Unit : 2

Introduction to Python Programming

By
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Learning Objectives:

At the end of this Unit you will be able to understand:

- What is a program and Programming Language
- Categories of Programming Languages
- Interpreter and Compiler
- Python Programming Language
- History and Features of Python Programming
- Installation of Python on Both Ubuntu and Windows
- Types of Modes
- IDE tools
- Reserved key words
- Identifiers and Variables
- Constant, Statements & Comments
- Operators and Operands

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What is a program?

“ A computer program is a sequence of instructions written using a computer programming language(Ex: C, C++, Java and Python) to perform a specific task by the computer. ”

```
classroom = “12-A”
chapter = “Introduction to Python Programming”

print(“I would to like welcome” + classroom + “ students to ” +chapter+”
Class”)
```

Computer Programming:

Computer Programming is the process of writing computer programs.

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Programming Language

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

These Languages allow us to give instructions to a computer in a language the computer understands.

Just as many human-based languages exist, there are an array of computer programming languages that programmers can use to communicate with a computer.

Programming Language

Continued…

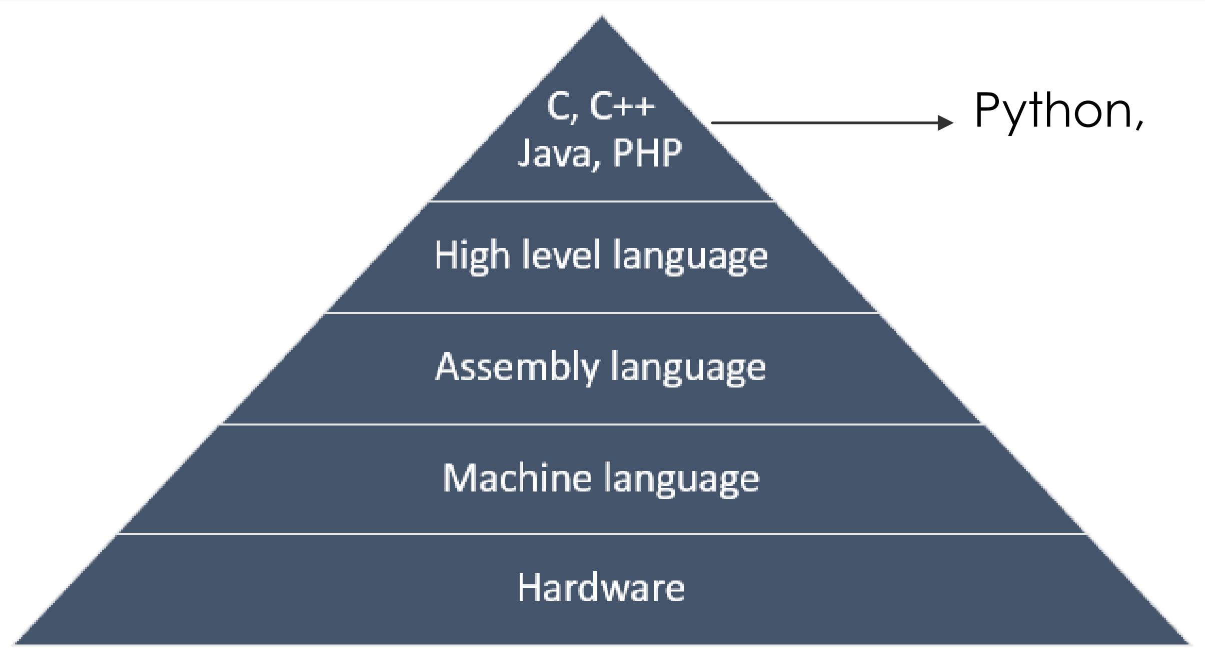
List of some most popular programming languages :

- JavaScript
- Python
- Java
- C++
- Swift
- Go
- Ruby
- R

Types of Programming Language

There are three major categories of programming languages given below :

1. Machine Language
2. Assembly Language
3. High level Language



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Machine Language

- Natural language of a particular computer.
- It is the only language understood by the computer without using a translation program.
- The instructions are in the form of binary code i.e. 0’s and 1’s
- Any other types of languages must be translated down to this level.
- It is a first-generation programming language.

Below is an example of machine language (binary) for the text "Hello World."

```
01001000  01100101 01101100 01101100 01101111 00100000 01010111 01101111
01110010 01101100 01100100
```

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Machine Language

Continued…

Advantages:

- ✓ Machine language makes fast and efficient use of the computer as it is directly understood by the processor so has faster execution of program.
- ✓ It requires no translator to translate the code.

Disadvantages:

- ✓ It is machine dependent language i.e. individual program required for each machine.
- ✓ It is difficult to find errors and debug.

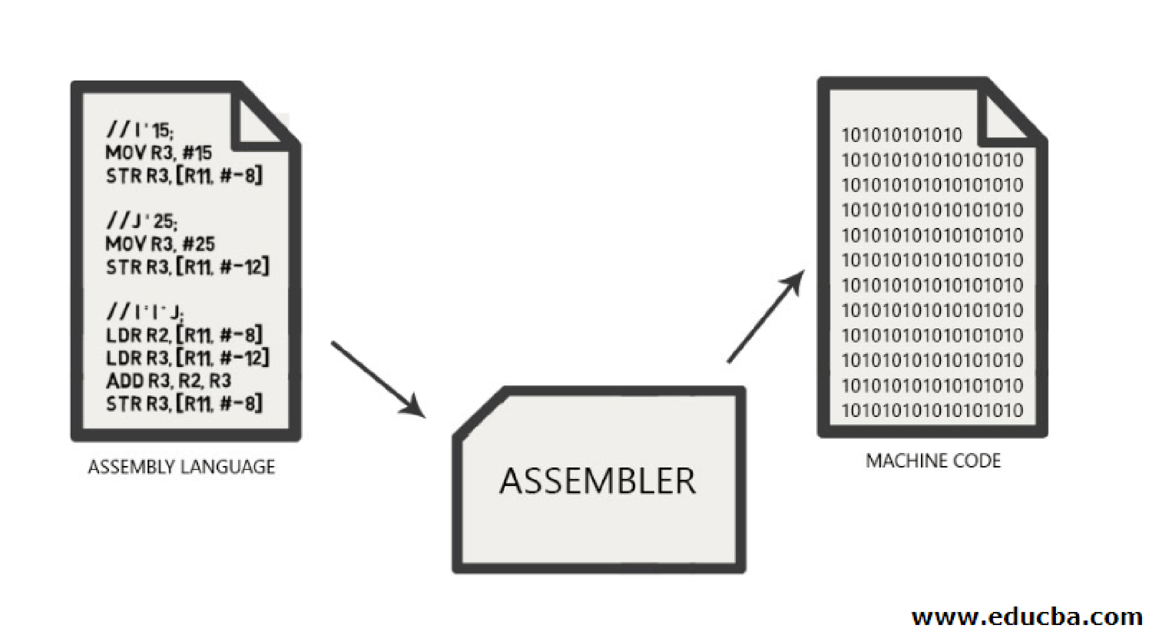
Assembly Language

- ✓ Assembly language is a little easier than machine language, but not much!
- ✓ English like Abbreviations used for operations(Load R1,R8)
- ✓ Programs written in machine language are replaceable by mnemonics(mov, add, sub,mul) which are easier to remember.

Example:

```
mov al, 6
mov bl, 10

Add bl, al
```



```
//I'15;
MOV R3, #15
STR R3, [R11, #-8]

//J'25;
MOV R3, #25
STR R3, [R11, #-12]

//I'I'J;
LDR R2, [R11, #-8]
LDR R3, [R11, #-12]
ADD R3, R2, R3
STR R3, [R11, #-8]
```

```
101010101010
101010101010101010
101010101010101010
101010101010101010
101010101010101010
101010101010101010
101010101010101010
101010101010101010
101010101010101010
101010101010101010
101010101010101010
101010101010101010
```

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Assembly Language

Continued…

Advantages :

Assembly language is easier to understand and use as compared to machine language.

Disadvantages:

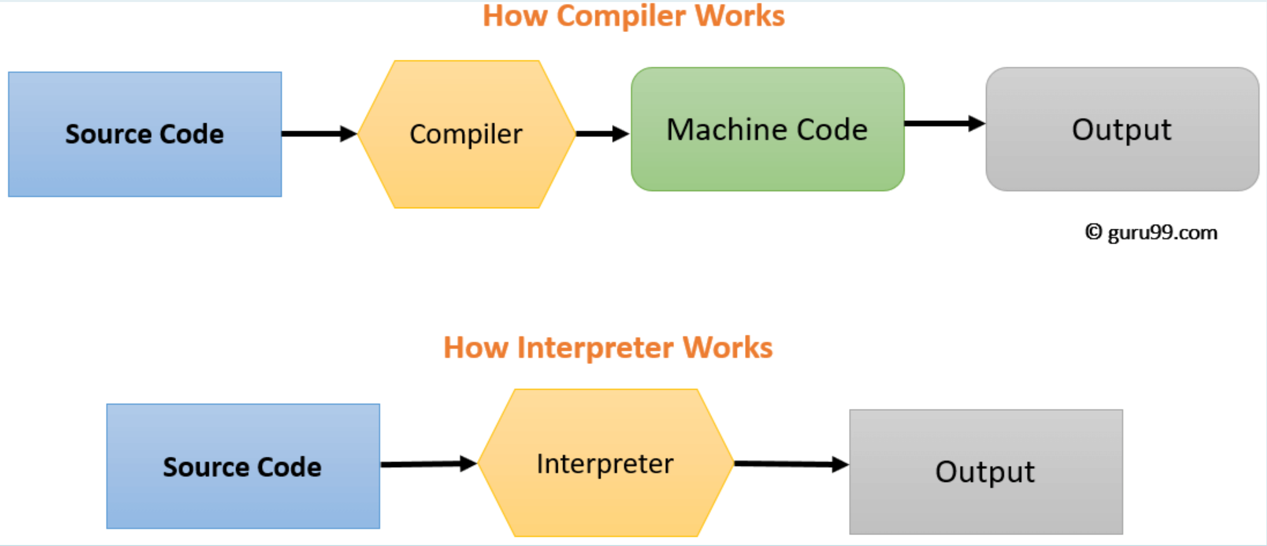
- Like machine language, it is also machine dependent/specific.
- Program design for one machine no use of other machines.
- Knowledge of hardware required.

High level Language

- It is very close to human languages.
- It is designed to simplify computer programming.
- High-level source code contains easy-to-read syntax that is later converted into low level language.
- A compiler is required to translate a high-level language into a low-level language.

Examples

- C
- C ++
- Java
- Python
- Cobol
- Swift
- JavaScript
- Perl



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High-level Language

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Advantages

- ✓ Easy to use and understand
- ✓ Machine independent
- ✓ Debugging is easy
- ✓ Easy to maintain program

Disadvantages

Slow Execution :

Program written in high level language need to be translated to machine language. This translation process increases the execution time of program

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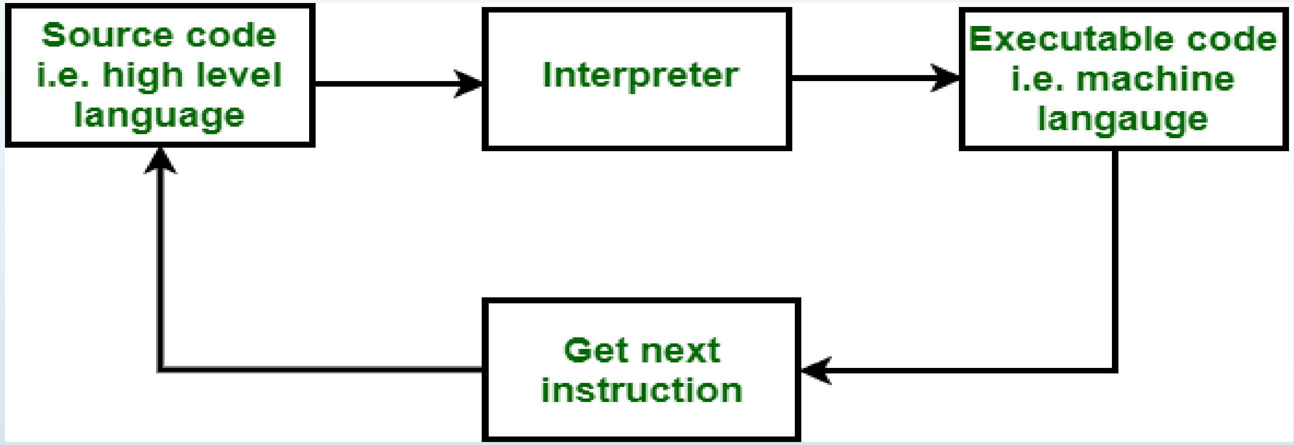
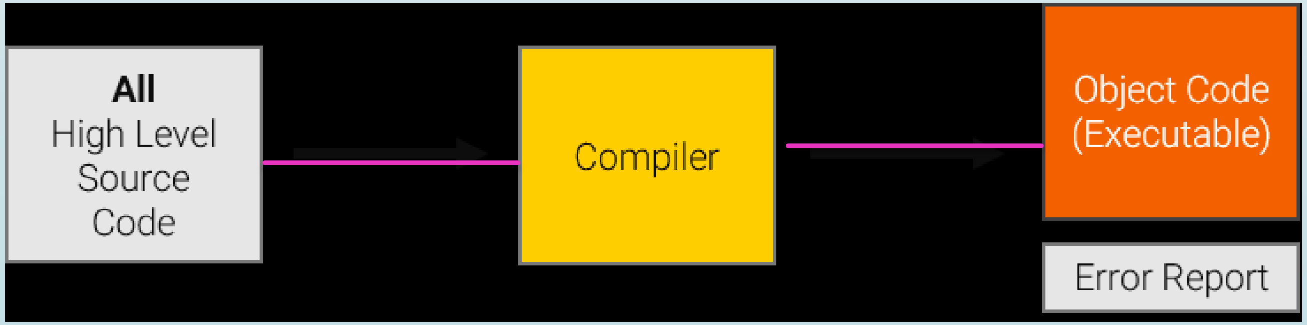
Interpreter and Compiler

A compiler and Interpreter both carry out the same purpose:

Translates a high level language(like C++, Java, Python) instructions into the binary form which is understandable by computer hardware(machine language)


Source code i.e. high level language
Interpreter
Executable code i.e. machine langauge
Get next instruction



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Interpreter Vs Compiler

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Interpreter :

✓ Translates program one statement at a time

✓ No executable file of machine code is produced (no object code)

✓ Error message produced immediately (and program stops at that point)

Compiler :

✓ Scans the entire program and translates it as a whole into machine code.

✓ An executable file of machine code is produced (object code)

✓ Error report produced once entire program is compiled. These errors may cause a program to crash