Assignment - 02

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1) What are datatypes in python? Explain

Ans: Python has five standard datatypes

1) Numbers
2) String
3) List
4) Tuple
5) Dictionary

Numbers :-

Python numbers variable are created by the standard python method

var = 382

Most of the time using the standard Python number type is fine. Python will automatically convert a number from one type to another if it needs. But, under certain circumstances that a specific number type is needed. In python numeric datatypes represent the data which has numeric value can be floating number, integer or even complex numbers. These values are defined as int, float and complex class in python.

→ Integers :- This value represented by int class. It contains positive or negative whole numbers (without fraction or decimal). In python there is no limit to how long an integer value can be.

→ float :- This value is represented by float class. It is a real number with floating point representation. It is specified by a decimal point. Optionally, the character e or E followed by a positive or negative integer may be appended to specify scientific notation.

→ Complex Numbers :- Complex number is represented by complex

class. It is specified as (real part) + (imaginary part). for example - 2+3j.

String :-

In python, String are arrays of bytes representing unicode characters. A string is a collection of one or more characters put in a single quote, double-quote or triple quote. In python there is no character data type, a character is a string of length one. It is represented by str class.

List :-

Lists are just like the arrays declared in other languages. Lists need not be homogeneous always which makes it the most powerful tool in python. A single list may contain Data Types like Integers, Strings as well as Objects. Lists are mutable, and hence they can be altered even after their creation. List in Python are ordered and have a definite count. The elements in a list are indexed according to a definite sequence and the indexing of a list is done with 0 being the first index. Each element in the list has its definite place in the list. which allows duplicating of elements in the list, with each element having its own distinct place and credibility. It is represented by list class.

Tuple :-

Tuple is an Ordered collection of Python objects much like a list. The sequence of values stored in a tuple can be of any type, and they are indexed by integers. the important difference between a list and a tuple is that tuples are immutable. Also, tuples are hashable whereas lists are not. It is represented by tuple class.

Dictionary :-

Dictionary in Python is an unordered collection of data values, used to store data values like a map, which unlike other Data types that hold only single value as an element, Dictionary holds key:value pair. Key-value is provided in the dictionary to make it more optimized. Each key-value pair in a dictionary is seperated by a colon :, whereas each key is seperated by a 'comma'.

2) Briefly explain history of Python.

Ans. The programming language Python was conceived in the late 1980s, and its implementation was started in December 1989 by Guido van Rossum at CWI in the Netherlands as a successor to ABC capable of exception handling and interfacing with the Amoeba operating system. Van Rossum is Python's principal author, and his continuing central role in deciding the direction of Python is reflected in the title given to him by the Python community, Benevolent Dictator for life. Python was named for the BBC TV show Monty Python's Flying Circus.

3) Explain all the operators in Python.

Ans: Operators are special symbols in Python that carry out arithmetic or logical computation. The value that the operator operates on is called the operand.

for example:

```
2+3
5
```

Here + is operator 2 and 3 are operands

Arithmetic Operators: Arithmetic operators are used to perform mathematical operators like addition subtraction, multiplication

+	Add two operands or unary plus	x+y+2
-	Subtract right operand from the left	x-y+2

*	multiply two operands	x * y
/	Divide left operand by the right one	x/y
%	Modulus - remainder of the division of left operand by the right	x % y (remainder of x/y)
//	floor division - division that results into whole division number adjusted to the left on the number line	x//y
**	Exponent - left Operand raised to the power of right	x ** y (x to the powery)

Relational Operators :-

Relational Operators are used to compare values. It returns either True or false according to the condition.

>	Greater than - True if left operand is greater than the right	x > y
<	less than - True if left operand is less than the right	x < y
==	equal to - True if both operands are equal	x == y
!=	Not equal to - True if operands are not equal	x != y
>=	Greater than or equal to - True if left operand is greater than or equal to the right	x >= y
<=	less than or equal to - True if left operand is less than or equal to the right	x <= y

Logical Operators :-

logical operators are the and, or, not operators.

and	True if both the operands are true	x and y
or	True if either of the operands is true	x or y
not	True if operand is false (complements the operand)	not x

Bitwise Operators :-

Bitwise operators act on operands as if they were strings of binary digits. They operate bit by bit, hence the name.

for example. 2 is 10 and binary and 7 is 111

In the table below : let x = 10 (0000 1010) and y=4 (0000 0100)

&	Bitwise AND	x & y = 0 (0000 0000)
|	Bitwise OR	x | y = 14 (0000 1110)
~	Bitwise NOT	~x = -11 (1111 0101)
^	Bitwise XOR	x ^ y = 14 (0000 1110)
>>	Bitwise right shift	x >> 2 = 2 (0000 0010)
<<	Bitwise left shift	x << 2 = 40 (0010 1000)

Assignment Operators :-

Assignment operators are used in python to assign values to variables.

=	x=5	x=5
+=	x+=5	x = x+5
-=	x-=5	x = x-5
*=	x*=5	x = x*5
/=	x/=5	x = x/5
%=	x%=5	x = x%5
//=	x//=5	x = x//5
**=	x**=5	x = x**5
&=	x&=5	x = x&5
|=	x|=5	x = x|5
^=	x^=5	x = x^5
>>=	x>>=5	x = x>>5
<<=	x<<=5	x = x<<5

Identity operators:-

is and is not are the identity operators in python. They are used to check if two values (or variables) are located on the same part of the memory. Two variables that are equal does not imply that they are identical

is	True if the operands are identical (refer to the same object)	x is True
is not	True if the operands are not identical (do not refer to the same object)	x is not True

Membership operators:-

in and not in are the membership operators in python. They are used to test whether a value or variable is found in a sequence (string, list, tuple, set and dictionary)

in	True if value/variable is found in sequence)	5 in x
not in	True if value/variable is not found in the sequence	5 not in x

4) Explain the features of Python.

Ans:- 1) Easy to code: Python is a high-level programming language. Python is very easy to learn the language as compared to other languages like C, C#, Java script, Java etc. It is very easy to code in python language and anybody can learn python basic in a few hours or days. It is also a developer-friendly language.

2) Object-oriented language: One of the key features of python is Object-oriented programming. Python supports object-oriented language and concepts of classes, objects, encapsulation etc.

3) GUI Programming support: Graphical user interfaces can be made using a module such as PyQt5, PyQt4, wxPython or Tk in Python.

PyQt5 is the most popular option for creating graphical apps with Python.

4) High level language: Python is a high-level language. When we write programs in python, we do not need to remember the system architecture, nor do we need to manage the memory

5) Extensible feature:

Python is a Extensible language. We can write us some Python code into C or C++ language and also we can compile that code in C/C++ language.

6) Python is Portable language:

Python language is also a portable language. for example, if we have python code for windows and if we want to run this code on other platforms such as Linux, Unix and Mac then we dont need to change it, we can run this code on any platform.

7) Python is integrated language:

Python is also an integrated language because we can easily integrated python with other languages like C, C++ etc.

8) Interpreted Language:

Python is an interpreted language because Python code is executed line by line at a time. like other languages C, C++ Java there is no need to compile python code this makes it easier to debug our code. The source code of python is converted into an immediate form called byte code.

9) Large Standard Library:

Python has a large standard library which provides a rich set of module and functions so you do not have to write your own code for every single thing. There are many libraries present in python for such as regular expressions, unit-testing, web browsers etc.

10) Dynamically Typed Language:

Python is a dynamically-typed language. That means the type (for example- int, double, long etc.) for a variable is decided at run time not in advance because of this feature we don't need to specify the type of variable.

5) Justify why python is a interpreted language;

Ans: An interpreter is a kind of program that executes other programs. When you write Python programs, it converts source code written by the developer into intermediate language which is again translated into the native language / machine language that is executed.

The python code you write is compiled into python bytecode, which creates file with extension .pyc. The bytecode compilation happened internally, and almost completely hidden from developer. Compilation is simply a translation step, and byte code is a lower-level, and platform independent, representation of your source code. Roughly, each of your source statement is translated into a byte code.