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COMPUTER ORGANIZATION – HARDWARE AND

SOFTWARE

ಗಣಕಯಂತ್ರದ ಸಂಘಟನೆ – ಯಂತ್ರಾಂಶ ಮತ್ತು ಕಂಪ್ಯೂಟರ್

2.1 **Computer Hardware** – concept and importance.

2.2 **Hardware devices:**

2.2.1 **Input devices** – Text inputs, audio inputs, image inputs, video inputs, pointing input devices.

2.2.2 **Output devices** –Text outputs, audio outputs, image outputs, video output devices.

2.2.3 **Memory devices** – Primary and Secondary memory devices.

2.3 **Software** – concept and importance.

2.3.1 **Operating system** - Needs and functions of operating system.

2.3.2 **Types of operating system** – Single user and multi user.

2.4 **Types of software** – System software, application software and Utility software

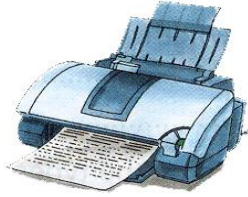
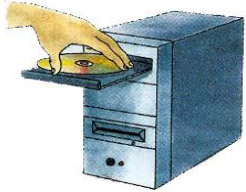
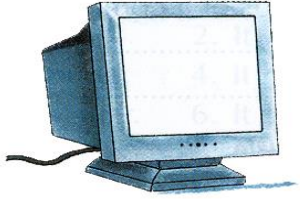
2.5 **Programming languages** - Meaning and types

2.6 **Computer Virus** and its prevention.

A computer system is composed of hardware and software.

ಗಣಕಯಂತ್ರವು ಯಂತ್ರಾಂಶ ಮತ್ತು ತಂತ್ರಾಂಶಗಳಿಂದ ಕೂಡಿದ ವಿದ್ಯುನ್ಮಾನ ಯಂತ್ರ. ಹಾಗಾಗಿ ಗಣಕಯಂತ್ರವು ಯಂತ್ರಾಂಶ ಮತ್ತು ತಂತ್ರಾಂಶಗಳ ಒಟ್ಟು ಸಂಘಟನೆಯಾಗಿದೆ.

ಯಂತ್ರಾಂಶ / Hardware



Hardware components are the physical,
tangible pieces that we can see and touch

ಯಂತ್ರಾಂಶ ಎಂದರೆ ನಮ್ಮೆದುರಿಗಿರುವ ವಿವಿಧ
ಭಾಗಗಳನ್ನು ಹೊಂದಿರುವ ಗಣಕಯಂತ್ರ. ಇವುಗಳನ್ನು
ನೋಡಬಹುದು ಹಾಗೂ ಸ್ಪರ್ಶಿಸಬಹುದು

ತಂತ್ರಾಂಶ / Software

Software is the set of instructions that lets you “talk” to your computer. Software translates commands into bits and bytes.



ವಿವಿಧ ಸಮಸ್ಯೆಗಳನ್ನು ಬಿಡಿಸುವ
ತಂತ್ರಜ್ಞಾನವನ್ನು ತಂತ್ರಾಂಶ ಎನ್ನುತ್ತೇವೆ.
ಇವುಗಳನ್ನು ನೋಡಬಹುದು ಹಾಗೂ
ಸ್ಪರ್ಶಿಸಲು ಸಾಧ್ಯವಿಲ್ಲ.



Example for Hardware

Input devices include:

- Digital camera
- Joystick
- Keyboard
- Microphone
- Mouse
- Scanner
- Touch screen
- Trackball

Output devices include:

- Monitor
- Printer
- Projector
- Speakers

Memory devices include:

- RAM
- ROM
- EPROM
- Hard disk
- Compact disk
- Pendrive

INPUT & OUTPUT DEVICES

Input or Output devices are required for users to communicate with the computer.

In simple terms, input devices bring information **INTO** the computer and output devices bring information **OUT** of a computer system.

Input Devices

- Keyboard
- Mouse
- Joystick
- Scanner
- Light Pen
- Touch Screen

Keyboard

- It is a text base input device that allows the user to input alphabets, numbers and other characters.
- It consists of a set of keys mounted on a board.



Alphanumeric Keypad

It consists of keys for English alphabets, 0 to 9 numbers, and special characters like + - / * () etc.

Function Keys

There are twelve function keys labeled F1, F2, F3... F12. The functions assigned to these keys differ from one software package to another. These keys are also user programmable keys.

Special-function Keys

These keys have special functions assigned to them and can be used only for those specific purposes. Functions of some of the important keys are defined below.

➤ Enter

➤ Shift

➤ Spacebar

➤ Caps Lock

➤ Backspace

➤ Tab

➤ Delete

➤ Ctrl

➤ Insert

Numeric Keypad

Numeric keypad is located on the right side of the keyboard and consists of keys having numbers (0 to 9) and mathematical operators (+ - * /) defined on them. This keypad is provided to support quick entry for numeric data.

Cursor Movement Keys

These are arrow keys and are used to move the cursor in the direction indicated by the arrow (up, down, left, right).

Mouse

- The mouse is a small device used to point to a particular place on the screen and select in order to perform one or more actions. It can be used to select menu commands, size windows, start programs etc.



- The most conventional kind of mouse has two buttons on top: the left one being used most frequently

Mouse Actions

Left Click : Used to select an item.

Double Click : Used to start a program or open a file.

Right Click : Usually used to display a set of commands.

Drag and Drop : It allows you to select and move an item from one location to another. To achieve this place the cursor over an item on the screen, click the left mouse button and while holding the button down move the cursor to where you want to place the item, and then release it.

Joystick

The joystick is a vertical stick which moves the graphic cursor in a direction the stick is moved. It typically has a button on top that is used to select the option pointed by the cursor. Joystick is used as an input device primarily used with video games, training simulators and controlling robots



Scanner



Scanner is an input device used for direct data entry from the source document into the computer system. It converts the document image into digital form so that it can be fed into the computer. Capturing information like this reduces the possibility of errors typically experienced during large data entry.

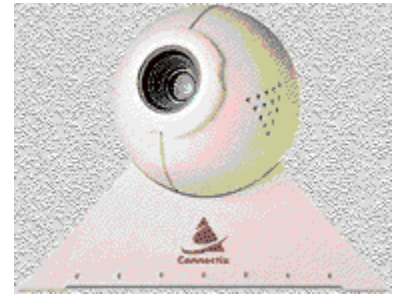
Bar codes

A bar code is a set of lines of different thicknesses that represent a number. Bar Code Readers are used to input data from bar codes. Most products in shops have bar codes on them. Bar code readers work by shining a beam of light on the lines that make up the bar code and detecting the amount of light that is reflected back





Digital camera



A digital camera can store many more pictures than an ordinary camera. Pictures taken using a digital camera are stored inside its memory and can be transferred to a computer by connecting the camera to it. A digital camera takes pictures by converting the light passing through the lens at the front into a digital image.

Output Devices

Monitor

LCD

Printer

Plotter

Speakers and Headsets

Projectors

Monitor



Monitor is an output device that resembles the television screen and uses a Cathode Ray Tube (CRT) to display information. The monitor is associated with a keyboard for manual input of characters and displays the information as it is keyed in. It also displays the program or application output. Like the television, monitors are also available in different sizes.

Categories of Monitor

Monitors can be divided into two categories:

i) Monochrome Monitors



ii) Color Monitors



Monochrome Monitors

- ❖ Monochrome means information displayed in one colour (such as white, green, black, blue, amber or gray) on different colour background, which is usually black.
- ❖ It used to display text only

Color Monitors

- Used to display output in different colors.

Now a days most of PC use color monitors

- RGB display screen; Red, Green, Blue
- It can create 256 different colors
- Thousands of variations of these colors

Liquid Crystal Display (LCD)

LCD was introduced in the 1970s and is now applied to display terminals also. Its advantages like low energy consumption, smaller and lighter have paved its way for usage in portable computers (laptops).



Process: When an electronic current passes through liquid crystal, its molecules twist. This twisting causes some light waves to be blocked (while others are passed through) and creating image on the screen.

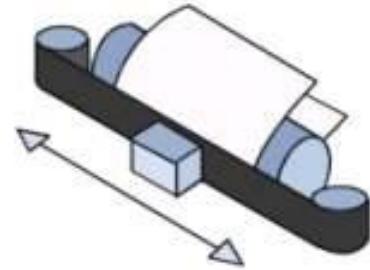
Printer

Printers are used to produce paper (commonly known as hardcopy) output. Based on the technology used, they can be classified as *Impact or Non-impact printers*.

➤ **Impact printers** use the typewriting printing mechanism wherein a hammer strikes the paper through a ribbon in order to produce output. **Dot-matrix** and **Character printers** fall under this category.

➤ **Non-impact printers** do not touch the paper while printing. They use **chemical, heat or electrical signals** to etch the symbols on paper. **Inkjet, Desk jet, Laser, Thermal** printers fall under this category of printers.

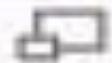
Dot Matrix Printer



Inkjet printer



An Epson inkjet printer



Laser Printer



Thermal Printers



Plotter

- Plotters are used to print graphical output on paper. It interprets computer commands and makes line drawings on paper using multi-coloured automated pens. It is capable of producing graphs, drawings, charts, maps etc.
- **Computer Aided Engineering (CAE)** applications like CAD (Computer Aided Design) and CAM (Computer Aided Manufacturing) are typical usage areas for plotters.

Plotters



Audio Output

Sound Cards and Speakers: The Audio output is the ability of the computer to output sound.

Two components are needed:

Sound card:— Plays contents of digitized recordings,

Speakers: — Attached to sound card.

Speakers and Headset

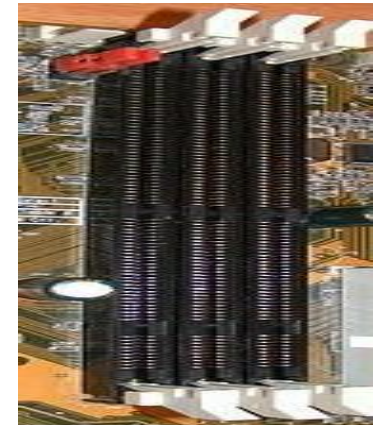
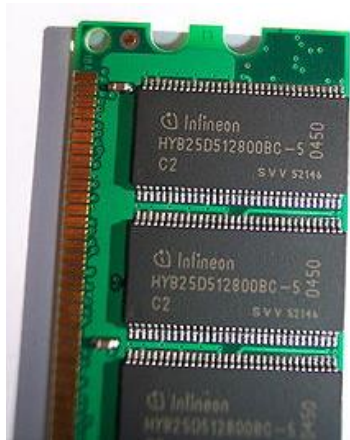


Projectors





MEMORY DEVICES



INTRODUCTION

Memory is the most essential part of a computer. Without memory there would be no computer, as we know it today. It is used for storing both instructions to be executed and data.

TYPES OF MEMORY

- **MAIN MEMORY**
 - Random Access Memory (RAM)
 - Read Only Memory (ROM)
- **SECONDARY MEMORY**
 - Optical Media Devices
 - Magnetic Media Devices

MAIN MEMORY

Directly or indirectly connected to the CPU

Main memory is of two types :

Random Access Memory (RAM)

Read Only Memory (ROM).

RANDOM ACCESS MEMORY

- In RAM, the memory cells can be accessed for information transfer from any desired location, that is the processing of a word in memory is the same and requires an equal amount of memory.
- It is the fastest main memory technology.
- It requires constant power to maintain the stored information, therefore, it is volatile.

A 1GB DDR RAM memory module



READ ONLY MEMORY

- It performs only read function not write function. So the data stored in ROM cannot be modified.
- It comes with special internal electronic fuses that can be programmed for a specific configuration. Once this pattern is established it stays in the unit. Thus, ROM is non-volatile.



SECONDARY STORAGE DEVICES

- These devices are used to store large amount of data permanently.
- It differs from primary storage in that it is not directly accessible by the CPU. So they need more access time and thus are much slower.
- Per unit, it is typically also an order of magnitude less expensive than primary storage. Consequently, modern computer systems have an order of magnitude more secondary storage than primary storage and data is kept for a longer time there (such as in hard disk).
- Two types-
 - 1) MAGNETIC MEDIA
 - 2) OPTIC MEDIA.

MAGNETIC MEDIA DEVICES

- Magnetic storage uses different patterns of magnetization in a magnetizable material to store data
- It is a form of non-volatile memory.
- The information is accessed using one or more read/write heads.
- **HARD DISKS** and **FLOPPY DISKS** are such devices.

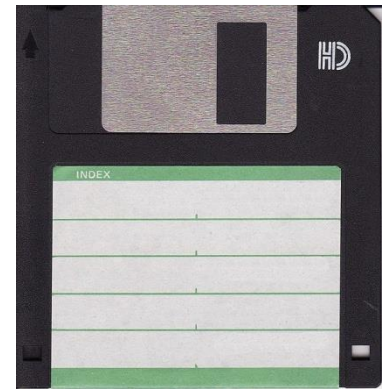
HARD DISKS

- It stores information on one or more continuously spinning disks which are coated with magnetic material.
- Information is recorded by magnetic heads called access arms.
- These days, hard disks have storage capacity between 80 to 300 GB.



FLOPPY DISK (DISKETTE)

- It is made of a flexible substance called Mylar.
- It has a magnetic surface for recording data.
- It stores upto 1.44 MB of data.
- It cannot include graphics or pictures within it.
- All floppy disks must be formatted before data can be written on it.



OPTIC MEDIA DEVICES

- Optic devices are generally circular disc which can contain data encoded in bumps on a special material on one of its flat surfaces.
- The encoding pattern follows a continuous, spiral path covering the entire disc surface and extending from the innermost track to the outermost track.
- The data is stored on the disc with a laser or stamping machine, and can be accessed when the data path is illuminated with a laser diode in an optical disc drive
- These are broadly of two types- 1) CDs and 2) DVDs.

COMPACT DISK (CD)

- CDs are very cheap and store upto 700 MB of data.
- They are of three types-
 - CD-ROM (CD Read Only Memory)
 - CD-R (CD Recordable)
 - CD-RW (CD Rewritable)



DIGITAL VIDEO DISK (DVD)

- It is of the same size as a CD but stores 15 times as much information, is 20 times faster than it.
- It can hold 17 GB of data.

It comes in three varieties :

- DVD-ROM (DVD Read Only Memory)
- DVD-R (DVD Recordable)
- DVD-RW (DVD Rewritable)



NEW AGE MEMORY DEVICES

- FLASH MEMORY-

- is a non-volatile memory
- It is a specific type of EEPROM
- primarily used in memory cards and USB_flash drives



- BLU-RAY DISK-

- Supersedes DVDs
- Uses blue-violet laser to read the disc
- stores almost six times more data than on a DV



ತಂತ್ರಾಂಶ / Software

Software is the set of instructions that lets you “talk” to your computer. Software translates commands into bits and bytes.



ವಿವಿಧ ಸಮಸ್ಯೆಗಳನ್ನು ಬಿಡಿಸುವ
ತಂತ್ರಜ್ಞಾನವನ್ನು ತಂತ್ರಾಂಶ ಎನ್ನುತ್ತೇವೆ.
ಇವುಗಳನ್ನು ನೋಡಬಹುದು ಹಾಗೂ
ಸ್ಪರ್ಶಿಸಲು ಸಾಧ್ಯವಿಲ್ಲ.



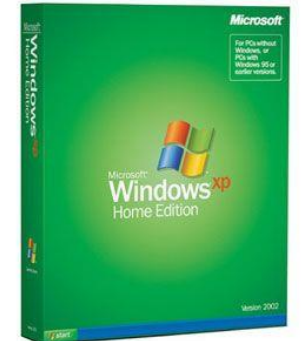
Types of Software

ತಂತ್ರಾಂಶದ ವಿಧಗಳು

- ❑ **Operating system (OS) software:** makes computer to work.
- ❑ **Application software:** lets different tasks on computer.
- ❑ **Utility software:** helps to maintain computer and keep it in good running condition .

ಸಿಸ್ಸಂ ಸಾಫ್ಟ್‌ವೇರ್—ಅಪರೇಟಿಂಗ್ ಸಿಸ್ಸಂ

- ಇವು ಅನೇಕ ರೀತಿಯ ಪ್ರೋಗ್ರಾಂಗಳನ್ನು ಒಳಗೊಂಡಿರುತ್ತದೆ
- ಇದನ್ನು ಗಣಕಯಂತ್ರದ ಮೇಲ್ವಿಚಾರಣೆ ಮಾಡಲು ಬಳಸುತ್ತಾರೆ.
- ಇದನ್ನು ಹಾರ್ಡ್‌ವೇರ್ ತಯಾರಕರು ಸರಬರಾಜು ಮಾಡುತ್ತಾರೆ.
- ಇವು ನಿರ್ದಿಷ್ಟ ಯಂತ್ರಗಳಲ್ಲಿ ಮಾತ್ರ ಕೆಲಸ ಮಾಡುತ್ತವೆ ಉದಾಹರಣೆ : ಅಪರೇಟಿಂಗ್ ಸಿಸ್ಸಂ, ಡಿವೈಸ್ ಡ್ರೈವರ್, ಡಯಗ್ನೋಸ್ಟಿಕ್ ಟೂಲ್ ಇತ್ಯಾದಿ



ಅಪ್ಲಿಕೇಶನ್ ಸಾಫ್ಟ್‌ವೇರ್

- ಇವು ಅನೇಕ ಪ್ರೋಗ್ರಾಂಗಳನ್ನು ಒಳಗೊಂಡಿದ್ದು, ನಿರ್ದಿಷ್ಟ ಕಾರ್ಯಗಳನ್ನು ನಿರ್ವಹಿಸಲು ಬಳಸಲಾಗುತ್ತದೆ.
- ಬಳಕೆದಾರನು ತನಗೆ ಅವಶ್ಯವಿರುವ ಕಾರ್ಯಗಳನ್ನು ನಿರ್ವಹಿಸಲು ಅಪ್ಲಿಕೇಶನ್ ಸಾಫ್ಟ್‌ವೇರ್‌ಗಳನ್ನು ಬಳಸುತ್ತಾರೆ.



ಉದಾಹರಣೆ: ಎಂ.ಎಸ್.ವರ್ಡ್- ರಿಪೋರ್ಟ್‌ಗಳನ್ನು ತಯಾರಿಸಲು, ಎಂ.ಎಸ್. ಎಕ್ಸೆಲ್-ಅಕೌಂಟ್‌ಗೆ ಸಂಬಂಧಿಸಿ, ಎಂ.ಎಸ್. ಆಕ್ಸಿಸ್-ಡಾಟಾಬೇಸ್ ನಿರ್ವಹಣೆ, ಟ್ಯಾಲಿ- (ಅಕೌಂಟ್‌ಗೆ ಸಂಬಂಧಿಸಿದ್ದು)





Utility Software

ಉಪಯುಕ್ತ ತಂತ್ರಾಂಶ



- A **utility** program looks after the safe and proper running of the computer, such as...
- Utility software helps to keep the computer running safely, protects it from viruses and attacks, and can carry out software repairs if necessary.
- Examples of popular brands are Norton and AVG.



Anti-virus

Anti-spyware

File Recovery

Copying to CD

Internet Filter

Crash Protection

Defragmenter

Device Driver

Firewall

OPERATING SYSTEM

An operating system (OS) is a collection of software that manages computer hardware resources and provides common services for computer programs. The operating system is an essential component of the system software in a computer system. Application programs usually require an operating system to function.

FUNCTIONS OF OPERATING SYSTEM

The main functions of OS are:

- Starting a computer
- Providing a user interface
- Managing data & program
- Managing memory
- Configuring devices

STARTING THE COMPUTER

The first function of an operating system is to start the computer. When we start a computer, it loads the operating system into the computer's memory. This process is called **booting**.

Booting means to load and initialize the operating system on a computer machine.

It can happen in two ways: warm boot or cold boot.

Warm Boot: A warm boot means restarting a computer that is already on. It normally happens after installing a new software or hardware or after an application crashes or stops working.

Cold Boot: A cold boot means starting a computer that is already off. It happens when we turn on a computer that has been completely powered off.

PROVIDING A USER INTERFACE

From the user's perspective, the most important function of an operating system, is providing the user interface. This function controls how the user enters data and instruction and how information is displayed.

The user interface typically enables users:

- to start an application program
- to manage disks and files such as formatting, copying and renaming
- to shut down the computer safely by following the correct procedures

The three type of user interface are: Command-Line, Menu-Driven and Graphical User Interface (GUI).

MANAGING DATA AND PROGRAMS

The next function of an operating system is to manage data and programs. When we start an application, the CPU loads the application from storage into memory. In the early days of personal computing, single tasking operating systems could run only one application at a time. Multitasking operating systems enable users to work with two or more application programs at the same time.

MANAGING MEMORY

The computer's operating system is responsible for managing memory such as:

- optimizing the use of random access memory (RAM)
- allocating data and instruction to an area of memory while being processed
- monitoring the contents of memory
- releasing data and instructions from being monitored in memory when the process is done

CONFIGURING DEVICES

Another function of an operating system is handling input and output, as well as enabling communication with input and output devices. Most operating systems come with drivers for popular input and output devices. These drivers install new devices and check whenever there is conflict with these devices.

- **Types of operating systems**
- **Real-time**
- **Multi-user**

Real-time

- A real-time operating system is a multitasking operating system that aims at executing real-time applications. Real-time operating systems often use specialized scheduling algorithms so that they can achieve a deterministic nature of behaviour. The main objective of real-time operating systems is their quick and predictable response to events. They have an event-driven or time-sharing design and often aspects of both. An event-driven system switches between tasks based on their priorities or external events while time-sharing operating systems switch tasks based on clock interrupts.
- pre-emptive multi-tasking. Mac OS prior to OS X used to support cooperative multitasking.

Multi-user

A multi-user operating system allows multiple users to access a computer system at the same time. Time-sharing systems and Internet servers can be classified as multi-user systems as they enable multiple-user access to a computer through the sharing of time. Single-user operating systems have only one user but may allow multiple programs to run at the same time.

Multi-tasking vs. single-tasking

A multi-tasking operating system allows more than one program to be running at the same time, from the point of view of human time scales. A single-tasking system has only one running program. Multi-tasking can be of two types: pre-emptive and co-operative. In pre-emptive multitasking, the operating system slices the CPU time and dedicates one slot to each of the programs. Unix-like operating systems such as Solaris and Linux support pre-emptive multitasking, as does Amiga OS. Cooperative multitasking is achieved by relying on each process to give time to the other processes in a defined manner. 16-bit versions of Microsoft Windows used cooperative multi-tasking. 32-bit versions of both Windows NT and Win9x, used

Programming Languages

LANGUAGE



Human Language:

Commonly used to express Feeling and understand other person's expression. It can be oral or gestural kind of Communication.

Computer languages

A computer language is an **artificial language** designed to work for different applications in different environments.

Programming languages can be used to create programs that control the behavior of a computer and serve any purpose.

Computer languages have some form of written specification of their **Syntax** (Rules) and **Semantic** (Words, phrase & sentences)

Computer Languages

Human languages are known as natural languages. Unfortunately, computers can not understand natural languages, as a result we must communicate with computers using computer languages.

These languages are:

- **High Level Languages**
- **Low Level Languages**
- **Assembly Language**
- **Machine Language**

High Level Language

The high-level languages are much closer to human language.

A programming language such as C, FORTRAN or Pascal that enables to write programs which is understandable to programmer (Human) and can perform any sort of task, such languages are considered high-level because they are closer to human languages.

High level language must use **interpreter, compiler or translator** to convert human understandable program to computer readable code (machine code).

Examples:

COBOL : Business applications

FORTRAN : Engg & Scientific Applications

PASCAL : General use and as a teaching tool

C & C++ : General Purpose – currently most popular.

PROLOG : Artificial Intelligence

JAVA : General all purpose programming

.NET : General or web applications.

Advantages of High level language over low level lang:

- The main advantage of high-level languages over low-level languages is that they are easier to read, write and maintain.
- High-level languages make complex programming simpler.
- High level programming techniques are applicable every where even where computational resources are limited.
- Error ratio is less in high level language and debugging (locate and correct errors in program code) is easier.
- Length of the program is also small compared with low level.
- Many real time problems can be easily solved with high level language.

Low Level Language

A computer low level language that deals with hardware registers by name known as **assembly language**.

Assembly language is the best example of low level language, this is in between machine language and high-level language.

A low-level language does not need a **compiler or interpreter** to run the program, the processor run low-level code directly.

Assembly Language

Assembly languages have the same structure and set of commands as machine languages, but they enable a programmer to use names instead of numbers.

In the early days of programming all programs were written in assembly language but now almost programs are written in a high-level language.

Programmers still use assembly language when speed is essential or when they need to perform an operation that isn't possible in a high-level language.

Assembly Language

It uses **mnemonic codes** (short forms) for instructions and allows the programmer to introduce names for blocks of memory that hold data.

Assembly language is designed to be easily translated into machine language. Like machine language, assembly language requires detailed knowledge of a particular internal computer architecture

```
mov edx, [esp+8]
```

```
cmp edx,
```

```
0 ja @f
```

```
mov eax, 0
```

```
ret
```

Machine language

Machine code or machine language is a system of instructions and data executed directly by a computer's CPU, The lowest-level programming language that only be understood by computers.

Computer language that is directly executable by a computer without the need for translation by a compiler or an assembler.

Machine Language

The native language of the computer,

The set of symbolic instructions in binary that is used to represent operations and data in a machine called machine code

Machine Language: “0110101100101000”

machine language is a collection of binary digits or bits that the computer reads and interprets.

Machine language is the only language a computer understands, It is almost impossible for humans to use because they consist entirely of numbers.

Program code converters

There are four models of execution of program by processor in high-level languages:

- **INTERPRETER**
- **COMPILER**
- **ASSEMBLER**
- **TRANSLATER**

Interpreter

An interpreter is a program that executes programming code directly.

Interpreter can convert a source code , usually on a step-by-step, line-by-line and unit-by-unit basis into machine code.

Interpreted languages are read and then executed directly, with no compilation stage.

Compiler

Compiler is a program that compile source code into executable instructions that a computer can understand, it compiles code and produce in **EXE** format before it run.

There are two stages of compiler

Intermediate Compilation

Intermediate level compiles code in the form of **Byte code** and save for later execution without the need to re-read the source file.

Machine code Compilation

Machine code compiles source code directly into machine code using **Virtual machines** that execute code directly into machine code

Assembler

Assembler normally converts assembly language's source code into machine language.

Assembly language is a family of low-level languages for programming computers. It implements a symbolic representation of code.

An assembler is a program that takes basic computer instructions and converts them into a pattern of **bits (0 & 1)** that the computer runs to produce result.

Translator

Translator is a computer program that translates one programming language instruction(s) into another programming language instruction(s) ...

A computer source code is to be translated into a low-level programming language where native code compilers change it in machine language for execution.

What is program

Program is an organized list of instructions that, when executed, it perform any operation, and do the job it is also known a code.

Without programs, computers are useless.

A program is like a recipe. It contains a list of variables and a list of directions (Statements) that tell the computer what to do with the variables.

The variables can represent numeric data, text or graphical images.

What are Keywords

Keyword is a word that is reserved by a program because the word has a special meaning and purpose in any computer language.

Keywords can be commands or parameters (values) .

Every programming language has a set of keywords that cannot be used as variable names.

Keywords are sometimes called reserved names.

What is instruction

The term instruction is often used to describe the programming commands.

computer's instructions set is the list of all the basic commands in the computer's machine language.

Language Generations

Computer languages has the same history as the computers itself history,

There are five generations of languages when programming method and techniques could be developed as far as development in hardware occurred.

First Generation (1GL)

First-generation language was machine language or the level of instructions and data that the processor is actually given to work on **binary numbers 0s and 1s**.

First-generation language is the lowest level computer language. Information is conveyed to the computer by the programmer as binary instructions.

In the 1940s and 1950s, computers were programmed by scientists sitting before control panels equipped with toggle switches so that they could input instructions as strings of zeros and ones.

Second Generation (2GL)

Second-generation language used assembly language, An assembler converts the assembler language statements into machine language.

By the late 1950s, this language had become popular. Assembly language consists of letters of the alphabet. This makes programming much easier than trying to program a series of zeros and ones.

Second-generation language use increased when Grace Hopper developed FLOW-MATIC, a language that made programming easier.

Third Generation (3GL)

Third-generation language is a high-level programming language, such as PL/I, COBOL, FORTRAN and C.

Compiler based FORTRAN and COBOL created because it improved the record keeping and data management ability in many business applications.

In the early 1960s, BASIC language designed and used by nonprofessional programmers. BASIC remained popular during the 1970s and 1980s.

Programs written in third-generation languages require more memory and run more slowly than those written in lower level languages.

Fourth Generation (4GL)

Fourth-generation language is designed to be closer to natural language than a 3GL language.

Fourth-generation languages attempt to make communicating with computers as much like the processes of thinking and talking to other people as possible.

Fourth-generation languages typically consist of English-like words and phrases, some of these languages include graphic devices such as icons and onscreen push buttons for use during programming and when running the application.

Many fourth-generation languages use C, C++, Java and SQL that support stand-alone as well as web applications.

Fifth Generation (5GL)

Fifth-generation language is programming that uses a visual or graphical development interface to create source language that is usually compiled with a 3GL or 4GL language compiler.

Microsoft, Borland, IBM, and other companies make 5GL visual programming products for developing applications in Java, J++, Visual Java, Visual Basic, ASP, ASP.NET, VB.NET and C#.

Visual programming allows you to see object oriented structures and drag icons to assemble program blocks.

Programme & Logic

Programme and Logic

Programme:

The series of instructions in a program arranged in a prescribed order to solve a problem called the ***program***.

Logic:

It is the method or technique to process a program in which user write program with reasons, techniques and methods known as ***program logic***.

The best program is one which has the fast execution and easily **changeable logic** according to environment.

Programme and Logic

INPUT

Retrieve data from a peripheral device or communications channel.

PROCESS

RAM

CALCULATE

Add, subtract, multiply or divide any two numbers.

+ - * /

COMPARE

Match any two items of data and go somewhere else in the program based on the results.

a=b ?
yes

COPY

Copy any characters of data from one location to another.

no
Move

OUTPUT

Transfer data to a peripheral device or communications channel.

GO TO

A Go To instruction directs the computer to repeat the input-process-output sequence over again.

Flow Chart - Logic

Flowchart is a visual representation of the sequence of the instructions.

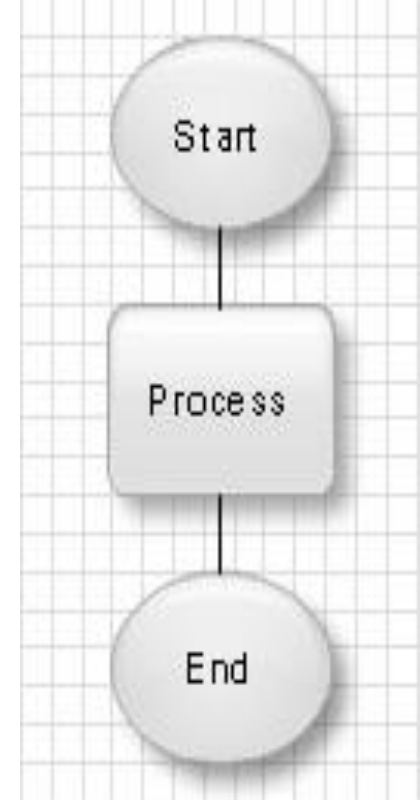
It shows what comes first, second, third and used to

Analyzing,

Designing,

Documenting

Managing a process or program



Flow Chart

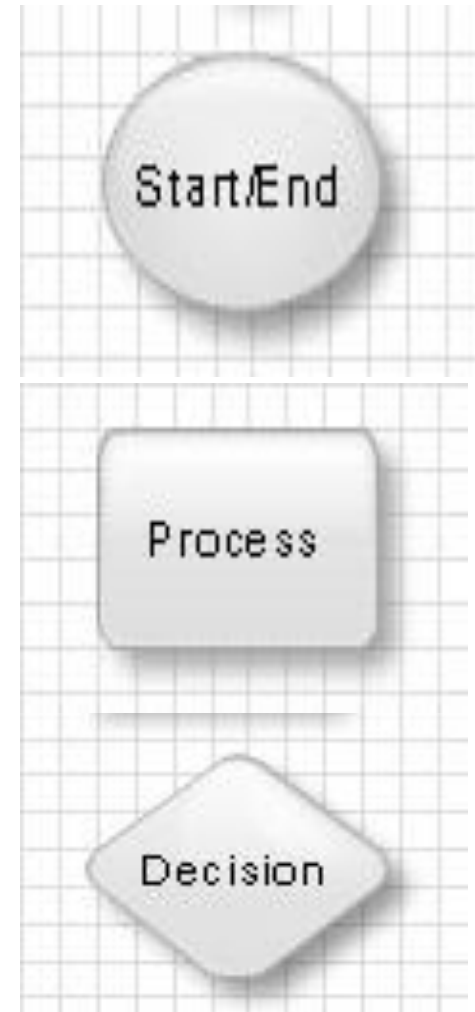
A flow chart's blocks shows different states of the process. There are three basic symbols of the flowchart.

Circles: Show Start/End points of program.

Squares: which represent activities or tasks

Diamonds: which represent decision points

Arrows: shows direction of flow.



Steps of flow chart

Sequential Processing:

These instructions do the actual data processing in sequence order, such as input, add/subtract, copy and output.

Decision Making:

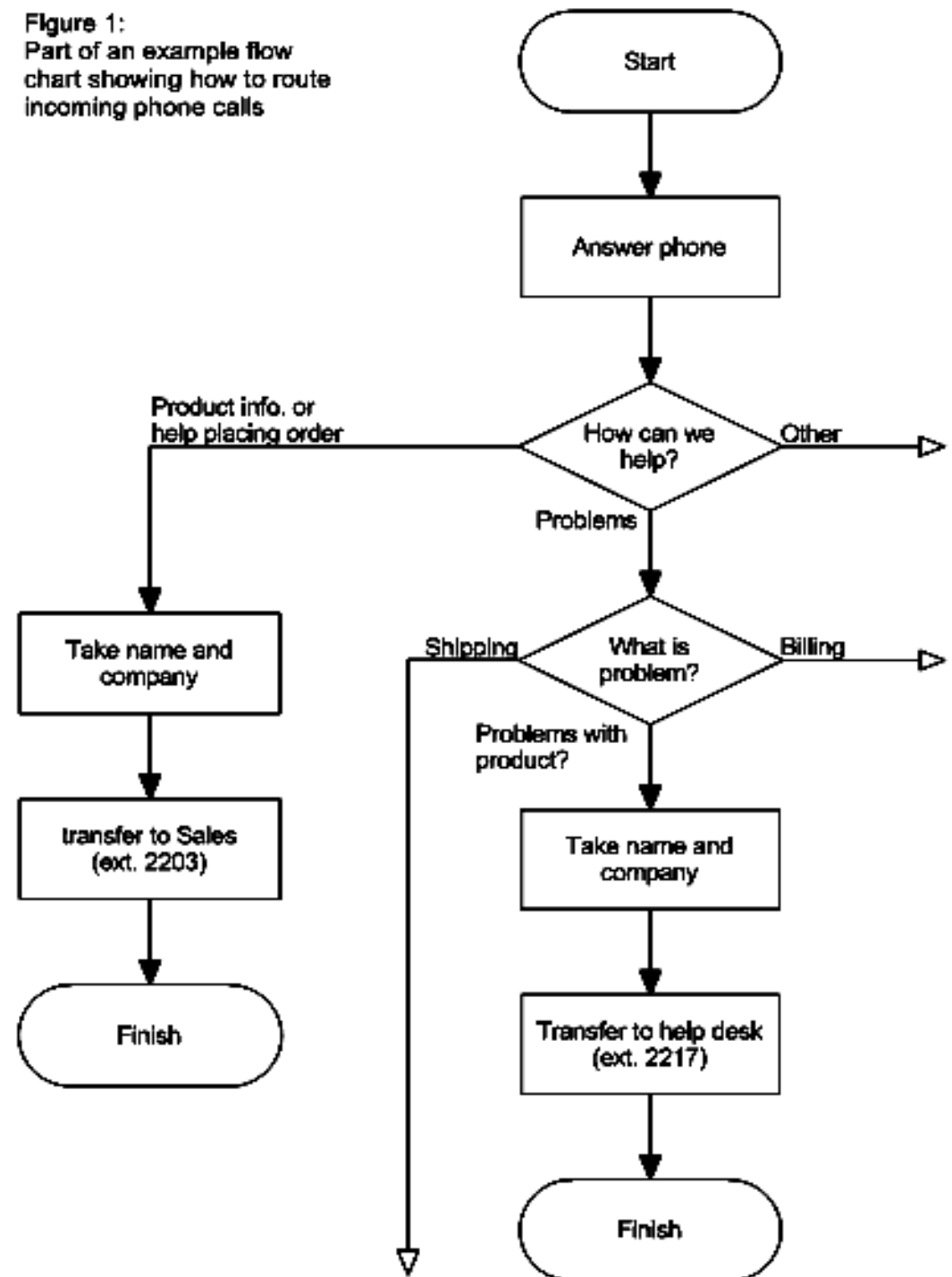
The decision making within the program is the process of comparing or evaluation of two sets of data of the program based on the results.

Iteration:

Many routines must be repeated for some number of times and are accomplished with the help LOOPS till the desired result.

Flow Chart Example

Figure 1:
Part of an example flow
chart showing how to route
incoming phone calls



The background is a deep blue space scene. A large, bright full moon is positioned in the center, slightly above the horizontal midline. The moon's surface shows some detail, and it has a soft white glow around it. The sky is filled with numerous small, bright white stars of varying sizes. There are also some faint, wispy white clouds or nebulae scattered throughout the scene. The overall color palette is dominated by shades of blue, from dark navy to bright cyan, with the white of the moon and stars providing high contrast.

COMPUTER VIRUS



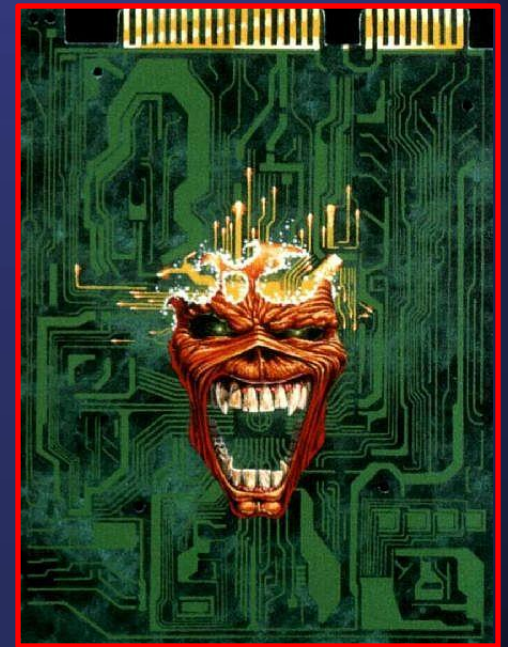
What is a Computer Virus ?

A **Computer Virus** is a computer program that can copy itself and infect a computer without permission or knowledge of the user.



How are viruses spread ?

A **virus** can only spread from one computer to another when its host is taken to the uninfected computer, for instance by a user sending it over a network or the Internet, or by carrying it on a removable medium such as a floppy disk, CD, or USB drive.



TYPES OF VIRUSES

On the basis of scale there are five types of viruses under one name:

MALWARE

```
graph TD; MALWARE[MALWARE] --- Spyware[Spyware]; MALWARE --- Adware[Adware]; MALWARE --- Worms[Worms]; MALWARE --- Trojans[Trojans]; MALWARE --- Rootkits[Rootkits];
```

Spyware

Adware

Worms

Trojans

Rootkits

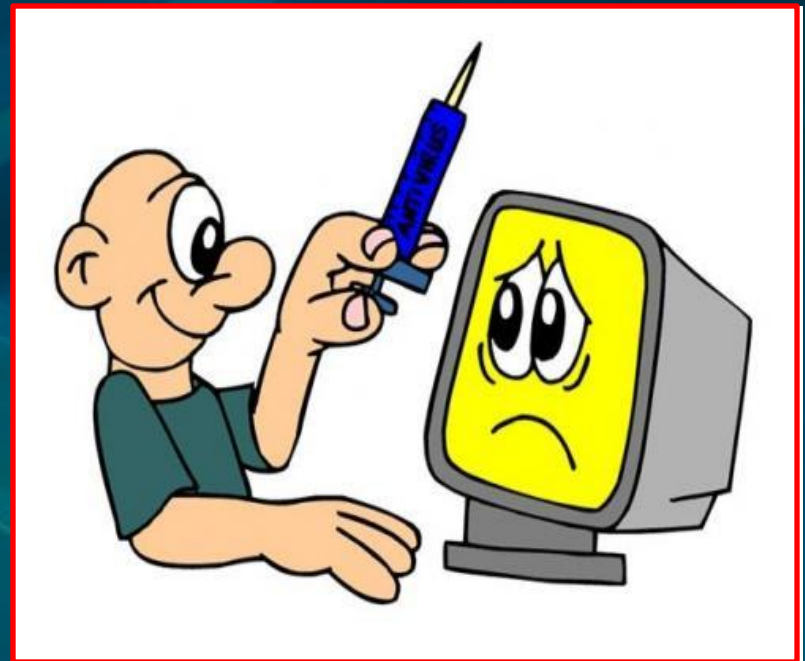
MALWARE



Malware, from the words **malicious** and **software**, is a software designed to infiltrate or damage a computer system without the owner's informed consent. It includes spyware, adware, computer worms and trojan horses.

SPYWARE

Spyware is computer software that is installed secretly on a personal computer to intercept or take partial control over the user's interaction with the computer, without the user's informed consent.



ADWARE



Adware or advertising-supported software is any software package which automatically plays, displays, or downloads advertisements to a computer after the software is installed on it or while the application is being used.

COMPUTER WORMS

A **Computer Worm** is a self-replicating computer program. It uses a network to send copies of itself to other nodes (computer terminals on the network) and it may do so without any user intervention. It always cause harm to the network, if only by consuming bandwidth.



TROJAN HORSES



A **Trojan**, is malware that appears to perform a desirable function but in fact performs undisclosed malicious functions.

ROOTKITS

A **Rootkit** is a computer virus which consists of a program designed to take fundamental control of a computer system, without authorization by the system's owners and legitimate managers.



Symptoms of Virus Attack

- Computer runs slower than usual
- Computer no longer boots up
- Screen sometimes flicker
- PC speaker beeps periodically
- System crashes for no reason
- Files/directories sometimes disappear
- Denial of Service (DoS)

A high-resolution image of the Earth as seen from space, showing the Western Hemisphere. The Americas, Europe, and Africa are visible, surrounded by swirling white clouds and deep blue oceans. The text "ANTI - VIRUS" is superimposed across the center of the globe in a bold, yellow, sans-serif font.

ANTI - VIRUS

Anti-Virus Software are computer programs that attempt to identify, neutralize or eliminate malicious software. Most modern **antivirus** software is now designed to combat a wide range of threats, including worms, rootkits, Trojans, often described collectively as malware.



How does an Anti-Virus work ?

There are two common methods that an anti-virus software application uses to detect viruses:



- **The first, and by far** the most common method of virus detection is using a list of virus signature definitions.
- **The second method** is to use a heuristic algorithm to find viruses based on common behaviors.

VIRUS REMOVAL



One possibility on **Windows Me, Windows XP and Windows Vista** is a tool known as **System Restore**, which restores the registry and critical system files to a previous checkpoint.

Manual Prevention from Viruses



- Delete your browsing history, temporary internet files, internet cookies before exiting .
- Always remember to scan any removable hardware using anti-virus software before accessing it. Removable hardware includes Floppy Disks, CD, USB Drive.
- Scan your computer every week using anti-virus software like Norton, McAfee for prevention against malware.
- Update your anti-virus for new and latest virus definitions.
- Create a system restore point before installing any software or freeware.



**PREVENTION
IS
BETTER
THAN CURE**

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