

Machine language

(Assembly language, High level language, mid-level Selection,
Compilers, Interpreters, Programming language)



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Hardware



Hardware is the machine itself and its various individual equipment.

✂ It includes all mechanical, electronic and magnetic devices such as monitor, printer, electronic circuit, floppy and hard disk.

Software



Software refers to the set of computer programs, which are used in applications and operating systems.

- ☞ It is the collection of programs, which increase the capabilities of the hardware.
- ☞ Software guides the computer at every step where to start and stop during a particular job.
- ☞ The process of software development is called *programming*.

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SOFTWARE TYPES



☐ 1- Application Software :

- ☞ Application Software is a set of programs for a specific application.
- ☞ Application software is useful for word processing, accounting, producing statistical report, Graphics, Excel and Data Base.
- ☞ programming languages COBOL, FORTRAN, C++, VB, VC, Java

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SOFTWARE TYPES

❑ 2- System Software:

- When you switch on the computer the programs written in ROM is executed which activates different units of your computer and makes it ready for you to work.
- This set of programs can be called system software.
- System software are general programs designed for performing tasks such as controlling all operations required to move data into and out of the computer
- System Software allows application packages to be run on the computer.
 - ❧ Computer manufactures build and supply this system software with the computer system
 - ❧ DOS, UNIX and WINDOWS are some of the widely used operating system software
 - ❧ Out of these UNIX is a multi-user operating system whereas DOS and WINDOWS are PC- 5 based.

programming languages

- ❧ programming languages specially developed so that you could pass your data and instructions to the computer to do specific job
- ❧ There are two major types of programming languages, Low Level Languages and High Level Languages
- ❧ Low Level languages are further divided in to *Machine language* and *Assembly language*
- ❧ High Level Languages are, for scientific application FORTRAN and C languages are used. On the other hand COBOL is used for business applications.

Machine Language



- ☞ **Machine Language** is the only language that is directly understood by the computer. It does not need any translator program
- ☞ The only advantage is that program of machine language runs very fast

Assembly Language

- ☞ It is the first step to improve the programming structure. You should know that computer can handle numbers and letters.
- ☞ The set of symbols and letters forms the Assembly Language and a translator program is required to translate the Assembly Language to machine language
- ☞ This translator program is called *Assembler*

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Assembly Language



☐ Advantages:

- ☞ Assembly Language is easier to understand and saves a lot of time and effort.
- ☞ It is easier to correct errors and modify program instructions.
- ☞ Assembly Language has the same efficiency of execution as the machine level language

☐ Disadvantages:

- Assembly language is machine dependent. A program written for one computer might not run in other computers with different hardware configuration.

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HIGH LEVEL LANGUAGES



- ☞ Assembly and machine level languages require deep knowledge of computer hardware where as in higher language you have to know only the *instructions in English words and logic of the problem.*
- ☞ Higher level languages are simple languages that use English and mathematical symbols like +, -, %, / etc. for its program construction.
 - ☞ Any higher level language has to be converted to machine language for the computer to understand
 - ☞ For example COBOL (Common Business Oriented Language), FORTRAN (Formula Translation) and BASIC (Beginners All-purpose Symbolic Instruction Code) are high level languages.

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HIGH LEVEL LANGUAGES



☐ Advantages of High Level Languages

- ☞ Higher level languages have a major advantage over machine and assembly languages that higher level languages are easy to learn and use similar to the languages used by us in our day to day life.

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The Evolution of Programming Languages Higher-Level Languages

Higher-level languages are more powerful than assembly language and allow the programmer more to work in English-like a environment.

Higher-level programming languages are divided into three "generations ".

Third-generation languages ✓

Fourth-generation languages ✓

Fifth-generation languages ✓

Higher-Level Languages - Third-Generation Languages

Third-generation languages (3GLs) are the first to use true English-like phrasing, making them easier to use than previous languages.

3GLs are portable, meaning the object code created for one type of system can be translated for use on a different type of system.

The following languages are 3GLs:

C	FORTAN
C++	COBOL
Java	BASIC
ActiveX	Pascal

Higher-Level Languages “Fourth-Generation Languages”

Fourth-generation languages (4GLs) are even easier to use than 3GLs.

4GLs may use a text-based environment (like a 3GL) or may allow the programmer to work in a visual environment, using graphical tools.

The following languages are 4GLs:

- ✓ **Visual Basic (VB)**
- ✓ **Visual Age**
- ✓ **Authoring environments**

Higher-Level Languages - Fifth-Generation Languages

Fifth-generation languages (5GLs) are an issue of debate in the programming community – some programmers cannot agree that they even exist.

These high-level languages would use artificial intelligence to create software, making 5GLs extremely difficult to develop.

Solve problems using constraints rather than algorithms, used in Artificial Intelligence.

Prolog ✓

Compiler



- ☞ *Compiler* : It is a program translator that translates the instruction of a higher level language to machine language.
- ☞ It is called compiler because it compiles machine language instructions for every program instructions of higher level language.
- ☞ Thus compiler is a program translator like assembler but more sophisticated. It scans the entire program first and then translates it into machine code.

The programs written by the programmer in higher level language is called *source program*. After this program is converted to machine languages by the compiler it is called *object program*.

A compiler can translate only those source programs, which have been written, in that language.

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Interpreter



- ☞ An interpreter is another type of program translator used for translating higher level language into machine language.
- ☞ It takes one statement of higher level languages, translate it into machine language and immediately execute it.
- ☞ Translation and execution are carried out for each statement.
- ☞ It differs from compiler, which translate the entire source program into machine code.

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Advantage and disadvantage of Interpreter



- ❧ The advantage of interpreter compared to compiler is its fast response to changes in source program
- ❧ do not require large memory in computer.
- ❧ The disadvantage of interpreter is that it is time consuming method because each time a statement in a program is executed then it is first translated
- ❧ Thus compiled machine language program runs much faster than an interpreted program.