



Study Material in Computer Applications

Semester- I

Compiled By:

1. Aadil Hussain Tak, Teaching Assistant- takaadil@gmail.com
2. Momin Sarwar Khan, Teaching Assistant- msk4me@redifmail.com
3. Dr. M. Yasin Pir, Assistant Professor- piryasin@gmail.com

The material is intended to help the learner and in no way is a substitute for class room teaching.



Introduction to the Course: This course introduces the beginners to the basics of computers, operating system and the basic terminology of internet and networking. It also introduces basics of C programming language development.

UNIT-I

1. INTRODUCTION OF COMPUTER

A computer is an electronic device which is capable of receiving data or information in a particular form and performs a sequence of operations in accordance with a predetermined instructions or program to produce the desired results.

Characteristics of Computer

- **SPEED:** It produces results at a very fast speed.
- **ACCURACY:** The results produced by computers are highly accurate and precise.
- **STORAGE:** Computer can store a large amount of data.
- **DILIGENCE:** Computer can work for hours without any break.
- **VERSATILITY:** It can perform completely different types of work at the same time.
- **NO IQ:** It does not work without instructions.
- **NO FEELING:** It does not have emotions or feelings.

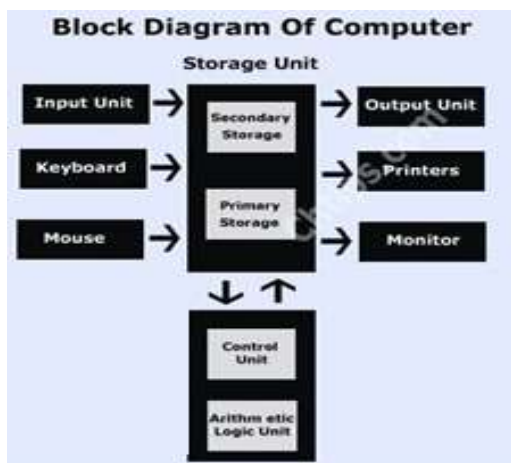
1.1 DATA

In computing, data is a raw fact which has no meaning and is given to computer for processing to obtain information. Thus, we can say that information is processed data or translated data.

1.2 DATA PROCESSING

Data processing is, generally, the collection and manipulation of items of data to produce meaningful information. It can be considered a subset of information processing, the change (processing) of information in any manner detectable by the user.

1.3 BLOCK DIAGRAM OF COMPUTER



The Computer system consists of mainly three parts that are Central Processing Unit (CPU), Input Devices and Output Devices. The Central processing unit (CPU) again consists of ALU (Arithmetic Logic Unit) and Control Unit (CU).

1.4 CENTRAL PROCESSING UNIT (CPU)

The Central Processing unit is also called as brain of a computer. The CPU is nothing but an electronic hardware device which carries or performs out all the operation such as arithmetic and logic operation. The CPU in another term is also



called as "PROCESSOR". Every instruction given through the input devices such as keyboard or mouse is carried further for processing and we user get our desired results through are output devices such as printer and monitor.

1.5 INPUT & OUTPUT DEVICES

The set of instruction or information is provided to the computer system or PC with the help of input devices such as keyboard or mouse. The input unit transfers the data from outside the world into the system and later this data is processed and system produces information through output unit. Some of the input devices are keyboard, mouse, scanner, joystick, etc.

Output devices of computer produce or generate results with the help of devices such as printer, monitor etc. These instructions or data provided to computer system is in binary code so as to produce or generate the desired output. The system has to convert this data into human readable form which is received by the user through output devices. Some of the output devices are monitor, printer, speaker, etc.

1.6 STORAGE UNIT

The term storage is defined as the devices which stores data/instructions given by the input devices or output devices after processing. The storage unit of a computer helps the user in retrieving data later on whenever he needs. There are mainly two types of storage units

- 1) Primary Storage
- 2) Secondary Storage

Primary & Secondary Storage

Primary Memory is also called as main memory and is of two types: the first is called the *Random Access Memory (RAM)* and the second is the *Read Only Memory (ROM)*. The data or set of instruction is stored in RAM before processing and later the data is transferred to ALU where further processing is done. The primary storage cannot store huge amount of data as this memory is temporary or volatile. i.e. (The data is lost when there is power failure). On the other hand, ROM contains computer instructions already fed to it at the time of manufacturing. This type of main memory is non-volatile and is not for user. The primary memories are generally expensive.

Secondary storage are non-volatile because the data stored in this memory are stored permanently as the users can retrieve data whenever they need. The data remains in this memory even when there is a power failure or shutdown. These memories are of large capacities and are much cheaper than primary memories. Some of the secondary storage memories are: Hard Disk, CD-ROM, DVD, USB Drive, etc.

1.7 TYPES OF COMPUTERS

Supercomputer

Supercomputer is a special-purpose and one of the fastest computers currently available. Supercomputers are very expensive and are employed for specialized applications that require immense amounts of mathematical calculations (number crunching). For example, weather forecasting requires a supercomputer. Other uses of supercomputers are scientific simulations, (animated) graphics, fluid dynamic calculations, nuclear energy research, electronic design, and analysis of geological data (e.g. in petrochemical prospecting). Examples are: CRAY-3, cyber 205 and PARAM, etc.

Mainframe

Mainframe is an ultra-high performance computer made for high intensive computing. Mainframes are the second largest (in capability and size) of the computer family. The mainframe allows users to maintain a large amount of data storage at a centralized location. It is typically used by large businesses and for scientific purposes. Some examples are: IBM's ES000, VAX 8000, CDC 6600, etc.



Minicomputer

It is a mid-sized computer. In general, a minicomputer is a multiprocessing system capable of supporting from up to 200 users simultaneously. It is designed to meet the computing needs of several people simultaneously in a small or medium sized business environment and serves as a centralized store house for a cluster of workstations. Examples are: PDP 11, IBM's 8000 series, VAX 7500, etc.

Micro computer

A microcomputer is a small, relatively inexpensive computer with a microprocessor as its central processing unit (CPU). It includes a microprocessor, memory, and minimal input/output (I/O) circuitry mounted on a single printed circuit board. Microcomputers became popular in the 1970s and 1980s with the advent of increasingly powerful microprocessors. The predecessors to these computers, mainframes and minicomputers, were comparatively much larger and more expensive. Originally these were designed for individual users only, but later became powerful tool for many businesses when networked together. These include desktops, laptops and hand-held models.

1.8 HARDWARE & SOFTWARE

Computer hardware is the physical parts or components of a computer, such as the monitor, keyboard, memory graphic card, sound card and motherboard. By contrast, software is a set of instructions that can be stored and executed by hardware. Hardware is directed by the software to execute any command or instruction. A combination of hardware and software forms a usable computing system.

Computer software, or simply software, is a part of a computer system that consists of data or computer instructions. Computer software includes computer programs, libraries and related non-executable data, such as online documentation or digital media. Computer hardware and software require each other and neither can be realistically used separately.

1.9 Introduction to different Processors

1. **Dual Core Processor:** A dual-core processor is a CPU with two processors or "execution cores" in the same integrated circuit. Each processor has its own cache and controller, which enables it to function as efficiently as a single processor. However, because the two processors are linked together, they can perform operations up to twice as fast as a single processor can.
2. **Core 2 Duo** (also known as Core2 Duo) processor is a 64 bit dual core processor. This means two processor cores work inside a Core 2 Duo in parallel. The Core 2 Duo, which was introduced on July 27 2006, is the direct successor of the Core Duo. Each core is based on the Pentium M micro architecture. Compared with Pentium 4, the cores in the Core 2 Duo have shorter pipelines and the maximum clock rate is lower but the performance per clock is significantly higher. Thus a Pentium 4M with the same clock rate is up to 40% slower.

Generally speaking the current generation of Core i3/i5/i7 have about 20% more processing power than their Core 2 Duo counterparts.

- 1) **Core i3 processor:** Dual Core CPU and supports Hyper Threading
- 2) **Core i5 processor:** Dual Core CPU having slightly higher clock speeds than core i3 and supports Hyper Threading. It has Turbo Boost (it's like an automatic overclock if the CPU is not too hot).
- 3) **Core i7 processor:** Dual Core CPU (models ending with M) ,Quad Core CPU (models ending with QM) and having higher clock speed than the Core i5, supports Hyper Threading. It has Turbo Boost and Virtualization (you can run multiple operating systems at the same time) features as well. It has circuitry that allows for easier and more secure remote access for corporate IT departments to trouble issues in a business environment.



1.10 Applications of Computer

The various applications of computers are listed below:

1. **Business:** Payroll calculations, Sales analysis, Budgeting, Financial forecasting, Managing employee database and Maintenance of stocks etc
2. **Education:** Learning, Research etc
3. **Marketing:** Advertising, Online Shopping etc
4. **Banking:** Net Banking, ATM etc.
5. **Insurance:** Record Keeping, online Premium Payments etc
6. **Communication:** Social Networking, E-mail, FTP, Video-conferencing and Telnet etc
7. **Health Care:** MRI, CT–Scan, Digital X-Ray, Radiotherapy etc
8. **Military:** Design of military warfare, Missile Technology, Security, Communication etc.
9. **Engineering Design:** Design Layouts of buildings, Malls, Bridges, etc



UNIT-II

2. INTRODUCTION TO OPERATING SYSTEM

A computer system has many resources (hardware and software), which may be required to complete a task. The commonly required resources are input/output devices, memory, file storage space, CPU etc. The operating system acts as a manager of the above resources and allocates them to specific programs and users, whenever necessary to perform a particular task. Therefore operating system is the resource manager i.e. it can manage the resources of a computer system internally. The resources are processor, memory, files, and I/O devices. In simple terms, an operating system is the interface between the user and the machine.

2.1 Functions of operating system

- 1) It boots the computer.
- 2) It performs basic computer tasks e.g. managing the various peripheral devices e.g. mouse, keyboard
- 3) It provides a user interface, e.g. command line, graphical user interface (GUI)
- 4) It handles system resources such as computer's memory and sharing of the central processing unit (CPU) time by various applications or peripheral devices.
- 5) It provides file management which refers to the way that the operating system manipulates, saves and retrieves data.
- 6) Error handling is done by the operating system. It takes preventive measures whenever required to avoid errors.

2.2 Components of operating system

An operating system provides the environment within which programs are executed. The operating system is partitioned into small modules with a well-defined interface and its design is a complex task. It is very important that the goals of the system be well defined before the design begins. The operating systems in use share the system components listed below:

- 1) Process management
- 2) I/O management
- 3) Main Memory management
- 4) File & Storage Management
- 5) Protection and Sharing
- 6) Security Management
- 7) User Interface

2.3 Types of operating systems

Single and Multi-Tasking

A single-tasking system can only run one program at a time, while a multi-tasking operating system allows more than one program to be run in concurrency. This is achieved by time-sharing, dividing the available processor time between multiple processes that are each interrupted repeatedly in time slices by a task-scheduling subsystem of the operating system. Multi-tasking may be characterized in preemptive and non-preemptive types. In preemptive multitasking, the



operating system slices the CPU time and dedicates a slot to each of the programs whereas in non-preemptive multitasking, then CPU cannot be taken away till the process who owns the processor is completed.

Single and Multi-User

Single-user operating systems have no facilities to distinguish users, but may allow multiple programs to run in tandem. A multi-user operating system extends the basic concept of multi-tasking with facilities that identify processes and resources, such as disk space, belonging to multiple users, and the system permits multiple users to interact with the system at the same time. Time-sharing operating systems schedule tasks for efficient use of the system. For example Windows is a single-user OS while as UNIX is multi-user OS.

Distributed

A distributed operating system manages a group of distinct computers and makes them appear to be a single computer. The development of networked computers that could be linked and communicate with each other gives rise to a distributed computing. Distributed computations are carried out on more than one machine.

Real-Time

A real-time operating system is an operating system that guarantees to process events or data within a specific moment or time otherwise it can create havoc. A real-time operating system may be single- or multi-tasking, but when multitasking, it uses specialized scheduling algorithms so that a deterministic nature of behavior is achieved.

2.4 Microsoft Windows

Microsoft Windows, or simply Windows, is a group of several graphical operating system families, all of which are developed, marketed, and sold by Microsoft. Microsoft introduced an operating environment named Windows on November 20, 1985, as a graphical operating system shell for MS-DOS in response to the growing interest in graphical user interfaces (GUIs). Microsoft Windows came to dominate the world's personal computer (PC) market with over 90% market share, overtaking Mac OS, which had been introduced in 1984. It is very easy to use than other operating systems. Windows is still the most popular operating system in India but many prefer to use Linux or U nix because of the better security feature.

2.5 Introduction to Linux operating system

Linux is an operating system or a kernel as it is known as is one of the most preferred OS. It is distributed under an open source license. Its functionality list is quite like UNIX. A kernel is a program at the heart of any operating system that takes care of fundamental stuff, like letting hardware communicate with software. Linux is an operating system or a kernel which germinated as an idea in the mind of young and bright Linus Torvalds when he was a computer science student. He used to work on the UNIX OS (proprietary software) and thought that it needed improvements.

However, when his suggestions were rejected by the designers of UNIX, he thought of launching an OS which will be receptive to changes, modifications suggested by its users. So Linus devised a Kernel named Linux in 1991. Though he would need programs like File Manager, Document Editors and Audio -Video programs to run on it. With the passage of time, he collaborated with other programmers in places like MIT and applications for Linux started to appear.



Around 1991, a working Linux operating system with some applications was officially launched, and this was the start of one of the most loved and open-source OS options available today.

2.6 Introduction to Unix operating system

UNIX is an operating system which was first developed in the 1960s, and has been under constant development ever since. It is the first OS to be written in C Language. It is a stable, multi-user, multi-tasking system for servers, desktops and laptops.

UNIX systems also have a graphical user interface (GUI) similar to Microsoft Windows which provides an easy to use environment. However, knowledge of UNIX is required for operations which aren't covered by a graphical program, or for when there is no windows interface available, e.g. in a telnet session. The UNIX operating system is made up of three parts; the kernel, the shell and the programs.

The kernel :The kernel of UNIX is the hub of the operating system: it allocates time and memory to programs and handles the file store and communications in response to system calls.

The shell :The shell acts as an interface between the user and the kernel. When a user logs in, the login program checks the username and password, and then starts another program called the shell.

2.7 Difference between Windows, Linux & Unix operating system

Linux OS	Unix OS	Windows OS
Linux is an illustration of open source programming advancement and free of charge operating system (OS).	Unix is a system that is extremely mainstream in colleges, organizations, big enterprises and so on.	Microsoft Windows is said as a progression of graphical interface system created, showcased, and traded by Microsoft.
Linux can usually install on a broad range of PC software and hardware, going from cellular phones, tablets PCs and video game consoles, to centralized servers and supercomputers.	The Unix system is utilized as a part of web servers, workstations and PCs. It plays an important role for finance infrastructure and numerous 24x365 high accessibility solutions.	Windows is a system used on desktop computers, portable workstations, servers and mobile phones.
Linux is an operating system which is used by everybody; from home clients to engineers and PC lovers alike.	Unix system were produced fundamentally for servers, mainframes and workstations aside from OSX, Which is intended for everybody.	Windows is an operating system used by everybody
Linux can consider as free operating system, free downloaded, distributed with the help of books, magazines and so on.	Unix have different flavors and also have different price structures as indicated by sellers.	Windows have usually low price compared to Unix OS.



2.8 Difference between a Smart Mobile OS and a Computer OSS

The difference between a mobile operating system (OS) and a computer OS has to do with how individual tech companies have rolled out various versions of the operating systems that supply the fundamental environments for traditional software applications as well as new mobile apps.

Mobile and computer operating systems have been developed in different ways and for different uses. Computer OS products are older and more familiar to larger groups of users. Through the last 20 or 30 years, the simple idea of a computer operating systems have been continuously built on and improved. There are lot of detail involved in computer OS design, but one prominent and hard fact is that computer operating systems were not really designed for mobile use over wireless networks.

The mobile operating system is a newer concept. In many ways, the mobile OS has built on what the computer OS has accomplished. In fact, many modern developers working with mobile operating systems tend to take the traditional elements of computer operating systems largely for granted as they focus on newer issues like responsive design, consistent network access, and other elements of providing software applications used across diverse wireless environments. Some common smart mobile operating systems are Android, Windows and iOS.



UNIT-III

3. INTRODUCTION TO INTERNET

The Internet is a worldwide system of interconnected computer networks. The computers and computer networks exchange information using TCP/IP (Transmission Control Protocol/Internet Protocol) to communicate with each other. The computers are connected via the telecommunications networks, and the Internet can be used for e-mailing, transferring files and accessing information on the World Wide Web. The Internet carries a vast range of information resources and services, such as the inter-linked hypertext documents and applications of the World Wide Web (WWW), electronic mail, telephony, and file sharing.

3.1 Basics of Web Site

The term World Wide Web (www) or simply web refers to the collection of Web sites connected to the Internet together with the devices such as computers, cell phones etc that access its content. Tim Berners-Lee led the development of the web in late 1980's. A web page is a document commonly written in Hypertext Markup Language (HTML) that is accessible through the Internet using a browser. A collection of web pages which are usually connected together in various ways is referred to a *web site*. A computer that hosts a website on the Internet is known as webserver. A search engine is a special kind of website that aids users locate web pages from *other* websites.

3.2 WWW

Stands for "World Wide Web." It is important to know that World Wide Web and the Internet are not same but we use these words interchangeably. The Web consists of pages that can be accessed using a Web browser. The Internet is the actual network of networks where all the information resides. Things like Telnet, FTP, Internet gaming, Internet Relay Chat (IRC), and e-mail are all part of the Internet, but are not part of the World Wide Web. The Hyper-Text Transfer Protocol (HTTP) is the method used to transfer Web pages to your computer. With hypertext, a word or phrase can contain a link to another web site. All web pages are written in the hyper-text markup language (HTML), which works in conjunction with HTTP.

3.3 Web Browser

A web browser is an application found on all modern computers. They are also now a common feature of mobile phones or other mobile devices and tablet computers like the iPad or Android tablets. Web browsers are used by people to find and look at web sites on the Internet. The first web browser was created in 1990. Many different web browsers are available for free. All web browsers can link us to websites but each browser has features and drawbacks associated with it. Some popular web browsers are.

- 1) Internet Explorer
- 2) Google Chrome
- 3) Mozilla Firefox
- 4) Opera
- 5) Safari

3.4 Search Engine

Search engines are programs that search documents for specified keywords and returns a list of the documents where the keywords are found. A search engine is really a general class of programs, however, the term is often used to specifically describe systems like Google, Bing and Yahoo! Search that enable users to search for documents on the World Wide Web.

3.5 Email Account

Electronic Mail (email or e-mail) is a method of exchanging messages between people using electronic devices. First substantial use of e-mail was in 1960s and by the mid-1970s had taken the form now recognized as email. Email operates across computer networks, which today is primarily the Internet. Some early e-mail systems required the author and the recipient to both be online at the same time, in common with instant messaging. Today's email systems are based on a



store-and-forward model. Email servers accept, forward, deliver, and store messages. Neither the users nor their computers are required to be online simultaneously. Everybody's e-mail id is unique and e-mail account has been given by the account holder of the account. Therefore, it becomes a safe way of sending messages and there is no scope for entering into other person's account unauthorizedly. No two e-mail accounts in the world are same.

3.6 Sending E-Mail

Creating and sending an e-mail message is, in many ways, similar to writing a letter without a stamp. In fact sending an e-mail is much the same as sending a letter. The main difference is that the e-mail is delivered almost instantly, although there can be delays caused by server problems, the fact that a recipient's mail box might be full, and other technical problems that will occur from time to time. The e-mail is sent on receiver's address using his special and unique address known as e-mail id. When the mail is sent, a message of confirmation that our mail has been sent or has not been delivered flashes on the screen shortly.

3.7 Receive E-Mail

Before you can receive an e-mail message you should first log onto your account. Your messages all sit on the server, waiting for you to come and retrieve them. You can choose whether to open each message, to delete it, or to store it. Within limits each server will typically allow you to keep several hundred e-mails, either read or unread, stored. If you have exceeded your storage limit, you will receive a message from the server administrator. At that time you will have to delete at least enough e-mails to get back within the storage limit.

3.8 Mailing List

A mailing list is a collection of names and addresses used by an individual or an organization to send material to multiple recipients. The term is often extended to include the people who subscribe to such a list, so the group of subscribers is referred to as "the mailing list" and it enables people with similar interests from all over the world to communicate and share information with each other. The mailing lists are administered software programs. Some of them are: Listserver, listserv and Majordomo.

3.9 Computer Virus

A computer virus is a type of malicious software program ("malware") that, when executed, replicates itself by modifying other computer programs and inserting its own code. Infected computer programs can include data files, or the "boot" sector of the hard drive. When this replication succeeds, the affected areas are then said to be "infected" with a computer virus.

3.10 Digital Signature

A digital signature is a mathematical technique used to validate the authenticity and integrity of a message, software or digital document. The digital equivalent of a handwritten signature or stamped seal, but offering far more good security. A digital signature is intended to solve the problem of tampering and impersonation in digital communications. It is used to authenticate digital information---such as form templates, e-mail messages and documents by using computer cryptography. It helps to establish the following assurances:

- Authenticity
- Integrity
- Non-Repudiation

3.11 Software Piracy

Software piracy is the unauthorized copying or distribution of software which is having a copyright. Software piracy can be done by copying, downloading, sharing, selling or installing multiple copies of software on personal computers. If you make more copies of the software or install the software more times than the license permits, upload software code to a website so that others can download and use it, share software license codes or activation keys, or in some cases, share your user ID and password for a web-based software application then this is known as software piracy which is legally and ethically wrong.



3.12 Firewall

In computing, a firewall is a network security system that monitors and controls incoming and outgoing network traffic based on predetermined security rules. A firewall typically establishes a barrier between a trusted internal network and untrusted outside network, such as the Internet.

Firewalls are often categorized as either network firewalls or host-based firewalls. Network firewalls filter traffic between two or more networks and runs on network. Host-based firewalls run on host computers and control network traffic in and out of those machines.

3.13 Hacking and Cracking

Hacking is an attempt to enter a computer system or a private network by breaking its security or passwords. In simple terms, it is the unauthorized access to or control over computer network security systems. A hacker is a person intensely interested in the hidden and complex workings of any computer operating system. Hackers are most often programmers and as such, hackers obtain advanced knowledge of operating systems and programming languages. They might discover loop holes within systems and the reasons for such holes. Hackers constantly seek further knowledge, freely share what they have discovered, and never intentionally damage data

Cracking is totally illegal method of breaking into someone else's computer system, often on a network; bypasses passwords or licenses in computer programs; or in other ways intentionally breaches computer security. A cracker can be doing this for profit, malicious design, for some altruistic purpose or cause. A cracker is one who breaks into or otherwise violates the system integrity of remote machines with malicious intent. Having gained unauthorized access, crackers destroy vital data, deny legitimate users service, or cause problems for their targets. Crackers can easily be identified because their actions are malicious.

3.14 Internet Service Provider (ISP)

An Internet service provider (ISP) is an organization that provides services for using the Internet. Internet service providers may be organized in various forms, such as commercial, community-owned, non-profit, or otherwise privately owned. Internet services typically provided by ISPs include Internet access, domain name registration, web hosting, usenet service, etc.

3.15 Cable Modem

A cable modem is a hardware device that allows your computer to communicate with an Internet Service Provider over a landline connection. It converts an analog signal to a digital signal for the purpose of granting access to broadband Internet. A cable modem works by connecting a coaxial cable to a jack in the wall and then a Cat5 (Ethernet) cord from the modem to a computer or a network router. Network routers are used to share your Internet connection between multiple computers.

3.16 Router

A router is a networking device that forwards data packets between computer networks. Routers perform the traffic directing functions on the Internet. A data packet is typically forwarded from one router to another router through the networks that constitute an internetwork until it reaches its destination node.

A router is connected to two or more data lines from different networks. When a data packet comes in on one of the lines, the router reads the network address information in the packet to determine the ultimate destination. Then, using information in its routing table or routing policy, it directs the packet to the next network on its journey.

3.17 Network Switch

A network switch is a computer networking device that connects devices together on a computer network by using packet switching to receive, process, and forward data to the destination device. A network switch is a multiport network bridge that uses hardware addresses to process and forward data at the data link layer (layer 2) of the OSI model. Some switches



can also process data at the network layer (layer 3) by additionally incorporating routing functionality. Such switches are commonly known as layer-3 switches or multilayer switches.

3.18 Server

In computing, a server is a computer program or a device that provides functionality for other programs or devices, called "clients". This architecture is called the client–server model, and a single overall computation is distributed across multiple processes or devices. Servers can provide various functionalities, often called "services", such as sharing data or resources among multiple clients, or performing computation for a client. A single server can serve multiple clients, and a single client can use multiple servers. A client process may run on the same device or may connect over a network to a server on a different device. Typical servers are database servers, file servers, mail servers, print servers, web servers, game servers, and application servers.

3.19 Client

A client is the requesting program or user in a client/server relationship. For example, the user of a Web browser is effectively making client requests for pages from servers all over the Web. The browser itself is a client in its relationship with the computer that is getting and returning the requested HTML file. The computer handling the request and sending back the HTML file is a server.

3.20 Port

In the internet protocol suite, a port is an endpoint of communication in an operating system. A port is always associated with an IP address of a host and the protocol type of the communication, and thus completes the destination or origination network address of a communication session. A port is identified for each address and protocol by a 16-bit number, commonly known as the port number. For example, an address may be "protocol: TCP, IP address: 1.2.3.4, port number: 80", which may be written 1.2.3.4:80 when the protocol is known from context.

Specific port numbers are often used to identify specific services. Of the thousands of enumerated ports, 1024 well-known port numbers are reserved by convention to identify specific service types on a host. In the client–server model of application architecture, the ports that network clients connect to for service initiation provide a multiplexing service. After initial communication binds to the well-known port number, this port is freed by switching each instance of service requests to a dedicated, connection-specific port number, so that additional clients can be serviced. The protocols that primarily use ports are the transport layer protocols, such as the Transmission Control Protocol (TCP) and the User Datagram Protocol (UDP).

3.21 Domain Name System (DNS)

The domain name system (DNS) is the way that internet domain names are located and translated into internet protocol (IP) addresses. The domain name system maps the name people use to locate a website to the IP address that a computer uses to locate a website.

Web browsing and most other internet activity rely on DNS to quickly provide the information necessary to connect users to remote hosts. DNS mapping is distributed throughout the internet in a hierarchy of authority. Access providers and enterprises, as well as governments, universities and other organizations, typically have their own assigned ranges of IP addresses and an assigned domain name.

3.22 Computer Network

A computer network is a set of computers connected together for the purpose of sharing resources. The most common resource shared today is connection to the Internet. Other shared resources can include a printer or a file server. The Internet itself can be considered a computer network.

There are several different types of computer networks. Computer networks can be characterized by their size as well as their purpose. Some of the different networks based on size are:



- 1) Local area network, or LAN
- 2) Wide area network, or WAN
- 3) Metropolitan Area Network or MAN

1. Local Area Network

A local area network, or LAN, consists of a computer network at a single site, typically an individual office building. A LAN is very useful for sharing resources, such as data storage and printers. LANs can be built with relatively inexpensive hardware, such as hubs, network adapters and Ethernet cables.

The smallest LAN may only use two computers, while larger LANs can accommodate thousands of computers. A LAN typically relies mostly on wired connections for increased speed and security, but wireless connections can also be part of a LAN. High speed and relatively low cost are the defining characteristics of LANs. LANs are typically used for single sites where people need to share resources among themselves but not with the rest of the outside world.

2. Wide Area Network

A wide area network, or WAN, occupies a very large area, such as an entire country or the entire world. A WAN can contain multiple smaller networks, such as LANs or MANs. The Internet is the best-known example of a public WAN. In WAN, computers are connected through public networks, such as the telephone systems, fiber-optic cables, satellite links or leased lines. Depending on the configuration, this type of network can cover an area from several miles to thousands of miles. Wide Area Network may or may not be privately owned.

3. Metropolitan Area Network

MAN or Metropolitan area Network covers a larger area than that of a LAN and smaller area as compared to WAN. It connects two or more computers that are apart but resides in the same or different cities. The familiar example of MAN can be a TV cable network. Depending on the configuration, this type of network can cover an area from several miles to tens of miles.



4.1 INTRODUCTION TO C LANGUAGE

The C programming language is a structure oriented high-level programming language, developed at Bell Laboratories in 1972 by Dennis Ritchie. C programming language features were derived from an earlier language called “B” (Basic Combined Programming Language – BCPL). C language was invented for implementing UNIX operating system. In 1978, Dennis Ritchie and Brian Kernighan published the first edition “The C Programming Language” and commonly known as K&R C. In 1983, the American National Standards Institute (ANSI) established a committee to provide a modern, comprehensive definition of C. The resulting definition, the ANSI standard, or “ANSI C”, was completed late 1988.

4.2 VARIABLES:

A variable is a place holder for a value. Before a C Program can utilize memory to store a variable it must claim the memory needed to store the values for a variable. This is done by declaring a variable. Variable is actually a name given to memory location where different constants are stored. These locations can contain integer, real or character constants. A variable name chosen by a programmer must reflect its function or nature in the program. It contains following specifications:

- A variable name must begin with a letter.
- ANSI standard recognizes a length of 31 characters. Normally, the length is 1 to 8 characters.
- Maximum compilers recognize only eight characters.
- Uppercase & lowercase are not same in naming variables. e.g., AB is different from ab.
- No keyword or white space to be used.

For example: temp ,ab_cd , Deccan are valid while as 2ths, ab cd, %dr are invalid

4.3 C – Data Types

C data types are defined as the data storage format that a variable can store a data to perform a specific operation.

Data types are used to define a variable before to be used in a program .Size of variable, constant and array are determined by data types. There are four data types in C language. They are:

Types	Data Types
Basic data types	int, char, float, double
Enumeration data type	enum
Derived data type	pointer, array, structure, union
Void data type	void

4.4 BASIC DATA TYPES IN C LANGUAGE:

A. INTEGER DATA TYPE: Integer data type allows a variable to store numeric values. “int” keyword is used to refer integer data type. The storage size of int data type is 2 or 4 or 8 byte depending upon the processor in the CPU that we use. int (2 byte) can store values from -32,768 to +32,767 while as int (4 byte) can store values from -2,147,483,648 to +2,147,483,647.



B. CHARACTER DATA TYPE: Character data type allows a variable to store only one character. Storage size of character data type is 1. We can store only one character using character data type. “char” keyword is used to refer character data type. For example, ‘A’ can be stored using char datatype.

C. FLOATING POINT DATA TYPE: Floating point data type consists of 2 types. They are: float and double.

Float data type allows a variable to store decimal values. Storage size of float data type is 4. This also varies depend upon the processor in the CPU as “int” data type. We can use up-to 6 digits after decimal using float data type. For example, 10.456789 can be stored in a variable using float data type.

Double data type is also same as float data type which allows up-to 10 digits after decimal. The range for double datatype is from 1E-37 to 1E+37.

4.5 MODIFIERS IN C LANGUAGE: The amount of memory space to be allocated for a variable is derived by modifiers. Modifiers are prefixed with basic data types to modify (either increase or decrease) the amount of storage space allocated to a variable.

- For example, storage space for int data type is 4 byte for 32 bit processor. We can increase the range by using long int which is 8 byte. We can decrease the range by using short int which is 2 byte.
- There are 5 modifiers available in C language. They are,
 1. short
 2. long
 3. signed
 4. unsigned
 5. long long

C Data types / storage Size(in bytes)	Range
char / 1 byte	-127 to 127
int / 2 bytes	-32,767 to 32,767
float / 4 bytes	1E-37 to 1E+37 with six digits of precision
double / 8 bytes	1E-37 to 1E+37 with ten digits of precision
long double / 10 bytes	1E-37 to 1E+37 with ten digits of precision
long int / 4 bytes	-2,147,483,647 to 2,147,483,647
short int / 2 bytes	-32,767 to 32,767
unsigned short int / 2 bytes	0 to 65,535
signed short int / 2 bytes	-32,767 to 32,767



long longint / 8 bytes	$-(2^{63}-1)$ to $2^{63}-1$
signed long int / 4 bytes	-2,147,483,647 to 2,147,483,647
unsigned long int / 4 bytes	0 to 4,294,967,295
unsigned long longint / 8 bytes	$2^{64}-1$

4.6 SIZEOF() FUNCTION IN C LANGUAGE:

sizeof() function is used to find the memory space allocated for each C data types

```
int main()
{
    int a;

    printf("Storage size for int data type:%d \n",sizeof(a));

    return 0;
}
```

Output : Storage size for int data type:4

4.7 Keywords in C language

Keywords are reserved words that have special meaning in C language which cannot be used as variable names because that would try to change the existing meaning of the keyword, which is not allowed. There are total 32 keywords in C language as listed below.

auto	double	int	struct
break	else	long	switch
case	enum	register	typedef
const	extern	return	union
char	float	short	unsigned
continue	for	signed	volatile
default	goto	sizeof	void
do	if	static	while



4.8 Flow Control Statements in C

Control statements enable us to specify the flow of program control; ie, the order in which the instructions in a program must be executed. They make it possible to make decisions, to perform tasks repeatedly or to jump from one section of code to another. There are four types of control statements in C:

1. Decision making statements
2. Selection statements
3. Iteration statements
4. Jump statements

Decision Making Statements:

1. The if-else Statement

The if-else statement is used to carry out a logical test and then take one of two possible actions depending on the outcome of the test (ie, whether the outcome is true or false).

if (condition)

{

statements

}

else

{

statements

}

Nested if and if-else Statements

It is also possible to **embed** or to **nest** if-else statements one within the other. Nesting is useful in situations where one of several different courses of action need to be selected

The general format of a nested if-else statement is:

if(condition1)

{// statement(s);

}

else if(condition2)

{//statement(s);

}

else if (conditionN)

{

//statement(s);

}



```
else  
  
{  
  
//statement(s);  
  
}
```

The above is also called the **if-else ladder**.

Selection Statement: the switch-case Statement

A switch statement is used for **multiple way selections** that will branch into different code segments based on the value of a variable or expression. This expression or variable must be of integer data type.

Syntax:

```
switch (expression)  
{  
case value1:  
code segment1;  
break;  
case value2:  
code segment2;  
break;  
casevalueN:  
codesegmentN;  
break;  
default:  
default code segment;  
}
```

The value of this **expression** is either generated during program execution or read in as user input. The case whose value is the same as that of the **expression** is selected and executed. The optional **default** label is used to specify the code segment to be executed when the value of the expression does not match with any of the case values.

Looping Statements

Every programming language has the feature to instruct to do such repetitive tasks with the help of certain form of statements. The process of repeatedly executing a collection of statement is called *looping*.

C supports following types of loops:

- while loops
- do while loops
- for loops

while loop executes the statement or block of statements as long as the condition/expression is true.

Syntax: while(*conditional expression*)

```
{  
  
Statement 1
```



Statement 2

Statement 3

}

This is an entry controlled loop.

do-while loop ensures execution at least once and checks the condition at the end whether true or false. The control will come out of the loop only when test condition is false. The block of statements within braces { } are executed at least once.

Syntax: do

```
{  
    Statement 1  
    Statement 2  
    Statement 3  
}
```

while(conditional expression)

This loop is an exit controlled loop.

for loop is used to execute a set of statements for a given number of times and comes out of the loop only when test_condition becomes false.

Syntax: for(*initialization; test_condition; increment or decrement*)

```
{  
    Statement 1  
    Statement 2  
    Statement 3  
}
```

This is an entry controlled loop and has three parts; first part initializes a control variable, second part has the test_condition and third part increments or decrements the control variable.



4.9 Jump Statements:

It can be accomplished by the following statements:

Statement	Syntax	Description
break statement	break;	Is used to terminate loop or switch statements.
continue statement	continue;	Is used to suspend the execution of current loop iteration and transfer control to the loop for the next iteration.
goto statement	gotolabelName; labelName: statement;	It transfers current program execution sequence to some other part of the program.

4.10. Algorithm : A Step by step procedure designed to perform an operation or process which will lead to the solution of the problem if followed correctly. Algorithms have a definite beginning and a definite end, and a finite number of steps.

Features or Characteristics of a good Algorithm:







- **Precision** –precisely defined steps.
- **Uniqueness** – results of each step are uniquely defined .
- **Finiteness** –a finite number of instructions to be executed.
- **Input** – the algorithm must receive input.
- **Output** – the algorithm must produce output.
- **Generality** –applies to a set of inputs.

4.11 Flowchart

A flowchart is a visual or diagrammatic representation of the sequence of steps needed to perform a process. Each step in the sequence is noted within a diagram shape, linked by connecting lines and directional arrows. Common Symbols used in flowcharts are listed below:

Shape	Name	Description
	Flowline (Arrowhead)	Shows the program's order of operation with a line coming from one symbol and ending at another.
	Terminal	Beginning or ending of a program or sub-process.



	Process	Set of operations that change value, form, or location of data and represented by a rectangle.
	Decision	Conditional operation determining which of two paths the program will take. The operation and is commonly a yes/no question or true/false test and represented as a diamond.
	Input/Output	Input or output of data and represented as a parallelogram.
	Annotation(Comment)	Additional information about a step the program.
	On-page Connector	Pairs of labeled connectors which replace long or confusing lines on a flowchart page and represented by a small circle with a letter inside.
	Off-page Connector	A labeled connector for use on another page and represented as pentagon.

4.12 Pseudocode: Pseudocode is an informal way of programming description. It does not require any programming language syntax. It is used for creating an outline or a rough flow of a program and excludes underlying details. It uses simple English language syntax to write code for programs before being converted into a specific programming language. Pseudocode is understood by the programmers of all types and enables the programmer to concentrate only on the algorithm of the program. For example: Consider the following C style pseudo code:

```
void function myfunc {
for (i = 1; i<= 100; i++) {
set flag to true;
    If i is divisible by 3
print "OK";

set flag to false;
}
}
```

TEXT BOOKS:

1. P.K. Sinha & P. Sinha , “Foundations of Computing”, BPB Publications, 2008.
2. ITL Educational Society , “Introduction To Information Technology”, Pearson,2013.
3. E. Balagurusamy, “Programming in ANSI C 6th Edition”, Mcgraw Hill Education, 2012.

REFERENCES :

1. www.w3schools.com
2. <https://en.wikipedia.org>
3. www.computerhope.com
4. www.how-to-build-websites.com
5. www.oer.nios.ac.in
6. www.techterms.com
7. <http://searchenterprisedesktop.techtarget.com>