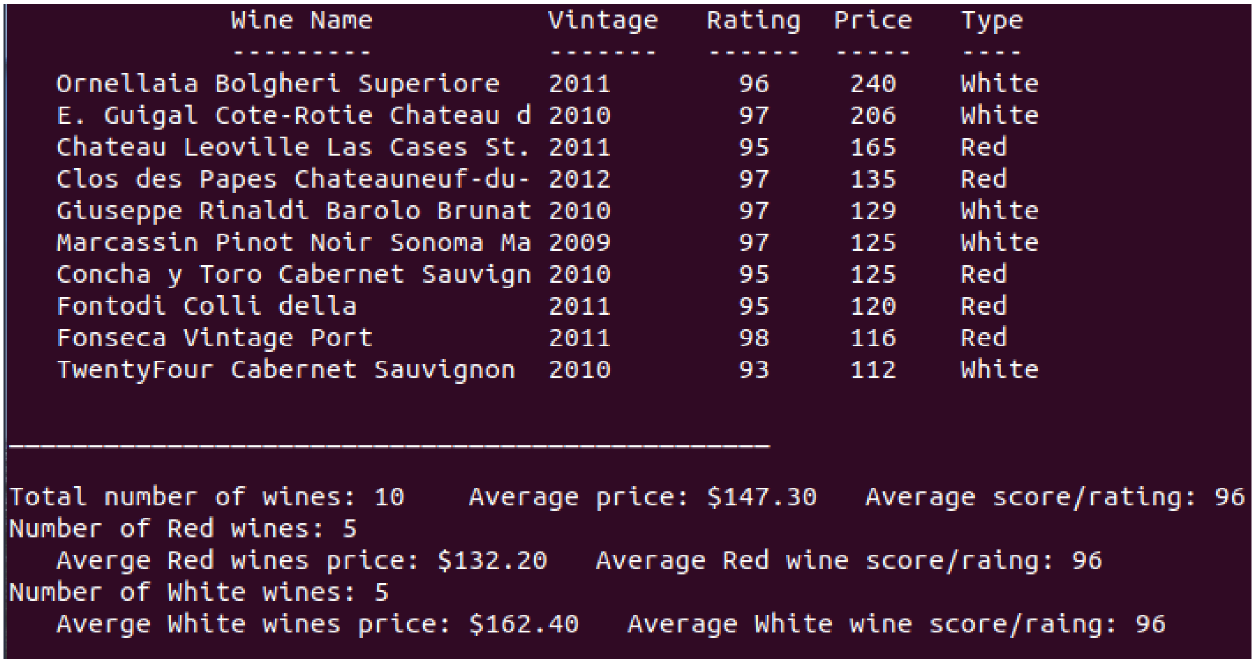
```
              Wine Name           Vintage   Rating  Price   Type
              ---------           -------   ------  -----   ----
   Chateau Leoville Las Cases St. 2011        95     165    Red
   Clos des Papes Chateauneuf-du- 2012        97     135    Red
   Giuseppe Rinaldi Barolo Brunat 2010        97     129    White
   Marcassin Pinot Noir Sonoma Ma 2009        97     125    White
   Concha y Toro Cabernet Sauvign 2010        95     125    Red
   Fontodi Colli della            2011        95     120    Red
   Fonseca Vintage Port           2011        98     116    Red
   TwentyFour Cabernet Sauvignon  2010        93     112    White
   Luce della Vite Toscana Luce   2011        95     105    White


________________________________________________

Total number of wines: 9    Average price: $125.78   Average score/rating: 95
Number of Red wines: 5
   Averge Red wines price: $132.20   Average Red wine score/raing: 96
Number of White wines: 4
   Averge White wines price: $117.75   Average White wine score/raing: 95
```

3. Display top 10 wines.

The output should be sorted by price and also display the total number of wine between the selected range, average price for the selected wines, total number of red wines and white wines**.**

- ○ **You must print out the SQL statement after you print out the wine info for each selection, so I know what SQL statement you used. Print out SQL statement you used after the Average price output**

Output should be similar to below:



```
              Wine Name              Vintage   Rating  Price   Type
              ---------              -------   ------  -----   ----
   Ornellaia Bolgheri Superiore   2011        96     240    White
   E. Guigal Cote-Rotie Chateau d 2010        97     206    White
   Chateau Leoville Las Cases St. 2011        95     165    Red
   Clos des Papes Chateauneuf-du- 2012        97     135    Red
   Giuseppe Rinaldi Barolo Brunat 2010        97     129    White
   Marcassin Pinot Noir Sonoma Ma 2009        97     125    White
   Concha y Toro Cabernet Sauvign 2010        95     125    Red
   Fontodi Colli della            2011        95     120    Red
   Fonseca Vintage Port           2011        98     116    Red
   TwentyFour Cabernet Sauvignon  2010        93     112    White


------------------------------------------------

Total number of wines: 10    Average price: $147.30   Average score/rating: 96
Number of Red wines: 5
   Averge Red wines price: $132.20   Average Red wine score/raing: 96
Number of White wines: 5
   Averge White wines price: $162.40   Average White wine score/raing: 96
```

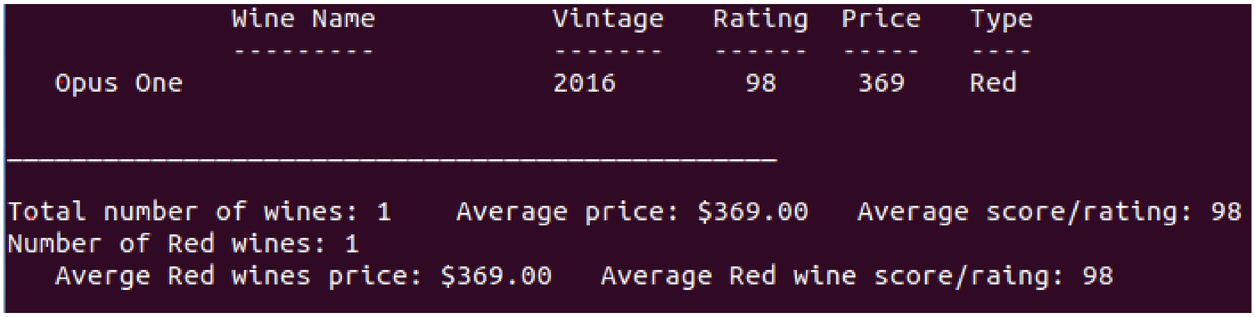
4. Insert a new wine

Ask user to enter information for the new wine:

- Wine name
- Vintage
- Price
- Score
- Type

- Need to validate user’s input
- **User the following test cases:**
    - Wine name: Opus One
    - Vintage: 2016
    - Rating: 98
    - Price: 369
    - Type: Red
    - wineUPC : (you can use any unique wineUPC number)
- Then INSERT into the wineInfo table using SQL INSERT INTO statement.
- **You must print out the SQL statement after you print out the wine info for each selection, so I know what SQL statement you used. Print out SQL statement you used after the Average price output**

- After the insert, your program needs to print out the wine info user just inputted. If you entered for the Opus One above, the output should be similar to the one below:



```
              Wine Name                  Vintage    Rating  Price    Type
              ---------                  -------    ------  -----    ----
   Opus One                              2016         98     369     Red


________________________________________________

Total number of wines: 1    Average price: $369.00   Average score/rating: 98
Number of Red wines: 1
   Averge Red wines price: $369.00   Average Red wine score/raing: 98
```

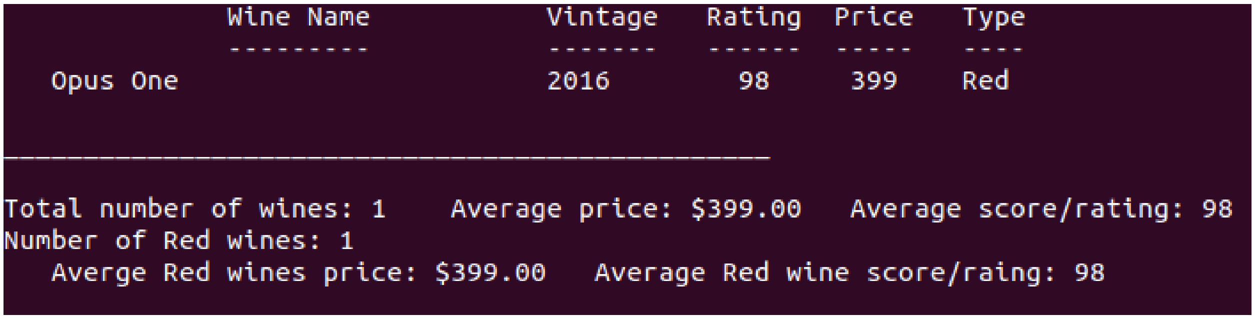
Don’t worry if you have multiple “Opus One” in your table as you may have added multiple times while running this program.

5. Update wine name

Ask user which wine to update, and the new price for the wine.
Test case: enter wineUPC: use the wineUPC you did in #4 “Insert wine” test case above. For example, if you entered 9999 for wineUPC, then, you would use wineUPC of 9999 as inputs from user to update the wine price.
Enter wine UPC: 9999
Enter update price: 399

You program should update all the wines with wine UPC that matches wine UPC number with new price of 399. In real world, you should use wine ID so you only update the one you need instead of all wines matches the name, since I didn’t include the id in the wine database, and all id in the database is 0, so we are using name instead id. So for this example, just use wine name. You program should output similar to the one below if user enters Opus as wine name, and price of 399, depends on how many Opus one in the database.

- **You must print out the SQL statement after you print out the wine info for each selection, so I know what SQL statement you used. Print out SQL statement you used after the Average price output**



```
              Wine Name                  Vintage    Rating  Price    Type
              ---------                  -------    ------  -----    ----
   Opus One                              2016         98     399     Red


________________________________________________

Total number of wines: 1    Average price: $399.00   Average score/rating: 98
Number of Red wines: 1
   Averge Red wines price: $399.00   Average Red wine score/raing: 98
```

6. **Quit – Exit program**

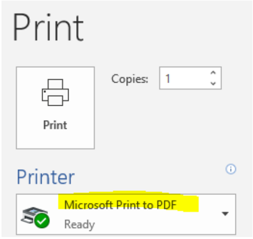
- Program output must be neat and nicely formatted.

Our lab assistants, are available during the open lab hours. Please refer to lab tutor hours posting in canvas. Don't wait until last minute to ask for help.

Lab Submission: See the lab submission requirements published in canvas.

To submit your assignment in canvas, you must submit TWO files (one pdf and one zip) as follows:

1. **Attach pdf file** which contains source codes you have written and program output screenshot so I can easily read in one file. You can use a word editor to place all the required programs and screenshots, and then use 'Print' to 'Microsoft Print to PDF' to save to a pdf file



Printer: Microsoft Print to PDF
Ready

The pdf file MUST have the following sections (1. Program Description, 2. Program Source Code and 3. Program Output).

1. Program Description

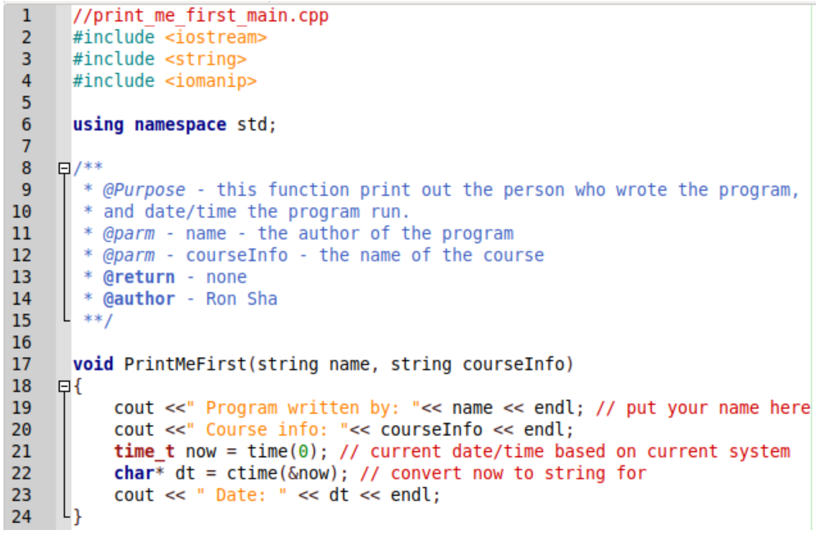
- brief *description* of the purpose of the *program and*
- an explanation of what your software does and what problem it solves

2. Program Source Code

- Include all the source codes (program files) you have written for this lab (screenshots are ok)
- Your program must have adequate documentation for your source codes:

    - Program description – see above on Program Description
    - **You must put the following function headers for each function (the function header MUST be placed just above the function declaration in your source code). For Functions, it must have:**
        - *Function name: name of this function*
        - *Function description: the purpose of this function and how to use it*
        - *@param param_name and what the parameter/argument is used for*
        - *@return what is returned from the function*
- Make sure your screenshots are readable (not too small)

Below is an example of source code
File: print_me_first_main.cpp (list the program file individually)



```
//print_me_first_main.cpp
#include <iostream>
#include <string>
#include <iomanip>

using namespace std;

/**
 * @Purpose - this function print out the person who wrote the program,
 * and date/time the program run.
 * @parm - name - the author of the program
 * @parm - courseInfo - the name of the course
 * @return - none
 * @author - Ron Sha
 **/

void PrintMeFirst(string name, string courseInfo)
{
    cout <<" Program written by: "<< name << endl; // put your name here
    cout <<" Course info: "<< courseInfo << endl;
    time_t now = time(0); // current date/time based on current system
    char* dt = ctime(&now); // convert now to string for
    cout << " Date: " << dt << endl;
}
```

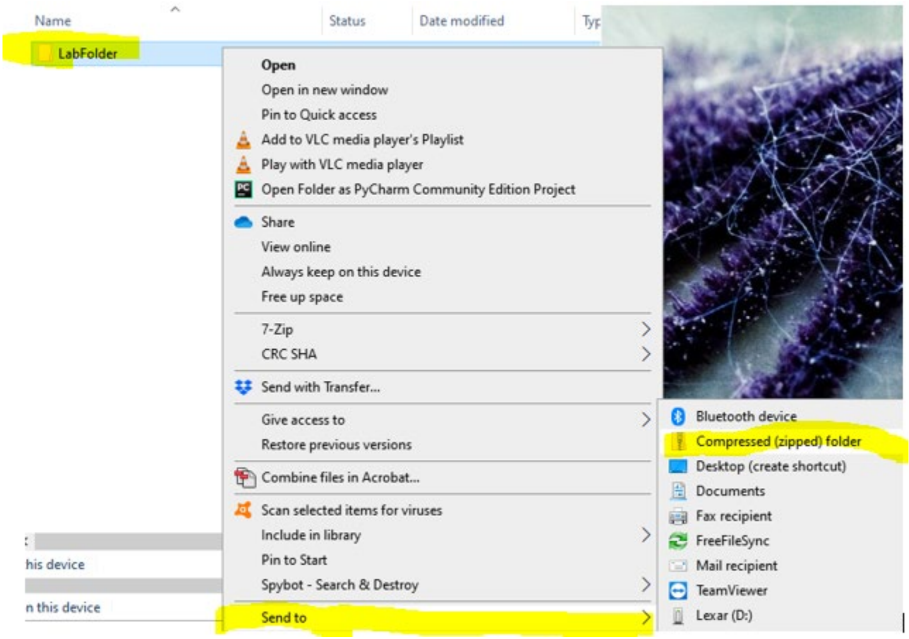
File: list other cpp files separately

3. Program Output

- Attach all the program outputs (screenshots)
- Don't place Source code and program output side by side as it is not readable in screenshot
- Make sure your screenshots are readable (not too small)
- Your main program outputs MUST include your name printout (use the print_me_first function/program).

2. **Attach** **zip file** which contains all your source code (you can zip the folder) and functions. Even if you only have one source file, you MUST still do a zip file of the folder. I must be able to compile and run your program from all the source code programs after I unzip your zip file.

   You should create a folder for each lab, and place all your programs, functions and all other files related to this lab in this lab folder. To submit the lab folder, you can use "Send to -> compress" in window file explorer to create a zip file of the folder.



3. **Now you can upload both the pdf file and zip file separately as your assignment submission in canvas.**