Birla Institute of Technology & Science, Pilani, K. K. BIRLA Goa campus
Database Systems (CS F212)
Second Semester 2019-2020
Lab-10
To learn how to access MySQL database from a high-level language (Python)

Introduction:

In order to develop a full-fledged software application, we need a collection of softwares, which includes a database system. Such a collection of software on which we can build a custom application is called a software stack. An example of a software stack is **LAMP**, which is an acronym that stands for **L**inux, **A**pache web server, **M**ySQL database and **P**ython. Using LAMP we can develop a web application (e.g. airline reservation system) where various requirements of the application would be programmed using a high level language (e.g. Python) and the actual data would be stored in a database system (e.g. MySQL).

In this reading material, we will learn how to connect and use MySQL database using a python program. No prior knowledge of Python will be assumed. The example python code will be simple and self explanatory. Students are not expected to become well-versed with the Python programming language. The goal here is to understand that a database system is just a component of a larger software stack on which we can develop any custom application (depending on our requirements).

Load database for Lab10:

Download db212lab10.sq1 file. Use the *source* command to run the sql script file. This will create a database called db212lab10. This is the same database that was used for Midsem online exam. We will use the db212lab10 database in this reading material.

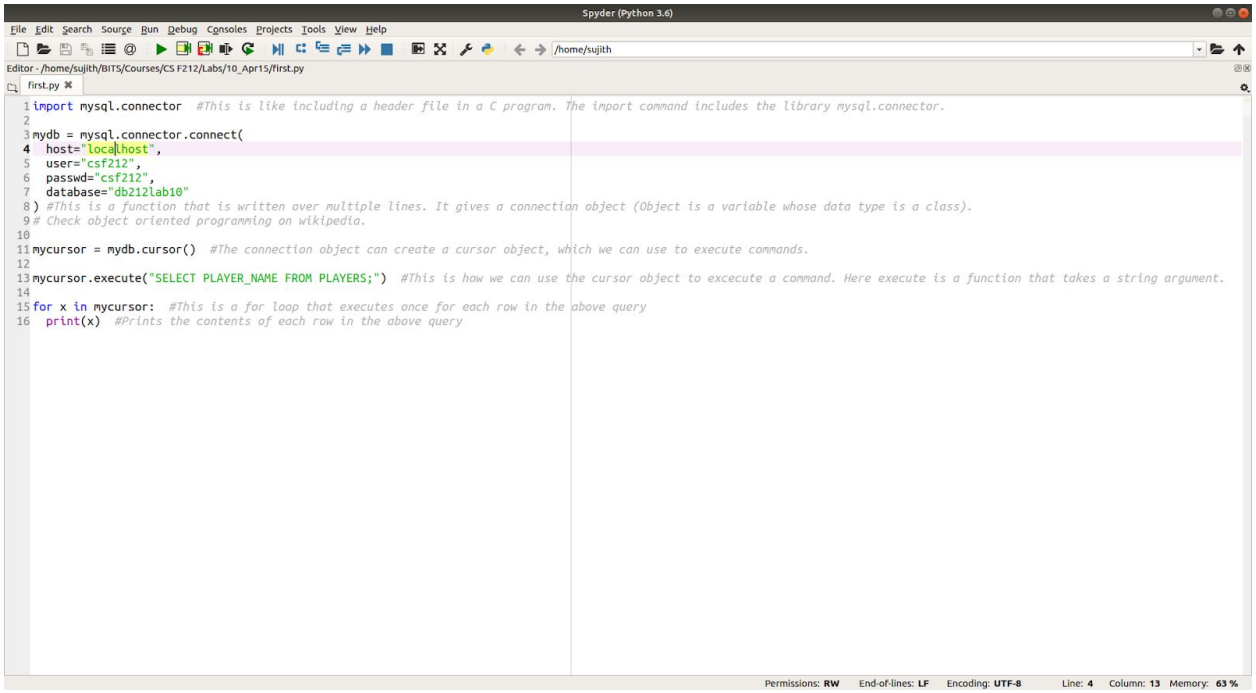
Installing Python 3 and mysql-connector:

As a first step, install the python 3 interpreter. The following link will help you install the python interpreter:
https://realpython.com/installing-python/

We also need the mysql-connector library to be able to connect to the MySQL database from a python program. The mysql-connector library provides the functions that we will be using to connect to the MySQL database. The following link will help you install the mysql-connector library:
https://dev.mysql.com/doc/connector-python/en/connector-python-installation-binary.html

Connecting to db212lab10 database:

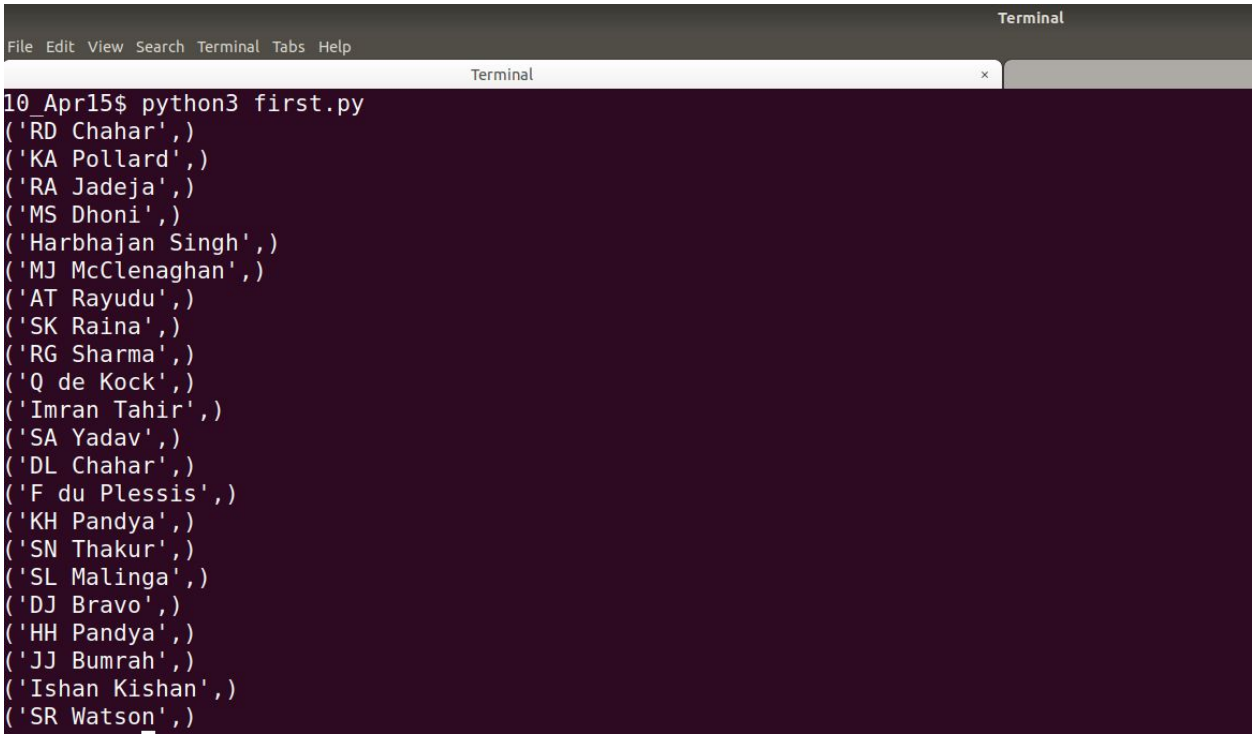
Open the first.py file in any editor. This python program will show how to connect to a mysql database.
A screen shot of first.py is given below:



Any text that follows the '#' symbol is a comment. Open first.py in a text editor and carefully read the comments in first.py. Try to understand what the program is doing and how it is doing it. Python uses special types of variables called objects, which are instantiation of classes. You will understand the code better when you get introduced to object oriented programming:
https://www.programiz.com/python-programming/object-oriented-programming

Now run the program from a terminal using the command:
python3 first.py

You should see an output like the one shown below:



Executing the insert query:

Next open second.py file. This python program inserts a record into the PLAYERS table. Run the program using the following command:
python3 second.py

Check the PLAYERS table in the database to see whether the record was inserted.

Constructing query string that avoids sql injection attack:

In a high level language, an sql query can be constructed using concatenation of strings. This way of writing code is prone to sql injection attack. In the program third.py, we pass the values to the execute function. Carefully read the comments given in third.py. Run the program third.py and check the output.

Executing the update query:

Next we will see an example of running an update query. The second.py program had added a player called Chris Lynn. Now we will fill the nationality field of Chris Lynn in the PLAYERS table. Read the comments in fourth.py. Run the fourth.py and check whether the PLAYERS table is updated.

Exercise:

1. Read about Solution stack (Software stack) here :
   https://en.wikipedia.org/wiki/Solution_stack

   How is the LAMP software stack different from the WIMP software stack? Find the answer using the above link.

2. Insert a row in BOWLING table and BATTING table for the new player Chris Lynn. You may choose any value for the fields.

3. Add a debut date of 1st June, 2020, for Chris Lynn in the PLAYERS table.

4. Read about SQL Injection attack here:
   https://en.wikipedia.org/wiki/SQL_injection