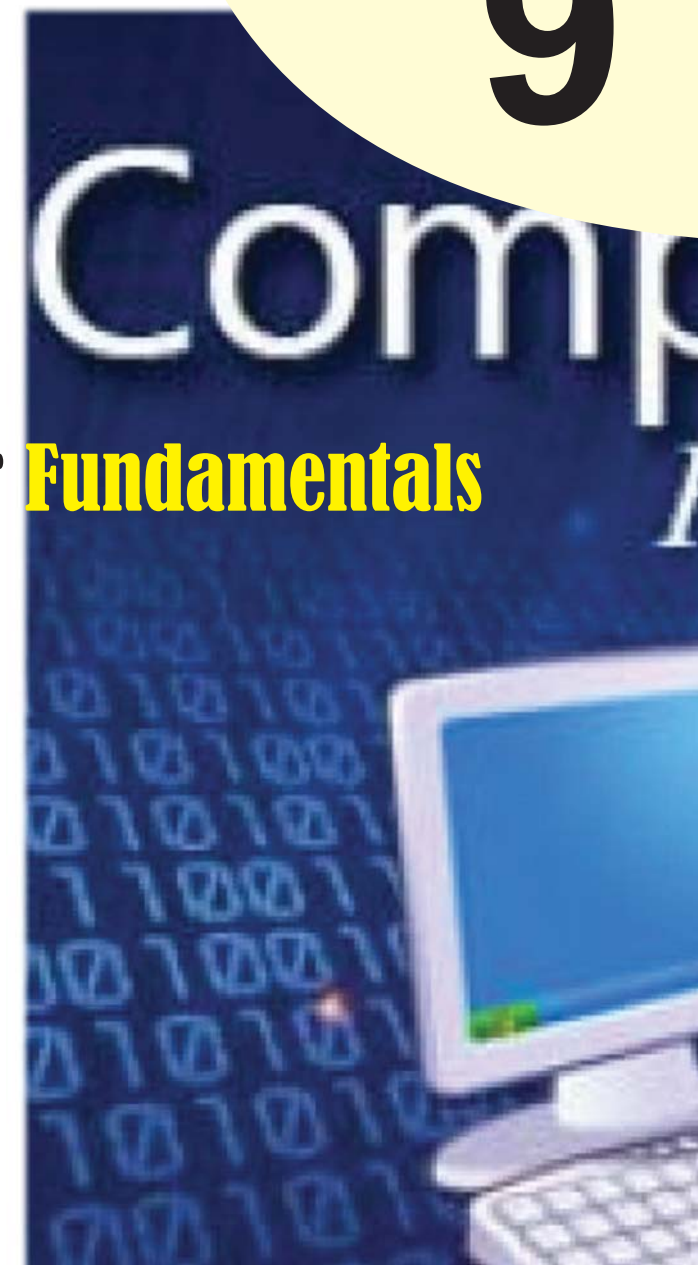




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Computer Fundamentals



Technical and Vocational Stream
Learning Resource Material

Fundamental of Computer
(Grade 9)

Secondary Level
Computer Engineering



Government of Nepal
Ministry of Education, Science and Technology
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Sanothimi, Bhaktapur

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Preface

The curriculum and curricular materials have been developed and revised on a regular basis with the aim of making education objective-oriented, practical, relevant and job oriented. It is necessary to instill the feelings of nationalism, national integrity and democratic spirit in students and equip them with morality, discipline and self-reliance, creativity and thoughtfulness. It is essential to develop in them the linguistic and mathematical skills, knowledge of science, information and communication technology, environment, health and population and life skills. It is also necessary to bring in them the feeling of preserving and promoting arts and aesthetics, humanistic norms, values and ideals. It has become the need of the present time to make them aware of respect for ethnicity, gender, disabilities, languages, religions, cultures, regional diversity, human rights and social values so as to make them capable of playing the role of responsible citizens with applied technical and vocational knowledge and skills. This Learning Resource Material for Computer Engineering has been developed in line with the Secondary Level Computer Engineering Curriculum with an aim to facilitate the students in their study and learning on the subject by incorporating the recommendations and feedback obtained from various schools, workshops and seminars, interaction programs attended by teachers, students and parents.

In bringing out the learning resource material in this form, the contribution of the Director General of CDC Dr. Lekhnath Poudel, Pro, Dr. Subarna Shakya, Bibha Sthapit, Kumar Prasun, Yogesh Parajuli, Dr. Romakanta Pandey, Jonshon Khadka, Chandra Praksha Timalina, Labin Rai, Bimal Thapa is highly acknowledged. The book is written by Bishnuraj Bhandari and the subject matter of the book was edited by Badrinath Timalina and Khilanath Dhamala. CDC extends sincere thanks to all those who have contributed in developing this book in this form.

This book is a supplementary learning resource material for students and teachers. In addition they have to make use of other relevant materials to ensure all the learning outcomes set in the curriculum. The teachers, students and all other stakeholders are expected to make constructive comments and suggestions to make it a more useful learning resource material.

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Unit: 1

Introduction

1.1 Introduction to computer

A computer is a multipurpose electronic device that can receive process and store data. They are used as tools in every part of society together with the Internet. Computers nowadays are complex; there are a lot of different components inside them, and they all serve different purposes.

1.2 History of computer and Its generation

The computer as we know it today had its beginning with a 19th century English mathematics professor name Charles Babbage. He designed the Analytical Engine, and design the basic framework of the computers. The framework is followed in modern computer technology.

Generation:

Generation in computer terminology is a change in technology a computer is being used. Initially, the generation term was used to distinguish between varying hardware technologies. Nowadays, generation includes both hardware and software, which together make up an entire computer system.

First Generation:

The period of first generation was from 1946-1959. The computers of first generation used vacuum tubes as the basic components for memory and circuitry for CPU (Central Processing Unit). These tubes, like electric bulbs, produced a lot of heat and the installations used to fuse frequently. Therefore, they were very expensive and only large organizations were able to afford it.

In this generation, mainly batch processing operating system was used. Punch cards, paper tape, and magnetic tape was used as input and output devices. The computers in this generation used machine code as the programming language.



The main features of the first generation

- Vacuum tube technology
- Unreliable
- Supported machine language only
- Very costly
- Generated a lot of heat
- Slow input and output devices
- Huge size
- Need of AC
- Non-portable
- Consumed a lot of electricity

Some computers of this generation

- ENIAC
- EDVAC

- UNIVAC
- IBM-701
- IBM-650

Second Generation:

The period of second generation was from 1959-1965. In this generation, transistors were used that were cheaper, consumed less power, more compact in size, more reliable and faster than the first generation machines made of vacuum tubes. In this generation, magnetic cores were used as the primary memory and magnetic tape and magnetic disks as secondary storage devices.

In this generation, assembly language and high-level programming languages like FORTRAN, COBOL were used. The computers used batch processing and multiprogramming operating system.



Fig. second generation computer

The main features of second generation

- Use of transistors
- More reliable in comparison to first generation computers

- Smaller size as compared to first generation computers
- Generated less heat as compared to first generation computers
- Consumed less electricity as compared to first generation computers
- Faster than first generation computers
- Still very costly
- AC required
- Supported machine and assembly languages

Some computers of this generation

- IBM 1620
- IBM 7094
- CDC 1604
- CDC 3600
- UNIVAC 1108

Third Generation:

The period of third generation was from 1965-1971. The computers of third generation used Integrated Circuits (ICs) in place of transistors. A single IC has many transistors, resistors, and capacitors along with the associated circuitry.

The IC was invented by Jack Kilby. This development made computers smaller in size, reliable, and efficient. In this generation remote processing, time-sharing, multiprogramming operating system were used. High-level languages (FORTRAN-II TO IV, COBOL, PASCAL PL/1, BASIC, ALGOL-68 etc.) were used during this generation.



Fig: Third generation computer

The main features of third generation

- IC used
- More reliable in comparison to previous two generations
- Smaller size
- Generated less heat
- Faster
- Lesser maintenance
- Costly
- AC required
- Consumed lesser electricity
- Supported high-level language

Some computers of this generation

- IBM-360 series
- Honeywell-6000 series
- PDP (Personal Data Processor)
- IBM-370/168
- TDC-316

Fourth Generation

The period of fourth generation was from 1971-present. Computers of fourth generation used Very Large Scale Integrated (VLSI) circuits. VLSI circuits having about 5000 transistors and other circuit elements with their associated circuits on a single chip made it possible to have microcomputers of fourth generation.

Fourth generation computers became more powerful, compact, reliable, and affordable. As a result, it gave rise to Personal Computer (PC) revolution. In this generation, time sharing, real time networks, distributed operating system were used. All the high-level languages like C, C++, DBASE etc., were used in this generation.



Fig: fourth generation computer

The main features of fourth generation

- VLSI technology used
- Very cheap
- Portable and reliable
- Use of PCs
- Very small size
- Pipeline processing
- No AC required
- Concept of internet was introduced
- Great developments in the fields of networks
- Computers became easily available

Some computers of this generation

- DEC 10
- STAR 1000
- PDP 11
- CRAY-1(Super Computer)
- CRAY-X-MP(Super Computer)

Fifth Generation

The period of fifth generation is 1980-till date. In the fifth generation, VLSI technology became ULSI (Ultra Large Scale Integration) technology, resulting in the production of microprocessor chips having ten million electronic components.

This generation is based on parallel processing hardware and AI (Artificial Intelligence) software. AI is an emerging branch in computer science, which interprets the means and method of making computers think like human beings. All the high-level languages like C and C++, Java, .Net etc., are used in this generation. This generation of computers are still in development process and it may take time for full phase.



AI includes

- Robotics
- Neural Networks
- Game Playing
- Development of expert systems to make decisions in real-life situations
- Natural language understanding and generation

The main features of fifth generation

- ULSI technology
- Development of true artificial intelligence
- Development of Natural language processing

- Advancement in Parallel Processing
- Advancement in Superconductor technology
- More user-friendly interfaces with multimedia features
- Availability of very powerful and compact computers at cheaper rates

Some computer types of this generation

- Desktop
- Laptop
- NoteBook
- UltraBook
- ChromeBook

1.3 Applications of computer in daily life

We can use computer in different sector as following ways.

Business

A computer has high speed of calculation, diligence, accuracy, reliability, or versatility which has made it an integrated part in all business organizations.

Computer is used in business organizations

- i. Payroll calculations
- ii. Budgeting
- iii. Sales analysis
- iv. Financial forecasting
- v. Managing employee database
- vi. Maintenance of stocks, etc.

Banking

Today, banking is almost totally dependent on computers.

Banks provide the following facilities

- Online accounting facility, which includes checking current balance, making deposits and overdrafts, checking interest charges, shares, and trustee records.
- ATM machines which are completely automated are making it even easier for customers to deal with banks.

Insurance

Insurance companies are keeping all records up-to-date with the help of computers. Insurance companies, finance houses, and stock broking firms are widely using computers for their concerns.

Insurance companies are maintaining a database of all clients with information showing

- i. Procedure to continue with policies
- ii. Starting date of the policies
- iii. Next due instalment of a policy
- iv. Maturity date
- v. Interests due
- vi. Survival benefits
- vii. Bonus

Education

The computer helps in providing a lot of facilities in the education system.

- The computer provides a tool in the education system known as CBE (Computer Based Education).
- CBE involves control, delivery, and evaluation of learning.
- Computer education is rapidly increasing the graph of number of computer students.
- There are a number of methods in which educational institutions can use a computer to educate the students.
- It is used to prepare a database about performance of a student and analysis is carried out on this basis.

Marketing

In marketing, uses of the computer are following –

- Advertising – With computers, advertising professionals create art and graphics, write and revise copy, and print and disseminate ads with the goal of selling more products.

- Home Shopping – Home shopping has been made possible through the use of computerized catalogues that provide access to product information and permit direct entry of orders to be filled by the customers.

Healthcare

Computers have become an important part in hospitals, labs, and dispensaries. They are being used in hospitals to keep the record of patients and medicines. It is also used in scanning and diagnosing different diseases. ECG, EEG, ultrasounds and CT scans, etc. are also done by computerized machines.

Following are some major fields of health care in which computers are used.

- Diagnostic System – Computers are used to collect data and identify the cause of illness.
- Lab-diagnostic System– All tests can be done and the reports are prepared by computer.
- Patient Monitoring System – These are used to check the patient's signs for abnormality such as in Cardiac Arrest, ECG, etc.
- Pharma Information System – Computer is used to check drug labels, expiry dates, harmful side effects, etc.
- Surgery – Nowadays, computers are also used in performing surgery.

Engineering Design

Computers are widely used for Engineering purpose

One of the major areas is CAD (Computer Aided Design) that provides creation and modification of images. Some of the fields are –

- Structural Engineering– Requires stress and strain analysis for design of ships, buildings, budgets, airplanes, etc.
- Industrial Engineering– Computers deal with design, implementation, and improvement of integrated systems of people, materials, and equipment.
- Architectural Engineering – Computers help in planning towns, designing buildings, determining a range of buildings on a site using both 2D and 3D drawings.

Military

Computers are largely used in defence. Modern tanks, missiles, weapons, etc. Military also employs computerized control systems. Some military areas where a computer has been used are –

- Missile Control
- Military Communication
- Military Operation and Planning
- Smart Weapons

Communication

Communication is a way to convey a message, an idea, a picture, or speech that is received and understood clearly and correctly by the person for whom it is meant. Some main areas in this category are –

- i. E-mail
- ii. Chatting
- iii. Usenet
- iv. FTP
- v. Telnet
- vi. Video-conferencing

Government

Computers play an important role in government services. Some major fields in this category are –

- i. Budgets
- ii. Sales tax department
- iii. Income tax department
- iv. Computation of male/female ratio
- v. Computerization of voters lists
- vi. Computerization of PAN card
- vii. Weather forecasting
- viii. National Identity Card Management

1.4 Classifications of Computer

Computer are classified into different categories based on working principle, size and capacity. There are three types of computer; analog, digital and hybrid, based on working principle.

Similarly supercomputers, mainframe computers, minicomputers, microcomputers and embedded computers are the major types of computer based on size and capacity.

Types of computer on the basis of working principle

- Analog computer
- Digital computer
- Hybrid computer

Analog Computers

Analog computers are used to process analog data. Analog data is of continuous nature and which is not discrete or separate. Such type of data includes temperature, pressure, speed weight, voltage, depth etc. These quantities are continuous and having an infinite variety of values.

It measures continuous changes in some physical quantity e.g. The Speedometer of a car measures speed, the change of temperature is measured by a Thermometer, the weight is measured by Weights machine. These computers are ideal in situations where data can be accepted directly from measuring instrument without having to convert it into numbers or codes.

Analog computers are the first computers being developed and provided the basis for the development of the modern digital computers. Analog computers are widely used for certain specialized engineering and scientific applications, for calculation and measurement of analog quantities. They are frequently used to control process such as those found in oil refinery where flow and temperature measurements are important. They are used for example in paper making and in chemical industry. Analog computers do not require any storage capability because they measure and compare quantities in a single operation. Output from an analog computer is generally in the form of readings on a series of dial (Speedometer of a car) or a

graph on strip chart.

Digital Computers

A Digital Computer, as its name implies, works with digits to represent numerals, letters or other special symbols. Digital Computers operate on inputs which are ON-OFF type and its output is also in the form of ON-OFF signal. Normally, an ON is represented by a 1 and an OFF is represented by a 0. So we can say that digital computers process information which is based on the presence or the absence of an electrical charge or we prefer to say a binary 1 or 0.

A digital computer can be used to process numeric as well as non-numeric data. It can perform arithmetic operations like addition, subtraction, multiplication and division and also logical operations. Most of the computers available today are digital computers. The most common examples of digital computers are accounting machines and calculators.

The results of digital computers are more accurate than the results of analog computers. Analog computers are faster than digital. Analog computers lack memory whereas digital computers store information. We can say that digital computers count and analog computers measures.

Hybrid Computers

A hybrid is a combination of digital and analog computers. It combines the best features of both types of computers, i-e. It has the speed of analog computer and the memory and accuracy of digital computer. Hybrid computers are used mainly in specialized applications where both kinds of data need to be processed. Therefore, they help the user, to process both continuous and discrete data. For example a petrol pump contains a processor that converts fuel flow measurements into quantity and price values. In hospital Intensive Care Unit (ICU), an analog device is used which measures patient's blood pressure and temperature etc, which are then converted and displayed in the form of digits. Hybrid computers for example are used for scientific calculations, in defense and radar systems.

Similarly Computers can be broadly classified by their speed and computing power as:

S.No.	Type	Specifications
1	PC (Personal Computer)	It is a single user computer system having moderately powerful microprocessor
2	Workstation	It is also a single user computer system, similar to personal computer however has a more powerful processor.
3	Mini Computer	It is a multi-user computer system, capable of supporting hundreds of users simultaneously.
4	Main Frame	It is a multi-user computer system, capable of supporting hundreds of users simultaneously. Software technology is different from minicomputer.
5	Supercomputer	It is an extremely fast computer, which can execute hundreds of millions of instructions per second.

PC (Personal Computer)



A PC can be defined as a small, relatively inexpensive computer designed for an individual user. PCs are based on the microprocessor technology that enables manufacturers to put an entire CPU on one chip. Businesses use personal computers for word processing, accounting, desktop publishing, and for running spreadsheet and database management applications. At home, the most popular use for personal computers is playing games and surfing the Internet.

Although personal computers are designed as single-user systems, these systems are normally linked together to form a network. In terms of power, now-a-days high-end models of the Macintosh and PC offer the same computing power and graphics capability as low-end workstations by Sun Microsystems, Hewlett-Packard, and Dell.

Minicomputer

It is a midsize multi-processing system capable of supporting up to 250 users simultaneously.



Mainframe

Mainframe is very large in size and is an expensive computer capable of supporting hundreds or even thousands of users simultaneously. Mainframe executes many programs concurrently and supports many simultaneous execution of programs.



Supercomputer

Supercomputers are one of the fastest computers currently available. Supercomputers are very expensive and are employed for specialized applications that require immense amount of mathematical calculations (number crunching).



For example, weather forecasting, scientific simulations, (animated) graphics, fluid dynamic calculations, nuclear energy research, electronic design, and analysis of geological data (e.g. in petrochemical prospecting).

1.5 Characteristics of computer

The characteristics of computers that have made them so powerful and universally useful are speed, accuracy, diligence, versatility and storage capacity. Let us discuss them briefly. Computers work at an incredible speed. A powerful computer is capable of performing about 3-4 million simple instructions per second.

To understand why computers are such an important part of our lives, let us look at some of its characteristics –

- Speed – typically, a computer can carry out 3-4 million instructions per second.
- Accuracy – Computers exhibit a very high degree of accuracy. Errors that may occur are usually due to inaccurate data, wrong instructions or bug in chips – all human errors.
- Reliability – Computers can carry out same type of work repeatedly without throwing up errors due to tiredness or boredom, which are very common among humans.

- Versatility – Computers can carry out a wide range of work from data entry and ticket booking to complex mathematical calculations and continuous astronomical observations. If you can input the necessary data with correct instructions, computer will do the processing.
- Storage Capacity – Computers can store a very large amount of data at a fraction of cost of traditional storage of files. Also, data is safe from normal wear and tear associated with paper.

Advantages of Using Computer

Now that we know the characteristics of computers, we can see the advantages that computers offer–

- Computers can do the same task repetitively with same accuracy.
- Computers do not get tired or bored.
- Computers can take up routine tasks while releasing human resource for more intelligent functions.

Disadvantages of Using Computer

Despite so many advantages, computers have some disadvantages of their own –

- Computers have no intelligence; they follow the instructions blindly without considering the outcome.
- Regular electric supply is necessary to make computers work, which could prove difficult everywhere especially in developing nations.

Unit: 2

Computer software

2.1. Introduction to computer software

Software is a set of programs, which is designed to perform a well-defined function.

A program is a sequence of instructions written to solve a particular problem.

There are two types of software –

- System Software
- Application Software

2.2. Types of software and its features

2.2.1. System software

The system software is a collection of programs designed to operate, control, and extend the processing capabilities of the computer itself. System software is generally prepared by the computer manufacturers. These software products comprise of programs written in low-level languages, which interact with the hardware at a very basic level. System software serves as the interface between the hardware and the end users.

Some examples of system software are Operating System, Compilers, Interpreter, Assemblers, etc.

2.2.2. Application software

An application is any program, or group of programs, that is designed for the end user. Applications software (also called end-user programs) include such things as database programs, word processors, Web browsers and spreadsheets.

2.3. Features of system software:

Systems software includes the programs that are dedicated to managing the computer itself, such as the operating system, file management utilities, and disk operating system (or DOS). The operating system manages the computer hardware resources in addition to applications and data.

2.4. Features of Application software

- i. Enterprise Resource Planning.
- ii. Customer Relationship Management.
- iii. Project Management Software.
- iv. Business Process Management Software.
- v. Word Processor.
- vi. Spreadsheet.
- vii. Database.
- viii. Resource Management Software.

2.5. Word processor package

Some of the functions of word processing software include:

- i. Creating, editing, saving and printing documents.
- ii. Copying, pasting, moving and deleting text within a document.
- iii. Formatting text, such as font type, bolding, underlining or italicizing.
- iv. Creating and editing tables.

Eg of word processor package are Ms-word, wordpro, wordperfect.

2.6. Spreadsheet package

A spreadsheet is an interactive computer application for organization, analysis and storage of data in tabular form. Spreadsheets are developed as computerized simulations of paper accounting worksheets. The program operates on data entered in cells of a table.

Eg: Ms-excel

2.7. Presentation package

A presentation program is a software package used to display information in the form of a slide show. It has three major functions: an editor that allows text to be inserted and formatted, a method for inserting and manipulating graphic images, and a slide-show system to display the content.

e.g. Ms-Powerpoint

Unit: 3

Operating system Overview

3.1 Operating system

An operating system (OS) is the program that, after being initially loaded into the computer by a boot program, manages all the other programs in a computer. The application programs make use of the operating system by making requests for services through a defined application program interface (API).

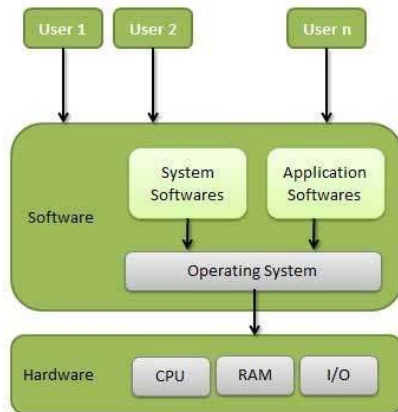
3.2 Functions of operating system

An Operating System (OS) is an interface between a computer user and computer hardware. An operating system is a software which performs all the basic tasks like file management, memory management, process management, handling input and output, and controlling peripheral devices such as disk drives and printers.

An Operating System (OS) is an interface between a computer user and computer hardware. An operating system is a software which performs all the basic tasks like file management, memory management, process management, handling input and output, and controlling peripheral devices such as disk drives and printers.

Some popular Operating Systems include Linux, Windows, OS X, VMS, OS/400, AIX, z/OS, etc.

An operating system is a program that acts as an interface between the user and the computer hardware and controls the execution of all kinds of programs.



Following are some of important functions of an operating System.

- i. Memory Management
- ii. Processor Management
- iii. Device Management
- iv. File Management
- v. Security
- vi. Control over system performance
- vii. Job accounting
- viii. Error detecting aids
- ix. Coordination between other software and users

Memory Management

Memory management refers to management of Primary Memory or Main Memory. Main memory is a large array of words or bytes where each word or byte has its own address.

Main memory provides a fast storage that can be accessed directly by the CPU. For a program to be executed, it must in the main memory. An Operating System does the following activities for memory management –

- i. Keeps tracks of primary memory, i.e., what part of it are in use by whom, what part are not in use.
- ii. In multiprogramming, the OS decides which process will get memory when and how much.
- iii. Allocates the memory when a process requests it to do so.
- ix. De-allocates the memory when a process no longer needs it or has been terminated.

Processor Management

In multiprogramming environment, the OS decides which process gets the processor when and for how much time. This function is called process scheduling. An Operating System does the following activities for processor management –

- Keeps tracks of processor and status of process. The program responsible for

this task is known as traffic controller.

- Allocates the processor (CPU) to a process.
- De-allocates processor when a process is no longer required.

Device Management

An Operating System manages device communication via their respective drivers.

It does the following activities for device management –

- Keeps tracks of all devices. Program responsible for this task is known as the I/O controller.
- Decides which process gets the device when and for how much time.
- Allocates the device in the efficient way.
- De-allocates devices.

File Management

A file system is normally organized into directories for easy navigation and usage.

These directories may contain files and other directions.

An Operating System does the following activities for file management –

- i. Keeps track of information, location, uses, status etc. The collective facilities are often known as file system.
- ii. Decides who gets the resources.
- iii. Allocates the resources.
- ix. De-allocates the resources.

Other Important Activities

Following are some of the important activities that an Operating System performs–

- i. Security – By means of password and similar other techniques, it prevents unauthorized access to programs and data.
- ii. Control over system performance – Recording delays between request for a service and response from the system.
- iii. Job accounting – Keeping track of time and resources used by various jobs and users.
- iv. Error detecting aids – Production of dumps, traces, error messages, and other

- debugging and error detecting aids.
- v. Coordination between other software and users – Coordination and assignment of compilers, interpreters, assemblers and other software to the various users of the computer systems.

3.3 Characteristics of operating system

Features of an Operating system are:

- i. Hardware Interdependence.
- ii. Provides User Interface.
- iii. Hardware Adaptability.
- iv. Memory Management.
- v. Task Management.
- vi. Networking Capability.
- vii. Logical Access Security.
- viii. File Management.

3.4 Objectives of operating system

Operating System Objectives and Functions

- i. An OS is a program that controls the execution of application programs and acts as an interface between applications and the computer hardware.
- ii. It can be thought of as having three objectives:
- iii. Convenience: An OS makes a computer more

3.5 Types of operating system

An Operating System performs all the basic tasks like managing file, process, and memory. Thus operating system acts as manager of all the resources, i.e. **resource manager**. Thus operating system becomes an interface between user and machine.

Computer Operating systems can be broadly classified into two types:

- i. Normal Operating System
- ii. Real Time Operating System

1. Normal Operating System

The normal operating system is further classified into two types:

- Character User Interface Operating System
- Graphical User Interface Operating System

The **CUI operating system** is a text-based operating system, which is used for interacting with the software or files by typing commands to perform specific tasks. The command line operating system uses only keyboard to enter commands. The command line operating systems include DOS and UNIX.

The **graphical mode interface operating system** is a mouse-based operating system (Windows Operating System, LINUX), wherein a user performs the tasks or operations without typing the commands from the keyboard. The files or icons can be opened or closed by clicking them with a mouse button. In addition to this, the mouse and keyboard are used to control the GUI operating systems for several purposes. The advanced GUI operating system is slower than the command line operating system.

Architecture of Operating systems

The operating systems control the hardware resources of a computer. The kernel and shell are the parts of the operating system that perform essential operations.

When a user gives commands for performing any operation, the request goes to the shell part, which is also known as interpreter. The shell part then translates the human program into a machine code, and then transfers the request to the kernel part.

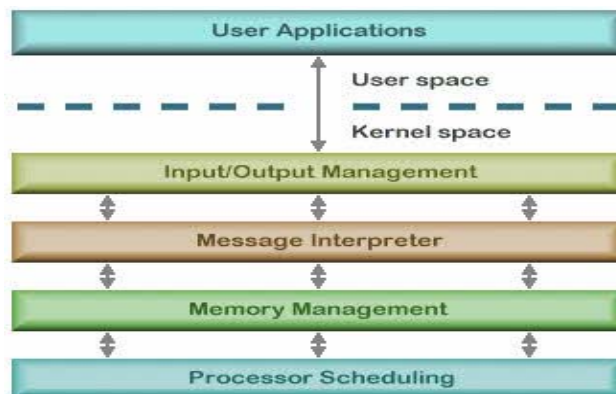


Figure: Architecture of operating system

When the kernel receives the request from the shell, it processes the request and displays the result on the screen. The kernel is also known as the heart of the operating system as every operation is performed by it.

Kernel

The kernel is a part of a software. It is like a bridge between the shell and hardware. It is responsible for running programs and providing secure access to the machine's hardware. The kernel is used for scheduling, i.e., it maintains a time table for all processes.

Types of Kernels

- Monolithic kernel
- Microkernels
- Exokernels
- Hybrid kernels

1. Real-time Operating System

Real-time operating systems are also known as multitasking operating systems. The normal operating system is responsible for managing the hardware resources of a computer. The RTOS perform these tasks, but it is especially designed to run applications at a scheduled or precise time with high reliability.

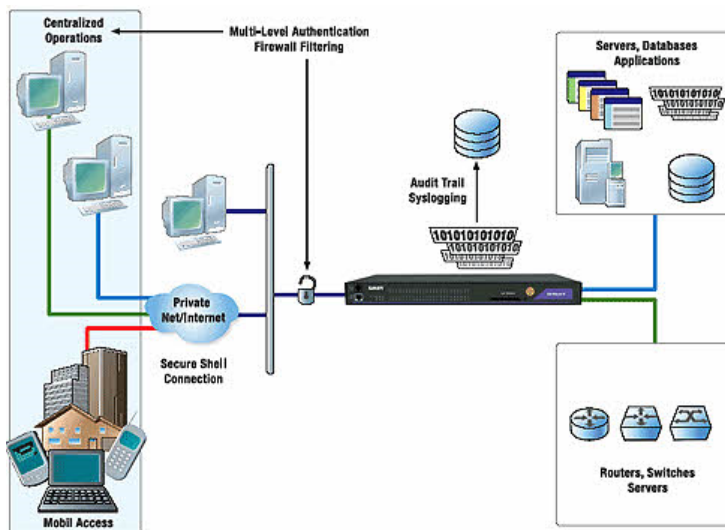


Figure: Real time operating system

Real-time operating system is designed for real-time applications, such as embedded systems, industrial robots, scientific research equipments and others. There are different types of operating systems in real time, such as soft real-time operating systems and hard real-time operating systems.

Examples of RTOS

- RTLinux
- VxWorks
- TRON
- Windows CE

Hard Real-time System

The hard real time system is a purely time constant system. For a hard real time operating system, finishing the tasks within deadline is very important for an efficient system performance.

For example, for a given input, if a user expects the output after 10seconds, then the system should process the input data and give the output exactly after 10seconds. Here, the deadline is 10 seconds, and therefore, the system should not give the output after 11th sec or 9th sec.

Therefore, the hard real-time systems are used in army and defense.

Soft Real-time System

For a soft real-time system, meeting the deadline is not mandatory for every task. Therefore, a soft real-time system can miss the deadline by one or two seconds. However, if the system misses deadlines every time, this will degrade the system performance. Computers, audio and video systems are examples of soft real-time systems. Nowadays, Androids are being widely used for applications like automatic gate openers.

3.5.1 Single user operating system

Single-user, single task - As the name implies, this operating system is designed to manage the computer so that one user can effectively do one thing at a time. The Palm OS for Palm handheld computers is a good example of a modern single-user,

single-task operating system.

Single-user, multi-tasking - This is the type of operating system most people use on their desktop and laptop computers today. Microsoft's Windows and Apple's MacOS platforms are both examples of operating systems that will let a single user have several programs in operation at the same time. For example, it's entirely possible for a Windows user to be writing a note in a word processor while downloading a file from the Internet while printing the text of an e-mail message.

3.5.2 Multiuser operating system

Multi-user - A multi-user operating system allows many different users to take advantage of the computer's resources simultaneously. The operating system must make sure that the requirements of the various users are balanced, and that each of the programs they are using has sufficient and separate resources so that a problem with one user doesn't affect the entire community of users. Unix, VMS and mainframe operating systems, such as *MVS*, are examples of multi-user operating systems.

3.5.3 Single tasking operating system

Single-tasking refers to focusing on one thing until it is completed. For example, if you are responding to emails, you block out time to concentrate on that task alone. Single-tasking can seem inefficient if you are accustomed to juggling multiple tasks.

1.5.4 Multitasking operating system

Sending emails while talking on the phone is an example of multitasking. When you do several tasks at one time, you might feel more effective and productive. However, the opposite is true, according to a Harvard Business Review article.

1.6 Comparison between single user and multi-user Operation system

	Single User	Multi User
Definition	A single user operating system provides facilities to be used on one computer by only one user.	A multi-user operating system has been designed for more than one user to access the computer at the same or different time.
Types	Single user, single task: A	Time sharing systems: These

	single task is performed by one user at a time. Example- The Palm OS for Palm handheld computers. Single user, multi-task: Several programs are run at the same time by a single user. For example- Microsoft Windows.	systems are multi-user systems in which CPU time is divided among the users. The division is made on the basis of a schedule. Most batch processing systems for the mainframe computers can also be considered as 'multi user.'
Attributes	Simple	Complex
Examples	Windows 95, Windows NT Workstation and Windows 2000 professional.	Unix, Linux and mainframes such as the IBM AS400.

3.6 Window operating system

Windows is a series of operating systems developed by Microsoft. Each version of Windows includes a graphical user interface, with a desktop that allows users to view files and folders in windows. For the past two decades, Windows has been the most widely used operating system for personal computers PCs.

Microsoft Windows is designed for both home computing and professional purposes. Past versions of Windows home editions include Windows 3.0 (1990), Windows 3.1 (1992), Windows 95 (1995), Windows 98 (1998), Windows Me (2000), Windows XP (2001), and Windows Vista (2006). The current version, Windows 7, was released in 2009.

The first business-oriented version of Windows, called Windows NT 3.1, was in 1993. This was followed by Windows 3.5, 4.0, and Windows 2000. When Microsoft released Windows XP in 2001, the company simply created different editions of the operating system for personal and business purposes. Windows Vista and Windows 7 have followed the same release strategy.

Windows is designed to run on standard x86 hardware, such as Intel and AMD processors. Therefore, it can be installed on multiple brands of hardware, such as Dell, HP, and Sony computers, as well as home-built PCs. Windows 7 also includes

several touchscreen features, that allow the operating system to run on certain tablets and computers with touchscreen displays. Microsoft's mobile operating system, Windows Phone, is designed specifically for smartphones and runs on several brands of phones, including HTC, Nokia, and Samsung.

Unit: 4

Memory system Overview

4.1 Memory definition

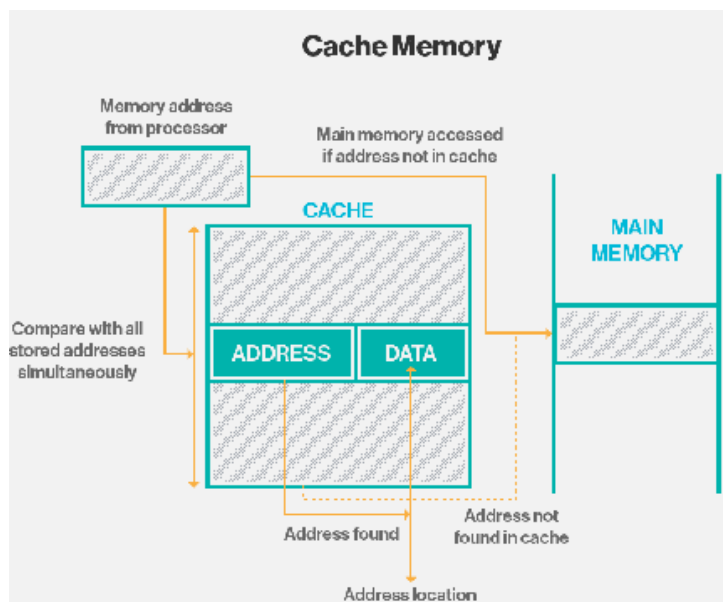
Computer memory is any physical device capable of storing information temporarily or permanently. For example, Random Access Memory (RAM), is a volatile memory that stores information on an integrated circuit used by the operating system, software, and hardware.

4.2 Types of memory

There are two main kinds of semiconductor memory, volatile and non-volatile. Examples of non-volatile memory are flash memory (used as secondary memory) and ROM, PROM, EPROM and EEPROM memory (used for storing firmware such as BIOS).

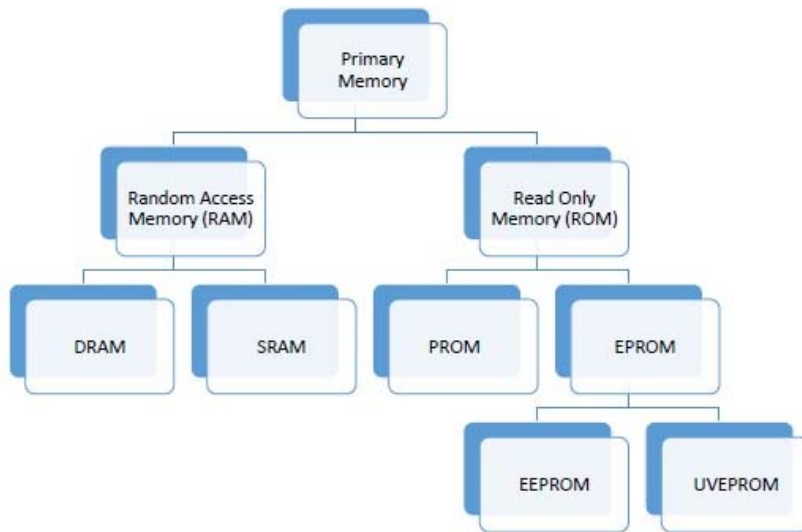
4.2.1 Cache memory

A memory cache, sometimes called a cache store or RAM cache, is a portion of memory made of high-speed static RAM (SRAM) instead of the slower and cheaper dynamic RAM (DRAM) used for main memory. Memory caching is effective because most programs access the same data or instructions over and over.



4.2.2 Primary memory/Main memory

Primary storage, also known as main storage or memory, is the area in a computer in which data is stored for quick access by the computer's processor. The terms random access memory (RAM) and memory are often as synonyms for primary or main storage.



4.2.3 Secondary memory

Secondary memory is where programs and data are kept on a long-term basis. Common secondary storage devices are the hard disk and optical disks. The hard disk has enormous storage capacity compared to main memory. The hard disk is usually contained inside the case of a computer.



4.3 Advantages and disadvantages of cache memory

Advantages of cache Memory

This technique uses a small memory with extremely fast access speed close to the processing speed of the CPU. This memory is called cache and it stores data and instructions currently required for processing. Cache memory thus makes main memory appear much faster and larger than it really is.

Processor cache is an extremely important part of the modern computer. When computers were slower there was less of a difference in speed between the computer's memory transfer rate and the speed that the processor makes calculations. The processor can make calculations only as quickly as it can be fed data.

The basic purpose of cache memory is to store program instructions that are frequently re-referenced by software during operation. Fast access to these instructions increases the overall speed of the software program. The main function of cache memory is to speed up the working mechanism of computer.

The advantages of cache memory are as follows:

- i. Cache memory is faster than main memory.
- ii. It consumes less access time as compared to main memory.
- iii. It stores the program that can be executed within a short period of time.
- iv. It stores data for temporary use.

Disadvantages of Cache memory

The disadvantages of cache memory are as follows:

- i. Cache memory has limited capacity.
- ii. It is very expensive
- iii. The register should be updated in every cache access
- iv. The replacement circuit becomes more complicated.

4.4 Characteristics of main memory

The key characteristics of memory devices or memory system are as follows:

1. Location

2. Capacity
3. Unit of Transfer
4. Access Method
5. Performance
6. Physical type
7. Physical characteristics
8. Organization

1. Location

It deals with the location of the memory device in the computer system. There are three possible locations:

- CPU : This is often in the form of CPU registers and small amount of cache
- Internal or main: This is the main memory like RAM or ROM. The CPU can directly access the main memory.
- External or secondary: It comprises of secondary storage devices like hard disks, magnetic tapes. The CPU doesn't access these devices directly. It uses device controllers to access secondary storage devices.

2. Capacity

The capacity of any memory device is expressed in terms of: i)word size ii)Number of words

- **Word size:** Words are expressed in bytes (8 bits). A word can however mean any number of bytes. Commonly used word sizes are 1 byte (8 bits), 2bytes (16 bits) and 4 bytes (32 bits).
- **Number of words:** This specifies the number of words available in the particular memory device. For example, if a memory device is given as 4K x 16.This means the device has a word size of 16 bits and a total of 4096(4K) words in memory.

3. Unit of Transfer

It is the maximum number of bits that can be read or written into the memory at a time. In case of main memory, it is mostly equal to word size. In case of external

memory, unit of transfer is not limited to the word size; it is often larger and is referred to as blocks.

4. Access Methods

It is a fundamental characteristic of memory devices. It is the sequence or order in which memory can be accessed. There are three types of access methods:

- i. Random Access: If storage locations in a particular memory device can be accessed in any order and access time is independent of the memory location being accessed. Such memory devices are said to have a random access mechanism. RAM (Random Access Memory) IC's use this access method.
- ii. Serial Access: If memory locations can be accessed only in a certain predetermined sequence, this access method is called serial access. Magnetic Tapes, CD-ROMs employ serial access methods.
- iii. Semi random Access: Memory devices such as Magnetic Hard disks use this access method. Here each track has a read/write head thus each track can be accessed randomly but access within each track is restricted to a serial access.

5. Performance

The performance of the memory system is determined using three parameters

- i. Access Time: In random access memories, it is the time taken by memory to complete the read/write operation from the instant that an address is sent to the memory. For non-random access memories, it is the time taken to position the read write head at the desired location. Access time is widely used to measure performance of memory devices.
- ii. Memory cycle time: It is defined only for Random Access Memories and is the sum of the access time and the additional time required before the second access can commence.
- iii. Transfer rate: It is defined as the rate at which data can be transferred into or out of a memory unit.

6. Physical type

Memory devices can be either semiconductor memory (like RAM) or magnetic surface memory (like Hard disks).

7. Physical Characteristics

- Volatile/Non- Volatile: If a memory devices continues hold data even if power is turned off. The memory device is non-volatile else it is volatile.

8. Organization

- Erasable/Non-erasable: The memories in which data once programmed cannot be erased are called Non-erasable memories. Memory devices in which data in the memory can be erased is called erasable memory.

E.g. RAM(erasable), ROM(non-erasable).

4.5 Characteristics of secondary memory

Characteristics of Secondary Memory are as followings:

- i. It is non-volatile.
- ii. It cannot directly access by the computer processor.
- iii. It is slower than primary memory.
- iv. It is cheap in cost.
- v. It has large capacity.

Example: Hard disk, Floppy disk etc.

Difference between RAM and ROM

RAM	ROM
It is a volatile memory (everything on the memory gets erased after shutdown)	It is a non-volatile memory (data doesn't get erased after shutdown)
It has high amount of memory	It has low amount of memory
It is slow in terms of operation	It is fast in terms of operation
It can be used for reading and writing purpose	It can be used only for reading purpose
It consumes a lot of power	It consumes less power
It stands for Random Access Memory	It stands for Read only memory
Types: SRAM , DRAM	Types: PROM, EPROM, EEPROM

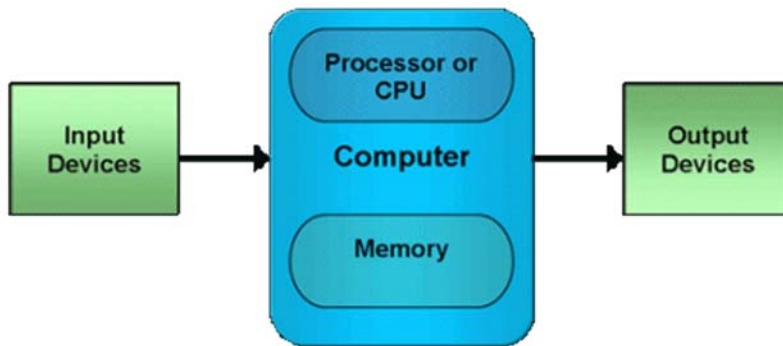
Unit: 5

Components of Computer system

Four basic components of computer system

- i. Input Unit.
- ii. Output Unit.
- iii. Storage Unit.
- iv. Central Processing Unit (CPU)

The internal architectural design of computers differs from one system model to another. However, the basic organization remains the same for all computer systems. The following five units (also called "*The functional units*") correspond to the five basic operations performed by all computer systems.



5.1 Input Unit

Data and instructions must enter the computer system before any computation can be performed on the supplied data. The input unit that links the external environment with the computer system performs this task. Data and instructions enter input units in forms that depend upon the particular device used. For example, data is entered from a keyboard in a manner similar to typing, and this differs from the way in which data is entered through a mouse, which is another type of input device. However, regardless of the form in which they receive their inputs, all input devices must provide a computer with data that are transformed into the binary codes that the primary memory of the computer is designed to accept. This transformation is accomplished by units that called input interfaces. Input interfaces

are designed to match the unique physical or electrical characteristics of input devices to the requirements of the computer system.

In short, an input unit performs the following functions.

- i. It accepts (or reads) the list of instructions and data from the outside world.
- ii. It converts these instructions and data in computer acceptable format.
- iii. It supplies the converted instructions and data to the computer system for further processing.

5.2 Output Unit

The job of an output unit is just the reverse of that of an input unit. It supplied information and results of computation to the outside world. Thus it links the computer with the external environment. As computers work with binary code, the results produced are also in the binary form. Hence, before supplying the results to the outside world, it must be converted to human acceptable (readable) form. This task is accomplished by units called output interfaces.

In short, the following functions are performed by an output unit.

- i. It accepts the results produced by the computer which are in coded form and hence cannot be easily understood by us.
- ii. It converts these coded results to human acceptable (readable) form.
- iii. It supplied the converted results to the outside world.

5.3 Storage Unit

The data and instructions that are entered into the computer system through input units have to be stored inside the computer before the actual processing starts. Similarly, the results produced by the computer after processing must also be kept somewhere inside the computer system before being passed on to the output units. Moreover, the intermediate results produced by the computer must also be preserved for ongoing processing. The **Storage Unit** or the **primary / main storage** of a computer system is designed to do all these things. It provides space for storing data and instructions, space for intermediate results and also space for the final results.

In short, the specific functions of the storage unit are to store:

- i. All the data to be processed and the instruction required for processing (received from input devices).
- ii. Intermediate results of processing.
- iii. Final results of processing before these results are released to an output device.

5.4 Central Processing Unit (CPU)



The main unit inside the computer is the **CPU**. This unit is responsible for all events inside the computer. It controls all internal and external devices, performs "*Arithmetic and Logical operations*". The operations a Microprocessor performs are called "*instruction set*" of this processor. The instruction set is "hard wired" in the CPU and determines the machine language for the CPU. The more complicated the instruction set is, the slower the CPU works. Processors differed from one another by the instruction set. If the same program can run on two different computer brands they are said to be compatible. Programs written for IBM compatible computers will not run on Apple computers because these two architectures are not compatible.

The control Unit and the Arithmetic and Logic unit of a computer system are jointly known as the Central Processing Unit (CPU). The CPU is the brain of any computer system. In a human body, all major decisions are taken by the brain and the other parts of the body function as directed by the brain. Similarly, in a computer system, all major calculations and comparisons are made inside the CPU and the CPU is

also responsible for activating and controlling the operations of other units of a computer system.

5.5.a. Arithmetic and Logic Unit (ALU)

The **arithmetic and logic unit (ALU)** of a computer system is the place where the actual execution of the instructions take place during the processing operations. All calculations are performed and all comparisons (decisions) are made in the **ALU**. The data and instructions, stored in the primary storage prior to processing are transferred as and when needed to the ALU where processing takes place. No processing is done in the primary storage unit. Intermediate results generated in the ALU are temporarily transferred back to the primary storage until needed at a later time. Data may thus move from primary storage to ALU and back again as storage many times before the processing is over. After the completion of processing, the final results which are stored in the storage unit are released to an output device.

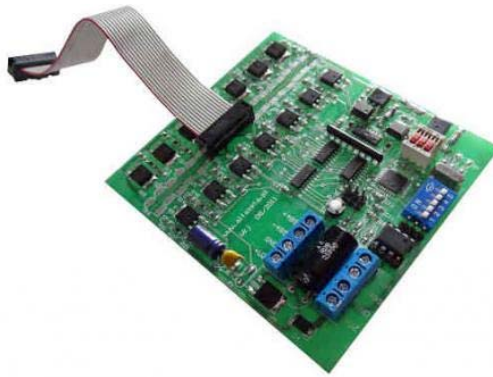
The arithmetic and logic unit (ALU) is the part where actual computations take place. It consists of circuits that perform arithmetic operations (e.g. addition, subtraction, multiplication, division over data received from memory and capable to compare numbers (less than, equal to, or greater than).

While performing these operations the ALU takes data from the temporary storage are inside the CPU named registers. Registers are a group of cells used for memory addressing, data manipulation and processing. Some of the registers are general purpose and some are reserved for certain functions. It is a high-speed memory which holds only data from immediate processing and results of this processing. If these results are not needed for the next instruction, they are sent back to the main memory and registers are occupied by the new data used in the next instruction.

All activities in the computer system are composed of thousands of individual steps. These steps should follow in some order in fixed intervals of time. These intervals are generated by the Clock Unit. Every operation within the CPU takes place at the clock pulse. No operation, regardless of how simple, can be performed in less time than transpires between ticks of this clock. But some operations required more than

one clock pulse. The faster the clock runs, the faster the computer performs. The clock rate is measured in megahertz (Mhz) or Gigahertz (Ghz). Larger systems are even faster. In older systems the clock unit is external to the microprocessor and resides on a separate chip. In most modern microprocessors the clock is usually incorporated within the CPU.

5.5.b.Control Unit



How the input device knows that it is time for it to feed data into the storage unit? How does the ALU know what should be done with the data once it is received? And how is it that only the final results are sent to the output devices and not the intermediate results? All this is possible because of the control unit of the computer system. By selecting, interpreting, and seeing to the execution of the program instructions, the control unit is able to maintain order and directs the operation of the entire system. Although, it does not perform any actual processing on the data, the control unit acts as a central nervous system for the other components of the computer. It manages and coordinates the entire computer system. It obtains instructions from the program stored in main memory, interprets the instructions, and issues signals that cause other units of the system to execute them.

The control unit directs and controls the activities of the internal and external devices. It interprets the instructions fetched into the computer, determines what data, if any, are needed, where it is stored, where to store the results of the operation, and sends the control signals to the devices involved in the execution of the instructions.

Unit: 6

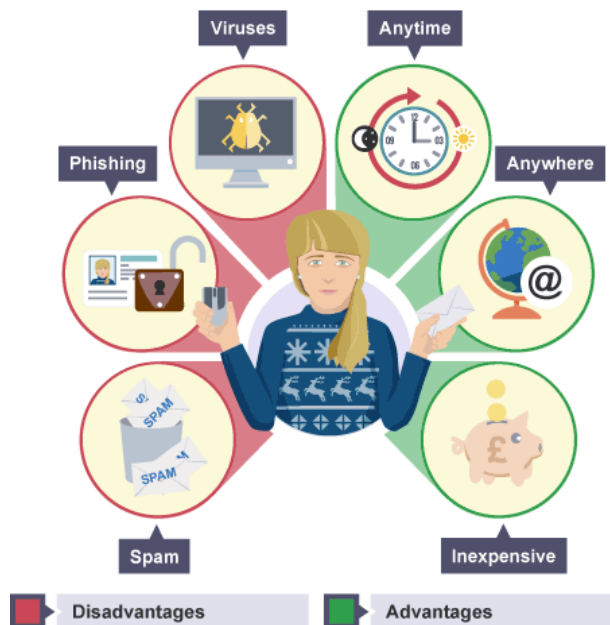
Electronic Mail

6. Electronic Mail

E-mail (electronic mail) is the exchange of computer-stored messages by telecommunication. (Some publications spell it e-mail; we prefer the currently more established spelling of e-mail.) E-mail messages are usually encoded in ASCII text.

6.1 E-mail and uses

Email, short for Electronic Mail, consists of messages which are sent and received using the Internet. There are many different email services available that allow you to create an e-mail account and send and receive e-mail and attachments, many of which are free.



6.2 E-mail ethics

E-mail etiquette refers to the principles of behavior that one should use when writing or answering email messages. It is also known as the code of conduct for e-mail communication. E-mail etiquette depends upon to whom we are writing- Friends & Relatives, Partners, Customers, Superior or Subordinates.

6.3 Advantages and disadvantages of using E-mail

Advantages

- i. E-mails are delivered extremely fast when compared to traditional post.
- ii. E-mails can be sent 24 hours a day, 365 days a year.
- iii. Webmail means emails can be sent and received from any computer, anywhere in the world, that has an internet connection.
- iv. Cheap - when using broadband, each email sent is effectively free. Dial-up users are charged at local call rates but it only takes a few seconds (for conventional email, eg text only) to send an email.
- v. E-mails can be sent to one person or several people.

Disadvantages

- i. The recipient needs access to the internet to receive email.
- ii. Viruses are easily spread via email attachments(most email providers scan emails for viruses on your behalf).
- iii. **Phishing** - sending an email to a user falsely claiming to be a legitimate company to scam the user into providing information, such as personal information and bank account numbers on a bogus website. The details will then be used for identity theft.
- iv. No guarantee the mail will be read until the user logs on and checks their email.
- v. **Spam** - unsolicited email, ie junk mail.

6.4 Create mail

To create an email account:

1. Open email service provider website or app such as : gmail, yahoomail, hotmail, fedora etc.
2. Sign up for new email.
3. Fill all the mandatory fields such as name, date of birth, address and mail address you want to create.
4. Keep a strong password.

5. Then submit your application.
6. Login with your new created mail address with your password.

A screenshot of the Google Account creation page. The page has the Google logo at the top left. Below it, the text "Create your Google Account to continue to Gmail" is displayed. There are input fields for "First name" (containing "abac"), "Last name" (containing "all"), "Username" (containing "abacall39"), and "Password" (with a "Confirm" field). A note says "You can use letters, numbers & periods". To the right is a blue shield icon with a person silhouette and a red location pin. Below the shield, it says "One account. All of Google working for you." At the bottom left is a "Sign in instead" link, and at the bottom right is a blue "Next" button. The footer shows "English (United States)" and links for "Help", "Privacy", and "Terms".A screenshot of the Google Account verification page. The page shows the user's name "abac, welcome to Google" and email "abacall39@gmail.com". There is a "Phone number (optional)" field with a dropdown arrow. Below it, a note says "We'll use your number for account security. It won't be visible to others." There is a "Recovery email address (optional)" field. Below that, a note says "We'll use it to keep your account secure". There are fields for "Your birthday" (Month, Day, Year) and "Gender". To the right is a blue shield icon with a lock and a red balloon. Below the shield, it says "Your personal info is private & safe". At the bottom left is a "Back" link, and at the bottom right is a blue "Next" button. The footer shows "English (United States)" and links for "Help", "Privacy", and "Terms".

6.5 Operation of mail

Mail operation

The Mail operation defines what you want to do with the connection, such as retrieve and send email.

The operation supports the following types of actions:

- Get — Used to retrieve messages from a POP mail server.
- Send — Used to send messages to an SMTP mail server.

Options tab, Get action

When configuring a Get action, the following fields appear on the Options tab:

Name	Description
From Address	Leave blank if Dell Boomi Integration should take all files from all Senders in the inbox. Enter the address if there is a particular sender from whom Boomi Integration should take emails.
Disposition	Set Disposition to: Attachment — if the data to be processed is contained in an attachment to the email message. Inline — if the data to be processed is contained in the body of the email message.
Delete From POP Server	Select to delete the email message after it has been read to prevent the same message from being read in twice.

Options tab, Send action

When configuring a Send action, the following fields appear on the Options tab:

NOTE: There is no limit to the number of email addresses that you can add in the To field. However, as a best practice, create an email group outside of Boomi Integration for the large number of users and email addresses. Then, enter the address of the email group in the To field. When you use an email group, you can update the list of recipients when appropriate without having to update and redeploy the processes.

Name	Description
From	The email address from which Boomi Integration sends email messages. If you use the Mail connector to send an attachment and leave the From field blank, you receive a message saying that the From address is missing.
To	The email address(es) to which Boomi Integration sends email messages. Separate multiple addresses with a semicolon. If you use the Mail connector to send an attachment and leave the To field blank, you receive a message saying that the To address is missing.
Subject	The value in the Subject field of the email messages that are sent.
Disposition	<p>Set Disposition to:</p> <p>Attachment — if the document data should be sent as an attachment. If you use this option, you can use the Mail > Body document property in a Set Properties step to create the body of the email message.</p> <p>Inline — if the document data should be sent in the body of the email message.</p>
Attachment Content Type / Content Type	<p>If the disposition is set to Attachment, use this field to specify the file format for the attachment. If the disposition is set to Inline, use this field to specify the file format for the body of the email message.</p> <p>Two-part identifiers for file formats on the Internet:</p> <p>text/plain</p> <p>text/HTML</p> <p>text/XML</p> <p>application/binary</p> <p>application/EDIFACT</p> <p>application/EDI-X12</p> <p>application/XML</p>
Body Content	(Available if Disposition is set to Attachment) Used to specify

Type	<p>the file format for the body of the email message. Use the Mail > Body document property in a Set Properties step to create the body of the email message.</p> <p>text/plain</p> <p>text/HTML</p> <p>text/XML</p>
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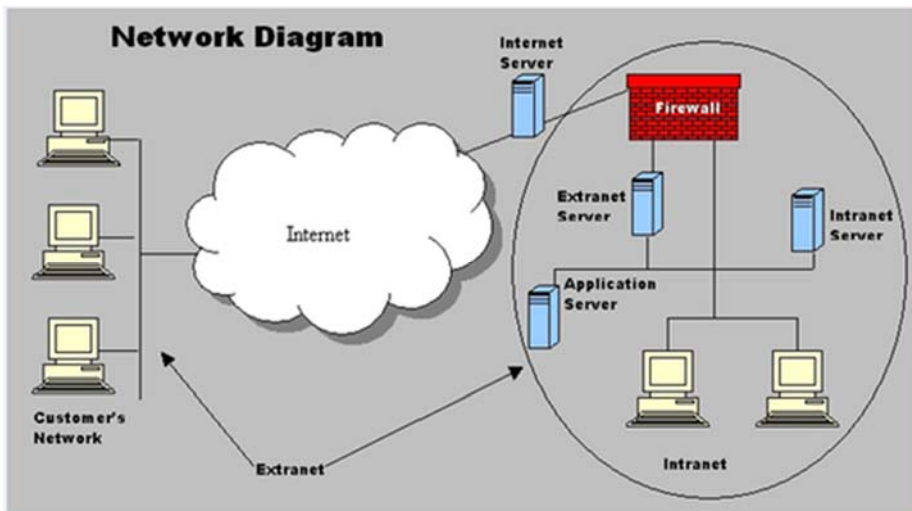
Unit: 7

Internet, Intranet and Extranet

The major difference between the two, however, is that an intranet is typically used internally. While an extranet allows businesses to communicate with clients and vendors, an intranet allows employees and colleagues to work with each other in a virtual space — no outside parties are involved.

- Intranet is shared content accessed by members within a single organization.
- Extranet is shared content accessed by groups through cross-enterprise boundaries.
- Internet is global communication accessed through the Web. e.g. Internet is a means of connecting a computer to other computer anywhere in the world.

Refer the below Network diagram for you references



7.1 Intranet

An intranet is a network where employees can create content, communicate, collaborate, get stuff done, and develop the company culture.

7.2 Extranet

An extranet is like an intranet, but also provides controlled access to authorized customers, vendors, partners, or others outside the company.

7.3 Difference in internet, intranet and Extranet

Internet	Intranet	Extranet
it is a global system of interconnected computer network.	It is a Private network specific to an organization	It is a private network that uses public network to share information with suppliers and vendors.
Thus content in the network is accessible to everyone connected.	thus content in the network is accessible only to members of organization	the content in the network is accessible to members of organization and external members with access to network.
it is owned by no one	it is owned by single organization	it is owned by single/multiple organization.
It is means of sharing information throughout the world	It is means of sharing sensitive information throughout the organization	It is means of sharing information between members and external members.
Security is depended of the user of device connected to network.	Security is enforced via a firewall.	security is enforced via a firewall that separates internet and extranet.
Example: What we are normally using is internet.	Eg. Prime bank using internal network for its business operation.	Eg. HP and Intel using network for business related operation.
Users can access internet anonymously.	Users should have valid username and password to access intranet	Users should have valid username/ password to access extranet.
Internet is unregulated and uncensored	But intranet is regulated by the organization policy.	Extranet is also regulated by contractual agreement between organization.

An extranet is a private network that uses Internet technology and the public telecommunication system to securely share part of a business's information or operations with suppliers, vendors, partners, customers, or other businesses.

Extranets offer small businesses many other advantages:

- i. Increased productivity
- ii. Reduced margin of error.
- iii. Flexibility.
- iv. Timely and accurate information.
- v. Shorter time to market.
- vi. Reduced inventory.
- vii. Build customer loyalty.

7.4 Advantages And Disadvantages Of Intranet

Intranet systems require a great deal of security, in order to protect the system from unauthorized access. This means IT professionals who set up and maintain Intranet systems must install effective firewalls, anti-malware, and anti-spyware programs, as well as protecting against the usual barrage of viruses that are transmitted daily via shared information systems. The advantage of Intranet is its ability to provide services to a defined group of people, who can provide the right passwords and enter the system.

The main advantage of the Internet is its ability to connect billions of computers and devices to each other. Not only does the Internet create convenience in sharing and receiving information between users, another advantage of the modern Internet is its ability for automation.

Do use the internet and find a solution to every problem. The Internet has also made access to information and communication far easier. Rather than searching the library, users can access vast amounts of information from home computers. ... Politics and government are another area in which the Internet is important.

Uses of Internet in our daily life – Everyday Internet Impact.

The Internet provides us useful data, information, and knowledge for the personal,

social and economic development and it is up to us to utilize our time on the world wide web in a productive manner. The Internet is a revolution in information technology.

7.5 Search engine

It is a database or website which contains links to all web pages on the Internet which help in search of information. Example is google. com, yahoo.com and bing.com. A search engine refers to a web software used to search for information on the internet using keywords.

7.6 Social media

Social media is a platform that communicates between users by means of audio, video, photography, animation, texts etc. It is a common forum for communication based on user preferences. The most popular example of social medias are Facebook, Tweitter, Instragram etc. It helps people to get in touch with each other at free of cost. So it is popular these days.

Unit: 8

Multimedia and its tools

8.1. Definition of Multimedia

Multimedia is the field concerned with the computer-controlled integration of text, graphics, drawings, still and moving images (Video), animation, audio, and any other media where every type of information can be represented, stored, transmitted and processed digitally.

Multimedia is more than one concurrent presentation medium (for example, on CD-ROM or a Web site). Although still images are a different medium than text, multimedia is typically used to mean the combination of text, sound, and/or motion video.

Multimedia tools and Applications:

A Multimedia Application is an application which uses a multiple media sources e.g. text, graphics, images, sound/audio, animation and/or video.

Basic Features Your Next Multimedia Authoring Tool Must Have

- i. Audio Capabilities
- ii. Assessment Capabilities
- iii. Branching and Navigation
- iv. Graphics and Animation
- v. Features that Support Video
- vi. Format Templates, Themes, Skins, and Text Features
- vii. Support and User Community Features
- viii. Integration with Social Media

Multimedia software tools

- i. Multimedia Software Tools
- ii. The basic tool set for building a multimedia project can be divided into five categories: Painting and Drawing Tools – 3-D Modeling and animation tools – Image editing tools – Sound editing tools – Animation Video – Digital

Movie tools.

8.2 Component of Multimedia

List the components of multimedia.



8.2.1 Text

It is the primary component of multimedia. Most of the information can be presented with the help of text. We can emphasize the text by using different fonts, colors, styles etc.

8.2.2 Audio

Audio is one of the important components of multimedia. It is music, speech or any other sound. It is normally combined with animation medium.

8.2.3 Video

The effective medium for presenting information is video. It presents the moving images. It displays the sequence of slightly varied pictures at the speed of 15-30 frames per second.

8.2.4 Image /Graphic

A digital representation of non-text information such as drawing, photographs etc are known as graphics. The graphic medium can be used with text medium.

8.2.5 Animation

The animation medium presents the sequence of still images of artwork at a rapid speed that looks like the image is moving.

8.3 Applications of Multimedia

A Multimedia Application is an Application which uses a collection of multiple media sources e.g. text, graphics, images, sound/audio, animation and/or video. Hypermedia can be considered as one of the multimedia applications.

A multimedia product uses a combination of images, words and sounds to present information. Multimedia is increasingly being used in education, advertising and entertainment.

Examples of Multimedia Applications include :

- i. World Wide Web
- ii. Hypermedia courseware
- iii. Video conferencing
- iv. Video-on-demand
- v. Interactive TV
- vi. Groupware
- vii. Home shopping
- viii. Games
- ix. Virtual reality
- x. Digital video editing and production systems
- xi. Multimedia Database systems

The purpose of multimedia is to combine all of these so that the benefits of each can be used in a desktop environment. Hypermedia: is software that allows the user to interactively manipulate information in a variety of formats - text, images, animation, graphics, sounds, digitized voice, and video.

8.4 Advantages and Disadvantages of Multimedia

ADVANTAGES

The advantages of multimedia are listed below:

- i. Increases learning effectiveness
- ii. Gains and holds attention
- iii. More appealing

- iv. Reduces training cost
- v. Easy to use
- vi. Give information to individuals
- vii. Provides high quality of presentations
- viii. Multi-sensorial
- ix. Integrated and interactive
- x. Can be used as a wide variety of audience
- xi. Entertaining and educational

DISADVANTAGES

The disadvantages of multimedia are listed below:

- i. Expensive
- ii. Not always ready to configure
- iii. Requires special hardware
- iv. Not always compatible
- v. Takes time to compile
- vi. Information overload
- vii. Misuse and/or overuse
- viii. Limitations of technology