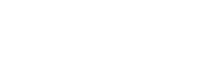
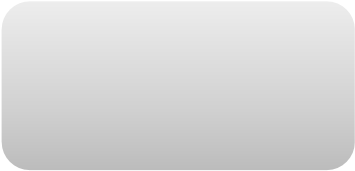
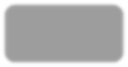
**THEORY QUESTIONS ASSIGNMENT**

**Hani Dore**

Software Stream



**Maximum**  **score: 100**

KEY NOTES

* This assignment to be completed at student’s own pace and submitted before given deadline.

* There are 10 questions in total and each question is marked on a scale 1 to 10. The maximum possible grade for this assignment is 100 points.

* Students are welcome to use any online or written resources to answer these questions.

* The answers need to be explained clearly and illustrated with relevant examples where necessary. Your examples can include code snippets, diagrams or any other evidence-based representation of your answer.

|  |  |
| --- | --- |
| **Theory questions** | **10 point each** |

1. How does Object Oriented Programming differ from Process Oriented Programming?

A computer programming paradigm known as object-oriented programming (OOP) arranges the architecture of software around data or objects rather than functions and logic. An object is a data field with certain characteristics and behaviour. OOP places more emphasis on the objects that programmers desire to manipulate than on the logic necessary to do so. Large, sophisticated, and actively updated or maintained programmes are a good fit for this method of development. This encompasses mobile applications as well as design and production software. OOP, for instance, can be applied to manufacturing system simulation software. Furthermore process oriented programming (POP) is a programming paradigm that is known for creating as an ordered set of sequential steps that are carried out one at a time. It concentrates on the actions needed to execute a task. Most of the time, it is broken down into smaller units called procedures, routines, or functions. Data are treated differently from these functions. POP are easier to manage the course of the program, codes are also easy to reuse with POP. The data stored is not a secure method as many people are able to access it. OOP have more lines of code than POP which can mean that it would take longer to accomplish and can also run slower at times. OOP is used by java, python and c++ and POP are mainly used by pascal and basic.

1. What's polymorphism in OOP?

An essential OOP principle is polymorphism. It speaks about the utilisation of a single type entity to represent a variety of types. For instance, the built-in function len() is still available and may be used with strings, dictionaries, and lists.

1. What's inheritance in OOP?

A class produced by inheritance can inherit the characteristics and functions of the parent class because inheritance enables programmers to create classes that are built upon pre-existing classes. This indicates that inheritance encourages the reuse of code. A subclass is thought of as reusing the methods or, more generally, the software that it has inherited. A directed graph is created by the relationships between objects or classes through inheritance.

1. If you had to make a program that could vote for the top three funniest people in the office, how would you do that? How would you make it possible to vote on those people?

I would need to start with collecting data and setting up requirements such as having a front end so that users can interact with the system, must have a user input so it also individuals to vote and interact with the game. Must also include a table where users votes are stored in the database. Things to consider would include not allowing one voter to vote more than once as it will change the results and would there be a ranking system in the game. SQL Database would be used to store the votes for each voter also so that it stores the information of people who have already voted. We would use python backend to connect the database and function, so the information is gotten. We would also need a server-side API.

1. What's the software development cycle?

Diagram, timeline

Description automatically generated

The software development life cycle is a set of processes that must be completed in order to generate a piece of software. It serves as the foundation for project scheduling and planning. By following the SDLC, you can make sure that the best software is created as quickly and cheaply as you can.

**Stages of SDLC**

The SDLC has 7 stages firstly is the planning stage, then moving on to defining the requirements, design, implementation, software development, testing, deployment and lastly maintenance.

During the planning phase, the project managers define the project and general layout. Discussions and decisions are made regarding the projects' schedule and logistics such as funding for the project and deciding on methodology such as agile or waterfall.

The next stage is the requirement, this is when the project and timeframes for it are concluded and how this can be done within a budget that has been set.

Design is the third stage, and this include design the way your project will work and usually a protype is made. the maintenance and user manual are created which help in the installation and operation system. The design phase usually ends with the customer being happy with the plan and signing off on it.

As soon as the code is finished and the modules are made available for testing, testing begins. The software is rigorously evaluated in this phase, and any flaws are assigned to developers to be corrected. Testing continues until the software satisfies the customer's expectations.

Once the product has been evaluated, either user acceptance testing is conducted, or it is deployed in the production environment.

When performing user acceptance testing, a copy of the production environment is made, and the customer and developers test the software together. The consumer must provide their approval for the application to go online if they find it to be what they expected.

the last stage is maintenance If a problem arises that must be rectified or an improvement needs to be made after a product has been deployed in a production environment, the developers assigned take care of it.

1. What's the difference between agile and waterfall?

Agile involves the team working on several project phases simultaneously, frequently with tight deadlines. In addition, the team determines the project's direction rather than a project manager. This can energise the team and increase productivity, but it also calls for a more independent team. Deliverables are not necessary to move on to the next stage. In large teams with multiple departments, it may be more difficult to guarantee that everyone is on the same page. Additionally, it implies that work may be overlooked or miscommunicated between team members, particularly if new team members join in the middle of ongoing tasks.

The approach is client-facing, so the group communicates progress and takes client comments into account. A well-known agile methodology is scrum, this is done by having sprints, these are short burst of time to make a product and share it and then continuing. A scrum follows this structure:

* Sprint planning
* Daily scrum meeting
* Sprint review
* Sprint retrospective meeting. Diagram

  Description automatically generated

Projects where the end outcome is known from the outset are best managed using the waterfall methodology, which is a linear approach. To go on to the following stage, it is necessary to meet the requirements for the project and the deliverables of each stage. This can have some benefits such as having a plan from start to finish and can save time as team members have established requirements for the project from early on. However, on the other hand this could be an issue as some problems may arise during a phase and you will not be aware until you have already moved on. This can be frustrating and waste a lot of time.

A blue screen with white text

Description automatically generated with low confidence

To conclude, waterfall methodology is more rigorous, whereas agile methodology has more room for change and adaption, a lot of developers use agile method for this reason as it is also less time consuming.

1. What is a reduced function used for?

When you need to apply a function to an iterable and reduce it to a single cumulative value, you use the reduce function. This eliminates the need for a for loop by condensing the iterable to a single cumulative value. Function and iterable are the two arguments for the reduce function. To produce a final value, the function argument will be applied to the iterables. A loopable second parameter is used. This could consist of dictionaries, tuples, sets or lists.

1. How does merge sort work

The merge sort method breaks the list into halves when sorting elements in a list and in ascending order. It then iterates through the new halves, gradually breaking them down to their smaller parts.

Diagram

Description automatically generated

The final sorted list is created after doing a comparison of smaller halves and combining the outcomes.

1. Generators - Generator functions allow you to declare a function that behaves like an iterator, i.e. it can be used in a for loop. What is the use case?

Generators are essentially functions that return items or objects that can be traversed. These processes only work when necessary and manufacture each item individually rather than all of them at once. To iterate over a set of things, generators are used instead of "for" loops.

1. Decorators - A page for useful (or potentially abusive?) decorator ideas. What is the return type of the decorator?

A Python design pattern called a decorator enables users to add additional functionality to an existing object without changing the object's structure. Usually, you call the decorators before you define the function you want to decorate.