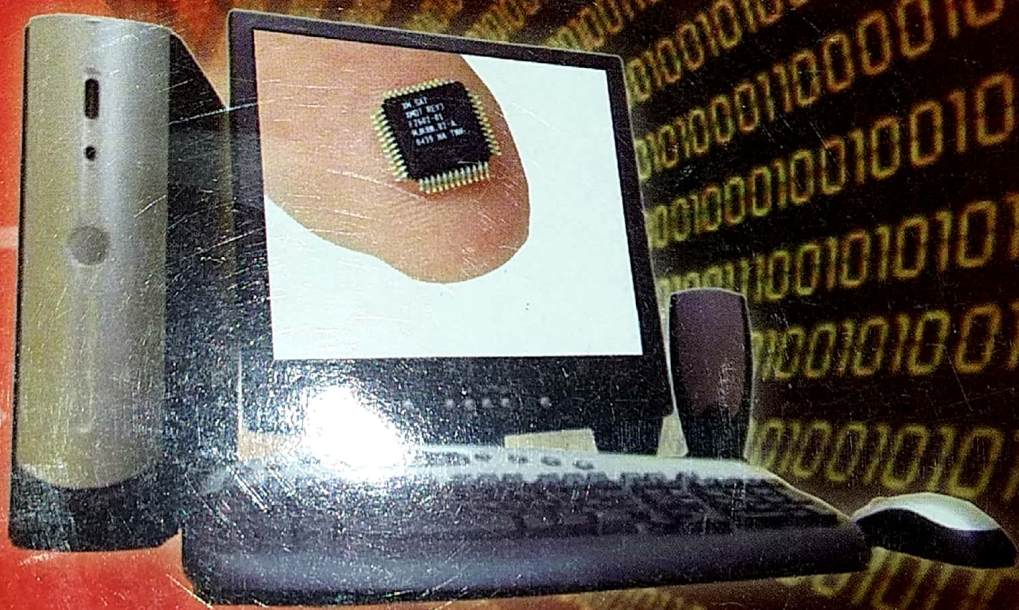


# Beyond Windows

Towards Understanding Computers



6

Navdeep Publications



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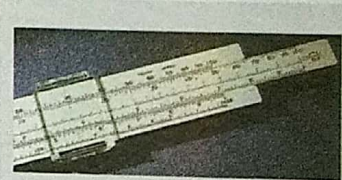




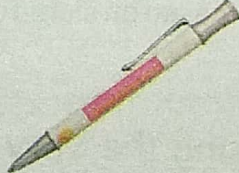





# Computer Story

## Understanding Generations


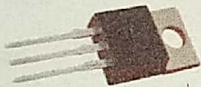

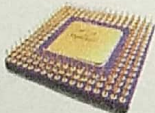

In every household there are different generations of people. Your grandfather belongs to a different generation, your father to a different and you belong to the latest generation. As the generations progressed, the devices that were used by people also became increasingly advanced. Observe the following pictures to understand this.

Your Grandfather	Devices used during his time	
	 Wooden pen and ink for writing	 Slide Rule for calculation
Your Father	Devices used during his time	
	 Fountain Pen for writing	 Calculator for doing calculations
You	Devices which you are using now	
	 Ball Pen for writing	 Computer for doing calculations and many other things



## Generations of Computers

In the same way, there have been different generations of computers. The computer which you see today is not the same, as it was some years back. It has passed through many generations to reach its current form. Let us learn about different generations which led to the invention of the modern computer.

The Generation	Parts used	Properties	Example
First Generation Computers (1940-1956)	 Vacuum Tube	<ul style="list-style-type: none"> <li>First generation computers used Vacuum tubes (very large in size)</li> <li>These were slow and generated a lot of heat</li> </ul>	UNIVAC, ENIAC, IBM 701, IBM 650
Second Generation Computers (1956-1963)	 Transistors	<ul style="list-style-type: none"> <li>Second generation computers used Transistors and were smaller in size and faster in speed.</li> <li>These used magnetic tapes and Punch cards to store data.</li> </ul>	IBM 7090, IBM 7094, UNIVAC 1108
Third Generation Computers (1964-1971)	 Integrated Circuits (ICs)	<ul style="list-style-type: none"> <li>Third generation computers used Integrated Circuits (ICs).</li> <li>These were smaller and faster and could do more complex work.</li> </ul>	IBM 370
Fourth Generation Computers (1971-Present)	 Microprocessor	<ul style="list-style-type: none"> <li>Fourth generation computers use Microprocessors and are light weight and faster.</li> <li>Currently we are using Fourth Generation computers.</li> </ul>	These are Personal Computers (PCs) like IBM system and HP 3000
Fifth Generation Computers (Present & Beyond)	 Artificial Intelligence	<ul style="list-style-type: none"> <li>These are still in the development stage.</li> <li>These will take decisions based on stored data.</li> </ul>	

### Fact File

Microprocessors were developed using the Very Large Scale Integration (VLSI), which combined thousands of transistor based circuits into a single chip.

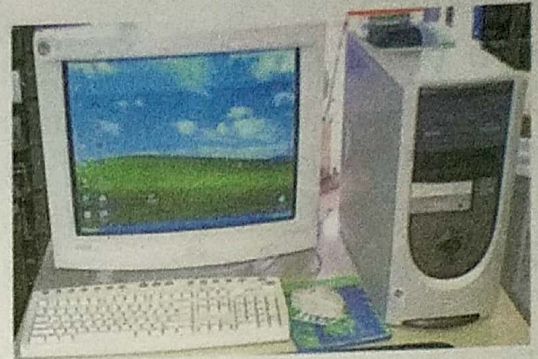


## Classification of Computers

Computers can be classified on the basis of their size and speed.

### Microcomputers

Microcomputers are small computers whose CPU is a microprocessor, contained on a single integrated circuit chip. These computers are also called personal computers (PCs). Two major types of these are Laptop and Desktop computers.



Desktop Computer

### Fact File

Modern desktop computers, video games, consoles, tablet PCs and many handheld computers including the latest high end mobile phones can be considered examples of microcomputers.

### What is a Workstation?

A workstation is like a personal computer, but it has a more powerful microprocessor and, in general, a higher-quality monitor.

### Minicomputers

Minicomputers came into existence in 1960s. Those days mainframe computers were very expensive. Minicomputers were powerful and available at a reasonable price, so users switched over to them. The minicomputer has become less important since the PC has become so powerful on its own. The present day PC is much more powerful and compact than the Minicomputer.



Minicomputer

*Remember* Minicomputers are normally referred to as mid-range servers now.



## Mainframe Computers

Mainframes are huge computers that can occupy an entire room or even a whole floor. A mainframe can accommodate many users at a time. Terminals are used to connect a user to this computer. A terminal is a device which has a keyboard and a screen integrated together. By using a terminal each user can give inputs into the computer and get the output on his/her monitor.



Mainframe Computer

**Remember** The mainframes are normally referred to as enterprise servers.

## Supercomputers

As the name "supercomputer" specifies these are the most powerful computers. A super computer uses multiple CPUs to work on a problem using the concept of Parallel processing.

Supercomputers are used for highly calculation-intensive tasks such as weather forecasting, climate research (like research into global warming), physical simulations (such as simulation of the flying of aeroplanes, nuclear energy research and petroleum exploration).



Supercomputer

### Fact File

Parallel processing is the simultaneous use of more than one CPU to execute a program. Ideally, parallel processing makes a program run faster because there are more CPUs working on it.

### Latest Trends

The latest trend in computing is wearable computers. Common computer applications like e-mail, multimedia, calendar/scheduler are integrated into watches, cell phones, clothing, belt, backpack, handbag etc, which have a microprocessor chip embedded into them.



## Quick Recap

- First generation computers used Vacuum tubes.
- Second generation computers used Transistors.
- Third generation computers used Integrated Circuits (ICs).
- Fourth generation computers use Very large Scale Integrated (VLSI) Circuits, also called microprocessors.
- Fifth generation computers are being developed to use the concept of Artificial intelligence.
- Microcomputers are small computers whose CPU is a microprocessor, contained on a single integrated circuit chip.
- A supercomputer uses multiple CPUs to work on a problem using the concept of Parallel processing.
- Parallel processing is the simultaneous use of more than one CPU to execute a program.

## Exercise Time

### 1. Write (T) for True and (F) for False statements.

1. First generation computers came into existence after 1980. ☐
2. Fifth generation computers will use Artificial intelligence. ☐
3. Microcomputers use microprocessors. ☐
4. Minicomputers are normally referred to as mid-range servers now. ☐
5. Supercomputers are used for highly calculation-intensive tasks such as weather forecasting, climate research, etc. ☐
6. In parallel processing a single processor works on multiple problems. ☐



**2. Select the suitable word and Fill in the blanks.**

Transistors

First

ICs

UNIVAC

Fourth

IBM 370

1. \_\_\_\_\_ generation computers used vacuum tubes.
2. \_\_\_\_\_ generation computers use microprocessors.
3. Second generation computers used \_\_\_\_\_.
4. Third generation computers used \_\_\_\_\_.
5. \_\_\_\_\_ is an example of first generation computers.
6. \_\_\_\_\_ is an example of third generation computers.

**3. Answer the following in 2-3 lines.**

1. Name the components used in every generation of computers.
2. Write a short note on microcomputers.
3. What is a workstation?
4. For which purpose are supercomputers used?
5. What is parallel processing?

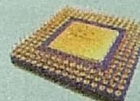
**4. Draw lines to match the computer generation with the parts used. Also write the name of the part in the space provided.**

First generation computers

Second generation computers

Third generation computers

Fourth generation computers







# Language and Software Story

## The Computer Language

A language is a medium to communicate with each other. We use components (symbols, words...) of a language according to certain rules defined by the language. It is called the syntax of the language. Each language has its own syntax. Similarly a computer language which is needed to interact with a computer has its own syntax. While writing computer programs it is essential to follow this syntax, otherwise the computer will not be able to understand our instructions.

Computer languages can be classified in the following three categories based on complexity of the language:

1. Machine language
2. Assembly language
3. High level languages

Tell me the syntax of IF-THEN-ELSE in QBasic.



IF (condition)  
THEN  
Action 1  
ELSE  
Action2  
END IF



## Machine Language

As we know all instructions/data that are fed into the computer are converted into a sequence of bits (0 and 1) as a computer understands only the binary language which consists of only two digits (0 and 1).

The Machine language is the elementary language of a computer which consists of binary digits (0 and 1) only.



A Machine language program

As is clear from the name, the Machine language is directly accepted and executed by the computer.



## Assembly Language

The Assembly language is close to the Machine language, but in the assembly language, binary operation codes were replaced by the Mnemonics.

Mnemonics are like two or three letter abbreviations. For example, in the machine language, if the operation code for "add" is "0010", its equivalent in the Assembly language is 'ADD'. Since mnemonics are abbreviations or symbols, they need to be translated into the machine language to get executed. This job is done by an Assembler.

```
; 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
```

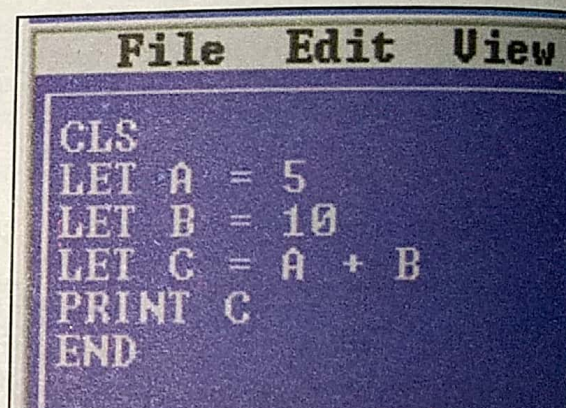
FIGURE 17. Assembly language

An Assembly language program

**Remember** Machine and Assembly languages are also called low level language as they are linked with the hardware.

## High Level Languages

As speed, power and the capacity of the computer increased, a need was felt to develop programs which could make use of computers in diverse fields and could be developed by people who were not experts in computer architecture and hardware. So High Level Languages came into existence. These high-level languages were much closer to the human language.



```
File Edit View
CLS
LET A = 5
LET B = 10
LET C = A + B
PRINT C
END
```

An High level language program

High Level Languages (HLL) are programming languages designed for users to write instructions in English-like statements (like  $c=a+b$ ) rather than in the Machine language or using Mnemonics.

Fortran, C and Java are a few examples of High level languages. We need language translators (compilers or interpreters) to change the HLL code to the machine code so that it could be understood and executed by the computer.

**Remember** High Level languages are considered to be third generation languages.



## Computer Software

A computer is a dumb machine, which is completely dependent on the user to give it step-wise instructions to make it work. You need to give instructions to it in the form of a computer program.

Computer software is the intelligence of the computer.



A set of computer programs which make the computer work is called software.

### Types of Softwares

Software can be classified in the following categories depending upon the usage to which it is put.

1. System software
2. Application software
3. Utilities

### System Software

The System software works at the internal level of the computer and instructs the computer how to manage its resources (Hardware and Software).

An operating system (like Windows XP, Linux and Unix) which is responsible for providing an interface between the user and the computer is also a type of system software.

**Remember** Operating systems, Assemblers, Compilers or Interpreters are types of system software.

### Application Software

The Application software makes the computer useful for people so that they can use them for different purposes.

Application software helps the user to work more efficiently, faster and more meaningfully. We can further classify application software as follows:

1. Custom-made application software
2. General purpose application software



## Custom-Made Application Software

Custom-made application software are the programs developed as per individual needs.

A few examples of such software are accounting, library management, fee collection, hotel management software etc. These software are developed using a suitable computer language or package.

## General Purpose Application Software (packages)

General-purpose application software provide the environment to develop custom made software.

For example, by using the MS ACCESS database management software, library management systems for schools can be developed.

## Utilities

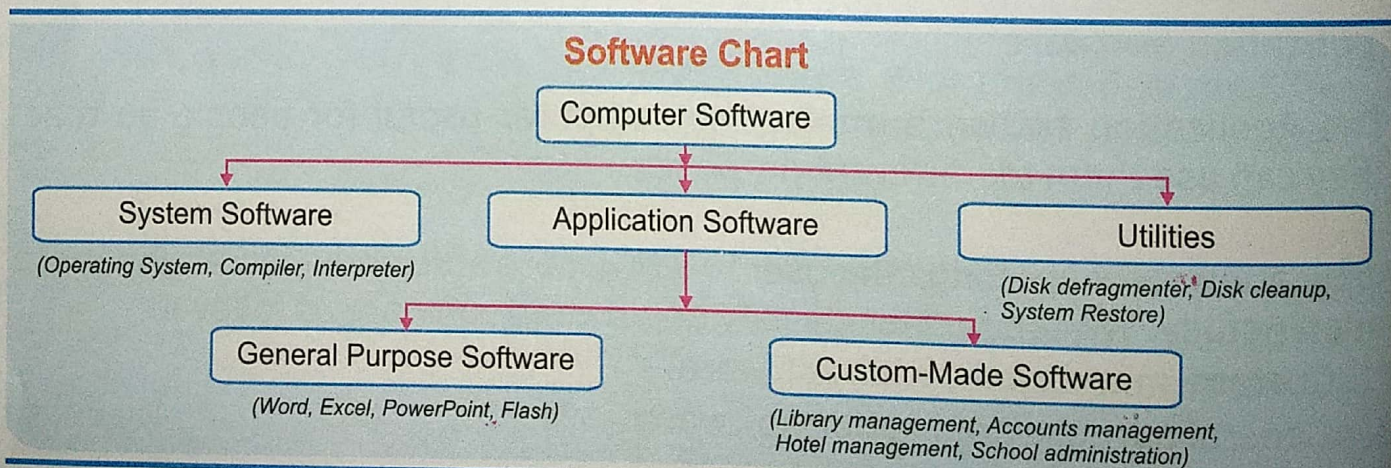
Utility programs perform routine but necessary jobs in a computer system.

These programs make life easier for a user by doing several routine and important jobs quickly and in an easy manner. These jobs include:

- Backup of data
- Testing the disk integrity
- Recovering accidentally deleted data.

Disk Defragmenter and System Restore are the common utilities provided with the Windows Operating System for the efficient working of the hard disk.

To open utilities in Windows XP, use Start → Programs → Accessories → System Tools Sequence.





## Quick Recap

- Machine language is the elementary language of a computer which consists of binary digits (0 and 1) only.
- In the Assembly language, binary operation codes were replaced by Mnemonics.
- High Level languages (HLL) are programming languages designed for users to write instructions in English-like statements.
- The System software works at the internal level of the computer and tells the computer how to manage its resources.
- An operating system which is responsible for providing an interface between the user and the computer, is a type of System software.
- The Application software makes the computer useful for people so that they can use them for diverse purposes.

## Exercise Time

### 1. Write (T) for True and (F) for False statements.

1. The Machine language is the elementary language of a computer. ☐
2. 1 and 2 are also called binary digits. ☐
3. Learning High Level language is more difficult than learning the Machine language. ☐
4. A Compiler or Interpreter changes the High level language into the Machine language. ☐
5. Windows XP is an example of an application software. ☐
6. A library management software is an example of a System software. ☐
7. Disk Defragmenter is a utility program. ☐



## 2. Select the suitable word and fill in the blanks.

1s      High Level      0s      Compiler      General Purpose  
Interpreter      Operating System      Custom made

1. The Machine languages consist of \_\_\_\_\_ and \_\_\_\_\_.
2. In \_\_\_\_\_ languages, you can write instructions in English like statements.
3. A \_\_\_\_\_ or an \_\_\_\_\_ converts the High Level Language program into the Machine language.
4. An \_\_\_\_\_ is the example of System software.
5. MS Access is an example of \_\_\_\_\_ application software.
6. A result-making software is an example of \_\_\_\_\_ application software.

## 3. Answer the following in 2-3 lines.

1. Write about the Machine language.
2. Write about High Level languages.
3. How are High Level languages understood by a computer?
4. What is System software?
5. What are the different types of Application software? Give one example of each.

## 4. Write down the terms from the box in the correct column.

Windows XP      Library Management Software      Java  
Disk Defragmenter      MS Excel      Unix  
Linux      System Restore      Visual Basic

System  
Software

General Purpose  
Application Software

Custom made  
Application Software

High Level  
Languages

Utilities