**Programming language**

Programming language is a vocabulary and set of grammatical rules for instructing a computer or computing device to perform specific task.

Each programming language has a unique set of keyword (word that it understands) and a special syntax for organizing program instruction.

Programming language is also known as computer language, computer system programming system.

**Types of programming language**

Basically programming language are divided into three types

1. Low level language
2. Middle level language
3. High level language

**:-*Python-:***

* Python is a high level, interpreted, interactive, object oriented and scripting language.
* Python is design for highly readable.
* Its flexibility allows it to do many things both big and small.
* Python can be used to write simple programs but as well as complex large scale enterprises solution.

**Some popular way to use python**

* Desktop graphical application development including games.
* Mathematical and scientific analysis of data and machine learning.
* Web and internet development.
* Artificial intelligent.

**History of python**

* Python was developed by GUIDO VAN ROSSUM in the late late eighties and early nineties at The National Research Institute for Mathematics and Computer Science in the Netherland.
* Python is derived from many other languages including ABC, Modula-3, C, C++, Algo-68, Small-Talk, UNIX Shell and scripting languages.
* Python named after the British Comedy group Monty Python, He was found of watching the comedy series [The Monty Python’s Flying Circus]

**Features of Python**

* **Easy to code and debug:-**
* Python is a high level programming language which has few keywords, simple structure and a clear defined syntax; this allows the students to pick up the language quickly**.**
* Python code is more clearly defined and visible to the eyes.
* It is also a developer friendly language.
* Python’s source code is fairly easy to maintain.

* **Free and open source:-**
* Since it is open source, it means the source code is also available to the public. So we can modify as we want
* **Object oriented language:-**
* One of the key feature of python is Object oriented programming, python supports object oriented language and concept of classes, object encapsulation etc.
* **GUI Programming:-**
* Python support GUI application that can be created and ported to many system calls, libraries and windows system, such as windows MFC, Macintosh and X windows system of UNIX.
* **High level language support:-**
* Python is a high level language, when we write programs in python
* **Extensible features:-**
* It can support extensible feature, we can write us some python code into C or C++ language and also we can compile that code in C/C++ Language.
* **Portable language:-**
* If we write Python code in windows then if we want to run this code on other platforms such as Linux, UNIX and Mac then we do not need to change it.
* **Interpreted language**
* **Large standard library:-**
* Python has a large standard library which provides a rich set of module and functions.
* Python library is a very portable and cross platform and compatible on UNIX, Windows and Macintosh.
* **Dynamically typed language**
* **Scalable:-**
* Python provides a better structure and support for large programs then shell scripting.

Apart from the above-mentioned features, Python has good features, few are listed below

* It can be used as scripting language or can be compiled to byte-code for building large applications.
* It provides very high level dynamic data types and supports dynamic type checking.
* Python support dynamic typed language.
* It supports automatic garbage collection.

:-**Comments-:**

* Comments are used to block a line of statement or multiple line of statement.
* Comments are non executable code used to provide documentation to programmer.
* Commented statement cannot be displayed at run time.
* Comment cannot hide statements.

**Types of comment**

There are two types of comments.

1. Single line of comment
2. Multiple line of comment

**Single line of comment**

* Single line of comment is used to block a single line of comment.
* Single line comment start with “#”, it can be placed anywhere in the program
* Any symbol written after ‘#’ is ignored by compiler.

**Syntax**

#it is single line of comment in python.

**Multiple line of comment**

* Multiple line of comment is used to block a multiple line of code, it can be placed anywhere in the program
* Multiple line of comment Is start with

**Character-Set**

It consist of upper case, lower case, digit special character and white spaces

Character Set consist of

|  |  |
| --- | --- |
| Types | Example |
| Upper Case | A-Z |
| Lower Case | a-z |
| Special character | !,@,#,$ etc |
| White spaces | Space, tab, new line etc |

Special character are listed below

|  |  |
| --- | --- |
| Name | Symbol |
| Tilde | ~ |
| Exclamation mark | ! |
| Number sign | # |
| Dollar sign | $ |
| Percent sign | % |
| Carrent sign | ^ |
| Ampersand | & |
| Asterisk | \* |
| Left parenthesis | ( |
| Right parenthesis | ) |
| Underscore | \_ |
| Plus sign | + |
| Vertical bar | | |
| Backslash | \ |
| Apostrophe | ` |
| Minus sign | - |
| Equal sign | = |
| Left braces | { |
| Right braces | } |
| Left bracket | ] |
| Right bracket | [ |
| Colon | : |
| Quotation mark | “ |
| Semicolon | ; |
| Opening angle bracket | < |
| Closing angle bracket | > |
| Question mark | ? |
| Comma | , |
| Period | . |
| Forward slash | / |
| Array | [ ] |
| Exponent | ^ |

**Identifier**

* Identifier is a name given to the program element such as variable, function, class, module, or other object.
* Identifier name must be sequence of upper case, lower case, digits and underscore (\_).
* First character should be alphabet or underscore (\_).
* No special symbol are allowed only (\_) underscore symbol is allowed
* Keywords cannot be used as an identifier.
* Python is a case sensitive language so M or m is different

**Keyword**

* Keywords are those words whose meaning is already defined by compiler.
* Keywords cannot be used as a variable name
* Keywords are also known as a reserved word

|  |  |
| --- | --- |
| **Keyword** | **Description** |
| and | a logical operator |
| as | To create an alias |
| Assert | For debugging |
| break | To break out of a loop |
| class | To define a class |
| continue | To continue to the next iteration of a loop |
| def | To define a function |
| del | To delete an object |
| elif | Used in conditional statements, same as else if |
| else | Used in conditional statement |
| except | Used with exceptions, what to do when an exception occurs |
| exec |  |
| false | Boolean value, result of comparison value |
| finally | Used with exceptions, a block of code that will be executed no matter if there is an exception or not |
| for | To create for loop |
| from | To import specific part of a module |
| global | To declare a global variable |
| if | To make a conditional statement |
| import | To import a module |
| in | To check if a value is present in a list, tuple, etc |
| is | To test if two variable are equal |
| lambda | To create an anonymous function |
| None | Represents a null value |
| nonlocal | To declare non-local variable |
| not | A logical operator |
| or | A logical operator |
| pass | A null statement |
| print |  |
| raise | To raise an exception |
| return | To exit a function and return a value |
| True | Boolean value, result of comparision operations |
| try | To make a try…except statement |
| while | To create a while loop |
| with | Used to simplify exception handling |
| yield | To end a function |

**Variable**

* Variable is a name given to the memory location where the actual data is stored.
* The data we stored in a variable is one of many types.
* Python variable do not need explicit declaration to reserved memory space.
* When we create a variable then this process is known as ***declare a variable***

**Assigning value to variable**

* The equal sign(=) is used to assign a value in a variable

**Example:-**

**A= 12**

* Python allow us to assign single value to several variables simultaneously.

**Example**

A=b=c=1

* We can get the data type of a variable by using type() function

Example:-

A =12

Print (typed(A))

* String variable can be declared either by using single or double quotes.
* If we have a collections of values in a list, tupple etc. then we can extract the values into variables. This is known as unpacking.

Patner= [shakir, ateeb, aftab]

A, b, c= patner

Print(a)

Print(b)

Print(c)

**Global Variable:-**

* Variable that are created outside of a function are known as global variable.
* Global variable can be used inside of function or outside of function.
* To create a global variable inside a function we use the global keyword.

def myfunc():

global a

a=”Ariz”

myfunc()

print(a)

* To change a global variable inside a function we use global keyword

**Example:-**

x=”syed”

def myfunc():

global x

x=”Ateeb”

myfunc()

print(x)

**Data-Types**

* Data types tell about the type of data used in a program.
* Variable can store data of different types, and different types can do different things.
* There are various data types in python. Some of the important are listed below in categories form.

|  |  |
| --- | --- |
| **Data types** | **Name** |
| Text-type | str |
| Numeric types | int, float, complex |
| Sequence types | list, tupple, range |
| Mapping types | Dict |
| Set types | set, frozenset |
| Boolean type | bool |
| Binary types | bytes,bytearray, memoryview |

* if we want to specify the data types we use constructor function.

X=str(“hello world”)

* We can get the data type of a variable by using type() function

Example:-

A =12

Print (typed(A))

**Numeric**

* Numeric data type represents the data which has all type of numeric value.
* Variables of numeric type are created when we assign a value to them.
* Numeric data-types are divided into three types

1. Integer
2. Floating
3. Complex number

**Integer**

* It contains positive or negative whole numbers (without fraction or decimal).
* The value is represented by Int class.
* There is no limit to how long an integer value can be.

**Float**

* The value is represented by float class.
* It contains positive or negative numbers, containing one or more decimals.
* Optionally the character e or E followed by positive or negative integers.

**Complex Numbers**

* Complex numbers is represented by complex class.
* It is specified as (real part) + (imaginary part)

Example:-

2+4j

Dictionary

**Boolean**

* It is denoted by the class bool.
* It contains two built in values, True or False.
* True and False with capital T and F are valid Booleans otherwise python will throw an error.

**String**

* String is sequence of Unicode characters.
* Anything written inside ‘ ’(a pair of single quotes) or “ ”(pair of double quotes) is known as string.
* We can also create multi line string it is denoted by “”” or ‘’’

**Example**

A= “hello world”

B= ‘Welcome to programming world ’

C=’’’agdhfhsfhgsjg,

Etrrfghnjef2ghjk,

W4657ne’’’

**Type conversion and Type casting**

* The process of converting the value of one data type (integer, string, float etc) to another data type is called type conversion.
* Python has two types of conversion

1. Implicit type conversion
2. Explicit type conversion

**Implicit type Conversion**

* In the implicit type conversion, Python automatically converts one data type to another data type.