**ASSESSMENT 2**

1) What is Thread and Multithreading?

Answer- A thread is an independent unit of execution created within the context of a process (or application that is being executed). When multiple threads are executing in a process at the same time, we get the term “multithreading.” Think of it as the application's version of multitasking.

2) what is concurrency and parallelism and what are the differences?

Answer- Concurrency is when two or more tasks can start, run, and complete in overlapping time periods. It doesn't necessarily mean they'll ever both be running at the same instant. For example, multitasking on a single-core machine. Concurrency is a condition that exists when at least two threads are making progress. A more generalized form of parallelism that can include time-slicing as a form of virtual parallelism. Parallelism is when tasks literally run at the same time, e.g., on a multicore processor. Parallelism: A condition that arises when at least two threads are executing simultaneously.

3) What is a Garbage Collector in Python? How does it work?

Answer- The garbage collector is keeping track of all objects in memory. A new object starts its life in the first generation of the garbage collector. If Python executes a garbage collection process on a generation and an object survives, it moves up into a second, older generation.

4) What is Transaction Management in a relational database (give an example)?

Answer- Transaction in RDBMS is a small process, a transaction takes place whenever we perform read or write operations. For a successful transaction, ACID properties must be followed.

ACID properties are:

Atomicity

Consistency

Isolation

Durability

Example –

CREATE TABLE REGION

(RegionID integer primary key,

RegionName varchar(20)

);

CREATE TABLE COUNTRY

(CountryID integer primary key,

CountryName varchar(20),

RegionID integer foreign key references REGION(RegionID)

);

Insert INTO REGION (RegionID, RegionName) values

(1,'North'),

(2,'SOUTH'),

(3,'EAST'),

(4,'WEST');

INSERT INTO COUNTRY (CountryID, CountryName, RegionID) VALUES

(1,'EUROPE',1),

(2,'Costa Rica',2),

(3,'Fiji',2);

Begin Transaction

Select RegionName from COUNTRY

Join REGION

On COUNTRY.RegionID=REGION.RegionID

Commit;

5) What is an API endpoint and what are the most common methods to interact? Answer- An API endpoint is a point at which an API -- the code that allows two software programs to communicate with each other -- connects with the software program. APIs work by sending requests for information from a web application or web server and receiving a response. APIs do the same for all interactions between applications, data, and devices.

6) Database Normalization is a process and it should be carried out for every database you design. The process of taking a database design, and apply a set of formal criteria and rules, is called Normal Forms. The database normalization process is further categorized into the following types:

First Normal Form (1 NF)

Second Normal Form (2 NF)

Third Normal Form (3 NF)

Boyce Codd Normal Form or Fourth Normal Form (BCNF or 4 NF)

Fifth Normal Form (5 NF)

Sixth Normal Form (6 NF)

Example –

SELECT empNum, lastName, firstName, deptNum, deptName, deptCity, deptCountry

FROM Employees A, Departments B, EmpDept C

WHERE A.empNum = C.empNum

AND B.deptNum = C.deptNum

WITH UR;

2) Exceptional Handling and Debugging in python- when a Python script encounters a situation that it cannot cope with, it raises an exception. An exception is a Python object that represents an error. When a Python script raises an exception, it must either handle the exception immediately otherwise it terminates and quits. If you have some suspicious code that may raise an exception, you can defend your program by placing the suspicious code in a try: block. After the try: block, include an except statement, followed by a block of code that handles the problem as elegantly as possible. Syntax- try:

You do your operations here;

except ExceptionI:

If there is ExceptionI, then execute this block.

except ExceptionII:

If there is ExceptionII, then execute this block.

......................

else:

If there is no exception, then execute this block.

Debugging means the complete control over the program execution. Developers use debugging to overcome program from any bad issues. So debugging is a healthier process for the program and keeps the diseases bugs far away. Python also allows developers to debug the programs using pdb module that comes with standard Python by default.

# Program to print Multiplication

# table of a Number

n=5

for x in range (1,11):

print (n, '\*', x, '=', n\*x)

output- 5 \* 1 = 5

5 \* 2 = 10

5 \* 3 = 15

5 \* 4 = 20

5 \* 5 = 25

5 \* 6 = 30

5 \* 7 = 35

5 \* 8 = 40

5 \* 9 = 45

5 \* 10 = 50

This program simply prints the multiplication table but now we need to debug the loop steps using set\_trace() function call to the PDB module.

3)Write a function that takes in a non-empty array of integers that are sorted in ascending order and returns a new array of the same length with the squares of the original integers also sorted in ascending order.

def sortSquare (arr, n):

for i in range(n):

arr[i] = arr[i] \* arr[i]

arr.sort()

# Driver code

arr = [1,2,3,5,6,8,9]

n = len(arr)

print("Before sort")

for i in range(n):

print(arr[i], end=" ")

print("\n")

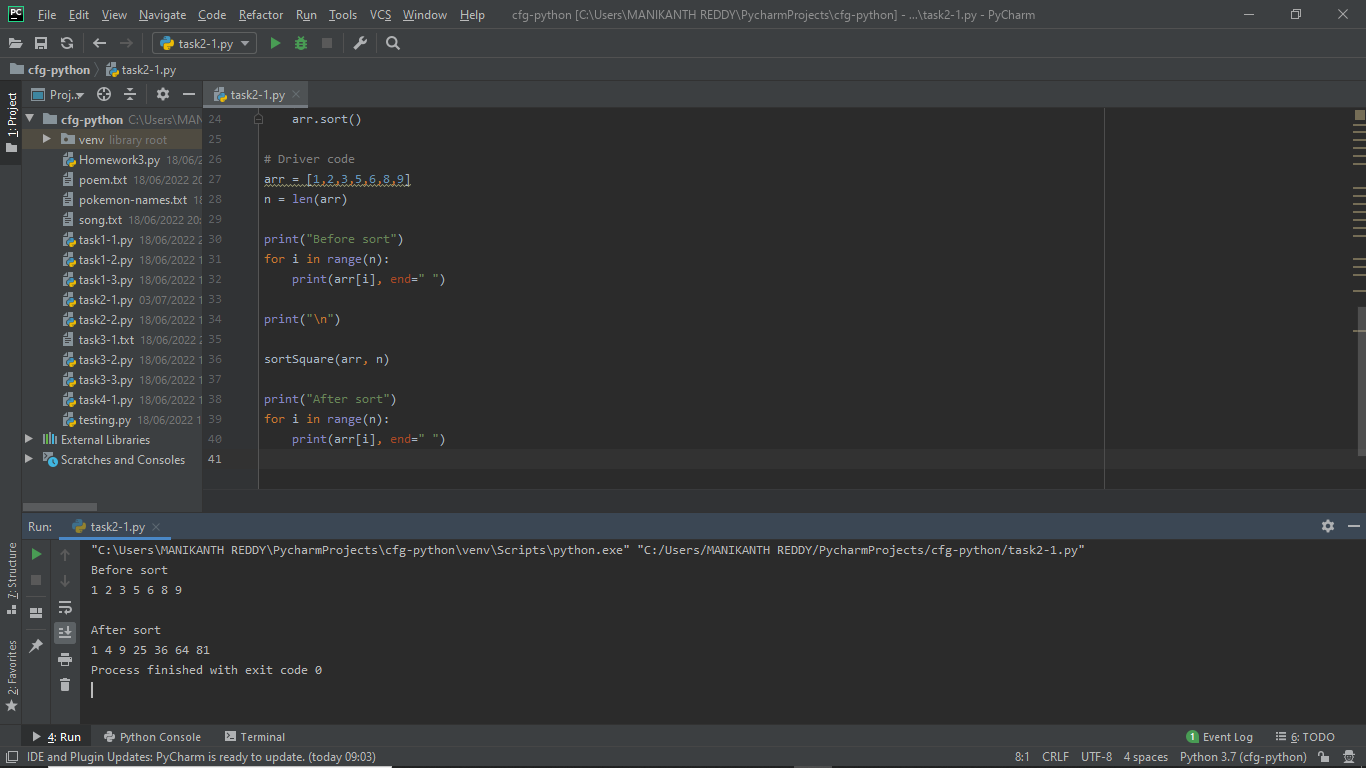
sortSquare(arr, n)

print("After sort")

for i in range(n):

print(arr[i], end=" ")

output-



5)Agile methodology: name and describe any 2 of the main roles in a Scrum Agile team.

Scrum has three roles: product owner, scrum master, and the development team members. The three scrum roles describe the key responsibilities of those on the scrum team. They aren’t jobbing titles. This means that any job title, even your existing ones, can perform one of the roles. Because the essence of scrum is empiricism, self-organization, and continuous improvement, the three roles give a minimum definition of responsibilities and accountability to allow teams to effectively deliver work. This allows teams to take responsibility for how they organize and to keep improving themselves. The development team is the people that do the work. At first glance, you may think the “development team” means engineers. But that’s not always the case. According to the Scrum Guide, the development team can be comprised of all kinds of people including designers, writers, programmers, etc. The development team’s responsibilities include:

Delivering the work through the sprint.

To ensure transparency during the sprint they meet daily at the daily scrum (sometimes called a stand-up). The daily scrum provides transparency to the work and provides a dedicated place for team members to seek help, talk about success and highlight issues and blockers. The scrum master might facilitate the daily scrum, but ultimately it is the responsibility of the development team to run this meeting. It is their meeting to help them, as a group, to inspect and adapt the work they are doing and work in a more effective way.

The product owner should not only understand the customer, but also have a vision for the value the scrum team is delivering to the customer. The product owner also balances the needs of other stakeholders in the organization. The Scrum Guide defines the product owner’s responsibilities as:

Managing the scrum backlog - This does not mean that they are the only ones putting new product backlog items into the backlog. But ultimately they are responsible for the backlog that the development team pulls to deliver from. That means the product owner should know about everything that is in the backlog and other people that add items to the product backlog should ensure that they communicate with the product owner.

Release management - The sprint is not a release cycle, but instead a planning cycle. That means that scrum teams can deliver at any time. Ideally, they would deliver frequently throughout the sprint allowing the sprint review to review real customer usage and feedback. However continuous delivery is not always possible and other release models are required. It is important for the product owner to know when things can and should be released.

Stakeholder management - Any product will have many stakeholders involved ranging from users, customers, governance, and organizational leadership. The product owner will have to work with all these people to effectively ensure that the development team is delivering value. That can mean a large amount of stakeholder management and communication.

6)Discuss the advantages and disadvantages of TDD (Test Driven Development):

Test-Driven Development (TDD) is additionally called test-driven design. TDD may be a method of software development during which ASCII text file is tested over and once again (unit testing). Test-driven development may be a balanced approach for the programming perfectly blended with tightly interwoven three activities: coding, testing (writing unit tests), and designing (refactoring)first goal of correcting specification instead of the validation first. In other words, TDD may be a smart approach to knowing and streamlining the wants before writing the functional code within the line of Agile principles.

Advantages of TDD:

You only write code that’s needed –

Following the principles, you’ve got to prevent writing production code when all of your tests pass. If your project needs another feature, you would like a test to drive the implementation of the feature. The code you write is the simplest code possible. So, all the code ending up within the product is really needed to implement the features.

More modular design –

In TDD, you consider one microfeature at a time. And as you write the test first, the code automatically becomes easy to check. Code that’s easy to check features a clear interface. This leads to a modular design for your application.

Easier to maintain –

Because the different parts of your application are decoupled from one another and have clear interfaces, the code becomes easier to take care of, and you’ll exchange the implementation of a microfeature with a far better implementation without affecting another module. you’ll even keep the tests and rewrite the entire application. When all the tests pass, you’re done.

Easier to refactor –

Every feature is thoroughly tested. you do not get to be afraid to form drastic changes because if all the tests still pass, everything is ok. Now, is extremely important because you, as a developer, improve your skills each and each day. If you open the project after six months of performing on something else, most likely, you will have many ideas on the way to improve the code. But your memory about all the various parts and the way they fit together isn’t fresh anymore. So, making changes is often dangerous. With an entire test suite, you’ll easily improve the code without the fear of breaking your application.

High test coverage –

There’s a test for each feature. This leads to a high test coverage It develops gain confidence in your code.

Tests document the code –

The test code shows you the ways your code is supposed to be used. As such, it documents your code. The test code is a sample code that shows what the code does and the way the interface has got to be used.

Less debugging –

How often have you ever wasted each day seeking out a nasty bug? How often have you copied a mistake message from Xcode and looked for it on the web?

Disadvantages of TDD:

No silver bullet –

Tests help to seek out bugs, but they cannot find bugs that you simply introduce within the test code and in the implementation code. If you haven’t understood the matter you would like to unravel, writing tests most likely doesn’t help.

slow process –

If you begin TDD, you’ll get the sensation that you simply need an extended duration of your time for straightforward implementations. you would like to believe the interfaces, write the test code, and run the tests before you’ll finally start writing the code.

All the members of a team got to do it –

As TDD influences the planning of code, it’s recommended that either all the members of a team use TDD or nobody in the least. additionally, to the present, it’s sometimes difficult to justify TDD to the management because they often have the sensation that the implementation of the latest features takes longer if developers write code that will not find themselves within the product half the time. It helps if the entire team agrees on the importance of unit tests.

Tests got to be maintained when requirements change –

Probably, the strongest argument against TDD is that the tests need to be maintained because the code has got to. Whenever requirements change, you would like to vary the code and tests. But you’re working with TDD. this suggests that you simply got to change the tests first and then make the tests pass. So, actually, this disadvantage is the same as before when writing code that apparently takes an extended time takes long time.

7) What is a Python DB cursor? Provide an example

The MySQLCursor of MySQL-connector-python (and similar libraries) is used to execute statements to communicate with the MySQL database.

Using the methods of it you can execute SQL statements, fetch data from the result sets, and call procedures. You can create Cursor an object using the cursor() method of the Connection object/class.

Example

import mysql.connector

#establishing the connection

conn = mysql.connector.connect(

user='root', password='password', host='127.0.0.1', database='mydb'

)

#Creating a cursor object using the cursor() method

cursor = conn.cursor()

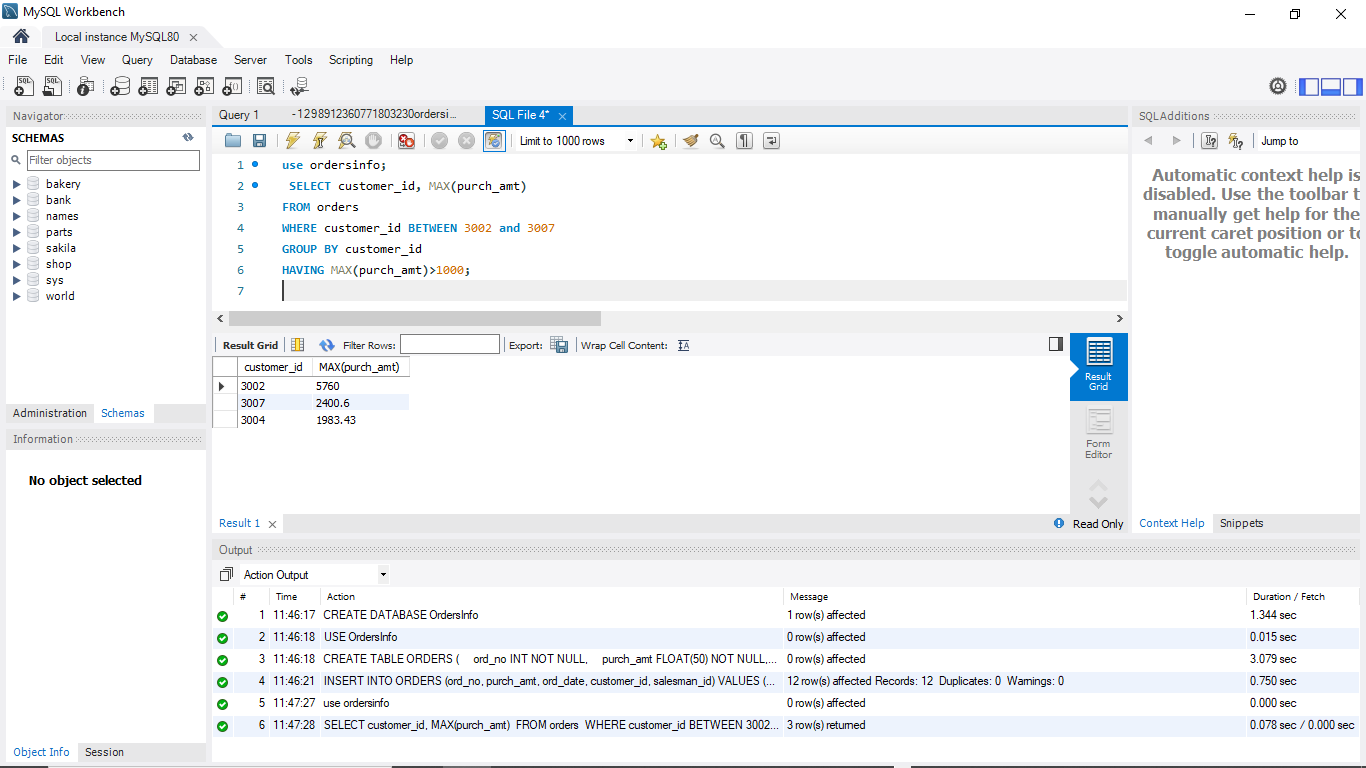
8) SELECT customer\_id, MAX(purch\_amt)

FROM orders

WHERE customer\_id BETWEEN 3002 and 3007

GROUP BY customer\_id

HAVING MAX(purch\_amt)>1000;

Output- 

9)Write a function that takes in a non-empty array of distinct integers and an integer representing a target sum. If any two numbers in the input array sum up to the target sum, the function should return them in an array, in any order. If no to numbers sum up to the target sum, the function should return an empty array.

Note that the target sum has to be obtained by summing two different integers in the array. You cannot add a single integer to itself in order to obtain the target sum.

You can assume that there will be at most one pair of numbers summing up to the target sum.

def two\_num\_sum\_1(num\_arr, num\_target):

for i in range(len(num\_arr) - 1):

for j in range(i + 1, len(num\_arr)):

if num\_arr[i] + num\_arr[j] == num\_target:

return [num\_arr[i], num\_arr[j]]

return []

def two\_num\_sum\_2(num\_arr, num\_target):

seen = set()

for i in num\_arr:

if (num\_target - i) in seen:

return [i, num\_target - i]

seen.add(i)

return []

print(two\_num\_sum\_1([3, 5, -4, 8, 11, 1, -1, 6], 10))

print(two\_num\_sum\_2([3, 5, -4, 8, 11, 1, -1, 6], 10))

output-

