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CHAPTER – 5

CONNECTING WITH DATABASE

- **Verifying the MySQL dB Interface Installation,**
- **Working with MySQL Database,**
- **Using MySQL from Python,**
- **Retrieving All Rows from a Table,**
- **Inserting Rows into a Table,**
- **Deleting Rows from a Table,**
- **Updating Rows in a Table,**
- **Creating Database Tables through Python**

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Q-1 What is Database and what is MySQL db?

- **A database** is basically a collection of structured data in such a way that it caneasily be retrieved, managed and accessed in various ways.
- One of the simplest forms of databases is a text database. Relational databases- the most popular database system which includes the following:

  - MySQL
  - Oracle Database
  - SQL server
  - Sybase
  - Informix
  - IBM db2
  - NO SQL

- Among all these databases, **MySQL** is one of the easiest databases to work with.
- Let me walk you through about this in detail.

What is MySQLdb?

- MySQLdb is an open-source freely available relational database managementsystem that uses Structured Query Language.
- Now one of the most important question here is "What is SQL?"
- SQL (Structured Query Language) is a standard language for relational databases that allow users to do various operations on data like, Manipulating, Creating, Dropping, etc.
- In a nutshell, SQL allows you to do anything with the data.

Q-2 Explain how does python connect to the MySQL database?

Detail :-

- It is very simple to connect Python with the database.
- Refer the below image which illustrates a Python connection with the database where how a connection request is sent to MySQL connector Python, gets accepted from the database and cursor is executed with result data.

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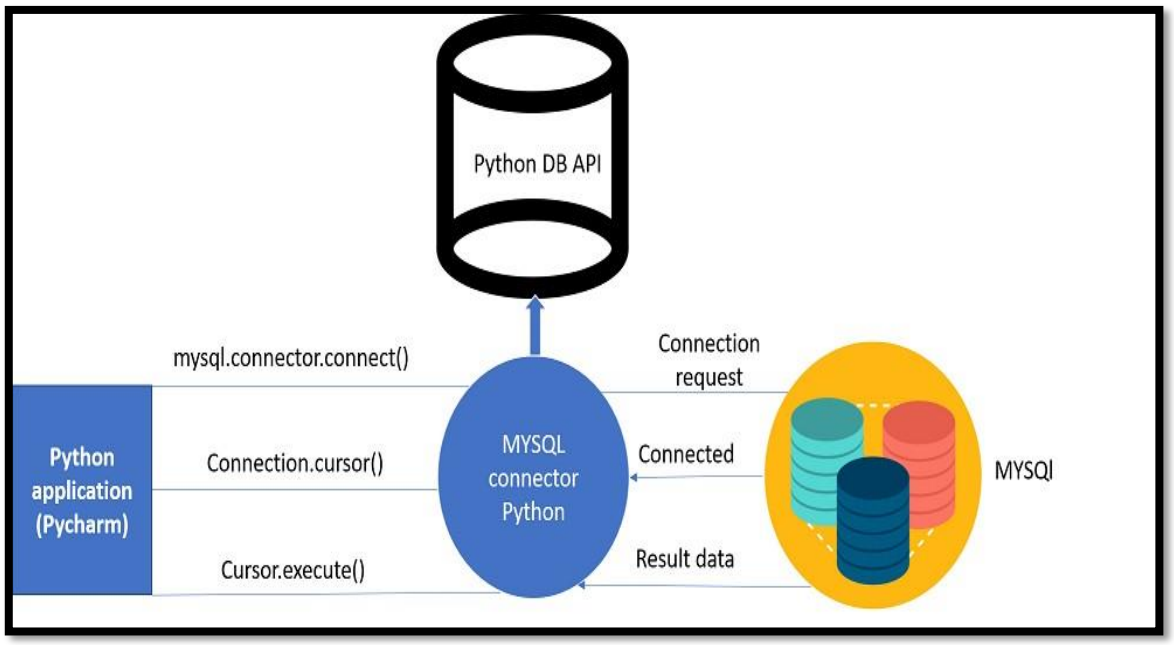

- Before connecting to the MySQL database, make sure you have MySQLinstaller installed on your computer.
- It provides a comprehensive set of tools which helps in installing MySQL withthe following components

  - MySQL server
  - All available connectors
  - MySQL Workbench
  - MySQL Notifier
  - Tools for Excel and Microsoft Visual Studio
  - MySQL Sample Databases
  - MySQL Documentation

1 Word Question – Answer

SR.NO	QUESTION	ANSWER
1	Before connecting to the MySQL database, make sure you have_____installed on your computer.	MySQL installer

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Q-3 How to verify installation of MySQL dB interface.

Detail :-

Install mysql.connector

- To connect the python application with the MySQL database, we must importthe mysql.connector module in the program.
- The mysql.connector is not a built-in module that comes with the pythoninstallation. We need to install it to get it working.
- Execute the following command to install it using pip installer.
- > python -m pip install mysql-connector

Or follow the following steps.

1. Click the link to download the source code :

https://files.pythonhosted.org/packages/8f/6d/fb8ebcbbaee68b172ce3dfd08c7b8660d09f91d8d5411298bcacbd309f96/mysql-connector-python-8.0.13.tar.gz

- Open the terminal (CMD for windows) and change the present workingdirectory to the source code directory.
- **$ cd mysql-connector-python-8.0.13/**

1. Run the file named setup.py with python (python3 in case you have also installedpython 2) with the parameter build.

- **$ python setup.py build**

Run the following command to install the mysql-connector

- **$ python setup.py install**
- This will take a bit of time to install mysql-connector for python. We can verify the installation once the process gets over by importing mysql-connector on the python shell.

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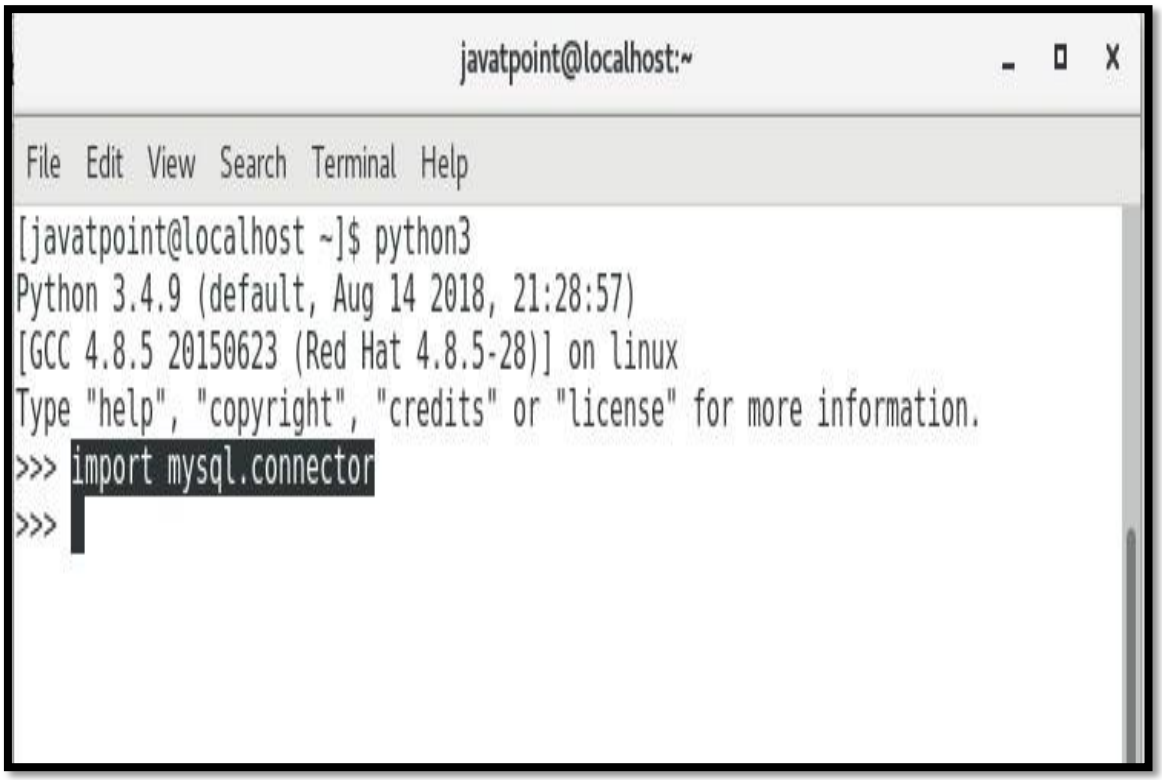

- Hence, we have successfully installed mysql-connector for python on oursystem.

1 Word Question – Answer

SR.NO	QUESTION	ANSWER
1	To connect the python application with the MySQL database, we must import the_____module.	mysql.connector
2	_____Command can be used to install mysql-connector	python setup.py install

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Q-4 Write note on working with MySQL Database.

Detail :-

Database Connection

- In this section ,we will discuss the steps to connect the python application tothe database.
- There are the following steps to connect a python application to our database.

Import mysql.connector module

Create the connection object.

Create the cursor objectExecute the query

Creating the connection

- To create a connection between the MySQL database and the python application, the connect() method of mysql.connector module is used.
- Pass the database details like HostName, username, and the database password in the method call. The method returns the connection object.

- The syntax to use the connect() is given below.

Connection-Object= mysql.connector.connect(host = <host- name> , user = <username> , passwd = <password>)

- Consider the following example.

Example

```
1. import mysql.connector
2. #Create the connection object
3. myconn = mysql.connector.connect(host = "localhost", user = "root",passwd = "google")
```

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```
4. #printing the connection object
       print(myconn)
```

Output:

<mysql.connector.connection.MySQLConnection object at 0x7fb142edd780>

- Here, we must notice that we can specify the database name in the connect()method if we want to connect to a specific database.

Creating a cursor object

- The cursor object can be defined as an abstraction specified in the Python DB-API 2.0.
- It facilitates us to have multiple separate working environments through thesame connection to the database.
- We can create the cursor object by calling the 'cursor' function of theconnection object.
- The cursor object is an important aspect of executing queries to thedatabases.

The syntax to create the cursor object is given below

<my_cur> = conn.cursor()

Example :-

```
1. import mysql.connector
2. #Create the connection object
3. myconn = mysql.connector.connect(host = "localhost", user = "root",passwd
   = "google", database = "mydb")
4. #printing the connection object
5. print(myconn)6
6. creating the cursor
object
7. cur = myconn.cursor()
8. print(cur)
```

Output :-

<mysql.connector.connection.MySQLConnection object at 0x7faa17a15748>
MySQLCursor: (Nothing executed yet)

1 Word Question – Answer

SR.NO	QUESTION	ANSWER
1	To create a connection between the MySQL database and the python application, the_____method can be used.	connect()
2	The_____object is an important aspect of executing queries to the databases.	cursor

Q-5Write note on creating new MySQL Database.

Detail :-

- In this section , we will create the new database PythonDB.

Getting the list of existing databases

- We can get the list of all the databases by using the following MySQL query.
  - show database

Example :-

```
1.import
mysql.connector2.
3. #Create the connection object


4. myconn = mysql.connector.connect(host = "localhost", user = "root",passwd
   = "google")

5. #creating the cursor object
6. cur = myconn.cursor()
```

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```
7. try:
8.     dbs = cur.execute("show databases")


9. except:
10.    myconn.rollback()
11.for x in cur:
12.    print(x)
13.myconn.close()
```

```
('EmployeeDB',)
('Test',)
('TestDB',)
('information_schema',)
('javatpoint',)
('javatpoint1',)
('mydb',)
('mysql',)
('performance_schema',)
('testDB',)
```

Creating the new database

- The new database can be created by using the following SQL query.

> **create database <database-name>Example**

```
1. import mysql.connector
2. #Create the connection object
3. myconn = mysql.connector.connect(host = "localhost", user = "root",passwd
   = "google")
4. #creating the cursor object
5. cur = myconn.cursor()


6. try:
7.     #creating a new database
```

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```
8.  cur.execute("create database PythonDB2")
9.  #getting the list of all the databases which will now include the new
    database PythonDB
10. dbs = cur.execute("show databases")

11. except:
12.
        myconn.rollback
()13.for x in cur:
14.      print(x)
15.myconn.close()
```

Output :-

```
('EmployeeDB',)
('PythonDB',)
('Test',)
('TestDB',)
('anshika',)
('information_schem
a',) ('javatpoint',)
('javatpoint1',)
('mydb',)


('mydb1',)
('mysql',)
('performance_schema',)
('testDB',)
```

1 Word Question – Answer

SR.NO	QUESTION	ANSWER
1	The syntax for creating new database is _____	create database <databasename>

2	_____Method can be used to execute particular query.	execute()
3	_____ method can be used to close the connection.	close()

Q-6 Write note on creating Database Table through Python.

Detail :-

Creating the table

- In this section , we will create the new table Employee. We have to mentionthe database name while establishing the connection object.
- We can create the new table by using the CREATE TABLE statement of SQL. In our database PythonDB, the table Employee will have the four columns, i.e., name, id, salary, and department_id initially.
- The following query is used to create the new table Employee.

> **create table Employee (name varchar(20) not null, id int primarykey, salary float not null, Dept_Id int not null)**

Example :-

```
1. import mysql.connector
2. #Create the connection object
3. myconn = mysql.connector.connect(host = "localhost", user = "root",passwd = "google",database = "PythonDB")
4. #creating the cursor object

5. cur = myconn.cursor()


6. try:
7.    #Creating a table with name Employee having four columns i.e., name, id, salary, and department id
8.    dbs = cur.execute("create table Employee(name varchar(20) not null, id int (20) not null primary key, salary float not null, Dept_id int not null)")
9. except:
```

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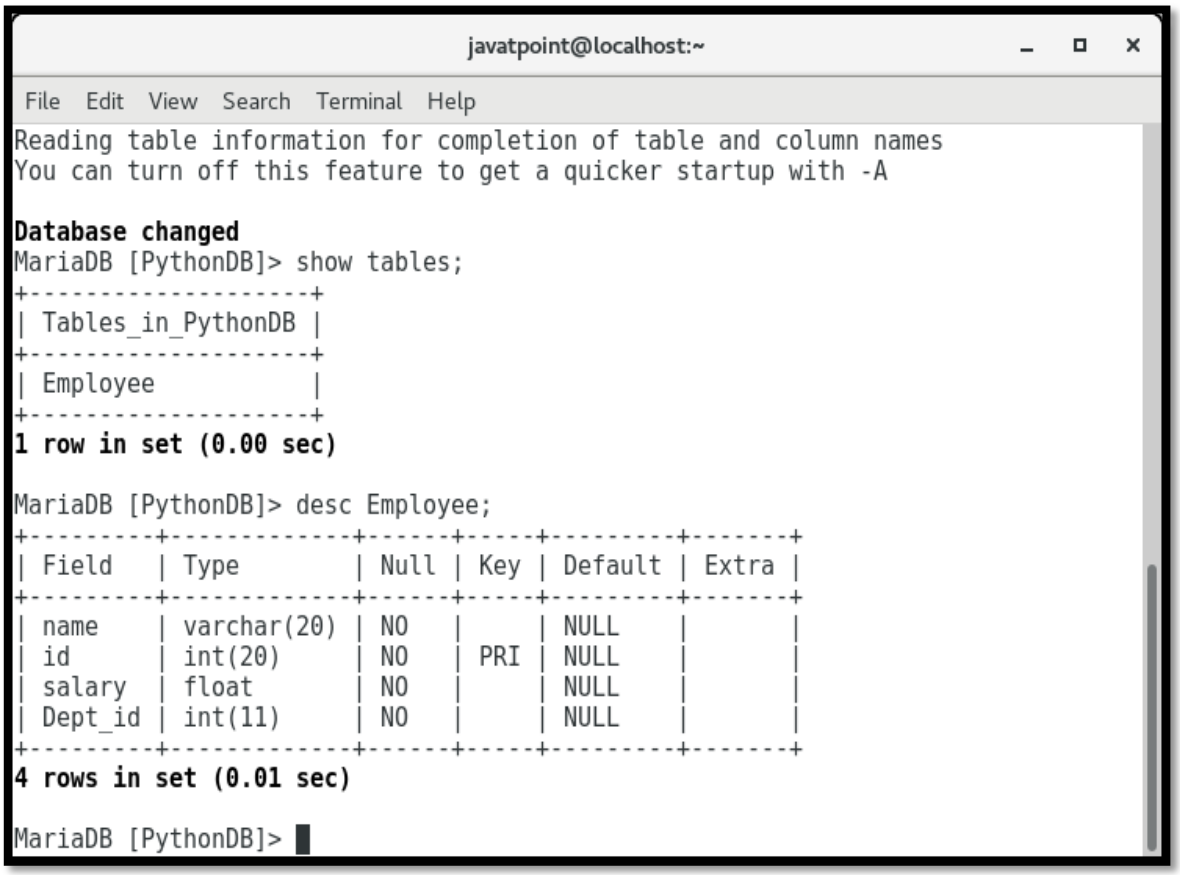
10. **myconn.rollback()**
11. **Myconn.close()**



- Now, we may check that the table Employee is present in the database.

Alter Table

- Sometimes, we may forget to create some columns, or we may need to updatethe table schema.
- The alter statement used to alter the table schema if required.
- Here, we will add the column branch_name to the table Employee.
- The following SQL query is used for this purpose.

alter table Employee add branch_name varchar(20) not null

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```
1. import mysql.connector

2. #Create the connection object

3. myconn = mysql.connector.connect(host = "localhost", user = "root",passwd
   = "google",database = "PythonDB")
4.
5. #creating the cursor object
6. cur = myconn.cursor()
7. try:
8.     #adding a column branch name to the table Employee
9.     cur.execute("alter table Employee add branch_name varchar(20) not null")
10.    except:
11.    myconn.rollback()
12.    Myconn.close()
```

```
javatpoint@localhost:~
File  Edit  View  Search  Terminal  Help
Server version: 10.1.30-MariaDB MariaDB Server

Copyright (c) 2000, 2017, Oracle, MariaDB Corporation Ab and others.

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

MariaDB [(none)]> use PythonDB
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
MariaDB [PythonDB]> desc Employee;
+-------------+-------------+------+-----+---------+-------+
| Field       | Type        | Null | Key | Default | Extra |
+-------------+-------------+------+-----+---------+-------+
| name        | varchar(20) | NO   |     | NULL    |       |
| id          | int(20)     | NO   | PRI | NULL    |       |
| salary      | float       | NO   |     | NULL    |       |
| Dept_id     | int(11)     | NO   |     | NULL    |       |
| branch_name | varchar(20) | NO   |     | NULL    |       |
+-------------+-------------+------+-----+---------+-------+
5 rows in set (0.00 sec)

MariaDB [PythonDB]>
```

1 Word Question – Answer

SR.NO	QUESTION	ANSWER
1	Table can be created using _____ statement	Create Table

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2	_____module must be import to connect with mysql.	mysql.connector
3	_____method can be used to close the connection.	mysql.close()

Q-7 Write note on inserting rows into table.

Detail :-

Insert Operation - Adding a record to the table

The **INSERT INTO** statement is used to add a record to the table. In python, wecan mention the format specifier (%s) in place of values

- We provide the actual values in the form of tuple in the execute() method ofthe cursor.

Example :-

```
1. import mysql.connector
2. #Create the connection object
3. myconn = mysql.connector.connect(host = "localhost", user = "root",passwd
   = "google",database = "PythonDB")
4. #creating the cursor object
5. cur = myconn.cursor()
6. sql = "insert into Employee(name, id, salary, dept_id, branch_name) values (
   %s, %s, %s, %s, %s)"
7. #The row values are provided in the form of tuple8.
8. val = ("John", 110, 25000.00, 201, "Newyork")

9. try:
10.    #inserting the values into the table
11.    cur.execute(sql,val)
12.    #commit the transaction
13.    myconn.commi
t()14.    except:
15.    myconn.rollback()
16.print(cur.rowcount,"record
inserted!")17.myconn.close()
```

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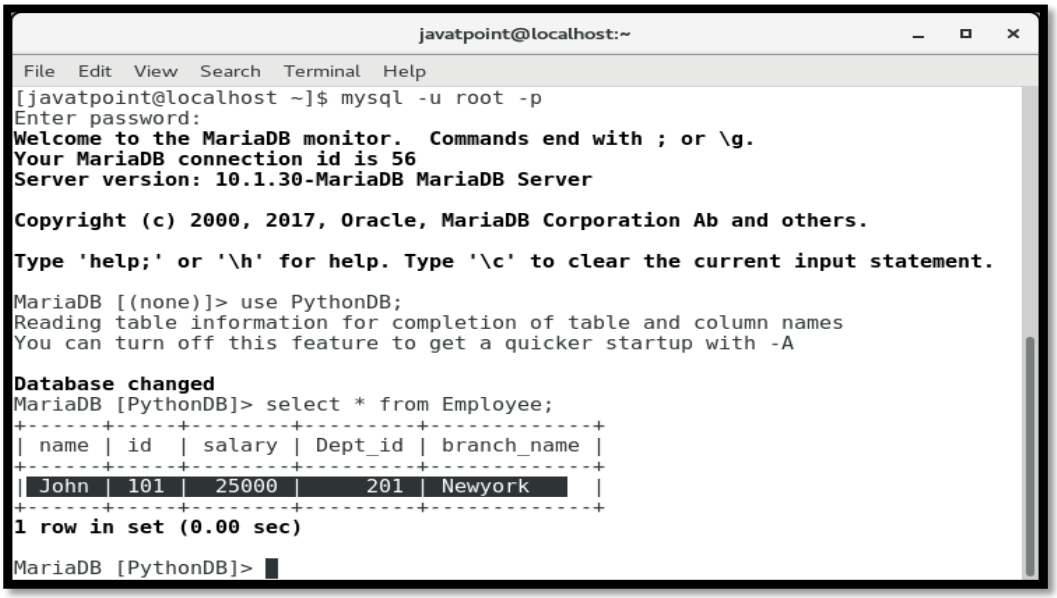
Output :-



1 record inserted!

Insert multiple rows

- We can also insert multiple rows at once using the python script.
- The multiple rows are mentioned as the list of various tuples.
- Each element of the list is treated as one particular row, whereas each element of the tuple is treated as one particular column value (attribute).

Example :-

```
1. import mysql.connector
2. #Create the connection object
3. myconn = mysql.connector.connect(host = "localhost", user = "root",passwd
   = "google",database = "PythonDB")
4. #creating the cursor object
5. cur = myconn.cursor()
```

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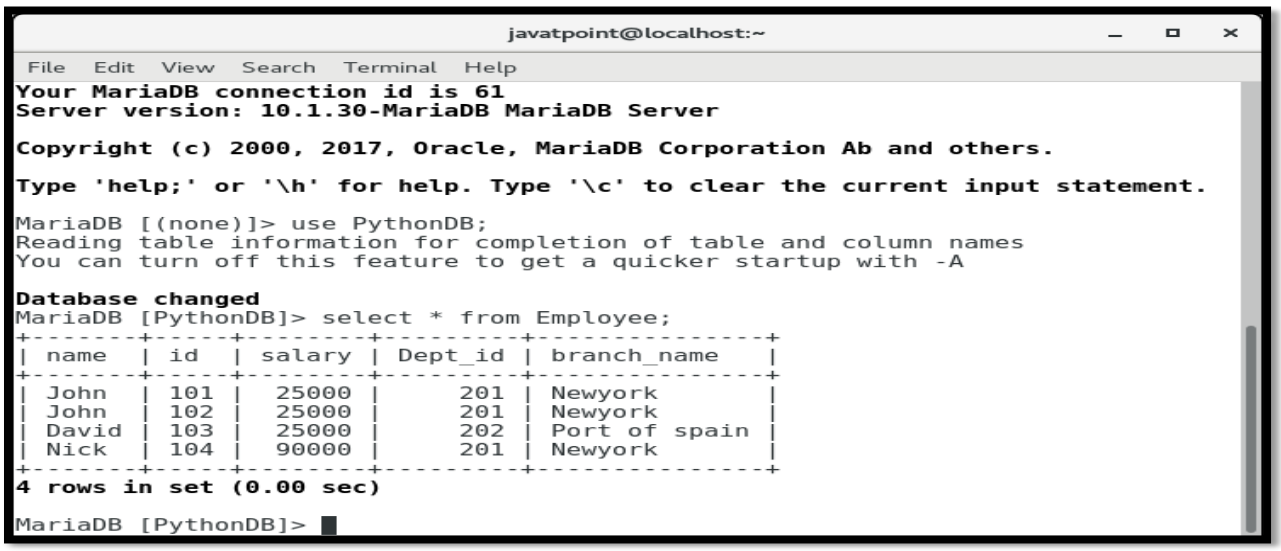
```
6.  sql = "insert into Employee(name, id, salary, dept_id, branch_name) values (
    %s, %s, %s, %s, %s)"


7. val = [("John", 102, 25000.00, 201, "Newyork"),("David",103,25000.00,202,"P
    ort of spain"),("Nick",104,90000.00,201,"Newyork")]
8.  try:
9.      #inserting the values into the table
10.     cur.executemany(sql,val)
11.     #commit the transaction
12.     myconn.commit()
13.     print(cur.rowcount,"records
inserted!")14.except:
15.     myconn.rollback()
    myconn.close()
```

Output :-

3 records inserted!



Row ID

- In SQL, a particular row is represented by an insertion id which is known asrow id.
- We can get the last inserted row id by using the attribute last rowid of thecursor object.

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```
1. import mysql.connector
2. #Create the connection object
3. myconn = mysql.connector.connect(host = "localhost", user = "root",passwd
   = "google",database = "PythonDB")
4. #creating the cursor object
5. cur = myconn.cursor()
6. sql = "insert into Employee(name, id, salary, dept_id, branch_name) values (
   %s, %s, %s, %s, %s)"

7. val = ("Mike",105,28000,202,"Guyana")
8. try:
9.     #inserting the values into the table

10.    cur.execute(sql,val)
11.    #commit the transaction
12.    myconn.commit()
13.    #getting rowid
14.    print(cur.rowcount,"recordinserted! id:",cur.lastrowid)
15.    except:
16.myconn.rollback
()17.myconn.close()
```

Output :-

1 record inserted! Id: 0

1 Word Question – Answer

SR.NO	QUESTION	ANSWER
1	The_____statement is used to add a record to the table.	insert into
2 -	In SQL, a particular row is represented by an insertion id which is known as_____	row id
3	We can also insert multiple rows at once using_____.	python script

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Q-8Write note on Retrieving all the rows from a table.

Detail :-

Read Operation

- You can use either **fetchone()** method to fetch single record or **fetchall()** method to fetech multiple values from a database table.

- **fetchone()** − It fetches the next row of a query result set. A result set is anobject that is returned when a cursor object is used to query a table.
- **fetchall()** − It fetches all the rows in a result set. If some rows have already been extracted from the result set, then it retrieves the remaining rows fromthe result set.
- **rowcount** − This is a read-only attribute and returns the number of rows thatwere affected by an execute() method

- The SELECT statement is used to read the values from the databases. We can restrict the output of a select query by using various clause in SQL like where,limit, etc.
- Python provides the fetchall() method returns the data stored inside the tablein the form of rows. We can iterate the result to get the individual rows.

- In this section of the tutorial, we will extract the data from the database by using the python script. We will also format the output to print it on the console.

Example :-

```
1. import mysql.connector
2. #Create the connection object
3. myconn = mysql.connector.connect(host = "localhost", user = "root",
passwd= "google",database = "PythonDB")
4. #creating the cursor object
5. cur = myconn.cursor()
6. try:
7.    #Reading the Employee data
8.    cur.execute("select * from Employee")
```

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```
#fetching the rows from the cursor object
result = cur.fetchall()
#printing the result
for x in result:
    print(x);
except:
myconn.rollback()
myconn.close()
```

/*Output:

```
('John', 101, 25000.0, 201, 'Newyork')
('John', 102, 25000.0, 201, 'Newyork')
('David', 103, 25000.0, 202, 'Port of spain')
('Nick', 104, 90000.0, 201, 'Newyork')
('Mike', 105, 28000.0, 202, 'Guyana')
```

Reading specific columns

- We can read the specific columns by mentioning their names instead of usingstar (*).

- In the following example, we will read the name, id, and salary from theEmployee table and print it on the console.

Example :-

```
import mysql.connector
#Create the connection object
myconn = mysql.connector.connect(host = "localhost", user = "root",
passwd= "google",database = "PythonDB")
#creating the cursor object
cur = myconn.cursor()


try:
    #Reading the Employee data
    cur.execute("select name, id, salary from Employee")
```

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```
9.
10.  #fetching the rows from the cursor object
11.  result = cur.fetchall()
12.  #printing the result
13.  for x in result:
14.      print(x);
15.except:
16.
       myconn.rollbac
k()17.myconn.close()
```

Output :-

```
('John', 101, 25000.0)
('John', 102, 25000.0)
('David', 103, 25000.0)
('Nick', 104, 90000.0)
('Mike', 105, 28000.0)
```

The fetchone() method

- The fetchone() method is used to fetch only one row from the table.
- The fetchone() method returns the next row of the result-set.

Example :-

```
1. import mysql.connector
2. #Create the connection object
3. myconn = mysql.connector.connect(host = "localhost", user = "root",passwd
   = "google",database = "PythonDB")
4. #creating the cursor object
5. cur = myconn.cursor()
6. try:
7.     #Reading the Employee data
8.     cur.execute("select name, id, salary from Employee")
9.     #fetching the first row from the cursor object
10.    result = cur.fetchone()
11.    #printing the result
```

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```
12. print(result)

13.except:
14. myconn.rollback()
15. myconn.close()
```

Output :-
'John', 101, 25000.0)

Formatting the result

- We can format the result by iterating over the result produced by the fetchall() or fetchone() method of cursor object since the result exists as the tuple objectwhich is not readable.

Example :-

```
1. import mysql.connector
2. #Create the connection object
3. myconn = mysql.connector.connect(host = "localhost", user = "root",passwd
   = "google",database = "PythonDB")
4. #creating the cursor object

5. cur = myconn.cursor()
6. try:
7.    #Reading the Employee data
8.    cur.execute("select name, id, salary from Employee")
9.    #fetching the rows from the cursor object
10.   result = cur.fetchall()
11.   print("Name  id   Salary");
12.   for row in result:
13.      print("%s  %d
      %d"%(row[0],row[1],row[2])) 14.except:
15.   myconn.rollback()
16.   myconn.close()
```

Output :-

```
Name   Id   Salary
John   101   25000
John   102   25000
David103     25000
```

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Nick 104 90000
Mike 105 28000

Using where clause

- We can restrict the result produced by the select statement by using thewhere clause.
- This will extract only those columns which satisfy the where condition.

Example: printing the names that start with j

```
1. import mysql.connector
2. #Create the connection object
3. myconn = mysql.connector.connect(host = "localhost", user = "root",passwd
   = "google",database = "PythonDB")
4. #creating the cursor object
5. cur = myconn.cursor()

6. try:
7.     #Reading the Employee data
8.     cur.execute("select name, id, salary from Employee where name like 'J%'")

9.     #fetching the rows from the cursor object
10.    result = cur.fetchall()
11.    print("Name  id   Salary");
12.    for row in result:
13.       print("%s  %d
%d"%(row[0],row[1],row[2])) 14.except:
15.myconn.rollback
()16.myconn.close()
```

```
Name   id
Salary      John
            101
            25000
John   102   25000
```

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Example: printing the names with id = 101, 102, and 103

Example :-

```
1. myconn = mysql.connector.connect(host = "localhost", user = "root",passwd
   = "google",database = "PythonDB")
2. #creating the cursor object
3. cur = myconn.cursor()
4. try:

5.    #Reading the Employee data
6.    cur.execute("select name, id, salary from Employee where id in
   (101,102,103)")
7.    #fetching the rows from the cursor object
8.    result = cur.fetchall()
9.    print("Name  id   Salary");
10.   for row in result:
13.      print("%s %d
%d"%(row[0],row[1],row[2]))
14.except:
15.   myconn.rollback()


16.myconn.close()
```

Ordering the result

- The ORDER BY clause is used to order the result.

Example

```
1. import mysql.connector
2. #Create the connection object
3. myconn = mysql.connector.connect(host = "localhost", user = "root",passwd
   = "google",database = "PythonDB")
4. #creating the cursor object
5. cur = myconn.cursor()
6. try:
7.    #Reading the Employee data
```

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3 – Vaishalinagar
Nr. Amrapali Under Bridge
Raiya Road
Rajkot – 360001

```
8.  cur.execute("select name, id, salary from Employee order by name")
9.    #fetching the rows from the cursor object
10.  result = cur.fetchall()
11.  print("Name  id   Salary");
12.  for row in result:
13.     print("%s  %d     %d"%(row[0],row[1],row[2]))
14.except:
15.myconn.rollback
()16.myconn.close()
```

Output:

```
Name   id
          Salary
David  103
          25000
John   101   25000
John   102   25000
Mike   105   28000
Nick   104    90000
```

Order by DESC

- This orders the result in the decreasing order of a particular column.

Example

```
1.  import mysql.connector
2.  #Create the connection object
3.  myconn = mysql.connector.connect(host = "localhost", user = "root",passwd
    = "google",database = "PythonDB")
4.  #creating the cursor object
5.  cur = myconn.cursor()
6.  try:
7.     #Reading the Employee data
8.     cur.execute("select name, id, salary from Employee order by name desc")
9.     #fetching the rows from the cursor object
10.    result = cur.fetchall()
```

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3 – Vaishalinagar
Nr. Amrapali Under Bridge
Raiya Road
Rajkot – 360001

```
11. #printing the result
12. print("Name  id   Salary");
13. for row in result:
14.print("%s       %d %d"%(row[0],row[1],row[2])) \
15.
15.except:
16.  myconn.rollback()
17.myconn.close()
```

Output:

```
Name   id   Salary
Nick  104   90000
Mike   105   28000
John   101   25000
John   102   25000
David  103   25000
```

1 Word Question – Answer

SR.NO	QUESTION	ANSWER
1	_____method can be used to fetch single record	fetchone()
2	_____method fetches all the rows in a result set	fetchall()
3	_____method is used to returns the number of rows that were affected.	rowcount()

Q-9Write note on Updating Rows in a table.

Detail :-

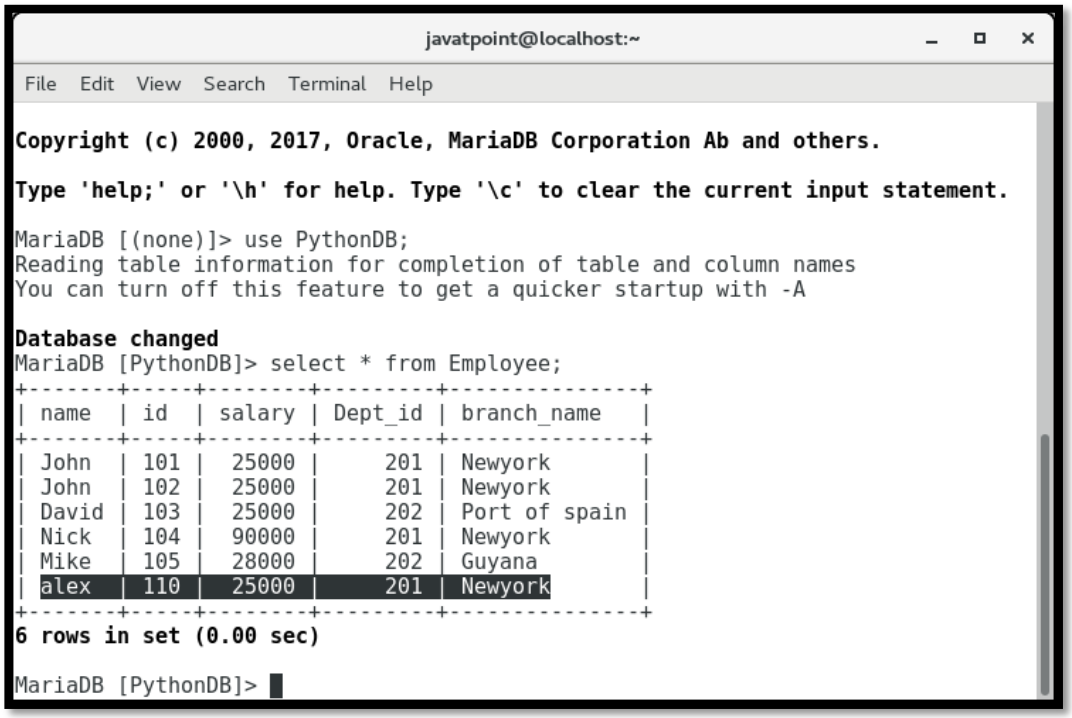
Update Operation

- The UPDATE-SET statement is used to update any column inside the table.
- The following SQL query is used to update a column.
- UPDATE Operation on any database means to update one or more records,which are already available in the database.

> update Employee set name = 'alex' where id = 110

Example :-

```
1. import mysql.connector
2. #Create the connection object
3. myconn = mysql.connector.connect(host = "localhost", user = "root",
   passwd= "google",database = "PythonDB")
4. #creating the cursor object
5. cur = myconn.cursor()
6. try:
7.     #updating the name of the employee whose id is 110
8.     cur.execute("update Employee set name = 'alex' where id = 110")
9.     myconn.commit()
10.    except:
11.    myconn.rollback()
12.    myconn.close()
```



1 Word Question – Answer

SR.NO	QUESTION	ANSWER
1	_____statement is used to update any column inside the table.	UPDATE-SET
2	_____method can be used to save the updation on record.	commit()

Q-10Write note on Deleting Rows from a table.

Detail :-

Delete Operation

- The DELETE FROM statement is used to delete a specific record from the table. Here, we must impose a condition using WHERE clause otherwise all the records from the table will be removed.
- The following SQL query is used to delete the employee detail whose id is 110from the table.

> delete from students where rollno = 4

```
1. import mysql.connector
2. #Create the connection object
3. myconn = mysql.connector.connect(host = "localhost", user = "root",passwd
 = "google",database = "PythonDB")
4. #creating the cursor object
5. cur = myconn.cursor()
6. try:
7.     #Deleting the student details whose rollno is 4
```

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Rajkot – 360001

3 – Vaishalinagar
Nr. Amrapali Under Bridge
Raiya Road
Rajkot – 360001

8. **cur.execute("delete from students where rollno = 4")**
9. **myconn.commit()**

10.except:
11.myconn.rollback
()12.myconn.close()

```
mysql> delete from students where rollno=4;
Query OK, 0 rows affected (0.05 sec)

mysql> select * from students;
+--------+--------+-----------------+--------+
| Name   | Branch | Address         | Rollno |
+--------+--------+-----------------+--------+
| Ramesh | CSE    | 149 Indirapuram |      1 |
| Peter  | ME     | Noida           |      2 |
| Amy    | CE     | New Delhi       |      3 |
+--------+--------+-----------------+--------+
3 rows in set (0.00 sec)
```

1 Word Question – Answer

SR.NO	QUESTION	ANSWER
1	The_____statement is used to delete a specific record from the table.	DELETE FROM
2	_____clause must be used to remove or delete particular record from the table.	WHERE