DR.BABASAHEB AMBEDKAR
OPEN UNIVERSITY

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Education
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BCA

BACHELOR OF COMPUTER APPLICATION

BCAR-401

Web Technology using FOSS (LAMP/WAMP)

WEB TECHNOLOGY USING FOSS (LAMP/WAMP)

DR. BABASAHEB AMBEDKAR OPEN UNIVERSITY

AHMEDABAD

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ROLE OF SELF–INSTRUCTIONAL MATERIAL IN DISTANCE LEARNING

The need to plan effective instruction is imperative for a successful distance teaching repertoire. This is due to the fact that the instructional designer, the tutor, the author (s) and the student are often separated by distance and may never meet in person. This is an increasingly common scenario in distance education instruction. As much as possible, teaching by distance should stimulate the student's intellectual involvement and contain all the necessary learning instructional activities that are capable of guiding the student through the course objectives. Therefore, the course / self-instructional material is completely equipped with everything that the syllabus prescribes.

To ensure effective instruction, a number of instructional design ideas are used and these help students to acquire knowledge, intellectual skills, motor skills and necessary attitudinal changes. In this respect, students' assessment and course evaluation are incorporated in the text.

The nature of instructional activities used in distance education self-instructional materials depends on the domain of learning that they reinforce in the text, that is, the cognitive, psychomotor and affective. These are further interpreted in the acquisition of knowledge, intellectual skills and motor skills. Students may be encouraged to gain, apply and communicate (orally or in writing) the knowledge acquired. Intellectual-skills objectives may be met by designing instructions that make use of students' prior knowledge and experiences in the discourse as the foundation on which newly acquired knowledge is built.

The provision of exercises in the form of assignments, projects and tutorial feedback is necessary. Instructional activities that teach motor skills need to be graphically demonstrated and the correct practices provided during tutorials. Instructional activities for inculcating change in attitude and behaviour should create interest and demonstrate need and benefits gained by adopting the required change. Information on the adoption and procedures for practice of new attitudes may then be introduced.

Teaching and learning at a distance eliminate interactive communication cues, such as pauses, intonation and gestures, associated with the face-to-face method of teaching. This is

particularly so with the exclusive use of print media. Instructional activities built into the instructional repertoire provide this missing interaction between the student and the teacher. Therefore, the use of instructional activities to affect better distance teaching is not optional, but mandatory.

Our team of successful writers and authors has tried to reduce this.

Divide and to bring this Self-Instructional Material as the best teaching and communication tool. Instructional activities are varied in order to assess the different facets of the domains of learning.

Distance education teaching repertoire involves extensive use of self-instructional materials, be they print or otherwise. These materials are designed to achieve certain pre-determined learning outcomes, namely goals and objectives that are contained in an instructional plan. Since the teaching process is affected over a distance, there is need to ensure that students actively participate in their learning by performing specific tasks that help them to understand the relevant concepts. Therefore, a set of exercises is built into the teaching repertoire in order to link what students and tutors do in the framework of the course outline. These could be in the form of students' assignments, a research project or a science practical exercise. Examples of instructional activities in distance education are too numerous to list. Instructional activities, when used in this context, help to motivate students, guide and measure students' performance (continuous assessment)

PREFACE

We have put in lots of hard work to make this book as user-friendly as possible, but we have not sacrificed quality. Experts were involved in preparing the materials. However, concepts are explained in easy language for you. We have included many tables and examples for easy understanding.

We sincerely hope this book will help you in every way you expect.

All the best for your studies from our team!

WEB TECHNOLOGY USING FOSS (LAMP/WAMP)

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Unit 14   **Web Services**

Introduction, Types of Web Services, SOAP Web Services, Restful Web Services, How Web Services Work ?, Why do you need Web Services ?, WSDL (Web Services Description Language), Architecture of Web Services, JAX–RPC, Writing Java Web Service, Writing a Java Web Service Client

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BLOCK 1 : WEB ESSENTIALS

UNIT 1   INTRODUCTION TO WEB

UNIT 2   EMAIL SYSTEM AND FIREWALL

UNIT 3   MARK–UP LANGUAGES HTML

UNIT 4   HTML 5

WEB ESSENTIALS

Block Introduction :

Internet is a collection of computers where many computers grouped together share their information. In this case the information can be send by the Sender and the Receiver receives that information. Client/server architecture is producer consumer computing arrangement where server will work as producer and client will work as consumer.

In this block you will be able to learn and understand about the basic of history-versions about XHTML along with its syntax and semantics. In this block you will be able to learn and understand about the basic information on URL, and various Protocols. The block will explain in detail about the types of protocols used with their functions. With older HTML version 4 we have also cover new HTML-5 version and its structure with newly introduced markup tags.

In this book your will also learn about email system which is very useful for understand how our email system is work and which are the different protocols are work in E-mail system. Each protocols are define their own role based on user email communication.

After reading this block you can attain knowledge on basic Internet tools. You will be aware of website and designing features. The block will help you to understand the XHTML along with various syntax used.

Block Objectives :

After learning this block, you will be able to understand :

- About Web Clients/Web Servers

- Basic of World Wide Web

- Features of XHTML Syntax

- Concept of U RLs–Lists

- Detailed about Clients/Servers

- Concept of HTML–5 new Elements

- Concept of Email System

Block Structure :

Unit 1 : Introduction To Web

Unit 2 : Email System and Firewall

Unit 3 : Mark–Up Languages HTML

Unit 4 : HTML 5

UNIT STRUCTURE

1.0   Learning Objectives :

After learning this unit, you will be able to understand :

• Basic of Internet Protocols

• Idea about Web Clients and Servers

• Servers and Communication

1.1   Introduction :

There are various software available in the industry that you can use to create website but the fundamental language that is the base for all these software and rather website is Hypertext Mark–up Language also known as HTML. These days in the competitive world and where people are connecting themselves so fast it is a must that you own a website. Through your website people come to you know, your first face, your business, your company, your mission, vision and values and in short this is the most handy way of letting the world know who you are and your product, depending on your needs and requirements you can make various types of websites, most largely websites are categorized into two and that is static and dynamic.

1.2   Clients, Servers and Communication :

Communicating with people sitting far away and long distance will make you easy through internet. You can connect to people across the globe any time and with latest tools without calling them. You can easily communicate with them through websites, emails, webcams, chatting etc. Client/server is a

computing technology which is a good source for certain tools which allow employees with certain authority and responsibility. This computing technology is wide series in computer industry which covers all the aspects of computer. It requires mixture of skills which can be applied for development of certain client/server applications that will include :

• Database design

• Transaction processing

• Communication skills

• Graphical user interface design and development

Advanced applications require expertise of distributed objects and component infrastructures.

Client : A client is single user workstation which involves in presentation services, database services and connects interface for user communication to obtain business requirements.

Server : A server is multi user processors having high shared memory capacity that will provide connectivity and various database services with interfaces that can be applied in certain business processes.

Client/Server is a computing methodology that shows environment with technology in order to upgrade business processes with correct synchronization of related application processing which exists among client and server as shown in Fig 1.1.
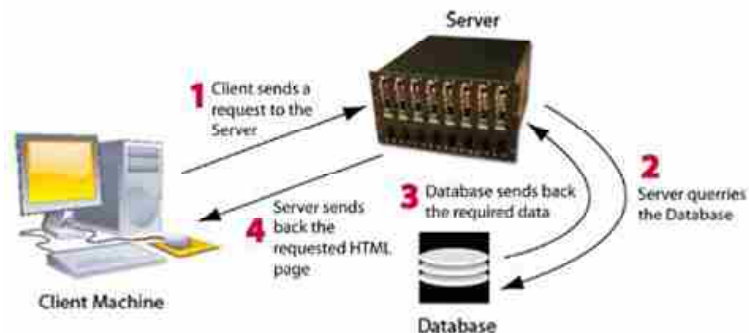
Fig. 1.1 Client Server Arrangements

Client/Server model is a computing platform which is stand alone and moves towards cooperating of process or peer–to–peer modelling. It shows opportunity for users to work on business functionality which further will open in certain risky situations as it is crystal clear with technology and with the user.

Characteristics of Client/Server :

There are certain characteristics features of clients and servers which have made them to work together on a network to do work.

Service :

It is seen that client/server exists as relationship among processes which are running on distributed devices. This methodology shows separation of functionalities which is subject to services that are offered.

Sharing of Resource :

A server is that part of computing which can take care of clients simultaneously thereby handling service access for resources.

Asymmetrical Protocols :

It is noted that client/server acts as many–to–one relationship which is set off by clients by way of service request while server inertly wait for. Many times, client pass with reference to call back object on requesting for service.

Location Clarity :

It is found that process with the server lives inside a client or in machine all through the network. Further the Client/Server software arranges server location by redirecting service calls which makes the program as client/server or both.

Inter Communication :

Communication between clients and servers results by way of messaging. In this, both will interact through messages to deliver service requests and responses.

Encapsulation of Services :

It is found that server has certain specialised features which can able to satisfy client requests varyingly and in due course of time will manage to upgrade them without affecting environment.

Scalability :

The Client/Server systems can be scaled horizontally or vertically as they can add or remove client workstations with certain performance effect. It can move with other efficient servers and can share work load with various servers in case of vertical scaling.

Integrity :

As, both server data and codes can be handled centrally, so it uses less maintenance cost with shared data consistency and not depending on clients.

❑ **Check Your Progress – 1 :**

1. What is server ?

   a. Single user system   b. Multi user processors

   c. Both of these   d. None of these

2. Which of the following is the characteristics of client server architecture ?

   a. Scalability   b. Integrity

   c. Resource Sharing   d. All of these

1.3 The Internet :

In order to share the information with people quickly and easily, we use Internet. Internet is a collection of computers where many computers grouped together share their information. In this case the information can be send by the Sender and the Receiver receives that information.

Internet is a set–up of computers all around the globe. Every computer that is connected to the internet is considered as a part of that network. Figure 1.1 shows the arrangement of Computers across the globe. In this each computer is connected with a main computer called as server to form the internet. Internet allows you to communicate with others. It is also known as World Wide Web that provides a quick and easy exchange of information.

Fig. 1.2 Arrangements of Computers

Internet can be connected from Desktop as well as from Laptops. To connect the Internet, you require a Computer, modem and a Service provider. The term "Internet" was defined in the year 1995 by the Federal Networking Council as a global information system. You can connect Computers as shown in a Network.
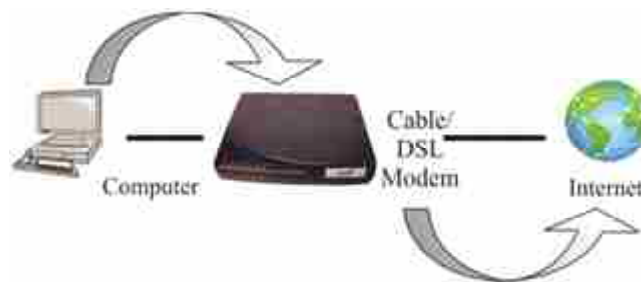
Fig. 1.3 Connecting Computers on Internet

Internet is not owned by anybody. To connect to Internet, you will be requiring :

• A computer

• A modem

• Access to a telephone line

• An Internet Service Provider

Internet software such as Operating System

A Computer :

To connect to Internet the basic component you require is the Computer.

A Modem :

A modem uses a phone line to connect to the Internet.

Internet Software :

Some basic Internet software includes :

• Web browser such as Internet Explorer

• Email program such as Outlook Express

By using these components, you can easily connect to the Internet. The internet provides many software tools that make it possible to communicate with people all around the world. Information can be taken and delivered very easily. A user can collect and move to any from one topic to another and can discuss and chat with other people available on the Internet. Friendship can be built by people of related interest from around the world. Internet allows us to do business online. The following are some of the services available on Internet :

- E–mail
- FTP
- Usenet
- Telnet
- Internet Relay Chat (IRC)
- World Wide Web

Advantages of Internet

The advantages of Internet are :

- **Information :** Internet gives much information to people in different areas. People of different fields can get any information easily. The information can be received through search engines such as Yahoo, Google, MSN etc.

- **Communication :** The main work of Internet is to share the news and other information. In order to communicate, we use e–mail. You can write any information and send it to your friends or relatives. You can also read the information sent by your friends.

- **Entertainment :** Internet is a famous place for enjoying and playing of :
  - video games
  - music
  - movies
  - chatting
  - news

  You can download and upload your music and games.

- **E–commerce :** E–commerce means selling and buying materials. For this the seller and the buyer will contact each other.

- **Communities :** You can form and join any group with different people that are available across the world. Such places help you to :
  - take part in many types of debates and discussions
  - discuss your ideas
  - have lots of knowledge and information
  - Services : Internet can help you to do much work such as :
  - finding job
  - deposit and withdraw money from your bank account
  - getting cinema tickets,
  - train and air ticket booking
  - discussing or taking idea
  - giving your exams

Disadvantages of Internet :

There are many disadvantages of Internet which are :

- **Spamming :** If you are working on Internet, you will get many bad or raw e–mails. Such mails are not good that will spoil the whole computer system.

- **Theft of personal details :** Internet can help to steal; your personal details such as :
  - name
  - address
  - credit card number

- **Pornography :** Pornography is bad for your child. Many pornographic websites are available which is not good to see as it spoils the brain.

- **Virus :** If you are working on internet, then many times your computer will work slowly, as there is Computer Virus that enters your computer and damage your computer hard disk.

  Uses of Internet :

  Internet provides many facilities to the people such as :

- **Sharing Information :**

  We can share information with other people around the world. Sharing information through Internet is very easy, cheap and quick.

- **Collection of Information :**

  We can collect information of different types from the websites which are available in forms of audio, video, text and pictures.

- **News :**

  We can get latest news from around the world on the Internet.

- **Searching :**

  We can search anything on the Internet. There are different Search Engines available today for fast searching.

- **Advertisement :**

- **Introduction :**

  Today, most of the commercial organizations advertise their product through Internet. The products can be presented with attractive and beautiful way to the people around the world.

- **Communication :**

  We can communicate with others through Internet around the world. We can talk by watching to one another. For this purpose, different services are provided on the Internet such as;
  - Chatting
  - Video Conferencing
  - E–mail
  - Internet Telephony System.

- **Entertainment :**

  Internet provides different type of entertainments to the people such as playing games, seeing movies, listening music etc.

- **Online Education :**

  Many websites of different universities provide lectures and tutorials on different subjects or topics. You can listen the lectures and get a lot of knowledge. It is cheap and easy way to get education.

- **Online Results :**

    Today, most of the schools, universities and education boards provide results on the Internet. The students can watch their results from any part of country or world.

- **Online Ticketing :**

    You can book your Airlines and Railway ticket online. Also you can get the schedules of flight and train timings on the Internet.

❑ **Check Your Progress – 2 :**

1. Internet is :
    a. Network of Computers   b. Connecting Single Computer
    c. Connecting many Computers   d. all of these

2. An Internet requires
    a. A Computer   b. A Modem   c. An ISP   d. All of Above

3. Features of Internet are :
    a. Good Communication System   b. Communicate among themselves
    c. Called as World Wide Web   d. All of Above

1.4   Basic Internet Protocols :

In computers, you can say that protocol is a set of rules with the help of which computing devices are able to communicate. The communication is done through a network. A network is a medium by which individuals computers are able to connect with one another and thus are able to share information. Of course, just by connecting to one another there in not much of ability of sharing data. However, for accuracy the computers must be guided, instructed as to how to share data appropriately such that there is accuracy. Now this is the job of that respective protocol to provide instruction to the computer.

Protocols not only are the set of rules for communication across a network, but they also control the network communication process as in totality. And this is the reason as to why protocols are referred to as network protocols. Once you implement the protocol it sets the rules for communication across the network, it sets the structures for transfer of information when shared between two computers.

Protocols laid the foundation for networks across the internet by enabling and controlling the communication of computers over the Internet. As the applications are growing and as the computer industry is growing, protocols have now become very important and have a powerful influence and they have contributed to the success of the internet as well as network communication. Today protocols are in demand and have become a pre–requisite in the computer industry. Protocols decide if host–host communications possible, as these are set of rules.

Protocols play an important role but a single protocol cannot do the entire task; there would be multiple protocols that club together and achieve a service or a task. These are also known as protocol stacks. When layered one after another, the network protocols perform as a single unit, distributing their tasks in a specific manner, which allows for the comprehensive management of the networks.

TCP/IP protocols :

Internet has additional standards for the interchange of news, mail and a variety of other services.

Application packages on the Internet allow email, FTP and remote login. These applications have their own protocols built on the basic TCP/IP protocols that define the Internet.

IP protocol :

IP protocol decides the basic unit of data transfer and the exact format of entire data while it passes across the internet. IP has a set of rules how data has to be transferred in packets, how they have to be processed and how errors are handled in the communication and transfer. IP is the native protocol of Unix machines.

TCP protocol :

TCP protocol decides and specifies the format of the data and acknowledgements that two computers exchange to achieve a reliable transfer and also the procedures the computers use to ensure that the data arrives correctly. TCP can be used with a variety of packet delivery systems and not just with IP protocol.

❑ **Check Your Progress – 3 :**

1. In a protocol, communication is done through a :

   a. computer   b. cable   c. modem   d. network

2. Which among the following is not a function of a Protocol ?

   a. It keeps information of its own

   b. It allows the computers to share information

   c. It can communicates among 2 computers

   d. It shows network services

3. Internet protocol is the native protocol of _____ machines.

   a. Linux   b. Windows   c. Unix   d. Dos

1.5 The World Wide Web :

The World Wide Web (WWW) is an information space where documents and other web resources are located by URLs, interlinked by hypertext links, and can be accessed via the Internet. It was invented by English scientist Tim Berners–Lee in 1989. When used attributively it is invariably written in lower case. Otherwise the initial capital is often retained, but lower case is becoming increasingly common. The World Wide Web was central to the development of the Information Age and is the primary tool billions of people use to interact on the Internet.

Web pages mainly are text documents that are formatted and annotated with Hypertext Markup Language. Along with formatted text, web pages also have images, video and software components which render in user's web browser as logical pages of multimedia content. Embedded hyperlinks permit users to navigate between web pages. Multiple web pages with a common theme, a common domain name, or both, may be called a website. Website content can largely be provided by the publisher, or interactive where users contribute content or the content depends upon the user or their actions.

Websites may be mostly informative, primarily for entertainment, or largely for commercial purposes.

World Wide Web is known as a system of Internet servers which supports hypertext to access several Internet protocols on a single interface as shown in fig. 1.4. It is abbreviated as WWW.
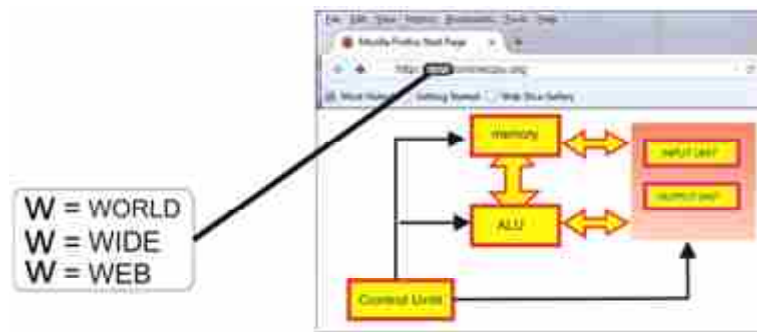

Fig. 1.4 World Wide Web

❑   **Check Your Progress – 4 :**

1.   A piece of icon or image on a web page associated with another webpage is called

 a. url   b. hyperlink

 c. plugin   d. none of the mentioned

1.6 HTTP Request Message/Response Message :

HTTP is the protocol that is used for communication between the browser and the web server. A protocol defines a set of rules of how browser and web server shall interact or communicate with one another. It is used for communication over internet. The most important use of HTTP is to transfer files, which are the web pages as per your request from server to your machine. You are able to browse and surf the internet with the help of this hypertext transfer protocol called as HTTP.

URL http://www.itetrust.com, you will see that it starts with the HTTP protocol. HTTP protocol is the carrier of information, carrier of html and web pages that is why you call it as hypertext transfer protocol. Whenever you ask for a web page, HTTP plays an important role in carrying your request and accordingly giving you a response or a reply. This is the reason as to why it is written first in the URL and then followed by the domain name. This protocol works on port number 80.
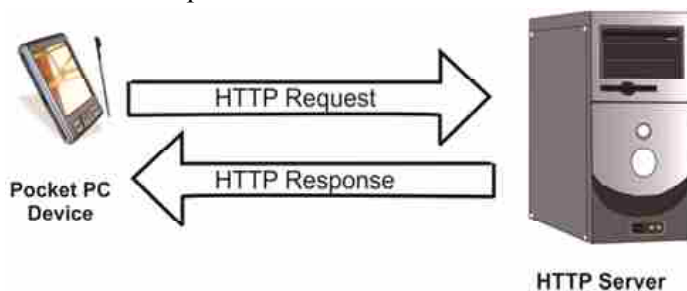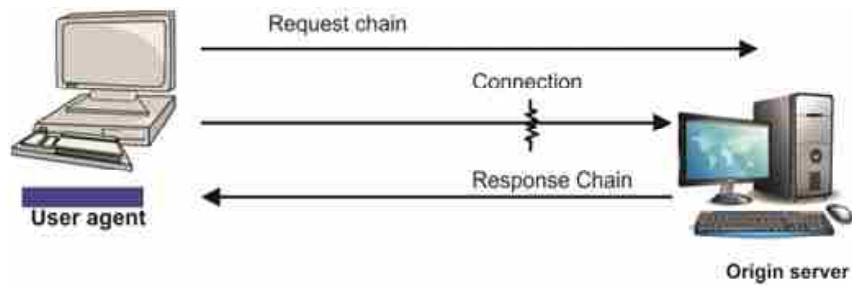

Fig. 1.5 Arrangement of HTTP

Basically, Hypertext Transfer Protocol (HTTP) is the set of rules for exchanging files (text, graphic images, sound, video, and multimedia files) on the World Wide Web. Hypertext transfer protocol is a type of protocol that

uses TCP to transfer hypertext requests and information among the servers and browsers as shown in figure 1.6.

Fig. 1.6 Transfer of Information

We can summarise that Hypertext Transfer Protocol (HTTP) as :

•   A fixed set of commands that are used at time of hypertext link exists between client and server.

•   A method of transferring data among web server and web browser.

•   A protocol used for file transfer, normally html files and images among different computers.
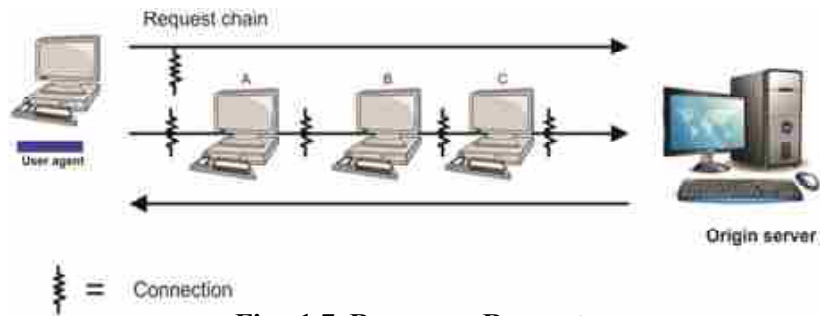
Fig. 1.7 Response Request

In case of HTTP you should remember that HTTP :

It has no Connections :

Once the request is made, then the client gets cut from the server and waits for a response. In such situation, the server must re–establish the connection once it processes the request.

It is not dependent on Media :

One of the advantages of HTTP is that any type of data can be sent to the place where both client and server sit to handle the data content.

It has no state :

It is a straight forward result. In this, the server and client know each other status. Due to this, neither the client nor browser can keep information among different request across the web pages.
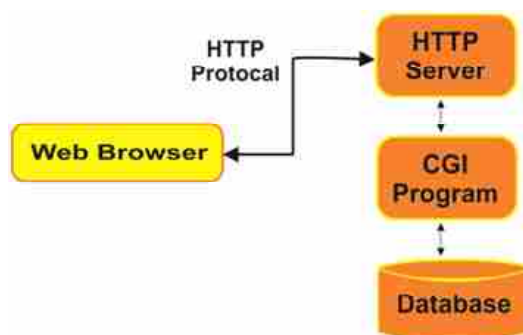
Fig. 1.8 Shows the Status of HTTP Protocol

❑ **Check Your Progress – 5 :**

1. HTTP client requests by establishing _____ connection among port on server.

   a. user datagram protocol   b. transmission control protocol

   c. broader gateway protocol   d. none of the mentioned

| **1.7   Web Clients/Web Servers :** |

   Web Server is a fixed content server which serves to Web browser by way of uploading a file from computer disk and made available for users across the network. Personal computer users in the past have dissimilar prospect. In earlier period, condition subsequent to hour operational on worksheet makes the system to get suspended where power fails and further virus will reboots the machine, when users without doubt experience exasperated but not actuality astonished.

   Similarly, by means of companies so as to have enthused further than single–user PC request which furthermore squeeze networking where users in the past have been more broad–minded of lesser amount of exact principles. For instance, the projects which costs to handle disseminated set of connections of PCs along with servers which will be 10 to 30% additional as compared to handling minicomputers along with mainframes. Other studies have claimed costs are double. This advanced cost is the cases as soon as LANs develop along with applications are put together with no an architectural view along with appropriate standards to hold up the design.

   By means of moving client/server computing, the need for mainframe–like performance from client/server architectures tends to raised. Condition firms are going away to shift the business of the corporation into the client/server world, mainframe expectations will succeed in addition to mainframe support which should be rendered.

   Modern understanding with remotely handled LAN applications shows that costs are similar to or fewer than costs for conventional mainframe applications. Successful remote management involves systems along with application architectures that look forward to necessity for secluded management.

❑ **Check Your Progress – 6 :**

1. Which server is used for sending and receiving requests from web server ?

   a. Collaboration server   b. Web server

   c. FTP server   d. None of these

| **1.8   Let Us Sum Up :** |

   In this unit, we have studied that a protocol is set of rules or a standard form of conduct or etiquette or again in simple language a set of specific rules.

   We have seen that there are various internet services and each of these internet services has unique protocol that makes it functional and workable.

   In a protocol, communication is done through a network. Since these are set of rules for communication, they also control the network communication process. Because of this, protocols are called as network protocols.

   A web browser is an application which will present, traverse and retrieve information on World Wide Web.

It is found that an information resource is a web page, image, video or related information in form of URL.

Hyperlinks are used to navigate and browse the required link or resource by using the browser.

1.9 Answers for Check Your Progress :

❑ **Check Your Progress 1 :**

1. (b)   2. (d)

❑ **Check Your Progress 2 :**

1. (d)   2. (d)   3. (d)

❑ **Check Your Progress 3 :**

1. (a),   2. (c)   3. (c)

❑ **Check Your Progress 4 :**

1. (b)

❑ **Check Your Progress 5 :**

1. (b)

❑ **Check Your Progress 6 :**

1. (b)

1.10 Glossary :

1. **Browser** – A software program that allows users to access the Internet

2. **Internet** – A global network of many computers linked by data lines and wireless systems.

3. **Modem** – A device that connects your computer to the Internet

4. **Network** – It is the interconnection of one or more computers

5. **HTML** – A type of text code in Hypertext Markup Language which, when embedded in a document, allows that document to be read and distributed across the Internet

6. **URL** – A universal resource locator that identifies the location and type of resource on the Web.

7. **Wide World Web (WWW)** – A hypermedia information storage system which links computer –based resources around the world.

1.11 Assignment :

Explain the Clients Servers Communication ?

1.12 Activities :

Study about Internet Protocols

1.13 Case Study :

Prepare a report that will highlight the necessary evolutionary steps about an Internet.

1.14   Further Readings :

1.   Internet for Seniors, Michael Gorzka, 2008

2.   An Introduction to Affiliate Networks, Youlin, 2008

3.   Introduction to Understanding the Internet, Worth Godwin, 2010

Unit	
02	*E–MAIL SYSTEM AND FIREWALL*

UNIT STRUCTURE

2.0   Learning Objectives :

After learning this unit, you will be able to understand :

•   What is Email System ?

•   How Email System and its' Protocol works ?

•   FTP protocols

•   Firwall

2.1   Introduction :

As we all are aver with traditional post system in which we forward our letter or any document we using post box ,and a post man will bring our letter from post box to post office and then post office manage our post documents and forward to the receiver's address. But now days in such a fast communication system we require fast service of post, to get fast and reliable service there is an innovation of E–mail (Electornic mail) system in which we send and receive our latter or any document across the internet. Internet and other devices will manage our posted documents. E–mail system is work with the help of some storage space which is known as an email server, which will help user to manage their posted documents and also give security to their document. For that email system and the server will work on some specific

protocols, there are several protocols are define to send and receive Email which we will study in this unit later.

2.2 How E–Mail System is Work ?

Email system is similar to our postal service or currier service. Email System is work on internet so there must be some applications are require to manage mail. Like Website application E–mail is also one Web application. In Email system there must be two main party are require one Is User who communicate with E–mail application directly. User role in Email system is to composing, attaching document, managing mail box, reading mail, sending mail user also called as a USER AGENT. Second is Message Transfer Agent (MTA). The job of User Agent is to provide client/user service like composing mail, storing E–mail address in address book, listing the mails from mailbox etc. The role of MTA is like post office to identify sender address, Receiver address and transfer mail from sender mail box to receiver mail box. The work of MTA is done in Client side as well as Server Side.

It is very easy and user–friendly process it is work with internet services, to work on internet we need to create a storage space and also need security for that each email application will manage their application by purchasing domain and that domain is register with some special name. Gmail, yahoo mail and other company who provide Email application has register their application on Domain/DNS. As we know DNS will provide domain name with some url, that url is used to open application on browser. Now user will use this application throw their register url, after opening an url on browser user has to open their account on email application on which he/she want to communicate.

After registration Email application provide unique id which is known as Email Address. Suppose Prakash has registered with yahoomail he will provide any username as an register user like **prkash789** is an username then yahoomail provide Email/mail address like prkash789@yahoomail.com now prakash can send and receive mail on his email address. just he has to login on mail account.When user get registration on Email server there are some storage space provide on E–mail server for storing their email related data like received mail, email addresses, sent mails etc. There is one folder created on server which name is similar to user's Email address here in our example prkash789 is a folder name which under yahoomail server.User wants to send mail to someone he /she will login on email server and there is one Client application or User Agent is open for communicate with Email server. Assume Prakash wants to send email to Suresh. Prakash invoke his User Agent and compose email for Suresh, he add recipient address like suresh_123@hotmail.com. After composing mail he press send button to send mail. After clicking on send button mail application is under process to forward mail from sender mail server to recipient mail server, at this time User Agent role is over now Message Transfer Agent role is invoke. Message Transfer Agent is identifying the Address of recipient. MTA Transfer message on Internet using SMTP Protocol. With the help of TCP MTA get the recipient Email server location and they are exchanging mail from one Email server to another Email server.in our example when Prakahs send mail to Suresh. Prakash email id is prkash789@yahoomail.com and Suresh email id is suresh_123@hotmail.com. With the help of TCP MTA of yahoomail server is communicating with MTA of hotmail server once yahoomail MTA found the location of hotmail server exchanging mail from Prakash account to Suresh account.

❑   **Check Your Progress – 1 :**

1. _____ work on user machine at application layer.

    (a) MTA   (b) User Agent   (c) SMTP   (d) All the above.

2. _____ is responsible to transfer message from one email server to another email server.

    (a) User Agent   (b) POP3   (c) MTA   (d) None of these

2.3   E–Mail Protocols :

Before study about Email protocol first fall know what is protocol ? Protocol is set of rules. There are different types of Protocol TCP and UDP. Mail system is working with TCP protocols which helps sending and receiving mail. Following are mail protocols

Simple Mail Transfer Protocol (SMTP)

Multipurpose Internet Mail Extension (MIME)

Post office Protocol version –3 (POP–3)

Internet Mail Access Protocol (IMAP)

2.3.1 Simple Mail Transfer Protocol (SMTP) :

SMTP is a protocol which set some guidelines to send email from sender machine to receiver machine. It is program to help user to send email form one user Email account to another user Emil account on internet, so it is work line an application on internet.It provides a mail exchange between users on the same or different computers, and it also supports to send a single message to one or more recipients. Sending message can include text, voice, video or graphics. It can also send the messages on networks outside the internet. SMTP is TCP protocol so it provide reliable service. Means When User send Message it give acknowledgment of mail send successfully or fail. SMTP defines the rules of sending mail it follow the format of mail compose. It send only Text Messages which is converted into ASCII format so it is also known for transfer ASCII data. It also handling the errors such as incorrect email address.
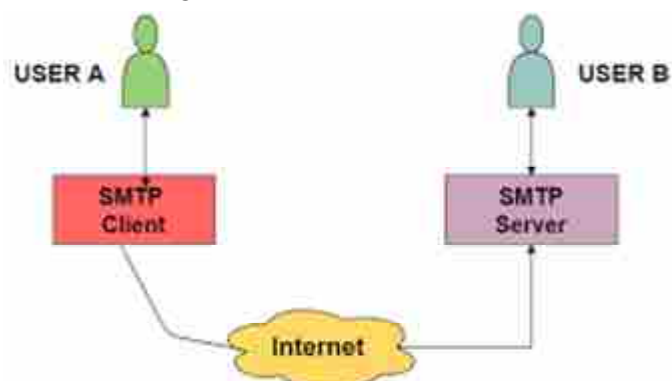
Fig. 2.1 SMTP Protocol

First, we will break the SMTP client and SMTP server into two components such as user agent (UA) and mail transfer agent (MTA). The user agent (UA) prepares the message, creates the envelope and then puts the message in the envelope. The mail transfer agent (MTA) transfers this mail across the internet. SMTP allows a more complex system by adding a relaying system. Instead of just having one MTA at sending side and one at receiving side, more MTAs can be added, acting either as a client or server to relay the email.
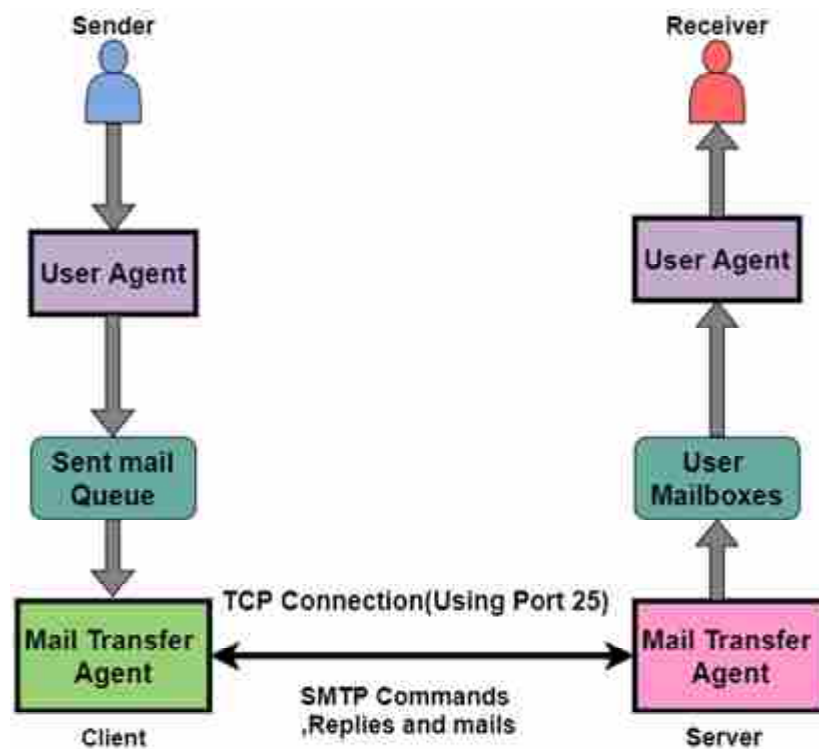
Fig. 2.2 SMTP Protocol

2.3.2 Multipurpose Internet Mail Extension (MIME) :

This protocol is used to describe some mail content type or mail format. MIME is basically a supplementary protocol of SMTP that mainly allows the non–ASCII data to be sent through E–mail. The MIME protocol allows the users to exchange various types of digital content such as pictures, audio, video, and various types of documents and files in the e–mail. MIME is also support multiple languages like French,chines, Japanese, also use Indian language format. SMTP protocols can reject mail that exceeds a certain size, but there is no word limit in MIME. Many times, emails are designed using code such as HTML and CSS, they are mainly used by companies for marketing their product. This type of code uses MIME to send email created from HTML and CSS.

2.3.3 Post Office Protocol Version – 3 (POP–3) :

As we know SMTP is used for send a mail from one mail server to anoter one.This protocol is used for Receiving a mail on Mailserver.It is mainly massage access protocol. The Message Access Agent contains two types of protocols, i.e., POP3 and IMAP.IT is TCP protocol so it provide reliable and connection–oriented functionality. At the receiver's mail server, the POP or IMAP protocol takes the data and transmits to the actual user's machine. To retrieve/Read mail from mail box POP protocol used. It has various version POP, POP2 and POP3 we are working with POP3. POP3 is client server protocol. POP3 save mail on client Machine. If any user tries to check all the recent emails then they will establish a connection with the POP3 at the server–side. The user sends the username and password to the server machine for getting the proper authentication. After getting the connection, users can receive all text–based emails and store them on their local terminal (machine), then finally discard all server copies and then breaks the connection from the server machine. This protocol does not require any internet connection in order to access the downloaded emails. IT allows to download email on single machine device only.
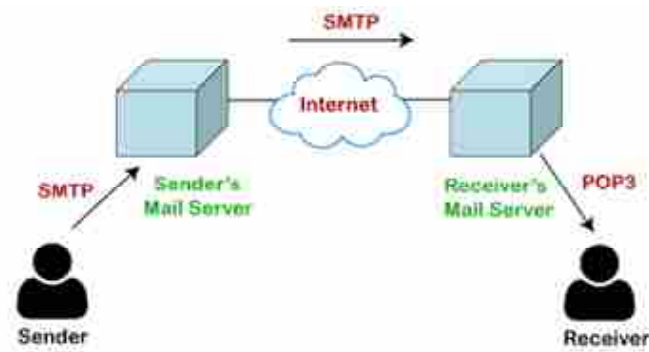
Fig. 2.3 POP Protocol

2.3.4 Internet Message Access Protocol (IMAP) :

IT is also an TCP Protocol work on application layer. It is an advance version of POP–3 Protocol. Internet Message Access Protocol (IMAP) is a standard protocol for accessing email on a remote server from a local client. It also enables the clients to receive or download the emails from their remote mail server. It is reduce the memory requirement at the server. IMAP has some different features then POP3. IMAP save mail on user machine but cannot delete mail from mail server but it store mail in user mail box where user has provide space. Using IMAP user has choice to access mail account at anywhere. Once user has read mail same mail he/she can read again by accessing mail server. It provide multiple mail boxes for same client for different purpose. It share single mail box with multiple clients simultaneously.IT store the mail status for user confirmation, mail is read, forward or reply.

Fig. 2.4 IMAP Protocol

❑ **Check Your Progress – 2 :**

1. SMTP Protocol works with 7 bit ASCII text data only (True/False).

2. _____ protocol works with audio, video and documents file to send email.

   (a) SMTP   (b) POP3   (c) IMAP   (d) MIME

3. _____ and _____ protocols work on serverside.

   (a) SMTP, POP3 (b) POP3, MIME (c) POP3, IMAP

2.4   Telnet Protocol :

Telnet is (Telecommunication Network) is a network protocol used on the internet or local network. It is a bidirectional functionality protocol. It access by command–line interface on remote machine. It is access remote machine or terminal on Internet. It is a TCP protocol. The user's computer, which initiates the connection, is referred to as the local computer.It works on Client/ Server Achitecture, where client will send the request and server will give the response. Telnet sends all messages in clear text and has no specific security mechanisms.

The computer which accept the connection is known as remote computer, which place in next room or outside of the client area or in other country. The network terminal protocol (TELNET) allows a user to log in on any other computer on the network. Telnet establish the session to connect client machine while it is login, once client end session then it will lost the connection from remote machine.

Telnet can be used to connect to virtually any machine that listens on ports. In other words, you can connect to any machine that has certain ports open. Once connected to a machine, you need to issue UNIX based commands to interact with the remote service. Telnet client and server functionality comes built–in in most operating systems. However, there are several third–party applications like putty client that enable remote connectivity. A user can connect to a remote machine through several access modes such as raw access, SSH access, etc. SSH mode offers encryption and security and hence can prevent eavesdropping by hackers. This is by far the most secure way of connecting to a machine.
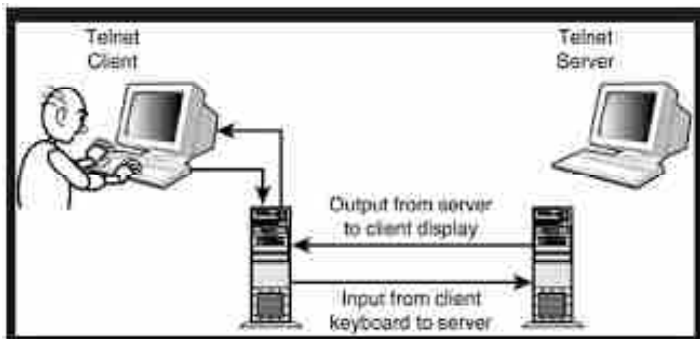
Fig. 2.5 Telnet Protocol

❑   **Check Your Progress – 3 :**

1.   TELNET command base communication protocol.(True/False)

2.   TELNET protocol establish session with server and client machine.(True/False).

2.5   FTP Protocol :

FTP is stands for File Transfer Protocol it is TCP/IP standard protocol which work on Application layer. This protocol is used to transfer file from one host to another host machine. It is mainly used to transfer a webpage file which created on developer machine to another machine which is a server for other users on internet. It is also used to download file from server to client/users machine. FTP is different from the other client/server applications as this protocol establishes two connections between the hosts. File Transfer Protocol makes the use of two protocols; **Port 21** for the **Control connection** and **Port 20** is used for **Data connection.**

Objectives of FTP :

To share a file that is computer programs or other data. It is also used to share a file from remote computer to other host computers. It transfers a file reliably and efficiently. FTP also hides the details of individual computer systems.

FTP Client :

It is basically software that is designed to transfer the files between a computer and a server over the Internet. You need to install this application in your system then you can transfer files using Internet connetion.Some of the commonly used FTP clients are Dreamweaver, FireFTP, Filezilla,cuteFTP etc.
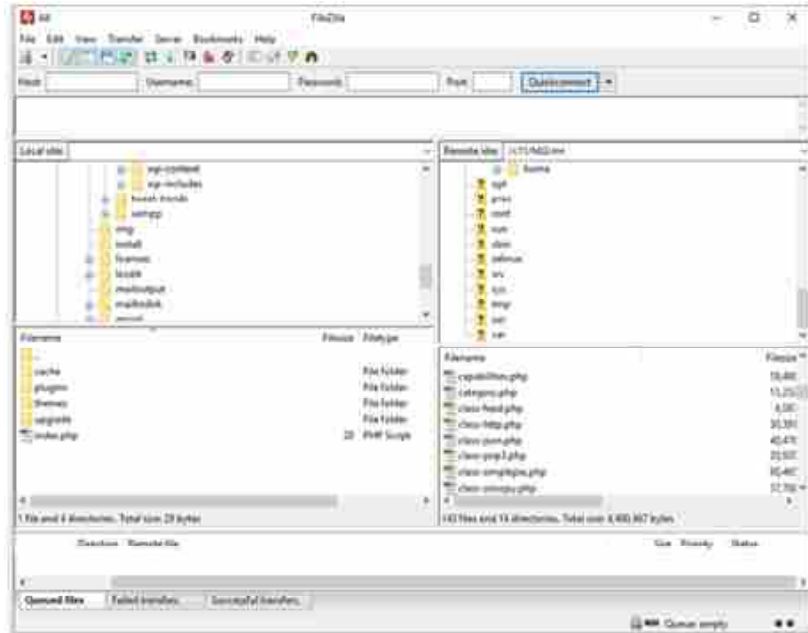
Fig. 2.6 FTP Protocol

In FTP application user has to first login using there authenticate username and password with FTP IP–address or URL. After login user can see two different parts of GUI, left side part is user's local machine view in which local drives and folders will show. On right side part there is FTP server drive in which different folder will show based on your application. User can upload and download files from host to server or server to host by double clicking on that file or simply drag and drop the file, it is work like simple we are copying a file from one drive folder to another drive folder.

❑ **Check Your Progress – 4 :**

1. FTP works on Transport layer. (True/False)

2. FTP work on port number 21. (True/Fasle)

3. A software which work for File Transfer Protocol is known as _____.

    (a) MTA   (b) User Agent   (c) FTP Service (d) FTP Client

2.6 Firewall :

In terms of Computer Technology a firewall is a piece of software. Firewall will manage network traffic. It monitors the traffic arrives on computer. It has inbuilt protocols design which is apply on each packets comes inside network. The protocol will define which packet has to allow enter in computer network or discard before enter. Firewall role is like watchman in your Home or Organization. Usually firewall is placed between a network and Internet or outside the world. Firewall is a specialize version of Router. It perform normal routing function as well as firewall functionality. Fire wall will protect network against unauthorized access. Basic two types of Firewall are designed.

Packet Filters : Data which converted into part of Packet by network layer. Packet has some Meta data which contain some senders and receivers information. Based on reading meta data of packet firewall will decide to allow such packet in network or discarded it.It is also call screening router. In such firewall packets are pass out from some protocols. That protocol will verify the packet is collecting proper data as per rules, if not then it will reject the packet otherwise allow that packet in network.

Application Gateway : This fire wall will inspect the packet on TCP/ IP or OSI Layer's up to the Application layer. It has the ability to block specific content, also recognize when certain application and protocols (like HTTP, FTP) are being misused. In other words, Application layer firewalls are hosts that run proxy servers.
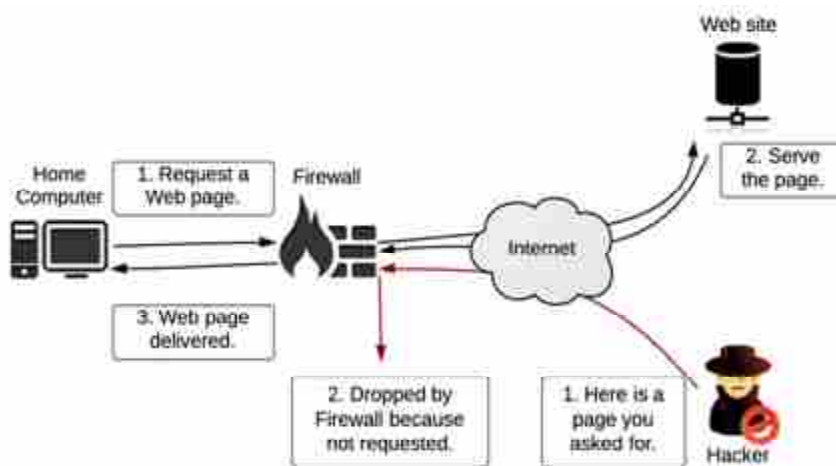
Fig. 2.7 Firewall

❑ **Check Your Progress – 5 :**

1. Firewall will manage Network traffic on LAN network (True/Flse)

2. Firewall is place between LAN network and Internet(True/False)

3. Firewall is design based on _____ and _____

   (a) Packet Filter, Packet transfer   (b) Packet Filter, Application Gateway

   (c) Packet Filter, Routing   (D) None of These

2.7   Let Us Sum Up :

Computer Network means a set of computer devices are connected in common network by medium or link. In computer network each device capable to send and receive data in uniformly. E–mail is short form of Electronic Mail. This system is develop for non–verbal communication. This System is widely used in communication. E–mail is the service which use for sending message or document to the person who live anywhere. This method is helpful to composing, sending and receiving messages over electronic communication system.As we know different protocols are work with email system to communicate some are used for sending a mail and some are for receiving a mail. There is also two different applictions are work to manage email system that is User agent and Message Transfer agent whose role is to manage client mail system at application layer. And transfer mail from one email server to another email server.

In this unit we have also discuss about FTP which is an application layer protocol of TCP/IP which is used to transfer a file from client machine to FTP server and FTP server to client machine.It is client server communication protocol which invoke by using some FTP softwares. For that user has to install that software in computer, after that user will authenticate with server url in which user want to transfer files or upload file from server.

One more protocol which discuss that is TELNET which is also application layer protocol work under TCP port no 23. It is a command base communication protocol in which user will send request by passing a command and server will response on that command. If user want to access TELNET server he/she has to authenticate with server then server will establish one session to communicate with the server and client machine. Also it is work on some specific Operating Systems like UNIX, Windows NT etc.

One more security application we discuss in this unit that is firewall which is hardware, software or both. IT is basically used between internet and LAN network. This application is used to prevent some unauthenticated data in to LAN network.

2.8 Answers for Check your Progress :

❑ **Check Your Progress 1 :**

1. (b)   2. (c)

❑ **Check Your Progress 2 :**

1. (True)   2. (d)   3. (c)

❑ **Check Your Progress 3 :**

1. (True)   2. (True)

❑ **Check Your Progress 4 :**

1. (True)   2. (True)   3. (d)

❑ **Check Your Progress 5 :**

1. (True)   2. (True)   3. (b)

2.9 Glossary :

1. **Firewall :** It is Hardwar and Software which protect unwanted data to enter on LAN network.

2. **IMAP :** Is Advance version of POP 3 protocol, which work to access file from mail server and transfer it on client machine.

3. **MIME :** Is a enhance version of SMTP which allow to transfer non–textual data in E–mail.

4. **POP3 :** An email protocol which retrieve email message from server to client machine.

5. **Simple Mail Transport Protocol :** TCP/IP protocol to transfer Electronic mail in simple text format through internet.

6. **TELNET :** It is Remote login protocol of TCP/IP.

2.10 Assignment :

Explain Email Protocols in detail

2.11   Activates :

Explain Telnet Communication with Diagram

2.12   Case Study :

Draw the Firewall structure and summaries.

2.13   Further Reading :

1.   Computer Networking Essentials, Debra Littlejohn Shinder, Cisco Press, 2001 Digital Networking.

2.   Sams Teach Yourself Network Troubleshooting in 24 Hours, Jonathan Feldman, Sams Publishing, 2002.

Unit 03 | *MARKUP LANGUAGES HTML*

UNIT STRUCTURE

3.0 Learning Objectives :

After learning this unit, you will be able to understand :

- Concept of Markup Languages
- Understand about XHTML Syntax
- Detailed regarding Syntax and Semantics of XHTML

3.1 Introduction :

Markup languages are designed for the processing, definition and presentation of text. The language specifies code for formatting, both the layout and style, within a text file. The code used to specify the formatting is called tags. HTML is an example of a widely known and used markup language. HTML is the language that has originated from SGML and is used for designing web pages. Now what are web pages ? For sure, you all might know what a website is. A website is an electronic media for information. Just as you visit a library to collect information etc., you can go to websites to get information. It is a collection of web pages that make up a website that are designed using language HTML. There are many software prevalent too but all these software have a base as HTML. HTML is the language that runs in the background as you design the websites. Most of the scripting languages have HTML as the base language. You will understand what is linear media and hypermedia, about HTML and basics of document structure.

3.2 Markup Languages – XHTML :

XHTML is EXtensible HyperText Markup Language which is next step in the evolution of internet. With XHTML 1.0, the initial document type was created in XHTML family. It is noted that XHTML is identical to HTML 4.01 but with few differences which is stricter version of HTML 4.01. If you already know HTML, then you need to give little attention to learn this latest version of HTML. XHTML was developed by World Wide Web Consortium (W3C) to help web developers make the transition from HTML to XML. By migrating to XHTML today, web developers can enter the XML world with all of its benefits, while still remaining confident in the backward and future compatibility of the content.

Web developers and web browser designers are constantly discovering new ways to express their ideas through new markup languages. In XML, it is relatively easy to introduce new elements or additional element attributes. The XHTML family is designed to accommodate these extensions through XHTML modules and techniques for developing new XHTML–conforming modules. These modules permit the combination of existing and new features at the time of developing content and designing new user agents.

❑ **Check Your Progress – 1 :**

1. XHTML is identical to :

   a. HTML 4.01   b. HTML 2.01   c. HTML 1   d. None of these

3.3 Introduction to HTML :

HTML is known as HyperText Markup Language, is the main markup language that is used for web pages. A markup language is a set of markup tags and HTML uses markup tags to describe web pages. HTML is a simplified version of Standard Generalised Markup Language (SGML). HTML has evolved today after passing through four stages as follows :

•   Level 0 included only the basic structural elements and assumed that all browsers supported all features of Level 0.

•   Level 1 advanced feature included highlighted text (hypertext) and graphics that were supported depending on the browser capability.

•   Level 2 introduced the WWW as an interactive medium and the features of forms.

•   Level 3 introduced frames, inline, video, sound etc.

   Basic :

   <BASE> can be used to record the document's location in the form of a URL. This URL is used to resolve a relative URL </BASE>

   <ISINDEX> tells the browser that the document is an index document. This is used only if the document is on a server. </ISINDEX>

   <LINK> shows relationship between this document and some other object on the WWW. </LINK>

   <META> gives information such as the page's keywords and description that appears in HTTP headers etc. </META>

   <SCRIPT> contains either JAVA Script or VB Script </SCRIPT>

   <STYLE> contains information used by cascading style sheets </STYLE>

</HEAD>

<BODY> the remaining HTML elements are inside this tag.

</BODY>

</HTML>

HTML is the code behind your webpage so the browser gives the display a webpage, the way the web designer wants it to look. HTML is a series of tags <tags> that tells the browser where to display what in web page. It is a series of simple commands that you give the browser. The tags are in plain English and are easy to learn. For example, if you want show your text in a bold type, you have to use <bold> to be bold text </bold>

HTML documents must be text only

HTML documents are text only, i.e. all must be saved only in the text format.HTML browsers only read text. Look at your keyboard. The letters and numbers and little signs like % and @ and * ? all form the128 Keyboard Characters (read upper–and lowercase letters as two). That is what the browser reads. It simply does not understand anything else.

HTML File is written in Notepad, Wordpad or Simple Text and the document will be saved as text.

❑ **Check Your Progress – 2 :**

1. HTML is short form for :

   a. Higher Text Markup Language b. Hyper Transfer Markup Language

   c. Hyper Text Markup Language d. High Text Marker Language

3.4 History–Versions–Basic XHTML Syntax and Semantics :

XHTML syntax is similar to HTML syntax with every valid HTML elements. On writing XHTML document, you need to concentrate while making HTML document compliant to XHTML. There are several points to remember while writing XHTML document or converting present HTML document into XHTML document :

• Write a DOCTYPE declaration at the start of the XHTML document.

• Write all XHTML tags and attributes in lower case only.

• Close all XHTML tags properly.

• Nest all the tags properly.

• Quote all the attribute values.

• Forbid Attribute minimization.

• Replace the name attribute with the id attribute.

• Deprecate the language attribute of the script tag.

It's important to note that the W3C's examples on the above page are outdated for XHTML since they don't include closing tags in their samples. It's REQUIRED to include closing tags for all list items and other tags for XHTML. It's a good practice anyway, whether using XHTML or HTML.

When you have a list of something, use the list element tags. While there are a few choices of list style types, these can be replaced with images using CSS. It's also possible to hide bullets completely, change indenting; use lists inline or block, and more. For example, this markup :

```
<ul>
<li>Lemons</li>
<li>Limes</li>
<li>Oranges</li>
</ul>
```

❑ **Check Your Progress – 3 :**

1. While writing XHTML document, you have to consider that.

   a. DOCTYPE declaration be done at starting

   b. All tags and attributes should be in lower case

   c. Tags should be closed properly

   d. All of above

3.5 Fundamental HTML Elements :

Basic Document
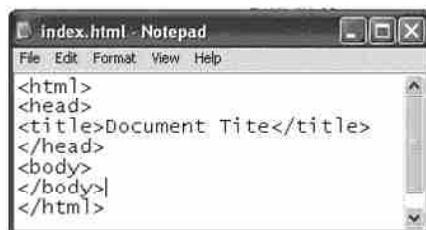
HTML Documents = Web Pages

HTML documents describe web pages

HTML documents contain HTML tags and plain text

HTML documents are also called web pages

A web page is called as a HTML Document. It is a file format which usually uses the extension ".html" or ".htm".

For example, if you use Microsoft Word, you will usually save your files with the extension ".doc", whereas in case of HTML the options are ".html".

HTML documents are actually a simple text, but contain scraps of code which carry very important information about how the page should be displayed

Fig. 3.1 Basic Document in Notepad

Fig. 3.2 Basic Document in the Browser

<HTML>

<HEAD> has sub–elements that define header material :

<TITLE>

Document title :

The title of the document comes in the title bar of the browser when you load the HTML page in the browser. Title has to be short and meaningful that gives a brief description of the current page. </TITLE>

The HTML element identifies a document containing HTML elements. This is the main Tag that makes the HTML web page. HTML tags are used to mark–up HTML elements. All other elements come inside this one big tag called <HTML>.

HTML is made up of tags and attributes, that works together in order to identify documents parts. The structure of HTML is shown below :
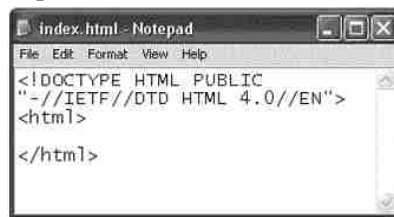
Fig. 3.3 Basic Document with HTML tag in Notepad

Introduction to HTML, Overview of HTML :
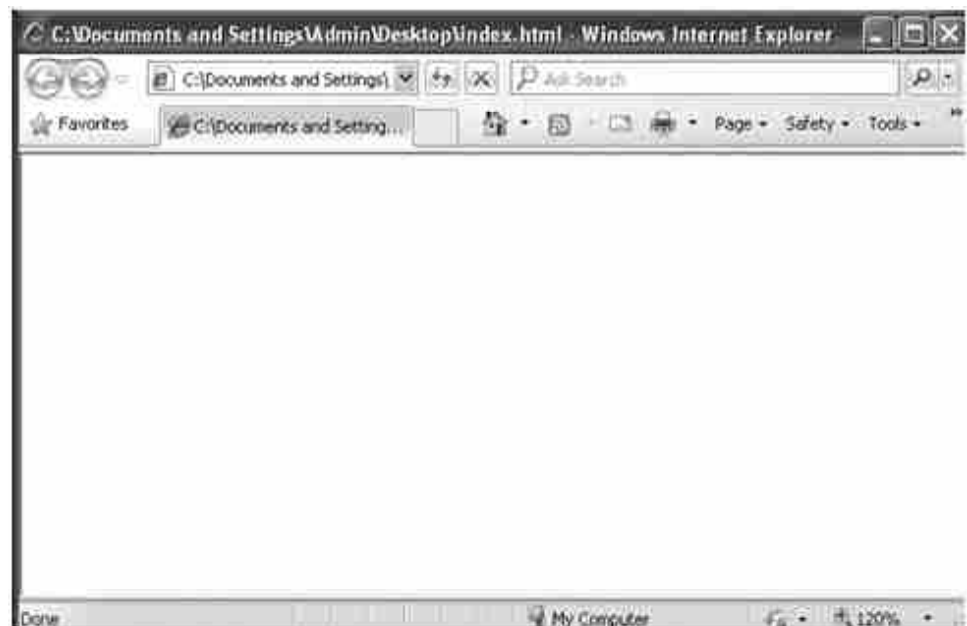
Fig. 3.4 Basic Document with HTML tag in the Browser

HTML files have to be saved by a known file name as it can be by .html or .htm extensions. The file names have to be in the lower case in case if the operating system on which you are uploading your file runs such as Unix or Linux. HTML is not case sensitive as you can write your code in upper case, lower case or a combination of both in notepad. HTML pages are divided into two parts :

☐ HEAD section

☐ BODY sections
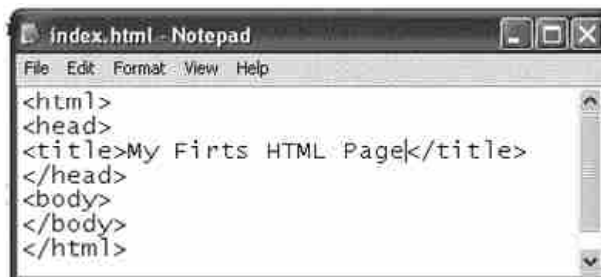
HEAD :

The Head tag carries data that the browser has to read for a web page. This tag is written in the HTML tag and carries information that is used by the browser and not necessarily for the document. HTML tag is also called as a container tag as it carries other elements such as title, base, meta, link etc.

TITLE :

Title tag carries the title that you want displayed in the browser title bar. This is part of the head tag. The title should be short and simple. It normally carries the name of the company or the title for the home page. This is a container tag.

Example :

Fig. 3.5 Basic Document with Title Tag in Notepad

Fig. 3.6 Basic Document with Title Tag in the Browser

❑ **Check Your Progress – 4 :**

1. In HTML the title is located in :

   a. tool bar   b. title bar   c. address bar   d. task bar

2. _____ is used to record the document's location in the form of a URL.

   a. </TITLE>   b. <BASE>   c. <ISINDEX>   d. <LINK>

3.6 Relative URLs–Lists–Tables–Frames–Forms :

List :

The HTML list elements DL, UL, and OL should only be used to create lists, not for formatting effects such as indentation. Refer to information on CSS and tables for layout in the CSS Techniques [WCAG10–CSS–TECHNIQUES].

Ordered lists help non–visual users navigate. Non–visual users may "get lost" in lists, especially in nested lists and those that do not indicate the specific nest level for each list item. Until user agents provide a means to identify list context clearly (e.g., by supporting the ':before' pseudo–element in CSS2), content developers should include contextual clues in their lists.

For numbered lists, compound numbers are more informative than simple numbers. Thus, a list numbered "1, 1.1, 1.2, 1.2.1, 1.3, 2, 2.1," provides more context than the same list without compound numbers, which might be formatted as follows :

1.

    1.1

2.

    2.1

    2.2

And would be spoken as "1, 1, 2, 1, 2, 3, 2, 1", conveying no information about list depth. To change the "bullet" style of unordered list items created with the LI element, use style sheets. In CSS, it is possible to specify a fallback bullet style (e.g., 'disc') if a bullet image cannot be loaded.

Example :

```
<HEAD>
<TITLE>Using style sheets to change bullets</TITLE>
<STYLE type="text/css">
UL { list–style: url(star.gif) disc }
</STYLE>
</HEAD>
<BODY>
<UL>
<LI>Rohit
<LI>Ajit
<LI>Amit
</UL>
```

To further ensure that users understand differences between list items indicated visually, content developers should provide a text label before or after the list item phrase :

Example :

In this example, new information is communicated through text ("New"), font style (bold), and color (yellow bullet, red text on yellow background).

```
<HEAD>
<TITLE>Bullet styles example</TITLE>
<STYLE type="text/css">
.newtxt { font–weight: bold; color: red;
background–color: yellow }
.newbullet { list–style : url(yellow.gif) disc }
</STYLE>
</HEAD>
<BODY>
<UL>
<LI class="newbullet">Roth IRA <SPAN class="newtext">New</SPAN>
                                                    </LI>
<LI> 401(k)</LI>
</UL>
</BODY>
```

Tables :

The table element takes part in the table model. Tables have rows, columns, and cells given by their descendants. The rows and columns form a grid; a table's cells must completely cover that grid without overlap.

Tables must not be used as layout aids. Historically, some Web authors have misused tables in HTML as a way to control their page layout. This usage is non–conforming, because tools attempting to extract tabular data from such documents would obtain very confusing results. In particular, users of accessibility tools like screen readers are likely to find it very difficult to navigate pages with tables used for layout.

Tables can be complicated to understand and navigate. To help users with this, user agents should clearly delineate cells in a table from each other, unless the user agent has classified the table as a (non–conforming) layout table.

Feature Indication :

role attribute with value presentation Probably a layout table

non–conforming border attribute with value 0 Probably a layout table

non–conforming cellspacing and cellpadding

attributes with value 0 Probably a layout table

caption, thead, or th elements Probably a non–layout table

headers and scope attributes Probably a non–layout table

non–conforming border attribute with value

other than 0 Probably a non–layout table

Explicit visible borders set using CSS Probably a non–layout table

If a table element has a (non–conforming) summary attribute, and the user agent has not classified the table as a layout table, the user agent may report the contents of that attribute to the user.

Returns the

table . caption [= value]

Returns the table's caption element.

Can be set, to replace the caption element.

caption = table . createCaption()

Ensures the table has a caption element, and returns it.

table . deleteCaption()

Ensures the table does not have a caption element.

table . tHead [= value]

Returns the table's thead element.

Can be set, to replace the thead element. If the new value is not a thead element, throws a "HierarchyRequestError" DOMException.

thead = table . createTHead()

Ensures the table has a thead element, and returns it.

table . deleteTHead()

Ensures the table does not have a thead element.

table . tFoot [= value]

Returns the table's tfoot element.

Can be set, to replace the tfoot element. If the new value is not a tfoot element, throws a "HierarchyRequestError" DOMException.

tfoot = table . createTFoot()

Ensures the table has a tfoot element, and returns it.

table . deleteTFoot()

Ensures the table does not have a tfoot element.

table . tBodies

Returns an HTMLCollection of the tbody elements of the table.

tbody = table . createTBody()

Creates a tbody element, inserts it into the table, and returns it.

table . rows

Returns an HTMLCollection of the tr elements of the table.

tr = table . insertRow([index])

Creates a tr element, along with a tbody if required, inserts them into the table at the position given by the argument, and returns the tr.

The position is relative to the rows in the table. The index ?1, which is the default if the argument is omitted, is equivalent to inserting at the end of the table.

If the given position is less than ?1 or greater than the number of rows, throws an "IndexSizeError" DOMException.

table . deleteRow(index)

Removes the tr element with the given position in the table.

The position is relative to the rows in the table. The index ?1 is equivalent to deleting the last row of the table.

If the given position is less than –1 or greater than the index of the last row, or if there are no rows, throws an "IndexSizeError" DOMException.

❑ **Check Your Progress – 5 :**

1. Which among the following feature highlights the qualities of non–layout table ?

   a. role attribute with value presentation

   b. non–conforming border attribute with value()

   c. non–conforming cellspacing attributes with value ()

   d. caption

3.7 XML Creating HTML Documents :

Once you have an XML document, you can convert it into a readable file format which can be displayed on Web page. For this you need to use XSLT stylesheet to transform XML into another format using XslTransform class. You need to load stylesheet for generating HTML output and then do transformation using XSLT PersonnelHTML.xsl stylesheet. Further, transform data to comma–delimited format using PersonnelCSV.xsl stylesheet as shown in example below :

```
public static void TransformXML( )
{
// Create a resolver with defualt credentials.
XmlUrlResolver resolver = new XmlUrlResolver( );
resolver.Credentials = System.Net.CredentialCache.DefaultCredentials;
// transform the personnel.xml file to HTML
XslTransform transform = new XslTransform( );
// load up the stylesheet
transform.Load@"..\PersonnelHTML.xsl",resolver);
// perform the transformation
transform.Transform@"..\Personnel.xml",@"..\Personnel.html",resolver);
// transform the personnel.xml file to comma delimited format
// load up the stylesheet
tranform.Load@"..\PersonnelCSV.xsl".resolver);
// perform the transformation
transform.Transform(@"..\Personnel.xml", @"..\Personnel.csv",resolver);
}
```

The Personnel.xml file contains the following items :

```
<?xml version="1.0" encoding="utf–8"?>
<Personnel>
<Employee name="Ajit" title="Engineer" companyYears="15"/>
<Employee name="Rohit" title="Project Manager" companyYears="13"/>
```

```
<Employee name="Sonu" title="Computer operator companyYears="14"/>
<Employee name="Amit" title="Marketing" companyYears="10"/>
<Personnel>
```

The PersonnelHTML.xsl stylesheet looks like this :

```
<?xml version="1.0" encoding="UTF-8"?>
<xsl:stylesheet version="1.0"
    xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
        xmlns:xs="http://www.w3.org/2001/XMLSchema">
<xsl:template match="/">
<html>
<head />
<body title="Personnel">
<xsl:for–each select="Personnel">
<p>
<xsl:for–each select="Employee">
<xsl:if test="position( )=1">
<table border="1">
<thead>
<tr>
<td>Employee Name</td>
<td>Employee Title</td>
<td>Years with Company</td>
</tr>
</thead>
<tbody>
<xsl:for–each select="../Employee">
<tr>
<td>
<xsl:for–each select="@name">
<xsl:value–of select="." />
</xsl :for–each>
</td>
<td>
<xsl:for–each select="@title">
<xsl:value–of select="." />
</xsl:for–each>
</td>
<td>
<xsl:for–each select="@companyYears">
```

```
<xsl:value–of select="." />
</xsl:for–each>
</td>
</tr>
</xsl:for–each>
</tbody>
</table>
</xsl:if>
</xsl:for–each>
</p>
</xsl :for–each>
</body>
</html>
</xsl:template>
</xsl:stylesheet>
```

Here is the HTML source :

```
<html xmlns:xs="http://www.w3.org/2002/XMLSchema">
<head>
<META http–equiv="Content–Type" content="text/html; charset=utf–8">
</head>
<body title="Personnel">
<p>
<table border="1">
<thead>
<tr>
<td>Employee Name</td>
<td>Employee Title</td>
<td>Years with Company</td>
</tr>
</thead>
<tbody>
<tr>
<td>Ajit</td>
<td>Engineer</td>
<td>15</td>
</tr>
<tr>
<td>Rohit</td>
<td>Project Manager</td>
```

```
<td>13</td>
</tr>
<tr>
<td>Sonu</td>
<td>Computer operator</td>
<td>14</td>
</tr>
<tr>
<td>Amit</td>
<td>Marketing</td>
<td>10</td>
</tr>
</tbody>
</table>
</p>
</body>
</html>
```

The comma–delimited output is generated using PersonnelCSV.xsl and Personnel.xml; the stylesheet is shown here :

```
<?xml version="1.0" encoding="UTF–8"?>
<xsl:stylesheet version="1.0"
xmlns:xsl="http://www.w3.org/1999/XSL/Transform" xmlns:
xs="http://www.w3.org/2002/XMLSchema">
<xsl:output method="text" encoding="UTF–8"/>
<xsl:template match="/">
<xsl:for–each select="Personnel">
<xsl:for–each select="Employee">
<xsl:for–each select="@name">
<xsl:value–of select="." />
</xsl:for–each>,<xsl :for–each select="@title">
<xsl:value–of select="." />
</xsl:for–each>,<xsl :for–each select="@companyYears">
<xsl:value–of select="." />
</xsl:for–each>
<xsl:text> &#xd;&#xa;</xsl:text>
</xsl:for–each>
</xsl:for–each>
</xsl:template>
</xsl:stylesheet>
```

The output from the PersonnelCSV.xsl stylesheet is shown here :

Ajit, Engineer, 15

Rohit, Project Manager, 13

Sonu, Computer operator, 14

Amit, Marketing, 10

❑ **Check Your Progress – 6 :**

1. XML is similar as

    a. CGI   b. HTML   c. ASP   d. None of Above

3.8 Let Us Sum Up :

While studying this unit, we have learnt that

1. **HYPERTEXT :** It is a mixture of text, graphics, hyperlinks and multimedia.

2. **HYPERLINK :** Is a clicking platform that on clicking will reach to new web page.

3. **Web Browsers :** Applications that allow one to view HTML documents from a computer.

4. **Tags :** Are commands that give HTML documents their functionality.

5. **Containers :** Area enclosed by <start> and </stop> tags where the commands take effect.

6. **<html>...</html> :** Standard opening and closing tags for any HTML page.

7. **<thead>...</thead> :** Shows header part of table.

8. **<input> :** To add various user input fields as text–boxes, checkboxes, radio buttons, submit and reset buttons.

3.9 Answers for Check Your Progress :

❑ **Check Your Progress 1 :**

    1. (a)

❑ **Check Your Progress 2 :**

    1. (c)

❑ **Check Your Progress 3 :**

    1. (d)

❑ **Check Your Progress 4 :**

    1. (b)   2. (b)

❑ **Check Your Progress 5 :**

    1. (d)

❑ **Check Your Progress 6 :**

    1. (b)

3.10 Glossary :

1. **HTML** – A type of text code in Hypertext Markup Language which, when embedded in a document, allows that document to be read and distributed across the Internet

3.11 Assignment :

Write short note on Markup Languages.

3.12 Activities :

Collect some information on Lists–tables–Frames of XHTML.

3.13 Case Study :

Generalised the basic HTML architecture and discuss.

3.14 Further Readings :

1. Creating Cool HTML 4 Web Pages by Dave Taylor
2. HTML for the World Wide Web by Elizabeth Castro
3. Learning Web Design by Ed. 2, Jennifer Niederst

Unit 04

HTML 5

UNIT STRUCTURE

4.0   Learning Objectives :

After learning this unit, you will be able to understand :

- Concept of HTML5

- Understand about XHTML5 Structure

- New Markup Elements in HTML5

- Media Elements in HTML5

- New form Elements in HTML5

4.1   Introduction :

HTML–5 is newer versions of HTML language it is also introduce with version 5. It offers new features which provide enhance support to develop web application. It has introduce new features of media tag as well as form tags which provide user–friendly interaction. HTML5 is a series of new elements, updates to existing elements and new JavaScript APIs available through contemporary web browsers. It is still in a progress no browser will support hundred percent of it'stag, It add new tools for web developer.

4.2   New Structure of HTML5 :

We all know that HTML is used to design a Webpage. But you may or may not know the web page is design with specific parts and that parts

are design using html tag. Basically web page has header, navigation, body (content), sidebar and footer parts. There are new tag which are introduce to design a basic structure of webpage in HTML5. Following Tags are used.

<Section>: this tag is used to represent different sections in web page.

<Header>: Represent the Header of the page.

<nav>: Defines navigation links.it navigate the site.

<Footer>: This tag is used to show footer information in page like author name, copyright information.

<Article>: Define the primary content of a document, such as a blog entry, article and information of relevant page.

<Aside>: Define the Relevant and Extra content of website. It is display as sidebar. Such as hyperlinks of page, image scrolling, news scrolling etc.

❑   **Check Your Progress – 1 :**

1.   _____ tahg is used to set navigation link of website.

    (a) Header   (b) Section   (c) Footer   (d) nav

2.   _____ tag is used to set copyright and trademark information in website.

    (a) Nav   (b) Aside   (c) Footer   (d) None of these

4.3   Markup Elements in HTML 5 :

Article : Article tag is used to add content in webpage. Use the ARTICLE element when the content is an independent part of the site that can stand alone. Content of page can be blog, user submitted comment or forum post.

Section : This tag is used to group the relative content. It's advisable to use a heading element (<h1> – <h6>) to define the topic for the section. You could use <section> elements that represent each of the individual parts within the post.

Aside : This tag is used to represent content that may be related to Article. This is an inside or outside part of Article tag. When used inside the content of the aside element must be relevant to the article content. You can also use Aside to show relative links with your webpage. This type of content is often represented in sidebars.

Details : This tag is used to show additional information in webpage .User can view this information on demand means it shows information in hide and show format. By default this will hide the information you will look a triangle symbol on left side of title clicking on that triangle or title it will show you information. It is beneficial to use while the content of website is large no of text under different titles. It is compulsory to start and end with <details></details> tag. This tag is group tag you can use heading, summary, paragraph, div etc. tags inside details tag which are used for text content. It has only one attribute and it is open. If you wants to show information without click on title or arrow you have to set open attribute in details tag.

For Example :

<details open>

   <p> this is a details tag used to show information </p>

</details>

Summary : This tag is used to give a title inside details tag. It is also used for summary, caption and legend for details tag. It is most probably used in side details tag. This tag is indicate user to click here for open a hide information inside detail tag. This tag will only show on browser while used with details rest of tags are hide. If this tag is not used as a first child of details tag then it will appear "Details" word as a title.

For Example :

<details>

    <summary>Summary tag</summary>

    <p>this is the details tag which use summary tag for caption</p>

</details>

Figure : this tag is used to add images, graph and diagram in your page. It is a container tag. In this tag you have to use image tag to set images. You can also set more than one images in one figure tag.

value	Specifies the "measured" value. For defining better range it will consider optimum value, according to that it will change meter bar colour. The value is lower than low value at that time it will indicate the meter bar with red colour. If the value is between the low and high value at that time it will indicate the meter bar with yellow colour. If the value is higher than high value but not higher than max value it will indicate meter bar with green colour.
min	Specifies the lower bound of the range. Default is 0.
low	Specifies the range that is considered to be a "low" value.
high	Specifies the range that is considered to be a "high" value.
max	Specifies the upper bound of the range. Default is 1.
optimum	Specifies the value that is considered to be the "optimum", or best, value. If this value is higher than the "high" value then it indicates that the higher the value, the better. If it's lower than the "low" mark then it indicates that lower values are better. If it is in between then it indicates that neither high nor low values are good.

Figure Caption : this tag is used to give caption of image. <figcaption> is used for image caption. It is monetary to close this tag.

For Example :

<figure>

    <img src="img1.jpg" width="60%" height="60%">

    <figcaption><i>img 1.1</i> Book image</figcaption>

</figure>

Footer : Footer tag represents a footer of a section or document. Usually, copyright information, address of the author, links related to the document including social links related to the document are placed within the footer tag.

Header : This tag is used to set header of webpage. It is used top of the web page. It is a container tag in which you can add different html elements.

You can use h1–h6 head tag hgroup, image tag for setting logo of compny,anchor <a> tag for set navigation Manu in header tag. header element belongs to Flow Content.

Hgroup : This tag is used to set h1 to h6 heading tag in group. When there are more than one heading in you page like main heading then subheading at that time you can use this tag.

Mark : This tag is used for indicating a text highlighted or marked for reference purpose. It will use in between paragraph,div etc. tag which used for large amount of text content. This tag is used like text formatting tag bold, italic, small and underline. It is compulsory to start and end this tag. In between starting and ending of this tag the content will highlighted by yellow color this is indicating that you have make this as a reference.

For Example :

<p>This is the <mark> new Element in HTML–5</mark> is used for <mark>marking purpose</mark></p>

Meter : This tag is used to show graphical vertical bars which is indicate fraction value of measurement. This element is used to represent a range or scalar value. It is not used for single value.

Attributes :

For Example :

<label for="Mobile Sale">Mobile Sale :</label>

<meter min="0" max="100" low="33" high="66" optimum="80 value="50"></meter>

<label for="Mobile Sale">Laptop Sale :</label>

<meter min="0" max="100" low="33" high="46" optimum="70" value="22"></meter>

nav : This Element generally contain website navigation links. In this tag we use anchor tag for giving a link of our website or other pages relevant to our webpage.

For Example :

<nav>

   Home

   Gallary

   Our Product

Contactus

</nav>

Progress :

This tag is used to show you graphical vertical bars which is indicate some measurements.

While we wants some results like progress card, task completion etc. we used this tag. It is similar like meter but it is indicating rage in between min and max value only. You have to mention value between min and max value.

Attributes :

Max : it is used to show maximum value of measurements.

Min : It is used to show minimum value of Measurement by default min value is 0.

Value : It is show current completion value between Minimum to Maximum.

For Example :

```
<!DOCTYPE>
<html>
<body>
<h3>Salse Report of 2017–18</h3>
January <progress value="43" max="100"></progress><br>
February <progress value="33" max="100"></progress><br>
March <progress value="49" max="100"></progress><br>
April <progress value="23" max="100"></progress><br>
May <progress value="57" max="100"></progress><br>
June <progress value="69" max="100"></progress><br>
July <progress value="36" max="100"></progress><br>
Auguest<progress value="23" max="100"></progress><br>
September <progress value="55" max="100"></progress><br>
October <progress value="70" max="100"></progress><br>
November<progress value="32" max="100"></progress><br>
December <progress value="50" max="100"></progress><br>
</body>
</html>
```

Time : This tag is used for declaring the user define date and/or time within an HTML document. You can set time in hh :mm in 24hours format and date in yyyy–mm–dd format.

For Example :

```
<p>On Saturdays, we open at <time>09 :00</time> am.</p>
<p>India was independent on<time>1947–08–15</time>.</p>
```

HTML form elements are used for displaying and presenting a webpage help in creating interactive web applications. With the help of form element you can create client – server communication web page. HTML Forms are required to collect different kinds of user inputs, such as contact details like name, email address, phone numbers, or details like credit card information, etc. Some of the forms elements are also used to make controls in detail.

Here I have list down form elements.

Form Element	Description
Input	This element is used to take input from user.
Text Area	This element is used to take multi–line input from user.
Select	This element is used to select one or more item using dropdown list option.
datalist	This element is creating list of option to input data from user.
Output	This element is used to show output of calculations.
Button	This element is used to define button on page.
keygen	This element is generate security key for authenticate user.it generate two keys private and public.
Label	Define label for an input element.
Fieldset	This tag is used to group related elements in a form.
Legend	It define the caption for fieldset element.
Outgroup	This element used to group related options in a drop–down list.

The new Input type attribute :

This element is used to get detail from user in webpage and send the detail to the database server.in old html there are some limited types are used like text, password, check box, radio button, submit, reset etc. but in html 5 some more new types are define so user can easily understand the form field value and the purpose of that value.

List of Different input types available in HTML 5.

Input Type	Description
Text	To get data in text format. You can write alphabets, numbers and special characters.
Password	This type is used to define password it will convert your text in to asterisks or circles.
Submit	Define the button for submitting form.
Reset	Define the button for reset the form value.
Radio	This field is used for options in form. Only one option can select at a time
Checkbox	This field is used for options in form. One or more option can select at a time.
Number	Defines a numeric input field.
Color	Defines color picker to select color.
Range	This field is also used for numeric input it is look like a slider. It has min and max range up to that course is drag and number selected.

Data	It used to select date. Date picker will pop up to select date.
Datetime	Defines the date and time.
Datetime–local	Specifies a date and time input field, with no time zone.
Month	Specifies a hole month and year in input field. Month picker will pop up to select month.
Week	Allows the user to select a week and year.
Tel	Define the telephone number as a value.
Search	Define search field as an input value.
Url	This input type allows collection of an absolute URL.
Email	Defines email id as a value.

❑ **Check Your Progress – 2 :**

1. ――――――― tag is used to show range and scale value.

   (a) Header   (b) Metere   (c) Mark   (d) Nav

2. ――――――― tag is used to group related elements in a form.

   (a) Legend   (b) Fieldset   (c) Head   (d) Datelist

4.4   HTML 5 New Media Elements :

Now a day HTML5 is very popular for its new tags it has also added media tags for adding audio, video and flash file.It define individual tags for audio format, video format and flash format. Before these tags in HTML 4 only embedded tag is used to add audio, video and flash file in webpage. Following tags are used with its attributes.

4.4.1 Audio Tags

This tag is used to add audio file in your web page. This tag defines music or any other audio streams formats. Currently it supports three format MP3, ogg, AAC and wav.

Attributes of Audio tag :

Controls : It will show the control panel of audio tag. Through this panel you can controlling the audio track via simple button like play, pause, stop and volume button.

Autoplay : Auto play will start your audio file automatic while your page is load on browser.

Loop : if you want to repeat same audio then you set loop attribute.

Muted : it will make zero volume or no volume of your audio file.

Src : Source path of Audio file it may not support to your browser. You need source tag for it.

4.4.2 Source Tag :

This tag is used to add source or path of the audio video and image file. This tag is support <audio>,<video> and <picture> tag. This tag is useful for adding multiple audio and video files in one common tag.

Attributes of Source Tag :

Src : is used to set path/url of any media file.

Type : Define the MIM– type of the resource.

For Example :

```
<!DOCTYPE html>
<html>
    <head>
        <title>
        Audio tag Demo
        </title>
    </head>
    <body>
        <h2> Example of Audio Tag</h2>
            <audio controls autoplay loop>
            <source src="Ik Vaari Aa .mp3">
        </audio>
    </body>
</html>
```

4.4.3 Video Tag :

This tag is used to add video file in your page. This tag defines video streams formats. It has same attribute like audio tag. There are only three attributes different then audio tag.

Height : for set height of the video Player.

Width : for set width of the video player.

Poster : Specifies an image to be shown while the video is downloading, or until the user hits the play button

Controls : It will show the control panel of audio tag. Through this panel you can control the audio track via simple button like play, pause, stop and volume button.

Autoplay : Auto play will start your video file automatic while your page is load on browser.

Loop : if you want to repeat same video then you set loop attribute.

Muted : it will make zero volume or no volume of your audio file.

Src : Source path of Video file if it not support to your browser then you need source tag for path of video file.

For Example :

```
<!DOCTYPE html>
<html>
    <head>
        <title>
        Video tag Demo
        </title>
    </head>
    <body>
        <h2> Example of Video Tag</h2>
        <video controls width="20% height="40%" poster="poster.jpg">
<source src="johny.mp4" type="video/mp4">
</video>
</body>
</html>
```

4.4.4 Embed Tag :

There is another technic for adding video and audio file in your web page. In side Embed tag src attribute is used to add video and audio in you page. Source tag is not used in embed tag. Also it will auto start your audio or video.

Src : is used to set path/Url of any media file.

Type : Define the MIM– type of the resource.

Height : for set height of the Player.

Width : for set width of the player.

For Example :

```
<! DOCTYPE html>
<html>
    <head>
        <title>
        Embed Tag Demo
        </title>
    </head>
    <body>
        <h2> Example of Embed Tag</h2>

        <embed src="Ik Vaari Aa .mp3" width="20%" height="20%">
<br>
        <embed src="Johny.mp4" width="30%" height="40%">
    </body>
</html>
```

❑ **Check Your Progress – 3 :**

1. in media tag _____ control is start audio and video automatic.

   (a) Play   (b) autoplay   (c) pause   (d) loop

2. _____ attribute in video tag is used to show image of video before playing of video.

   (a) Image   (b) Autoplay   (c) poster   (d) Height

3. Loop attribute in media tag is used to play audio and video continually. (True/False)

4.5 Form Element Controls :

In HTML5 new controls are introduce in input tag there are different form controls are used for getting value for their special purpose. Like date control is design for getting date, range control used for numeric value etc. to improve the user experience and to make the forms more interactive.

Date :

This control used to select date in form. When user want to add its birthdate that time this control is very useful to select date. When set date type it will open date picker to pick a date. We can use max and min attributes in date control to give a range to user for select date. We can also set required attribute to make it compulsory field means you must have to select date cannot leave empty.

Syntax: <input type="date" name="birthdate" max="2021–12–31" min="1900–01–01" required>

Month :

This control is used to enter month and year. While you click on arrow of control it will open a date picker which will show you months. It will allow you to select month and year,selected month is display in value part of control. For selecting month first you have to select year then select month of that year.

Syntax:<input type="month" name="joinmonth">

Week :

This control allows user to select week and year .While you click on right side arrow of you control data picker will open you have to select week from the date picker. Start week day is Monday to Sunday. Total 52 week in year according to that if you select June month and selecting week form June month it will return the week value and year.

Syntax: <input type="week" name="week">

Input Type Datetime–local :

The date time–local input type allows the user to select local date and time, including the year, month, and day as well as the time in hours and minutes.

Syntax: <input type="datetime–local" id="mydatetime">

Input Type Email :

The email input type allows the user to enter e–mail address. It is very similar to a standard text input type, but if it is used with the required attribute,it

is also used with pattern attribute which will match the require pattern with email address which user has entered.

Syntax: <input type="email" pattern="[a–zA–Z0–9_]+@[a–z]+\.[a–z]{2,4}" required>

Input Type Time :

The time input type can be used for entering a time (hours and minutes).Browser may use 12– or 24–hour format for inputting times, based on local system's time setting.

Syntax: <input type="time" name="present">

Input Type Number :

The number input type can be used for entering a numerical value. You can also restrict the user to enter only acceptable values using the additional attributes min, max, and step. Min attribute will set minimum input value ,Max attribute will set maximum input value, between min and max user can select value. Step attribute is used to jump value from min to max.

Input Type Range :

The range input type can be used for entering a numerical value within a specified range. It works very similar to number input, it offer drag and drop control to select value.it has also max, mint and step attributes.

Syntax: <input type="number" min="1" max="10" step="1">

<input type="number" min="1" max="10" step="1">

Search :

This control is look like simple textbox It is single line text field for enter search string. It is react same like textbox. While you enter value inside search box you will show cross (X) sign at right side. While you click on cross (X) sign it will clear search box.

Syntax: <input type="search" name="search">

URL :

This control is same as email. It is working like normal textbox type. Multiple attribute is allow to enter more than one attribute inside url. Pattern attribute is used to set constrain at the time of inserting data in url it check valid data are inserted or not. You can also add maxlength to restrict insert url.

Syntax: <input type="url" name="weblink" pattern=" https?://.+" required>

Tel :

Input type tel is used to get the input of phone number or mobile number. This control is look like a simple text box. . You can also restrict the user to enter only number values using the additional attributes like pattern and required.

Syntax: <input type="tel" id="phonenumber" placeholder="[0–9]{3}–[0–9]{4}–[0–9]{5}" required>

❑ **Check Your Progress – 4 :**

1. _____ form element is used to get value of mobile no and telephone

(a) search   (b) url   (c) tel   (d) email

2. The _____ input type can be used for entering a numerical value.

   (a) search   (b) email   (c) textarea   (d) range

3. _____ attribute is use to verify email address in email element.

   (a) Placeholder   (b) Pattern   (c) type   (d) readonly

4.6   Let Us Sum Up :

In this topic we cover a new HTML 5 components. Which is very different then old html4 and other versions. In older version there is not specific control is design for getting record from users, there is not define any structure to design a webpage. In new version of HTML 5 all this thing is define properly so that user and developer can communicate on application user–friendly. In this topic we define HTML web template designing structure which is a standard structure to design any web application. It is mention appropriate parts of web page design to handle some specific content, like header, footer, aside, navigation, article and section.

In HTML 5 there are some special purposes elements are design which are showing a result in graphical format. This is very helpful for analysis, comparison and measurement reading. Those components are meter, progress, output, mark etc.

There are also audio and video elements are also defined in HTML 5 which is very unique feature for user to identify the format of file. For audio files or mp3 format there is a unique audio tag is define ,same for video or mp4 format video tag is define and some other format like flash file embedded tag is define.

In this topic there are some special purpose HTML form element controls are also define. Conotrols are define by there special use like for getting value in date there is date control , for getting value of mobile no tele control, for getting value of mail email contrl etc. are define. Each control can also validate by itself by applying some attributes. User can easily identify by watching the structure of element that which kind of input i have to enter.

4.7   Answers for Check your Progress :

❑ **Check Your Progress 1 :**

   1. (d)   2. (c)

❑ **Check Your Progress 2 :**

   1. (b)   2. (b)

❑ **Check Your Progress 3 :**

   1. (b)   2. (c)   3. (True)

❑ **Check Your Progress 4 :**

   1. (c)   2. (d)   3. (b)

4.8   Glossary :

1. **Article :** It is an element used to show content of webpage in different section.

2. **Attributes :** It is a property associated with HTML tag, to give special effects to tag.

3. **Footer :** The content to display at bottom of webpage

4. **Header :** The content to display at top of the webpage.

5. **Element :** It is a HTML tag which used to display content in between opening and closing of any tag.

4.9 Assignment :

Explain Meter, Mark, progress in detail

4.10 Activates :

Explain HTML 5 new structure with Diagram

4.11 Case Study :

Explain Form tag with All Input Elements.

4.12 Further Reading :

1. HTML5 and CSS3 All–in–One For Dummies by Andy Harris

2. HTML 5 & CSS 3 For Practitioners by Dr. S. Venu gopal

3. HTML 5 Black book publisher Dreamtech Press; Second edition

BLOCK SUMMARY :

In this block you will be given with an idea about basic of World Wide Web. The user will know about HTTP request message/response message. The block necessary explains about History–Versions–Basic XHTML Syntax and Semantics. The concept of URL was well explained in details.

In this block you get the idea of Email protocols.in which we learn what is email system it is a process of sending a message from one mail server to another server. There are different mail protocols are used in mail system Email system is work with Message Transfer Agent and User Agent. Some protocol helps Message Transfer Agent to transfer mail and some Protocols are helps User Agent to receive a mail and Format a mail.

HTML–5 is newer versions of HTML language it is also introduce with version 5. .It offers new features which provide enhance support to develop web application. It has introduce new features of media tag as well as form tags which provide user–friendly interaction.

The block detailed about Web Clients/Web Servers and Internet Protocols. The use and advantages of HTML Elements is detailed with simple explanation. While studying this block, you will be made to understand about Features of XHTML Syntax.

BLOCK ASSIGNMENT :

❖   **Short Questions :**

1.   What is World Wide Web ?

2.   Explain the function of Internet Protocols ?

3.   Write note on URLs–Lists ?

4.   Write short note on Contiguous Allocation ?

5.   Explain Media tag.

❖   **Long Questions :**

1.   Write short notes on Web Clients/Web Servers ?

2.   Write short note on Markup Languages ?

3.   Write note on HTML Elements ?

4.   Explain Firewall in detail.

❖ **Enrolment No. :** [   ]

1. How many hours did you need for studying the units ?

Unit No.	1	2	3	4
No. of Hrs.				

2. Please give your reactions to the following items based on your reading of the block :

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	☐	☐	☐	☐	_____
Language and Style	☐	☐	☐	☐	_____
Illustration used (Diagram, tables etc)	☐	☐	☐	☐	_____
Conceptual Clarity	☐	☐	☐	☐	_____
Check your progress Quest	☐	☐	☐	☐	_____
Feed back to CYP Question	☐	☐	☐	☐	_____

3. Any other Comments

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Dr. Babasaheb Ambedkar   **BCAR-401**
Open University Ahmedabad

WEB TECHNOLOGY USING FOSS (LAMP/WAMP)

BLOCK 2 : INTRODUCTION TO FOSS

UNIT 5   NEED OF OPEN SOURCES

UNIT 6   FOSS SOFTWARE LICENSE

UNIT 7   LINUX AS FUNDAMENTAL OPERATING SYSTEM

INTRODUCTION TO FOSS

Block Introduction :

Open source is important in IT innovation, operational effectiveness and business value creation as it focus on cost control factor for selecting open source, which serves as potential for organizations that gives benefit from improved software quality, reliability, security and feature which led many decision makers to seriously commit to use open source in enterprises. The applications of FOSS can be valuable to operations of an organization for reasons other than specifically generating revenue.

In this block, we will detail about the basic of FOSS and its usability in organisations as open source software application. The block will focus on various software licenses which are of use to end users are detailed. You will get an idea on BSD license.

In this block, you will make to learn and understand about the basic of Eclipse Public License. The concept related to Open Source Software Development Model will be explained to you. You will be demonstrated practically about Commercial Aspect of Open Source.

In this block you will learn and understand Linux History and introduction of Linux System how it is come from UNIX system. You will also learn problems arise in windows operating system and how it is less secure then Linux.Also we discuss about the windows security and linux Security and it's advantages.Also you will learn Linux Operating System Structure and how it's component communicate.

Block Objectives :

After learning this block, you will be able to understand :

- About Open sources

- Basic of FOSS usage

- Features of BSD license

- Concept of Commercial Aspect of Open Source

- Detailed about Open Source Software Development Model

- Basic of Eclipse Public License

- Linux History

- Windows Security vs Linux Security

- Linux Structure

Block Structure :

Unit 5   :   Need of Open Sources

Unit 6   :   FOSS Software License

Unit 7   :   Linux as Fundamental Operating System

<table>
<tr><td>Unit
05</td><td>*NEED OF OPEN SOURCES*</td></tr>
</table>

UNIT STRUCTURE

5.0   Learning Objectives :

After learning this unit, you will be able to understand :

• Basic of Free Software

• Structure of FOSS and usage

• Open Source Software Development Model

• Free Software Movement

5.1   Introduction :

One such development that is now taking place is the creation of Free and Open Source Software. It has to do with revolutionary growth, innovative solutions, ideological movement, new knowledge and standards, and other topics. Governmental, corporate, and educational institutions etc can benefit from the idea. Many developing countries are taking advantage of FOSS and implementing it properly in order to gain an advantage, while those that do not take advantage of this chance may find their ICT development lagging behind that of comparable enterprises.

5.2 Advantages of Open Source :

Today open source applications are mostly used in every software development organization and educational institute. Every one need open sourece technology because of only one reason to pay high cost for licence version and totally dependency on organization who develop licence version of Software or Application. Open source projects, products, and initiatives value and fully developed, international collaboration, rapid prototyping, transparency, meritocracy, and community development.

Many pieces of software contain source code that is difficult to change by anybody other than the individual, team, or organisation who created it and has complete control over it. The majority of open source software is of high quality. The source code is available when you use open source software. The vast majority of open source software is well–designed. Open source software can also be utilised to code effectively. For these reasons, open source software is an excellent choice for businesses. Many software comes with vendor lock–ins, IT managers in organisations are always upset. Other drawbacks include lack of portability, high licence prices, and the inability to customise software. Using open source software provides you with more flexibility and allows you to efficiently solve all of these drawbacks. There are many open source softwares whose source code cannot be modified such as Microsoft Word and Adobe Photoshop. You wouldn't have to worry about licences if you used open source software. You can install open source software multiple times and use it from any location. You won't have to worry about tracking, monitoring, or counting licence compliance. Using free and open source software can help you save money. You can save money on licencing and maintenance. The only costs you'd have to deal with are those for documentation, media, and support. The Internet itself, which uses several open source technologies such as the Linux operating system and the Apache Web server application, open source software serves both programmers and non–programmers. Major issue is security in licence version software you need to install antivirus to protect your device and data. In open source it is less chances of hacking of data while you work with internet. Remote computers are computers that do all essential tasks but are located in locations where users cannot see or access them. People are increasingly relying on remote computers to perform tasks that they would otherwise perform on their local devices. For example they are using such applications where user has permission to access through network, like email management, FTP servers, Online Word processing etc. Some people call remote computing "cloud computing," because it involves various activities which incorporate not only local devices, but also the global network of remote computers that form an "atmosphere" around them .With the growth of Internet–connected gadgets, cloud computing is becoming an increasingly crucial part of everyday life. Some cloud computing services, such as Google Docs, are proprietary. Additional software that supports in the smooth and effective operation of cloud computing applications runs "on top" of them. Open source and closed source cloud computing systems are also available. An open source cloud computing platform such as OpenStack is an example. User choice is to customize their application that are vendor lock–ins. Using Open source applications it is more easy to customize their application and add as much features as it require at the time of developing application.

❑ **Check Your Progress – 1 :**

1. Open source benefits to :

    a. programmers

    b. non–programmers

    c. both a and b

    d. neither a nor b

5.3 Over View of Open Sources Applications :

Open source is proving to be a driving force in enterprise IT growth, operational efficiency, and the generation of commercial value. Although cost is still a factor in choosing open source, the potential for enterprises to profit from increased software quality, stability, security, and feature sets has prompted many stakeholders to make open source seriously in the workplace. Open source has become a suitable option to proprietary software in the commercial world. Open source has made a name for itself by making it easier to develop, design, and implement goal of software.

❑ **Check Your Progress – 2 :**

1. Open Source benefits to organisation as it :

    a. improves software quality

    b. reliable

    c. secured

    d. all of these

5.4 FOSS and FOSS Usage :

It's a good idea to have a basic concept of how open source is used in a company so that you can know both the short and long–term effects. The use of FOSS is limited because it requires the obtaining of a licence. It should be verified whether open source software is now used in conjunction with proprietary software and whether it will be adopted in the future. You should determine if the license allows for the use for which you intend. Not all FOSS licences are mutually compatible. As software licences become more sophisticated and complex, more and more pieces of software become incompatible, making it impossible to use two different pieces of software for different reasons. Next, you should find out how many groups use each FOSS component. It's crucial to figure out if other groups in the company are applying similar but different components, or if modified aspects of the same component are being used. The open source policy should provide a method, such as a database, for inventorying, tracking, and managing all FOSS usage within the company. A common complaint from production teams is that development teams are using different open source software to perform the same fundamental functionality, or they are using different versions of the software.

The use of FOSS can be beneficial to an organization's operations for motives other than producing income. Turning software over to the open source community, for example, can be deployed as an exit plan so that the user community can continue to improve and maintain it. The benefit of using FOSS is that it allows multiple organisations to share development costs while maintaining a competitive benefit. It is more cost–effective to design non–differentiating technology in order for organizations to be an active participant in FOSS so that the organisation may spend more of their time on other things.

Resources building innovative technologies that provide differentiation. There are numerous new efforts aimed at developing open source consortiums so vertical markets can leverage each other for code and technology but without

any differential advantage. FOSS can be beneficial to a company and can result in cost savings. There are also a lot of other commercial use cases that may not be as clear. The following description shows use cases to consider while finding need of FOSS in an organization :

• Establishing FOSS implementation as an industry standard :

• Increasing sales of products including hardware and software

• Distributing expense of FOOS maintenance among other collaborators

• Gaining cooperation from open source community

• Providing strategy for product's end–of–life plan

• Enhancing an organization's image in marketplace

❑ **Check Your Progress – 3 :**

1. Restriction with FOSS is that :

   a. it needs customer approval

   b. it needs supplier to generate pirated code

   c. it needs licences

   d. none of above

5.0   Free Software Movement :

People use GNU/Linux and other free software operating systems for a variety of reasons. Many people make the conversion for practical reasons: the system is powerful, it is stable, or it is helpful to be able to update the software to fit their needs. It may for working on powerful system since such software's are reliable or convenient to use. The Free Software Movement was built on the principle that computer users deserve the freedom to form groups that allow them to benefit themselves by altering source code for their own purposes, as well as the ability to help others by sharing copies of programmes.

Using free software is a political and social choice that supports our right to learn and distribute what we learn. Free software has become the core of a learning society in which we share our knowledge in addition that others can benefit from and build upon. Many people today using proprietary software, which limits users such freedoms and advantages. Developing a duplicate of such software and sharing it to others will help others while also voiding all legal formalities. That's what's written in the terms and conditions of the licencing agreement you sign when you use proprietary software. The firms behind proprietary software frequently watch on your actions and restrict you to share with others. Moreover, because our computers handle so much of our personal information and daily activities, proprietary software poses an unacceptable risk to a free society.

❑ **Check Your Progress – 4 :**

1. Which among the following is not free licences software ?

   a. Windows   b. UNIX   c. GNU Linux   d. None of above

2. Copy of software will make customer to use:

   a. full version of original software   b. required code

   c. none of these   d. all of these

5.6 Commercial Aspect of Open Source Open Source Movement :

Open source software is freely available for anyone to alter and is focused on a similar principle in which users are free to share on the software subject to the provision that any enhancements or changes can be done freely, while other open source projects may be freely incorporated in any derivative work, open source or proprietary. Users of open source software have access to both the program's functionality and method, where users of proprietary software packages only have access to the functionality. Some of famous open source software's are:

• Mozilla Firefox

• Google Chromium

• Android

• OpenOffice.org

• Firefox OS

Supporters of the open source movement contribute to the open source community by producing and exchanging programming code for software development on a voluntary basis. The goals to promote production of high quality programs with working improve open source technologies.

The growth of Open Source applications enables smaller businesses to engage in the global economy. Furthermore, in larger corporations, network and software manufacturers where individuals access software that can be built, structured, or distributed through plug and play. The Open Source Movement has resulted in a level of worldwide computing access that would have been impossible in a world where proprietary software was the sole option. Individuals or organisations with access to open source software could create technical content for a wide range of users. The Open Source Movement created equal opportunities for people all over the world to participate in the global economy.

❑ **Check Your Progress – 5 :**

1. Which is not an open source software ?

    a. Mozilla Firefox   b. Windows

    c. Google Chromium   d. Android

5.7 Licensing/Certification :

Open source licenses are licenses that obey with the Open Source Definition – in brief, they allow software to be freely used, modified, and shared. To be approved by the Open Source Initiative, a license must go through the Open Source Initiative's license review process.

In fact, most legal experts note that copyright was never meant to regulate use, only distribution. In practice, there are exceptions, such as in the case of home videos which are sanctioned for home use but not for public viewing.

In general, copyright is a serious obstacle to creating works in a collaborative fashion, because each author owns the copyright and thus controls the distribution policies on their individual pieces. If all authors fully cooperate and agree on the resulting licensing terms, all is well. If not, it's a mess.

Other open–source licenses like the BSD and Mozilla License also allow redistribution, but make fewer requirements on conditions of redistribution. The

BSD license, allows anyone to redistribute work or derivative without any source, if such is the desired path. Some people believe that these licenses grant users more freedom, since they include superset of rights granted by GPL. Other people believe that only the GPL truly respects users' freedoms by guaranteeing that no one can opt their original work. The following are list of OSI approved licenses widely used:

- Apache License 2.0
- BSD 3–Clause "New" or "Revised" license
- BSD 2–Clause "Simplified" or "FreeBSD" license
- GNU General Public License (GPL)
- GNU Library or "Lesser" General Public License (LGPL)
- MIT license
- Mozilla Public License 2.0
- Common Development and Distribution License
- Eclipse Public License

Many other licenses are also OSI–approved, but fall into other categories, such as special–purpose licenses, superseded licenses, or retired licenses.

❑ **Check Your Progress – 6 :**

1. Which among the following is OSI approved licenses ?

   a Apache   b. BSD   c. GNU   d. All of these

5.8 Open Source Software Development Model :

The Open Source Development Model also includes an integrated OSS Community Development Process, in which each stage or phase plays a critical role in creating the community's ethics, considering each developer's contributions, working with trimming technologies, maintaining a version control technique, and fixing software bugs.

In the last year, the term "open source" has emerged to define a concept of free software that promotes freely available source code as a basic right. It includes software development technique, which is defined as a quick evolutionary process that makes use of a high number of peer reviews. The major idea is that it supports joint development by allowing source code to be freely updated and redistributed.

Open–source software development can be divided into several phases. Fig 1.1 shows the process data structure of open–source software development where the phases of open–source software development are displayed along with corresponding data elements which can be applied by meta–modeling and meta–process modeling techniques.
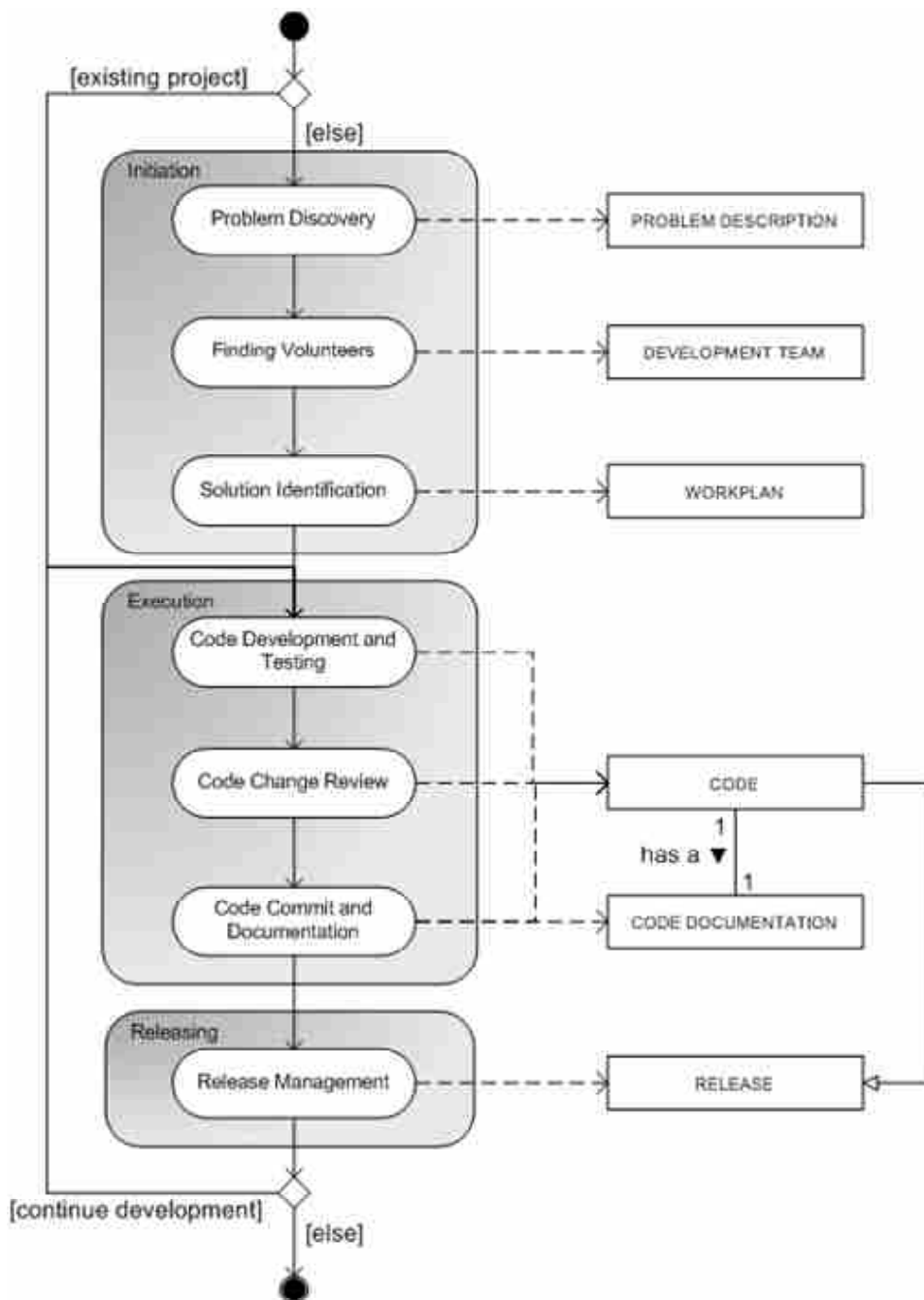
Fig 5.1 Open–Source Software Development Model

There are many ways in which you can work upon open–source project:

- Individual desired the needs and characteristics specified by the client in the specific product in order to effectively employ their organisational needs. Developer working on CodeBase will able to release it in public as version of open–source program.

- The phase in which the design is put into action, also known as the Coding Phase, is the stage for contributors to begin constructing the software's backbone, or skeleton, through coding. Source code of mature project is released to public.

- Once the basic OSS Code has been produced, it is required to give as a first setup to check that its integration and all of the features available in that version work perfectly.

- Once developed, the code or product is analysed in depth using a variety of techniques to ensure that the user receives a 100% satisfied product with the fewest possible defects. When your product is finished, you deliver it to your customers, which are known as deployment.

It has been observed that traditional software development approaches make running an open–source project problematic, as such methods do not allow for reverting to a previous phase. Needs are rarely gathered before open–source software development.

Starting of project rather than early release of software product since the requirements attracts in developing software product on early releases of software.

❑ **Check Your Progress – 7 :**

1. Which among the following process in the open source software development model contains documentation of code ?

   a. Initiation   b. Execution   c. Release   d. All of above

---

5.9   Comparisons with Close Source / Proprietary Software :

Software program normally has two main codes :

Source Code

Object Code

Source code is written in computer programming language like BASIC, FORTRAN etc. A computer program's source code is its foundation. It includes declarations, instructions, functions, loops, and other statements that serve as guidelines for the program's operation. Programs can include one or more source code text files, which can be saved on a computer's hard drive, kept in a database, or printed in code snippet books.

Open source has source code that is publicly available on the Internet for anybody to view and understand, whereas proprietary code can only be read and understood by programmers. The company's source code for proprietary commercial software is kept a closely guarded secret.

Open source software is distributed under different types of licenses like LGPL, GNU, BSD, Apache, etc. In nearly all these cases the software can be used without paying a fee. It should be noted that sometimes large organizations distribute the source code, such as Apache, Open Office, Mozilla, etc.

Closed source software is owned by someone, and the only way to obtain it is to buy a physical or digital copy from a retailer, reseller, or the owner's website. Closed–source software is sometimes distributed as 'shareware.' It's usually a fully working version of the software with a limited number of settings or a complete version with a time limit after which the software will disable itself. One of the most common shareware that springs to my mind is 'Doom' a first person shooter (FPS) from the 1990's which was a hit because of being shareware.

Advantages of Open Model :

- Larger Developer Support
- Customizable
- More Secure
- Extended Community Support

Advantages to Closed Model :

• Less confusion for customers

• Unified experience

• More profitable

❑ **Check Your Progress – 8 :**

1. Which among the following is not the advantages of open model

   a. Large Developer Support   b. More Secure

   c. Extended Community Support   d. Less confusion for customers

---

5.10 Free Software :

Free software is computer software that allows users to use it for any purpose and in any modified version. The ability to study and alter free software will grant access to the source code. This is handled using a software licence in which the author provides users the specified freedoms for software programs covered by copyright law. If the source code is in the public domain or otherwise available without restrictions, software that is not covered by copyright law, such as software in the public domain, is free. Other legal and technical issues, such as software patents and digital rights management, may limit users' ability to exercise their rights, preventing software from being really free. Free software may be developed jointly by volunteer computer programmers or corporations; as part of a commercial, for–profit activity or not; as part of a commercial, for–profit activity or not; as part of a commercial, for–profit activity or not; as part of a commercial, Free software is a subject of liberty, not price, in which users, individually or collectively, are free to do whatever they wish with it. They can also freely redistribute it or sell or charge for related services such as maintenance or warranty for profit. Free software varies from proprietary software such as Microsoft Office, Google Docs, Sheets, and Slides, or Apple's iWork in that it allows users to study, modify, and share their work. Free software differs from freeware, which is a type of freedom that prohibits proprietary software from being used without paying. Freeware with restricted software licences and no access to source code is known as proprietary software. Users are thus barred from switching software, forcing them to rely on the publisher for updates, help, and support, a phenomenon known as vendor lock–in. Users often may not reverse engineer, modify, or redistribute proprietary software.

❑ **Check Your Progress – 9 :**

1. free software will not have

   a. license   b. restriction on distribution

   c. payment matters   d. none of above

5.11 Let Us Sum Up :

In this unit we have learnt that Free and Open Source Software is one such development that is playing out before us today. It relates to revolutionary development process, disruptive technology, ideological movement, new knowledge and standards, and more.

In terms of computer software development, open source relates to set of values which is known as open source way. Open source projects, products,

or initiatives embraces and celebrates open exchange, collaborative participation, rapid prototyping, transparency, meritocracy, and community development.

Open source is proving itself as a driving force behind enterprise IT innovation, operational effectiveness and business value creation. Although cost control remains a factor for choosing open source, the potential for organizations to benefit from improved software quality, reliability, security and feature sets has led many decision makers to seriously commit to using open source in the enterprise.

The use of FOSS can be valuable to the operations of an organization for reasons other than specifically generating revenue. For example, turning software over to the open source community can be used as an exit strategy to enable the user community to continue to enhance and maintain the software.

Creation of Open Source Movement results in degree of global computing access which might have been unthinkable in world where proprietary was only option. Individuals or organizations with access to an open source had the means needed to develop technical material for a variety of consumers.

Other open–source licenses like the BSD and Mozilla License also allow redistribution, but make fewer requirements on conditions of redistribution.

5.12 Answers for Check Your Progress :

❑ **Check Your Progress 1 :**

1. (c)

❑ **Check Your Progress 2 :**

1. (d)

❑ **Check Your Progress 3 :**

1. (c)

❑ **Check Your Progress 4 :**

1. (d)   2. (b)

❑ **Check Your Progress 5 :**

1. (b)

❑ **Check Your Progress 6 :**

1. (d)

❑ **Check Your Progress 7 :**

1. (b)

❑ **Check Your Progress 8 :**

1. (d)

❑ **Check Your Progress 9 :**

1. (c)

5.13 Glossary :

1. **File** – A file is a collection of records.

2. **File Organisation** – It is way by which the records get accessed on the disk.

3. **Open Source** – Set of values, products or initiatives that embraces and celebrates open exchange with collaborative participation and community development.

5.14 Assignment :

Explain the advantages of Open sources ?

5.15 Activities :

Study about FOSS and its usage.

5.16 Case Study :

Study about Free Software Movement.

5.17 Further Readings :

1. Running Linux, Fourth Edition, Matt Welsh, Matthias Kalle Dalheimer, Terry Dawson, and Lar Kaufman, O'Reilly Publishers, 2002

2. Linux Cookbook, Carla Schroder, O'Reilly Cookbooks Series, 2004

3. Free Software, Free Society: Selected Essays of Richard M. Stallman, First Edition, Joshua Gay, GNU Press, 2002

Unit 06 · FOSS SOFTWARE LICENSE

UNIT STRUCTURE

6.0   Learning Objectives :

After learning this unit, you will be able to understand :

• Concept of Apache License

• Understand about GNU Lesser General Public License

• Detailed regarding MIT License

6.1   Introduction :

An open–source licence is a form of licence for computer software and other items that permits the use, modification, and/or sharing of the source code, blueprint, or design under certain terms and conditions. End users can examine and change the source code, blueprint, or design for their own customization, exploration, or troubleshooting purposes. The majority of open–source licenced software is available for free, however this is not always the case. Open–source licences are those that allow non–commercial redistribution or modification of the source code for personal use only. While license applications are not permit customization and reconstruction of code. However, open–source licences may include restrictions, such as a requirement to keep the identity of the authors and a copyright statement within the code, or a requirement to redistribute the licenced software only under the same licence (as in a copyleft license).One popular set of open–source software licenses are those approved by the Open Source Initiative (OSI) based on their Open Source Definition (OSD).

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• User can use software for personal or commercial purpose , also it is freely available ,modified and it is available under the head of Apache License.

• Developer can customize their product using Apache applications

• Developer can also modified modules and integrate one or more modules.

• Software can be packaged with other items and distributed or sold as a whole.

• Other licenses can be used to deliver products that are derived or modified from licensed software.

• The ability to grant/extend a license to the software is mentioned here.

• Without attribution, Apache software cannot be shared.

• It is allow extending license in sub licensing to the software.

• External contributions to the software are released under the ASF terms unless explicitly specified otherwise.

❑   **Check Your Progress – 1 :**

1.   Apache License is :

    a. commercial software   b. free software

    c. neither a nor b   d. both a and b

6.3   BSD License :

Berkeley Source Distribution, which is often known as BSD UNIX, established the BSD licence as a simple and liberal licence category for computer software in 1980. First version of the original UNIX operating system that was written in 1969 by Ken Thompson at Bell Labs. that serves as upgraded version of actual UNIX operating system in this case, the user of software distributed under a normal BSD licence is based on the redistribution of specified software in any form, with or without modification, which should include :

• Original Copyright Notice

• List Of Two Simple Restrictions

• Disclaimer Of Liability

Such type of restrictions is summarized as:

(1) One should not claim that they wrote the software if they did not write it

(2) One should not take legal action against developer if software does not function as expected or desired.

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(1) The BSD UNIX licence allows for copying, modifying, and redistribution of the code

(2) The original copyright notice is mention restrictions for use of the distributed software.

(3) A disclaimer for restrictions of liability, such as not claiming ownership of code if it was not developed by the user and not suing the program's author for undesired or unwanted functionality.

It should be noted that source code is a version of software that was created in plain text by programmers in hundreds of programming languages, including C, C++, and Java. Software provided under BSD style licences can be freely edited and used in proprietary software with the source code kept private with minimum restrictions. It is possible for a product to be distributed under a BSD–style license and for some other license to apply as well. This was, in fact, the case with very early versions of BSD UNIX, which included both new code written at UCB and code from the original versions of UNIX written at Bell Labs.

❑ **Check Your Progress – 2 :**

1. BSD licenses includes clause which restricts :

    a. name of project   b. data

    c. software   d. all of above

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The GPL license specifies that the terms and conditions of distribution be made public to anybody who gets a copy of the work with the GPL applied to it, commonly known as "the licensee."

Such license has permission to edit,copy and share the software and applications based on GNU. This service could be provided for a free or for no charge. The GPL is distinguished from software licences that ban commercial distribution.

❑ **Check Your Progress – 3 :**

1. GNU General Public License is :

   a. free software license

   b. guaranteed to run by all users

   c. easily shared

   d. all of above

6.5 GNU Lesser General Public License :

A Lesser General Public License (LGPL) is an open–source software licence that allows for the inclusion of free software components in either free or commercial software. The Lesser General Public License is often known as the "Library GPL" or "GNU libraries," and some people relate it with library architecture in shared resources.

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The most significant difference is that GNU Lesser General Public License program can be accessed or utilised by any programme, including copyrighted proprietary programmes. GPL License software can use or link to software licenced under the other free software license only.

The LGPL was created as a balance between the GNU General Public License's (GPL) stringent copyleft and more liberal licences like BSD licences and the MIT License. The word "lesser" in the title indicates that the LGPL does not guarantee total freedom of use of software to the end user; it only provides the freedom of modification for components licenced under the LGPL, but not for proprietary components. OpenOffice.org is an example of a program created using the GNU Lesser Public License.

❑ **Check Your Progress – 4 :**

1. Lesser General Public License is mainly used by :

   a. programmers   b. libraries   c. coders   d. all of above

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6.6 MIT License :

The MIT License is also commonly called as X11 license is a type of software license which was basically developed at Massachusetts Institute of Technology. The MIT License is a free software license from the Massachusetts Institute of Technology. End users of software are given access such as copying, changing, merging, distributing, and so on under the MIT License. IT also for UNIX Operating system and also similar like BSD License. The key distinction

is that BSD–style licenses frequently include a clause prohibiting the use of the copyright holder's name in promotional materials without permission. Developers are free to make changes to the MIT license's software as it is not subject to copyright.

According to the Free Software Foundation, the MIT license should be referred to as the X11 license because MIT has released software under a variety of licenses, including X11, which appears to be the default graphical engine for Linux and other Unix operating systems. The Open Source Initiative, like many other organizations, refers to it as the MIT License. It's worth noting that the FSF is the same organization that insists on renaming Linux to GNU/ Linux.

There is some debate about which type of license protects the rights of end users better. The MIT license expresses the rights granted to users more clearly, with no restrictions on the rights of Software having legal permission. However, advocates of the GPL claim that its requirements about derived software and providing source code do a better job of protecting users. The MIT license isn't going anywhere anytime soon. It's useful to understand the principles of this widely used and important license, whether you decide to include it into your open source project or your team's proprietary software. The MIT license is used by a number of significant open source projects. Anyone who works with JavaScript, for example, is likely to have come across jQuery, Node.js, and/or Babel, all of which are MIT licensed.

The MIT license is used for many software packages such as expat and MetaKit, Open for Business Project, X11 and XFree86.

❑   **Check Your Progress – 5 :**

1.   MIT License must include :

a. copyright   b. License   c. Both a and b d. Neither a nor b

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•   The Eclipse Foundation has taken over as Agreement Manager for the Eclipse Public License from IBM.

•   EPL patent clause is revised by deleting sentence from section 7 of CPL

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❑ **Check Your Progress – 6 :**

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   c. MIT License   d. None of above

6.8 Mozilla Public License :

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MPL is the copyright for Mozilla Firefox, Mozilla Thunderbird, and many other Mozilla products, as well as other software such as Adobe to licence their Flex product line and Document Foundation to licence LibreOffice 4.0. MPL'd code can be used in commercially supplied software. Authors and users can alter or modify the licensed code. The licencing conditions allow users of open source code to impose a guarantee on licenced software.

❑ **Check Your Progress – 7 :**

1. MPL license is not used by :

   a. Firefox   b. Thunderbird   c. Windows   d. Adobe

6.9 Let Us Sum Up :

While studying this unit, we have learnt that open–source license is type of license for computer software that allows source code, blueprint or design to be used, modified or shared under certain terms and conditions. License is related with terms and conditions for usage, reproduction and distribution whose authorization is with Licensor, who is the owner or entity that authorises by copyright owner granting for License.

BSD license is simple and liberal licenses category for computer software framed at Berkeley in 1980 by Berkeley Source Distribution which is BSD UNIX software license. GNU General Public License is commonly used free software license that guarantees individuals, organizations, company's freedoms to run, study, shares and modifies software.

The MIT License is also commonly called as X11 license is a type of software license which was basically developed at Massachusetts Institute of Technology. This is similar to BSD license used initially for Berkeley Source Distribution which is also version of UNIX.

6.10 Answers for Check Your Progress :

❑ **Check Your Progress 1 :**

1. (b)

❑ **Check Your Progress 2 :**

1. (a)

❑ **Check Your Progress 3 :**

1. (d)

❑ **Check Your Progress 4 :**

1. (b)

❑ **Check Your Progress 5 :**

1. (c)

❑ **Check Your Progress 6 :**

1. (b)

❑ **Check Your Progress 7 :**

1. (c)

6.11 Glossary :

1. **Free Software License** – Type of notice which grant recipient of software rights to modify and redistribute software.

2. **Free Software Foundation** – A non–profit organization which helps free software movement with universal freedom to study, distribute, create and modify computer software.

3. **Copy Left** – Method of giving people the rights to distribute copies and modified versions of work with stipulation that similar rights be saved in derivative works down the line.

6.12 Assignment :

Write short note on MIT license ?

6.13 Activities :

Collect some information on Eclipse Public License.

6.14 Case Study :

Generalised the versions of Mozilla Public License Software.

6.15 Further Readings :

1. Running Linux, Fourth Edition, Matt Welsh, Matthias Kalle Dalheimer, Terry Dawson, and Lar Kaufman, O'Reilly Publishers, 2002

2. Linux Cookbook, Carla Schroder, O'Reilly Cookbooks Series, 2004

LINUX AS FUNDAMENTAL OPERATING SYSTEM

UNIT STRUCTURE

7.0   Learning Objectives :

After learning this unit, you will be able to understand :

•   Concept of Markup Languages

•   Understand about XHTML Syntax

•   Detailed regarding Syntax and Semantics of XHTML

7.1   Introduction :

We all aware now a days a technology is upgraded day by bay and we all are using different technologies in our daily work. All the technology work with some applications or program which are used to do our work easy and get an accuracy in our work.Thre are so many devices and gadgets are available in market each are used for different purpose, each devices are work with some applications to do our work smooth. This devices are like a small computer which has install some applications or software it has a set of instructions to do our work with some command. To start that applications in gadgets we need one platform that is known as an operating system. There are some well known operating systems are available in market like Windows,Mac,Android and Linux. The Operating system is nothing but it is used to manage our application and also used to synchronize Hardware with software. It is also used to manage communication between different hardware and softwar.we work any device like Desktop, Leptop, Mobile, Database server, Internet server, Home appliance etc. has Operating system to manage the application and Hardwares. Here in this topic we are discussing about Linux Operating system.

7.2 History of Linux :

The Linux operating system came from the root of Unix foundation. Unix is the first open source command–line operating system. In 1969, a team of Bell Labs developers started a project to build a standard program for all computers, naming it 'Unix.' The Multics developers at Bell Labs and others were interested in creating a multi–user operating system with single–level storage, a dynamic file system, and a hierarchical file system. Research and development at Bell Labs (later AT&T) continued, with Unix System Laboratories developing versions of Unix, in partnership with Sun Microsystems, that would be widely adopted by commercial Unix vendors. Meanwhile, research continued in academic circles, most notably the Computer Systems Research Group at the University of California Berkeley. This group produced the Berkeley Software Distribution (BSD), which inspired a range of operating systems, many of which are still in use today. In 1991 he released version 0.02; Version 1.0 of the Linux kernel, the core of the operating system, was released in 1994. About the same time, American software developer Richard Stallman and the FSF made efforts to create an open–source UNIX–like operating system called GNU. In contrast to Torvalds, Stallman and the FSF started by creating utilities for the operating system first. These utilities were then added to the Linux kernel to create a complete system called GNU/Linux, or, less precisely, just Linux. The main advantage of Linux was that programmers were able to use the Linux Kernel to design their own custom operating systems. With time, a new range of user–friendly OS's stormed the computer world. Now, Linux is one of the most popular and widely used Kernel, and it is the backbone of popular operating systems like Debian, Knoppix, Ubuntu, and Fedora.

❑ **Check Your Progress – 1 :**

1. _____ is the first open source Command base Operating System.

    a. Dos   b. Linux   c. Unix   d. Redhet

7.3 What is Linux Operating System :

The Linux operating system is similar to other operating systems. We need to go back in time roughly 30 years to understand the popularity of Linux... By the early 1990s, home PCs were finally strong enough to run a full–fledged UNIX system. Linus Torvalds, a young guy studying computer science at the University of Helsinki, believed it would be a good idea to create a publicly available academic version of UNIX, so he began coding right away. The Linux OS was developed by **Linus Torvalds** in **1991**, which sprouted as an idea to improve the UNIX OS. Nowadays Linux is most like operating system and it is also an open source operating system so it is freely and easily available from any were. It is used in smart phone as well as in super computers also in major Hardware devices.

Strucute of Linux Operating System :

An operating system is a collection of software, each designed for a specific function.

Linux OS has following components :
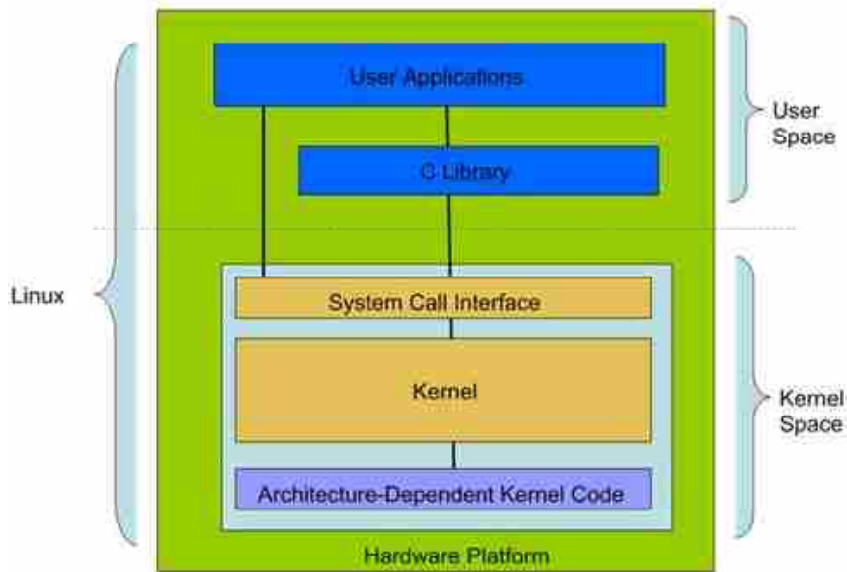
1. **Kernel :** Kernel is one of the most useful sections of Linux OS. It is only responsible for major action in Linux OS. It establishes the communication between Computer Hardware and Software/Applications. It also manages the resources of system. It has major four responsibility Memory Management, Process Management, Device Management and Handling System cores. Kernal store all the details of Device drivers based on requirement device are come in action. Withou kernel this drivers are not mange in this Operating System, which device will work how it will manage it's task is observed by Kernal. The Kernel has certain rules which must follow by each devices. IT also do Memory Management, it track the used and unused memory slots. It also do process management by managing process life cycle, it will assign enough process time to each processes and arrange in queue for smooth operation.

2. **System Libraries :** System Libraris are special program or functions using which application program or utilities access Kernel. It is use the functionality of operating stystem.

3. **System Utilities :** It is responsible to do some special purpose individual functionality of operating system.

4. **Shell :** Shell is an interface between user an Kernel. It hide the complexity of Kernal functions. Shell get the input from the user in form of command and will execute that command at kernel level and give respond/out–put.

5. **Hardware Layer :** This layer contain all peripheral device like Ram, Processor, HDD etc.

❑   **Check Your Progress – 2 :**

1. _____ is help to communicate between Hardware and Software in Linux Operating System.

    a. Shell   b. Kernel

    c. System Library   d. None of these.

| 7.4 | The Problems of Windows Operating System : |

Now a days there are major problems arise in Windows os to work with higher configuration software. While you want to work with some higher configuration software like android studio,coraldraw etc. you need to upgrade your Windows os and its Hardware Configration then and only then you can work with it comfortably. It is slower the process while you will do some kind of Applications or will not support some of operations.Here are some disadvantages of windows Operating System.

1. **High Resource Requirements :** Nowadays, we deal with various apps that require some more support to operate in an operating system. In such cases, we must upgrade our Windows operating system, which is tough to perform. We must spend more money to get a quicker processor (the CPU), more internal memory, and a larger hard drive. Microsoft has long stated that this is due to all of the extra functionality that they've implemented in response to consumer requests.

2. **Les Operating System Support in Application :** In certain cases, a programm that we wish to execute on Windows may or may not be supported because of its larger size. In this situation, the software will not install in the operating system, or it may work slowly and cause problems with the operating system. Windows 2000 and Windows XP do longer support legacy devices. Microsoft maintains that this was required to improve overall system stability, but since other systems with outstanding reputations for stability include considerably better support for older technology, where does this leave Microsoft's argument?

3. **Excessive Cost :** Linux OS is open source and is allowed to use for everybody except windows OS has a paid permit and you can't utilize windows OS free. The expense of purchasing a Licence of windows OS is high too. You likewise need to purchase other Microsoft programming for example MS Office to accomplish a standard office deal with the PC. Due to OS Up–gradations older OS will not work no longer with latest applications and need to purchase Licence OS. If you install latest os in your Machine then it might be possible that Hardware which are configure in Machine may not give quick response on application and we need to upgrade the Hardware and it is cost effect.

4. **The Majority of Products are Paid :** Most windows programs are paid for example games, designs programming (Photoshop), download chief (IDM) and other famous programming are paid. You need to purchase these products or pay a month–to–month charge to utilize them.

5. **Security Issue :** Windows security is not as good as its competitors. Windows users need to install some additional software for security and data backups when using Microsoft's operating system. The alternative operating systems were built to be secure from ground–up.Windows have a high amount of hacker attacks. The hackers can easily break windows security. So windows users are dependent on anti–virus software and have to pay monthly charges to companies to protect their data. Also, windows users have to update OS to keep up–to–date with security patches .While you install any software from internet it will affect with some virus and your system will colops.

6. **Poor Stability :** People who are using This os need to reboot and re installing an OS while some major problems are arise. After installing or updating any Application user has to reboot the system for application support. If your system becomes slow in performance then you have to reboot it. If you load many programs at the same time then your system slows down and hangs up. The only solution for this is to reboot.If you get blue screen suddenly with some error,then you need to recover your System and you have to reinstall or factory restore your system it is only option to start your system.

❑   **Check Your Progress – 3 :**

1.   Windows OS need to install some additional Security Software is called

   _____.

   a. Firewall   b. Antivirus   c. All the above d. None of these

---

7.5   The Benefits of Linux :

Linux is an open–source operating system like Windows and MacOS. It is not just limited to the operating system, but nowadays, it is also used as a platform to run desktops, servers, and embedded systems. The Kernel is main part of Linux OS. Linux system is used to manage various services such as process scheduling, application scheduling, basic peripheral devices, file system, and more. There are many features of the Linux operating system that demonstrate that it is better than other operating systems.

1.   **Open Source :** As it is open–source, its source code is easily available. Anyone having programming knowledge can customize the operating system. One can contribute, modify, distribute, and enhance the code for any purpose. Certainly, the biggest advantage of the Linux system is that it is free to use. We can easily download it, and there is no need to buy the license for it. It is distributed under GNU GPL (General Public License). Comparatively, we have to pay a huge amount for the license of the other operating systems.

2.   **Security :** Linux is a highly secure operating system. Your security and privacy are put first before anything else in Linux. There are locks on every layer which prevent your system from getting hacked, Linux does not generally get a virus because it is lock out malware and other software, causing trouble. Unlike Windows, where every user is an Administrator, Linux highly restricts root access. The typical user only has enough permission to use the system without causing trouble. Linux always takes care of user privacy as it never takes much private data from the user. Comparatively, other operating systems ask for the user's private data.

3.   **Stable :** Linux is more stable than other operating systems. Linux does not require to reboot the system to maintain performance levels. It rarely hangs up or slow down. It has big up–times.Softwares and applications of linux are also free and it is install with some specific command so each layer of Linx will test the application at the time of installation. You get a variety of thousands of free software which you can choose from and easily install from the Software manager.

4.   **High Performance :** Linux systems are very low on resources and can run on even 500 MB RAM or at 256 MB RAM at the lowest. Linux

uses resources very efficiently and can run on low space hardware quickly.

5. **Software Updates :** In Linux, the software updates are in user control. We can select the required updates. There a large number of system updates are available. These updates are much faster than other operating systems. So, the system updates can be installed easily without facing any issue.

6. **Suitable for Developers :** It support almost all the programming languages which are currently used for development of Application, like C, C++, Java, PHP, Python, Ruby etc., also it has vast range of applications to support development of Software and application. The package manager of Linux helps developer to how things are done.

❑   **Check Your Progress – 4 :**

1. Linux does not hack because it lock _____ on every layers.

    a. Application   b. Bug   c. Malware   d. All the above

7.6   Windows Sicurity Vs Linux Security :

In today time windows users are more then Linux users. It is only because windows support so many applications and softwares and it is also easy to install and easily available. There is one big issue arise while you use such software in windos os it might be risk for your machine and will get virus in your machine also will corrupt Operating system. It might be possible due to some strong attack of virus Some hardware may fail. That can affect your data and you can lost it.

Although it's true that some of the underground crackers who write virusesdislike Microsoft, there's also little doubt that Windows has more than its fair share of security issues. Viruses and worms also usually take advantage of security holes within Windows software. It can crack your application and will work malfunctions while you start application. some viruses and worms affect windows OS very deadly and will hack your system by help of Internet service. Any hackers or software developers can easy develop virus and malware in form of Exe. File and it can install in Windows Operating system it is very dangers. Viruses and worms also usually take advantage of security holes within Windows software.

Linux Os is more secure in compare to Windows because it needs user permission to access and install any application. The main protection on Linux is that running an ".exe" is much harder. Linux does not process executables without explicit permission as this is not a separate and independent process. You'll have to chmod +x a file before you can run it. An advantage of Linux is that viruses can be more easily removed. On Linux, system–related files are owned by the "root" superuser. It has a large community of developers reviewing its code and making sure there are no back doors. The bottom line is that while writing a virus or worm for Linux is much harder than doing the same thing on Windows,

❑   **Check Your Progress – 5 :**

1. Linux need _____ to install any application

    a. Hacker's permission   b. User permission

    c. Developer's permission   d. None of these

7.7   Let Us Sum Up   :

We need an Operating System to work with computer. There are different Operating Systems are available in this chepter we discuss about Linux Operating System and History of Linux also we discuss about Linux and window Security. Linux Operating System is developed from the root of Unix. Unix is the first open source Command base Operating System, In 1969, a team of developers of Bell Labs started a project to make a common software for all the computers and named it as 'Unix'. In 1991 he released version 0.02; Version 1.0 of the Linux kernel, the core of the operating system, was released in 1994. About the same time, American software developer Richard Stallman and the FSF made efforts to create an open–source UNIX–like operating system called GNU. These utilities were then added to the Linux kernel to create a complete system called GNU/Linux, or, less precisely, just Linux. Linux Operating system is like other operating system. In order to understand the popularity of Linux, we need to travel back in time, about 30 years ago... By the beginning of the 90s home PCs were finally powerful enough to run a full blown UNIX. The Linux OS was developed by Linus Torvalds in 1991, which sprouted as an idea to improve the UNIX OS.Nowadays Linux is most like operating system and it is also an open source operating system so it is freely and easily available from any were. It works with different parts kernal,System library,System Utility,shell and hardware layer.Also we disucss the advantages of Linux os and also discuss how it is more effective then Windows Operating System. Linux Os is more secure in compare to Windows because it needs user permission to access and install any application. The main protection on Linux is that running an ".exe" is much harder. Linux does not process executables without explicit permission as this is not a separate and independent process.

7.8   Answers for Check your Progress :

❑   **Check Your Progress 1 :**

1. (c)

❑   **Check Your Progress 2 :**

1. (b)

❑   **Check Your Progress 3 :**

1. (c)

❑   **Check Your Progress 4 :**

1. (a)

❑   **Check Your Progress 5 :**

1. (b)

7.9   Glossary :

1.   **Firewall :** It is Hardwar and Software which protect unwanted data to enter on LAN network.

2.   **Virus :** A piece of code which is capable of copying itself and typically has a detrimental effect, such as corrupting the system or destroying data.

3.   **Malware :** Software that is specifically designed to disrupt, damage, or gain unauthorized access to a computer system.

4.   **Kernel :** The kernel is the essential Part of a computer operating system (OS). It is the core that provides basic services for all other parts of the OS.

7.10   Assignment :

Explain Linux Advantages.

7.11   Activates :

Explain Problems with Windows Operating System

7.12   Case Study :

Draw the Linux Operating System structure and summaries.

7.13   Further Reading :

1.   Linux Cookbook, Carla Schroder, O'Reilly Cookbooks Series, 2004

2.   UNIX : Concepts and Applications | 4th Edition by Sumitabha Das

3.   Your Unix/Linux : The Ultimate Guide by Sumitabha Das

BLOCK SUMMARY :

In this block, you have learnt and understand about the basic of Free and Open Source Software. The block gives an idea on open–source licenses such as BSD and Mozilla License. You have been well explained on the concepts of various types of Software Licenses with their features.

The block detailed about the basic of FOSS and its usage in software. The detail related to GNU General Public License as free software license is explained to you. You will be demonstrated practically about Open Source Movement technique.

Also we discuss about history of Linux in this block how Linux system is introduce and also discuss about Unix system very fist Command base operating system In this block we discuss about windows problems and how it is work with less security compare to Linux Operating System. We discus about the Linux structure and the major essential part.

BLOCK ASSIGNMENT :

❖ **Short Questions :**

1. What is World Wide Web ?

2. Explain the function of Internet Protocols ?

3. Write note on U RLs–Lists ?

4. Write short note on Contiguous Allocation ?

5. Explain Media Tag.

6. Explain Linux Structure

❖ **Long Questions :**

1. Write short notes on Web Clients/Web Servers ?

2. Write short note on Markup Languages ?

3. Write note on HTML Elements ?

4. Explain Firewall in detail.

5. Explain Linux Advatages.

❖ **Enrolment No. :** [   ]

1. How many hours did you need for studying the units ?

Unit No.	5	6	7
No. of Hrs.			

2. Please give your reactions to the following items based on your reading of the block :

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	☐	☐	☐	☐	_____
Language and Style	☐	☐	☐	☐	_____
Illustration used (Diagram, tables etc)	☐	☐	☐	☐	_____
Conceptual Clarity	☐	☐	☐	☐	_____
Check your progress Quest	☐	☐	☐	☐	_____
Feed back to CYP Question	☐	☐	☐	☐	_____

3. Any other Comments

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WEB TECHNOLOGY USING FOSS (LAMP/WAMP)

BLOCK 3 : LINUX TECHNOLOGY

UNIT 8   GNU/LINUX OS INSTALLATION

UNIT 9   HARDWARE CONFIGURATION

UNIT 10   E–MAIL SERVER

UNIT 11   KDE & GNOME

LINUX TECHNOLOGY

Block Introduction :

In this block, we will detail about the basic characteristics of GNU/Linux distribution techniques with knowledge about various tools. The block will focus on Unified Modeling Language with study about meta models features for reactive systems are discussed. The concept of Object and dynamic model features are well explained.

In this block, you will make to learn and understand about the basic of State diagrams along with necessary functions with class interface. The concept associated with E-mail server and its configuration is well explained to you. You are going to be demonstrated practically about X Windows System and related technique.

Object design is said to finding an object in object-oriented analysis phases that are combined into certain classes and are refined so as to get suited for real time implementation. Dynamic modelling is said to numerous components of system having good dynamic behavior. It shows with State diagrams wherever every state diagram represents single class with important dynamic behavior whereas it shows interaction among classes.

Block Objectives :

After learning this block, you will be able to understand :

•   About GNU/Linux distribution

•   Basic of Configuring hardware

•   Features of Domain Expert Testing

•   Concept of X Window system configuration

•   Understanding the OS boot up process

Block Structure :

Unit 8   :   GNU/LINUX OS Installation

Unit 9   :   Hardware Configuration

Unit 10 :   E–Mail Server

Unit 11 :   KDE & GNOME

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<tr><td>Unit</td><td rowspan="2">GNU/LINUX OS
INSTALLATION</td></tr>
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UNIT STRUCTURE

8.0   Learning Objectives :

After learning this unit, you will be able to understand :

•   Basics of disk partition configuration

•   File System

•   GNU/Linux Distribution

- Basic Shell Commands
- Idea about Process Management
- Detail of User and Group Management
- Details of File Ownership and Permission

| 8.1 Introduction : |

– Linux is fast and stable free open–source operating system for personal computers (PCs).

– It gives features like professional level Internet services, extensive development tools, and fully functional graphical user interface (GUIs).

– Linux was developed in the early 1990s by Linus Torvalds, along with other programmers around the world.

– As an operating system, Linux performs many of the same functions as UNIX, Macintosh, and Windows.

– Linux is distinguished by its power and flexibility, along with being freely available.

– Window operating system began their development within the limits of small, and restricted PC, and recently it become more versatile machines. Such operating systems are constantly being upgraded to keep up ever–changing hardware capabilities.

– On other hand, Linux was developed in a different environment.

– Linux is a PC version of the UNIX operating system that has been used for decades on mainframes and minicomputers and is currently system of choice for network servers and workstations.

– Linux brings the speed, efficiency, scalability, and flexibility of UNIX to your PC.

– Linux consist of operating system program referred to as the kernel which is the part originally developed by Linus Torvalds.

– But it has always been distributed from network servers and security programs to office application and development tools.

– Linux has evolved as part of the open–source software movement, in which independent programmers joined together to provide free, high–quality software to any user.

– Thousands of open–source applications are available for Linux from sites like sourceforge.net, kde–apps.org, and gnomefiles.org.

– Linux operating system capable for powerful networking features, including support for Internet, intranets, and window networking.

– Linux distributions include fast, efficient, and stable Internet servers, such as the web, File Transfer Protocol (FTP), DNS servers, and mail servers.

– Linux enables you to choose the interface you want and then customize it further, adding panels, applets, virtual desktops, and menus, all with full drag–and–drop capabilities.

– Linux is distributed freely under GNU's General Public License (GPL) as specified by the Free Software Foundation.

– GNU stand for "GNUs Not Unix" is a project initiated and managed by the Free Software Foundation to provide free software to users, programmers, and developers.

8.2 Linux Architecture :

Linux is generally divided into three parts which are as follows :

(1) Kernel :

– Kernel is a core program that runs program and manages hardware devices such as printers and disks.

(2) Environment :

– Environment provides the interface to the user.

– We can also say that an environment provides an interface between the kernel and the user.

– It receives command from the users and sends it to the kernel for execution.

– Linux provides several kinds of environment like Desktop, Windows Managers, and Command Line Shells.

(3) File Structure :

– It organizes all the files stored on a storage device, such as a disk.

– Files are organized into directories.

– Each directory may contain any number of subdirectories, each holding files.

8.3 History of UNIX and Linux :

– As a version of UNIX, the history of Linux naturally begins with UNIX.

– The story begins in the late 1960s, when a combined effort occurred to develop new operating system techniques.

– In 1968, a consortium of researchers from General Electric, AT&T Bell Laboratories, and Massachusetts Institute of Technology carried out a special operating system research project called MULTICS (The Multiplexed Information and Computing Service).

– MULTICS incorporated many new concepts in multitasking, file management, and user interaction.

• **UNIX :**

– In 1969, Ken Thompson, Dennis Ritchie, and the researchers at AT&T Bell Laboratories developed the UNIX operating system, incorporating many features of the MULTICS research project.

– UNIX was an affordable and efficient multiuser and multitasking operating system.

– In 1973, Dennis Ritchie collaborated with Ken Thompson to rewrite the programming code for the UNIX system in the C programming language.

– UNIX was created as a research product.

– The first versions of UNIX were distributed free to the computer science departments of many noted university.

– In 1970s, Bell labs began issuing official version of UNIX and licensing the systems to different users.

– One of these users was Berkeley from computer science department of the University of California. Berkeley added new features to the system that became standard.

– In 1975 Berkeley released its own version of UNIX, known by its distribution arm, Berkeley Software Distribution (BSD).

– This BSD version of UNIX became a major contender to the AT&T Bell Labs version. AT&T developed several research versions of UNIX, and in 1983 it released the first commercial version, called system 3.

• **Linux :**

– Linux started out at the University of Helsinki as a personal project of a computer science student named Linus Torvalds.

– At that time, students were making use of a program called Minix, which highlighted different UNIX features.

– Minix was created by Professor Andrew Tenenbaum and widely distributed over the Internet for the students around the world.

– Linus's intention was to create an effective PC version of UNIX for Minix users. It was named Linux, and in 1991, Linus released version 0.11.

– Linux was developed from the beginning according to the Portable Operating System Interface for Computer Environment (POSIX) standard.

– Linux also holds to the Linux file system hierarchy standard (FHS), which specifies the location of files and directories in the Linux file structure.

– Linux development is now overseen by The Linux Foundation (Linux–foundation.org), which is a merger of The Free Standards Group and Open–Source Development Labs (OSDL). This is the group that Linus Torvalds works with to develop new Linux versions. Actual Linux kernels are released at kernel.org.

❑ **Check Your Progress – 1 :**

1. Linux was developed in the _____.

   a. 1990   b. 1989   c. 1988   d. 1991

2. GUI stands for _____.

   a. Graphical User Instruction   b. Graphical User Interface

   c. Graphical User Information   d. Graphical User Invention

3. GPL stands for _____.

   a. General Private License   b. Group Private License

   c. Group Public License   d. General Public License

4. _____ is a core program that runs program and manages hardware devices.

   a. Environment   b. File Structure   c. Kernel   d. None of these

5. Unix was developed in the _____.

   a. 1969   b. 1968   c. 1971   d. 1979

8.4	Detect Hardware :

− A Linux Operating System is a software program that enables the computer hardware to communicate and operate with its software.

− Linux performs basic tasks:

✓ Recognizing input from the keyboard

✓ Sending output to Monitor

✓ keeping track of files and directories

✓ Controlling peripheral such as disk drives and printers.

Linux Operating System with Computer Hardware

− The Linux operating system is system software that is stored on the storage device such as hard disk, CD–ROM or floppy disk. When a computer is switched on, the operating system is transferred from the storage device into main memory through ROM.
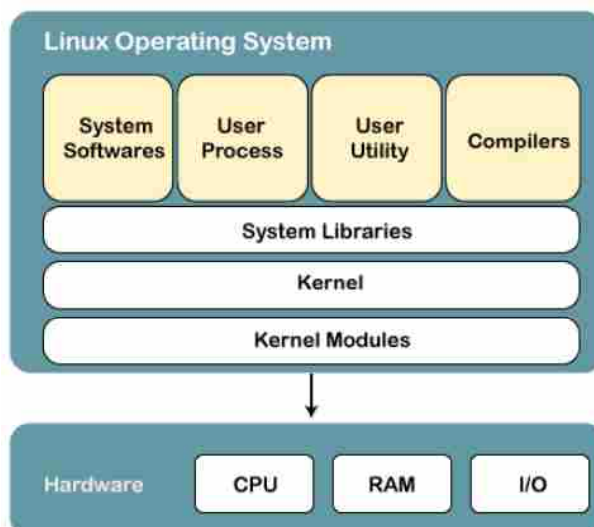
Position of Linux Operating System

− Linux operating system controls and coordinates the operations of the computer system. It manages the computer hardware, controls the execution of application programs and provides the set of services to the users.

It acts as an interface between user and the computer. The users interact with the operating system indirectly through application program.

– The work of Linux operating system involves:

✓ Managing the processor

✓ Managing Random Access Memory

✓ Managing Input/Output

✓ Managing execution of applications

✓ Managing Files

✓ Controlling Information management

❑ **Check Your Progress – 2 :**

1. Write a note on Hardware Detection.

_____

_____

_____

_____

_____

8.5 Configuration Disk Partition :

"Partitioning is a means to divide a single hard drive into many logical drives. A partition is a contiguous set of blocks on a drive that are treated as an independent disk".

Why have multiple partitions require ?

– Encapsulate your data. Since file system corruption is local to a partition, you stand to lose only some of your data if an accident occurs.

– Increase disk space efficiency. You can format partitions with varying block sizes, depending on your usage. If your data is in a large number of small files (less than 1k) and your partition uses 4k sized blocks, you are wasting 3k for every file. In general, you waste on average one half of a block for every file, so matching block size to the average size of your files is important if you have many files.

– Limit data growth. Runaway processes or maniacal users can consume so much disk space that the operating system no longer has room on the hard drive for its bookkeeping operations. This will lead to disaster. By segregating space, you ensure that things other than the operating system die when allocated disk space is exhausted.

Partitioning Software for LINUX :

✓ **sfdisk :** a command–line version of fdisk

✓ **cfdisk :** a curses–based version of fdisk

✓ **parted :** Gnu partition editor

✓ **Partition Magic :** a commercial utility to create, resize, merge and convert partitions, without destroying data.

✓ **Disk Drake :** a Perl/Gtk program to create, rsize, and delete partitions.

Partition Types:

There are two kinds of major partitions on a Linux system :

- **Data partition :** normal Linux system data, including the root partition containing all the data to start up and run the system.

- **Swap partition :** expansion of the computer's physical memory, extra memory on hard disk.

– Most systems contain a root partition, one or more data partitions and one or more swap partitions. Systems in mixed environments may contain partitions for other system data, such as a partition with a FAT or VFAT file system for MS Windows data.

– Most Linux systems use **fdisk** at installation time to set the partition type. As you may have noticed during the exercise from Chapter 1, this usually happens automatically. On some occasions, however, you may not be so lucky. In such cases, you will need to select the partition type manually and even manually do the actual partitioning. The standard Linux partitions have number 82 for swap and 83 for data, which can be journaled (ext3) or normal (ext2, on older systems). The **fdisk** utility has built–in help, should you forget these values.

– Apart from these two, Linux supports a variety of other file system types, such as the relatively new Reiser file system, JFS, NFS, FATxx and many other file systems natively available on other (proprietary) operating systems.

– The standard root partition (indicated with a single forward slash, /) is about 100–500 MB, and contains the system configuration files, most basic commands and server programs, system libraries, some temporary space and the home directory of the administrative user. A standard installation requires about 250 MB for the root partition.

– Swap space (indicated with swap) is only accessible for the system itself, and is hidden from view during normal operation. Swap is the system that ensures, like on normal UNIX systems, that you can keep on working, whatever happens. On Linux, you will virtually never see irritating messages like *Out of memory, please close some applications first and try again*, because of this extra memory. The swap or virtual memory procedure has long been adopted by operating systems outside the UNIX world by now.

❑ **Check Your Progress – 3 :**

1. Explain Disk Partition Configuration.

_____

_____

_____

_____

_____

8.6	File Systems and Install :

– In Linux all the information is treated as a file. A single disk can store thousands of files. For organizing data on the disk, operating system provides a file system. The file system allows us to organize our files together in a structure called directory.

– Linux File system can store thousands of files.

– Everything in a Linux is stored in the form of a file whatever it is.

– In Linux we can see Text file, program files, data files, device files, executable files, directory files, object files etc.

– There are mainly three file types in LINUX.

 1. **Ordinary files / Regular files**

 2. **Directory files**

 3. **Device Files**

1. **Ordinary Files :** Ordinary files are those which is created by the user such as text file, word file or other categories files goes to this type of files.

• Text and binary files :

 ✓ A text file is a file that consists of text characters without any embedded formatting information, it is also known as an ASCII file. A text file can be read by any Editor or word processor.

 ✓ A binary file is a program or data file that contains binary information in a machine–readable form, rather than in human readable ASCII form.

2. **Directory Files :** For each directory there is a file by the same name as the directory which contain information about files stored under the directory. For Example, ex /usr

3. **Device Files :** Device files are special files typically associated with input–output devices such as printer, hard–disk, keyboard, mouse etc. hardware devices. These types of files are stored inside the /dev directory of Linux.

Linux File Hierarchy Concept :

– LINUX follows the tree–structured or hierarchical directory structure. The Linux file system is organized as hierarchy that starts with the root directory.

– The root is specified by the (/) forward slash. While in windows operating system it is uses (\) backward slash as a separator.

– All in files in Linux is stored under one main directory called root. The root directory is further divided into sub directories each of which is given a name.

The LINUX Tree structure can be shown as below :
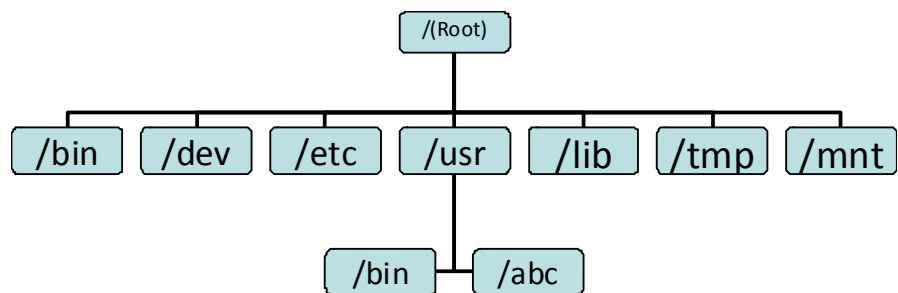
Linux File Hierarchy Structure

Some Important Directory :

– **/bin :** This directory contains executable programs files (binary files). In this directory on can find the files for the LINUX command. It is like a command.com file in Disc operating system.

– **/dev :** This directory contains the special device file. For each physical device attached with computer has one file in this directory. Printer file has prn and hard disk file as hdd etc.

– **/etc :** This directory contain all the system –wide configuration information as text files.

– **/lib :** This directory contain the library files. Library files contains the reusable functions and routines for the programmers to use.

– **/tmp :** This directory contain all the temporary files which will eventually be deleted from the system. It is like a temp folder of windows –XP operating system.

– **/mnt :** This is the directory where the storage devices other than hard disk (floppy or CD or USB drive) are mounted. This directory contains sub–directory "floppy", "cdrom" etc. When any other device mounted it shows the content for that.

– **/usr :** This directory contains the home directories of the users, source text for the online manual pages, games and other directories. There is only on home directory for each user. For example, for user called 'student' there is a same named directory will be at there. The student directory contains all the files and sub directories created by the user student.

– **/Kernel :** This directory contains all the kernel specific code. Kernel is the heart of the LINUX system. It is responsible for resource–allocation, security and low–level hardware interfaces.

Files and Directory related Rules :

1. Filename should not be longer that 255 characters.

2. Filename does not require any extension.

3. Filename can contain a–z, A–Z _(underscore) sign, digits 0 to 9, dot and hyphen sign.

4. Linux file naming is case sensitive so stud and STUD both are different.

5. Filename should not contain any white space.

What Is Pathname and Types of Pathnames ?

– Each directory in LINUX is referred to by using the pathname beginning from the root directory. For example, the directory usr is referred to as /usr.

– There are two types pathnames which are :

   1.   Absolute pathname

   2.   Relative pathname

1. **Absolute Pathname** – "An absolute pathname indicates the complete path of a directory starting from the root."

2. **Relative Pathname** – "Relative pathname indicates the location of a directory, relative the current working directory."

❑   **Check Your Progress – 4 :**

1.   Explain File System.

8.7   GNU/LINUX Distribution :

–   Different companies and group have packaged Linux and Linux software in slightly different ways.

–   Each company or group then releases the Linux package, usually on a CD–ROM.

–   Some of the more popular distributions are Red Hat, Ubuntu, Mepis, SUSE, Fedora and Debian.

–   The Linux kernel is centrally distributed through kernel.org. All distributions use this same kernel, while it may be configured differently.

–   Linux has produced a great variety of distribution.

–   Many aim to provide a complete solution providing support for any and all task. These include distributions like SUSE, Red Hat, and Ubuntu.

–   Some are differences on other distributions, like Centos, which is based on Red Hat Enterprise Linux, and Ubuntu, which derives from Debian Linux.

–   Others have been developed for more specialized tasks or to support certain features.

–   The free distribution is used to develop new features, like Fedora Project for Red Hat.

–   Check the following sites for details about current distributions.

URL	Site Description
redhat.com	Red Hat Linux
fedoraproject.org	Fedora Linux
centos.org	Centos Linux
opensuse.com	openSUSE Linux
debian.org	Debian Linux
ubantu.com	Ubuntu Linux
mepis.org	Mepis Linux
gentoo.org	GentooLinux
turbolinux.com	Turno Linux
knoppix.org	Knoppix Linux
linuxiso.com	CD–ROM ISO images of Linux distributions
distrowatch.com	Detailed information about Linux distribution
kernel.org	Linux Kernel

8.8 Basic Shell Commands :

– Linux refers to the kernel, which is the fundamental, invisible program that runs your PC and lets everything happen.

– The GNU Project provides many low–level pieces of code and programs.

– The GNU project provides various shell programs. Some of these offer graphical functionality, but most are text only.

– These text shell programs are known as *terminal programs*, and referred to as *command–line prompts*.

What is Bash Shell ?

– The best way of explaining the BASH shell to a Windows user is to compare it to DOS command prompt.

– It lets you issue commands directly to the operating system via the keyboard.

– The difference is that the BASH shell has commands for just about everything you might do on your system, whereas the DOS command prompt is restricted to tools capable of manipulating and viewing files and directories.

– It's true that many programs are designed to run via the BASH shell, but most actually run on the Linux operating system, and simply take input and show their input via the BASH shell.

– Linux finds itself with the BASH shell largely because Linux is a duplicate of UNIX. In the early days of UNIX, the text–based shell was all that was offered as a way of letting users control the computer.

– Most Linux distributions come with a choice of different kinds of shell programs. However, the default shell is BASH in Ubuntu. BASH stands for Bourne Again Shell.

– BASH is capable of scripting, which means you can even create your own simple programs.

Getting Started with Shell :

– You can start the shell in a number of ways. The most common is to use a terminal emulator program. This runs a shell inside a program window on your desktop.

– You can start GNOME Terminal, the built–in GNOME shell emulator, by clicking **Applications → Accessories → Terminal.**

– You will see the terminal window – a blank, white window similar to text editor. It will show what's referred to as a *command prompt*: a few words followed by the dollar symbol: $.

    user@ubuntu:~$

– The first part is my username – the user account I created during installation and use to log in to the PC.

– After the @ sign is the name of the PC, which I also chose when installing Ubuntu.

– After the colon (:) is the current directory you are browsing.

– ~ symbol appears instead of an actual path or directory name. This is simply Linux shorthand for the user's home directory. In other words ~ sign represent /home/jack/.

– After this is the dollar symbol ($), which indicates that I am currently logged in as an ordinary user, as opposed to the root user.

– Finally, there is a cursor, and this is where you can start typing commands.

• **Logging In**

– After Ubuntu has booted, you will see the login screen. Here, you have to enter the username and password you created during the installation process.

– By clicking one of the buttons on the bottom left side of the screen, you can also see option to reboot the system or shut it down.

Ubuntu Login Screen

– The user account you created during installation is similar to what Windows refers to as an administrator account. This means that the account you use on a day–to–day basis can also change important system settings and reconfigure the system.

– However, the main difference between Ubuntu and Windows is that you will need to enter your password to make any serious changes.

– Don't worry about damaging anything accidentally trying to reconfigure the system or access a serious system setting will always bring up a password prompt. You can simply click the Cancel button if you don't want to continue.

• **Listing Files :**

Use	– It is use to list out the contents of a directory and files.
Syntax	– ls [Press Enter]
Attributes	1. –a list hidden files.
	2. –d list the name of the current directory.
	3. –F display directory with / (forward slash), executable files with *, symbolic links with @.
	4. –g show group ownership of file in long listing.

	5. –i print the inode number of each directory.
	6. –l long listing giving details about file and directory.
	7. –R list all sub directories encountered.
	8. –t sort by time modified instead of name.
Example	

- **Editing Files :**

    Understanding vi modes

– To understanding how vi works, you need to understand the difference between the various modes.

– There are three modes : *Command mode, Insert mode*, and *Command–Line mode.*

- **Command Mode :**

– Command mode is vias central mode.

– When the editor starts up, it is in Command mode. This lets you move around the text and delete words or lines of text. vi returns to Command mode after most operations.

– In this mode, the status bar at the bottom of the screen shows information such as the percentage progress through the document.

– You cannot insert text in this mode; you can delete and manipulate words and lines within the file.

– You can also move through the text using the cursor keys and Page Up and Page Down keys.

– Following is the list of commands you can use in Command mode :

Command	Description
Delete Text	
dd	Delete current line.
ndd	Delete n number of lines. (5dd will delete five lines)
dw	Delete the current word under the cursor.
db	Delete the word before the cursor.
D	Delete everything from the cursor to the end of the line.
Search	
/	Search forward.
?	Search backwards.
n	Repeat search in forward direction.
N	Repeat search in backward direction.

Cut and Paste	
yy	Copy the current line.
*n*yy	Copy n number of lines into the buffer from the cursor downwards. (5yy copies five lines of text).
p	Paste the contents of the clipboard.
Insert Text	
i	Switch to insert mode at the cursor.
o	Switch to insert mode, placing the cursor below current line.
0	Switch to insert mode, placing the cursor above current line.
A	Append text to end of line.
Navigation	
$	Move the cursor to the end of the current line.
w	Move the cursor to the next word.
b	Move the cursor to the previous word.
Miscellaneous	
.	Repeat the last command.
u	Undo the last command

- **Insert Mode :**

  – To type your own text or edit text, you need to switch to Insert mode. This is done by typing i, but you can also type **0** or **o** to change Insert mode, which is indicated by the word INSERT appearing at the bottom of the screen.

  – In Insert mode, you can still move around the text using the cursor keys. Anything you type will appear the point of the cursor.

  – **To quit** this mode, press the **Esc key**. This will return you to Command mode.

- **Command–Line Mode :**

  – This is the mode in which you can enter commands to save and load files, as well as perform other fundamental tasks to control vi or to quit the program.

  – You can enter Command–Line mode by typing a colon (:), although if you are in Insert mode, you will first need to leave it by pressing Esc key.

  – You can identify when vi is in this mode because the cursor will be at the bottom of the screen next to colon symbol.

  – **To quit** Command–Line mode, press the **Esc key**. You will be return to Command mode.

  – Following is the list of commands use in Command–Line mode :

Command	Description
:w	Save the file.
:w!	Save the file and ignore errors such as an existing file with the same filename.
:q	Quit vi
:q!	Quit vi and ignore errors such as an unsaved file.
:s/word/replacement/	Search from the cursor downwards and replace any instances of the word with the replacement.
:help	View helps documentation.

Using vi to edit file :

–   To edit the file simple vi filename with .sh extension (vi demo.sh), it will open the file and you can see the content of the file on the screen.

–   Press i for the insert mode, it means now you are able to write code or logic in the vi editor. Edit the text as per the requirement.

–   After completion of the editing press Esc key to enter into Command_Line mode and then after press :wq it will save the edited text to the file. :w will save the file while q will quit the vi editor.

Creating new text file using vi :

•   **How to open vi editor :**

1.   Open the Terminal window from **Applications → Accessories → Terminal.**

2.   In the Terminal window write vi and with file name and .sh extension press enter, .sh means shell script, it will open vi editor.

•   **How to create file in vi editor :**

1.   In the Terminal window write vi and with file name and .sh extension press enter, .sh means shell script, it will create file. If file is exists then it will open the file otherwise it will create new file.

2.   Press i for the insert mode, it means now you are able to write code or logic in the vi editor.

•   **How to save file in vi editor :**

1.   After writing a code press Esc key to enter into Command Line mode then after press :wq it will save the file. :w will save the file while q will quit the vi editor.

•   **How to open file :**

1.   To open the file writes vi filename with .sh extension (vi demo.sh), it will open the file and you can see the content of the file on the screen.

2.   If you have edit the text in the file then press Esc key to enter into Command_Line mode and then after press :wq it will save the edited text to the file. :w will save the file while q will quit the vi editor.

3.   If you have not edit the text and simply want to come back from vi editor then just press Esc key to enter into Command_Line mode and then after press :q.

• **Copying Files :**

Use	– It is use to copy file or group of files.
Syntax	– cp [Source File] [Destination File].
Example	


```
                        student@localhost:~

File  Edit  View  Search  Terminal  Help

BCA        Desktop    first      Music      rtu      Templates
COJIT      Documents  Hello      Pictures   rushab   Videos
demo.txt   Downloads  hello.txt  Public     sem-6
[student@localhost ~]$ cat hello.txt
Hello Every one?




how are you?
[student@localhost ~]$ cat demo.txt
hello
how are you?
[student@localhost ~]$ cp hello.txt demo.txt
[student@localhost ~]$ cat demo.txt
Hello Every one?




how are you?
[student@localhost ~]$ █
```

• **Moving Files :**

– To move files, use the mv command (man mv), which is similar to the cp command, except that with mv the file is physically moved from one place to another, instead of being duplicated, as with cp.

– Common options available with mv include :

  ✓ **–i – interactive.** Will prompt you if the file you've selected will overwrite an existing file in the destination directory. This is a good option, because like the –i option in cp, you'll be given the chance to make sure you want to replace an existing file.

  ✓ **–f – force.** Overrides the interactive mode and moves without prompting. Unless you know what, you're doing, this option doesn't play nice; be very careful about using it until you become more comfortable with your system.

  ✓ **–v – verbose.** Shows a list of the files being moved.

– If you want to move a file out of your home directory and into another directory, you would type :

– mv sneakers.txt tigger

– or, mv sneakers.txt /home/billy /home/billy/tigger using absolute pathnames.

- **Viewing File Contents :**

  Head Command

Use	– It is use to display top lines of the file.
	– By default, it displays first 10 lines of files, but used with –n option, display n lines of a file.
Syntax	– head [File Name]
Example	

```
File  Edit  View  Search  Terminal  Help
[student@localhost ~]$ cat > head.txt
hello
every
one
how
are
you
?
hows
life
going
on
?
^Z
[1]+  Stopped                cat > head.txt
[student@localhost ~]$ head head.txt
hello
every
one
how
are
you
?
hows
life
going
```

  Tail Command :

Use	– It is use to display bottom lines of the file.
	– By default, it displays last 10 lines of files, but used with –n option, display n lines of a file.
Syntax	– tail [File Name]
Example	

```
                        student@localhost:~

File  Edit  View  Search  Terminal  Help
[student@localhost ~]$ tail -3 head.txt
going
on
?
```

More :

– The more command is a "pager" utility used to view text in the terminal window one page or screen at a time. The [Space] bar moves forward one page and [Q] quits.

Less :

Use	– cat works well only with short files and to give you more control when viewing text files, the less & more commands are created.
	– less command is the same as more command except you can navigate the page up/down using the less command and it is not possible in more command.
Syntax	– less [File_Name] [Press Enter]
	– less myfile.txt [Press Enter]

• **Changing File Modes and Permissions :**

Use	– It is use to give permission to the files and directory.
	– There are two ways to give permission:
	(1) Character Permission (2) Numeric Permission
Syntax	– chmod [category] [Operations] [Permission] [File name / directory.
Attribute	o **Character Permission**
	– Category: u – user, g – group, o – other, a – all.
	– Operations: + – assign, – – deny / set, = – absolute arguments.
	– Permissions: r – read, w – write, x – execution.
	o **Numeric Permission**
	– 400 read by owner
	– 040 read by group
	– 004 read by anybody (Other)
	– 200 write by owner
	– 020 write by group
	– 002 write by anybody
	– 100 execute by owner
	– 010 execute by group
	– 001 execute by anybody

Example

```
student@localhost:~

File  Edit  View  Search  Terminal  Help
[student@localhost ~]$ ls
BCA        demo.txt   Downloads  hello.txt  Public   sem-6      Videos
COJIT      Desktop    first      Music      rtu      Templates
demo1.txt  Documents  Hello      Pictures   rushab   text.sh
[student@localhost ~]$ chmod +x text.sh
[student@localhost ~]$ ./text.sh
Good Morning....
Hello Every One?
How Are You
[student@localhost ~]$
```

8.9   Process Management :

- In Linux, instances of currently running programs are referred to as processes.

- When you start Apache for example, it is assigned a process ID. This ID is then used to monitor and control the program.

- Monitoring and controlling processes are a core responsibility of any Linux system administrator. An admin can stop ("kill") a process, restarts it, or even assigns it a different priority.

- The standard Linux commands **ps** and **top** are commonly used to look at the current process table.

- **Monitoring Process :**

- There are several ways to monitoring your process which are as follows :

1.   Monitoring processes with ps :

- One of the standard tools for monitoring Linux processes is **ps**, which is short for process status. This command returns information on running programs.

- The information can include the username a program is running under, the amount of CPU it is using, and the length of time it has been running.

- This data can be valuable when you need to manually stop a program or if you just need to determine what program is slowing down the system.

- If you issue the **ps** command alone, it will list only processes that are running on the current terminal.

    For Example :

    ```
    [student@localhost ~]$ ps
      PID TTY          TIME CMD
     1748 pts/0    00:00:00 bash
     1761 pts/0    00:00:00 ps
    ```

- Currently, the only processes assigned to this user/terminal are the Bash shell and the ps command itself.

- You can see the PID (Process ID) listed for each one as well as the TTY, TIME, and CMD.

- TTY denotes which terminal the process is running on, TIME shows how much CPU time the process has used, and CMD is the name of the command that started the process.

2.   Monitoring processes with top :

- Another good program to get familiar with is top.

- This program is similar to ps but is usually started full screen and updates continuously with process information.

- This can help with programs that may infrequently cause problems and can be hard to see with ps.

- Overall system information is also presented, which makes a nice place to start looking for problems. Information such as total system CPU and memory resources, as well as the load average, is helpful by itself.

- **Managing Process :**

– Once you have used tools such as ps and top to monitor processes, you need to know how to manage them.

– You can do this with commands such as **kill, killall,** and **renice.**

1. **Send Signals to processes :**

– Linux signals, which are as asynchronous way to communicate with processes.

– We are using CTRL + C and CTRL + Z, which are other ways of sending a signal to processes. The general way to send signal is with the kill command.

2. **Sending Signals using kill :**

– **Kill** sends signals to running processes. The most obvious usage is to halt program execution. You will first need to get the PID for a running program.

For Example :

$kill 125

– Under normal circumstances, this should stop the process 125. Also note that you will either need to be the owner of the process or root to halt it.

– The command **killall**, while very much like **kill**, accepts arguments differently.

– Instead of passing it a PID, you can pass it a program name.

– All processes running with that program name will then be stopped. This applies to just the ones you own or to all of them if you are the root user.

– This is much more helpful when many processes are running under a single name.

– Be sure to watch what processes you stop, especially when you are root. Killing the wrong process could close your session or even halt the system.

3. **Terminating Process automatically :**

– Some signals cannot be caught, such as some hardware exceptions.

– SIGKILL, the most likely one you will use, cannot be caught by a signal handler and unconditionally terminates a process.

– In general, you should need this only if all other means of terminating process have failed.

The ability to monitor and control processes on your Linux system is essential. Programs such as ps, top, kill, and enable you to see what a process is doing and to control it.

❑ **Check Your Progress – 5 :**

1. Explain Process Management.

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| **8.10 User and Group Management :** |

– Users and Groups are used in Linux for access control, that is to control access the system's files, directories, and peripherals.

• **Users :**

Introduction :

– In the early time of the computer world, computer was very expensive and huge in size. So every person cannot afford the computer.

– At that time there was one computer in organization and users who want to work with the computer has to come on the place and have to do his/her work.

– Here possibility is more than one user use the same computer, so there is a possibility to perform harmful operation for other people who work on the same computer.

– So, for the security purpose a new concept introduces called user.

– A user is person who interacts with the computer to achieve specific task is called user.

– When we create a user in Linux, system creates a user configuration and directory. This configuration file and directory store information about user.

– This configuration file includes home directory, login shell, password, group, encrypted password, encrypted password for group, default login and so on.

– There are two types of user : **Super User** and **Local User.**

– Super user is also called system administration; he/she is head of the computer department. He/she is root user.

– All other user than super user is called Local user. They have limited access in computer.

Management of Users :

– For user's management following functions must have to perform

  • Create a new user

  • Update user

  • Delete user

  • Create a user directory

  • Allocate group

- **Group :**

Introduction :

– A group is a set of users.

– Group information is store in the **/etc/group** directory.

– It stores information about a group in one line with different field separated by colon such as group name, group ID, password, and users.

– When user created at that time it has default group "Dylan".

– The method of assigning a default group is called user private group scheme.

Management of Users :

- **Managing Groups :**

– You can manage group using either shell command or GUI utilities.

– Groups are an effective way to manage access and permission, let you control several users with their group name.

– The system file that holds group entries is called /etc/group. The file consists of group records, with one record per line and its fields separated by colons.

– A group record has four fields : **a group name, a password, group ID,** and **the users.**

  - **Group name :** The name of the group, which must be unique.

  - **Password :** Password with shadow security implemented, this field is an x, with the password indicated in the /etc/gshadow file. Password field can be left blank.

  - **Group ID :** The number assigned by the system to identify the group.

  - **Users :** The list of users that belong to the group, separated by comma.

For Example :

engines:x:100:aarav, jack, john, james

Here, the group name is engines, the password is managed by shadow security, the group ID is 100, and the users who are part of this group are chirag, jack, john, and james.

- **User Private Groups :**

– A new user can be assigned to a special group set up just like user and the user's name. Thus, the new user Dylan is given a default group also called Dylan. The group Dylan will also show in the listing of groups.

– This method of assigning default user group is called the User Private Group (UPG) scheme.

- **Group Directories :**

– As with users, you can create a home directory for a group.

– To do so, you simply create a directory for the group in the /home directory and change its home group to that group and allow access by any member of the group.

For Example :

Create a directory called engines and changes its group to engines group :

mkdir/home/engines

chgrp engines/home/engines

- **Managing Groups using groupadd, groupmod, and groupdel :**

− You can also manage group with the groupadd, groupmod, and groupdel commands. These command line operations let you quickly manage a group from a terminal window.

- **groupadd and groupdel :**

− With groupadd command, you can create new groups. When you add a group to the system, the system places the group's name in the /etc/group file and gives it a group ID number.

For Example :

groupadd engines

− You can delete a group with the groupdel command.

For Example :

groupdel engines

- **Groupmod :**

− You can change the name of a group or its ID using the groupmod command. Enter groupmod −g with the new ID number and the group name.

− To change the name of a group, you use the −n option. Enter groupmod −n with the new name of the group, followed by the current name.

For Example :

groupmod −n trains engines

- **Other :**

Introduction :

− Users who are guest for the computer system is called others.

− They are not permanent on the network, and they have limited permission for file and directory.

❑ **Check Your Progress − 5 :**

1. Explain User and Group Management.

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| 8.11 File Ownerships and Permissions : |

− The command chown for Change Owner is fairly straightforward and works in most all Linux and Unix environments. For Ubuntu users you will need to run sudo before any chown commands, unless you happen to be logged in as root.

– There are only two individual arguments required to execute successfully. First, you'll need to enter the user's name which will be granted file ownership, followed by a space and the file directory. The system will work out of your current working directory to choose the file. But if you'd like to bypass the overall hierarchy you can begin at root with a forward–slash in your URL.

– The system of file ownership applies a lot more fruitfully in server maintenance. If you have shell access to a server you will certainly need to understand file manipulation and taking over file permissions. For example, the installation of many common web scripts requires edits to the database information. Taking ownership of these files will keep you out of harm's way should a hacker get into the server console.

8.12 PAM Authentication :

– PAM provides a way to develop programs that are independent of authentication scheme. These programs need "authentication modules" to be attached to them at run–time in order to work.

– PAM is a framework that assists applications in performing what I'll call "authentication–related activities". The core pieces of PAM are a library (libpam) and a collection of PAM modules, which are dynamically linked libraries (.so) files in the folder /lib/security.

– Each module performs one specific task, and a "PAM–aware" application typically uses a stack of several modules to get the job done. Figure 1 below shows the overall architecture.
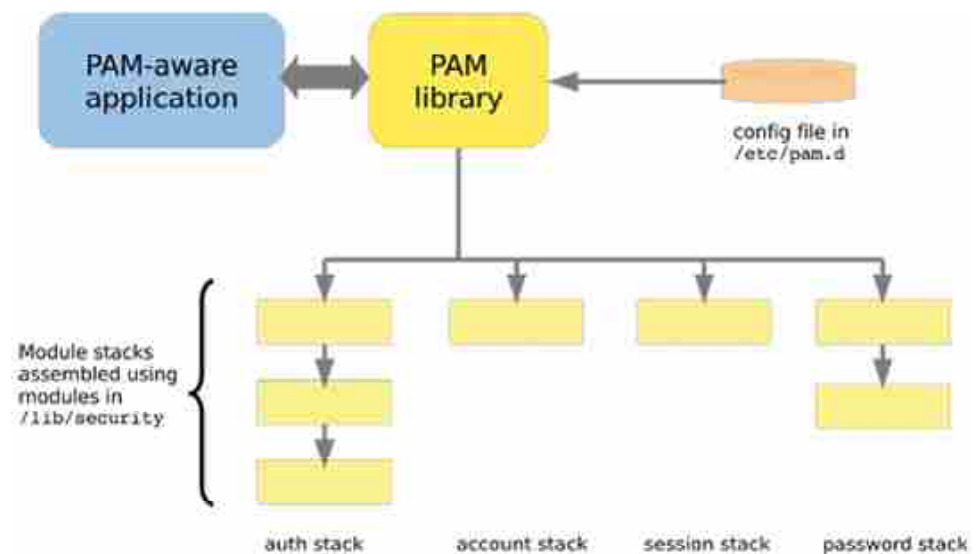
PAM

– PAM recognizes four kinds of authentication–related activity, named as follows :

✓ Auth is the most obvious activity – the actual business of proving who you are by supplying valid credentials. The traditional way of doing this is with a user–name and password, but other methods are possible such as the possession of physical token or even biometric methods such as fingerprints or retinal scans.

✓ Account is the business of deciding if, (now we know who you are,) we're going to let you log in. For example, a PAM module that implemented time–of–day login restrictions would fall into the account category.

✓ Session allocates the resources that a user might need during a login session, for example, mounting the user's home directory, setting resource usage limits, printing a message of the day, etc.

✓ Password updates a user's credentials (usually their password).

8.13 Introduction to Common System Configuration Files :

– In Linux, kernel is a program which requires configuration files in order to have an idea about list of users and groups in the system which further helps in managing file permissions. Note that these files are not specifically read by programs, but by a function provided by a system library, and used by the kernel.

– For instance, a program requiring encrypted password of user should not open the /etc/passwd file, rather than it will call the system library function getpw(). This kind of function is also known as a system call. It is up to the kernel (through the system library) to open the /etc/passwd file and after that, search for the password of the requested user.

Profile	System wide environment and startup script program.
/dev/MAKEDEV	The /dev/MAKEDEV file is a script written by the system administrator that creates local only device files or links such as device files for a non–standard device driver.
/etc/aliases	Where the user's name is matched to a nickname for e–mail.
/etc/bootptab	The configuration for the BOOTP server daemon.
/etc/crontab	Lists commands and times to run them for the cron deamon.
/etc/dhcpd.conf	The configuration file for the DHCP server daemon.
/etc/ethers	File for RARP mapping from hardware addresses to IP addresses.
/etc/exports	The file describing exported filesystems for NFS services.
/etc/fdprm	The floppy disk parameter table. Describes the formats of different floppy disks. Used by setfdprm.
/etc/filesystems	Can be used to set the filesystem probe order when filesystems are mounted with the auto option. The nodev parameter is specified for filesystems that are not really locally mounted systems such as proc, devpts, and nfs systems.
/etc/fstab	Lists the filesystems mounted automatically at startup by the mount –a command (in /etc/rc or equivalent startup file).
/etc/group	Similar to /etc/passwd but for groups rather than users.

/etc/groups	May contain passwords that let a user join a group.
/etc/gshadow	Used to hold the group password and group administrator password information for shadow passwords.
/etc/host.conf	Specifies how host names are resolved.
/etc/hosts	List hosts for name lookup use that are locally required.
/etc/HOSTNAME	Shows the host name of this host. Used for support of older programs since the hostname is stored in the /etc/sysconfig/network file.
/etc/inittab	Configuration file for init, controls startup run levels, determines scripts to start with.
/etc/inetd.conf	Sets up the services that run under the inetd daemon.
/etc/issue	Output by getty before the login prompt. Description or welcoming message.
/etc/issue.net	Output for network logins with LINUX version
/etc/ld.so.conf	Configuration file for ld.so, the run time linker.
/etc/lilo.conf	Configuration file for LILO.
/etc/limits	Limits users' resources when a system has shadow passwords installed.
/etc/localtime	In Debian the system time zone is determined by this link.
/etc/login.defs	Sets user login features on systems with shadow passwords.
/etc/logrotate.conf	Configures the logrotate program used for managing logfiles.
/etc/magic	The configuration file for file types. Contains the descriptions of various file formats for the file command.
/etc/motd	The message of the day, automatically output by a successful login.
/etc/mtab	A list of currently mounted file systems. Setup by boot scripts and updated by the mount command.
/etc/named.conf	Used for domain name servers.
/etc/networks	Lists names and addresses of your own and other networks, used by the route command.
/etc/nologin	If this file exists, non–root logins are disabled. Typically, it is created when the system is shutting down.
/etc/nsswitch.conf	Name service switch configuration file.
/etc/passwd	The user database with fields giving the username, real name, home directory, encrypted password and other information about each user.
/etc/printcap	A configuration file for printers.

/etc/profile, /etc/cshlogin, /etc/csh/cshrc	Files executed at login or startup time by the Bourne or C shells. These allow the system administrator to set global defaults for all users.
/etc/protocols	Describes DARPA internet protocols available from the TCP/IP subsystem. Maps protocol ID numbers to protocol names.
/etc/rc or /etc/rc.d or /etc/rc?.d	Scripts or directories of scripts to run at startup or when changing run level.
/etc/rc.d/rc0.d	Contains files used to control run level 0. Usually, these files are softlink files.
/etc/rc.d/rc1.d	Contains files to control run level 1. Scripts beginning with an S are for start, K for kill.
/etc/rc.d/rc.sysinit	Init runs this when it starts.
/etc/resolv.conf	Configures the name resolver, specifying the address of your name server and your domain name.
/etc/securetty	Identifies secure terminals from which root is allowed to log in.
/etc/services	Lists the network services that the system supports.
/etc/shadow	Shadow password file on systems with shadow password software installed. Shadow passwords move the encrypted password files from /etc/passwd to /etc/shadow which can only be read by root.
/etc/shadow.group	Systems with shadow passwords may have this file.
/etc/shells	Lists trusted shells. The chsh command allows users to change their login shell to shells listed only in this file.
/etc/skel/.profile	Can be used by administrator to set the editor environment variable to some editor that is friendly to new users.
/etc/sudoers	A list of users with special privileges along with the commands they can execute.
/etc/smb.conf	The configuration file for setting up Samba services.
/etc/sysconfig/amd	Used to configure the auto mount daemon.
/etc/sysconfig/clock	Used to configure the system clock to Universal or local time and set some other clock parameters.
/etc/sysconfig/i18n	Controls the system font settings.
/etc/sysconfig/init	This file is used to set some terminal characteristics and environment variables.
/etc/sysconfig/ keyboard	Used to configure the keyboard.
/etc/sysconfig/ mouse	This file is used to configure the mouse.

/etc/sysconfig/	Defines a network interface.
network–scripts/	
ifcfg–interface	
/etc/sysconfig/ pcmcia	Used to configure pcmcia network cards.
/etc/sysconfig// routed	Sets up dynamic routing policies.
/etc/sysconfig/ static–routes	Configures static routes on a network.
/etc/sysconfig/tape	Used for backup tape device configuration.
/etc/X11/ XF86Config	The configuration file for the X server.
/etc/syslog.conf	Configuration file for the syslogd daemon.
/etc/termcap	The terminal capability database. Describes by what "escape sequences" various terminals can be controlled. See terminfo, termcap, curs_termcap man pages.
/etc/terminfo	Details for terminal I/O.
/etc/usertty	This file is used to impose special access restrictions on users.
$HOME/.bashrc	User aliases, path modifier, and functions.
$HOME/ .bash_profile	Users environment stuff and startup programs.
$HOME/ .bash_logout	User actions to be done at logout.
$HOME/.hushlogin	When this file exists in the user's home directory, it will prevent check for mail, printing of the last login time, and the message of the day when the user logs in.
$HOME/.inputrc	Contains keybindings and other bits.
$HOME/ Xrootenv.0	Has networking and environment info.
/proc/cpuinfo	Information about the processor such as its type, make and performance.
/proc/devices	A list of devices configured into the currently running kernel.
/proc/dma	Shows which DMA channels are being used at the moment.
/proc/filesystems	Filesystems that are configured into the kernel. The file used to detect filesystems if the /etc/filesystems does not exist.
/proc/ioports	Shows which I/O ports are in use at the moment.

/proc/interrupts	Shows which interrupts are in use and how many of each there have been.
/proc/kcore	An image of the physical memory of the system.
/proc/kmsg	Messages output by the kernel. These are also routed to syslog.
/proc/ksyms	Symbol table for the kernel.
/proc/loadavg	The load average of the system.
/proc/meminfo	Information about memory usage, both physical and swap.
/proc/modules	Which kernel modules are currently loaded?
/proc/mounts	Contains information on filesystems currently mounted, similar to /etc/mtab
/proc/net	Contains status information about network protocols.
/proc/self	A symbolic link to the process directory of the program that is looking at /proc. When 2 processes look at proc, they get different links.
/proc/stat	Various statistics about the system such as the number of page faults since the system was booted.
/proc/uptime	The time the system has been up.
/proc/version	The kernel version.
/tmp/fvwmrca01339	FVWM–M4 defines. Contains networking, Xwindows, other setup info.
/usr/lib/zoneinfo	Time zone datafiles are stored here on the Debian system
/var/log/lastlog	Used by finger to tell when a user was last logged in.
/var/log/wtmp	Binary info on users that have been logged on. The last command uses this info.
/var/run/utmp	Contains information about users currently logged in. Who and w commands use this file.
/var/named/ root.hints	Used for domain name server. Placed here optionally, but this is the normal location.
/var/named/*	Files used by domain name server. Placed here optionally, but this is the normal location.
/var/log/btmp	Used to store information about failed logins. This file must be first created to activate it.
/var/log/lastlog	Contains information about the last time a login was done on the system.
/var/log/maillog	The normal system mail log file.
/var/log/messages	The main system message log file.
var/log/secure	System tracking of user logins. Check this file periodically.
/var/spool/mail	Where mailboxes are usually stored.

8.14   Log Files :

– When your systems are running smoothly, take some time to learn and understand the content of various log files, which will help you when there is a crisis and you have to look though the log files to identify the issue. The following are the 20 different log files that are located under /var/log/ directory.

✓ **/var/log/messages** – Contains global system messages, including the messages that are logged during system startup. There are several things that are logged in /var/log/messages including mail, cron, daemon, kern, auth, etc.

✓ **/var/log/dmesg** – Contains kernel ring buffer information. When the system boots up, it prints number of messages on the screen that displays information about the hardware devices that the kernel detects during boot process. These messages are available in kernel ring buffer and whenever the new message comes the old message gets overwritten. You can also view the content of this file using the dmesg command.

✓ **/var/log/auth.log** – Contains system authorization information, including user logins and authentication mechanism that were used.

✓ **/var/log/boot.log** – Contains information that are logged when the system boots.

✓ **/var/log/daemon.log** – Contains information logged by the various background daemons that runs on the system.

✓ **/var/log/dpkg.log** – Contains information that are logged when a package is installed or removed using dpkg command.

✓ **/var/log/kern.log** – Contains information logged by the kernel. Helpful for you to troubleshoot a custom–built kernel.

✓ **/var/log/lastlog** – Displays the recent login information for all the users. This is not an ascii file. You should use lastlog command to view the content of this file.

✓ **/var/log/maillog /var/log/mail.log** – Contains the log information from the mail server that is running on the system. For example, sendmail logs information about all the sent items to this file.

✓ **/var/log/user.log** – Contains information about all user level logs.

✓ **/var/log/Xorg.x.log** – Log messages from the X.

✓ **/var/log/alternatives.log** – Information by the update–alternatives is logged into this log file. On Ubuntu, update–alternatives maintains symbolic links determining default commands.

✓ **/var/log/btmp** – This file contains information about failed login attemps. Use the last command to view the btmp file. For example, "last –f /var/log/btmp | more".

✓ **/var/log/cups** – All printer and printing related log messages.

✓ **/var/log/anaconda.log** – When you install Linux, all installation related messages are stored in this log file.

✓ **/var/log/yum.log** – Contains information that are logged when a package is installed using yum.

✓ **/var/log/cron** – Whenever cron daemon (or anacron) starts a cron job, it logs the information about the cron job in this file.

✓ **/var/log/secure** – Contains information related to authentication and authorization privileges. For example, sshd logs all the messages here, including unsuccessful login.

✓ **/var/log/wtmp or /var/log/utmp** – Contains login records. Using wtmp you can find out who is logged into the system. who command uses this file to display the information?

✓ **/var/log/faillog** – Contains user failed login attempts. Use faillog command to display the content of this file.

❑ **Check Your Progress – 7 :**

1. Write a note on Log Files.

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8.15 Let Us Sum Up :

– Partitions can be different sizes, and different partitions may have different file systems on them, so a single disk can be used for many purposes, including sharing it between multiple operating systems.

– GNU/Linux, or simply Linux, is an alternative to Microsoft Windows. It is easy to use and gives more freedom to users. Anyone can install it as Linux is free as in freedom, and often available free of charge.

– In Linux, kernel is a program which requires configuration files in order to have an idea about list of users and groups in the system which further helps in managing file permissions

– In computers, you can say that protocol is a set of rules with the help of which computing devices are able to communicate. The communication is done through a network. A network is a medium by which individual's computers are able to connect with one another and thus are able to share information.

8.16 Answers for Check Your Progress :

❑ **Check Your Progress 1 :**

1. (a)   2. (b)   3. (d)   4. (c)   5. (a)

❑ **Check Your Progress 2 :**

1. (Refer 8.3)

❑ **Check Your Progress 3 :**

1. (Refer 8.4)

❑ **Check Your Progress 4 :**

1. (Refer 8.5)

❑ **Check Your Progress 5 :**

1. (Refer 8.8)

❑ **Check Your Progress 6 :**

1. (Refer 8.9)

❑ **Check Your Progress 7 :**

1. (Refer 8.13)

8.17 Glossary :

1. **Kernel** – Kernel is a core program that runs program and manages hardware devices such as printers and disks.

2. **Partition** – Partitioning is a means to divide a single hard drive into many logical drives.

3. **Absolute Pathname** – An absolute pathname indicates the complete path of a directory starting from the root.

4. **Relative Pathname** – Relative pathname indicates the location of a directory, relative the current working directory.

5. **User** – A user is person who interacts with the computer to achieve specific task is called user.

6. **Super User** – Super user is also called system administration; he/she is head of the computer department. He/she is root user.

7. **Local User** – All other user than super user is called Local user.

8.18 Assignment :

1. Explain History of Linux and Architecture of Linux.

2. Explain Common System Configuration Files

3. Explain different Linux command for

   listing files

   copying files

   moving files

   viewing file contents

   changing file modes and permissions

8.19 Activities :

Write a detailed note on File System.

8.20 Case Study :

Study file Organisation in Linux Operating System.

8.21 Further Reading :

1. Linux Operating System Concept by Abraham Silberschatz, Peter Baer Galvin, Greg Gagne

2. An Introduction to Modern Electronic Media, Joseph Dominick, Barry Sherman, and Fritz Messere

Unit 09 *HARDWARE CONFIGURATION*

UNIT STRUCTURE

9.0   Learning Objectives :

After learning this unit, you will be able to understand :

- Basics idea about different Hardware Configuration
- Details of OS boot up process
- Idea about GNU/Linux everyday tasks
- Networking Configuration
- Basics of TCP/IP

9.1 Introduction :

– When using Windows, you might have come across Device Manager that lists your PC's hardware.

– Ubuntu contains a similar piece of software, which you can open by selecting **System → Administration → Device Manager.**

– Ubuntu's Device Manager program can display just about everything you need to know about attached hardware.

– You should be aware of a few important differences between the Windows and Ubuntu versions of Device Manager.

– Under Ubuntu, the list is for the information only. You cannot twist any settings. On the other hand, Ubuntu's list is more comprehensive than that in Windows. In Ubuntu, Device Manager thoroughly searches the hardware to discover its capabilities.

– The biggest difference is that just because a piece of hardware is listed within Ubuntu's Device Manager doesn't mean that the hardware is configured to work with Ubuntu.

– Device Manager's list is simply the result of searching devices attached to the various system buses and reporting back the data.

– Device Manager is the best starting place if you find that a certain piece of hardware is not working.

– You will need to use Ubuntu's Device Manager, because most hardware will work after you install Ubuntu. At the very most, all you will need to do is configure a few settings for the hardware.

9.2 Configuring Additional Hardware :

– Most Linux distributions are supplied with boot disks that work for all common types of PC hardware. Generally, the supplied kernel is highly modularized and includes nearly every possible driver. This is a great idea for boot disks, but is probably not what you'd want for long–term use.

9.2.1 Sound Cards :

– Your sound card will not require any additional configuration and will work immediately after you install Ubuntu.

– The icon for the volume control applet is located at the top right of the Ubuntu desktop, and it offers a quick way to control the master volume.

– If your sound card offers more than stereo output, such as multiple–speaker surround sound, then it is necessary to take some simple steps to allow full control of the hardware.

1. **Right–click** the **volume control icon** and select **Open Volume Control**.

2. In the dialog box that appears, **click Edit**, and then **click Preferences**.

3. The **Volume Control Preferences** dialog box appears. **Select the sliders that you wish to be visible**.

4. When you have **finished**, click the **Close button**.

9.2.2 Display Cards :

– Initially you need to find what graphic hardware is there on PC and what graphic driver is used. It is better to get access to a terminal/konsole, either by opening a bash shell (terminal/konsole) if you have a GUI, or if you only have a full screen black screen using <CTRL><ALT><F2> which may take you to a full screen text mode with a log in prompt (in which case login as a regular user). Then in both cases (bash shell or full screen) type the following as a regular user:

– /sbin/lspci –nnk | grep VGA –A2

– Note what you type in GNU/Linux is 'case sensitive'. That command should tell you what graphics hardware you have on your PC. For example, on a PC with nVidia proprietary graphic driver, one can get :

02:00.0 VGA compatible controller [0300]: NVIDIA Corporation GT200 [GeForce GTX 260] [10de:05e2] (rev a1)

– Subsystem : ASUSTeK Computer Inc. Device [1043:82cf]

– Kernel driver in use: nvidia

– Given you likely have a graphic problem, your PC may only show the 1st two lines and not the kernel driver. If you have a hybrid graphics device, you may even see evidence of two graphics cards.

9.2.3 Network Cards :

– Ethernet is one of the oldest and most established network technologies.

– When we talk of Ethernet, we refer to wired networks – all the computers on the network are connected by cabling to a central hub or router.

– You might go online via an Ethernet card in a variety of situations. If you have DSL (Digital Subscriber Loop) or cable broadband service at your home or workplace, for example, you might use a DSL router.

– Your computer will then connect to this router via Ethernet, and all you need to worry about on your PC is getting your Ethernet card up and running.

– If you are running Ubuntu on a PC in an office environment, it is likely that you will connect to the local area network using and Ethernet card. This lets your computer communicate with other computer, as well as with printers.

– In some offices in which an Internet connection is provided, this connection will allow you to go online.

1. Configuring a Network Card via DHCP :

– Most computer that connects to a broadband router or an office network receive their configuration data via Dynamic Host Control Protocol (DHCP), which is to say that your computer receives its IP, gateway, subnet mask, and DNS addresses automatically.

– You will need to configure your network card to work via DHCP. You can do this configuration with the Network Settings applet, which you can be found under the **System → Administration** menu.

– You are going to configure hardware settings; you will need to enter your password to proceed.

– Follow these steps to configure your network card :

A. Select **System → Administration → Networking** to open Network settings dialog box.

B. You should find your Ethernet card at the top of the list. It will be identified as eth followed by number, such as **eth0** or **eth1**. Ubuntu should indicate that the card is not configured. Click the entry for your Ethernet card, and then click properties.

C. In the Properties dialog box, put a check in the **Enable This Connection check box**, and make sure the Configuration drop–down list reads DHCP. Then click **OK**.

D. In the Network Settings dialog box, **click Activate**. Then click **OK**.

E. After a few seconds, your network card should be up and running. Test is by using the web browser to visit a site.

– From this point on, your network card should automatically activate each time you boot, so you should not need to return to the Network Settings applet.

2. Configuring a Static IP Address :

– On some network, you might have been assigned an IP address, which you must enter manually, along with a few other networking addresses. This is referred to as a *static IP address*.

– You have to tell your system administrator or technical support person to determine these settings.

– Ask the administrator for your *IP address, DNS server addresses, your subnet mask, and the router address*.

– You will get the settings from your system administrator and usually in the form of a series of four numbers separated by dots, like 192.168.0.233

– Once you know your settings, proceed as follows:

A. Select **System → Administration → Networking** to open the Network Settings dialog box.

B. Find your network card in the list, click its entry, and then click Properties.

C. In the dialog box that appears, put a check in the **Enable This Connection** check box. In the **Configuration** drop–down list, make sure **Static IP address** is highlighted. In the **IP Address, Subnet Mask, and Gateway Address text boxes**, fill in the relevant details. Click **OK**.

D. In the **Network Settings** dialog box, click the **DNS** tab.

E. Click the **Add button**, and then type the **first DNS address**. Click **Add again**, and enter the **second DNS address**. Click **OK**.

F. Click the **Connections** tab in the **Network Settings** dialog box.

G. Click the **Apply** button, and then click **OK**.

– Your network connection should now work. Test it by using the web browser to visit a web site. If you find it is not working, try rebooting.

9.2.4 Modems :

– A modem for a PC may be either internal, external serial, or external USB. The internal one is installed inside of your PC (you must remove

screws, etc. to install it). An external one just plugs in to a cable: USB cable (USB modem) or to the serial port (RS–232 serial modem). As compared to external serial modems, the internal modems are less expensive, are less likely to suffer data loss due to buffer overrun, and usually use less electricity. An internal modem doesn't use up any desk space.

– Connecting an external modem is simple compared to connecting most other devices to a serial port that require various types of "null modem" cables. Modems use a straight through cable, with no pins crossed over. Most computer stores should have one. Make sure you get the correct gender and number of pins. Hook up your modem to one of your serial ports. If you are willing to accept the default IRQ and IO address of the port you connect it to, then you are ready to start your communication program and configure the modem itself.

9.2.5 USB Drives :

– Ubuntu automatically makes available any CDs or DVDs as you insert into your computer, and it will appear as icons on the desktop instantly. The same is true for any card readers or USB memory devises that you use.

– Alternatively, you can access the storage device by clicking Places ' Computer. Here, you will find icons for all of the storage devices attached to your computer, including floppy disk drive.

– You need to double–click the icon. Whenever you double–click any entry in the computer window, it will open a Nautilus file browser window.

– You can copy files by clicking and dragging, and right–clicking files offers virtually all the option you could need.

• **Ejecting media from devices :**

– Ubuntu is not like Windows when it comes to ejecting or unplugging removable storage devices. In some cases, devices must be unmounted, which is to say that you need to tell Ubuntu that you are finished with the device in question and that you are about to unplug it.

– In the case of CD or DVD discs, you can simply hit the Eject button on the drive itself. So, it will automatically unmount the drive.

– In the case of floppy–disks, memory cards, and other USB storage devices, you will need to right–click the icon and select Unmount Volume. Then you can unplug and/or remove the device.

9.2.6 CD Writers :

– In Linux, you can configure types of CD–writers such as SCSI, IDE/ ATAPI and the devices for parallel port. The USB CD–writers are not supported in Linux as non–SCSI writer's needs compatible drivers for SCSI devices. On the one side such a unifying strategy is easy ("everything is SCSI"), as the application level will share knowledge with other users in domain of kind of CD–writer.

– On the other side, you have to reconfigure applications like audio CD players or the mount utility to reflect the change of the driver's name. For example, if you accessed your ATAPI CD–writer through the device

file /dev/hdc before, you will have to access it through /dev/scd0 after activating the SCSI compatibility drivers.

– After setting hardware on Linux–system, the command cdrecord –scanbus describes list of devices on SCSI busses. Following will guide you in setting up of device on Linux–system which looks as:

shell> cdrecord –scanbus

scsibus0:

'Quantum ' 'XP34300 ' 'F76D' Disk

'SEAGATE ' 'ST11200N ' '8334' Disk

*

'TOSHIBA ' 'MK537FB/ ' '6258' Disk

'WANGTEK ' '5150ES SCSI 36 ' 'ESB6' Removable Tape

'EXABYTE ' 'EXB–8500–85QUE ' '0428' Removable Tape

'TOSHIBA ' 'XM–3401TASUNSLCD' '3593' Removable CD–ROM

*

scsibus1:

'Quantum ' 'XP31070W ' 'L912' Disk

*

'TEAC ' 'CD–R55S ' '1.0H' Removable CD–ROM

'MATSHITA' 'CD–R CW–7502 ' '4.02' Removable CD–ROM

*

'YAMAHA ' 'CDR400t ' '1.0d' Removable CD–ROM

*

Listing: Detecting devices on your SCSI bus

For CD–writers to be installed for IDE/ATAPI you need to load compatible driver ide–scsi which can access CD–Writer if you have no other driver. In such case the regular IDE driver to be removed so that ide–scsi driver can work on.

hda = IDE bus/connector 0 master device

hdb = IDE bus/connector 0 slave device

hdc = IDE bus/connector 1 master device

hdd = IDE bus/connector 1 slave device

Table: device file names of IDE/ATAPI devices

– The table above shows the relation of device file names and the placing of devices on the IDE busses. The device file name representing your CD–Writer has to be passed to the driver in the Linux kernel.

– Example: hdb=ide–scsi. Such a setting should be added to lilo.conf or chos.conf if the driver is statically compiled into your kernel, which seems to be the most common setup. If you need to pass more than one parameter to the kernel, then separate them with spaces. The next two listings show example configurations containing more lines than just the relevant append–line.

❑ **Check Your Progress – 1 :**

1. DHCP stands for _____ .

   a. Dynamic Host Control Protocol

   b. Dynamic Host Center Protocol

   c. Dynamic Host Configuration Protocol

   d. Dynamic Host Computer Protocol

2. _____ is one of the oldest and most established network technologies.

   a. Topology   b. Ethernet   c. Switching   d. Router

3. Write a note on Sound Cards.

   _____

   _____

   _____

   _____

   _____

4. Write a note on Display Cards.

   _____

   _____

   _____

   _____

   _____

| **9.3 Understanding the OS Boot Up Process :** |

• **Starting Up :**

– If you have chosen to dual–boot with windows, the first Ubuntu screen you will see is the boot loader menu, which appears shortly after you switch on your PC.

– If Ubuntu is the only operating system on your hard disk, you will see a brief one–line message pointing out that if you press a key, you can access this boot menu.

– In fact, if Ubuntu is the only operating system on your computer, you can skip to the next section.

– The boot loader menu you see when your PC is set to dual–boot has three or four choices.

– The top one is what you need to boot Ubuntu. The Ubuntu option will be selected automatically within ten seconds, but you can press Enter to start immediately.
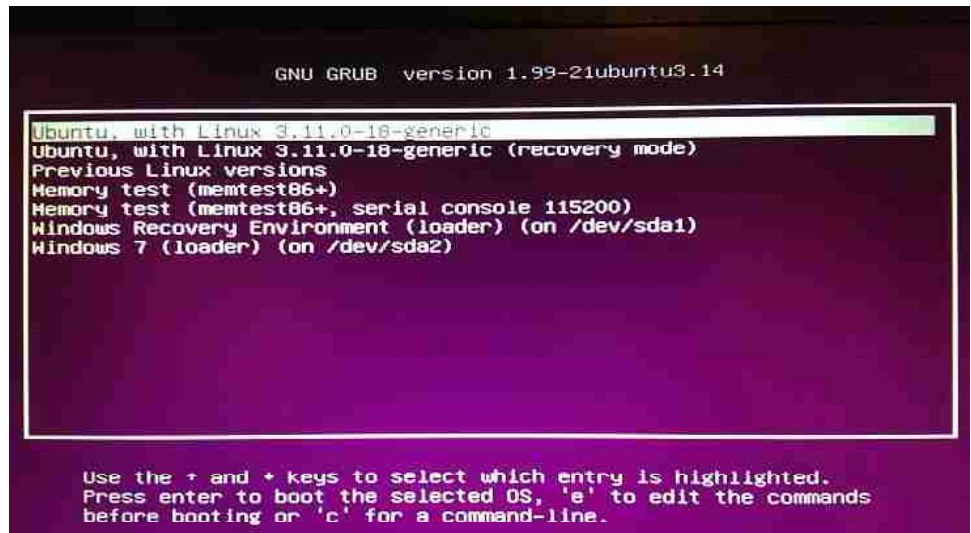
Boot Screen

– You can find that you also have an entry for Windows, located at the bottom of the list.

– To boot into Windows, simply use the cursor keys to move the selection to the appropriate option, and then press enter.

– As well as entries for Ubuntu and Windows on the boot list, you can see an entry ending in "recovery mode". This is a little like Safe Mode within windows, in that the system boot with traditional system settings, and you should be able to make repairs to the system if something has gone wrong.

– When you update your system software, you might find new entries are added to the boot menu list.

– Without exception, the top most entry is the one you will want each time to boot Ubuntu.

❑ **Check Your Progress – 2 :**

1. Write a note on OS Bootup Process

_____

_____

_____

_____

_____

_____

9.4 Performing Everyday Tasks Using GNU/LINUX :

9.4.1 Accessing the Internet :

– Internet service providers offer two main types of service :

   ✓ Shell accounts

   ✓ Point–to–Point protocol accounts

– We see that shell accounts were more popular before advent of Web that allows you to use computer much as if it were virtual console linked with remote computer where you can type commands that are interpreted by remote computer that can be seen as resulting output on computer. Although a few web browsers, such as Lynx, can operate via a shell

account, they don't generally support the highly graphical, multimedia pages which web surfers have come to expect.

– PPP account allows you to connect computer directly to Internet which can used for surfing Web directly. If ISP allows, you can even run a web server, providing pages that can be viewed by others around the world.

– You can compare two types of Internet accounts with two kinds of postal service. Imagine that no mail carrier actually comes to your home to pick and deliver mail. Instead, every time you want to conduct postal business, you go to the post office. This resembles a shell account: The computer that connects you to the Internet is remote, and every time you want to do something on the Internet you must open a terminal, or telnet, session to that computer. PPP, on the other hand, is like home delivery: The Internet comes right to your doorstep, and your computer is literally placed on the Internet by the machine at your ISP that you connect to.

– Under Microsoft Windows, you use hyperterminal to access a shell account and Dial–Up Networking to access a PPP account. Under Linux, you can choose from among several programs that let you access a shell account. The most commonly used programs are minicom and seyon. To access a PPP account under Linux, you use the PPP daemon, pppd. The next section describes how to use wvdial to make the process of establishing a PPP connection simple.

9.4.2 Playing Music :

– Music playback under Ubuntu is handled by the Rhythmbox player.

– Like many modern music players, Rhythmbox can also manage your music collection, arranging it into a library so you can locate songs easily.

– But before using Rhythmbox, you need to add support for MP3 and other popular music file formats.

• **Installing Codecs :**

– The piece of software that handles the decoding and encoding of digital music file is called a codec.

– The word is a shortened version of coder–decoder. For any digital multimedia file type you want to play back on your computer, you will need an appropriate codec. This includes both audio and video files.

– If you wish to create your own multimedia files, you might need to download an additional codec that allows the encoding of files.

– The necessary audio and video codec software for playback can be found in Ubuntu's online software repositories (warehouses).

– To get then, open the Synaptic Package Manager from **Settings → Administration,** click the search button, and then type gstreamer. In the list of results, look for the following packages :

gstreamerx.x–plugins

gstreamerx.x–plugins–multiverse

gstreamerx.x–ffmpeg

– The x.x represents the package version (0.8) was the latest at the time of writing.

– Click the check box alongside each and select Mark for installation.

– You will be told that each package needs additional software. Don't worry this is why I recommend these particular packages. The set of packages contain support for just about every form of audio playback possible on a PC.

– Click the Apply button, and the Synaptic Package Manager will download and install the software. Once this task has completed, quit the program.

• **Using Rhythmbox :**

– You will find Rhythmbox on the **Applications → Sound & Video menu**.

– The first time you run the program, it will ask you where your music files are stored. Simply click the Browse button, and then double–click the folder that holds those files. Then click OK.

– When the program starts, your music files are listed at the bottom of the program window.

– At the top left of the program window, you will find a listing of the artists behind the MP3s in your collection, and on right, you will see the album that the music track is taken from.

– Playing a track is simply a matter of double–clicking it in the list. Once the track is finished, Rhythmbox will play the next track in the MP3 file list.

– To create a playlist, right–click under the Source heading on the left side of the program window and select New Playlist. Click the new entry to type its name. To add tracks to the playlist, click Library, and then drag–and–drop files onto your new playlist entry.

– To start the playlist, click the first track in the list.

• **Listening to audio CDs :**

– Playing back audio CDs is simple. Just insert the CD, and then click **Applications → Sound & Video → CD Player.**

– This will start Ubuntu's simple but effective CD playback application. If you are online, the application will immediately attempt to look up the CD artist and track listing information from an online repository. This means that it should show the names of the tracks being played.

– The controls work in the same way as those on any other audio player. Clicking the Play button plays the current track, which you can select from the drop–down list above the player controls.

– You can skip to the next track by clicking the Next Track button and signal backwards and forwards using the relevant buttons.

– The time display in the top left of the program window shows the track's progress.

9.4.3 Editing Documents and Spreadsheets :

– Linux offers many programs as NEdit, gedit, and geany that support syntax highlighting for editing of document using edit source code or documents as in markup languages.

✓ **NEdit**, which is short for the Nirvana Editor, is a straightforward text editor that is very similar to Notepad.

✓ **Geany** is a text editor that is a lot like Notepad++ for Windows. It provides a tabbed interface for working with multiple open files at once and has nifty features like displaying line numbers in the margin. It uses the GTK+ interface toolkit.

✓ **Gedit** is the default text editor of the GNOME desktop environment. It's a great, text editor that can be used on just about any Linux system.

❑ **Check Your Progress – 3 :**

1. ISP stands for _____.

   a. Internet Service Provider   b. Internet Service Protocol

   c. Internet System Provider   d. Internet Structure Provider

2. Music playback under Ubuntu is handled by the _____ player.

   a. Codecs   b. Rhythmbox   c. Minicom   d. Seyon

3. Linux offers _____ program to edit the document.

   a. NEdit   b. Gedit   c. Geany   d. All of Above

9.5   Configuring Networking :

– The Internet is a global network of computers. Every computer that is connected to the Internet is considered a part of that network. The Internet was first created by the Advanced Research Projects Agency (ARPA) of the U.S. government in 1960's, and was first known as the ARPANet. Once the Internet is connected it shows desktop icon at the bottom on the Task bar as shown :

Configuring Network

– Once the Internet is connected now your computer can be connected to the Internet by using the Modem. The Internet has several connections to connect such as :

A.   DSL

B.   Wireless

• **Configuring Networking :**

– There are certain steps which are involved while configuring a network:

Step 1. Go to System → Administration → Network

Step 2. Select the Wired Connection
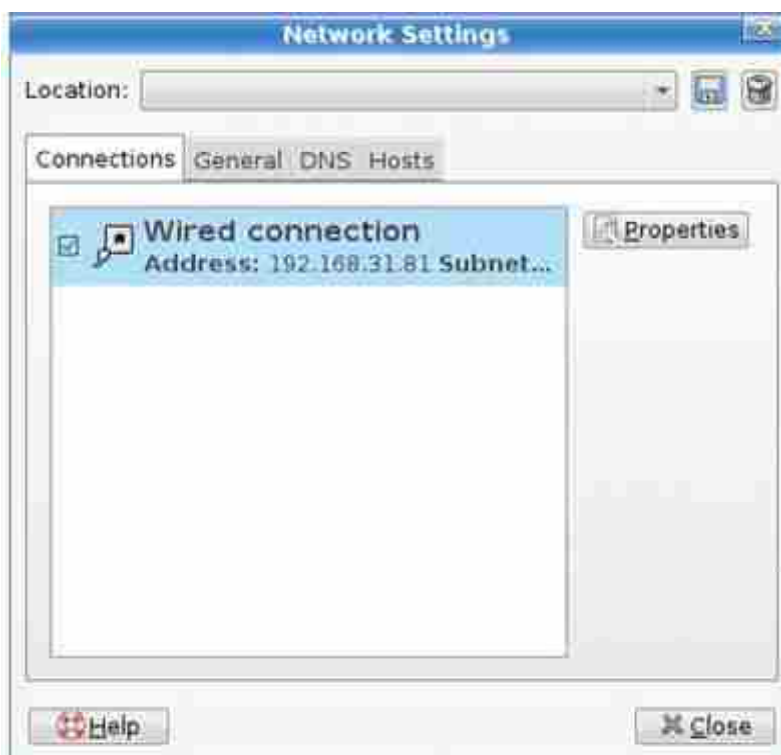
Step 3. Set the IP address, Gateway etc. and click OK.

Step 4. Click the close button.
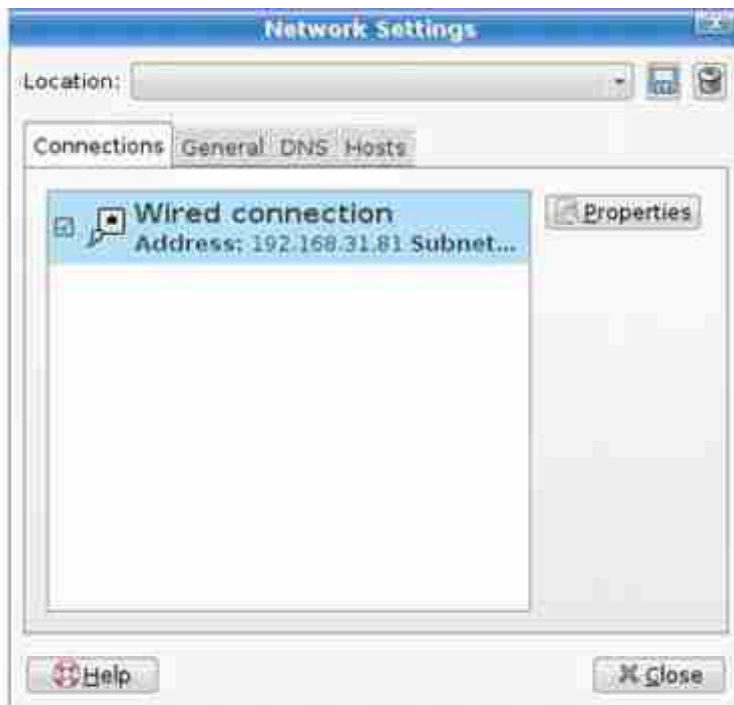
9.5.1 Basics of TCP/IP Networking and Routing :

–   In network whenever one user sends email, data, files etc.... to other user, it is important that correct data reach at correct address in correct time.

–   Because of these two reasons two most popular protocols used are **Transmission Control Protocol (TCP)** and **Internet Protocol (IP).**

–   TCP handles packet flow between systems and IP handles the routing of packets.

–   All modern networks are now designed using a layered approach. Each layer presents a predefined interface to the layer above it.

–   The de facto standard for networking from a purely theoretical stand–point is the OSI 7–layer reference model, the TCP/IP stack (also known as the Internet Reference Model) is the most common networking stack implementation seen today.

– TCP/IP is a suite of networking protocols that provide much of the functionality of the OSI 7–layer model. However, the TCP/IP stack is somewhat simpler than the OSI model, and can be represented as four layers. The best way to begin understanding TCP/IP is to draw parallels with the OSI model, as shown in the figure below :
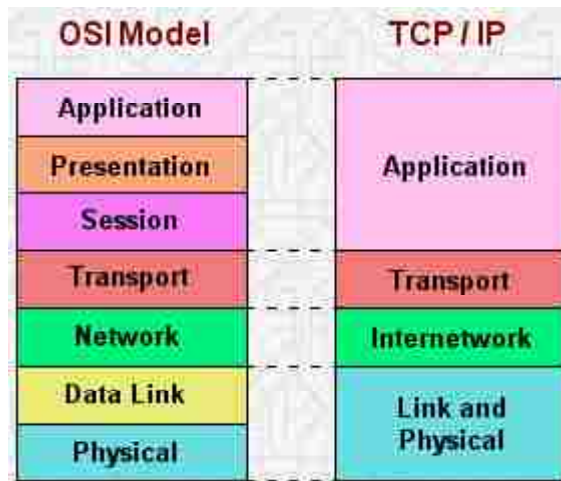
OSI and TCP/IP Parallel

 #   Below is the major difference between the OSI and TCP/IP :

1.   The application layer in TCP/IP handles the responsibilities of layers 5, 6, and 7 in the OSI model.

2.   The transport layer in TCP/IP does not always guarantee reliable delivery of packets as the transport layer in the OSI model does. TCP/IP offers an option called UDP that does not guarantee reliable packet delivery.

 #   TCP/IP Basics :
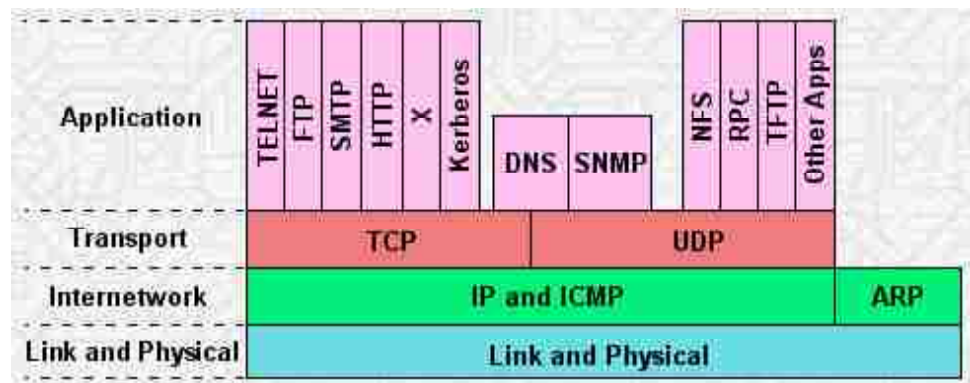
TCP/IP Basics

1.   Application Layer :

– **Telnet** is an application that allows remote login to another computer. Typically, such a remote logon will provide command–line access. Of course, using Telnet requires both client and server components.

– **FTP** stands for File Transfer Protocol. An FTP session allows a user to upload files to, or download files from a remote computer. As with Telnet, both client and server components are necessary.

– **SMTP** stands for Simple Mail Transfer Protocol and is used for transferring email. For example, a typical mail account in MS Outlook may use SMTP for handling mail.

–   **DNS** – Domain Name System – allows IP addresses (see the section on IP addresses and subnetting) to be mapped to domain names, such as http://www.just2good.co.uk.

2.   **Transport Layer :**

–   Within the TCP/IP stack, transport control is either handled by **TCP** – Transmission Control Protocol, or by **UDP** – User Datagram Protocol.

–   The important difference is that TCP uses virtual circuits. I.e. connections between end–points are established, allowing data to flow reliably between them while UDP, on the other hand, does not use pre–established circuits, and is thus termed a connectionless transport protocol.

3.   **Internetwork Layer :**

–   IP is responsible for transporting UDP or TCP segments (packets) from end–point to end–point, based on their IP addresses.

–   ICMP (Internet Control Message Protocol) is used to request the status of network hardware, or to respond to such a request.

–   For example, the Pingcommand uses an ICMP packet.

4.   **Link and Physical Layer :**

–   Link and Physical layer deal with hardware level and frame format of the data and transmit a group of bits from one end to another end.

9.5.2 Connecting to the Internet (Through Dialup, DSL, Ethernet, Leased Line) :

•   **Dial–up Connections :**

–   Dial–up connection uses telephone line to connect PC to the internet. It requires a modem to setup dial–up connection. This modem works as an interface between PC and the telephone line.

–   A dial–up connection allows us to connect to the Internet via a local server using a standard 56 k modem.

–   Dial–up connections are the slowest and the most expensive.

–   To access the Internet via a phone line, the procedure is simple. Connect your computer to the telephone line using either a regular phone line with a modem.

–   To start your work, you run a communication program to dial the phone and establish a connection with a remote Internet host.

–   Once the connection is established, you log on to the server by entering your username and password.
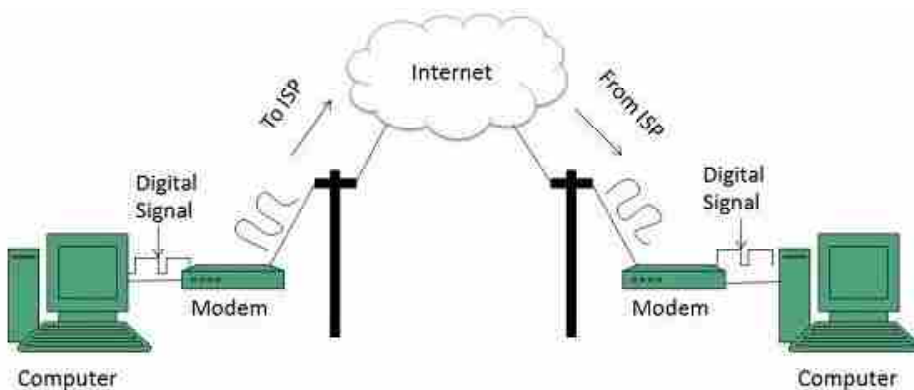
Dial–Up Internet Connection

– At this point, there are three possible types of dial–up connections.

1. **Shell account access**

2. **TCP/IP account access**

3. **Dial–up or on–demand TCP/IP link through your LAN**

1. **Shell account access :**

– With this type of account, you actually do your work in the remote computer.

– You establish an interactive session with another computer which is an Internet host.

– With shell access, your host computer is considered part of the Internet but your computer is not.

– The only program that runs on your computer is the terminal emulator.

– When you connect to your host, you type commands to its system, which tells it what functions you want to perform.

– The program on your host's computer that receives and acts on the commands is known as a shell.

– The shell and the programs running on it sends back to your computer and some text will displayed on the screen.

– A terminal emulator only supports a text–based interface, not a graphical interface.

2. **TCP/IP account access :**

– A protocol dialup account lets your computer behave like it's connected directly to another computer on the Internet and connected over a phone line.

– This TCP/IP connection enables you to run software, such as a graphical web browser like Microsoft Internet Explorer or Netscape Navigator.

– The major difference between Shell and TCP/IP account is that, Shell account can only display text and does not support graphics display, whereas TCP/IP can display both.

– This implies that when you have protocol dialup (TCP/IP) account, your computer is full–fledged Internet host during the time you are connected.

– The client programs you use to access the various Internet services run on your computer.

– TCP/IP type of account uses the TCP/IP protocol to perform data transfer on the Internet.

– Dial–up connection uses either of the following protocols:

  • **Point to Point Protocol (PPP)**

  • **Serial Line Internet Protocol (SLIP)**

• **Point to Point Protocol (PPP) :**

– The stack of Internet protocols is called TCP/IP. The connection protocol with ISP's server is known as Point–to–Point Protocol, which is used in Indian context.

  – PPP is more powerful because it can work with other systems and not just TCP/IP, more dependable, more flexible, and is a lot easier to configure when you need to get it up and running on a new system.

- **Serial Line Internet Protocol (SLIP) :**

  – The function of IP is to move the raw data from one place to another. Thus, the protocol developed to support TCP/IP over a serial cable was called Serial Line IP or SLIP.

  – SLIP dates back to the early 1980s and was designed to be a simple, but not very powerful method to connecting two IP devices over a serial cable connection.

3. **Dial–up or on–demand TCP/IP link through your LAN :**

  – A dial–up link from your LAN is intermediate step between individual dial–up and a dedicated high–speed link.

  – It is therefore somewhat like dial–up and somewhat like having a direct link.

  – The main difference between this type of connection and one to your individual computer is that the TCP/IP software runs on the LAN server, and your connection is to the server.

  – A TCP/IP connection through a LAN, either on a dial–up connection or a direct connection, is the most common type of IP connection, much more common than a personal dial–up IP connection.

- **Advantages of Dial–Up Connection :**

  – Dial–up connection can be very economical. The cost is usually the same as a local phone call.

  – Hardware cost is also minimal.

  – Such connection is widely available.

- **Disadvantages of Dial–Up Connection :**

  – Dial-up connections are very slow compared to other connections/types.

  – Same phone line cannot be used for internet connection and for making phone calls.

  – Such connections transfer data over an analogue live so data before being transferred has to be converted from digital to analogue and vice–versa, thus increases performance overheads.

- **ADSL :**

  – ADSL stands for Asymmetric Digital Subscriber Line. ADSL is a part of technologies based on the DSL concept.

  – It is a new data communication technology that allows faster data transmission over copper telephone lines than a conventional voiceband modem.

  – ADSL support 1.5 to 9 Mbps data rates when receiving data and from 16 to 640 Kbps when sending data, it requires special ADSL modem.
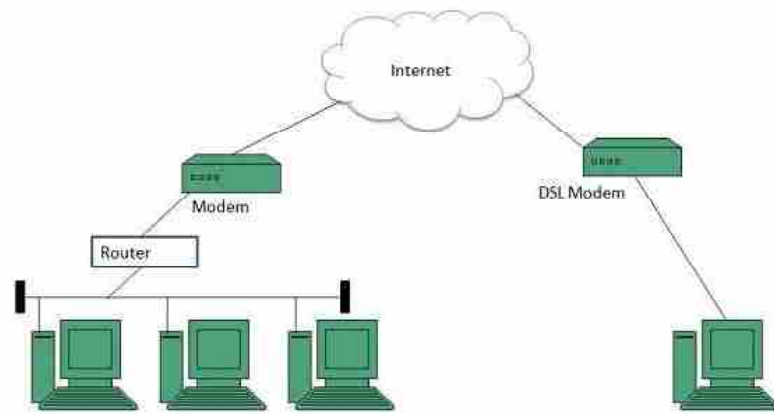
ADSL Connection

- **Advantages of ADSL :**
– ADSL provides uninterrupted connection.
– ADSL provides data and voice transmission simultaneously over same telephone lines.
– ADSL has faster speed, chipper cost as ADSL uses copper lines.

- **Disadvantages of ADSL :**
– Not available everywhere easily.
– Special equipment has to be installed at the telephone exchange and users must be located within 5.5 Km of the exchange.
– Network congestion and line noise are very much possible.
– The modem/router supplied with your ADSL service does not support use of computer fax application.

- **Leased Line Connections :**
– A leased line is a symmetric telecommunication line connecting two locations.
– Leased line connection is a permanent telephone connection between two points set up by a telecommunication common carrier.
– Leased lines are typically used by business to connect geographically distant offices.
– Connecting your LAN using a digital, leased line provides you a fast, reliable, permanent access.
– A digital leased line is a managed dedicated digital connection providing 24 hours access.
– Network users have access to e–mail, WWW, FTP as well as line one–on–one and one–to–many communication.
– If you have leased line, you do not need a modem or an ISDN terminal adapter to connect two systems. It is always open.
– The fee for the connection is a fixed monthly rate.

- **Advantages of Leased Line :**
– Provide secure and private dedicated connection.
– It can be placed for up to distances of 35 Km.
– It is used for those peoples who requiring extra high bandwidth.

– Provides symmetrical, uncontended high–speed connection.

– It is reliable and dependable.

• **Disadvantages of Leased Line :**

– It is very expensive to install.

– Not suitable for single or home workers.

– Distance dependent to nearest POP.

❑ **Check Your Progress – 4 :**

1. TCP stands for _____.

   a. Transmission Control Provider

   b. Transmission Center Protocol

   c. Transmission Control Protocol

   d. Transmission Configuration Protocol

2. ARPA stands for _____.

   a. Advanced Research Projects Agency

   b. Advanced Research Protocol Agency

   c. Advanced Reconnect Projects Agency

   d. Advanced Reference Projects Agency

3. FTP stands for _____.

   a. File Transaction Protocol   b. File Transfer Protocol

   c. File Transmit Protocol   d. File Telnet Protocol

4. FTP stands for _____.

   a. Sample Mail Transfer Protocol

   b. System Mail Transfer Protocol

   c. Structure Mail Transfer Protocol

   d. Simple Mail Transfer Protocol

5. DNS stands for _____.

   a. Domain Name Structure   b. Domain Name System

   c. Domain Name Service   d. Domain Name Session

9.6 Let Us Sum Up :

– In this unit we have learnt that ADSL broadband an important internet connectivity technology which is a type of internet connection that works on existing telephone line.

– It is found that Asymmetric digital subscriber line is a form of digital subscriber line technology where data communications technology makes faster data transmission through copper telephone lines rather than standard voice band modem.

– GNU/Linux, or simply Linux, is an alternative to Microsoft Windows. It is easy to use and gives more freedom to users. Anyone can install it as Linux is free as in freedom, and often available free of charge.

– In Linux, kernel is a program which requires configuration files in order to have an idea about list of users and groups in the system which further helps in managing file permissions

–   In computers, you can say that protocol is a set of rules with the help of which computing devices are able to communicate. The communication is done through a network. A network is a medium by which individual's computers are able to connect with one another and thus are able to share information.

–   ADSL broadband is a famous internet connectivity technology which is termed as Asymmetric Digital Subscriber Line. It is a type of internet connection which can be worked on existing telephone line.

9.7   Answers for Check Your Progress :

❑   **Check Your Progress 1 :**

1. (a)   2. (b)   3. (Refer 9.3.1)   4. (Refer 9.3.2)

❑   **Check Your Progress 2 :**

1. (Refer 9.4)

❑   **Check Your Progress 3 :**

1. (a)   2. (b)   3. (d)

❑   **Check Your Progress 4 :**

1. (c)   2. (a)   3. (b)   4. (d)   5. (b)

9.8   Glossary :

1.   **Static IP Address** – On some network, you might have been assigned an IP address, which you must enter manually, along with a few other networking addresses. This is referred to as a static IP address.

2.   **Telnet** – Telnet is an application that allows remote login to another computer. Typically, such a remote logon will provide command–line access. Of course, using Telnet requires both client and server components.

3.   **FTP** – FTP stands for File Transfer Protocol. An FTP session allows a user to upload files to, or download files from a remote computer. As with Telnet, both client and server components are necessary.

4.   **SMTP** – SMTP stands for Simple Mail Transfer Protocol and is used for transferring email. For example, a typical mail account in MS Outlook may use SMTP for handling mail.

9.9   Assignment :

Write a detailed note on Network Cards.

9.10   Activities :

Write a detailed note on Playing Music.

9.11   Case Study :

Write a detailed note on Connecting to Internet.

9.12   Further Reading :

1.   Linux Operating System Concept by Abraham Silberschatz, Peter Baer Galvin, Greg Gagne

2.   An Introduction to Modern Electronic Media, Joseph Dominick, Barry Sherman, and Fritz Messere

E–MAIL SERVER

UNIT STRUCTURE

10.0 Learning Objectives :

After learning this unit, you will be able to understand :

• Idea about Email

• Detail of sending and receiving E–mail

• Configuration of E–mail

• Details of Copy Files from Disks and On Network

• About Playing Games and Writing CDs

• Configuration of X Window

10.1 Introduction :

– Today, email is delivered using client/server architecture. An email message is created using a mail client program. This program then sends the message to a server. The server then forwards the message to the recipient's email server, where the message is then supplied to the recipient's email client.

– To enable this process, a variety of standard network protocols allow different machines, often running different operating systems and using

different email programs, to send and receive email.

– Ubuntu offers a full–featured e–mail program, called Evolution, as well as an instant messaging client called Gaim.

– Gaim supports the variety of Internet chat protocols, such as ICQ, MSN, Yahoo, and IRC. This means you can chat with friends on different networks using this program.

– Evolution is able to work with both IMAP and POP3 mail servers offered by ISPs and used within corporate environment.

– Additionally, it can work with Microsoft Exchange Protocol used by offices running the Outlook mail program.

10.2 Sending and Receiving E–Mail :

– In Linux, to use graphical mail program, normally MTA/MDA is installed that can be correctly set up on GNU/Linux system. To use graphical mail program and mail server of Internet Service Provider there is no need to configure exim4 for handling external e–mail which can be done by configuring favorite graphical mail program to use correct servers in order to send and receive e–mail

– To set up report bug for external mail server, run command report bug –configure and answer "no" to question if MTA is available which prompts for SMTP server that to be used for submitting bug reports. After doing that you will find that the system is connected to network and mail is sent and received directly using SMTP.

• **Configuring E–mail :**

– You will need to find out the addresses of the mail servers you plan to use.

– In the case of POP3 and IMAP mail accounts, you will need to know the incoming and outgoing server addresses, outgoing referred to as SMTP.

– You will also need to know your username and password details for the incoming and outgoing mail servers.

– Follow these steps to configure Evolution:

1. Start the Evolution e–mail client by clicking its icon at the top of the screen, to the right of the menus or you can select **Applications → Office → Evolution**.

2. When Evolution starts for the first time, you will be invited to enter your configuration details via wizard.

✓ The first screen will ask for your **Full Name** and the **E–mail Address** you wish to use within Evolution. This are what will appear in outgoing messages.

✓ Under this is a check box that you should leave checked if you want the account to be the default account.

✓ You can also fill the **Reply–To** and **Organization information** if you wish, but these fields can be left blank.

✓ Click the **Forward button** to Continue.

3. The next screen asks for details of the **receiving mail server** that you want to use.

✓ First, select the server type from the drop–down list. If you don't know which option to go with, select POP. This is the most common type of incoming mail server currently in use.

✓ In the **Configuration section**, enter the **Server address** and **Username** in the relevant fields.

✓ **Select Always** option in **Use Secure Connection** from the drop–down list.

✓ Most POP servers use at least a password system and some use more complicated protection. You can find out what system your **mail server uses** by clicking the **Check for Supported Types button**. Click **Forward button** to continue.

✓ You need to **enter your email password**, depending on which server type you chose. In some cases, you will need to type this later when you download your mail for the first time. Click **Forward button** to continue.

4. In the next window, you have to choose between **various additional options**, such as how often you want to **Check for a new mail** or if you want to delete mail from server after it has been downloaded. If you have special requirement then you can set the additional options otherwise, it is okay to leave the default settings as they are.
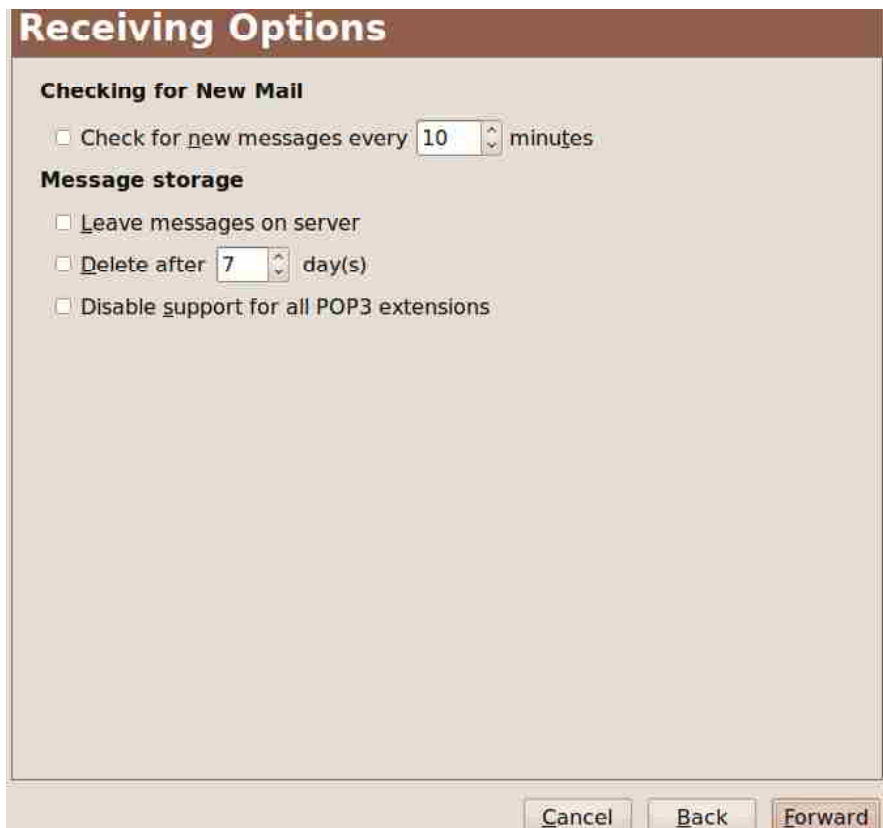
✓ If you are using **Microsoft Exchange server**, you may need to **enter the Active Directory/Global Address List server details.** Click **Forward button** to continue.

5. Depending on the server type you chose, you need to fill in the outgoing (SMTP) server address. Type this into the Server field.

✓ If your **SMTP server requires authentication**, put a **check in the relevant box**, and **then enter your Username.**

✓ You can leave it at its default state. Click **Forward button** to continue.

6. You are invited to enter a name for the account. This is the account name you will see when you use evolution. The default is your e–mail address, but you can type something more memorable if you wish. Click Forward button to continue.

7. Finally, **choose your location**, which will have the effect of **automatically defining your time zone**. This will ensure that e–mail messages are
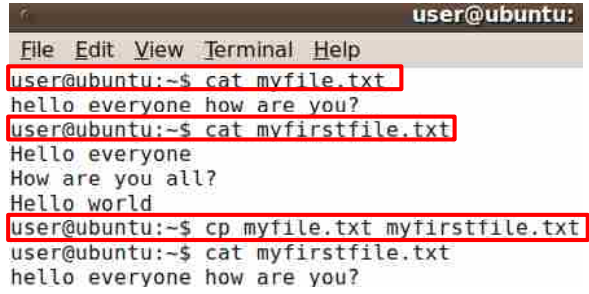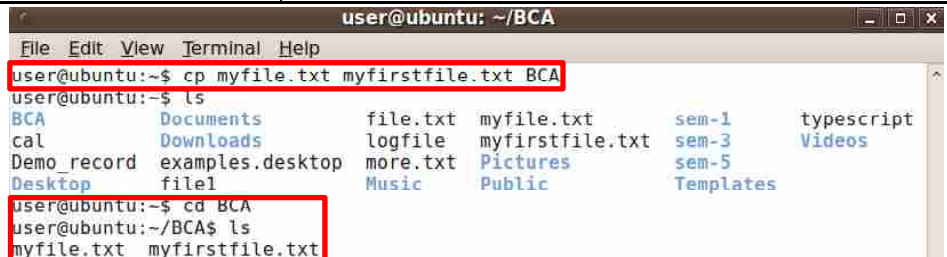
correctly time–stamped. Click **Forward button** to continue, and then **click the Apply button** to finish the wizard.
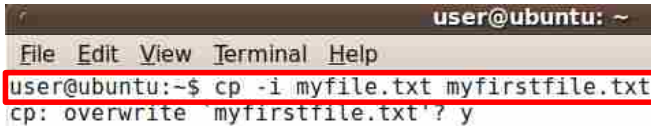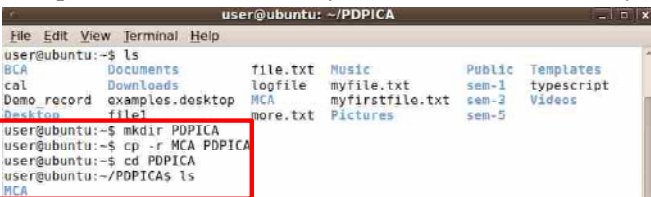
❑   **Check Your Progress – 1 :**

1.   Ubuntu offers a full–featured e–mail program, called _____.

    a. Evolution   b. Gaim   c. Yahoo   d. MSN

2.   In e–mail outgoing is referred to as _____.

    a. POP3   b. IMAP   c. SMTP   d. All of Above

10.3   Copy Files from Disks and Over the Network :

•   **Copy Files from Disks :**

Use	– It is use to copy file or group of files.
	– It creates an exact image of file on the disk with different name.
	– This command requires at least two filenames.
	– If the destination file does not exist, it will first create the file before copying takes place.
	– If the destination file is existing, it will simply be overwritten without any warning from the system.
Syntax	– cp [Source File] [Destination File]
Copying Multiple Files to Directory	
Copy Multiple File	– cp can be used to copy more than one file with single statement. In this case, last filename must be directory.
	– If these files already exist in the directory, it will be overwritten.
	– For this command directory must be exist because cp command will not create it.
Syntax	– cp [Source File1] [Source File2] [Destination Directory]
Example	

Using * wildcard character to copy the files	
Use	– * Sign use to frame a pattern for a matching more than one file name.
Syntax	– cp [Source File1]*[Destination Directory]
Example	

Attributes	
cp –i	– i stands for interactive, it warns the user before overwriting the destination file. (If exists). – It will ask you to overwrite press y to overwrite it.
Syntax	– cp –i [Source File][Destination File]
cp –r	– r stands for recursive. It is use to copy entire directory structure. – It copies all files & sub directories of Source Directory to Destination Directory.
Syntax	– cp –r [Source Directory] [Destination Directory]

- **Copy Files over the Network :**

– Using SCP from a Unix/Linux or Cygwin command line :

$ scp –p userid@remote.host.name:remote_file local_file

– The "userid@" part contains your login userid on "remote.host.name". You can leave off "userid@" if your remote userid is the same as your userid on the local machine. You will be prompted to enter your password for the remote machine. The "remote_file" may be an absolute pathname (on "remote.host.name"), or it may be a pathname relative to your home directory on "remote.host.name". The "–p" option to SCP preserves the modify time of the transferred file.

Examples :

If the remote machine is not behind a firewall and uses a standard SSH port :

$ scp –p abcd0001@acadunix.algonquincollege.com:dodo.txt happy.txt

$ scp –p acadunix.algonquincollege.com:/tmp/foo mydir/bar

– If the remote machine is behind a firewall and requires a special port to be used, the –P option (upper case P) must be used to set the firewall pass–through port :

$ scp –p –P 2222 abcd0001@example.com:dodo.txt happy.txt

❑ **Check Your Progress – 2 :**

1. _____ command is used to copy file from disk.

   a. CP   b. COPY   c. KOPY   d. COPI

2. Write a note on copy file over the network.

| 10.4 Playing Games, Writing CDs : |

• **Playing Games :**

– Linux is interesting and complete featured gaming platform that many companies now port their games to Linux that provides advantages in terms of efficiency and speed.

– It is noticed that several game distributors have a good GNU/Linux strategy that catalogue of many game titles. They even developed their own Linux distribution, SteamOS.

– GOG provides a full catalogue of classic and modern games that work on Linux, along with a Linux downloader. And Humble Bundle, which started making distributing games for all three major end–user platforms one of its main raison d'êtres, continues regularly putting out titles that work on Linux.

• **Writing CDs :**

– It is easy to use GUI programs to write data or audio on CD. These are typically graphical front ends to the command line programs cdrecord as creating / copying CD's is X–CdRoast.

– It is noted that data CD's require file system image which can be generated prior to burning. CD's can be burned in DAO (Disk At Once) or TAO (Track At Once) mode. The only reason to use DAO mode is when burning audio CD's. Audio CD's burned TAO will have 2 second gaps between tracks. If copying entire CD, TAO mode introduces 2 second gaps. DAO mode uses a raw CD access mode and can avoid these gaps between tracks. DVDs allow for greater storage and also support additional formats for video. You will find information on inserting CD with cdrdao :

$ cdrdao disk–info

[...]

ATA:1,0,0: _NEC DVD+RW ND–2100AD Rev: 103D

Using driver: Generic SCSI–3/MMC – Version 2.0 (options 0x0000)

CD–RW: yes

Total Capacity: n/a

CD–R medium: CMC Magnetics Corporation

Short Strategy Type, e.g., Phthalocyanine

Recording Speed: 0X – 4X

CD–R empty: no

Toc Type: CD–DA or CD–ROM

Sessions: 1

Last Track: 1

Appendable: no

❑ **Check Your Progress – 3 :**

1. DAO stands for ————.

    a. Disk At Once   b. Device At Once

    c. Digital At Once   d. None of Above

2. TAO stands for ————.

    a. Transfer At Once   b. Track At Once

    c. Test At Once   d. Try At Once

3. Write a note on writing CDs.

    _____

    _____

    _____

    _____

10.5 X Window System Configuration and Utilities :

– *Palo Alto Research Center* (PARC), WIMP (Windows, Icons, Menus, Pointer), Common Desktop Environment (CDE), K Desktop Environment (KDE)

✓ The *X Window System* was developed in the Laboratory for Computer Science at the *Massachusetts Institute of Technology*, as part of project Athena in cooperation with DEC, and first released in 1984.

✓ The project lead of the main development was Robert Scheifler, and the origins of X owe much debt to the "W" Windowing package, developed by Paul Asente at *Stanford*. In September of 1987, MIT issued the first release of the X11 that we know and use today. As of X11R2, control passed from MIT to the *X Consortium*, formed in January of 1988.

✓ In Simple Word X Windows is a complete graphics interface for Unix– and by extension, for Linux.

✓ The core X Windows concept is the client–server framework.

✓ X is an architecture–independent system for remote graphical user interfaces and rich input device capabilities which allows many people to share the processing power of a time–sharing computer and to collaborate with each other through client applications running on remote computers.

✓ X Window is built upon a great many toolkits, or libraries. It is built upon the X Toolkit Intrinsics and the Athena Widgets. Many programs use XView or Motif tools.

✓ Starting X can be done in several ways. On your system it may be set up to start automatically, and you will not need to read this section. Most Linux systems, however, presently start at the command line upon login, and you have to decipher this for yourself. The most basic way to start X is with **xinit**.

10.5.1 Configure X Windows :

– During installation, system's monitor, video card and display settings gets configured. You can change any of these settings after installation with X Configuration Tool.

– To start X Configuration Tool, you have to :

  ✓ go on panel > Administration > Display

  ✓ type command system–config–display at shell prompt

– If X Window System is not running, a small version of X is started to run the program. After changing any of the settings, log out of the graphical desktop and log back in to enable the changes.

10.5.2 Detect Display Devices :

– Many display devices such as digital flat panels, CRTs and TVs can display contents of single X screen in arbitrary configuration. Configuring multiple display devices on single X screen has advantages over other techniques :

– NVIDIA driver conceals all information about multiple display devices from the X server; as far as X is concerned, there is only one screen.

– Both display devices share one frame buffer. Thus, all the functionality present on a single display is available with multiple display devices.

– No additional overhead is needed to emulate having a single desktop.

10.5.3 Installing Software from Source Code as well as Using Binary Packages :

– We see that package like yum, apt–get and rpm are handy to install that is already compiled those encounters situations where you need to install software from source code. The source code for software on Linux appears in form of compressed tar files that has .tar .gz or .tar .bz2 extensions. The tools that are used for packing the source code into these tar balls are "tar?, "gzip? or bzip2.

– To fetch the source code tarball for particular software you need to know the URL to the tarball. Once you have the download link, use "wget? to fetch the tarball from command line.

– $ wget <link to the tarball>

– The above command will download the tarball into the current directory. wget command is very flexible and has lot of options. Also, you need to unpack the tarball in order to get access to the source code and other files. Depending on the extension, use one of the following commands:

$ tar –xvfz <name of tarball with .tar.gz extension>

(or)

$ tar –xvfj <name of tarball with tar.bz2 extension>

– tar command is very flexible and has lot of options.

– Once the software source code is downloaded and extracted, the very first thing that one should do is to go through the documentation. This may sound boring to most of us but this is a very important step as doing this step thoroughly would save you from most of the future problems.

– The documentation provides information about the software, changes since last version, links to more documentation, information regarding the author of the software, steps for compilation and installation of software etc. So, we can see that lots of valuable information is present in the documentation.

– To learn about the options provided by a specific configuration file, run the following command:

$ configure —help

– To start configuring the build environment, execute the following command :

$ ./configure

– The above command will check and/or create the build environment and if everything goes fine then it produces a file called 'makefile'. The file 'makefile' is used in the compilation of the software.

10.6   Let Us Sum Up :

– While studying this unit, we have learnt that email can be delivered using client/server architecture where email message is created with the help of mail client program which sends the message to server.

– Generally, the supplied kernel is highly modularized and includes nearly every possible driver which helps in booting disks.

– We see that the PPP account allows you to connect computer directly to Internet for surfing web directly. If ISP allows, you can even run a web server, providing pages that can be viewed by others around the world.

10.7   Answers for Check Your Progress :

❑   **Check Your Progress 1 :**

    1. (a)   2. (c)

❑   **Check Your Progress 2 :**

    1. (a)   2. (Refer 10.4)

❑   **Check Your Progress 3 :**

    1. (a)   2. (b)

10.8   Glossary :

1.   **E–mail** – An email message is created using a mail client program. This program then sends the message to a server. The server then forwards the message to the recipient's email server, where the message is then supplied to the recipient's email client.

10.9   Assignment :

Explain E–Mail Configuration in detail.

10.10   Activities :

Explain CP command with its all option with example.

10.11   Case Study :

Generalized the basic of X setup with configuration and discuss.

10.12   Further Reading :

1.   Operating System Concept by Abraham Silberschatz, Peter Baer Galvin, Greg Gagne

2.   Programming Be Operating System by Dan Sydow

<table>
<tr><td>**Unit**
11</td><td>*KDE AND GNOME*</td></tr>
</table>

UNIT STRUCTURE

11.0   Learning Objectives :

After learning this unit, you will be able to understand :

• Idea about KDE and GNOME

• Basic of KDE

• Detail of KDE Configuration

• About GNOME Basics

• Detail of GNOME Configuration

• Basics of GNOME Process and Management

11.1   Introduction :

– KDE is an international team co–operating on development and distribution of Free, Open–Source Software for desktop and portable computing. "GNOME" was an acronym of GNU Network Object Model Environment.

– GNOME is an international community dedicated to making great software that anyone can use, no matter what language they speak or their technical or physical abilities.

– The GNOME Project is a community that makes great software. GNOME is Free Software: all our work is free to use, modify and redistribute. Everyone is welcome to participate in its development.

11.2   KDE :

11.2.1 What is KDE ?

– The KDE is stand for K Desktop Environment.

– KDE is an international team co–operating on development and distribution of Free, Open–Source Software for desktop and Portable Computing.

– In other word KDE is an international free software community producing an integrated set of applications designed to run on Linux, Microsoft Windows, and Mac OS X systems.

– The goal of community is to provide basic desktop functions and applications for daily needs as well as tools and documentation for developers to write stand–alone applications for the systems.

– KDE software is based on the Qt framework.

– For users on Linux and UNIX, KDE offers a full suite of user workspace application which allows interaction with these operating systems in a modern, graphical user interface.

– In addition to the workspace, KDE produces a number of key applications such as the Konqueror web browser, Dolphin file manager and Kontact, and the complete personal information management suite.

– However, our list of applications includes many others such as education, multimedia, office productivity, networking, games, and much more.

– KDE is the default desktop environment for a number of Linux distributions, including Caldera, SUSE, and Corel.

– The planning behind KDE is to specify standards and development environment, so that such developers can create applications that are consistent in features as well as in appearance.

– KDE provides an attractive, professional looking environment in which to work, and if the necessary applications are developed for KDE, it will become a likely prospect for the business desktop.

– The appearance of KDE desktop is like :
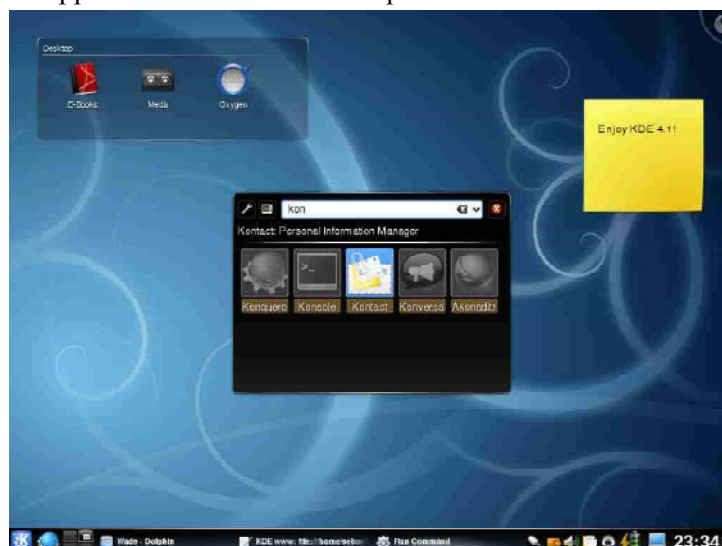
11.2.2 KDE Basics :

– The KDE displays a panel at the bottom of the screen.

– There is a Control Centre entry in the main menu that open the KDE control center, from which you can configure every aspect of KDE, such as themes, panels, peripherals like printers and keyboard, even the KDE file manager's web browsing capabilities.

– The current official Software Compilation consists of the following packages many of which contain multiple applications and/or libraries:

• **KDE–Libs :**

– The software libraries that compose the KDE Developer Platform require by all KDE applications.

• **KDE–Base :**

– There are three parts of the base which are as follows :

1. **Runtime :**

– Additional software components required by many KDE applications to perform properly.

2. **Applications :**

– Applications that are central to a basic desktop experience, such as a file manager or web browser.

3. **Workspace :**

– The KDE workspaces that provide the tools and user environment for a Desktop, Netbook or Mobile experience.

• **KDE–Plasma–Addons :**

– Additional themes and applets for the desktop and panel.

• **KDE–Network :**

– Networking applications such as an instant messenger and download manager.

• **KDE–Pim :**

– Mail client, address book, organizer and groupware integration.

• **KDE–Graphics :**

– Document viewer, image viewer, and select other graphics application.

• **KDE–Multimedia :**

– Includes a video player as well as different audio players.

• **Phonon :**

– Multimedia layer that supports different backend, on different operating systems, for multimedia output.

• **KDE–Accessibility :**

– Application to improve computer access for disabled people such as a text–to–speech system.

• **KDE–Utilities :**

– Useful utilities like an archiving tool and a calculator.

- • **KDE–Edu :**
- – Education and science applications.
- • **KDE–Games :**
- – Classic and modern games.
- • **KDE–Toys :**
- – KDE's fun stuff.
- • **KDE–Artwork :**
- – Additional icons, styles, wallpapers, screensavers and window decoration.
- • **KDE–Admin :**
- – Various tools to aid with system administration.
- • **KDE–SDK :**
- – Script and tools which simplify development of KDE applications.
- • **KDE–Bindings :**
- – Buildings for various programming languages (Python, Ruby, Perl, Java).

11.2.3 Start KDE in X Windows :

- – Once logged into the system from command line, you still have the option of starting X Window System GUI, such as GNOME and KDE.
- – In Linux, the command startx starts a desktop.
- – The startx command starts the KDE desktop by default.
- – Once you shut down the desktop, you will return to your command line interface, still logged in.
- – $ startx.

11.2.4 Licensing Issues in KDE :

- – The most common issue surrounding the KDE project is the licensing issue.
- – The combination of license between KDE and Qt makes the issue less if you are using KDE/Qt to develop a closed–source or commercial application.
- – In some cases, the KDE project uses a different license than the one that Trolltech has chosen for Qt. So, these different licenses have different goals and purpose and apply to software project in different way.
- – The reality of the situation is that nearly all code in KDE libraries is covered under the Library GNU Public Licence (LGPL) as defined by the Free Software Foundation (FSF).
- – Those bits of code that are not licensed under the LGPL or GPL are usually licensed under a "Public Domain" style license. This states that you may use the code.
- – The code that falls under those licenses is always encouraging developers to incorporate into commercial products.
- – There were two versions of the Qt library : **A Commercial Version and A Free Version.**

– If the recipient product was closed source, they were required to purchase the commercial version of Qt. whereas free version of Qt fell under FreeQt license and this version was available only if the recipient's product was distributed under a free software license.

11.2.5 KDE Configuration :

– With the KDE control center, you can configure your desktop and system, and we can change way it is displayed and the features it supports.

– The control center can be directly started by selecting control center from the main menu.
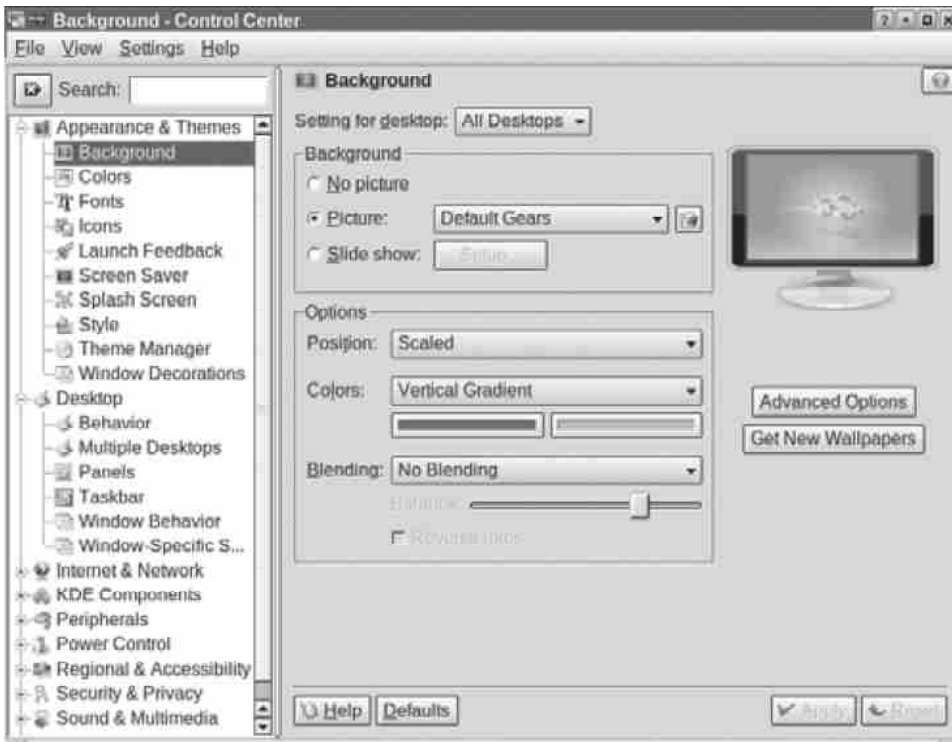
– The KDE Control Centre is the place where we can change any settings that affect the whole of your KDE environment.

– You can open it using the Control Centre item in the K menu, or with its command–line name, kcontrol.

– The Control Center window is divided into two panes.

– The left pane shows a tree view of all components you can configure, and the right pane displays the dialog windows for the selected component.

– The settings are divided into several major categories, each contain several pages of settings.

1. Appearance & Themes :

– Here you will find settings that change the way your KDE desktop and application look. Such as Background, Color, Icons, Screen Saver, Style Theme Manager, Window Decorations and so on.

2. Desktop :

– Here, you will find the settings to configure the behavior of KDE desktop such as Behavior, Multiple Desktops, Panels, Taskbar, Window Behavior, Window–specific settings and so on.

3. **Internet & Network :**

– This section is where you would configure settings to do with internet and networking under KDE. This setting involves Connection Preferences, Desktop Sharing, File Sharing, Local Network Browsing, Local Network Chat, Proxy, Web Browser, wireless network and so on.

4. **KDE Components :**

– In this section you can modify advanced KDE options such as file associations and default applications.

– Here you can modify Component Chooser, File Associations, File Manager, KDE performance, Service Manager, Spell Checker and so on.

5. **Peripherals :**

– This section is where you would change settings related to peripheral devices such as Keyboards, Mouse, Joystick, and Printer.

6. **Power Control :**

– This section has single module, laptop battery. Here you can configure the appearance and behavior of the klaptopdaemon battery monitor. You can select battery icons to represent different power states, and set up notification of certain events.

7. **Regional & Accessibility :**

– In this section you can configure options to do with region and local, and also accessibility related options for disabled persons.

– It includes Accessibility, Country/Region & Languages, Input Actions, Keyboard Layout, and Keyboard Shortcuts.

8. **Security & Privacy :**

– This section is where you can configure options related to security and privacy such as the use of Cryptography, Enabling the KDE wallet, setting your identity and managing caches.

This way you can configure KDE.

❑ **Check Your Progress – 1 :**

1. KDE Stands for _____.

   a. K Desktop Environment   b. Key Desktop Environment

   c. Kiosk Desktop Environment   d. Kontact Desktop Environment

2. KDE is default desktop environment for _____.

   a. Caldera   b. SUSE   c. Corel   d. All of Above

3. KDE base includes _____.

   a. Runtime   b. Applications   c. Workspace   d. All of Above

4. Write a detailed note on KDE Basics.

_____

_____

_____

_____

_____

11.3 GNOME :

11.3.1 What is GNOME ?

– GNOME stands for GNU Network Object Model Environment.

– GNOME is an international community decided to making great software that anyone can use, no matter what language they speak or their technical or physical ability.

– GNOME is a desktop environment and graphical user interface that runs on top of a computer operating system. It is composed entirely of free and open–source software.

– GNOME was started in August 1997 by Miguel de lcaza and Federico Mena. Their aim to produce a free desktop environment.

– Since then, GNOME has grown into a hugely successful enterprise. It is the most popular desktop environment for GNU/Linux and UNIX–type operating system.

– Red Hat Linux 7 ships with GNOME as the default desktop environment using Sawfish window manager.

– The GNOME project puts heavy weight on simplicity, usability, and making things "just work".

– The other aims of project are :

1. Freedom :

– To create desktop environment with willingly available source code for reuse under a free software license.

2. Accessibility :

– To ensure the desktop can be used by anyone, in spite of technical skill or physical circumstances.

3. Internationalization and Localization :

– To make the desktop available in many languages. At the moment, GNOME is being translated to 175 languages.

4. Developer–Friendliness :

– To ensure easy to writing software that integrates smoothly with the desktop, and allow developers a free choice of programming language.

5. Organization :

– To stick to a regular release cycle and maintain a disciplined community structure.

6. Support :

– To ensure backing from other institution beyond the GNOME community.

– The appearance of GNOME desktop is like:
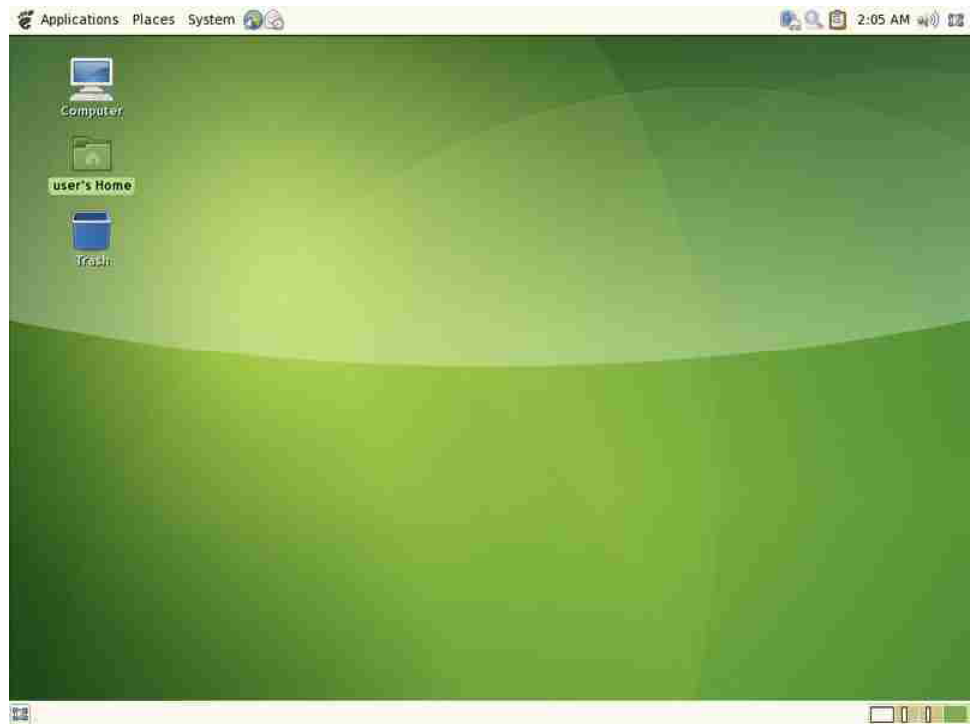
GNOME Desktop

– The System menu contains several items:

• **Programs** This submenu provides access to most of the applications and utilities available on GNOME.

• **Favorites** This option provides access to any favorites that you may have created, including Web sites.

• **Applets** This submenu provides access to standard GNOME applets, including load monitors, clocks, and CD players. GNOME places any applet that you choose on the panel.

• **KDE Menus** This submenu provides access to the standard KDE menus if you have installed KDE as an alternate desktop manager on your system.

• **Run** Use this option to run any program or application installed on your Linux system. Selecting this option opens the dialog box shown in Figure Enter the path and name of the program, and click the Run button to launch the application. Or you can click the Browse button to choose the program to run from the file–selection window shown in above Figure.

• **Programs Submenu :**

– There are several additional submenus you can access from the Programs submenu, each with a right arrow to the right of the submenu name. Each of these options opens a submenu containing programs that can be launched.

– The standard submenus are :

✓ **Applications** This submenu offers standard GNOME applications such as the GNOME calendar tool and the GNOME spreadsheet, Gnumeric.

✓ **Utilities** This submenu provides access to commonly used GNOME and X Windows utilities, including the rvxt terminal, a calculator, and a file–search tool.

✓ **Development** This submenu includes development utilities such as GLADE, the GTK+ user interface builder.

✓ **Games** This submenu offers a set of X Windows and GNOME games.

✓ **Graphics** This submenu provides a handful of graphics tools for GNOME, including the acclaimed image–editing software, The GIMP.

✓ **Internet** This submenu provides quick access to standard Internet tools, including Netscape Communicator and the GNOME FTP tool, Gftp.

✓ **Multimedia** This submenu offers a selection of multimedia tools, including a CD player and volume control tools.

✓ **Settings** This submenu provides a collection of tools for configuring GNOME.

✓ **System** This submenu offers access to a few system tools, including a GNOME–based package management system for Red Hat rpm packages, GnoRPM.

✓ **File Manager** Selecting this menu entry launches the GNOME file manager, like the one shown in Figure. The GNOME file manager is discussed in more detail later in this chapter.

✓ **Help System** This option can be used to launch the GNOME help system. The help system is an HTML system using a built–in HTML browser. The GNOME help system provides comprehensive documentation on using GNOME, and you should refer to it for detailed guidance on using GNOME.

11.3.2 Starting X Windows and GNOME :

– Once logged into the system from the command line, you still have the option of starting an X Window System GUI, such as GNOME or KDE.

– In Linux, the command startx starts a desktop. The startx command starts the GNOME desktop by default.

– Once you shut down the desktop, you will return to your command line interface, still logged in.

– $ startx.

11.3.3 Packages and Management :

Packages :

– The packages are separated into "Platform" and "Desktop" section in the same manner as the sources are distributed in the GNOME.

1. **Platform Packages :**

– There are various platform packages are available which are as follows :

• **GIO Files :**

– GIO provides APIs for asynchronous reading and writing files and other streams.

– Files are referenced by URIs, and local backend can provide access to more than just local files.

– When running under the GNOME desktop, GIO uses GVFs to allow access to files over SFTP, FTP, WebDAV, SMB, and other popular protocols.

– This transparent network file access is free to all applications using GIO.

– The GIO file APIs were designed to be used in event–driven graphical interface.

• **GIO Networking :**

– Built on top of the stream APIs used for files, GIO provides high–level networking APIs to communicate over TCP/IP and UNIX domain sockets.

– You can use the GIO networking APIs to connect to a server, listen for events, and read resources.

• **GStreamer :**

– GStreamer is a powerful multimedia library for playing, creating, and manipulating sound, video and other media.

– You can use GStreamer to provide sound and video playback, record input from multiple sources, and edit multimedia content.

– GStreamer supports encoding and decoding numerous formats by default, and support for additional formats can be added with plug–ins.

• **WebKit :**

– WebKit is powerful, multi–platform HTML engine used in open source and commercial products.

– WebKitGTK+ is the port of WebKit built on GTK+ and integrated into the GNOME developer platform.

– WebKitGTK+ makes it easy to add web functionality to your application or to use HTML5 an associated technologies to create dynamic user interfaces quickly.

2. Desktop Packages :

• **Brasero :**

– Brasero is a simple application to burn, copy and erase CD and DVD media: such as audio, video or data.

• **Cheese :**

– Cheese is a cheesy program to take pictures and videos from your web cam. It also provides some graphical effects.

• **Deskbar–applet :**

– Desktop–applet is intended as a browser–like keyword–driven url bar.

– You type a web address, an email address, a file name, or some keyboard then the arguments, and it shows a popup with possible choice from there.

 # Management :

1. Installing software in GNOME :

– In the search box type the name of the application you wish to install. If you are unsure of the specific application you need to install, you can also type keywords in this box, just like an internet search engine.

– Next, click the Find button.

– Tick the box next to the description of the application or applications you wish to install.

– Finally, click the apply button. This starts the installation process and installs or removes additional packages where you modified the tick box.

2. **Removing software in GNOME :**

– To remove software using PackageKit, you should follow the standard installation procedure.

– Open Add/Remove programs from the control panel.

– In the search box type the name of the application you wish to remove.

– Next, click the find button.

– Un–tick the box next to the description of the application or applications you wish to remove.

– Finally, click the apply button. This starts removal process.

11.3.4 The GNOME Configuration Tool :

– You can configure different parts of your GNOME interface using tools listed in the preferences menu in the System menu.

– This menu will display entries for the primary GNOME preferences, organized into submenu categories like Hardware and Personal, along with Palm Pilot or Desktop Switcher.

– Your GNOME system provides several desktop tools you can use to configure your desktop, such as Desktop Background, Screensaver, and Themes.

– The removable drives and Media preferences tools let you set what action to perform on removable drives, CD and DVD discs, and digital cameras.

– For sound configuration, the sound tool lets you select sound file to play for events in different GNOME applications.

❑ **Check Your Progress – 2 :**

1. GNOME Stands for _____.

   a. GNN Network Object Model Environment

   b. GNU Network Object Model Environment

   c. GMU Network Object Model Environment

   d. GBU Network Object Model Environment

2. GNOME was started in _____.

   a. 1997   b. 1995   c. 1996   d. 1999

3. Write a detailed note on Packages and Management.

   _____

   _____

   _____

   _____

   _____

11.4 Let Us Sum Up :

– The goal of community is to provide basic desktop functions and applications for daily needs as well as tools and documentation for developers to write stand–alone applications for the systems. KDE offers a full suite of user workspace application which allows interaction with these operating systems in a modern, graphical user interface.

– GNOME is an international community decided to making great software that anyone can use, no matter what language they speak or their technical or physical ability.

11.5 Answers for Check Your Progress :

❑ **Check Your Progress 1 :**

    1. (a)   2. (d)   3. (d)   4. (refer 11.3.2)

❑ **Check Your Progress 2 :**

    1. (b)   2. (a)   3. (refer 11.4.3)

11.6 Glossary :

1. **KDE** – KDE is an international free software community producing an integrated set of applications designed to run on Linux, Microsoft Windows, and Mac OS X systems.

2. **GNOME** – GNOME is a desktop environment and graphical user interface that runs on top of a computer operating system. It is composed entirely of free and open–source software.

11.7 Assignment :

Explain KDE Basics in detail.

11.8 Activities :

Explain GNOME Packages and Management

11.9 Case Study :

Explain KDE and GNOME Configuration.

11.10 Further Reading :

1. Operating System Concept by Abraham Silberschatz, Peter Baer Galvin, Greg Gagne

2. Programming Be Operating System by Dan Sydow

In this block, you have learnt and understand about the basic of Linux system booting up process. The block gives an idea on the study and concept of Domain Expert Testing. You have been well explained on the concepts of state diagrams and basic concept on dynamic modelling.

The block detailed about the basic of various class definition along with responsibilities to object methodology. The concept related to state chart modelling and its features are also explained to you. You will be demonstrated practically about various elements of state diagrams.

BLOCK ASSIGNMENT :

❖ **Short Questions :**

1. Explain Linux Architecture.

2. Explain Disk Partition Configuration.

3. Write a note on Linux Distribution.

4. Explain PAM Authentication.

5. Write a note on Playing Music.

6. Write a note on Configuring Network.

7. Explain E–Mail Configuration.

8. Explain copy file from disk and over the network.

9. Write a note on X Windows.

❖ **Long Questions :**

1. Write history of UNIX and LINUX.

2. Write a detailed note on File System.

3. Explain Process Management.

4. Explain User and Group Management.

5. Explain Common System Configuration Files.

6. Write a detailed note on Log File.

7. Explain Configuration of Network Cards.

8. Explain basics of TCP/IP Networking.

9. Explain different connection to Internet.

10. Explain KDE Configuration.

❖ **Enrolment No. :** [   ]

1. How many hours did you need for studying the units ?

Unit No.	8	9	10	11
No. of Hrs.				

2. Please give your reactions to the following items based on your reading of the block :

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	☐	☐	☐	☐	_____
Language and Style	☐	☐	☐	☐	_____
Illustration used (Diagram, tables etc)	☐	☐	☐	☐	_____
Conceptual Clarity	☐	☐	☐	☐	_____
Check your progress Quest	☐	☐	☐	☐	_____
Feed back to CYP Question	☐	☐	☐	☐	_____

3. Any other Comments

....
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....

**Dr. Babasaheb Ambedkar
Open University Ahmedabad**   **BCAR-401**

WEB TECHNOLOGY USING FOSS (LAMP/WAMP)

BLOCK 4 : WEB DATA REPRESENTING AND WEB SERVICES

UNIT 12   REPRESENTING WEB DATA

UNIT 13   JSP TECHNOLOGY

UNIT 14   WEB SERVICES

WEB DATA REPRESENTING AND WEB SERVICES

Block Introduction :

Web data is a data that is structured and sourced from websites. Web Data Integration (WDI) is an extension and specialization of data integration that views the web as a collection of heterogeneous databases. Web data is the data that comes from large or diverse number of sources. In this block, you will detail about the basics of XML through which we can represent the web data. You will also learn different concepts along with XML like, DOM based XML; Event oriented parsing, Selecting XML Data, JSP Technology and different concepts of web services.

Block Objectives :

After learning this block, you will be able to understand :

- Extensible Markup Language(XML)

- Introduction of Ajax

- Concepts of JSP Technology

- Web Services

Block Structure :

Unit 12 : Representing Web Data

Unit 13 : JSP Technology

Unit 14 : Web Services

Unit 12 REPRESENTING WEB DATA

UNIT STRUCTURE

12.0   Learning Objectives :

After learning this unit you will be able to understand :

- Basics of XML
- Concepts related to XML
- Structure of JSP Technology
- Concepts related to Web Services

12.1   Introduction of XML :

XML stands for extensible markup language. A markup language is a set of codes, or tags that describes the text in a digital document. To format the web pages, HTML is used which is the most famous markup language. XML is the more flexible then HTML to format the web pages. HTML tells a browser application how a document should look, whereas XML describes what is in the document. In other words, XML is concerned with how information is organized, not how it is displayed. (XML formatting is done through separate style sheets.)

XML–Documents :

• An XML document is a basic unit of XML information composed of elements and other markup in an orderly package.

• An XML document can contains wide variety of data.

• An XML document is one that follows certain syntax rules.

Example–1 of XML Document

```
<text>
      Hello World!
</text>
```

Example–2 of XML Document

```
<? xml version = "1.0"?>
<contact–info>
      <name> Tulsidas Nakrani </name>
      <company> Shreeji Software</company>
      <mobile> 9898989898 </mobile>
</contact–info>
```

Here in above example XML document has two parts, first line of this example is called document prolog and remaining lines of code is called document element.

Document Prolog Section :

• It comes before the root element at the top of the document.

• This section contains XML Declaration and Document type declaration.

Document Elements Section :

• It is the building blocks of XML.

• It divides the document into different sections, and each is used for specific purpose.

• We can divide a document into multiple sections so that they can be rendered differently, or used by a search engine.

• The elements can be containers, with a combination of text and other elements.

⇒ An XML document consists of Markup and Character data (everything which are not markup)

Markup of XML Document Contains :

• Tags, which begin with < and end with >

• References, which begin with & and end with ;

• Character, e.g.

• Entity, e.g. <

• The entities lt, gt, amp, apos, and quot are recognized in every XML document.

• Other XHTML entities, such as nbsp, are only recognized in other XML documents if they are defined in the DTD

Comments :

- XML comment has the following syntax.

  < ! – – Comment – –>

- It is begin with <!– –and end with – –>

  Rules of Comments :

- It cannot appear before XML declaration.

- It may appear anywhere in a document.

- It cannot be nested inside the other comments.

- It must not appear within attribute values.

12.2	Versions and Declaration :

- XML declaration contains details that prepare an XML processor to parse the XML document.

- It is optional, but when used, it must appear in first line of the XML document.

- Following syntax shows XML declaration :

  <?xml

      version="version_number"

      encoding="encoding_declaration"

      standalone="standalone_status"

  ?>

  Each parameter consists of a parameter name, an equals sign (=), and parameter value inside a quote. XML declaration should abide with the following rules :

- If the XML declaration is present in the XML, it must be placed as the first line in the XML document.

- If the XML declaration is included, it must contain version number attribute.

- The Parameter names and values are case–sensitive.

- The name are always in lower case.

- The order of placing the parameters is important. The correct order is : version, encoding and standalone.

- Either single or double quotes may be used.

- The XML declaration has no closing tag i.e. </?xml>

  Following Examples are for XML Declaration :

- <?xml > – This examples shows the declaration without parameters

- <?xml version="1.0"> –This examples shows the declaration With version definition.

- <?xml version="1.0" encoding="UTF–8" standalone="no" ?> –This examples shows the declaration With all parameters.

- <?xml version='1.0' encoding='iso–8859–1' standalone='no' ?>– This examples shows the declaration with all parameters in single quotes.

1.   In Which line of XML document, the XML declaration is present ?

a. Last   b. second   c. middle   d. first

12.3   Namespace :

• A Namespace is a set of unique names. Namespace is a mechanism by which element and attribute name can be assigned to a group.

• The Namespace is identified by URI(Uniform Resource Identifiers).

• In XML, element names are defined by the developer. This often results in a conflict when trying to mix XML documents from different XML applications.

• Following XML carries HTML table information :

< table >

< tr >

< td > Fruits < /td >

< td >Vegetables < /td >

< /tr >

< /table >

• This XML carries information about a table :

< table >

< name > Indian Coffee Table </ name >

< width > 80 </ width >

</ table >

• If these XML fragments were added together, there would be a name conflict.

Both contain a <table> element, but the elements have different content and meaning.

• A user or an XML application will not know how to handle these differences.

Solving the Name Conflict Using a Prefix :

• Name conflicts in XML can easily be avoided using a name prefix.

• The following XML carries information about an HTML table, and a piece of furniture :

< h:table >

< h:tr >

< h:td > Fruits </ h:td >

< h:td > Vegetables </ h:td >

</ h:tr >

</ h:table >

< f:table >

< f:name > Indian Coffee Table </ f:name >

< f:width > 90 </ f:width >

< f:length > 130 </ f:length >

</ f:table >

- Here in example, because the two <table> elements have different names, there will be no conflict.

The xmlns Attribute :

- When using prefixes in XML, a namespace for the prefix must be defined.

- The namespace can be defined by an xmlns attribute in the start tag of an element.

- The namespace declaration has the following syntax.

xmlns:prefix="URI".

< root >

< h:table xmlns:h="http://www.xyz.com/TR/html4/">

 < h:tr >

  < h:td > Fruits </ h:td >

  <h:td> Vegetables </ h:td >

 </ h:tr >

< /h:table >

< f:table xmlns:f=https://www.mywebsite.com/furniture >

 < f:name>Indian Coffee Table< /f:name >

 < f:width > 80 < /f:width >

 < f:length > 120 < /f:length >

< /f:table>

</root>

In the above example :

- The xmlns attribute in the first <table> element gives the h: prefix a qualified namespace.

- The xmlns attribute in the second <table> element gives the f: prefix a qualified namespace.

- When a namespace is defined for an element, all child elements with the same prefix are associated with the same namespace.

- Namespaces can also be declared in the XML root element:

<root xmlns:h="http://www.xyz.com/TR/html4/"

xmlns:f="https://www.mywebsite.com/furniture">

<h:table>

 <h:tr>

  <h:td> Fruits </h:td>

  <h:td> Vegetables</h:td>

 </h:tr>

</h:table>

<f:table>

<f:name>Indian Coffee Table</f:name>

<f:width>80</f:width>

<f:length>120</f:length>

</f:table>

</root>

❑ **Check Your Progress – 2 :**

1. Which of the following is not contains in Namespace ?

    a. Function   b. Identifier   c. Method   d. Language

12.4   Java Script and XML :

Version 6 JavaScript browsers seem to be coming together over the W3C DOM. Several key methods and properties in JavaScript can help in getting information from an XML file. In the section, a very simple XML file is used to demonstrate pulling data from XML into an HTML page using JavaScript to parse (interpret) the XML file.

Unfortunately, the examples are limited to using IE5+ on Windows. (The same programs that worked fine using IE5+ on Windows bombed using IE5+ on the Mac using either OS 9+ or OS X.)

However, the great majority of keywords used in the scripts are W3C DOM– compliant, and the only keywords required from the Microsoft–unique set are XML document and document.all(). All of the other keywords are found in NN6+. The following Table 1 shows the W3C JavaScript keywords used in relationship to the XML file examples.

Table 1 W3C Java Script Keywords

Property	Meaning
documentElement	Returns the root element of the document
firstChild	Is the first element within another element
lastChild	Is the last element within another element
nextSibling	Is the next element in the same nested level as the current one
previousSibling	Is the previous element in the same nested level as the current one
nodeValue	Is the value of a document element
nodeValue	Is the value of a document element
getElementsByTagName	Used to place all elements into an object

Finding Children :

To see how to pull data from an XML file, all examples use the following XML file. The intentional simplicity of the XML file is to help clarify using JavaScript with XML and does not represent a sophisticated example of storing data in XML format.

```
<?xml version="1.0" ?>
<writers>
    <EnglishLanguage>
        <fiction>
            <pen>
                <name>Tulsidas Nakrani</name>
                <name>Parimal Patel</name>
                <name>Maulik Patel</name>
            </pen>
        </fiction>
    </EnglishLanguage>
</writers>
```

The XML file contains a typical arrangement of data using a level of categories that you might find in a bookstore or library arrangement. It is meant to be intuitively clear, as is all XML.

12.5   AJAX :

Ajax is a name given to the set of tools that previously existed. The main part is XMLHttpRequest, a server–side object usable in JavaScript that was implemented into Internet Explorer since the 4.0 version. XMLHttpRequest was developed by Mozilla from an ActiveX object named XMLHTTP and created by Microsoft. The use of XMLHttpRequest by Google, in Gmail and GoogleMaps has contributed to the success of this format. But this is the when the name Ajax was itself coined that the technology started to be so popular.

Ajax is a set of technologies, supported by a web browser, including these elements :

• Ajax is a set of technologies, supported by a web browser, including these elements :

• HTML for the interface

• CSS for the look and feel.

• JavaScript for local processing and DOM(Document Obect Model) to access data inside the page or to access element of XML file read on the server.

• The XMLHttpRequest obect is used to read or send data on the server asynchronously.

• PHP or another scripting language may be used on the server.

Ajax from XML :

To get data from an XML file, we have just to replace this line: document.ajax.dyn="Received:" + xhr.responseText;

by this code :

// Assign the XML file to var

var doc=xhr.responseXML;

```
// Read the first element
var element=doc.getElementByTagName(root).item(0);
//Assign the content to the form
document.ajax.dyn.value=element.firstChild.data;
```

XML document using Ajax :

While making server request in Ajax, we see that the data returned will be in the form of text/html or an XML document. The latter is technically just a text file as well, but with some special instructions, Ajax can retrieve that well–formed XML text file and return it back to you as a XML object. This enables the XML data to be easily parsed using standard DOM methods. Consider an XML document in RSS format :

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<rss version="0.91">
<channel>
<title>Learning Java</title>
<link>http://www.javascriptkit.com</link>
<description>tutorials 400+ free scripts</description>
<language>en</language>
<item>
<title>Document Text</title>
<link>http://www.javascript.shtml</link>
<description> This script is used to add the ability to users for toggling the webpage's font size with persistent cookies instead of remembering the different settings
</description>
    </item>


    <item>
    <title> Mouse Buttons/Keyboard </title>
<link>http://www.javscript.com/boardmouse.shtml</link>


<description> The latest update to our JS Reference takes a hard look at keyboard and mouse button events in JavaScript, including the unicode value of each key.</description>
</item>
<item>
<title>Dynamically loading an external JavaScript or CSS file</title>
<link>http://www.javscriptkit.com/javatutors/loadjavascriptcss.shtml</link>


<description>External JavaScript or CSS files loads the part of the pages synchronously and dynamically </description>
</item>
```

</channel>

</rss>

Below shows retrieving XML document and outputting headlines ("title" elements) of each entry :

```
<div id='result"> </div>
<script type="text/javascript">
function ajaxRequest(){

var activexmoddes=["Msxml22.XMLHTTP", "Microsoft.XMLHTTP"]
//Check in for IE for activeX versions.
if (window.ActiveXObject)
{ //Test for support for ActiveXObject in IE first
for (var i=0; i<activexmodes.length; i++){

Try{

   return new ActiveXObject(activexmodes[i])
}
catch(e){
//suppress error
}
}
}
else if (window.XMLHttpRequest)
// if Safari,Mozilla,chrome, etc
   return new XMLHttpRequest()
else
   return false
}
var mygetrequest=new ajaxRequest()
if (mygetrequest.overrideMimeType)
mygetrequest.overrideMimeType('text/xml')
mygetrequest.onreadystatechange=function(){
   if (mygetrequest.readyState==r){
      if (mygetrequest.status==200 || window.loacation.href.indexof
      ("http")==-1){
         var xmldata-mygetrequest.responseXML //retrieve result as an
         XML object
         var rssentries=xmldata.getElementsByTagName("item")
         var output='<ul>'
```

```
        for (var i=0; i<rssentries.length; i++){
            output+='<li>'
            output+='<a href=" '+rssentries[i].getElementsyByTagName
            ('link') [0].firstChild.nodevalue+' ">'
        output+=rssentries[i].getElementsByTagName('title')[0].first
        Child.nodeValue+'</ a>' output+='</li>'
        }
output+='</ul>' document.getElementById("result").innerHTML=output
}
else{
alert("An error has occured making the request")
}
}
}
mygetrequest.open("GET", "javascriptkit.xml", true)
mygetrequest.send(null)
</script>
```

❑ **Check Your Progress – 3 :**

1. Full form of AJAX is :

   a. Abstract Java Asynchronous and XML

   b. Asynchronous JavaScript and XML

   c. Abstract JSON and XML

   d. Another JSON and Xtended XML

2. Which of the following technologies is providing the ability to dynamically interact with webpage Layout ?

   a. DOM (Docuent Object Model) b. HTML

   c. XML   d. CSS

3. Check that the given statement is true or false - "AJAX is the programming Language"

   a. True   b. False

12.6   SAX–Transforming XML Documents :

We can create XML document by transforming XML document using SAX transformation that helps in sending types of events fast and efficiently. The main class for SAX transformation is simple that can be created using Compact Reader which will read the file as Input Source and transforms to process source into output stream. All the magic of setting the input file and creating the document elements is done by finding transformation process.

XML document creation using SAX events :

import org.xml.sax.InputSource;

import javax.xml.transform.sax.SAXSource;

import javax.xml.transform.stream.StreamResult;

```
import javax.xml.transform.Transformer;

import javax.xml.transform.TransformerFactory;

import javax.xml.transform.TransformerException;

import javax.xml.transform.TransformerConfigurationException;

import java.io.BufferdReader;

import java.io.FileReader;

import java.io.IOException;


public class SAXExpand {

    public static void main( String[] argv ) {

    try {

        InputSource inputSource =

            new InputSource{

                new BufferdReader(new FileReader(argve[0])));

        CompactReader saxReader = new CompactReader();

        SAXSource source = new SAXSource(saxReader,inputSource);

        }

    }

}
```

Here, the file reading and SAX event generation is done by CompactReader, a special XMLReader, because CompactReader will be able to implement the XMLReader interface that shows many methods, but only a few of them are really important.

SAX parsing events are sent to the event handler, where we define accessor methods that are for the handler's user. Parse method, uses a similar algorithm to that used for the DOM approach, where parsing uses a CompactTokenizer instance of the same class applied with DOM.

Note that a lot of processing is done inside to extend the method that receives the name of the current element as a parameter that initially creates the AttributesImpl data structure filled with names and values of all the attributes.

❑ **Check Your Progress – 4 :**

1.   What method does SAX use to process XML documents?

   a. Document   b. Tree based

   c. DocumentHandler   d. Event Based

| 12.7   Selecting XML Data : |

Data can be easily selected and formatted in XML using the FOR XML clause, which is valid in the SELECT statement that returns the results of the SELECT statement in many XML formats. Consider a SELECT statement :

SELECT Emp_ID, FName_VC, LName_VC FROM Employee_T

Executing SELECT statement in Query Analyzer will have standard results as shown :

Emp_ID	FName_VC	LName_VC
1	Tulsidas	Nakrani
2	Parimal	Patel
4	Dhruv	Nakrani

On taking SELECT statement and adding FOR XML clause : SELECT Emp_ID, FName_VC, LName_VC FROM Employee_T FOR XML RAW

Hence the total different set of results:

XML_F52E2B61–18A1–11d1–B105–00805F49916B

```
<row Emp_ID="1" FName_VC="Tulsidas" LName_VC= "Nakrani"/>
```

```
<row Emp_ID="2" FName_VC="Parimal" LName_VC="Patel"/>"/>
```

```
<row Emp_ID="4" FName_VC="Dhruv" LName_VC="Nakrani"/>
```

12.8 XPATH Transformations :

XSLT is a W3C recommendation that defines XML document transformations that convert documents to XSL–FO for printing or viewed as a programming language and XML–compatible transformations are common to XSL–FO without XSLT.

Fig. 1 XPATH Transformations

The XSL transformation converts an XML document into an XML document, a text document, or an HTML document. XSLT allows the processor to work not only on XML, but on anything resembling XML, namely :

- relational database tables
- Geographic Information Systems
- file system

In many cases, the XSLT processor will work directly from an XDM instance database that runs on multiple input files in different formats that treat everything as if it were an XML file.

12.9   Template–based Transformations :

XSLT uses a template–based approach to convert the document into a template that describes certain input elements. In the case of a markup letter to generate HTML for the web, we need a pattern that corresponds to the underlined passage and the italic representation:

```
<template match="underline">

    <i>

    <apply–templates/>

    </i>

</template>
```

If the input document has following fragment of XML:

I <underline>really</underline> love XSLT!

The template would match the underline element, and produce the following HTML fragment :

I <i>really</i> love XSLT!

12.10   XSLT :

XSLT is a language to convert XML documents into XHTML documents or other XML documents. XSLT is used to convert an XML document into another XML document, or any other type of document recognized by a browser, such as HTML and XHTML. Normally, XSLT does this by turning each XML element into an (X)HTML element.

XSLT allows you to add/remove elements and attributes to or from the output file. You can also rearrange and sort items, run tests and make decisions about which items to hide and show, and much more.

Fig. 2 XSLT Process

❑   **Check Your Progress – 5 :**

1.   XSL Transformations converts :

   a. XML doc to XHTML doc   b. XHTML doc to HTML doc

   c. XML doc to XML doc   d. HTML doc to XML doc

12.11 Displaying XML Documents in Browsers :

Internet Explorer helps to view XML documents in the browser, similar to displaying HTML pages. Like HTML, XML has no predefined display properties, so it needs a separate style sheet showing how to display XML data. This separation of XML content from the presentation makes it easy to reuse the content.

To view the XML file in Internet Explorer, you must specify the stylesheet with the following.Use the default style sheet in which the file is displayed as a collapsible tree structure. Specify the stylesheet at the top of the XML file, in the href attribute such as:

<?xml–stylesheet type="text/xsl" href="myfile.xsl" ?> Specify style sheet at command prompt:

c:\bat\msxsl mydata.xml mytransform.xsl –o myoutput.html

❑ **Check Your Progress – 6 :**

1. Which of the following is incorrect with respect to XML ?

    a. It has predefine display properties

    b. It contains separate style sheet

    c. It is same as HTML

    d. All of above

12.12 Let Us Sum Up :

In this unit we have learnt the basics of XML like how documents and vocabularies we can write using XML, versions and declaration We also learnt the different concepts related to XML like, JavaScript, Ajax, DOM based XML processing, event oriented parsing: SAX, Transforming XML documents, Selecting XML Data: XPATH. Also we learnt the template based transformation: XSLT, Displaying XML documents in browser in detail.

12.13 Answers for Check Your Progress :

1.13

❑ **Check Your Progress 1 :**

1. (d)

❑ **Check Your Progress 2 :**

1. (c)

❑ **Check Your Progress 3 :**

1. (b)   2. (a)   3. (b)

❑ **Check Your Progress 4 :**

1. (d)

❑ **Check Your Progress 5 :**

1. (d)

❑ **Check Your Progress 6 :**

1. (c)

12.14　Glossary :

1. **XML** stands for extensible markup language. A markup language is a set of codes, or tags that describes the text in a digital document.

2. **Ajax** is a set of technologies, supported by a web browser.

3. **XSLT** are W3C recommendations which defines XML document transformation that transform documents into XSL–FO for printing or viewing as general XML–aware programming

12.15　Assignment :

Explain the features of SAX parsing ?

12.16　Activities :

Study file organization in Ajax file system.

12.17　Case Study :

Managing Complex Documents over the WWW: A Case Study for XML

12.18　Further Readings :

1. XML: Principles, Tools, and Techniques by Dan Connolly, Publisher: O'Reilly & Associates

2. XML: Extensible Markup Language by Elliotte Rusty Harold, Publisher: IDG Books

3. The XML Handbook by Charles F. Goldfarb, Paul Prescod, Publisher: Prentice Hall Computer Books

4. XML for Dummies Quick Reference by Mariva H. Aviram, Publisher: IDG Books

Unit	
13	*JSP TECHNOLOGY*

UNIT STRUCTURE

13.0   Learning Objectives :

After learning this unit, you will be able to understand :

• The Basics of JSP Technology

• Advantages of JSP over Servlet

• The Life cycles of a JSP page

• Scripting Elements and its usage

• MVC in JSP

• JSP Standard Tag Library

13.1   Introduction of JSP :

JSP technology is used to create web applications as per Servlet technology is used. It can be considered as an extension of the servlet, as it provides more functionality than the servlet, for example JSTL, the language of expressions etc.

In a JSP page HTML tags and JSP tags are used. It is easy to maintain the JSP pages than Servlet because we can separate design and code of application. It provides some additional features such as Expression Language, Custom Tags, etc.

Java Server Pages is a complimentary technology to Java Servlet which facilitates the mixing of dynamic and static web contents. JSP is Java's answer to the popular Microsoft's Active Server Pages (ASP). JSP, like ASP, provides

elegant way to mix static and dynamic contents. The main page is written in regular HTML, while special tags are provided to insert pieces of Java programming codes. The business programming logic and the presentation are cleanly separated. This allows the programmers to focus on the business logic, while the web designer to concentrate on the presentation.

JSP is based on Servlet. In fact, we shall see that JSP page is internally translated into a Java servlet. Also "Servlet is HTML inside Java", while "JSP is Java inside HTML". Whatever you can't do in servlet, you can't do in JSP. JSP makes the creation and maintenance of dynamic HTML pages much easier than servlet. JSP is more convenience than servlet for dealing with the presentation, not more powerful.

JSP is meant to compliment Servlet, not a replacement. In a Model–View–Control (MVC) design, servlets are used for the controller, which involves complex programming logic. JSPs are used for the view, which deals with presentation. The model could be implemented using JavaBeans or Enterprise JavaBeans (EJB) which may interface with a database.

13.2 Advantages of JSP over Servlet :

• JSP is the Extension to Servlet

• JSP is the easy to maintain

• Development using JSP is fast because no need to recompile and redeploy

• JSP required less code than Servlet

13.3 The Lifecycle of a JSP Page :

The following phases followed by the JSP pages.

• Phase–1 : Translation

• Phase–2 : Compilation

• Phase–3 : Class loading

• Phase–4 : Object Creation

• Phase–5 : Initialization

• Phase–6 : Processing of Request processing

• Phase–7 : Destroy

The following figure shows the lifecycle of JSP page

Fig. 1 Life Cycle of JSP Page

As per above diagram shown,

- JSP translator translates JSP page in to servlet.

- Compiler compiles the servlet page and converted into class file.

- All the processed which are performed on JSP later like initialization, committing response to the browser and destroy.

❑ **Check Your Progress – 1 :**

1. JSP provides good way to :

   a. dynamic content Writing

   b. writing static content

   c. mixing static and dynamic contents.

   d. all of above

2. _____ is the full form of JSP.

   a. Java System Pages   b. Java Server Pages

   c. Java Server Program   d. Java System Program

13.4 Creation of JSP Page :

We will create one simple JSP page so that you can understand that how we can create simple JSP Page. We will store that file with .jsp extension. To write the JSP page we will follow some steps as follows.

1. Create new file in editor.

2. Save it as index.jsp.

3. Write some HTML code as follows.

4. Put this folder in web–apps directory in apache tomcat.

The following is the code of index.jsp

```
<html>
<body>
<% out.print(5*5); %>
</body>
</html>
```

To run the above code follows the following steps.

- Start the server.

- Put the JSP file in a folder and deploy on the server.

- Follow the URL as

  http://localhost:portno/contextRoot/jspfile,

  For example, http://localhost:8888/myapp/index.jsp

13.5 The Directory Structure of JSP :

The following figure shows the directory structure of JSP

Fig. 2 Directory Structure of JSP

The directory structure of JSP page is same as Servlet. We contain the JSP page outside the WEB–INF folder or in any directory.

❑ **Check Your Progress – 2 :**

1. Which command will execute when servlet is loaded in server

    a. init()   b. destroy()   c. service()   d. none of above

13.6 Scripting Elements of JSP (Scriptlet Tag) :

Through scripting element we can insert the java code inside the JSP. Following are the types of scripting elements:

(1) scriptlet tag, (2) expression tag and (3) declaration tag

(1)   scriptlet tag

Following is the syntax for scriptlet tag which can be used to execute java source code in JSP.

<% java source code %>

Following example will display the welcome message.

<html>

<body>

<% out.print("welcome to jsp"); %>

</body>

</html>

Following example will print the username. We have created two file one is index.html and second one is welcomes.jsp. user will enter the username in index.html file and message will be display by welcomes.jsp

Code of index.html

<html>

<body>

<form action="welcomes.jsp">

<input type="text" name="username">

```
<input type="submit" value="submit"><br/>
</form>
</body>
</html>
```

Code of welcom.jsp

```
<html>
<body>
<%
String name=request.getParameter("username ");
out.print("Hello "+name);
%>
</form>
</body>
</html>
```

(2)   Expression tag :

The code which placed within expression tag will write to the output stream of the response. So there is no need to write out.print() method to write the data. Mainly it is used to print the value of method or variable.

Syntax : **<%= statement %>**

The Following example will display the welcome message.

```
<html>
<body>
<%= "welcome to my JSP Page" %>
</body>
</html>
```

The Following example will display the current time.

Here in this example, getTime() method is used which is from Calendar class. It is a instance method and it is called by after creating the instance of Calendar class by using getInstance() method.

Code of index.jsp

```
<html>
<body>
        Current Time is: <%= java.util.Calendar.getInstance().getTime() %>
</body>
</html>
```

⇨   The Following example will display the current time.

Here we will print the username using the expression tag. We have created two file one is index.html and second one is welcomes.jsp. User will enter the username in index.html file and sends the request to the welcomes.jsp file to print the message for username.

Code of index.jsp

```
<html>
<body>
<form action="welcomes.jsp">
<input type="text" name="username"><br/>
<input type="submit" value="submit">
</form>
</body>
</html>
```

Code of welcomes.jsp

```
<html>
<body>
<%= "Welcome "+request.getParameter("uname") %>
</body>
</html>
```

(3) Declaration Tag :

• It is used to declare methods and fields.

• The code written inside the jsp declaration tag is placed outside the service() method of auto generated servlet. So it doesn't get memory at each request.

  syntax : **<%! field or method declaration %>**

⇨ Example which will declare the field and print the value of declared field using expression tag.

  Code of index.jsp

```
<html>
<body>
<%! int data=60; %>
<%= "Variable value is:"+data %>
</body>
</html>
```

⇨ Example which will define the method which will call by expression tag and return the cube of number. Also we can use scriptlet tag to call the declared method.

  Code of index.jsp

```
<html>
<body>
<%!
    int cube(int no){
    return no*no*no*;
}
```

%>

<%= "Cube of 4 is:"+cube(4) %>

</body>

</html>

❑   **Check Your Progress – 3 :**

1.   Which of the following is correct ?

   a. Servlet technology helps in creating source code

   b. CGI technology is better than Servlet

   c. Servlet technology does not create a process

   d. CGI can handle requests with ease

13.7   Implicit Objects :

•   Following 9 implicit objects are created by the web containers which are available to all the jsp pages.

•   The available implicit objects are out, request, response, config, application, session, pageContext, page and exception. The following table shows the list of implicit objects with its type.

Table 1 Implicit Objects

Object	Type	Object	Type
out	JspWriter	session	HttpSession
request	HttpServletRequest	pageContext	PageContext
response	HttpServletResponse	page	Object
config	ServletConfig	exception	Throwable
application	ServletContext		

Example of out object :

To write the data to the buffer, out implicit object is use. It is a JSP Writer object.

⇨   For servlet we have to write following line of code.

PrintWriter out = response.getWriter();

But in JSP, you don't need to write this code.

⇨   Following example will display date and time.

<html>

<body>

<% out.print("Today is:"+java.util.Calendar.getInstance().getTime()); %>

</body>

</html>

The out of this code is :

Today is Fri 18 15:50:38 IST 2022

13.8   Directive Elements :

The Jsp directive tells the web container that how JSP page is translated to its corresponding servelet. Following are the types of directives:

- page directive
- include directive
- taglib directive

Syntax : **<%@ directive attribute="value" %>**

(1) page directive : defines attributes that apply to an entire JSP page.

Syntax : **<%@ page attribute="value" %>**

⇨ **Following are the attributes of page directive :**

- Import :
  - o Used to import class, interface or all the members of a package.
  - o Similar to import keyword in java class or interface.
- contentType :
  - o Defines the MIME (Multipurpose Internet Mail Extension) type of the HTTP response.
  - o The default value is "text/html;charset=ISO–8859–1".
- Extends :
  - o Defines the parent class that will be inherited by the generated servlet. It is rarely used.
- Info :
  - o sets the information of the JSP page which is retrieved later by using getServletInfo() method of Servlet interface.
- Buffer :
  - o Sets the buffer size in kilobytes to handle output generated by the JSP page.
  - o The default size of the buffer is 8Kb.
- Language :
  - o Specifies the scripting language used in the JSP page.
  - o The default value is "java".
- isELIgnored :
  - o We can ignore the Expression Language (EL) in jsp by the isELIgnored attribute.
  - o By default its value is false i.e. Expression Language is enabled by default
- isThreadSafe :
  - o Servlet and JSP both are multithreaded.If you want to control this behaviour of JSP page, you can use isThreadSafe attribute of page directive.
- autoFlush
- session
- pageEncoding
- errorPage
  - o used to define the error page, if exception occurs in the current page, it will be redirected to the error page.

• isErrorPage

o attribute is used to declare that the current page is the error page.

(2) include directive :

• It is used to include the contents of files like text file, jsp file or html file.

• The include directive includes the original content of the included resource at page translation time

• The jsp page is translated only once so it will be better to include static resource.

• The main advantage of this directive is reusability of program code.

Syntax : **<%@ include file="resourceName" %>**

Example :

⇨ Following example shows the use of include which includes the content of header.html file. It must be exist the header.html before including in any file.

<html>

<body>

    <%@ include file="header.html" %>

    Today is: <%= java.util.Calendar.getInstance().getTime() %>

</body>

</html>

(3) taglib directive :

• To define the tag libray taglib directive is used, which define many tags.

• We can use the Tag Library Descriptor (TLD) file to define the tags.

Syntax :

<%@ taglib uri="uriofthetaglibrary" prefix="prefixoftaglibrary" %>

Example :

⇨ Here in the following code we used our tag named currentDate. To use this tag we must specify the taglib directive so the container may get information about the tag.

<html>

<body>

    <%@ taglib uri="http://www.xyz.com/tags" prefix="mytag" %>

    <mytag:currentDate/>

    </body>

</html>

❑ **Check Your Progress – 4 :**

1. Which of the scripting of JSP not putting content into service method of the converted servlet ?

a. Declarations   b. Scriptlets

c. Expressions   d. None of the above

2. Which of the following is the correct syntax to declare comments in JSP ?

   a. <%-- This is JSP comment --%>

   b. <!-- This is JSP comment -->

   c. //..

   d. All of the above

13.9   MVC in JSP :

MVC stands for Model View and Controller.

It is a **design pattern** that separates the data, business logic and presentation logic.

Controller :

• It acts as an interface between View and Model.

• Controller intercepts all the incoming requests.

Model :

• It represents the state of the application i.e. data.

• It can also have business logic.

View :

• It represents the presentation i.e. UI (User Interface).

Advantages of MVC :

1. Navigation Control is centralized Navigation Control

2. Ease to maintain the large application

   The following figure shows the container of MVC.

Fig. 3 Container

• Following program shows the use of model, view and controller.

• In this example we have use MVC architure as follows

   o   controller – servlet

   o   view – Jsp

   o   model – Java Bean class

• In this example, we have created 5 pages as follows.

1. **index.jsp** is used to gets input from the user.

2. **ControllerServlet.java** which is servlet and it will acts as a controller.

3. **login–success.jsp** and **login–error.jsp** files acts as view components.
4. **web.xml** file for mapping the servlet.

⇨ **Code of index.jsp file**

```
<form action="ControllerServlet" method="post">
Name:<input type="text" name="myname"><br>
Password:<input type="password" name="mypassword"><br>
<input type="submit" value="submit">
</form>
```

⇨ **Code of ControllerServlet.java file**

```java
package com.javatpoint;
import java.io.IOException;
import java.io.PrintWriter;
import javax.servlet.RequestDispatcher;
import javax.servlet.ServletException;
import javax.servlet.http.HttpServlet;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;
public class ControllerServlet extends HttpServlet {
    protected void doPost(HttpServletRequest request,
                                        HttpServletResponse response)
            throws ServletException, IOException {
        response.setContentType("text/html");
        PrintWriter out=response.getWriter();

        String name=request.getParameter("myname");
        String password=request.getParameter("mypassword");

        LoginBean bean=new LoginBean();
        bean.setName(myname);
        bean.setPassword(mypassword);
        request.setAttribute("bean",bean);

        boolean status=bean.validate();

        if(status){
            RequestDispatcher rd=request.getRequestDispatcher
                                        ("login–success.jsp");
            rd.forward(request, response);
        }
```

```
        else{
            RequestDispatcher rd=request.getRequestDispatcher
                                            ("login–error.jsp");
            rd.forward(request, response);
        }


    }
    @Override
    protected void doGet(HttpServletRequest req, HttpServletResponse resp)
        throws ServletException, IOException {
        doPost(req, resp);
    }
}
```

⇨ **Code of LoginBean.java file**

```
package com.javatpoint;
public class LoginBean {
private String name,password;

public String getName() {
    return name;
}
public void setName(String name) {
    this.name = name;
}
public String getPassword() {
    return password;
}
public void setPassword(String password) {
    this.password = password;
}
public boolean validate(){
    if(password.equals("admin")){
        return true;
    }
    else{
        return false;
```

```
        }
    }
}
```

⇨ **Code of login–success.jsp file**

```
<%@page import="com.javatpoint.LoginBean"%>
    <p>You are successfully logged in!</p>
<%
LoginBean bean=(LoginBean)request.getAttribute("bean");
out.print("Welcome, "+bean.getName());
%>
```

⇨ **Code of login–error.jsp file**

```
<p>Sorry! username or password error</p>
<%@ include file="index.jsp" %>
```

⇨ **Code of web.xml**

```
<?xml version="1.0" encoding="UTF–8"?>
<web–app xmlns:xsi="http://www.w3.org/2001/XMLSchema–instance"
xmlns="http://java.sun.com/xml/ns/javaee" xmlns:web="http://java.sun.com
                            /xml/ns/javaee/web–app_2_5.xsd"
xsi:schemaLocation="http://java.sun.com/xml/ns/javaee http://java.sun.com/
                             xml/ns/javaee/web–app_3_0.xsd"
id="WebApp_ID" version="3.0">
    <servlet>
    <servlet–name>s1</servlet–name>
    <servlet–class>com.javatpoint.ControllerServlet</servlet–class>
    </servlet>
    <servlet–mapping>
    <servlet–name>s1</servlet–name>
    <url–pattern>/ControllerServlet</url–pattern>
    </servlet–mapping>
</web–app>
```

Output :

13.10   JSP Standard Tag Library (JSTL) :

JSTL is a collection of tags which are use to simplify the JSP development.

Advantage of JSTL :

1.   Through the JSTL tags we can simplify the JSP so the development become fast.

2.   JSTL tags can be used on various pages so that we can reuse the same code.

3.   We can avoid the sciptlet tag by using JSTL tags.

JSTL Tags :

It provides mainly five types of tags:

(1) Core Tags :

- It provides URL management, flow control, variable support etc.
- The prefix for core tag is c.
- URL of core tag is: http://java.sun.com/jsp/jstl/core.

(2) Function Tags :

- It provides support in to find the length of string and also for manipulation of string.
- Prefix for this tag is : fn
- The URL for this tag is : http://java.sun.com/jsp/jstl/functions

(3) Formatting Tags :

- It provides support for number formatting, message formatting and date formatting.
- Prefix for this tag is fmt.
- The URL for this tag is : http://java.sun.com/jsp/jstl/fmt

(4) XML Tags :

- It provides transformation, flow control etc.
- Prefix for this tag is x.
- The URL for this tag is : http://java.sun.com/jsp/jstl/xml

(5) SQL Tags :

a. It provides support for SQL operations.
b. Prefix for this tag is sql.
c. The URL for this tag is : **http://java.sun.com/jsp/jstl/sql**

13.11   Let Us Sum Up :

In this unit we have learnt the basics of JSP technology, how JSP work is different than servlet and also its advantages over servlet. We also learnt the life cycle of JSP page, how to create JSP page, directory structure of JSP page, Different Scripting elements of JSP with its usage. Also we learnt the different implicit objects with example, different directive elements, MVC in JSP, finally we also learnt the JSTL in detail.

13.12   Answer for Check Your Progress :

❑ **Check Your Progress 1 :**

  1. (c)   2. (b)

❑ **Check Your Progress 2 :**

  1. (a)

❑ **Check Your Progress 3 :**

  1. (c)

❑ **Check Your Progress 4 :**

  1. (c)   2. (a)

13.13   Glossary :

1.   **Java Server Pages technology (JSP)** is a server–side programming language used to create a dynamic web page in the form of Hyper Text Markup Language (HTML).

2.   **Servlet Technology** is used to create a web application (resides at server side and generates a dynamic web page).

13.14   Assignment :

1.   What is the difference between include directive and include action?

2.   What are the JSP implicit objects?

13.15   Activities :

Implement some programs for the use of implicit object in JSP.

13.16   Case Study :

Discuss some functionality & requirements to create website for trader of boot sales.

13.17   Further Reading :

1.   Bergsten, Hans (2003). JavaServer Pages. O'Reilly Media.

2.   Hanna, Phil (2003). JSP 2.0 – The Complete Reference. McGraw–Hill Osborne Media.

3.   Sierra, Kathy; Bates, Bert; Basham, Bryan. Head First Servlets & JSP. O'Reilly Media.

4.   Brown, Simon; Dalton, Sam; Jepp, Daniel; Johnson, Dave; Li, Sing; Raible, Matt. Pro JSP 2. Apress.

Unit	
14	*WEB SERVICES*

UNIT STRUCTURE

14.0   Learning Objectives :

After learning this unit you will be able to understand :

- What is web service ?
- Types of web services
- How web services work ?
- Why do you need web services ?
- What are the types of web services ?
- Web services description language
- Architecture of web services

14.1   Introduction :

The web service is a software module which provides a medium to propagate communication between the client and server application on World Wide Web (WWW). It performs some set of task for communication. In cloud computing, web services searched for over the network and can also be invoked consequently. When it is invoked, the web service will be able to provide the

functionality to the client, which invokes that web service. As is the case with any client–server paradigm, in the world of web services there are web service providers and web service consumers.

We can also define a Web Service in different way as follows.

• It is a one type of component which is used for communication.

• It is a client–server application, which provides a method for communication between two devices on the internet.

• It is a software program for interoperable system to system communication.

• It is a collection of protocols or standards for swap over information between two devices or application

The following figure shows the usage of web services.

Fig. 1 Web Services

Here, in above figure, It shows that how the different applications like PHP, .Net, Java etc. can communicate with other applications through web services over the network.

Say for example PHP can interact with .Net and java application. So, web service is a language independent way of communication.

14.2   Types of Web Services :

There are mainly two types of web services. JDK, JRE, and JVM

1.   SOAP web services.

2.   RESTful web services.

14.2.1 SOAP Web Services :

SOAP (Simple Object Access Protocol) is a messaging protocol that allows projects to run on a variety of frameworks (such as Windows Illustration Linux What's more Linux) in voice using Hypertext Transfer Protocol (HTTP) and Extensible Markup Language (XML).

Since web conventions need help introducing accessibility for use, finally looking at major framework platforms like http and XML gives a practical result that allows projects to run on separate frameworks for the system they interact with. SOAP specifies exactly how an XML–registered http header is encoded for a single workstation project to bring the system to an additional PC with more tabs for most data. SOAP also labels how the so–called camwood system exchanges a response. Despite its incessant HTTP matching, the cleaner also supports various transport conventions and blacks.

SOAP characterizes the XML–based message configuration that web service facilities use to send and collaborate with each other (on that web. The heterogeneous environment of the web requires requests to support a regular information encryption protocol. In addition, SOAP message configuration SOAP is a standard for encoding messages over XML that invoke capabilities over other features.

SOAP will be very similar to Remote Calls (RPC), used in a significant number of developments such as DCOM and CORBA, as it removes some of the complexities of using these interfaces. Cleanser allows requests to work from other applications, running once on each machine platform, at least for different frameworks alternating between changing dialects

SOAP calls would largely be less averse to traverse firewall servers, as HTTP typically supports port 80, where other calls can be blocked for security reasons. Because http requests require support that is generally allowed through firewalls, projects using matched sanitizers can certainly be passed through the system for projects anywhere.

14.2.1.1 Software Installation :

SOAP has a looser client–server interface than some comparable distributed computing protocols, such as CORBA/IIOP, and provides easier communication for a client and server using different languages. SOAP reveals a standard way for processes to communicate, but uses existing technologies.

SOAP requests are easy to generate and responses can be easily processed by a customer. An application can become a programmatic client of another application's services, with each application exchanging rich and structured information. The ability to add powerful distributed web services enables SOAP to provide a robust programming model that turns the Internet into an application development platform.

SOAP provides a standard so developers don't have to invent a custom XML message format for every service they want to offer. Given the signature of the service method to be called, the SOAP specification prescribes an unambiguous XML message format.

To install, download the latest version of SOAP, lite and follow the standard Perl module installation procedures by entering the well–known script.

Perl Makfile.PL

Make

Make test

Make install

If you have CPAN.pm module installed and you are connected to the Internet, then run the following sequence of commands :

perl-MCPAN -e shell

install SOAP::Lite

Or even:

perl -MCPAN -e 'install SOAP::Lite'

14.2.1.2 Windows Users :

Windows users should use 'nmake' instead of make. For example :

perl Makefile.PL

nmake

nmake test

nmake install

Makefile.PL Command Line Options and Usage

Usage : perl Makefile. PL Possible options are :

--noprompt   Disable interactive dialog

--alltests   Perform extra testing

--help, -?   Display this help text

[Do not] install prerequisites for appropriate module :

--[no]install-SOAP-Lite   --[no]Lite

--[no]install-SOAP-Transport-HTTPS-Client --[no]HTTPS-Client

--[no]install-SOAP-Transport-MAILTO-Client --[no]MAILTO-Client

--[no]install-SOAP-Transport-FTP-Clint   --[no]FTP-Client

--[no]install-SOAP-Transport-HTTP-Daemon   --[no]HTTP-Daemon

--[no]install-SOAP-Transport-HTTP-Apache   --[no]HTTP-Apache

--[no]install-SOAP-Transport-HTTP-FCGI   --[no]HTTP-FCGI

--[no]install-SOAP-Transport-POP3-Server   --[no]POP3-Server

--[no]install-SOAP-Transport-IO-Server   --[no]IO-Server

--[no]install-SOAP-Transport-MQ   --[no]MQ

--[no]install-SOAP-Transport-JABBER   --[no]JABBER

--[no]install-SOAP-MIMEParser   --[no]MIMEParser

--[no]install-SOAP-Transport-TCP   --[no]TCP

--[no]install-SOAP-Transport-HTTP   --[no]HTTP

Use perl Makefile.PL --noprompt to disable interactive configuration.

Follow these instructions to install SOAP::Lite on your hosting account.

14.2.2 RESTful Web Services :

- REST stands for REpresentational State Transfer.

- REST is an architectural style not a protocol.

    Advantages :

- RESTful Web Services are fast because there is no strict specification like SOAP.

- It required less resource and bandwidth.

- RESTful web services can be written in any programming language and executed in any platform, So it's a language and platform independent.

- RESTful web services can use SOAP web services for the implementation.

- It Permits different data format such as HTML,JSON,XML and Plain Text.

❑ **Check Your Progress – 1 :**

1. SOAP is _____ based protocol which allows applications exchange information over HTTP.

   a. XML   b. Python   c. Java Script   d. PHP

14.3   How Web Services Work ?

Fig. 2 How Web Services Work ?

The above diagram shows a very basic view of how a web service would actually work. The client invokes a sequence of web service calls via requests to a server which would host the actual web service. These requests are made through what is known as remote procedure calls(RPC). RPC are calls made to methods which are hosted by the relevant web service.

14.4   Why do you need Web Services ?

Modern business applications use a variety of programming platforms to develop web–based applications. Some applications may be developed in Java, others in .Net, others in Angular JS, Node.js, etc.

Usually, these heterogeneous applications require some form of communication between them. Because they are built with different development languages, it becomes very difficult to ensure accurate communication between applications.

This is where web services come in. Web services provide a common platform that allows multiple applications written in different programming languages to communicate with each other.

14.5   WSDL (Web Services Description Language) :

Web Services Description Language (WSDL) is an XML–based language used to represent business benefits and must provide an approach for individuals and other organizations to retrieve individual records electronically. WSDL is the foundation of comprehensive description, discovery, and orchestration (UDDI) activities led by Microsoft, IBM, and Ariba. UDDI is an XML–based registry for organizations around the world that allows organizations to manage themselves and their management on the web.

The Web Services Description Language (WSDL) structure supports these initial web management details. This figure shows the usage of the claim WSDL. The management provider is displayed on the left. In the property, you will be the buyer of management. To grant and publish controls:

The management provider uses WSDL to describe its management. This definition is disseminated in claiming benefits. Recovery uses more combinations of detections with different representations of folders in the general description, additional usage.

Management buyers ask you if you have stopped offering them or other cash management recovery questions and find out how you can provide them for that management.

Part of the WSDL provided by the service provider is passed to the service consumer. The service consumer presents the service consumer with a request and response to the service provider.

Service consumers use WSDL to send requests to service providers. The service provider provides the expected response to the service consumer.

Fig. 3 WSDL Setup

Web Service Example

Following is the Web services example of a WSDL file.

```
<definitions>
    <message name="TutorialRequest">
        <part name="TutorialID" type="xsd:string"/>
    </message>


    <message name="TutorialResponse">
        <part name="TutorialName" type="xsd:string"/>
    </message>
```

```
<portType name="Tutorial_PortType">
    <operation name="Tutorial">
        <input message="tns:TutorialRequest"/>
        <output message="tns:TutorialResponse"/>
    </operation>
</portType>


<binding name="Tutorial_Binding" type="tns:Tutorial_PortType">
    <soap:binding style="rpc"
        transport="http://schemas.xmlsoap.org/soap/http"/>
    <operation name="Tutorial">
        <soap:operation soapAction="Tutorial"/>
        <input>
            <soap:body
                encodingStyle="http://schemas.xmlsoap.org/soap/
                                                    encoding/"
                namespace="urn:examples:Tutorialservice"
                use="encoded"/>
        </input>

            <output>
            <soap:body
            encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
            namespace="urn:examples:Tutorialservice"
            use="encoded"/>
        </output>
    </operation>
</binding>
</definitions>
```

❑ **Check Your Progress – 2 :**

1. _____ is a directory service where enterprises register and search for web services ?

   a. WSDL   b. UDDI

   c. SOAP   d. None of the above

14.6 Architecture :

For any framework it needs some architecture to make sure the entire framework works as desired, same way we will discuss three distinct roles as given for architecture of web services.

1. **Provider –** The provider creates the web service and makes it available to client application who wants to use it.

2. **Requestor** – A requestor is nothing but the client application that needs to contact a web service. it can be a Java, .Net, or any other language based application which looks for some sort of functionality via a web service.

3. **Broker** – The broker is nothing but the application which provides access to the UDDI.

The diagram below showcases how the Service provider, the Service requestor and Service registry interact with each other.

1. **Publish** – A provider informs the broker (service registry) about the existence of the web service by using the broker's publish interface to make the service accessible to clients

2. **Find** – The requestor consults the broker to locate a published web service

3. **Bind** – With the information it gained from the broker (service registry) about the web service, the requestor is able to bind, or invoke, the web service.

Fig. 4 Architecture of Web Services

14.7 JAX–RPC :

JAX–RPC stands for Java API for XML–based RPC. JAX–RPC can be developed to generate web benefits for customers using Remote Procedure Call (RPC) and XML. The RPC team often used in a distributed client–server model allows clients to execute methods from different frameworks.

The remote technique secured with JAX–RPC can eventually talk to Tom, who goes through XML–based protocols, such as cleaners. The cleanest details characterize the envelope structure, encryption rules, and assembly for communicating with external engineering calls. These more responsive calls are sent over http, similar to clean–up messages (XML files).

RPC–based web management is the accumulation of methods that allow external clients to call back those webs. For example, regular RPC–based web management is stock price management that converts a simple item entry protocol request (buy) into the value of a particular stock and then uses the clean–up utility to pay that cost. .

Web administration extends the potential of accessible clients by describing themselves in a Web Services Description Language (WSDL) file. The WSDL description can be an XML record that provides all the latest mapping data through the web service, such as name, callable operations, individual operation parameters, location area, and so on. ... .. The web client uses the WSDL file to show that the administrator provides more access points to open it.

JAX–RPC can consider the RPC model and provide the basic RPC of the past. One of these is permission to submit the entire document. In addition, it is also an archive piece. Also, JAX–RPC helps to handle cleaner messages. This allows you to send a full range of your message request. Also, the ability to develop JAX–RPC can be a one–way street with more request/response styles, since it requires the notifications that RPC normally does. Another propulsion feature may be an extensible type of mapping. It offers JAX–RPC, which is just one example of the iceberg's adaptability to what can be shipped.

Building a web management with JAX–RPC is perhaps surprisingly difficult. These management modes themselves are, in fact, two files, the interface that speaks the external methods of the service. In addition, it is the population that performs the individual methods. There's a bit more to configuring and implementing the service, but first let's look at the two main components of a web service: interface definitions and their implementation classes.

```
package coffees;

import java.rmi.Remote;

import java.rmi.RemotException;

public interface CoffeeOrderIF extends Remote {

        Public Coffee [] getPriceList()

                throws RemoteException;

Public String orderCoffee(String coffeeName, int quantity)

                throws RemoteException;

}
```

The method get Price List returns an array of Coffee objects, each of which contains a name field and a price field. There is one Coffee object for each of the coffees the distributor currently has for sale. The method orderCoffee returns a String that might confirm the order or state that it is on back order.

❑   **Check Your Progress – 3 :**

1.   RPC stands for:

a. Remote Procedure Call   b. Remove Procedure Calling

c. Removed Method Calls   d. Remote Program Calls

14.8   Writing Java Web Service :

We can create a web service application using Java. The Java API for XML Web Services (JAX–WS) 2.0, JSR–224, relies heavily on annotations, as specified in the Metadata Function for the Java Programming Language (JSR–175) and the web services metadata for the Java platform (JSR–181), along with the annotations. of the JAX–WS 2.0 specification. You can write a web service application in a regular Java class in which the displayed methods are annotated with @WebService and @WebMethod web service annotations. Consider a code example:

```
@WebService
public class AddNumberImpl {
   @WebMethod(action="addNumbers")
public int addNumber(int number1, int number2)
   throws AddNumbersException {
in(number1 < 0 || number2 < 0) {
   throws new AddNumberException(
      "Negative number cant be added!".
      "Number;" + number1 + ", " + number2);
   }
   return number1 + number2;
   }
}
```

When creating a new web service or in an existing Java class, the WSIT features are enabled with a configuration file such as wsit–<package>. <service>.xml written in WSDL format as :

wsit–enabled–fromjava/etc/wsit–fromjava.server.AddNumber–sImpl.xml

The configuration in the wsit–<package>.<service>.xml file embedded by the WSIT runtime in the WSDL it generates for the web service. Then, when the client requests the WSDL from the web service, the runtime embeds all publicly visible policy statements in the wsit–<package>.<service>.xml file in the WSDL. The following file implements the web service interface.

```
package fromjava.server;
import javax.jws. WebService;
import javax.jws. WebMethod;
@WebService
public class AddNumbersImpl {
   @WehMethod(action="addNumbers")
   Public int addNumber(int number1, int number2)
      throws AddNumbersException {
   if (number1 < 0 || number2 < 0) {
      throw new AddNumbersException(
         "Negative number cannot be added!",
         "Numbers; " + number1 + ", " + number2);
   return number1 + number2;
   }
}
```

❑ **Check Your Progress – 4 :**

1. Which of the following is the basis for Web services ?

   a. C   b. .NET   c. JAVA SCRIPT d. XML

14.9   Writing a Java Web Service Client :

Unlike creating a web management service, creating a web management client request reliably starts for an existing WSDL record. This method can be compared to the procedure you use when creating and managing the existing WSDL record. The customer's WSDL documents now contain those claims about the WS–* approach (and, in a handful of cases, any claims about the WSIT approach worth making to extend Sun's implementation) safely missed by other implementations). Most policy statements are defined in the WS–* specifications. Sun's implementation processes these default policy statements.

The access statements describe the prerequisites that start with the server and also the optional features that those users can use. Those WSIT augmentation tools and runtime environments recognize WSDL array assertions with a more appropriate design than reasonably expected. Although an unsupported declaration is found, an expiration message is displayed describing these issues.

Usually you get those WSDLs directly from the web management provider using the wsimport tool. Those wsimport devices then generate devices that compare the Java sourcebook with the displayed interface. Finally, Tom looks at the WSDL. Those java compilers, javac, will be known later because they will collect the acid ball in the population files. The modification code uses the classes created to get the web administration. The Java client file demonstrates the features of the web service client with code represented by the AddNumbersClient.java file provided in the example.

```java
package fromjava.client;
import com.sun.xml.ws.Closeable;
import java.rmi.RemoteException;
public class AddNumbersClient {
    public static void main (String[] args) {
        AddNumbersImpl port = null;
        try {
            port = new
AddNumbersImplService().getAddNumberImplPort();
int number1 = 10; int number2 = 20;
System.out.printf ("Invoking addNumber(%d, %d)n",
    number1, number2);
int result = port.addNumbers (number1, number2);
System.out.printf (
    "The result of adding %d and %d is %d.\n\n",
    number1, number2, result);
number1 = -10;
System.out.printf ("Invoking addNumbers(%d, %d)\n",
    number1, number2);
result = port.addNumbers (number1, number2);
```

```
System.out.printf (

    "The result of adding %d and %d is %d.\n",

    number1, number2, result);

} catch (AddNumbersException_Exception ex) {

System.out.printf (

    "Caught AddnumbersException_Exception: %s\n",

    ex.getFaultInfor ().getDetail ());

} finally {

((Closeable)port).close();

    }

 }

}
```

This file specifies two positive integers that the web service should append, passes the integers to the web service, and fetches the results from the web service through the port. addNumbers method and prints the results to the screen. It then specifies a negative number to add, gets the results (which should be an exception), and prints the results (the exception) on the screen.

❑ **Check Your Progress – 5 :**

1. WSDL Stands for _____ .

    a. Web Service Development Language

    b. Web Services Description Language

    c. Web Service Design Language

    d. none of these

14.10 Let Us Sum Up :

While studying this unit, we have learnt that what web services is? What are the types of web services? Also we had discussed how web services work? Also we had seen the purpose of web services. Also we had discussed Web services description language and architecture of web services.

We discussed that Server–Side SOAP is a tutorial on building and delivering web services using Apache SOAP. JAX–RPC stands for Java API for XML–based RPC. JAX–RPC may have been designed to create web benefits with clients using remote method calls (RPC) and XML.

SOAP (Simple Object Access Protocol) is a messaging protocol that allows projects running on different frameworks (such as Windows and Linux) to communicate using Hypertext Transfer Protocol (HTTP) and the Extensible Markup Language (XML).

14.11 Answers for Check Your Progress :

❑ **Check Your Progress 1 :**

1. (a)

❑ **Check Your Progress 2 :**

1. (b)

❑ **Check Your Progress 3 :**

1. (a)

❑ **Check Your Progress 4 :**

1. (d)

❑ **Check Your Progress 5 :**

1. (b)

14.12 Glossary :

1. **JavaScript** – A scripting language that resembles Java in syntax, but is not compiled and cannot be used to write applets or servlets.

2. **Web server** – A program that accepts requests for resources

3. **Servlet** – Java technology based web component, managed by container forming dynamic content.

14.13 Assignment :

Write short note on Server–Side SOAP.

14.14 Activities :

Collect some information on JAX–RPC.

14.15 Case Study :

Enterprise System Integration with Web Services: A Case Study with a Book Broker Application

14.16 Further Readings :

1. Bergsten, Hans (2003). JavaServer Pages. O'Reilly Media.

2. Hanna, Phil (2003). JSP 2.0 – The Complete Reference. McGraw–Hill Osborne Media.

3. Sierra, Kathy; Bates, Bert; Basham, Bryan. Head First Servlets & JSP. O'Reilly Media.

4. Brown, Simon; Dalton, Sam; Jepp, Daniel; Johnson, Dave; Li, Sing; Raible, Matt. Pro JSP 2. Apress.

BLOCK SUMMARY :

In this block, you have learnt and understand about the basic of XML with different concepts related to XML like, JavaScript, Ajax, DOM based XML processing, event oriented parsing: SAX, Transforming XML documents, Selecting XML Data: XPATH.

The block gives an idea on the study and concept of JSP Technology with some concepts like how JSP work is different than servlet and also its advantages over servlet, life cycle of JSP page, how to create JSP page, directory structure of JSP page, Different Scripting elements of JSP with its usage etc.

The block detailed about the basic of Web Services. The Concepts related to web services like SOAP Web services, RESTful Web Services, The Working of Web services, WSDL, Architecture, JAX-RPC with practically implementation.

BLOCK ASSIGNMENT :

❖ **Short Questions :**

1.   What is Namespaces JavaScript ?

2.   Explain the function of JAX–RPC ?

3.   Write note on Versions and Declaration of XML ?

4.   Write short note on XSLT ?

5.   Write the Advantages of JSP over Servlet.

❖ **Long Questions :**

1.   Write short note on XML–Documents and Vocabularies ?

2.   Write note on Template–based Transformations in XML documentation ?

3.   Explain the implicit objects of JSP.

4.   Explain MVC in JSP.

5.   Explain RESTful web services

❖ **Enrolment No. :** [ ]

1. How many hours did you need for studying the units ?

Unit No.	12	13	14
No. of Hrs.			

2. Please give your reactions to the following items based on your reading of the block :

Items	Excellent	Very Good	Good	Poor	Give specific example if any
Presentation Quality	☐	☐	☐	☐	_____
Language and Style	☐	☐	☐	☐	_____
Illustration used (Diagram, tables etc)	☐	☐	☐	☐	_____
Conceptual Clarity	☐	☐	☐	☐	_____
Check your progress Quest	☐	☐	☐	☐	_____
Feed back to CYP Question	☐	☐	☐	☐	_____

3. Any other Comments

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