**Python**

##### Language Fundamentals

**Introduction**

* **Python is a general purpose high level programming language.**
* **Python was developed by Guido Van Rossam in 1989 while working at National Research Institute at Netherlands.**
* **But officially Python was made available to public in 1991. The official Date of Birth for Python is : Feb 20th 1991.**
* **Python is recommended as first programming language for beginners.**

**Eg1: To print Helloworld: Java:**

* 1. **public class HelloWorld**

**2) {**

**3) p s v main(String[] args)**

**4) {**

**5) SOP("Hello world");**

**6) }**

**7) }**

**C:**

**1) #include<stdio.h>**

**2) void main()**

**3) {**

**4) print("Hello world");**

5) **}**

**Python:**

**print("Hello World")**

**Eg2: To print the sum of 2 numbers Java:**

|  |  |  |  |
| --- | --- | --- | --- |
| **1) public class Add** | | | |
| **2)** | **{** |  |  |
| **3) public static void main(String[] args)** | | | |
| **4)** |  | **{** |  |
| **5) int a,b;** | | | |
| **6)** |  |  | **a =10;** |
| **7)** |  |  | **b=20;** |
| **8) System.out.println("The Sum:"+(a+b));** | | | |
| **9)** |  | **}** |  |
| **10) }** | | | |

**C:**

**1) #include <stdio.h>**

**3) void main()**

**5) int a,b;**

**7) b=20;**

9) **}**

**8) printf("The Sum:%d",(a+b));**

**6) a =10;**

**4) {**

**2)**

**Python:**

**1) a=10**

**2) b=20**

**3) print("The Sum:",(a+b))**

**The name Python was selected from the TV Show "The Complete**

**Monty Python's**

**Circus", which was broadcasted in BBC from 1969 to 1974.**

**Guido developed Python language by taking almost all programming features from different languages**

1. **Functional Programming Features from C**
2. **Object Oriented Programming Features from C++**
3. **Scripting Language Features from Perl and Shell Script**
4. **Modular Programming Features from Modula-3**

**Most of syntax in Python Derived from C and ABC languages. Where we can use Python:**

**We can use everywhere. The most common important application areas are**

1. **For developing Desktop Applications**
2. **For developing web Applications**
3. **For developing database Applications**
4. **For Network Programming**
5. **For developing games**
6. **For Data Analysis Applications**
7. **For Machine Learning**
8. **For developing Artificial Intelligence Applications**
9. **For IOT**

**...**

**Note:**

**Internally Google and Youtube use Python coding**

**NASA and Nework Stock Exchange Applications developed by Python.**

**Top Software companies like Google, Microsoft, IBM, Yahoo using Python.**

**Features of Python:**

1. **Simple and easy to learn:**

**Python is a simple programming language. When we read Python program,we can feel like reading english statements.**

**The syntaxes are very simple and only 30+ kerywords are available.**

**When compared with other languages, we can write programs with very less number of lines. Hence more readability and simplicity.**

**We can reduce development and cost of the project.**

1. **Freeware and Open Source:**

**We can use Python software without any licence and it is freeware.**

**Its source code is open,so that we can we can customize based on our requirement. Eg: Jython is customized version of Python to work with Java Applications.**

**Data Types**

**Data Type represent the type of data present inside a variable.**

**In Python we are not required to specify the type explicitly. Based on value provided,the type will be assigned automatically. Hence Python is Dynamically Typed Language.**

**Python contains the following inbuilt data types**

1. **int**
2. **float 3.complex 4.bool 5.str 6.bytes**

**7.bytearray 8.range 9.list 10.tuple 11.set 12.frozenset 13.dict 14.None**

**a**

**a b**

**10**

**a = 10**

**b = 10**

**20**

**a = 10**

**a = 20**

**10**

**Note: Python contains several inbuilt functions 1.type()**

**to check the type of variable**

1. **id()**

**to get address of object**

1. **print()**

**to print the value**

**In Python everything is object**

**int data type:**

**We can use int data type to represent whole numbers (integral values) Eg:**

**a=10**

**type(a) #int**

**Note:**

**In Python2 we have long data type to represent very large integral values.**

**But in Python3 there is no long type explicitly and we can represent long values also by using int type only.**

**We can represent int values in the following ways**

1. **Decimal form**
2. **Binary form**
3. **Octal form**
4. **Hexa decimal form**
5. **Decimal form(base-10):**

**It is the default number system in Python The allowed digits are: 0 to 9**

**Eg: a =10**

1. **Binary form(Base-2):**

**The allowed digits are : 0 & 1**

**Literal value should be prefixed with 0b or 0B**

**Eg: a = 0B1111 a =0B123**

**a=b111**

1. **Octal Form(Base-8):**

**The allowed digits are : 0 to 7**

**Literal value should be prefixed with 0o or 0O.**

**Eg: a=0o123**

**a=0o786**

1. **Hexa Decimal Form(Base-16):**

**The allowed digits are : 0 to 9, a-f (both lower and upper cases are allowed) Literal value should be prefixed with 0x or 0X**

**Eg:**

**a =0XFACE**

**a=0XBeef a =0XBeer**

**Note: Being a programmer we can specify literal values in decimal, binary, octal and hexa decimal forms. But PVM will always provide values only in decimal form.**

**a=10**

**b=0o10 c=0X10 d=0B10**

**print(a)10 print(b)8 print(c)16 print(d)2**

**Base Conversions**

**Python provide the following in-built functions for base conversions**

1. **bin():**

**We can use bin() to convert from any base to binary Eg:**

|  |  |
| --- | --- |
| **1)** | **>>> bin(15)** |
| **2)** | **'0b1111'** |
| **3)** | **>>> bin(0o11)** |
| **4)** | **'0b1001'** |
| **5)** | **>>> bin(0X10)** |
| **6)** | **'0b10000'** |

1. **oct():**

**We can use oct() to convert from any base to octal**

## Type Casting

**We can convert one type value to another type. This conversion is called Typecasting or Type coersion.**

**The following are various inbuilt functions for type casting.**

1. **int()**
2. **float()**
3. **complex()**
4. **bool()**
5. **str()**

**1.int():**

**We can use this function to convert values from other types to int Eg:**

|  |  |
| --- | --- |
| **1) >>> int(123.987)** | |
| **2) 123** | |
| **3) >>> int(10+5j)** | |
| **4) TypeError: can't convert complex to int** | |
| **5) >>> int(True)** | |
| **6)** | **1** |
| **7) >>> int(False)** | |
| **8)** | **0** |
| **9)** | **>>> int("10")** |
| **10) 10** | |
| **11) >>> int("10.5")** | |
| **12) ValueError: invalid literal for int() with base 10: '10.5'** | |
| **13) >>> int("ten")** | |
| **14) ValueError: invalid literal for int() with base 10: 'ten'** | |
| **15) >>> int("0B1111")** | |
| **16) ValueError: invalid literal for int() with base 10: '0B1111'** | |

**Note:**

1. **We can convert from any type to int except complex type.**
2. **If we want to convert str type to int type, compulsary str should contain only integral value and should be specified in base-10**