Database Connectivity

what is Data?

it is a raw fact,that can be processed.

types' of data?

the data can be categorized into 3-types,they are

1).Structured data
the data represented in the form of tables i.e., row and columns.

2).Semi-Structured data
the data repressented in the form of json,xml,xlsx,csv,....

3).Unstructured data
the data represented in the form of graphs,maps,images,video,audio,...

what is database?

it collection of organized,related data.

types of databases?

the Databases can be categorized into 2-types,they are

1).SQL databases
these Databases are used to store the structured data.

ex: Oracle,Sqlite,Mysql,Postgresql,Teradata,...

2).No-Sql Database
these Databases are used to store any type of data.

ex: MongoDB,Cassandra,DynamoDB,Neo4j,Bigtable,..

what is DBMS?

DBMS(DataBase Management Systems) is software,which is used to create,manipulate and delete the databases.

RDBMS(Relational Database Management System)
ORDBMS(Object Relational DataBase management System)

what is SQL?

SQL(Structured Query Language) is a Query language,which is used to communicate the databases.

the basic SQL commands are

- DDL(Data Definition Languages)
  - Create
  - Alter
    - add
    - modify
    - rename
    - drop
  - Rename
  - Drop
  - Truncate
- DML(Data Manipulation Languages)
  - Update
  - Insert
  - Delete
- DRL/DQL(Data Retreival/Query Languages)
  - Select
- DCL(Data Control Languages)
  - Grant
  - Revoke
- TCL(Transaction Control Languages)
  - Commit
  - Rollback
  - Savepoint

if we want to connect and communicate the Databases through the python programs,to required following things,

- Database Server(locally/remotely)
- That particular Database server related python packages

DataBase Server	python package
Oracle	cx_Oracle
sqlite3	sqlite3(by default)
My-SQL	mysql-connector-python
postgresql	psycopg2
mongoDB	pymongo
....	....
....	....

how to install 3rd party packages in python?
---

we can install 3rd party packages in python by using "pip"

pip(python installation package)is a python package manager,to handle the installation and uninstallation of packages.

pip install packagename

ex:
--
C:\Python310\Scripts>pip install cx_Oracle

C:\Python310\Scripts>pip install mysql-connector-python

how to uninstall 3rd party packages in python?
---
we can uninstall 3rd party packages in python by using "pip".

pip uninstall packagename

ex:
C:\Python310\Scripts>pip uninstall cx_Oracle

C:\Python310\Scripts>pip uninstall mysql-connector-python

working with sqlite database:
---
if we want to working with sqlite database dont required sqlite database server.

sqlite3 package is a builtin package.

ex1:
---
wap to create a database?

```
import sqlite3
sqlite3.connect("employe.db")
print("Database Created Successfully")
```

output:

Database Created Successfully

ex2:
---
wap to create a table?

```
create table tablename(column_name datatype(size) constraint,
                       column_name datatype(size),
                                  ......
```

```
                                ......
                            column_name datatype(size));
```

```
import sqlite3
conn_obj=sqlite3.connect("employe.db")
print("Connection establish")
cur_obj=conn_obj.cursor()
cur_obj.execute("create table emp(eid integer primary key,\
ename string,sal double(6,2),dno integer)")
print("Table created Successfully")
cur_obj.close()
conn_obj.close()
print("Connection Closeing")

output:
------
Connection establish
Table created Successfully
Connection Closeing

ex3:
---
wap to insert the data into the database?

        insert into tablename values(vlaue_1,value_2,....,value_n);

import sqlite3
conn_obj=sqlite3.connect("employe.db")
print("Connection establish")
cur_obj=conn_obj.cursor()
cur_obj.execute("insert into emp values(101,'siva',3000,10)")
cur_obj.execute("insert into emp values(102,'rama',3100,20)")
cur_obj.execute("insert into emp values(103,'sachin',2500,30)")
cur_obj.execute("insert into emp values(104,'dhoni',2800,10)")
cur_obj.execute("insert into emp values(105,'virat',3000,30)")
cur_obj.execute("insert into emp values(106,'laxma',2900,10)")
cur_obj.execute("insert into emp values(107,'drvid',3100,20)")
cur_obj.execute("insert into emp values(108,'krishna',2600,30)")
cur_obj.execute("insert into emp values(109,'rohith',3000,10)")
cur_obj.execute("insert into emp values(110,'ganully',3100,30)")
cur_obj.execute("insert into emp values(111,'ishanth',2800,20)")
print("Records are inserted Successfully")
cur_obj.execute("commit")
print("Commit completed")
cur_obj.close()
conn_obj.close()
print("Connection Closeing")

output:
```

```
------
Connection establish
Records are inserted Successfully
Commit completed
Connection Closeing
```

ex4:
---
wap to Retreive the data from the database?

```
        select * from tablename;

                (or)

        select col_1,col_2,...,col_n from tablename;
```

```
import sqlite3
conn_obj=sqlite3.connect("employe.db")
print("Connection establish")
cur_obj=conn_obj.cursor()
cur_obj.execute("select * from emp")
for rec in cur_obj:
    print(rec)
cur_obj.close()
conn_obj.close()
print("Connection Closeing")
```

output:
```
------
Connection establish
(101, 'siva', 3000.0, 10)
(102, 'rama', 3100.0, 20)
(103, 'sachin', 2500.0, 30)
(104, 'dhoni', 2800.0, 10)
(105, 'virat', 3000.0, 30)
(106, 'laxma', 2900.0, 10)
(107, 'drvid', 3100.0, 20)
(108, 'krishna', 2600.0, 30)
(109, 'rohith', 3000.0, 10)
(110, 'ganully', 3100.0, 30)
(111, 'ishanth', 2800.0, 20)
Connection Closeing
```

ex5:
---
wap to fecth only one record from cursor object?

        we can fetch only one record from cursor object by calling fetchone() of cursor object.

```
import sqlite3
conn_obj=sqlite3.connect("employe.db")
print("Connection establish")
cur_obj=conn_obj.cursor()
cur_obj.execute("select * from emp")
rec=cur_obj.fetchone()
print(rec)
cur_obj.close()
conn_obj.close()
print("Connection Closeing")

output:
-----
Connection establish
(101, 'siva', 3000.0, 10)
Connection Closeing

ex6:
----
wap to fetch many records from the cursor object?

        we can fetch morethan one record from the cursor object,in that case we are
using fetchmany(N) of cursor object.

        the fetchmany(n) to return the N-records in the form of list object.


import sqlite3
conn_obj=sqlite3.connect("employe.db")
print("Connection establish")
cur_obj=conn_obj.cursor()
cur_obj.execute("select * from emp")
records=cur_obj.fetchmany(3)
print(records)
cur_obj.close()
conn_obj.close()
print("Connection Closeing")

output:
-----
Connection establish
[(101, 'siva', 3000.0, 10), (102, 'rama', 3100.0, 20), (103, 'sachin', 2500.0, 30)]
Connection Closeing

ex7:
---
wap to ferch all the records from cursor object?

        we can fetch all the records from cursor object by calling fetchall() of
```

cursor object.

the fetchall() to return the output as list object.

```
import sqlite3
conn_obj=sqlite3.connect("employe.db")
print("Connection establish")
cur_obj=conn_obj.cursor()
cur_obj.execute("select * from emp")
records=cur_obj.fetchall()
print(records)
cur_obj.close()
conn_obj.close()
print("Connection Closeing")
```

output:

```
Connection establish
[(101, 'siva', 3000.0, 10), (102, 'rama', 3100.0, 20), (103, 'sachin', 2500.0, 30),
(104, 'dhoni', 2800.0, 10), (105, 'virat', 3000.0, 30), (106, 'laxma', 2900.0, 10),
(107, 'drvid', 3100.0, 20), (108, 'krishna', 2600.0, 30), (109, 'rohith', 3000.0,
10), (110, 'ganully', 3100.0, 30), (111, 'ishanth', 2800.0, 20)]
Connection Closeing
```

how to filter the records?
---

we can filter the records by using where clause.

select * from tablename where condition;

ex8:
---
wap to fetch employe details,whose employe working under department no 10?

```
import sqlite3
conn_obj=sqlite3.connect("employe.db")
print("Connection establish")
cur_obj=conn_obj.cursor()
cur_obj.execute("select * from emp where dno=10")
for rec in cur_obj:
    print(rec)
cur_obj.close()
conn_obj.close()
print("Connection Closeing")
```

output:

```
Connection establish
(101, 'siva', 3000.0, 10)
```

```
(104, 'dhoni', 2800.0, 10)
(106, 'laxma', 2900.0, 10)
(109, 'rohith', 3000.0, 10)
Connection Closeing
```

ex9:
---
wap to fetch employe details,whose employe working under department no 10 and which employe name endswith 'a' ?

```
import sqlite3
conn_obj=sqlite3.connect("employe.db")
print("Connection establish")
cur_obj=conn_obj.cursor()
cur_obj.execute("select * from emp where dno=10")
for rec in cur_obj:
    print(rec)
print('*'*20)
cur_obj.execute("select * from emp where dno=10 and ename like '%a'")
for rec in cur_obj:
    print(rec)
cur_obj.close()
conn_obj.close()
print("Connection Closeing")
```

output:

```
Connection establish
(101, 'siva', 3000.0, 10)
(104, 'dhoni', 2800.0, 10)
(106, 'laxma', 2900.0, 10)
(109, 'rohith', 3000.0, 10)
********************
(101, 'siva', 3000.0, 10)
(106, 'laxma', 2900.0, 10)
Connection Closeing
```

ex10:
----
wap to fetch employe details,whose employe working under department no 10 and which employe name startswith 's' ?

```
import sqlite3
conn_obj=sqlite3.connect("employe.db")
print("Connection establish")
cur_obj=conn_obj.cursor()
cur_obj.execute("select * from emp where dno=10")
for rec in cur_obj:
    print(rec)
print('*'*20)
```

```
cur_obj.execute("select * from emp where dno=10 and ename like 's%'")
for rec in cur_obj:
    print(rec)
cur_obj.close()
conn_obj.close()
print("Connection Closeing")

output:
------
Connection establish
(101, 'siva', 3000.0, 10)
(104, 'dhoni', 2800.0, 10)
(106, 'laxma', 2900.0, 10)
(109, 'rohith', 3000.0, 10)
********************
(101, 'siva', 3000.0, 10)
Connection Closeing

ex11:
----
wap to fetch employe details,whose employe working under department no 10 and which
employe name contains 'i' ?

import sqlite3
conn_obj=sqlite3.connect("employe.db")
print("Connection establish")
cur_obj=conn_obj.cursor()
cur_obj.execute("select * from emp where dno=10")
for rec in cur_obj:
    print(rec)
print('*'*20)
cur_obj.execute("select * from emp where dno=10 and ename like '%i%'")
for rec in cur_obj:
    print(rec)
cur_obj.close()
conn_obj.close()
print("Connection Closeing")

output:
------
Connection establish
(101, 'siva', 3000.0, 10)
(104, 'dhoni', 2800.0, 10)
(106, 'laxma', 2900.0, 10)
(109, 'rohith', 3000.0, 10)
********************
(101, 'siva', 3000.0, 10)
(104, 'dhoni', 2800.0, 10)
(109, 'rohith', 3000.0, 10)
Connection Closeing
```

ex12:
----
wap to fetch employe details,whose employe working under department no 10 and which employe name contains second charecter 'i' ?

```
import sqlite3
conn_obj=sqlite3.connect("employe.db")
print("Connection establish")
cur_obj=conn_obj.cursor()
cur_obj.execute("select * from emp where dno=10")
for rec in cur_obj:
    print(rec)
print('*'*20)
cur_obj.execute("select * from emp where dno=10 and ename like '_i%'")
for rec in cur_obj:
    print(rec)
cur_obj.close()
conn_obj.close()
print("Connection Closeing")
```

output:

```
Connection establish
(101, 'siva', 3000.0, 10)
(104, 'dhoni', 2800.0, 10)
(106, 'laxma', 2900.0, 10)
(109, 'rohith', 3000.0, 10)
********************
(101, 'siva', 3000.0, 10)
Connection Closeing
```

ex13:
----
wap to fetch employe details,whose employe working under department no 10 and which employe name dont contains 'i' charecter?

```
Connection establish
(101, 'siva', 3000.0, 10)
(104, 'dhoni', 2800.0, 10)
(106, 'laxma', 2900.0, 10)
(109, 'rohith', 3000.0, 10)
********************
(106, 'laxma', 2900.0, 10)
Connection Closeing
```

ex14:
----
wap to fetch employe details,whose employe getting the salary greaterthan or equal to 3000?

```
import sqlite3
conn_obj=sqlite3.connect("employe.db")
print("Connection establish")
cur_obj=conn_obj.cursor()
cur_obj.execute("select * from emp")
for rec in cur_obj:
    print(rec)
print('*'*20)
cur_obj.execute("select * from emp where sal>=3000")
for rec in cur_obj:
    print(rec)
cur_obj.close()
conn_obj.close()
print("Connection Closeing")
```

ex15:
---
wap to fetch employe details,whose employe getting the salary between 2800 and 3000?

```
import sqlite3
conn_obj=sqlite3.connect("employe.db")
print("Connection establish")
cur_obj=conn_obj.cursor()
cur_obj.execute("select * from emp")
for rec in cur_obj:
    print(rec)
print('*'*20)
cur_obj.execute("select * from emp where sal between 2800 and 3000")
for rec in cur_obj:
    print(rec)
cur_obj.close()
conn_obj.close()
print("Connection Closeing")
```

output:

```
Connection establish
(101, 'siva', 3000.0, 10)
(102, 'rama', 3100.0, 20)
(103, 'sachin', 2500.0, 30)
(104, 'dhoni', 2800.0, 10)
(105, 'virat', 3000.0, 30)
(106, 'laxma', 2900.0, 10)
(107, 'drvid', 3100.0, 20)
(108, 'krishna', 2600.0, 30)
(109, 'rohith', 3000.0, 10)
(110, 'ganully', 3100.0, 30)
(111, 'ishanth', 2800.0, 20)
```

```
********************
(101, 'siva', 3000.0, 10)
(104, 'dhoni', 2800.0, 10)
(105, 'virat', 3000.0, 30)
(106, 'laxma', 2900.0, 10)
(109, 'rohith', 3000.0, 10)
(111, 'ishanth', 2800.0, 20)
Connection Closeing
```

ex16:
---
wap to fetch employe details,whose employe getting the salary in 2800 and 3000?

```
import sqlite3
conn_obj=sqlite3.connect("employe.db")
print("Connection establish")
cur_obj=conn_obj.cursor()
cur_obj.execute("select * from emp")
for rec in cur_obj:
    print(rec)
print('*'*20)
cur_obj.execute("select * from emp where sal in(2800,3000)")
for rec in cur_obj:
    print(rec)
cur_obj.close()
conn_obj.close()
print("Connection Closeing")
```

output:

```
Connection establish
(101, 'siva', 3000.0, 10)
(102, 'rama', 3100.0, 20)
(103, 'sachin', 2500.0, 30)
(104, 'dhoni', 2800.0, 10)
(105, 'virat', 3000.0, 30)
(106, 'laxma', 2900.0, 10)
(107, 'drvid', 3100.0, 20)
(108, 'krishna', 2600.0, 30)
(109, 'rohith', 3000.0, 10)
(110, 'ganully', 3100.0, 30)
(111, 'ishanth', 2800.0, 20)
********************
(101, 'siva', 3000.0, 10)
(104, 'dhoni', 2800.0, 10)
(105, 'virat', 3000.0, 30)
(109, 'rohith', 3000.0, 10)
(111, 'ishanth', 2800.0, 20)
Connection Closeing
```

ex17:
----
wap to fetch employe details,whose employe getting the salary not in 2800 and 3000?

```
import sqlite3
conn_obj=sqlite3.connect("employe.db")
print("Connection establish")
cur_obj=conn_obj.cursor()
cur_obj.execute("select * from emp")
for rec in cur_obj:
    print(rec)
print('*'*20)
cur_obj.execute("select * from emp where sal not in(2800,3000)")
for rec in cur_obj:
    print(rec)
cur_obj.close()
conn_obj.close()
print("Connection Closeing")
```

output:

```
Connection establish
(101, 'siva', 3000.0, 10)
(102, 'rama', 3100.0, 20)
(103, 'sachin', 2500.0, 30)
(104, 'dhoni', 2800.0, 10)
(105, 'virat', 3000.0, 30)
(106, 'laxma', 2900.0, 10)
(107, 'drvid', 3100.0, 20)
(108, 'krishna', 2600.0, 30)
(109, 'rohith', 3000.0, 10)
(110, 'ganully', 3100.0, 30)
(111, 'ishanth', 2800.0, 20)
********************
(102, 'rama', 3100.0, 20)
(103, 'sachin', 2500.0, 30)
(106, 'laxma', 2900.0, 10)
(107, 'drvid', 3100.0, 20)
(108, 'krishna', 2600.0, 30)
(110, 'ganully', 3100.0, 30)
Connection Closeing
```

ex18:
----
wap to get the employe details,whose employe to get the maximum salary?

```
import sqlite3
conn_obj=sqlite3.connect("employe.db")
print("Connection establish")
```

```
cur_obj=conn_obj.cursor()
cur_obj.execute("select * from emp")
for rec in cur_obj:
    print(rec)
print('*'*20)
cur_obj.execute("select * from emp where sal=(select max(sal) from emp)")
for rec in cur_obj:
    print(rec)
cur_obj.close()
conn_obj.close()
print("Connection Closeing")
```

how to ordereing the records?
---
we can ordering the records by using "order by" clause

```
select * from tablename order by columnname ordertype;
                                                  |
                            asc for ascending order(by default)
                            desc for descending order
```

ex19:
---
wap to print employe details in ascending order based on salary?

```
import sqlite3
conn_obj=sqlite3.connect("employe.db")
print("Connection establish")
cur_obj=conn_obj.cursor()
cur_obj.execute("select * from emp")
for rec in cur_obj:
    print(rec)
print('*'*20)
cur_obj.execute("select * from emp order by sal")
for rec in cur_obj:
    print(rec)
cur_obj.close()
conn_obj.close()
print("Connection Closeing")
```

output:

```
Connection establish
(101, 'siva', 3000.0, 10)
(102, 'rama', 3100.0, 20)
(103, 'sachin', 2500.0, 30)
(104, 'dhoni', 2800.0, 10)
(105, 'virat', 3000.0, 30)
```

```
(106, 'laxma', 2900.0, 10)
(107, 'drvid', 3100.0, 20)
(108, 'krishna', 2600.0, 30)
(109, 'rohith', 3000.0, 10)
(110, 'ganully', 3100.0, 30)
(111, 'ishanth', 2800.0, 20)
********************
(103, 'sachin', 2500.0, 30)
(108, 'krishna', 2600.0, 30)
(104, 'dhoni', 2800.0, 10)
(111, 'ishanth', 2800.0, 20)
(106, 'laxma', 2900.0, 10)
(101, 'siva', 3000.0, 10)
(105, 'virat', 3000.0, 30)
(109, 'rohith', 3000.0, 10)
(102, 'rama', 3100.0, 20)
(107, 'drvid', 3100.0, 20)
(110, 'ganully', 3100.0, 30)
Connection Closeing
```

ex20:
---
wap to print employe details in descending order based on salary?

```
import sqlite3
conn_obj=sqlite3.connect("employe.db")
print("Connection establish")
cur_obj=conn_obj.cursor()
cur_obj.execute("select * from emp")
for rec in cur_obj:
    print(rec)
print('*'*20)
cur_obj.execute("select * from emp order by sal desc")
for rec in cur_obj:
    print(rec)
cur_obj.close()
conn_obj.close()
print("Connection Closeing")
```

output:

```
Connection establish
(101, 'siva', 3000.0, 10)
(102, 'rama', 3100.0, 20)
(103, 'sachin', 2500.0, 30)
(104, 'dhoni', 2800.0, 10)
(105, 'virat', 3000.0, 30)
(106, 'laxma', 2900.0, 10)
(107, 'drvid', 3100.0, 20)
(108, 'krishna', 2600.0, 30)
```

```
(109, 'rohith', 3000.0, 10)
(110, 'ganully', 3100.0, 30)
(111, 'ishanth', 2800.0, 20)
********************
(102, 'rama', 3100.0, 20)
(107, 'drvid', 3100.0, 20)
(110, 'ganully', 3100.0, 30)
(101, 'siva', 3000.0, 10)
(105, 'virat', 3000.0, 30)
(109, 'rohith', 3000.0, 10)
(106, 'laxma', 2900.0, 10)
(104, 'dhoni', 2800.0, 10)
(111, 'ishanth', 2800.0, 20)
(108, 'krishna', 2600.0, 30)
(103, 'sachin', 2500.0, 30)
Connection Closeing

how to update the records?
--------------------------
        we can update the records by using update command

        update tablename set condition where condition;

ex21:
---
wap to update the employe salary 3500,whose employe working under department number
10 and which employename contains 'h' charecter?

import sqlite3
conn_obj=sqlite3.connect("employe.db")
print("Connection establish")
cur_obj=conn_obj.cursor()
print("Before Update")
cur_obj.execute("select * from emp where dno=10")
for rec in cur_obj:
    print(rec)
print('*'*20)
cur_obj.execute("update emp set sal=3500 where dno=10 and ename like '%h%'")
print("Updated Successfully")
print("After Update")
cur_obj.execute("select * from emp where dno=10")
for rec in cur_obj:
    print(rec)
cur_obj.execute("rollback")
print("Rollback Completed")
print("After rollback")
cur_obj.execute("select * from emp where dno=10")
for rec in cur_obj:
    print(rec)
cur_obj.close()
```

```
conn_obj.close()
print("Connection Closeing")

output:
------
Connection establish
Before Update
(101, 'siva', 3000.0, 10)
(104, 'dhoni', 2800.0, 10)
(106, 'laxma', 2900.0, 10)
(109, 'rohith', 3000.0, 10)
********************
Updated Successfully
After Update
(101, 'siva', 3000.0, 10)
(104, 'dhoni', 3500.0, 10)
(106, 'laxma', 2900.0, 10)
(109, 'rohith', 3500.0, 10)
Rollback Completed
After rollback
(101, 'siva', 3000.0, 10)
(104, 'dhoni', 2800.0, 10)
(106, 'laxma', 2900.0, 10)
(109, 'rohith', 3000.0, 10)
Connection Closeing

how to delete the records?
--------------------------
        we can delete the records by using delete command

        delete from tablename where condition;

ex22:
-----
wap to delete the employe records,whose employe working under department number 10
and which employename contains 'h' charecter?

import sqlite3
conn_obj=sqlite3.connect("employe.db")
print("Connection establish")
cur_obj=conn_obj.cursor()
print("Before Delete")
cur_obj.execute("select * from emp where dno=10")
for rec in cur_obj:
    print(rec)
print('*'*20)
cur_obj.execute("delete from emp where dno=10 and ename like '%h%'")
print("Deleted Successfully")
print("After Delete")
cur_obj.execute("select * from emp where dno=10")
```

```
for rec in cur_obj:
    print(rec)
try:
    cur_obj.execute("commit")
    print("commit completed")
    cur_obj.execute("rollback")
except:
    print("Once commit the transaction we cant rollback the data")
    cur_obj.execute("select * from emp where dno=10")
    for rec in cur_obj:
        print(rec)
else:
    print("Rollback Completed")
    print("After rollback")
    cur_obj.execute("select * from emp where dno=10")
    for rec in cur_obj:
        print(rec)
finally:
    cur_obj.close()
    conn_obj.close()
print("Connection Closeing")

output:
------
Connection establish
Before Delete
(101, 'siva', 3000.0, 10)
(104, 'dhoni', 2800.0, 10)
(106, 'laxma', 2900.0, 10)
(109, 'rohith', 3000.0, 10)
********************
Deleted Successfully
After Delete
(101, 'siva', 3000.0, 10)
(106, 'laxma', 2900.0, 10)
commit completed
Once commit the transaction we cant rollback the data
(101, 'siva', 3000.0, 10)
(106, 'laxma', 2900.0, 10)
Connection Closeing
```