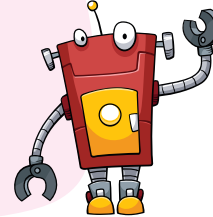




Computer Language

Learning in this chapter

- ❖ Computer language
- ❖ Low level language
- ❖ High level language
- ❖ Language translator



Communication is the media through which we can express our ideas to others. To communicate with other people we need a language like Hindi, English, Bengali etc. Similarly to communicate with the computer a language is required that the computer can understand.

A computer is a machine it requires a special language through which can communicate with it. For this purpose, different language are developed called **Computer language**.

In this chapter, we will study about these computer languages in detail.

COMPUTER LANGUAGE

A **computer language** is the means by which instruction and data are transmitted to the computer. In other words, computer language is an interface between a computer and human beings. It is a set of words, symbols and codes that the computer can understand. It is used to write a computer program.

- A **program** is a set of instructions which tells the computer what to do.
- The process of writing a program in a computer language is called **Programming**. Each programming language has its own specific rules and syntax. The development of programming language has improved considerably with the ease and ability of programmers to write powerful application programs that can solve any task in the world today.

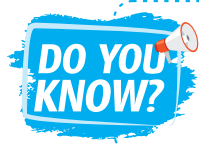


Remember

- **Syntax** are the rules governing the formation of statements in a Programming language.
- The people who write the programs are called **Programmers**.



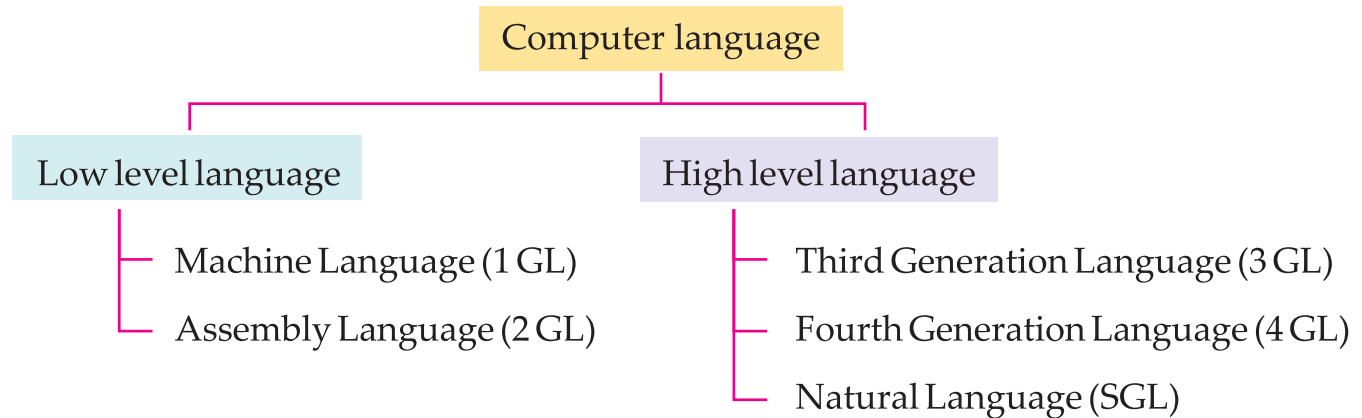
There are a number of programming languages worldwide. Some languages were developed for specific computers, others were developed for specific uses, such as scientific or business applications.



Lady Ada Lovelace is regarded the first computer programmer.



The development of computer language has been classified into the following categories:



LOW LEVEL LANGUAGE

A low level language is a programming language that is machine dependent. A machine dependent language runs only on one particular type of computer. These programs are not easily runs on to the other types of computers.

There are two categories of low level languages :

Machine Language (First Generation Language)

It is the only language understood by a computer. It is also known a **First generation language** (1GL). It is expressed in binary i.e., '0' and '1'. The '0' stands for 'OFF' and '1' stands for 'ON'.

Advantages of Machine Language

- It has the advantage of very high speed as it is directly understood by the computer.
- It utilizes very low memory .
- These is no need to use a translator for machine language.
- It is the language that is directly accepted and executed by the CPU.

Disadvantages of Machine Language

- Understanding and learning machine language is a tough and time consuming process.
- It is difficult to find errors in a program.
- A machine language program written on one computer may or may not run on another computer. i.e., they are machine dependent.



- It is very difficult to write a program in this language because its codes (like 0 and 1) are difficult to remember.

Assembly Language

Assembly language was developed to overcome the inconvenience of machine language. It is also known as **Second generation language (2GL)**. In this language binary operations codes are replaced by the alphanumeric symbols called **Mnemonics**.

Mnemonics are like two or three letter abbreviations. For example in the machine language if the code for 'add' operation is '0010', its equivalent in the assembly language is 'ADD'. Because of this feature it is also known as '**Symbolic Programming Language**'.

As you know that the computer only understands machine language, the instruction code (mnemonics) given in assembly language are converted to machine language by a software called '**Assembler**'.

An assembler is a program used to translate assembly language into machine language so that the computer can understand it. A program written in assembly language is called the **source program** and the program converted into machine language by the assembler is called **object program**.

Advantages of Assembly Languages

- It is easy to use the program written in assembly language as compared to machine language.
- It is easy to find and correct errors in a program.
- It can be modified easily because of fewer instructions.

Disadvantages of Assembly Languages

- It is also a machine dependent language.
- A translator is required to translate it into machine language.
- Programming in this language is quite time consuming.



HIGH LEVEL LANGUAGE

The restrictions in the usage of Machine and Assembly language prompted people to develop a language that is machine independent. So high level languages came into existence.

High level language is a programming language that enables a programmer to write programs that are machine independent. These languages are considered high level as they are closer to human language and farther from machine language.

The main advantage of high level language over low level language is that they are easier to read, write and maintain. The programs written in this language need to be translated into machine language by using the **Translator program**. There are two types of translator



programs for converting high level language program into machine language–

- (a) Compiler
- (b) Interpreter

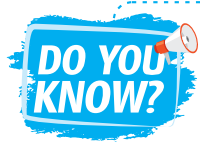
Three main categories of high level language are:

- Third Generation language (3GL)
- Fourth Generation language (4GL)
- Natural language (5GL)

Third Generation Language

A third generation language (3GL) instruction is also written as a series of English like words such as ADD for addition, SUB for subtraction, etc. Many third generation languages also use arithmetic operators such as + for addition, * for multiplication. These English like words and arithmetic notation make it easy for a programmer to write the program .

Example: BASIC, COBOL, PASCAL, FORTRAN.



Locator Identifier Separation Protocol (LISP) was the first computer language for writing artificial Intelligence programs.

Fourth Generation Language (4GL)

Fourth generation languages are closer to human language than any other high level language. A fourth generation language is a non-procedural language, which means the programmer only specifies what the program should accomplish without explaining how. A 4GL is fast and requires less time on the part of the programmer. A 4GL language has following features.

- Very high speed of execution.
- Highly user friendly, portable and independent of operating system.
- Designed to reduce level of programming efforts.
- 4GLs are so easy to use that users with very little programming background can develop programs using a 4GL.
- In 4GL, the user has to specify only the required output and the format of the output without bothering about the steps required to obtain that.

Examples of 4GLs are Visual Basic, Oracle, SQL, JAVA, OOP (Object oriented programming).

Natural Language (5GL)

Natural language, sometimes called a Fifth Generation Language (5GL) is a type of Query language that allows a programmer to enter request that resemble human speech.

Natural language is very easy to use. For example if a program is written in 4GL to get the name of students whose marks exceed 95, it might be written as:

```
SELECT LAST_NAME, FIRST_NAME, FROM STUDENT WHERE MARKS> 95
```



A natural language version of the same program might be written as :

TELL ME THE NAME OF STUDENT WITH MARKS OVER 95

Natural languages are often associated with expert system and artificial intelligence. These systems are popular in the medical field but are not widely used in business application.

Advantages of High Level Language

- High level language is user friendly.
- High level language is easier to maintain.
- High level language is problem oriented rather than 'Machine Based'.
- Program written in a high level language can be translate into many machine languages and therefore can run on any computer for which these exist an appropriate translator.
- It is machine independent, i.e., programs developed in high level language can be run on any computer.

Disadvantages of High Level Language

- A high level language has to be translated into the machine language by a translator and thus it wastes a lot of the computer time.
- The object code generated by a translator might be inefficient as compared to an equivalent assembly language program.



LANGUAGE TRANSLATOR

A software program that is used to convert a high level language program into a machine language, called **Translator**. Following are the types of language translators.

- **Assembler** : An assembler is a translator that enables the computer to convert the program written in assembly language in machine code i.e., 0 and 1.

Assembly language program

Machine code



- **Compiler** : Compiler is a translator program used to convert a high level language program into machine language before executing it. It translates the whole program at once, i.e., it generates the object code for the program along with a list of errors, if any.

High level language program

Machine code



(Source program)

(Object program)

- **Interpreter** : This language program is used to convert a high level language program into machine language. It translates line by line , i.e., it converts one line at a time,



execute the instruction and then repeats the procedure for the remaining instructions. In case, if any errors were found, they are to be immediately removed. That is the interpreter converts one line at a time of program. It displays the errors one line at a time and it goes to the next line only after the error is corrected. Interpreter program are preferred for beginners and are slow in execution speed.



POINTS to Recall

- A computer language is a type of language that is used to write computer programs to give instructions to the computer.
- Computer language are divided into two categories. Low level language and high level language.
- Machine language programs are directly understood by the computer .
- Assembly language is a second generation language.
- Programs written in the assembly language and high level language need to be first converted into the machine language.
- A compiler and interpreter are two types of translator programs used to convert a high level language program into machine language.
- A natural language is a type of query language that allows programmer to enter requests that remember human speech.



TERMS to Learn

- **Program** : A set of instructions to perform a specific task.
- **Programmer** : A person who writes computer programs.
- **Machine language** : A language that is directly understood by a computer.
- **Assembly language** : A low level language that uses mnemonics for writing computer programs.
- **Mnemonics** : Alphanumeric symbols used in assembly language.
- **High level language** : Any one of the several programming languages that resemble the English language.



Multiple Choice Questions

A. Tick (✓) the correct answer :

1. A ___ is a set of instructions which tells the computer what to do.

(a) Assembler



(b) Program



(c) Language



2. Which of the following language is not the example of low level language?
 (a) Machine language (b) Assembly language (c) Natural language
3. A program written in the assembly language is called_____.
 (a) Source program (b) Object program (c) Converter
4. Which of these is not a high level language?
 (a) Assembly (b) COBOL (c) FORTRAN
5. In which language mnemonics are used:
 (a) Machine language (b) Assembly language (c) Natural language

B. Fill in the blanks with the help of given hints :

1. _____ is an interface between a computer and human beings.
2. The program converted into machine language by the translator is called _____ .
3. The machine language is a language of _____ .
4. _____ is understood by the computer.
5. An _____ is a program used to translate assembly language into machine language.

HINTS: Object program Machine language Assembler Computer language Binary digits

C. Write 'T' for true statements and 'F' for false statements :

1. Machine language is the second generation language.
2. High level language uses simple English words and mathematical operators.
3. Computer understands only assembly language.
4. Assembly language uses binary digits i.e., '0' and '1'.
5. Visual Basic is the example of fourth generation language.

D. Very Short Answer Question :

1. Who is programmer?

2. Which language uses mnemonic codes?

3. What are binary digits?

4. Which language directly understood by the computer?



5. Name any one third generation language.

E. Short Answer Question :

1. What is machine language?

2. Define mnemonics?

3. Write the full form of LISP?

4. What is an assembler?

5. What is source program?

F. Long Answer Question :

1. What is computer language? Name its two categories.

2. How is a machine language different from an assembly language?

3. What is the difference between compiler and interpreter?

4. Differentiate between HLL and LLL?

