Foundation 2 Assessment
Lorelle Brownlee

PYTHON THEORY QUESTIONS

1. What is the program?

A programme is a set of encoded instructions that are written in a computer programming language. It is translated by the computer from computer programming language to machine code, which the computer can read to interpret the instructions given.

2. What is the process?

A process is the event of a computer programme being executed or running. A process is what takes place when a computer programme is executing the instructions encoded in its code and it includes both the activity being performed by the code as well as the reading of the code itself. Many processes can be taking place at any given time.

3. What is Cache?

Cache is a kind of computer memory that is held in a separate storage area from where the computer's main data storage is. It is a rapid, easily accessible kind of data storage. However, it is demanding of energy and takes up more memory space than other kinds of memory. It is useful for tasks that are frequently undertaken, as it can speed up data retrieval.

4. What is thread and multithreading?

When a programme is executed, the path of execution it takes is known as a thread. This can include the passing of values to different variables, modules and functions, amongst other things. Programmes can be executed as one single thread or as multiple threads.

5. What is GIL in Python and how does it work?

GIL stands for Global Interpreter Lock. This is an in-built feature that allows the Python interpreter, the feature that translates Python to machine code, to be controlled by a single thread in order to help prevent freezes in the programme due to deadlocks in multithread code.

6. What is concurrency and parallelism and what are the differences?

Parallelism is the process of performing multiple computational tasks at one time to help speed up execution of the programme. Tasks must be broken down into smaller pieces of work in order to execute them in parallel.

Concurrency is similar to parallelism, but instead of executing smaller parts of one task at any one time, multiple whole tasks are processed at once.

In parallelism, if multiple tasks are executed, they will be executed in small pieces of each task, and one whole task will be completed before the next whole task is started. However in concurrency, whole tasks are processed simultaneously, and one task does not need to be completed before the next is started.

7. What do these stand for in programming?

DRY - 'Don't Repeat Yourself'. This encourages programmers to keep code simple to speed up performance and improve readability.
KISS - ' Keep It Simple Stupid'. This encourages programmers to write no more and no less code than required, to optimise performance.
BDUF - 'Big Design Up Front'. This encourages programmers to have a project complete and functioning effectively before release or implementation.

8. What is a garbage collector?

A garbage collector is an in-built feature of code that aids in memory management. It can fix circular references, which are problems in the code where for example an object references itself or two objects reference each other, creating an aberrant circular movement of data.

9. What are a deadlock and livelock in a relational database?

A deadlock is a situation in a relational database where two or more transactions are left waiting for the other transactions to give up locks, which are in-built features that maintain data integrity. If the locks are not given up, the transaction cannot progress and it is left at a standstill.
A livelock is a situation where a request for a lock is denied over and over again, due to many processes overlapping their locks. This causes the locks to move from process to process without any progress being made in completion of the transaction.

10. **What is flask and what can we use it for?**

Flask is an in-built Python module designed as a web application framework, which accommodates easier writing of web-based applications. The module helps programmers to not have to focus on low-level programming features, for example thread management.

11. **Discuss the difference between Python 2 and 3**

There are a number of differences between Python 2 and Python 3. The more notable differences are that Python 3 has a wider range of libraries for a wider range of purposes, strings in Python 2 were stored as ASCII characters but are stored as UNICODE characters in Python 3, and Python 3 uses the range() function while the xrange() function was used in Python 2. Overall the syntax in Python 2 was more complicated than the syntax in Python 3.

Question 5:

Agile methodology- name at least 3 types of meetings that are exercised by agile teams and describe the objective of each meeting

- Daily scrum meeting . - This is a short daily meeting where the team developers meet to update each other on current progress towards the goals of that sprint, and what the goals for the upcoming day will be.
- Sprint retrospective meeting- this is a meeting that takes place at the end of a Sprint, where the team reflect upon what went well during that Sprint and what can be improved upon during the next Sprint. It aims to help improve the effectiveness of the team in future work.
- Sprint review meeting - this meeting is between the team and end users, and is where the team will present their work to the end users. The team will receive feedback on the product at this meeting, and are able to respond to it by making adjustments later on.

Question 6:

Exception handling: Describe what each mean

- Try - this lets you test a piece of code for errors
- Except - lets you code a way of dealing with the error, for example by raising a Value Error.
- Else - this is executed when your code makes it through the test without an error, and tells the computer what the next step in the programme is.

- Finally - this is a piece of code that is executed whether the rest of the code passes the test or not.

Question 7:

How can we connect a Python programme (process) with a database? Explain how it works and how do we fetch/insert data into DB tables from a Python programme?

Python is often used to import, extract and manipulate data on a higher level than what is achievable through using a database management system, such as MySQL. Python and a DBMS need an additional programme to link them and help them interact. One Python library that does this is the Python DB-API. Python DB-API can do this by linking to a SQL database by using an API key. Once it is linked, queries can be run through Python to fetch data directly from or insert data directly into the database.