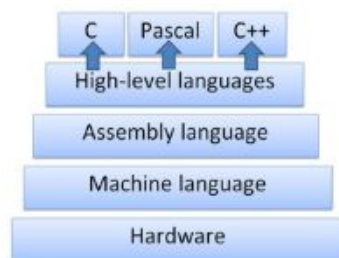# FUNDAMENTAL KNOWLEDGE OF COMPUTING PROGRAMMING

Computers are the machines that can perform tasks or calculations according to the set of instructions or programs. Computers are very fast due to which thousands of tasks can be performed within a short period of time. Hence, computers are the machine, they have no brain so they work according to the set of instructions set inside it.

We know that a computer is an electronic device works on ON and OFF (1 AND 0), the technique to read and write data. We use several languages to communicate with others, just like it, we use several computers languages to communicate with other computers e.g. BASIC, COBOL, PASCAL, FORTRAN etc. The computer understands only computer language written in binary. Other languages have to be converted to machine level for a computer to understand. Programming languages can be used to create programs to control the behavior of a machine or to express algorithms. Different types of programming languages are as follows:

Machine level language
Assembly level language
High-level language

Machine Code (Machine Languages)

Computer dependent language written in binary is called Machine code or Machine language. Machine code requires a high-level programming skill along with sound knowledge of computer architecture and functions. Instructions written in binary are immediately executable without the help of any language translators because computer understands the machine codes.

Advantages

It is written in machine code so no need to translate it into machine language.
It has faster execution than other languages.
Other translator type subsidiary programs are not required.

Disadvantages

It is difficult to understand and develop a program using machine language.
It is machine-oriented language.
The knowledge of computer internal architectures is essential for program coding.
Time-consuming.
Debugging is tough and difficult.

Assembly Language


```
; Example of IBM PC assembly language
; Accepts a number in register AX;
; subtracts 32 if it is in the range 97-122;
; otherwise leaves it unchanged.

SUB32  PROC         ; procedure begins here
       CMP  AX,97   ; compare AX to 97
       JL   DONE    ; if less, jump to DONE
       CMP  AX,122  ; compare AX to 122
       JG   DONE    ; if greater, jump to DONE
       SUB  AX,32   ; subtract 32 from AX
DONE:  RET          ; return to main program
SUB32  ENDP         ; procedure ends here
```

FIGURE 17. Assembly language

It is a low-level language in which some high-level words are used with machine codes. These words are called mnemonics. Some mnemonics are given below:

ADD for Addition
SUB for Subtraction

Assembly language requires ASSEMBLER to translate assembly language code into computer understandable code (Machine code). So, it is not immediately executable. It is difficult to develop the program using this immediately executable. It is difficult to develop the program using this language.

Advantages

Coding is faster than machine code language because mnemonics are used for program coding.
Less time consumed with respect to Machine code languages.
Debugging is easy.

Disadvantages

Machine oriented language
The good knowledge of machine architectures is required.
Time consuming
The translator is used to translate the program into machine code.
Not as fast as machine code language in case of execution.

High-level language

High-level language contains a set of instructions written in simple English. It is a set of symbols, words and rules to instruct machine. The language is oriented towards the problem and procedures. A program written in a high-level language is called source program. A language translator is used to translate into object code (Machine code).

Advantages

Simple English is used for program coding.
Machine independent
Problem and procedure oriented
The knowledge of computer architectures is not necessary.
It requires less time for program coding.
Program can be debugged easily

Disadvantages

Since it is written in user's language so it should be converted into machine code.So it requires a translator.
The execution of the program is slower than machine code.
The conversion time is slower than assembly language because it is entirely written in human language.