21UAB372: PROBLEM SOLVING USING PYTHON

UNIT 1

**Welcome to Python: What is Python?**

Python is a widely used general-purpose, high-level programming language. It was initially designed by Guido van Rossum in 1991 and developed by [Python](#) Software Foundation. It was mainly developed for emphasis on code readability, and its syntax allows programmers to express concepts in fewer lines of code.

In the late 1980s, history was about to be written. It was that time when working on Python started. Soon after that, Guido Van Rossum began doing its application-based work in December of 1989 at Centrum Wiskunde & Informatica (CWI) which is situated in the **Netherlands**. It was started firstly as a hobby project because he was looking for an interesting project to keep him occupied during Christmas. The programming language in which Python is said to have succeeded is ABC Programming Language, which had interfacing with the Amoeba Operating System and had the feature of exception handling. He had already helped to create ABC earlier in his career and he had seen some issues with ABC but liked most of the features. After that what he did was really very clever. He had taken the syntax of ABC, and some of its good features. It came with a lot of complaints too, so he fixed those issues completely and had created a good scripting language that had removed all the flaws. The inspiration for the name came from BBC's TV Show – 'Monty Python's Flying Circus', as he was a big fan of the TV show and also he wanted a short, unique and slightly mysterious name for his invention and hence he named it Python! He was the "Benevolent dictator

for life" (BDFL) until he stepped down from the position as the leader on 12th July 2018. For quite some time he used to work for Google, but currently, he is working at Dropbox.

The language was finally released in 1991. When it was released, it used a lot fewer codes to express the concepts, when we compare it with Java, C++ & C. Its design philosophy was quite good too. Its main objective is to provide code readability and advanced developer productivity. When it was released it had more than enough capability to provide classes with inheritance, several core data types exception handling and functions.

Key Features Of Python
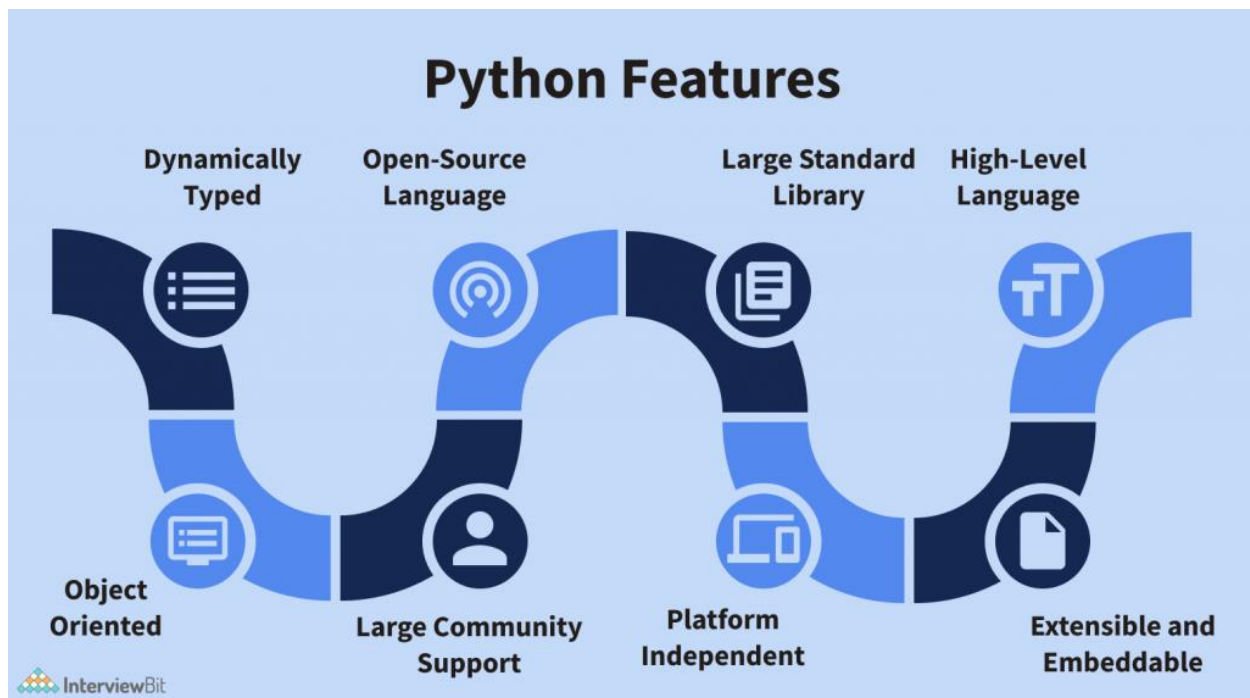
1. Easy To Learn and Readable Language

Python is extremely easy to learn. Its syntax is super simple and the learning curve of Python is very smooth. It is extremely easy to learn and code in Python and the indentation used instead of curly braces in Python makes it very easy to read Python code. Perhaps, because of this, a lot of schools and universities, and colleges are teaching Python to their students who are beginning their journey with coding.

2. Interpreted Language

Python is an interpreted language (an interpreted language is a programming language that is generally interpreted, without compiling a program into machine instructions. It is one where the instructions are not directly executed by the target machine, but instead, read and executed by some other program known as the interpreter) and an IDLE (Interactive Development Environment) is packaged along with Python. It is nothing but an interpreter which follows the REPL (Read Evaluate Print Loop) structure just like in Node.js. IDLE executes and displays the output of one line of Python code at a time. Hence, it displays errors when we are running a line of Python code and displays the entire stack trace for the error.

3. Dynamically Typed Language

Python is a dynamically typed language. In other words, in Python, we do not need to declare the data types of the variables which we define. It is the job of the

Python interpreter to determine the data types of the variables at runtime based on the types of the parts of the expression. Though it makes coding easier for programmers, this property might create runtime errors. To be specific, Python follows duck typing. It means that "If it looks like a duck, swims like a duck and quacks like a duck, it must be a duck."

4. Open Source And Free

Python is an open-source programming language and one can download it for free from Python's official website. The community of Python users is constantly contributing to the code of Python in order to improve it.

5. Large Standard Library

One of the very important features because of which Python is so famous in today's times is the huge standard library it offers to its users. The standard library of Python is extremely large with a diverse set of packages and modules like itertools, functools, operator, and many more with common and important functionalities in them. If the code of some functionality is already present in these modules and packages, the developers do not need to rewrite them from scratch, saving both time and effort on the developer's end. Moreover, the developers can now focus on more important things concerning their projects. Also, Python provides the PyPI (Python Package Index) which contains more packages that we can install and use if we want even more functionality.

6. High-Level Language

A high-level language (HLL) is a programming language that enables a programmer to write programs that are more or less independent of a particular

type of computer. These languages are said to be high-level since they are very close to human languages and far away from machine languages. Unlike C, Python is a high-level language. We can easily understand Python and it is closer to the user than middle-level languages like C. In Python, we do not need to remember system architecture or manage the memory.

7. Object Oriented Programming Language

Python supports various programming paradigms like structured programming, functional programming, and object-oriented programming. However, the most important fact is that the Object-Oriented approach of Python allows its users to implement the concepts of Encapsulation, Inheritance, Polymorphism, etc. which is extremely important for the coding done in most Software Industries as objects map to entities in real-world and lot of real-world problems can be solved using the Object-Oriented Approach.

8. Large Community Support

With one of the biggest communities on StackOverflow and Meetup, Python has gained popularity over the years. If we need any kind of help related to Python, the huge community is always there to answer our queries. A lot of questions about Python have already been answered on these sites and Python users can reference them as per requirement.

9. Platform Independent

Platform independence is yet another amazing feature of Python. In other words, it means that if we write a program in Python, it can run on a variety of platforms, for

instance, Windows, Mac, Linux, etc. We do not have to write separate Python code for different platforms.

10. Extensible and Embeddable

Python is an Embeddable language. We can write some Python code into C or C++ language and also we can compile that code in C/C++ language. Python is also extensible. It means that we can extend our Python code in various other languages like C++, etc. too.

11. Graphical User Interface (GUI) Support

Yet another interesting feature of Python is the fact that we can use it to create GUI (Graphical User Interfaces). We can use Tkinter, PyQt, wxPython, or Pyside for doing the same. Python also features a large number of GUI frameworks available for it and various other cross-platform solutions. Python binds to platform-specific technologies.