

# WEB TECHNOLOGIES USING FOSS (LAMP/WAMP)

BCA - 503

**BLOCK 1:  
WEB ESSENTIALS**

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# WEB TECHNOLOGIES USING FOSS (LAMP/WAMP)

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Knowledge Management and  
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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 are 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 behavior 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 eliminates 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 TECHNOLOGIES USING FOSS (LAMP/WAMP)

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Apache License, BSD license, GNU General Public License, GNU Lesser General Public License, MIT License, Eclipse Public License and Mozilla Public License



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## BLOCK 1: WEB ESSENTIALS

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### UNIT 1

INTRODUCTION TO WEB

02

### UNIT 2

MARKUP LANGUAGE

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# **BLOCK 1: WEB ESSENTIALS**

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## **Block Introduction**

Internet is a collection of computers where many computers grouped together share their information. In this case the information can be sent 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.

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 Objective**

**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

## **Block Structure**

**Unit 1: Introduction to Web**

**Unit 2: Markup Language**

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# UNIT 1: INTRODUCTION TO WEB

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## Unit Structure

- 1.0 Learning Objectives**
- 1.1 Introduction**
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## 1.0 Learning Objectives

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

- Basic of Internet Protocols
- Idea about Web Clients and Servers
- Servers and Communication

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## 1.1 Introduction

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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.

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## 1.2 Clients, Servers and Communication

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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:

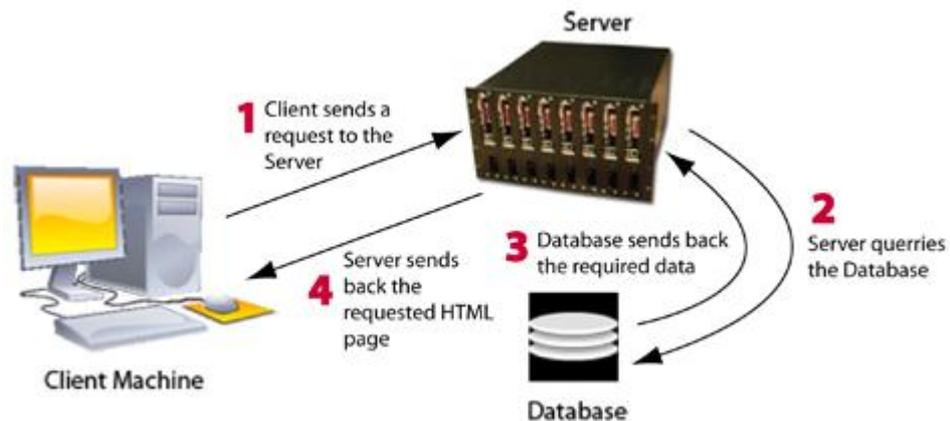
- Database design
- Transaction processing
- Communication skills
- Graphical user interface design and development

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

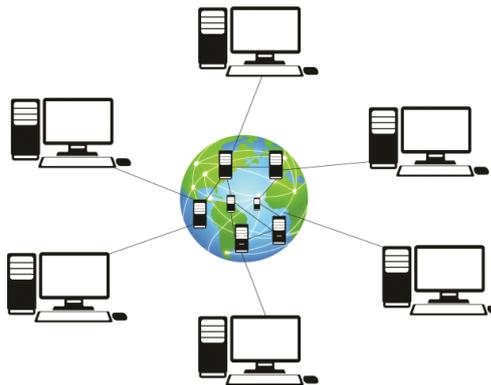
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## 1.3 The Internet

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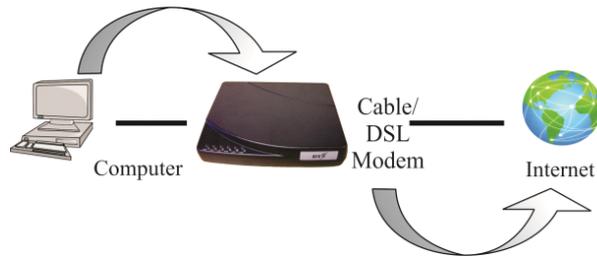
In order to share the information with people quickly and easily, we use Internet. Internet is a collection of computers where many computers grouped together share their information. In this case the information can be send by the Sender and the Receiver receives that information.

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

That can be used by any of the person who is not your friend or relative.

- **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

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## **1.4 Basic Internet Protocols**

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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 is 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 communicate 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

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## 1.5 The World Wide Web

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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.

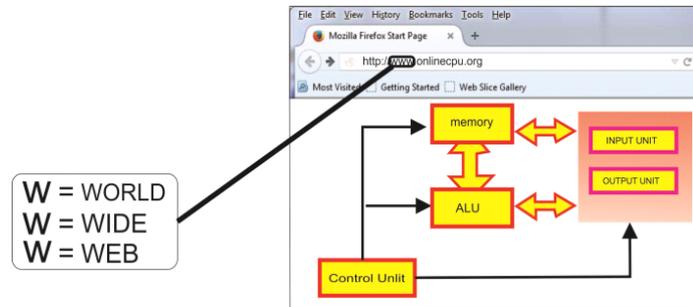


Fig 1.4 World Wide Web

### 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

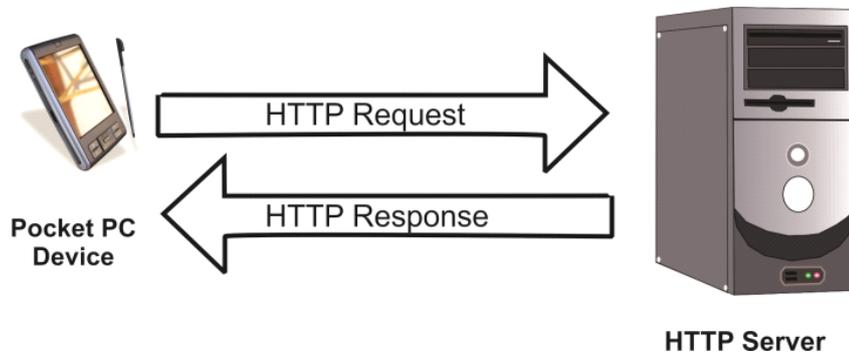
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## 1.6 HTTP request message/response message

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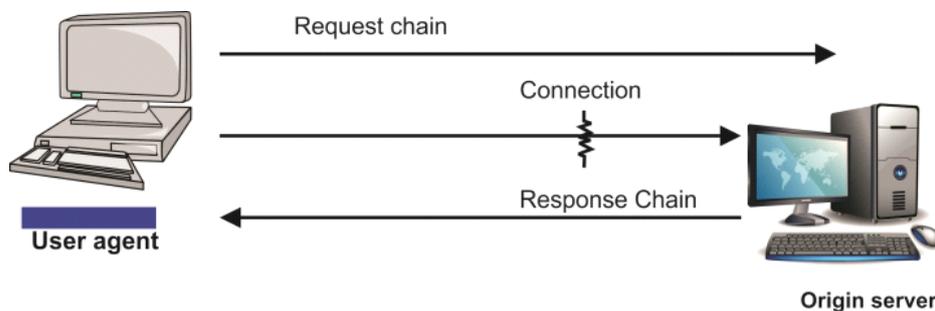
HTTP is the protocol that is used for communication between the browser and the web server. A protocol defines a set of rules of how browser and web server shall interact or communicate with one another. It is used for communication over internet. The most important use of HTTP is to transfer files, 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.

The World Wide Web uses the http which is hypertext transfer protocol. In the 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.

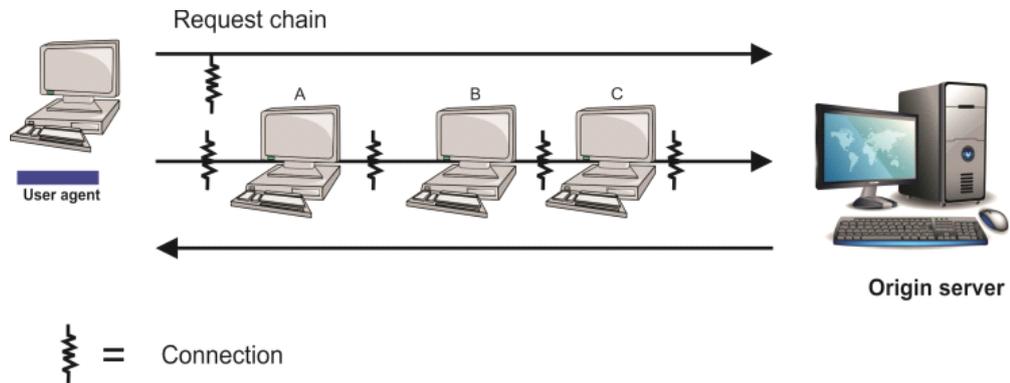


Fig 1.7 Response request

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.

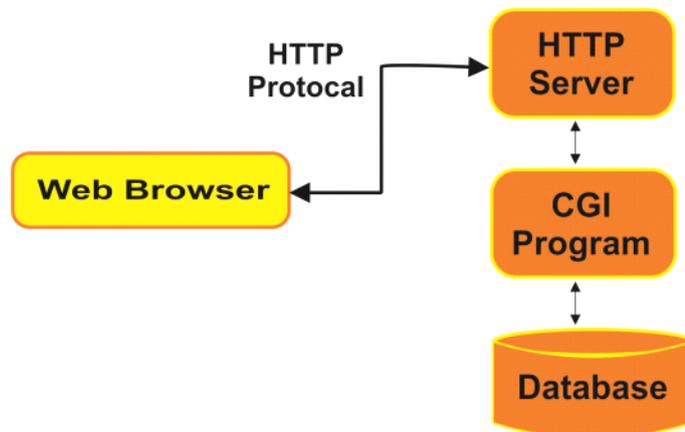


Fig 1.8 Shows the status of HTTP protocol

### 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

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## 1.7 Web Clients/Web Servers

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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

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## 1.8 Case Study - Intelisys

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Intelisys, the gold-standard provider of the “two-tier” telecommunications and cloud distribution model, has been connecting businesses to peak telecommunications services since its inception in 1994. Its technology sales channel took a great leap forward in 2012 when it entered the cloud services market headfirst. At this point, many businesses that relied on Intelisys for professional telecommunications consulting, found that they could also benefit from the range of applications that the cloud was capable of enabling for them. With this expanded reach came the need to educate clients on a host of new services and an increased reliance upon Intelisys’ website and its related extensions and sites. In tandem with launching Intelisys Cloud Services University to address this need, the Intelisys website became a mission critical outpost for a new and rapidly growing market. This market nearly doubled its online traffic, placing an intensified importance on the performance of its website.

While some of the Intelisys site relied upon older code, there were many benefits to explore by applying best practices. By setting up two load balanced web servers to handle the site, Liquid Web created a hybrid environment that, while somewhat customized, could actually benefit many sites that rely on old and new code alike. Liquid Web spun up one legacy web server to host older code as well as a MariaDB Database server for Intelisys. The primary Intelisys.com sites, relying on newer code, are now on the two load balanced servers to enhance the site’s core speed, while Liquid Web’s CDN service ensures faster content delivery to all of Intelisys’ end-users.

The changes enabled by Liquid Web’s engineers resulted in an immediate reduction in load time for Intelisys.com by 7.1 seconds. The significance of this is put into perspective by a recent Compuware study that noted a 6 second page

load-time decrease resulted in a 74% increase sales conversions for pages included in this test group. While Intelisys.com assists with the retail of many telecommunications and cloud services, it is not a traditional ecommerce site. That said, it's worth noting that this type of performance increase could produce notable increases in conversions for sites of this nature, as the same study reported a mere 4 second page load time decrease led to an improvement in abandonment rates by 25%.

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## 1.9 Let Us Sum Up

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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.

---

## 1.10 Answers for Check Your Progress

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**Check your progress 1**

**Answers:** (1 - b), (2 - d)

**Check your progress 2**

**Answers:** (1 - d), (2 - d), (3 - d)

**Check your progress 3**

**Answers:** (1 - a), (2 - c), (3 - c)

**Check your progress 4**

Answers: (1 - b)

**Check your progress 5**

Answers: (1 - b)

**Check your progress 6**

Answers: (1 - b)

---

## 1.11 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.

---

## 1.12 Assignment

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Explain the Clients Servers Communication?

---

## 1.13 Activities

---

Study about Internet Protocols.

---

## 1.14 Case Study

---

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

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## 1.15 Further Readings

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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 2: MARKUP LANGUAGE**

---

### **Unit Structure**

#### **2.0 Learning Objectives**

#### **2.1 Introduction**

#### **2.2 Markup Languages: XHTML**

#### **2.3 Introduction to HTML**

#### **2.4 History - Versions-Basic XHTML Syntax and Semantics**

#### **2.5 Fundamental HTML Elements**

#### **2.6 Relative URIs-Lists-tables-Frames-Forms**

#### **2.7 XML Creating HTML Documents**

#### **2.8 Case Study**

#### **2.9 Let Us Sum Up**

#### **2.10 Answers for Check Your Progress**

#### **2.11 Glossary**

#### **2.12 Assignment**

#### **2.13 Activities**

#### **2.14 Case Study**

#### **2.15 Further Readings**

---

### **2.0 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

---

## 2.1 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.

---

## 2.2 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

---

## 2.3 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 the 128 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

---

## 2.4 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

---

## 2.5 Fundamental HTML Elements

---

### Basic Document

HTML Documents = Web Pages

HTML documents describe web pages

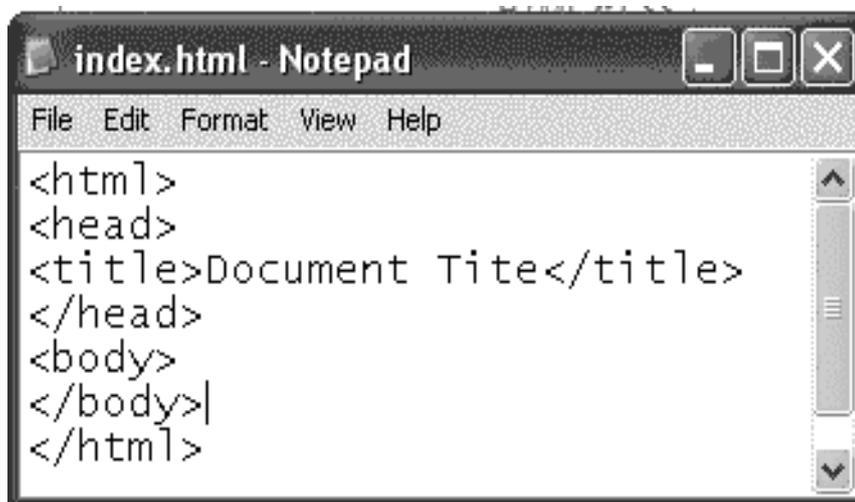
HTML documents contain HTML tags and plain text

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".

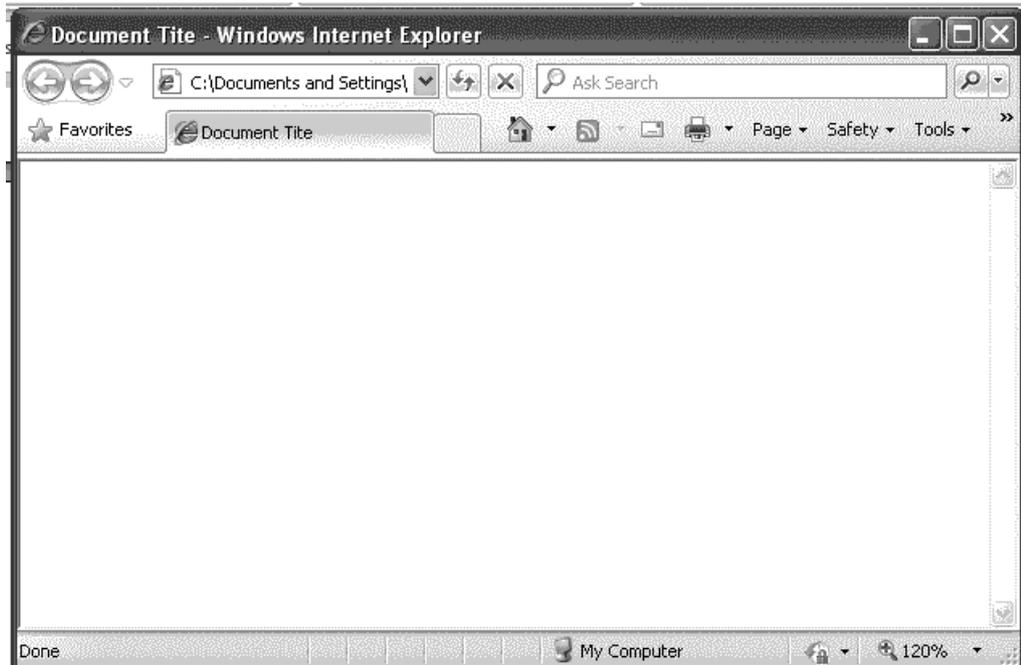
For example, if you use Microsoft Word, you will usually save your files with the extension ".doc", whereas in case of HTML the options are ".html".

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

A screenshot of a Notepad window titled "index.html - Notepad". The window has a menu bar with "File", "Edit", "Format", "View", and "Help". The text area contains the following HTML code:

```
<html>
<head>
<title>Document Tite</title>
</head>
<body>
</body>
</html>
```

Fig 2.1 Basic Document in Notepad



**Fig 2.2 Basic Document in the Browser**

<HTML>

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

<TITLE>

### **Document title**

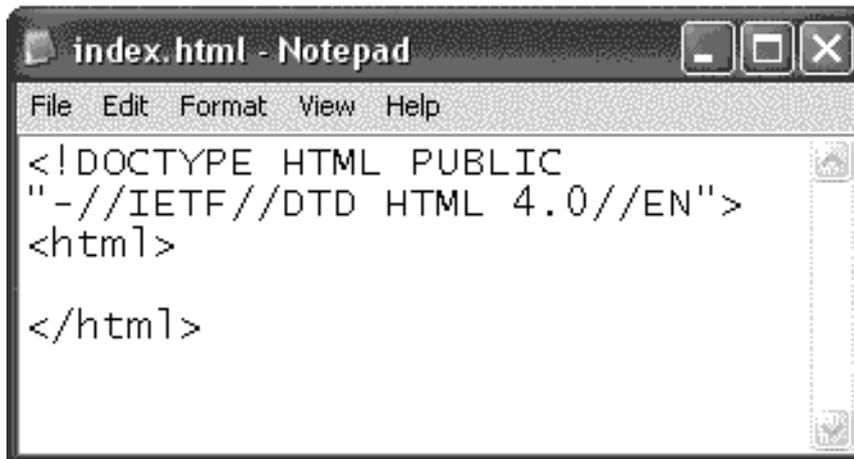
The title of the document comes in the title bar of the browser when you load the HTML page in the browser. Title has to be short and meaningful that gives a brief description of the current page. </TITLE>

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:

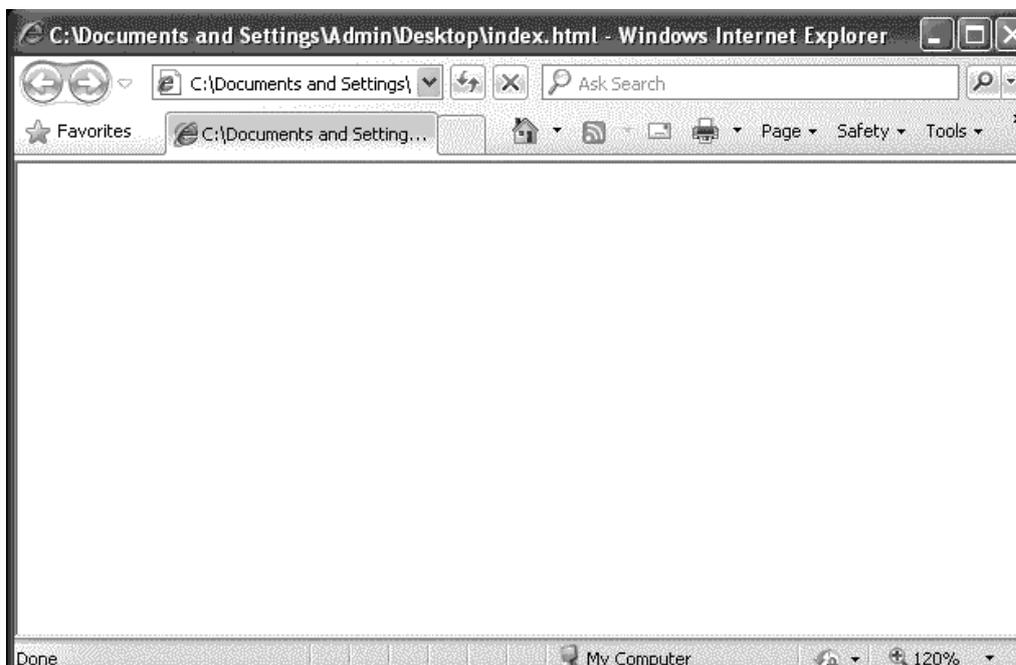
<!DOCTYPE  
<HTML>  
<HEAD>  
<TITLE>RA  
<LINK REV  
<META NAM

**Example:**



**Fig 2.3 Basic Document with HTML tag in Notepad**

**Introduction to HTML, Overview of HTML**



**Fig 2.4 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:



```
index.html - Notepad
File Edit Format View Help
<html>
<head>
<title>My Firts HTML Page</title>
</head>
<body>
</body>
</html>
```

Fig 2.5 Basic Document with title tag in Notepad

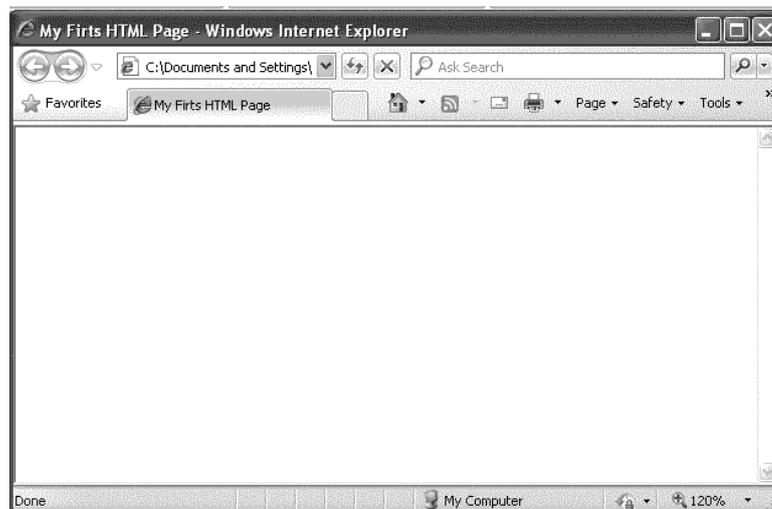


Fig 2.6 Basic Document with title tag in the Browser

### 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>

---

## 2.6 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.
  2.
    - 1.

- 3.
- 2.
- 1.

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.

<b>Feature</b>	<b>Indication</b>
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.

`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 0
  - d. caption

---

## 2.7 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 default credentials.
    XmlUriResolver resolver = new XmlUriResolver( );
    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
    transform.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

---

## **2.8 Case Study**

---

The government of the Province of Manitoba created the Personal Property Registry to provide property owners with state-of-the-art Internet services around the clock. The main benefits of the application were faster and more convenient access to property data, fewer manual steps in the property management process, and fewer calls to the government's call center. In other words, giving customers better service while saving the government money and reducing the government's workload.

### Application design

The application was designed as an n -tiered application, with the interface separated from the back-end logic. The data for each transaction needed to be transformed a number of different ways, depending on how it needed to be rendered on a device, presented to an application, or formatted for the back-end processing system. In other words, the application was a perfect opportunity to use XML.

As with any application, the user interface to the application was extremely important. To simplify the first implementation, the necessary XML data was transformed into HTML. This gave users a browser interface to the

application. The registry was built with VisualAge for Java, specifically the Visual Servlet Builder component. It also uses Enterprise Java Beans (EJBs), including Session beans and Entity beans.

#### Generating multiple user interfaces with XML

In addition to the HTML interface, a Java client interface and a B2B electronic interface were planned as well. For all of these interfaces, the structured XML data is transformed into the appropriate structures and documents. The initial rollout of the service allowed one business partner, Canadian Securities Registration Systems, to submit XML transaction data using the Secure Sockets Layer. The XML transaction data was transformed into the appropriate format for the back-end transactions.

The end result is that the Province of Manitoba was able to create a flexible new application and their end users could access the property registry more easily and quickly. Because the province uses XML as the data format, the government IT team has a great deal of flexibility in designing new interfaces and access methods. Best of all, the back-end systems didn't have to change at all.

#### First Union banks on XML



#### First Union banks on XML

First Union National Bank, one of the largest banks in the U.S., is in the process of reengineering many of its applications using Java and XML. Like most large companies, its environment is heterogeneous, with OS/390, AIX, Solaris, HP/9000, and Windows NT servers and Windows NT, Windows 98, Solaris, and AIX clients. Given this environment, First Union chose Java for platform-independent code and XML for platform-independent data.

#### A messaging-based system

The bank's distributed applications are built on a messaging infrastructure, using IBM's MQSeries to deliver messages to the OS/390 system. The message content is based on a specification called the Common Interface Message (CIM), a First Union proprietary standard. Both the front-end and back-end components of the application are dependent on the message format. Using XML as the data format isolates both sides of the application from future changes and additions to the messaging protocol.

In developing this XML-based application, the First Union and IBM team created a service that converts the CIM into an XML document. Another part of the application converts the XML request into the appropriate format for the back-end processing systems. Finally, a third service converts COBOL copy books into DTDs. Once the copy book has been converted into a DTD, First Union can use the DTD and the XML4J parser to validate the XML document automatically; the bank can then be sure that the XML document matches the COBOL data structure that OS/390 expects.

Using Java technology and XML has been very successful for First Union. According to Bill Barnett, Manager of the Distributed Object Integration Team at First Union, "The combination of Java and XML really delivered for us. Without a platform-independent environment like Java and the message protocol independence we received from the use of XML, we would not have the confidence that our distributed infrastructure could evolve to meet the demand from our ever-growing customer base."

Hewitt Associates LLC



Hewitt Associates LLC

Hewitt Associates LLC is a global management consulting firm that specializes in human resource solutions. The company has more than 200 corporate clients worldwide; those companies in turn have more than 10 million employees. Hewitt's clients demand timely, accurate delivery of human resources information for those 10 million employees.

Prior to its jStart engagement, Hewitt built custom, proprietary solutions when its clients requested human resources data. Those custom solutions were typically gateways to Hewitt's existing legacy applications; in some cases, the solutions dealt with the actual byte streams. These custom applications were very costly to develop, test, and deploy, leading Hewitt to investigate Web services.

---

## 2.9 Let Us Sum Up

---

While studying this unit, we have learnt that

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

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

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

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

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

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

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

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

---

## 2.10 Answers for Check Your Progress

---

**Check your progress 1**

**Answers:** (1 - a)

**Check your progress 2**

**Answers:** (1 - c)

**Check your progress 3**

**Answers:** (1 - d)

**Check your progress 4**

**Answers:** (1 - b), (2 – b)

**Check your progress 5**

**Answers:** (1 - d)

<b>Check your progress 6</b>
------------------------------

Answers: (1 – b)

---

## 2.11 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

---

## 2.12 Assignment

---

Write short note on Markup Languages.

---

## 2.13 Activities

---

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

---

## 2.14 Case Study

---

Generalised the basic HTML architecture and discuss.

---

## 2.15 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

---

## **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.

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 Answer 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?

### **Long Answer Questions**

1. Write short notes on Web Clients/Web Servers?
2. Write short note on Markup Languages?
3. Write note on HTML Elements?

**Enrolment No.**

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

Unit No	1	2	3	4
<b>Nos of Hrs</b>				

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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____ _____
Language and Style	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____ _____
Illustration used (Diagram, tables etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____ _____
Conceptual Clarity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____ _____
Check your progress Quest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____ _____
Feed back to CYP Question	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____ _____

3. Any Other Comments

.....

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.....

.....



“

*Education is something  
which ought to be  
brought within  
the reach of every one.*

”

- Dr. B. R. Ambedkar



**Dr. Babasaheb Ambedkar Open University**  
'Jyotirmay Parisar', Opp. Shri Balaji Temple, Sarkhej-Gandhinagar Highway, Chharodi,  
Ahmedabad-382 481.

# WEB TECHNOLOGIES USING FOSS (LAMP/WAMP)

BCA - 503

**BLOCK 2:  
INTRODUCTION TO FOSS**

**Dr. Babasaheb Ambedkar Open University  
Ahmedabad**



# WEB TECHNOLOGIES USING FOSS (LAMP/WAMP)

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Knowledge Management and  
Research Organization  
Pune



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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 are 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 behavior 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 eliminates 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 TECHNOLOGIES USING FOSS (LAMP/WAMP)

## Contents

### **BLOCK 1: WEB ESSENTIALS**

#### **UNIT 1 INTRODUCTION TO WEB**

Clients, Servers, and Communication. The Internet-Basic Internet Protocols, The World Wide Web, HTTP request message, response message, Web Clients Web Servers, Case Study

#### **UNIT 2 MARKUP LANGUAGE**

Markup Languages: HTML. An Introduction to HTML History-Versions-Basic XHTML Syntax and Semantics-Some Fundamental HTML Elements, Relative URLs, Lists, tables, Frames, Forms, XML Creating HTML Documents Case Study

---

### **BLOCK 2: INTRODUCTION TO FOSS**

#### **UNIT 1 NEED OF OPEN SOURCES**

Advantages of Open sources, Over View of Applications, FOSS, FOSS usage, Free Software Movement, Commercial Aspect of Open Source Open Source Movement, Licensing, Certification, Open Source Software Development Model, comparison with close source / Proprietary software, Free Software

#### **UNIT 2 FOSS SOFTWARE LICENSE**

Apache License, BSD license, GNU General Public License, GNU Lesser General Public License, MIT License, Eclipse Public License and Mozilla Public License

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**BLOCK 3: LINUX TECHNOLOGY**

**UNIT 1 GNU/LINUX OS INSTALLATION**

Detect hardware, configure disk partitions, file systems and install a GNU/Linux distribution, Basic shell commands, logging in, listing files, editing files, copying/moving files, viewing file contents, changing file modes and permissions, process management, User and group management, file ownerships and permissions, PAM authentication, Introduction to common system configuration files, log files, Configuring networking, basics of TCP/IP networking and routing, connecting to the Internet (through dialup, DSL, Ethernet, leased line)

**UNIT 2 HARDWARE CONFIGURATION AND E-MAIL SERVER**

Configuring additional hardware, sound cards, displays, display cards, network cards, modems, USB drives, CD writers, Understanding the OS boot up process, Performing every day tasks using gnu/Linux,- accessing the Internet, playing music, editing documents and spreadsheets, sending and receiving email, copy files from disks and over the network, playing games, writing CDs, X Window system configuration and utilities-- configure X windows, detect display devices, Installing software, from source code as well as using binary packages

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Introduction, State, Transition Diagrams, Domain Expert Testing, Dynamic Modelling, State Transition Diagrams And State charts, State Transition Diagram For A Digital Watch



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Event, oriented Parsing: SAX, Transforming XML Documents, Selecting  
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**UNIT 2 WEB SERVICES**

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Service Client, Describing Web Services: WSDL, Representing Data  
Types: XML Schema, Communicating Object Data: SOAP Related  
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Databases and Java Servlets



Dr. Babasaheb  
Ambedkar  
Open University

BCA - 503

# WEB TECHNOLOGIES USING FOSS (LAMP/WAMP)

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## BLOCK 2: INTRODUCTION TO FOSS

---

### UNIT 1

NEED OF OPEN SOURCES

02

### UNIT 2

FOSS SOFTWARE LICENSE

17

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# **BLOCK 2: INTRODUCTION TO FOSS**

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## **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.

## **Block Objective**

**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

## **Block Structure**

**Unit 1: Need of Open Sources**

**Unit 2: FOSS Software License**

---

# UNIT 1: NEED OF OPEN SOURCES

---

## Unit Structure

- 1.0 Learning Objectives**
- 1.1 Introduction**
- 1.2 Advantages of Open sources**
- 1.3 Over View of Open sources Applications**
- 1.4 FOSS and FOSS usage**
- 1.5 Free Software Movement**
- 1.6 Commercial Aspect of Open Source Open Source Movement**
- 1.7 Licensing/Certification**
- 1.8 Open Source Software Development Model**
- 1.9 Comparisons with close source / Proprietary software**
- 1.10 Free Software**
- 1.11 Let Us Sum Up**
- 1.12 Answers for Check Your Progress**
- 1.13 Glossary**
- 1.14 Assignment**
- 1.15 Activities**
- 1.16 Case Study**
- 1.17 Further Readings**

---

## 1.0 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

---

## 1.1 Introduction

---

The 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. The concept offers opportunities for governmental, private and educational institutions. It is seen that many developing nations' takes advantage of FOSS and implement appropriately in order to gain, while those that fail to take advantage of this opportunity may find their ICT development lagging behind that of comparable organizations.

---

## 1.2 Advantages of Open sources

---

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.

Many software contains source code which is difficult to modify by anyone but the concern person, team or organization who develops it and maintains exclusive control over it. Such kind of software is called as proprietary software since its source code is property of manufacturers who are legally allowed to copy or modify. There are many open source softwares whose source code cannot be modified such as Microsoft Word and Adobe Photoshop. In order to use proprietary software, computer users must agree that they will not do anything with the software that the software's authors have not expressly permitted.

Open source benefits programmers and non-programmers as that of Internet itself which has many open source technologies as Linux operating system and the Apache Web server application where anyone can take advantage from open source software. Every time computer users view webpages, check email, chat with friends, stream music online, or play multiplayer video games, their computers, mobile phones, or gaming consoles connect to a global network of computers that routes and transmits their data to the "local" devices they have in front of them.

The computers who does all necessary work are typically located in different locations where users cant see or access will act as remote computers. More and more, people rely on remote computers when doing things they might otherwise do on their local devices. For example, they use online word processing,

email management, and image editing software that they don't install and run on their personal computers. Instead, they simply access these programs on remote computers by using a Web browser or mobile phone application.

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. Cloud computing is an increasingly important aspect of everyday life with Internet-connected devices. Some cloud computing applications, like Google Docs, are closed source programs.

Cloud computing applications run "on top" of additional software that helps them operate smoothly and effectively. The software that runs "underneath" cloud computing applications acts as a platform for those applications. Cloud computing platforms can be open source or closed source. OpenStack is an example of an open source cloud computing platform.

### **Check your progress 1**

1. Open source benefits to:
  - a. programmers
  - b. non-programmers
  - c. both a and b
  - d. neither a nor b

---

## **1.3 Over View of Applications**

---

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. Open source is now integral to business—a real alternative to proprietary software. With its flexibility to simplify the development, design and implementation of business-critical applications, open source has hit prime time.

### **Check your progress 2**

1. Open Source benefits to organisation as it:

- a. improves software quality
- b. reliable
- c. secured
- d. all of these

---

## **1.4 FOSS and FOSS usage**

---

It is advisable to have an idea about application of open source applied in an organization in order to understand both short and long-term ramifications. The application of FOSS is restricted as you need to have license issues. It should be determined if open source software is presently used with other proprietary code and whether it will be used in future. You should determine if the license allows for the use for which you intend. Not all FOSS licenses are compatible with one another. As licenses continue to proliferate and become more complex, more and more pieces of software are becoming incompatible so you cannot always combine two different pieces of software for different purposes.

Next, you should find out how many groups use each FOSS component. It is important to determine if there are other groups in the organization using similar but different components, or different versions of the same component. The open source policy needs to provide a mechanism, such as a database that can be used to inventory track, and manage all FOSS use within the organization. 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 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.

The advantage of using FOSS is that it has an ability to share development costs across multiple organizations with no loss of competitive advantage. In case of an organization to be an active participant in FOSS, it is more cost-effective to build non-differentiating technology so the organization can spend more of their

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 advantageous for an organization and can have cost-savings benefits. Additionally, there are a number of other business use cases that might not be as obvious. 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 FOSS 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

---

## **1.5 Free Software Movement**

---

Today, free software's are mainly used by the people such as GNU/Linux or may be Windows for several reasons. It may for working on powerful system since such software's are reliable or convenient to use. The idea of Free Software Movement comes up with computer users who deserve the freedom to frame community so that they can help themselves by changing source code for their own purpose, along with probability to help others by distributing copies of programs.

To use free software is to make a political and ethical choice asserting the right to learn, and share what we learn with others. Free software has become the

foundation of a learning society where we share our knowledge in a way that others can build upon and enjoy.

There are many people today who use proprietary software which denies users with such freedoms and benefits. On making a copy of such software and distributing among friend, will give help to others but at the same time voids with all legal formalities. That's what's in the fine print of the license agreement you accept when using proprietary software.

The corporations behind proprietary software will often spy on your activities and restrict you from sharing with others. And because our computers control much of our personal information and daily activities, proprietary software represents an unacceptable danger 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

---

## **1.6 Commercial Aspect of Open Source Open Source Movement**

---

Open source software is available for anyone which can be modified which is based on share identical principle where users are free to pass on the software subject to the stipulation 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.

With open source software, users are granted the right to both program's functionality and methodology, while in case of proprietary software programs, users only have rights to functionality. Some of famous open source softwares are:

- Mozilla Firefox
- Google Chromium
- Android
- OpenOffice.org
- Firefox OS

Programmers who support the open source movement philosophy contribute to the open source community by voluntarily writing and exchanging programming code for software development. The goals to promote production of high quality programs with working improve open source technologies.

Movement of Open Source programs allow smaller firms to participate in global economy. Moreover, in larger corporations, producers of networks and software where individuals access software which can be created, organized or distribute content through plug and play. Creation of Open Source Movement results in degree of global computing access which might have been unthinkable in world where proprietary were only option. Individuals or organizations with access to an open source had the means needed to develop technical material for a variety of consumers. 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

---

## 1.7 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

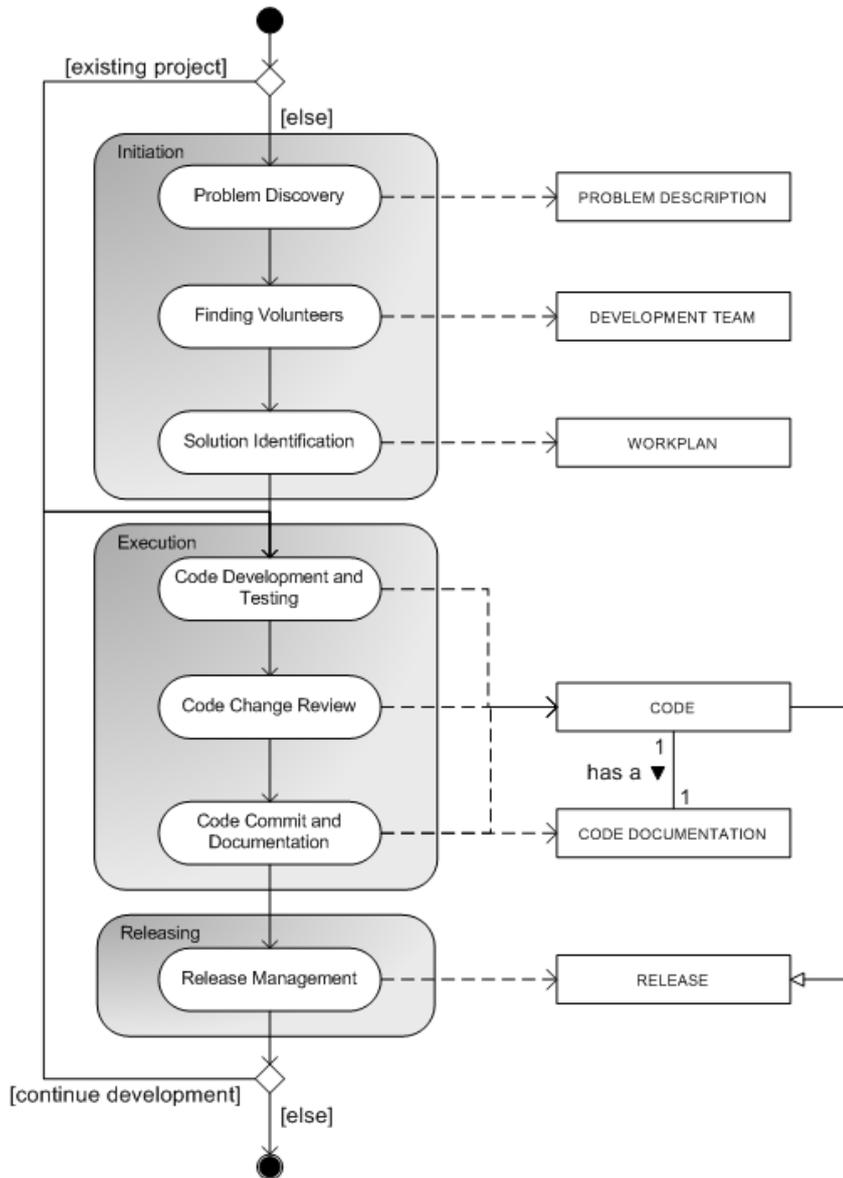
---

## **1.8 Open Source Software Development Model**

---

Open source has emerged in past year which describes about philosophy of free software that advocates commonly available source code as a fundamental right. It encompasses software development methodology which describes as rapid evolutionary process that leverages large scale peer review. The basic premise is that it allows source code to be freely modified and redistributed encourages collaborative development.

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 1.1 open-source software development model**

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

- Individual as desired for project will announce need to develop a project in public.
- Developer working on CodeBase will able to release it in public as version of open-source program.
- Source code of mature project is released to public.
- Well-established open-source project be forked by interested outside party.

It is seen that with traditional software development method it is difficult to run an open-source project as such methods will not go back to a previous phase. While in open-source software development, need are rarely gathered before

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

---

## **1.9 Comparison 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. which can be read and understood by programmers while open source has it's source code that are freely available on Internet for anyone. The source code for proprietary commercial software is closely guarded the secret of the company. 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 are owned by someone and often the way to get hold of software by purchasing physical product or digital product from retailers, resellers or the owner's website. Some closed source software is distributed as 'shareware'. Often it's a fully functional version of the software but either with a limited amount of options available to use in it or a full version that is limited to a set period of time 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

---

## **1.10 Free Software**

---

Free software is computer software that gives users the freedom to run the software for any purpose and any adapted versions. The right to study and modify free software will allow access to its source code. For computer programs that are covered by copyright law, this is achieved with a software license by which the author grants users the aforementioned freedoms. Software that is not covered by copyright law, such as software in the public domain, is free if the source code is in the public domain, or otherwise available without restrictions. Other legal and technical aspects, such as software patents and digital rights management may restrict users in exercising their rights, and thus prevent software from being free. Free software may be developed collaboratively by volunteer computer programmers or by corporations; as part of a commercial, for-profit activity or not

Free software is a matter of liberty, not price where users, individually or collectively are free to do what they want with it, further can redistribute the software without any charge or to sell or charge it for related services in terms of support or warranty for profit. Free software is different from proprietary software such as Microsoft Office, Google Docs, Sheets, and Slides or iWork from Apple as in this the user cannot study, change and share. Free software is also different than freeware, which is a category of freedom restricting proprietary software having no payment for its application. Proprietary software is a freeware that uses restrictive software licences and normally have no access to source code. Users are thus prevented from changing the software which made them to rely on publisher to have updates, help and support which is commonly called 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

---

## **1.11 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.

---

## 1.12 Answers for Check Your Progress

---

**Check your progress 1**

**Answers:** (1 - c)

**Check your progress 2**

**Answers:** (1 - d)

**Check your progress 3**

**Answers:** (1 - c)

**Check your progress 4**

**Answers:** (1 - d), (2 - b)

**Check your progress 5**

**Answers:** (1 - b)

**Check your progress 6**

**Answers:** (1 - d)

**Check your progress 7**

Answers: (1 - b)

**Check your progress 8**

Answers: (1 - d)

**Check your progress 9**

Answers: (1 - c)

---

## 1.13 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.

---

## 1.14 Assignment

---

Explain the advantages of Open sources?

---

## 1.15 Activities

---

Study about FOSS and its usage.

---

## 1.16 Case Study

---

Study about Free Software Movement.

---

## 1.17 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, GNUPress, 2002

---

## **UNIT 2: FOSS SOFTWARE LICENSE**

---

### **Unit Structure**

- 2.0 Learning Objectives**
- 2.1 Introduction**
- 2.2 Apache License**
- 2.3 BSD license**
- 2.4 GNU General Public License**
- 2.5 GNU Lesser General Public License**
- 2.6 MIT License**
- 2.7 Eclipse Public License**
- 2.8 Mozilla Public License**
- 2.9 Let Us Sum Up**
- 2.10 Answers for Check Your Progress**
- 2.11 Glossary**
- 2.12 Assignment**
- 2.13 Activities**
- 2.14 Case Study**
- 2.15 Further Readings**

---

### **2.0 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

---

## 2.1 Introduction

---

Open-source license is a type of license for computer software and other products that allows the source code, blueprint or design to be used, modified and/or shared under defined terms and conditions. This allows end users to review and modify the source code, blueprint or design for their own customization, curiosity or troubleshooting needs. Open-source licensed software is mostly available free of charge, though this does not necessarily have to be the case. Licenses which only permit non-commercial redistribution or modification of the source code for personal use only are generally not considered as open-source licenses. However, open-source licenses may have some restrictions, particularly regarding the expression of respect to the origin of software, such as a requirement to preserve the name of the authors and a copyright statement within the code, or a requirement to redistribute the licensed software only under the same license (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).

---

## 2.2 Apache License

---

License is concern with terms and conditions for usage, reproduction and distribution. Licensor is the copyright owner or entity which is authorized by copyright owner which grants for License. Legal Entity shall mean the union of the acting entity and all other entities that control, are controlled by, or are under common control with that entity. Control relates to power, direct or indirect, to cause direction or management of such entity, whether by contract or otherwise, or it is ownership of fifty percent or more of outstanding shares or beneficial ownership of such entity. The Apache License is a free and open source software (FOSS) licensing agreement from the Apache Software Foundation (ASF). The agreement stipulates terms for use, reproduction, modification and distribution of any software that is released under the Apache License. Following are some of the core specifications of the Apache License:

- Software may be freely used, reproduced, modified, distributed or sold.
- Software can be combined with other products and distributed or sold as packages.
- Products derived or modified from licensed software can be distributed under other licenses.

- Apache software cannot be redistributed without attribution.
- A copy of the license must be redistributed along with any Apache 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

---

## 2.3 BSD license

---

BSD license is simple and liberal licenses category for computer software which was framed at Berkeley in 1980 by Berkeley Source Distribution, which is also BSD UNIX, that serves as upgraded version of actual UNIX operating system. In this, user of software released under typical BSD license depends on redistribution of certain 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.

Some BSD licenses additionally include a clause that restricts the use of the name of the project for endorsing or promoting derivative works. The most basic definition of a derivative work is a product that is based on, or incorporates, one or more already existing works. This can become a complex issue, particularly

with regard to software, but the primary indicator that a software program is a derivative of another program is if it includes source code from the original program, even if the source code has been modified, including improving, extending, reordering or translating it into another programming language.

It is noted that source code is version of software as it is originally written by programmers in plain text written in hundreds of programming languages which can be C, C++ and Java. With minimal restrictions of BSD style licenses, software released under such licenses be freely altered and used in proprietary software for which the source code is kept secret.

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

---

## **2.4 GNU General Public License**

---

GNU General Public License is widely used free software license that guarantees individuals, organizations, company's freedoms to run, study, share and modify software. Such rights are called as free software and if software is copy lefted needs such rights to be retained as demanded by GPL. The license of GNU was initially created by Richard Stallman.

GNU General Public License grants the recipients of computer program rights of Free Software Definition and uses copyleft to make sure that freedoms are preserved in case of distribution of work, in case when work is altered or added to. The GPL is copyleft license, which means that derived works can only be distributed under the same license terms. This is in distinction to permissive

free software licenses, of which the BSD licenses and the MIT License are the standard examples. GPL was the first copyleft license for general use.

### **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

---

## **2.5 GNU Lesser General Public License**

---

GNU Lesser General Public License is free software license introduced by Free Software Foundation which allows developers and companies to use and apply software releases under LGPL under its proprietary to own software without necessity of copyleft license in order to release source code of particular components. Such license need software under LGPL to be altered by end users through the application of source code. In case of proprietary software, code under LGPL is normally applied in form of shared library like DLL, as there is clear separation among proprietary and LGPL components. LGPL is mainly applicable for software libraries, although it is also used by some stand-alone applications.

The LGPL was developed as a compromise between the strong copyleft of the GNU General Public License (GPL) and more permissive licenses such as the BSD licenses and the MIT License. The word "Lesser" in the title shows that the LGPL does not guarantee the end user's complete freedom in the use of software; it only guarantees the freedom of modification for components licensed under the LGPL, but not for any proprietary components.

### **Check your progress 4**

1. Lesser General Public License is mainly used by:
  - a. programmers
  - b. libraries
  - c. coders
  - d. all of above

---

## **2.6 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. This is similar to BSD license used initially for Berkeley Source Distribution which is also version of UNIX. The main difference among this is that BSD-style licenses often has clause which restrict the application of name of copyright holder in promotions without permission.

As per Free Software Foundation, MIT license is need to referred as X11 license, since MIT has released software under many other licenses among which X11 is current version of X Window System, which appears to be the de facto standard graphical engine for Linux and other Unix operating systems. However, the Open Source Initiative refers to it as the MIT License, as do many other groups. It should be kept in mind that the FSF is the same organization that insists that Linux should be renamed GNU/Linux.

There is also some disagreement as to which type of license does a better job of protecting end users' rights. The MIT license more explicitly states the rights given to users, without any restriction on rights of Software with 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 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

---

## 2.7 Eclipse Public License

---

Eclipse Public License is an open source software license which is applicable by Eclipse Foundation for particular software. It can be replaced with Common Public License and removes certain terms relating to litigations related to patents. This License is designed to be used as business friendly free software license which features about weak copyleft provisions than licenses such as GNU General Public License. We see that receiver of such EPL licensed programs will be able to use, modify, copy and distribute work and modified versions in particular cases which are being obligated to release own changes. The EPL is approved by the Open Source Initiative and is listed as free software license by Free Software Foundation.

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

Eclipse Foundation take permission from contributors to re-licence CPL code under EPL.

### Check your progress 6

1. Eclipse Public License is similar to:
  - a. General Public License
  - b. Common Public License
  - c. MIT License
  - d. None of above

---

## 2.8 Mozilla Public License

---

Mozilla Public License is a free, open source detailed software license which was created by Mozilla Foundation. Such type of license is characterized as hybridization of modified BSD license and GNU General Public License which look for balance among concern of proprietary and open source developers. It results in two revisions with version 2.0 having goals of greater simplicity and better compatibility along with other licenses.

MPL is the license for Mozilla Firefox, Mozilla Thunderbird and many other Mozilla software, along with other software like Adobe to license their Flex product line, and Document Foundation to license LibreOffice 4.0. Also, version 1.1 was notably adapted by companies to create derivative licenses such as Sun Microsystems having its Common Development and Distribution License.

### **Check your progress 7**

1. MPL license is not used by:
  - a. Firefox,
  - b. Thunderbird
  - c. Windows
  - d. Adobe

---

## 2.9 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.

---

## 2.10 Answers for Check Your Progress

---

**Check your progress 1**

**Answers:** (1 - b)

**Check your progress 2**

**Answers:** (1 - a)

**Check your progress 3**

**Answers:** (1 - d)

**Check your progress 4**

**Answers:** (1 - b)

**Check your progress 5**

**Answers:** (1 - c)

**Check your progress 6**

**Answers:** (1 - b)

**Check your progress 7**

**Answers:** (1 - c)

---

## 2.11 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. **Copyleft** - 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.

---

## 2.12 Assignment

---

Write short note on MIT license?

---

## 2.13 Activities

---

Collect some information on Eclipse Public License.

---

## 2.14 Case Study

---

Generalised the versions of Mozilla Public License Software.

---

## 2.15 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

---

## **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 softwares. 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.

---

## **Block Assignment**

---

### **Short Answer Questions**

1. What are FOSS Software Licenses?
2. Explain the function of Open Source Software Development Model?
3. Write note on Free Software Movement?
4. Write short note on Mozilla Public License?

### **Long Answer Questions**

1. Write short notes on Eclipse Public License?
2. Write short note on Commercial Aspect of Open Source Open Source Movement?
3. Write note on GNU Lesser General Public License?

**Enrolment No.**

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

Unit No	1	2	3	4
Nos 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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Language and Style	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Illustration used (Diagram, tables etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Conceptual Clarity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Check your progress Quest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Feed back to CYP Question	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

3. Any Other Comments

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....



“

*Education is something  
which ought to be  
brought within  
the reach of every one.*

”

- Dr. B. R. Ambedkar



**Dr. Babasaheb Ambedkar Open University**  
'Jyotirmay Parisar', Opp. Shri Balaji Temple, Sarkhej-Gandhinagar Highway, Chharodi,  
Ahmedabad-382 481.

# WEB TECHNOLOGIES USING FOSS (LAMP/WAMP)

BCA - 503

## BLOCK 3: LINUX TECHNOLOGY

**Dr. Babasaheb Ambedkar Open University  
Ahmedabad**



# WEB TECHNOLOGIES USING FOSS (LAMP/WAMP)

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Knowledge Management and  
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Pune



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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 are 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 behavior 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 eliminates 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 TECHNOLOGIES USING FOSS (LAMP/WAMP)

## Contents

### **BLOCK 1: WEB ESSENTIALS**

#### **UNIT 1 INTRODUCTION TO WEB**

Clients, Servers, and Communication. The Internet-Basic Internet Protocols, The World Wide Web, HTTP request message, response message, Web Clients Web Servers, Case Study

#### **UNIT 2 MARKUP LANGUAGE**

Markup Languages: HTML. An Introduction to HTML History-Versions-Basic XHTML Syntax and Semantics-Some Fundamental HTML Elements, Relative URLs, Lists, tables, Frames, Forms, XML Creating HTML Documents Case Study

### **BLOCK 2: INTRODUCTION TO FOSS**

#### **UNIT 1 NEED OF OPEN SOURCES**

Advantages of Open sources, Over View of Applications, FOSS, FOSS usage, Free Software Movement, Commercial Aspect of Open Source Open Source Movement, Licensing, Certification, Open Source Software Development Model, comparison with close source / Proprietary software, Free Software

#### **UNIT 2 FOSS SOFTWARE LICENSE**

Apache License, BSD license, GNU General Public License, GNU Lesser General Public License, MIT License, Eclipse Public License and Mozilla Public License

---

**BLOCK 3: LINUX TECHNOLOGY**

**UNIT 1 GNU/LINUX OS INSTALLATION**

Detect hardware, configure disk partitions, file systems and install a GNU/Linux distribution, Basic shell commands, logging in, listing files, editing files, copying/moving files, viewing file contents, changing file modes and permissions, process management, User and group management, file ownerships and permissions, PAM authentication, Introduction to common system configuration files, log files, Configuring networking, basics of TCP/IP networking and routing, connecting to the Internet (through dialup, DSL, Ethernet, leased line)

**UNIT 2 HARDWARE CONFIGURATION AND E-MAIL SERVER**

Configuring additional hardware, sound cards, displays, display cards, network cards, modems, USB drives, CD writers, Understanding the OS boot up process, Performing every day tasks using gnu/Linux,- accessing the Internet, playing music, editing documents and spreadsheets, sending and receiving email, copy files from disks and over the network, playing games, writing CDs, X Window system configuration and utilities-- configure X windows, detect display devices, Installing software, from source code as well as using binary packages

**UNIT 3 STATE TRANSITION DIAGRAMS**

Introduction, State, Transition Diagrams, Domain Expert Testing, Dynamic Modelling, State Transition Diagrams And State charts, State Transition Diagram For A Digital Watch

---



**BLOCK 4: WEB DATA REPRESENTING AND WEB SERVICES**

**UNIT 1 REPRESENTING WEB DATA**

XML, Documents and Vocabularies, Versions and Declaration ,  
Namespaces JavaScript and XML: Ajax, DOM based XML processing  
Event, oriented Parsing: SAX, Transforming XML Documents, Selecting  
XML Data: XPATH, Template, based Transformations: XSLT, Displaying  
XML Documents in Browsers, Case Study, Related Technologies.  
Separating Programming and Presentation: JSP Technology  
Introduction, JSP and Servlets, Running JSP Applications Basic JSP,  
JavaBeans Classes and JSP, Tag Libraries and Files, Support for the  
Model, View, Controller Paradigm, Case Study, Related Technologies

**UNIT 2 WEB SERVICES**

JAX, RPC, Concepts, Writing a Java Web Service, Writing a Java Web  
Service Client, Describing Web Services: WSDL, Representing Data  
Types: XML Schema, Communicating Object Data: SOAP Related  
Technologies, Software Installation, Storing Java Objects as Files,  
Databases and Java Servlets



Dr. Babasaheb  
Ambedkar  
Open University

BCA - 503

## **WEB TECHNOLOGIES USING FOSS (LAMP/WAMP)**

---

### **BLOCK 3: LINUX TECHNOLOGY**

---

#### **UNIT 1**

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---

# **BLOCK 3: LINUX TECHNOLOGY**

---

## **Block Introduction**

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 behaviour. It shows with State diagrams wherever every state diagram represents single class with important dynamic behaviour whereas it shows interaction among classes.

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.

## **Block Objective**

**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 1: GNU/Linux OS installation**

**Unit 2: Hardware Configuration and E-Mail Server**

**Unit 3: State Transition Diagrams**

---

# UNIT 1: GNU/LINUX OS INSTALLATION

---

## Unit Structure

### 1.0 Learning Objectives

### 1.1 Introduction

### 1.2 Detect hardware

### 1.3 Configure disk partitions

### 1.4 File systems and install

### 1.5 GNU/Linux distribution

### 1.6 Basic shell commands

1.6.1 logging in

1.6.2 listing files

1.6.3 editing files

1.6.4 copying/moving files

1.6.5 viewing file contents

1.6.6 changing file modes and permissions

1.6.7 process management

1.6.8 User and group management

1.6.9 File ownerships and permissions

1.6.10 PAM authentication

### 1.7 Introduction to common system configuration files

1.7.1 Log files

### 1.8 Configuring networking

### 1.9 Basics of TCP/IP networking and routing

### 1.10 Connecting to the Internet (through dialup, DSL, Ethernet, leased line)

### 1.11 Let Us Sum Up

### 1.12 Answers for Check Your Progress

### 1.13 Glossary

### 1.14 Assignment

### 1.15 Activities

### 1.16 Case Study

### 1.17 Further Readings

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## 1.0 Learning Objectives

---

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

- Basic of File systems
- Structure and file partition concepts
- Types of files
- Non-contiguous and contiguous storage allocation
- Idea about Disk scheduling

---

## 1.1 Introduction

---

Earlier in 1960's, operating system is software which handles the hardware. Presently, we see operating system as set of programs that create the hardware to work. Generally, operating system is set of programs to facilitate controls of a computer. There are different types of operating systems as UNIX, MS-DOS, MS-Windows, Windows/NT, and VM.

Overprotecting of computer engage software at numerous levels. We will distinguish kernel services, library services, as well as application-level services, all of which are division of an operating system. Processes run Applications, which are related together by means of libraries that carry out standard services. The kernel supports the development by providing a path to the peripheral devices. The kernel reacts to service calls as of the processes as well as interrupts from the devices. The centre of the operating system is the kernel, a organize program with the purpose to function in restricted state, act in response to interrupts from external devices as well as service requests along with traps from processes. In order to run Computer hardware, we require an Operating System that will be able to recognise all hardware components and enable us to work on it. In this unit, we will study about Operating system and its evolution along with its necessary role.

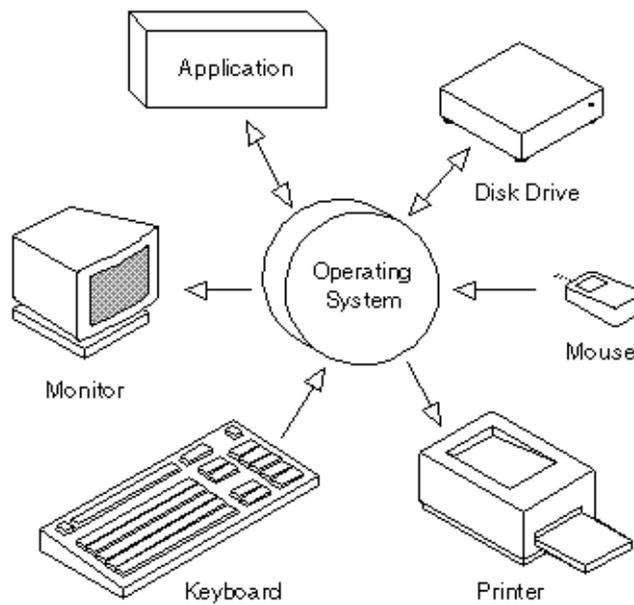
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## 1.2 Detect hardware

---

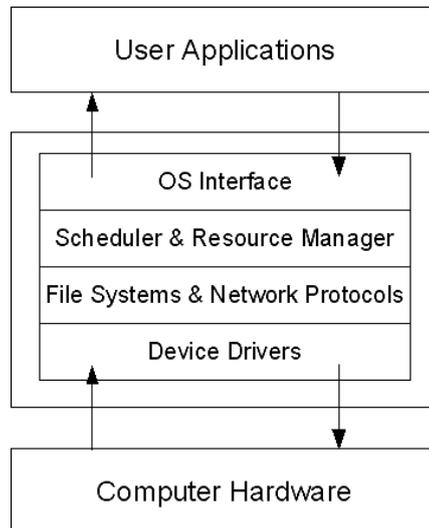
A Linux Operating System is a software program that enables the computer hardware to communicate and operate with its software. Linux performs basic tasks:

- Recognizing input from the keyboard
- Sending output to Monitor
- keeping track of files and directories
- Controlling peripheral such as disk drives and printers.



**Fig 1.1 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.



**Fig 1.2 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

**Linux Operating System has:**

i) Resident part:

It is called as kernel that contains critical functions. It is loaded inside the main memory during the booting. It performs various functions residing in the main memory.

ii) Non-resident part:

This part of operating system is loaded into main memory when required.

### Check your progress 1

1. Linux Operating System:
  - a. System software
  - b. Stores information on the storage device
  - c. Controls and coordinates the operations of the computer system
  - d. All of above
2. Which is not a function of Linux operating system?
  - a. recognize input from keyboard
  - b. shows output on monitor
  - c. loads keyboard
  - d. track of files
3. Linux Operating system is loaded on:
  - a. Hard disk
  - b. pen drive
  - c. CD drive
  - d. all

---

## 1.3 Configure disk partitions

---

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. Linux allows only 4 primary partitions. Partition information is stored in a partition table on the disk. The table lists information about the start and end of each partition, information about its type, and whether it is marked bootable or not. To create and delete partitions, you edit the partition table using a program specially designed for the job. You can have a much larger number of logical partitions by sub-dividing one of the primary partitions. Only one of the primary partitions can be sub-divided.

### **fdisk**

It is started by typing `fdisk device` at the command prompt. device might be something like `/dev/hda` or `/dev/sda`. The basic `fdisk` commands you need are:

- print the partition table
- create a new partition
- delete a partition
- quit without saving changes
- write the new partition table and exit

Here is a sample partition table:

Disk /dev/hdb: 64 heads, 63 sectors, 621 cylinders

Units = cylinders of 4032 \* 512 bytes

Device	Boot	Start	End	Blocks	Id	System
/dev/hdb1	*	1	184	370912+	83	Linux
/dev/hdb2		185	368	370944	83	Linux
/dev/hdb3		369	552	370944	83	Linux
/dev/hdb4		553	621	139104	82	Linux swap

### Check your progress 2

1. There are \_\_\_\_\_ primary partitions in Linux.
  - a. 1
  - b. 3
  - c. 4
  - d. 7

---

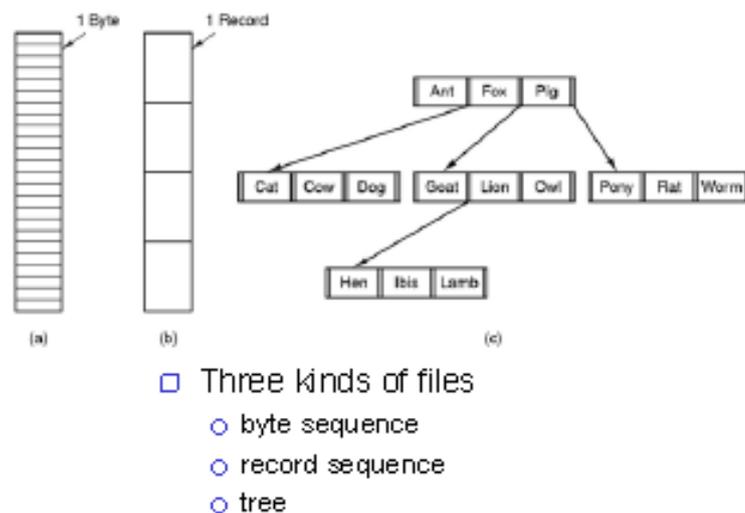
## 1.4 File systems and install

---

A file system is the methods and data structures that an operating system uses to keep track of files on a disk or partition; that is, the way the files are organized on the disk. The word is also used to refer to a partition or disk that is used to store the files or the type of the file system. The difference between a disk or partition and the file system it contains is important. A few programs operate directly on the raw sectors of a disk or partition; if there is an existing file system there it will be destroyed or seriously corrupted. Most programs operate on a file system, and therefore won't work on a partition that doesn't contain one.

Before a partition or disk can be used as a file system, it needs to be initialized, and the bookkeeping data structures need to be written to the disk. This process is called making a file system. When preparing a segment such as this, an adequate discussion tends to blur the line between hardware issues associated with hard disks and the software issues that control what is placed on them and in what manner. As manufacturers and operating system developers strive for performance and security, this line tends to blur even more. The very nature of the logical structures on a hard disk influences their performance, reliability, expandability and compatibility.

In spite of all of the media hype about them, a hard disk is merely a medium for storing information. A replacement for the limited capacity of the floppy disk, which was the first type of disk storage media available on small computers. As hard disks grow in capacity, becoming larger and larger every year, it is becoming increasingly difficult for operating systems and their companion file systems, to use them in an efficient manner.



**Fig 1.3 File System**

The file system employed by most operating systems today is a generic name given to the software routines and logical structures used to prepare the given hard disk to store data as well as control access to that particular storage space. Different operating systems use different methods of organizing and controlling access to the data on the hard disk, which is entirely independent of the specific hardware in use. A single hard disk can be prepared in many different ways to store data, and under given circumstances a hard disk may even be prepared multiple ways on the same disk.

File systems specify conventions for naming files, including the maximum number of characters in a name, which characters can be used and, in some systems, how long the file name suffix can be. A file system also includes a format for specifying the path to a file through the structure of directories. File systems use metadata to store and retrieve files. Some examples of metadata tags include:

- Date created
- Date modified
- File size

An example of a file system that capitalizes on metadata is OS X, the OS used by Macintosh hardware. It allows for a number of optimization features, including file names that can stretch to character counts of 255.

File systems can also restrict read and/or write access to a particular group of users. Passwords are the easiest way to do this. Encrypting files is another way to prevent user access. A key is applied to unencrypted text to encrypt it, or the key is used to decrypt encrypted text. Only users with the key can access the file. The file systems definition can also refer to the part of an OS or an added-on program that supports a file system. Examples of such add-on file systems include the Network File System (NFS) and the Andrew file system (AFS).

In addition, the term has evolved to refer to the hardware used for non-volatile storage, the software application that controls the hardware, and the architecture of both the hardware and software.

## **File System**

Linux files are setup so access to them is controlled. There are three types of access:

1. read
2. write
3. execute

Each file belongs to a specific user and group. Access to the files is controlled by user, group, and what is called other. The term, other, is used to refer to someone who is not the user (owner) of the file, nor is the person a member of the group the file belongs to.

When talking about setting permissions for "other" users to use, it is commonly referred to as setting the world execute, read, or write bit since anyone

in the world will be able to perform the operation if the permission is set in the other category.

Linux File System is like a Tree as shown above. In this the

1. Leaves are called as Files
2. Branches are called Subdirectories
3. Stem is called as Root

A file system is a collection of files that contain various kinds of data and the collection of organizational details with which the files are stored. These files and the details that organize them are all maintained together inside a computer system, and together they make up a file system.

### **Check your progress 3**

1. There are \_\_\_\_\_types of access to Linux File System.
  - a. one
  - b. three
  - c. four
  - d. five

---

## **1.5 GNU/Linux distribution**

---

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.

BOSS is a Linux division which is developed specially for the Indian location to improve the use of Free/Open Source Software. BOSS Linux consists of an easy to use desktop environment, English/Indian language support and other packages that are most important for the use in the government domain.

BOSS GNU/Linux Desktop is available in almost all the Indian Languages such as Assamese, Bengali, Gujarati, Hindi, Kannada, Malayalam, Marathi, Oriya, Punjabi, Sanskrit, Tamil, Telugu, Bodo, Urdu, Kashmiri, Maithili, Konkani, Manipuri , which will enable the mainly non-English literate users in the country to be exposed to ICT and to use the computer more effectively.

Linux is an operating system where large portion of software manages a computer. It is like Microsoft Windows. The accurate name is GNU/Linux but "Linux" is used more often. Linux is not one company's product, but a number of companies and groups of people contribute to it. In fact, the GNU/Linux system is a core part, which is branched off into many different products. They are called distributions.



**Fig 1.4 Linux desktop**

### **Check your progress 4**

1. the accurate name of Linux is:
  - a. GNU/Linux
  - b. Linux/GNU
  - c. Linux/GNU/Linux
  - d. None of above

---

## **1.6 Basic shell commands**

---

The system of shell commands is one of the oldest languages for systems communications. Computers have been able to access command line prompts since the very early days of electronic computing, even before Operating Systems

were fully developed. There are so many terms being used here it may help to clarify some.

- shell – a basic program which takes user input and executes commands. shell is usually a generic term referring to any command-line interface.
- terminal – the connection made between end user and a computer system.
- Bash – a type of shell scripting which is most popularly used in Linux environments.
- command – input issued into the computer with a set task or list of instructions.
- kernel – internal software written into the core of most Operating Systems. The kernel can be given commands via any shell window to handle physical computer processes. ie. memory allocation, hardware, external devices, CPU functionality, etc.

### **1.6.1 Logging in**

In computer security, logging in is the process by which an individual gains access to a computer system by identifying and authenticating themselves.

### **1.6.2 Listing files**

almost-all: List all files, including the normally hidden files whose names begin with a period. Does not include the . and .. directories.

ignore-backups: Do not list files ending in ~ unless given as arguments.

format=vertical: List files in columns (the default format).

dired: List in a format suitable for Emacs dired mode.

classify, --indicator-style=classify: Flag filenames by appending / to directories, \* to executable files, @ to symbolic links, | to FIFOs, and = to sockets.

no-group: In long format, do not display group name.

dereference-command-line: When symbolic links are given on the command line, follow the link and list information from the actual file.

ignore pattern: Do not list files whose names match the shell pattern pattern, unless they are given on the command line.

dereference: List the file or directory referenced by a symbolic link rather than the link itself.

literal: Display special graphic characters that appear in filenames.

quote-name: Quote filenames with "; quote nongraphic characters.

recursive: List directories and their contents recursively.

Rfile, --reload-state file: Load state from file before starting execution.

sort=size: Sort by file size, largest to smallest.

sort=none: Do not sort files.

sort=extension: Sort by file extension, then by filename.

### 1.6.3 Editing files

You need to use any one of the following text editor:

- vi / vim
- pico

pico command

New user should start with pico command. For example, edit a file called demo.txt, enter:

```
pico demo.txt
```

### 1.6.4 copying/moving files

#### Copy command

Like so many Linux features, you have a variety of options from which to choose when you want to manipulate files and directories. You can also use wildcards when you're copying, moving, or deleting files and directories.

Basically, the copy command is not much more complex than typing:

```
cp <source> <destination>
```

so to copy the file sneakers.txt to the directory tigger in your login directory, just type:

```
cp sneakers.txt tigger
```

We see that you also used relative pathnames to copy the file. You can use both relative and absolute pathnames with cp. Our login directory is the parent of the directory tigger; meaning that tigger is one directory down from ours.

## 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.

## 1.6.5 Viewing file contents

### The head Command

The `head` command displays the beginning of a file. The format of the `head` command is:

```
head <filename>
```

By default, you can only read the first ten lines of a file. You can change the number of lines displayed by specifying a number option.

```
head -20 <filename>
```

The above command would display the first 20 lines of a file named `<filename>`

### The tail Command

The reverse of `head` is `tail`. Using `tail`, you can view the last ten lines of a file. This can be useful for viewing the last ten lines of a log file for important system messages. You can also use `tail` to watch log files as they are updated. Using the `-f` option, `tail` automatically prints new messages from an open file to

the screen in real-time. For example, to actively watch `/var/log/messages`, enter the following at a shell prompt (as the root user):

```
tail -f /var/log/messages
```

Press `[Ctrl]-[C]` when you are finished.

### The more Command

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.

### Viewing Files with less

The format of the `less` command is:

```
less <filename>
```

The main difference between `more` and `less` is that `less` allows backward and single-line movement using the same navigation as man pages: press the `[Space]` bar to go down one page, the `[B]` to go back one page, the directional (or "arrow") keys to move one line at a time, and `[Q]` to quit.

To search the output of a text file using `less`, press `[/]` and enter the keyword to search for within the file.

```
/stuff
```

The above command would search through the file for all instances of "stuff" and highlight them in the text.

## 1.6.6 Changing file modes and permissions

Linux uses the same permissions scheme as Unix. Each file and directory on your system is assigned access rights for the owner of the file, the members of a group of related users, and everybody else. Rights can be assigned to read a file, to write a file, and to execute a file (i.e., run the file as a program).

To see the permission settings for a file, we can use the `ls` command as follows:

```
[me@linuxbox me]$ ls -l some_file
```

```
-rw-rw-r-- 1 me  me 1097374 Sep 26 18:48 some_file
```

We can determine a lot from examining the results of this command:

- The file "some\_file" is owned by user "me"

- User "me" has the right to read and write this file
- The file is owned by the group "me"
- Members of the group "me" can also read and write this file
- Everybody else can read this file

### **Directory permissions**

The chmod command can also be used to control the access permissions for directories. In most ways, the permissions scheme for directories works the same way as they do with files. However, the execution permission is used in a different way. It provides control for access to file listing and other things.

### **Changing file ownership**

You can change the owner of a file by using the chown command. Here's an example: Suppose I wanted to change the owner of some\_file from "me" to "you". I could:

```
[me@linuxbox me]$ su
```

Password:

```
[root@linuxbox me]# chown you some_file
```

```
[root@linuxbox me]# exit
```

```
[me@linuxbox me]$
```

Notice that in order to change the owner of a file, you must be the superuser. To do this, our example employed the su command, then we executed chown, and finally we typed exit to return to our previous session.

## **1.6.7 Process management**

Process management is a case in point. Linux creates a process whenever a program is launched, either by you or by Linux. This process is a container of information about how that program is running and what's happening.

The commands described below should be entered via the command line interface. Simply open a terminal (all-text) window to access this interface. It may look basic, but it's actually very powerful and flexible – just the thing for keeping all those processes in line.

## top command

```
top - 00:11:08 up 9:54, 2 users, load average: 0.15, 0.50, 0.21
Tasks: 139 total, 2 running, 137 sleeping, 0 stopped, 0 zombie
%Cpu(s): 2.7 us, 1.8 sy, 0.0 ni, 94.0 id, 1.5 wa, 0.0 hi, 0.0 si, 0.0 st
KiB Mem: 3065928 total, 1186836 used, 1879092 free, 111452 buffers
KiB Swap: 4095996 total, 0 used, 4095996 free, 675916 cached
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
1713	root	20	0	82832	24m	9.9m	S	4.0	0.8	1:12.95	Xorg
31435	ricing	20	0	387m	51m	18m	S	2.3	1.7	0:05.59	gnome-screensho
2260	ricing	20	0	174m	13m	9656	S	0.7	0.4	0:04.72	firefox
31433	ricing	20	0	5208	1384	1032	R	0.7	0.0	0:00.44	top
10	root	20	0	0	0	0	S	0.3	0.0	0:10.22	ksoftirqd/1
5979	mysql	20	0	312m	38m	5928	S	0.3	3.2	0:03.43	mysqld
5983	root	20	0	120m	118m	608	D	0.3	1.2	0:02.69	gnome-screensav
5984	ricing	20	0	171m	11m	9232	S	0.3	1.9	0:00.46	gtk-window-deco
6145	root	20	0	29012	4272	3200	S	0.3	3.9	0:02.45	gnome-panel
7036	root	20	0	0	0	0	S	0.3	2.6	0:00.26	notification-da
10022	ricing	20	0	192m	13m	10m	S	0.3	4.0	0:00.56	mate-terminal
1	root	20	0	3728	2172	1348	S	0.0	0.2	0:01.10	init
2	root	20	0	0	0	0	S	0.0	0.4	0:00.00	kthreadd
3	root	20	0	0	0	0	S	0.0	0.0	0:09.98	ksoftirqd/0
6	root	rt	0	0	0	0	S	0.0	0.0	0:00.27	migration/0
7	root	rt	0	0	0	0	S	0.0	0.0	0:00.06	watchdog/0
8	root	rt	0	0	0	0	S	0.0	0.0	0:00.10	migration/1

The top command gives you information on the processes that currently exist. As the sample output above shows, the first part of the information is an overview of the situation.

## htop command

The htop command is like top, but prettier and smarter. The information is presented in a clearer format, and you can select a particular process (use the arrow keys) and then act on it (use the F1, F2, etc. keys) with the htop display.

```
CPU[||| 2.0%] Tasks: 106, 180 thr; 1 running
Mem[|||||||||299/1001MB] Load average: 0.37 0.16 0.18
Swp[ 0/0MB] Uptime: 00:20:49
```

PID	USER	PRI	NI	VIRT	RES	SHR	S	CPU%	MEM%	TIME+	Command
3175	howtoge	20	0	5216	1540	1212	R	3.0	0.2	0:00.42	htop
1081	root	20	0	197M	59968	7340	S	0.0	5.8	0:15.01	/usr/bin/
2313	ho	20	0	136M	14340	10444	S	0.0	1.4	0:01.11	gnome-ter
1216	root	20	0	32624	3460	2860	S	0.0	0.3	0:05.66	/usr/bin/
1	root	20	0	3456	1976	1280	S	0.0	0.2	0:02.31	/sbin/ini
341	root	20	0	5324	1212	932	S	0.0	0.1	0:00.08	mountall
375	root	20	0	2648	604	444	S	0.0	0.1	0:00.16	upstart-u
378	root	20	0	3100	1436	752	S	0.0	0.1	0:00.22	udev --d
494	syslog	20	0	27968	1312	1040	S	0.0	0.1	0:00.10	rsyslogd
500	syslog	20	0	27968	1312	1040	S	0.0	0.1	0:00.01	rsyslogd
501	syslog	20	0	27968	1312	1040	S	0.0	0.1	0:00.01	rsyslogd
475	syslog	20	0	27968	1312	1040	S	0.0	0.1	0:00.23	rsyslogd

F1 help F2 Setup F3 Search F4 Invert F5 Tree F6 SortBy F7 Nice F8 nice + F9 Kill

## ps command

Use the ps command to list running processes (top and htop list all processes whether active or inactive). You'll need to specify one or the other option to get useful information, however.

The command `ps -a` will list all the processes on your system. The command `ps -a | grep mysqld` would then pick out the `mysqld` process if, for example, you had a connection via the system to a MySQL database.

### **pstree command**

A step up from the simple `ps` command, `pstree` is used to display a tree diagram of processes that also shows relationships that exist between them. Every process is generated, or spawned, by another process (a parent process) in Linux. What's important to know is that if you alter something for a parent process, you affect the child processes as well.

## **1.6.8 User and group management**

Although `linuxconf` gives you the option of having a GUI admin tool for managing users and groups, you can also manage users and groups from the command line. This is something Linux is pretty famous for.

### **Adding Users**

The `useradd` command is a command-line utility that you can use to create a new user or to update an existing user. To add new user Barney Rubble to the system, simply `su` to root and type:

```
[root@cartoons]# useradd -c "Barney Rubble" -d /home/brubble brubble
```

### **Managing Groups from the Command Line**

Not only can you manage users from the command line, but Red Hat Linux also provides a couple of utilities for managing groups.

To create a new group you can use the `groupadd` command:

```
[root@cartoons]# groupadd newgroup
```

You can then add a user to the group with the `usermod` command:

```
[root@cartoons]# usermod -G newgroup brubble
```

To delete the group use the `groupdel` command:

```
[root@cartoons]# groupdel newgroup
```

### 1.6.9 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 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 require edits to the database information. Taking ownership of these files will keep you out of harms way should a hacker get into the server console.

### 1.6.10 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.

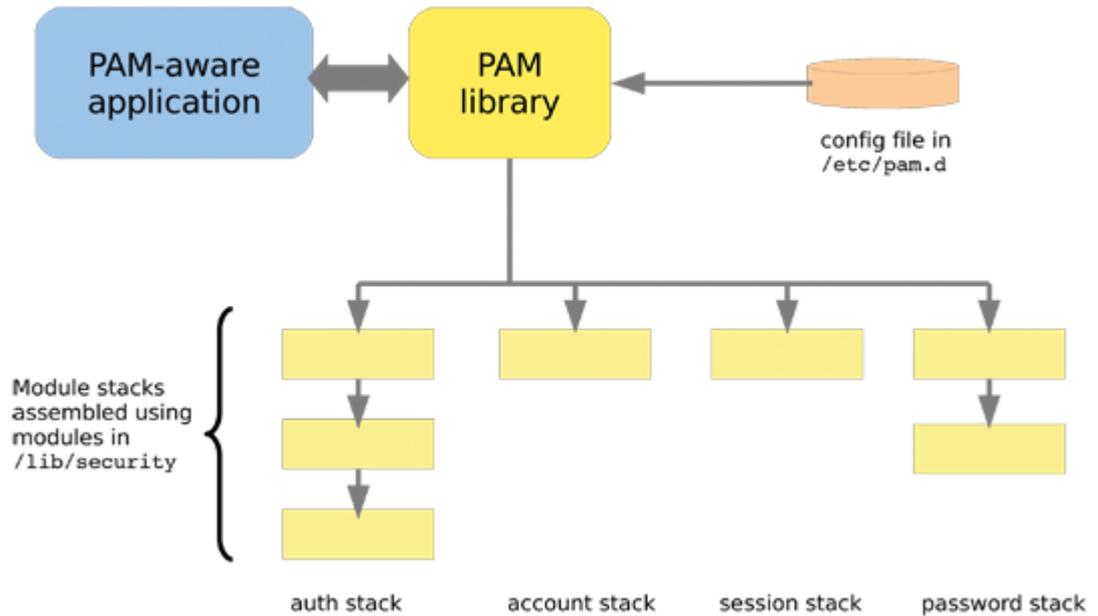


Fig 1.5 PAM

PAM recognises 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).

### Check your progress 5

1. Which file in linux, display special graphic characters in filenames?
  - a. literal
  - b. almost-all
  - c. ignore-backup
  - d. no-group
2. Which options in moving files mv replaces an existing file?
  - a. v
  - b. i
  - c. f
  - d. none of above

---

## 1.7 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

<code>/etc/aliases</code>	device driver.  Where the user's name is matched to a nickname for e-mail.
<code>/etc/bootptab</code>	The configuration for the BOOTP server daemon.
<code>/etc/crontab</code>	Lists commands and times to run them for the cron daemon.
<code>/etc/dhcpd.conf</code>	The configuration file for the DHCP server daemon.
<code>/etc/ethers</code>	File for RARP mapping from hardware addresses to IP addresses. See the man page <code>ethers(5)</code> .
<code>/etc/exports</code>	The file describing exported filesystems for NFS services.
<code>/etc/fdprm</code>	The floppy disk parameter table. Describes the formats of different floppy disks. Used by <code>setfdprm</code> .
<code>/etc/filesystems</code>	Can be used to set the filesystem probe order when filesystems are mounted with the <code>auto</code> option. The <code>nodev</code> parameter is specified for filesystems that are not really locally mounted systems such as <code>proc</code> , <code>devpts</code> , and <code>nfs</code> systems.
<code>/etc/fstab</code>	Lists the filesystems mounted automatically at startup by the <code>mount -a</code> command (in <code>/etc/rc</code> or equivalent startup file).
<code>/etc/group</code>	Similar to <code>/etc/passwd</code> 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.

<code>/etc/lilo.conf</code>	Configuration file for LILO.
<code>/etc/limits</code>	Limits users resources when a system has shadow passwords installed.
<code>/etc/localtime</code>	In Debian the system time zone is determined by this link.
<code>/etc/login.defs</code>	Sets user login features on systems with shadow passwords.
<code>/etc/logrotate.conf</code>	Configures the logrotate program used for managing logfiles.
<code>/etc/magic</code>	The configuration file for file types. Contains the descriptions of various file formats for the file command.
<code>/etc/motd</code>	The message of the day, automatically output by a successful login.
<code>/etc/mtab</code>	A list of currently mounted file systems. Setup by boot scripts and updated by the mount command.
<code>/etc/named.conf</code>	Used for domain name servers.
<code>/etc/networks</code>	Lists names and addresses of your own and other networks, used by the route command.
<code>/etc/nologin</code>	If this file exists, non-root logins are disabled. Typically it is created when the system is shutting down.
<code>/etc/nsswitch.conf</code>	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.

<code>/etc/securetty</code>	Identifies secure terminals from which root is allowed to log in.
<code>/etc/services</code>	Lists the network services that the system supports.
<code>/etc/shadow</code>	Shadow password file on systems with shadow password software installed. Shadow passwords move the encrypted password files from <code>/etc/passwd</code> to <code>/etc/shadow</code> which can only be read by root.
<code>/etc/shadow.group</code>	Systems with shadow passwords may have this file.
<code>/etc/shells</code>	Lists trusted shells. The <code>chsh</code> command allows users to change their login shell to shells listed only in this file.
<code>/etc/skel/.profile</code>	Can be used by administrator to set the editor environment variable to some editor that is friendly to new users.
<code>/etc/sudoers</code>	A list of users with special privileges along with the commands they can execute.
<code>/etc/smb.conf</code>	The configuration file for setting up Samba services.
<code>/etc/sysconfig/autofs</code>	Used to configure the auto mount daemon.
<code>/etc/sysconfig/clock</code>	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/network-scripts/ifcfg-interface	Defines a network 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.

<code>/etc/usertty</code>	This file is used to impose special access restrictions on users.
<code>\$HOME/.bashrc</code>	User aliases, path modifier, and functions.
<code>\$HOME/.bash_profile</code>	Users environment stuff and startup programs.
<code>\$HOME/.bash_logout</code>	User actions to be done at logout.
<code>\$HOME/.hushlogin</code>	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.
<code>\$HOME/.inputrc</code>	Contains keybindings and other bits.
<code>\$HOME/Xrootenv.0</code>	Has networking and environment info.
<code>/proc/cpuinfo</code>	Information about the processor such as its type, make and performance.
<code>/proc/devices</code>	A list of devices configured into the currently running kernel.
<code>/proc/dma</code>	Shows which DMA channels are being used at the moment.
<code>/proc/filesystems</code>	Filesystems that are configured into the kernel. The file used to detect filesystems if the <code>/etc/filesystems</code> does not exist.
<code>/proc/ioproports</code>	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 process 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.

<code>/proc/uptime</code>	The time the system has been up.
<code>/proc/version</code>	The kernel version.
<code>/tmp/fvwmrca01339</code>	FVWM-M4 defines. Contains networking, Xwindows, other setup info.
<code>/usr/lib/zoneinfo</code>	Time zone datafiles are stored here on the Debian system
<code>/var/log/lastlog</code>	Used by finger to tell when a user was last logged in.
<code>/var/log/wtmp</code>	Binary info on users that have been logged on. The last command uses this info.
<code>/var/run/utmp</code>	Contains information about users currently logged in. Who and w commands use this file.
<code>/var/named/root.hints</code>	Used for domain name server. Placed here optionally, but this is the normal location.
<code>/var/named/*</code>	Files used by domain name server. Placed here optionally, but this is the normal location.
<code>/var/log/btmp</code>	Used to store information about failed logins. This file must be first created to activate it.
<code>/var/log/lastlog</code>	Contains information about the last time a login was done on the system. Works with lastb(1).
<code>/var/log/maillog</code>	The normal system mail log file.

<code>/var/log/messages</code>	The main system message log file.
<code>var/log/secure</code>	System tracking of user logins. Check this file periodically.
<code>/var/spool/mail</code>	Where mailboxes are usually stored.

### 1.7.1 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 through 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 machinsm 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.

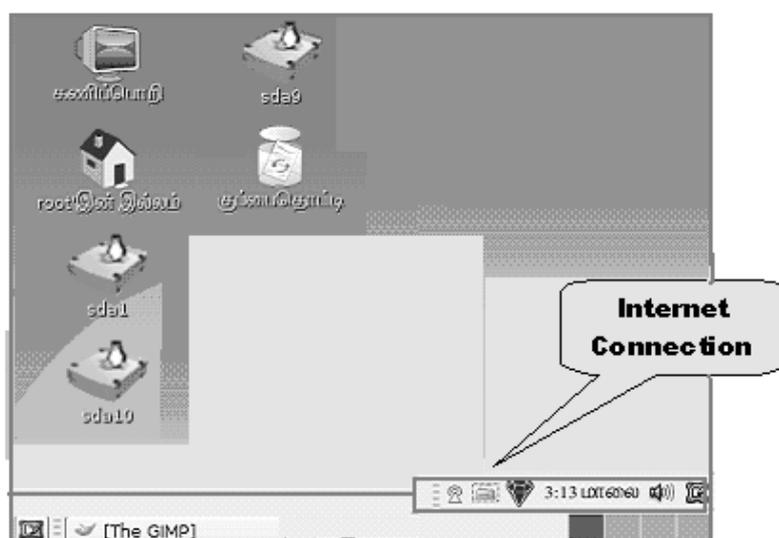
- `/var/log/lastlog` – Displays the recent login information for all the users. This is not an ascii file. You should use `lastlog` command to view the content of this file.
- `/var/log/maillog` `/var/log/mail.log` – Contains the log information from the mail server that is running on the system. For 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 are 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 attempts. 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 6

1. which library function is known as system call?
  - a. getpw()
  - b. /etc/ethers
  - c. /etc/inittab
  - d. /etc/limits

## 1.8 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:



**Fig 1.6 Configuring Network**

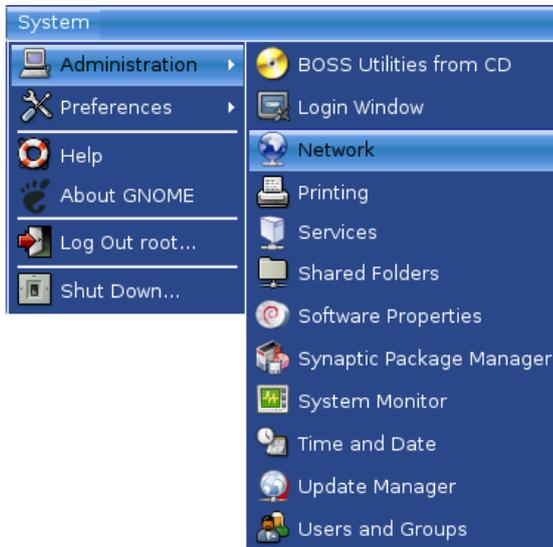
Once the Internet is connected now your Computer can be connected to the Internet by using the Modem. The Internet has several connections to connect such as:

- (a) DSL
- (b) Wireless

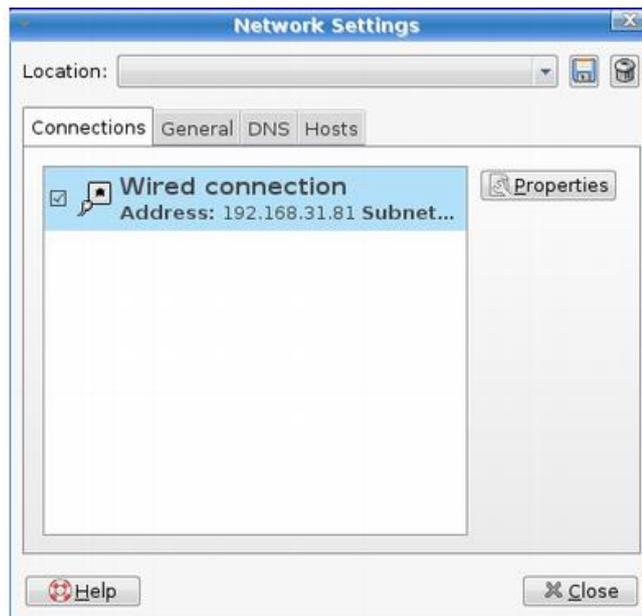
## Configuring Networking

There are certain steps which are involved while configuring a network:

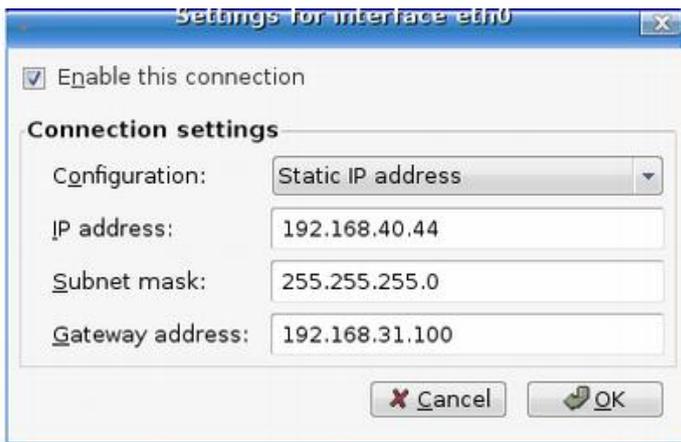
Step 1. Go to System -> Administration -> Network



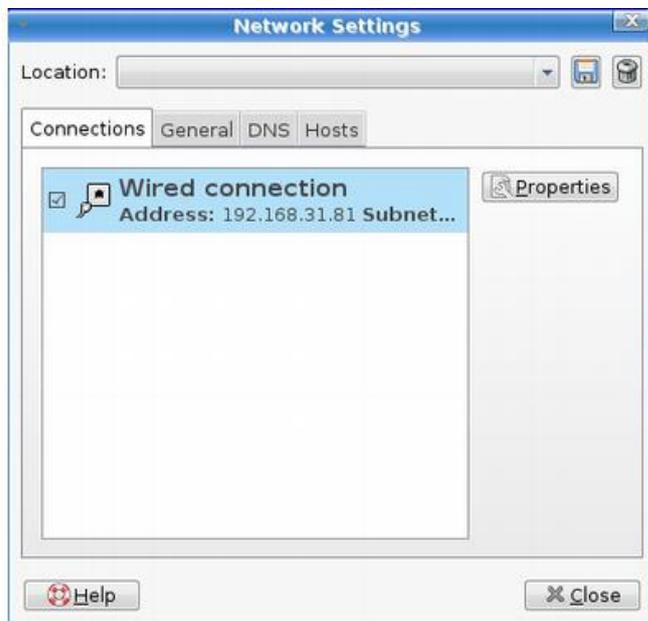
Step 2. Select the Wired Connection



Step 3. Set the IP address, Gateway etc. and click OK.



Step 4. Click the close button.



### Check your progress 7

1. To configure network, you will not need:

- a. network device
- b. network cable
- c. network hard disk
- d. network software

---

## 1.9 Basics of TCP/IP networking and routing

---

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 is 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.

### Uses

- Transfers information
- Enable computers to share information.
- It communicates among 2 computers.
- Shows the network services
- Give formulas for passing messages

- Specify details about message formats
- Explains about how to handle error conditions

### **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 8**

1. In a protocol, the 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 communicate 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

---

## 1.10 Connecting to the Internet (through dialup, DSL, Ethernet, leased line)

---

### DSL

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. Such type of broadband communications technology is used for connecting to Internet which allows data to be sent over existing telephone lines and works in the similar manner as normal modem lines. For using ADSL, a microfilter, is installed on subscriber's telephone line which allows ADSL and telephone services to be used at the same time. It make use of special ADSL modem and subscribers position should be within the required network locations so that the subscriber should receive signal in the modem. Normally it is seen that the required distance of ADSL working is within radius of 1 kilometer. In ADSL, the data rates ranges from 1.5 to 18 Mbps when receiving data and 1.6 to 4 Mbps for sending data.

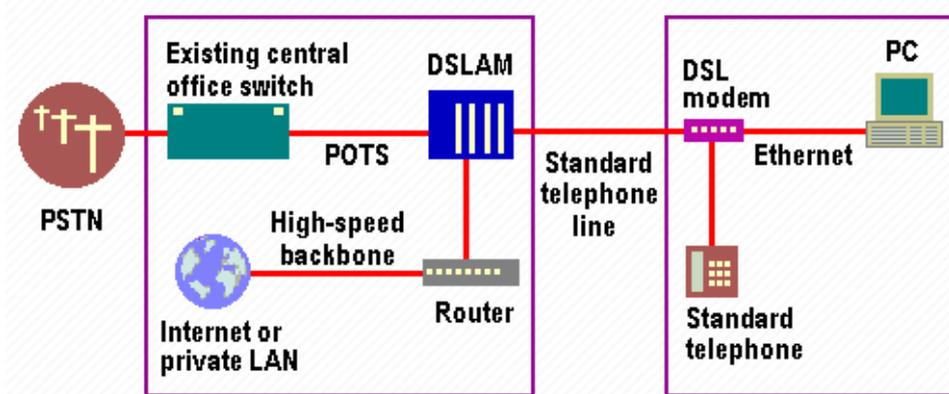


Fig 1.7 ADSL connection

It is noted that at user place, the ADSL connection will collect high frequency digital data and keep it for transmission to Computer or network. In the exchange, Digital Subscriber Line Access Multiplexer will connect ADSL

user to wider Internet which totals the incoming lines into one data connection for transmission of voice and data networks. Further, it is noticed that the phone signals hereby sends the switched telephone network and digital data which will route required data to Internet by using high speed backbone.

There are many forms of ADSL modems which are directly connected to Computer through USB port or can be by way of Ethernet. It is noticed that many devices allow Internet connection which gets shared across many computers.

### Dial-up Connection

Dial-up connection requires telephone line which gets connected to computer in order to connect to internet. It uses modem to setup dial-up connection which works as interface among computer and telephone line having communication program with instructions for modem provided by ISP. Dial-up connection uses either of the following protocols:

Serial Line Internet Protocol (SLIP)

Point to Point Protocol (PPP)

The following diagram shows the accessing internet using modem:

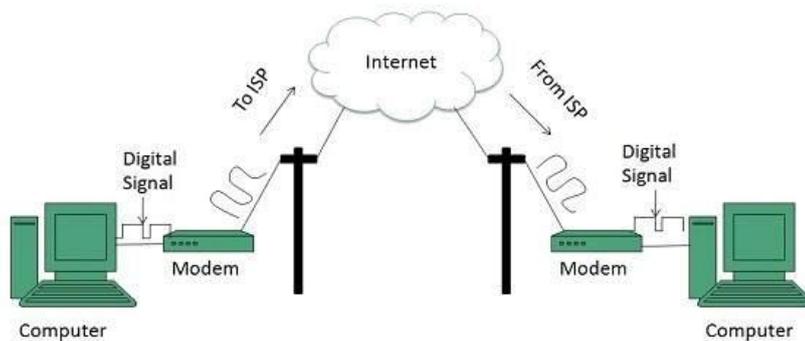


Fig 1.8 Dial up connection

### Check your progress 9

1. Telephone lines are made of:

- a. aluminum
- b. copper
- c. tin
- d. bronze

---

## 1.11 Let Us Sum Up

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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.

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 individuals 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.

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## 1.12 Answers for Check Your Progress

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<b>Check your progress 1</b>
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**Answers:** (1 - a), (2 - c), (3 - a)

<b>Check your progress 2</b>
------------------------------

**Answers:** (1 - c)

**Check your progress 3**

Answers: (1 - c)

**Check your progress 4**

Answers: (1 - a)

**Check your progress 5**

Answers: (1 - a), (2 - b)

**Check your progress 6**

Answers: (1 - a)

**Check your progress 7**

Answers: (1 - c)

**Check your progress 8**

Answers: (1 - a), (2 - c), (3 - c)

**Check your progress 9**

Answers: (1 - b)

---

## 1.13 Glossary

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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. **TCP** - It is called as Transmission Control Protocol which divides files/messages into packets on the source computer.
4. **IP** - Internet Protocol handles the address of the destination computer.
5. **ISP**- It is called as Internet Service Provider as it gives the permission to access the Internet.
6. **Client-server** - Client-server is a software architecture model that consists of client systems and server systems

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## **1.14 Assignment**

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Explain the Linux Operating System File structure?

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## **1.15 Activities**

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Study file organisation in Linux Operating System.

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## **1.16 Case Study**

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Study about Transmission Protocols.

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## **1.17 Further Readings**

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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

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# **UNIT 2: HARDWARE CONFIGURATIONS AND E-MAIL SERVER**

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## **Unit Structure**

### **2.0 Learning Objectives**

### **2.1 Introduction**

### **2.2 Configuring additional hardware**

2.2.1 Sound cards

2.2.2 Displays cards

2.2.3 Network cards

2.2.4 Modems

2.2.5 USB drives

2.2.6 CD writers

### **2.3 Understanding the OS boot up process**

### **2.4 Performing everyday tasks using gnu/Linux**

2.4.1 Accessing the Internet

2.4.2 Playing music

2.4.3 Editing documents and spreadsheets

2.4.4 Sending and receiving email

2.4.5 Copy files from disks and over the network

2.4.6 Playing games

2.4.7 Writing cds

### **2.5 X Window system configuration and utilities**

2.5.1 Configure X windows

2.5.2 Detect display devices

### **2.6 Installing software from source code as well as using binary packages**

### **2.7 Let Us Sum Up**

### **2.8 Answers for Check Your Progress**

### **2.9 Glossary**

## 2.10 Assignment

## 2.11 Activities

## 2.12 Case Study

## 2.13 Further Readings

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# 2.0 Learning Objectives

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

- Concept of I/O devices
- Understand about Bus Architecture
- Detailed regarding features of DMA controlled I/O
- Basic of Input Output Programme
- Idea of DMA Channels

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## 2.1 Introduction

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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.

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## 2.2 Configuring additional hardware

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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.

### 2.2.1 Sound cards

To install sound card in linux, follow instructions manual. Older sound cards usually have switch or jumper settings for IRQ, DMA channel, etc; note down the values used. If you are unsure, use the factory defaults. Try to avoid conflicts with other devices (e.g. ethernet cards, SCSI host adaptors, serial and parallel ports) if possible. Usually you should use the same I/O port, IRQ, and DMA settings that work under DOS. In some cases though (particularly with PnP cards) you may need to use different settings to get things to work under Linux.

Further it is required to use correct device drivers for sound card in the kernel which runs on system which was already included drivers for sound card. In most cases the drivers would have been built as kernel loadable modules. You can check which drivers are available as modules by looking in the /lib/modules directories.

### 2.2.2 Displays 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.

Once you have determined

- your openSUSE version,
- your graphic hardware, and
- your in use graphic driver [whether it works or does not work],

### 2.2.3 Network cards

Ethernet network interface is built-in to most modern motherboards. Some computer systems, especially server systems, are equipped with two network interfaces built-in to the motherboard. Additional interfaces can be installed in extra PCI expansion slots. Use the command `lspci -vv` to see if hardware is detected properly and which kernel module is being assigned:

```
01:00.0 Ethernet controller: Broadcom Corporation NetXtreme BCM5764M  
Gigabit Ethernet PCIe (rev 10)
```

```
Subsystem: Hewlett-Packard Company Device 1309
```

```
Control: I/O- Mem+ BusMaster+ SpecCycle- MemWINV- VGASnoop- ParErr-  
Stepping- SERR- FastB2B- DisINTx+
```

```
Status: Cap+ 66MHz- UDF- FastB2B- ParErr- DEVSEL=fast >TAbort- <TAbort-  
<MAbort- >SERR- <PERR- INTx-
```

```
Latency: 0, Cache Line Size: 64 bytes
```

```
Interrupt: pin A routed to IRQ 52
```

```
Region 0: Memory at f7000000 (64-bit, non-prefetchable) [size=64K]
```

```
Capabilities: <access denied>
```

```
Kernel driver in use: tg3
```

```
Kernel modules: tg3
```

```
...
```

```
...
```

37:09.0 Ethernet controller: Broadcom Corporation NetXtreme BCM5782 Gigabit Ethernet (rev 03)

Subsystem: Hewlett-Packard Company Device 000c

Physical Slot: 5

Control: I/O- Mem+ BusMaster+ SpecCycle- MemWINV- VGASnoop- ParErr- Stepping- SERR+ FastB2B- DisINTx-

Status: Cap+ 66MHz+ UDF- FastB2B+ ParErr- DEVSEL=medium >TAbort- <TAbort- <MAbort- >SERR- <PERR- INTx-

Latency: 32 (16000ns min), Cache Line Size: 64 bytes

Interrupt: pin A routed to IRQ 21

Region 0: Memory at f8000000 (64-bit, non-prefetchable) [size=64K]

[virtual] Expansion ROM at f7100000 [disabled] [size=64K]

Capabilities: <access denied>

Kernel driver in use: tg3

Kernel modules: tg3

or more specifically lspci -vv | grep Ethernet

01:00.0 Ethernet controller: Broadcom Corporation NetXtreme BCM5764M Gigabit Ethernet PCIe (rev 10)

37:09.0 Ethernet controller: Broadcom Corporation NetXtreme BCM5782 Gigabit Ethernet (rev 03)

## 2.2.4 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.

### 2.2.5 USB drives

You need to configure USB into your kernel. Use of make menuconfig is recommended. Under USB support, you need to select Support for USB. You also need to select either UHCI (Intel PIIX4, VIA, ...) support, UHCI Alternate Driver (JE) support or OHCI-HCD (Compaq, iMacs, OPTi, SiS, ALi, ...) support. Which one you select is dependent on what kind of motherboard or adapter you have. Intel and Via motherboards, and Via-based adapters are UHCI, and you can use either of the two UHCI drivers - there seems to be little user visible difference between them. Ali and SiS chipsets, Compaq and NEC motherboards, iMacs and any adapter using Opti chips are OHCI, and you should use OHCI-HCD. If you do not know what kind of controller to choose, check your motherboard documentation. You can also look at /proc/pci for a hint - if the USB entry is of the form 0xHHHH, where HHHH are hex digits (e.g. something like I/O at 0xe400), then it is UHCI. If it is of the form 32 bit memory at 0xHH000000, where HH are hex digits (e.g. something like 32 bit memory at 0xee000000), then it is OHCI. Failing that, just try both.

You can select type of USB devices you want to use like:

- USB Human Interface Device for USB keyboard, mouse, joystick, tablet or gamepad,
- USB Scanner support for certain scanners
- USB Audio support for USB speakers
- USB Modem support for POTS or ISDN modem
- USB Printer support for USB printer
- USB Serial Converter support for serial port type devices
- USB CPiA Camera support for cameras based on Vision CPiA chipset
- USB Mass Storage support for mass storage devices
- USB-Network driver for certain USB to USB type connections

## 2.2.6 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 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.

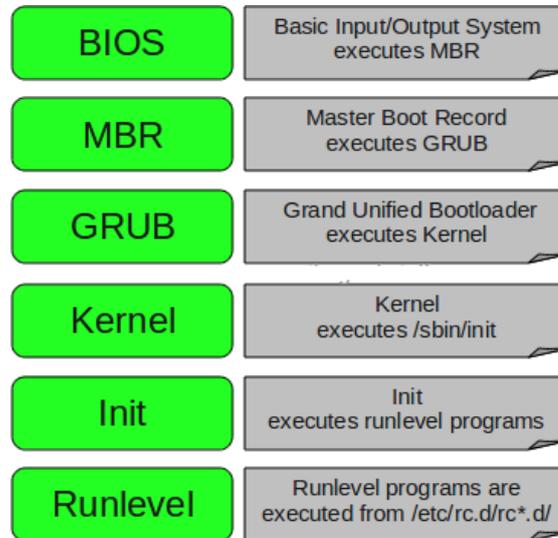
Example: hdb=ide-scsi. Such a setting should be added to lilo.conf or chos.conf if the driver is statically compiled into your kernel, which seems to be the most common setup. If you need to pass more than one parameter to the kernel, then separate them with spaces. The next two listings show example configurations containing more lines than just the relevant append-line.

### Check your progress 1

1. In Linux, sound card need \_\_\_\_\_ to install.
  - a. file
  - b. drivers
  - c. folders
  - d. all of above
2. Modem in linux could be:
  - a. internal
  - b. external
  - c. both a and b
  - d. neither a nor b

## 2.3 Understanding the OS boot up process

After making power button ON of your computer, you will see that Linux login will prompt which lead to 6 high level stages of booting process.



**Fig 2.1 Linux Booting Process**

### BIOS

BIOS is Basic Input/Output System, which does system integrity checks that searches, loads and executes boot loader program. It looks for boot loader in floppy, cd-rom, or hard drive by pressing F12 or F2 keys at the time of Boot sequence. Once the boot loader program is detected and loaded into the memory, BIOS gives the control to it. So, in simple terms BIOS loads and executes the MBR boot loader.

### MBR

MBR is Master Boot Record which is present in the 1<sup>st</sup> sector of bootable disk having syntax /dev/hda, or /dev/sda

It is less than 512 bytes in size having three components:

- primary boot loader info in 1st 446 bytes
- partition table info in next 64 bytes
- mbr validation check in last 2 bytes.

MBR has information about GRUB or LILO that loads and executes GRUB boot loader.

## GRUB

GRUB is Grand Unified Bootloader, that helps in selecting images to be executed among many images. It displays splash screen and wait for few seconds when you have not entered anything. It has the knowledge of filesystem having configuration file as /boot/grub/grub.conf such as:

```
#boot=/dev/sda
default=0
timeout=5
splashimage=(hd0,0)/boot/grub/splash.xpm.gz
hiddenmenu
title CentOS (2.6.18-194.el5PAE)
    root (hd0,0)
    kernel /boot/vmlinuz-2.6.18-194.el5PAE ro root=LABEL=/
    initrd /boot/initrd-2.6.18-194.el5PAE.img
```

From the above information we see GRUB loads and executes Kernel and initrd images.

## Kernel

Mounts the root file system as specified in the “root=” in grub.conf

Kernel executes the /sbin/init program

Since init was the 1st program to be executed by Linux Kernel, it has the process id (PID) of 1. Do a ‘ps -ef | grep init’ and check the pid.

initrd stands for Initial RAM Disk.

Initrd is used by kernel as temporary root file system until kernel is booted and the real root file system is mounted. It also contains necessary drivers compiled inside, which helps it to access the hard drive partitions, and other hardware.

## Init

Looks at the /etc/inittab file to decide the Linux run level.

Following are the available run levels

0 – halt

1 – Single user mode

- 2 – Multiuser, without NFS
- 3 – Full multiuser mode
- 4 – unused
- 5 – X11
- 6 – reboot

Init identifies the default initlevel from `/etc/inittab` and uses that to load all appropriate program. Execute `'grep initdefault /etc/inittab'` on your system to identify the default run level. If you want to get into trouble, you can set the default run level to 0 or 6. Since you know what 0 and 6 means, probably you might not do that. Typically you would set the default run level to either 3 or 5.

### Runlevel programs

When the Linux system is booting up, you might see various services getting started. For example, it might say “starting sendmail .... OK”. Those are the runlevel programs, executed from the run level directory as defined by your run level.

Depending on your default init level setting, the system will execute the programs from one of the following directories.

Run level 0 – `/etc/rc.d/rc0.d/`

Run level 1 – `/etc/rc.d/rc1.d/`

Run level 2 – `/etc/rc.d/rc2.d/`

Run level 3 – `/etc/rc.d/rc3.d/`

Run level 4 – `/etc/rc.d/rc4.d/`

Run level 5 – `/etc/rc.d/rc5.d/`

Run level 6 – `/etc/rc.d/rc6.d/`

Under the `/etc/rc.d/rc*.d/` directories, programs starting with S and K are located.

Programs starts with S are used during startup. S for startup.

Programs starts with K are used during shutdown. K for kill.

There are numbers right next to S and K in the program names. Those are the sequence number in which the programs should be started or killed.

For example, S12syslog is to start the syslog daemon, which has the sequence number of 12. S80sendmail is to start the sendmail daemon, which has the sequence number of 80. So, syslog program will be started before sendmail.

### **Check your progress 2**

1. Master Boot Record is located in the \_\_\_\_\_sector of bootable disk.
  - a. first
  - b. second
  - c. middle
  - d. last

---

## **2.4 Performing everyday tasks using gnu/Linux**

---

In order to exercise an interrupt obtained from device drivers, the data is assigned from the hardware which will work correctly if the data appear is less. If

### **2.4.1 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.

## 2.4.2 Playing music

We see that Linux and BSDs equipped with many text/console audio cd console players. There are many free software console cd audio players available like cdplay , cdcd and dcd which can be used in GNU to play music. On Debian and Ubuntu G\*/Linuces cdplay and cdcd are installable via apt. You can install cdtool using command:

```
root@xubuntu-desktop:~# apt-get install cdtool
```

...

cdtool package, contains a number of commands enabling you to listen/stop/shuffle/eject/get info about cd audio volumes. cdtool with binaries:

```
cdeject  
cdcldse  
cdlr  
cdlrfo  
cdpause  
cdplay  
cdstop  
cdvolume  
cdshuffle
```

Install cdcd on Debian by typing:

```
root@xubuntu-desktop:~# apt-get install cdcd
```

...

cdcd has shell like interface the most basic use of it is with:

```
root@xubuntu-desktop:~# cdc  
cdcd> play
```

It is noticed that in order to play audiocds in console on FreeBSD, command tool such as dcd is available and installable through ports which can be installed:

```
root@freebsd# cd /usr/ports/audio/dcd  
root@freebsd# make install clean
```

...

dcd is also available for Linux but on most GNU/Linuxes it has to be built from source.

Lets say you'd like to Play the 5th song from audio CD:

```
freebsd# dcd 5
```

dcd has plenty of great arguments, to get some fun with it check the man page.

Another program that can be used to play audio CDs on both Linux and BSDs is the "classical" mplayer .

### 2.4.3 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.

### 2.4.4 Sending and receiving email

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 reportbug for external mail server, run command `reportbug --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.

## 2.4.5 Copy files from disks and over the network

### Copy a file

File copy in Linux has many useful options as `-R` (or `-r`) that recursively copies directories and subdirectories with command syntax as:

```
cp -options file_or_files new_location
```

Consider an example:

```
cp file1 file2: This will copy file1 to file2 in same directory.
```

```
cp /tmp/file1 ~/file2 /mnt/win_c: It shows last option copy directory option which simply copies two files from different areas of file system to /mnt/win_c
```

```
cp -R directory_and_or_files new_location: It will copy directories and/or files to new_location
```

### Copy a file from remote machine to local machine

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
```

## 2.4.6 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'être*s, continues regularly putting out titles that work on Linux.

## 2.4.7 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 introduce 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. For Editing of text document in Linux, you can apply:
  - a. NEdit command
  - b. gedit command
  - c. geany command
  - d. all of above

---

## 2.5 X Window system configuration and utilities

---

X is standard graphical user interface for Linux which allows to interact with programs using mouse to point and click, providing a simple means of communicating with your computer. To have proper X Window System running you need to have device drivers for much wider array of hardware and configuration tools to assist in setup process. While still tricky at times - especially with unusual hardware - X setup and configuration is no longer the daunting process it once was, and should be relatively easy.

X Window System, is GUI which is at top of Linux and can look and work in the same way as Microsoft Windows. It operates very primitively or very advanced, look beautiful or ugly, be sleek and fast or bloated and slow.

## 2.5.1 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.

## 2.5.2 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.

### **Check your progress 4**

1. NVIDIA driver is related with:

- a. memory
- b. display
- c. sound
- d. none of above

---

## 2.6 Installing software from source code as well as using binary packages

---

We see that packages like yum, apt-get and rpm are handy to install that is already compiled that 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.

### **Check your progress 5**

1. tarball is a:
- a. program
  - b. source code
  - c. software
  - d. none of these

---

## **2.7 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.

---

## **2.8 Answers for Check Your Progress**

---

### **Check your progress 1**

**Answers:** (1 - b), (2 - c)

### **Check your progress 2**

**Answers:** (1 - a)

**Check your progress 3**

Answers: (1 - d)

**Check your progress 4**

Answers: (1 - b)

**Check your progress 5**

Answers: (1 - b)

---

## 2.9 Glossary

---

1. **File** - A file is a collection of records.
2. **ISP** - It is called as Internet Service Provider as it gives the permission to access the Internet.
3. **Client-server** - Client-server is a software architecture model that consists of client systems and server systems

---

## 2.10 Assignment

---

Write short note on client/server architecture.

---

## 2.11 Activities

---

Collect some information on mail client program.

---

## 2.12 Case Study

---

Generalised the basic of X setup with configuration and discuss.

---

## 2.13 Further Readings

---

1. Operating System Concept by Abraham Silberschatz, Peter Baer Galvin, Greg Gagne
2. Programming Be Operating System by Dan Sydow

---

## UNIT 3: STATE TRANSITION DIAGRAMS

---

### Unit Structure

- 3.0 Learning Objectives**
- 3.1 Introduction**
- 3.2 State-Transition Diagrams**
- 3.3 Domain Expert Testing**
- 3.4 Dynamic Modelling**
- 3.5 State Transition Diagrams and State charts**
- 3.6 State Transition Diagram for a Digital Watch**
- 3.7 Let Us Sum Up**
- 3.8 Answers for Check Your Progress**
- 3.9 Glossary**
- 3.10 Assignment**
- 3.11 Activities**
- 3.12 Case Study**
- 3.13 Further Readings**

---

### 3.0 Learning Objectives

---

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

- Basic of State-Transition Diagrams
- Basic of Domain Expert Testing
- Basic of Dynamic Modelling

---

### 3.1 Introduction

---

A dynamic model describes about the time in which any operation is performed. It is often seen that actors are active objects where the dynamic model declares when to start or stop. Since the data stores are passive objects, so it will

only react to updates and queries, hence nothing more needs to specify in case of dynamic model.

The dynamic model basically represents the time-based aspects of a system. This is related with the temporal changes in the states of the objects in a system. The main concepts are:

- State, is the situation at particular condition during lifetime of an object
- Transition, a change in the state
- Event, an occurrence that triggers transitions
- Action, an uninterrupted and atomic computation occurs due to some event
- Concurrency of transitions

---

## 3.2 State-Transition Diagrams

---

A state machine models the behaviour of an object because it passes through a number of states in its lifetime due to some events as well as the actions occurring due to the events. A state machine is graphically represented by using a state transition diagram. A state generally represents

- a time period during which a predicate is true, e.g.,  $\text{budget} - \text{expenses} > 0$ ,
- an action that is being performed, e.g., check inventory for order items
- or someone waits for an event to happen, e.g., arrival of a missing order item
- A state can be marked as “on” or “off”

When a state is “on”, all its outgoing transitions are eligible to fire. For a transition to fire, its event must occur and its condition must be holding true. When a transition does fire, its action is carried out and States can have associated actions:

- OnEntry-Such actions are performed soon after state gets entered
- Do-Such actions performs during lifetime of state
- OnEvent-Such actions performs in response to event
- OnExit-Such actions occur before state exists
- Include- Such shows submachine from another state chart diagram

State Diagrams appears to be a dynamic model which describes various states by which single object will pass during its life in response to events, along with its responses and actions. Consider examples of state diagrams:

For book class where use of entry and exit takes place:

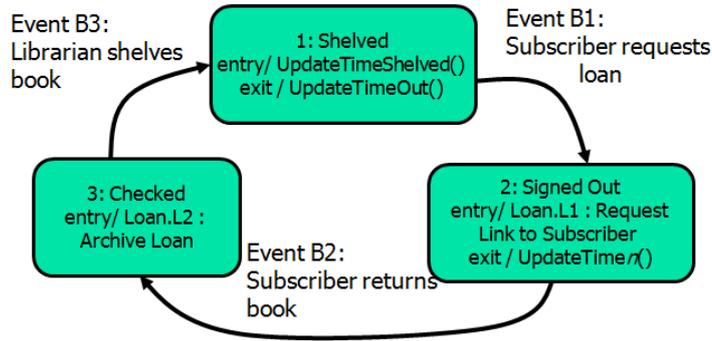


Fig 3.1 State diagram

### Check your progress 1

1. The State Diagram shows:
  - a. potential states showing object that goes into
  - b. behavior of an object across several use cases
  - c. lifecycle of an object
  - d. all of these

---

## 3.3 Domain Expert Testing

---

Domain analysis is a method for priming the pump which shows easily accessible supply of concepts which serves as classes in analysis model. After locating the domain classes, extra classes are created to show interfaces of domain model along with certain technologies like user interfaces and database which arises as domain model showing specific application.

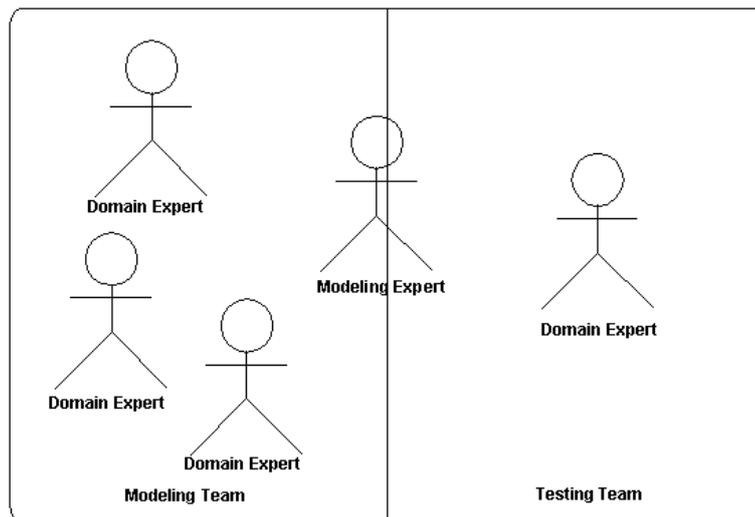
Different development methods structure the domain model very differently. At Software Architects we use the complete UML suite of diagram types to represent the knowledge needed to describe the domain which carry set of high-level use cases showing typical system in domain application using set of guided inspection for examining domain model.

Domain models are abstract that shows as generally as possible. Constraints are stated as liberally as applicable. While this produces a model that encompasses as many applications as possible, it also makes it difficult to evaluate the "correctness" of a use of an application. A domain model may be inconsistent. By being inclusive of all potential applications, the model may contain concepts that would always appear separately in an actual application. The use of the inheritance notation in UML supports the inclusion of alternatives. A car contains a single transmission but the domain model should present all possible types of transmissions that are used.

The testing process has two roles:

- modelling expert
- domain expert

Domain expert caters information related to domain where it shows expertise in syntax and semantics. The modelling expert is familiar with guided inspection process which serves as driving force for testing process. Figure 3.3 shows that single modeling expert manages many domain experts that works with model development and model testing processes.



**Fig 3.2 single modelling expert**

The model testing process is tightly attached with model development process which iterates within modelling process by periodically switching from modelling activity to testing activity. This provides quick feedback and often provides new information to be modelled. The basic steps are the same as for any testing process:

Analyze - Much of the testing analysis has been done if the use case descriptions contain sufficient information to allow them to be prioritized.

Construct - Write scenarios from the use cases. Vary the number of test cases based on the use case priorities.

Execute and evaluate – The test session involves role-playing in which the modellers and developers step through the model.

### **Check your progress 2**

1. Model testing involves:
  - a. modelling activity
  - b. testing activity
  - c. both a and b
  - d. neither a nor b

---

## **3.4 Dynamic Modelling**

---

Actions can be related to getting into an exciting a state as an alternative to connecting them to transactions. an entry action is performed when any transition enters the state and an exit action is performed once a state is exited. This enables a state to be expressed in terms of matched entry and exit actions without regard to what happens before a state becomes active.

An internal action doesn't change the state it executes at intervals the state. Automatic transactions fire and change the state once their conditions are met and any activity in the current state is terminated.

### **Sending Events:**

An object can send an event {to another to a different} object together with an attribute. A race condition occurs once a state might accept events from more than one object. in this case the order of the events becomes important since it'd have an effect on the final state of the object.

### **Synchronization of concurrent activities:**

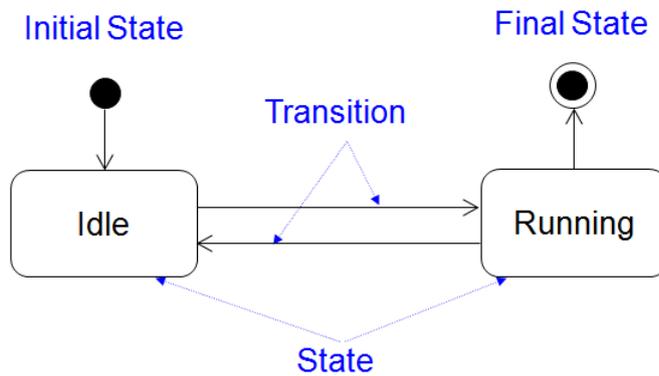
Sometime the object might perform 2 or additional activities at a time at the same time. the internal steps might not be synchronous , but both the activities

should be completed before the object will progress to next state. Any transition into a state with sub diagrams activates each of the diagrams.

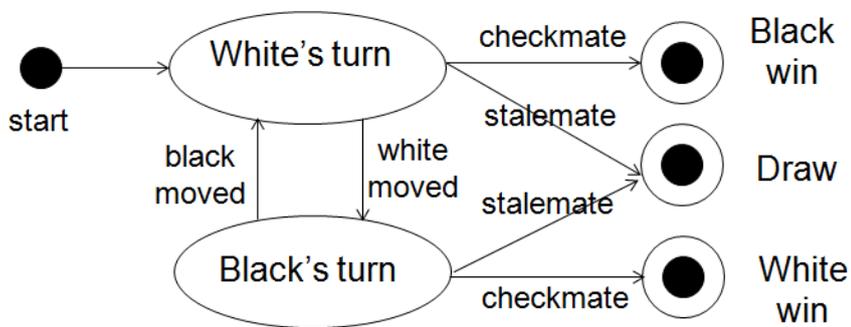
**State Diagram Elements**

In order to check an interrupt obtained from device drivers, the data is assigned to the hardware which will work correctly if the data is less. The elements of state diagrams are:

- Pseudo state – is the starting point of a state chart
- State – is the condition that occurs during an object’s life when it satisfies some criteria, performs some action, or waits for an event
- Transition – is the movement of object from one state to another state
- Message event – is the trigger for the transition



**Fig 3.3 State Diagram**



**Fig 3.4 Initial and final State**

### Check your progress 3

1. When the exit action does is performed?
  - a. When a transaction enters the state
  - b. When the transaction leaves the state
  - c. When the task is performed
  - d. None of these

---

## 3.5 State Transition Diagrams and State charts

---

### State Diagram

A state diagram shows behaviour of classes in response to external stimuli which describes behaviour of single object in response to series of events in system. It is also known as Harel state chart or state machine diagram. This UML diagram models the dynamic flow of control from state to state of a particular object within a system.

### State chart Diagram

State chart diagram explains state machine which defines machine in various states of an object that are controlled by external or internal events. These diagram is one of five UML diagrams used to model dynamic nature of system. They define different states of an object during its lifetime which can be changed by events. These diagrams are useful to model reactive systems which are defined as system that responds to external or internal events.

State chart diagram describes the flow of control from one state to another state. States are defined as a condition in which an object exists and it changes when some event is triggered. So the most important purpose of State chart diagram is to model life time of an object from creation to termination. State chart diagrams are also used for forward and reverse engineering of a system. But the main purpose is to model reactive system. Following are the main purposes of using Statechart diagrams:

- To model dynamic aspect of a system.
- To model life time of a reactive system.
- To describe different states of an object during its life time.

- Define a state machine to model states of an object.

### Check your progress 4

1. State chart diagram shows:
  - a. flow of control from one state to another state
  - b. description about UML
  - c. basic of model system
  - d. none of above

## 3.6 State Transition Diagram For a Digital Watch

In a simple digital watch, showing display and two buttons for setting, such as button A and B. The watch carries two modes of operation:

- Display time mode
- Set time mode

In this, button A selects modes where each time on pressing, advances mode in sequence: display, set hours, set minutes, display etc, while button B advances hours or minutes once each time when pressed as shown in figure 3.5.

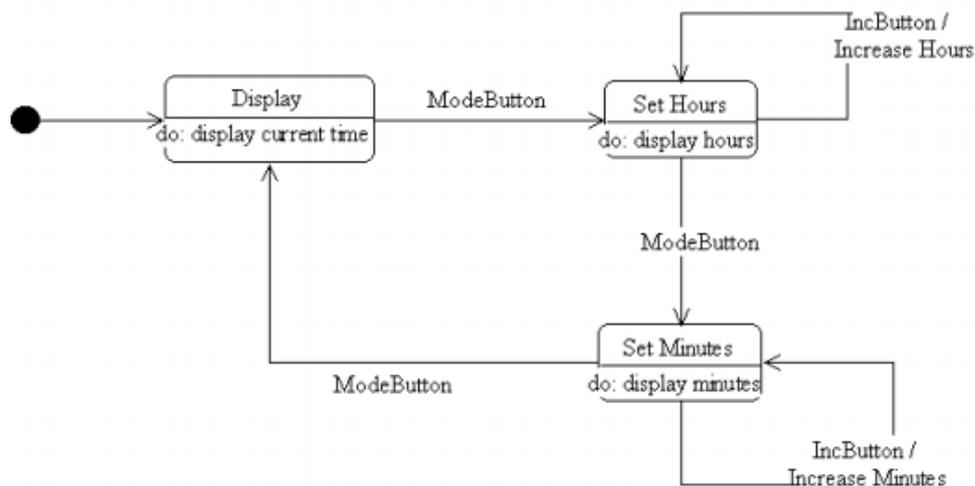


Fig 3.5 digital watch

In this, there are three states:

- Display
- Set Hours
- Set Minutes

Display is the start state, shows by arrow from black dot. Here, Set Hours state, event Mode Button causes a transition to Set Minutes state, whereas event Inc Button causes the action Increase Hours to occur.

### **Check your progress 5**

1. In digital clock, which among the following is not a state:
  - a. Display
  - b. Set Hours
  - c. Set Minutes
  - d. Set Days

---

## **3.7 Let Us Sum Up**

---

While studying this unit, we have learnt that events are occurrences which trigger state transition of object or group that carries location in time and space without period of time related to it.

It is noted that state diagrams are dynamic model showing various states by which single object which passes during its life in response to events, along with its responses and actions.

It is found that concurrency appears to be tendency for things which happens at same time in a system where many things happens at same time.

It is noted that dynamic model shows time in which an operation is performed where actors are active objects where dynamic model declares when to start or stop.

---

## 3.8 Answers for Check Your Progress

---

**Check your progress 1**

Answers: (1 - d)

**Check your progress 2**

Answers: (1 - c)

**Check your progress 3**

Answers: (1 - b)

**Check your progress 4**

Answers: (1 - a)

**Check your progress 5**

Answers: (1 - d)

---

## 3.9 Glossary

---

1. **Object design** - It is design strategy where system designers think of operations or functions.
2. **State** - In modelling, state refers to time period during which predicate is true.

---

## 3.10 Assignment

---

What is the purpose of state diagrams?

---

## 3.11 Activities

---

What are concurrent and nested state diagrams?

---

## 3.12 Case Study

---

Develop steps to test transition diagram.

---

## 3.13 Further Readings

---

1. John D. McGregor. Fifty Foot Look at Analysis and Design Models, 1998.
2. Reuben Prieto-Diaz. Domain Analysis, Software Engineering, ACM Press.

---

## **Block Summary**

---

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 Answer Questions**

1. What is Collaboration Diagrams?
2. Explain various commands used in linux for installation of network?
3. Write note on Domain Expert Testing?
4. Write short note on State Transition Diagrams?

### **Long Answer Questions**

1. Write short notes on client/server architecture?
2. Write short note on configuring various hardware in Linux?
3. Write note on considering effective UML Diagrams?

**Enrolment No.**

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

Unit No	1	2	3	4
Nos 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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Language and Style	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Illustration used (Diagram, tables etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Conceptual Clarity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Check your progress Quest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
Feed back to CYP Question	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____

3. Any Other Comments

.....

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“

*Education is something  
which ought to be  
brought within  
the reach of every one.*

”

- Dr. B. R. Ambedkar



**Dr. Babasaheb Ambedkar Open University**  
'Jyotirmay Parisar', Opp. Shri Balaji Temple, Sarkhej-Gandhinagar Highway, Chharodi,  
Ahmedabad-382 481.

# WEB TECHNOLOGIES USING FOSS (LAMP/WAMP)

BCA - 503

**BLOCK 4:  
WEB DATA  
REPRESENTING AND WEB  
SERVICES**

**Dr. Babasaheb Ambedkar Open University  
Ahmedabad**



# WEB TECHNOLOGIES USING FOSS (LAMP/WAMP)

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Knowledge Management and  
Research Organization  
Pune



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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 are 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 behavior 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 eliminates 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 TECHNOLOGIES USING FOSS (LAMP/WAMP)

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Apache License, BSD license, GNU General Public License, GNU Lesser General Public License, MIT License, Eclipse Public License and Mozilla Public License



**BLOCK 3: LINUX TECHNOLOGY**

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Introduction, State, Transition Diagrams, Domain Expert Testing, Dynamic Modelling, State Transition Diagrams And State charts, State Transition Diagram For A Digital Watch

---

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**UNIT 1 REPRESENTING WEB DATA**

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Event, oriented Parsing: SAX, Transforming XML Documents, Selecting  
XML Data: XPATH, Template, based Transformations: XSLT, Displaying  
XML Documents in Browsers, Case Study, Related Technologies.  
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Service Client, Describing Web Services: WSDL, Representing Data  
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Technologies, Software Installation, Storing Java Objects as Files,  
Databases and Java Servlets

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BCA - 503

# WEB TECHNOLOGIES USING FOSS (LAMP/WAMP)

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## BLOCK 4: WEB DATA REPRESENTING AND WEB SERVICES

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### UNIT 1

REPRESENTING WEB DATA 02

### UNIT 2

WEB SERVICES 39

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# **BLOCK 4: WEB DATA REPRESENTING AND WEB SERVICES**

---

## **Block Introduction**

Java is an object oriented programming language, so in java programming, main two features are supported that is class and object. Basically we know that class is collection of objects and object is an instance of class. SAX parsing events are sent to event handler where we define accessor methods which are for user of handler. Parse method, uses similar algorithm as ones used for the DOM approach where parse uses Compact Tokenizer instance of same class applied with DOM.

In this block, we will detail about the basic of Ajax-DOM based XML and JSP Technology. The block will focus on the study and concept of various technologies lead to Web Services. You will get an idea on JavaBeans Classes.

In this block, you will make to learn and understand about the basic of Server-Side SOAP. The concept related to Simple Object Access Protocol will also be explained to you. You will be demonstrated practically about programmed databases.

## **Block Objective**

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

- About Ajax-DOM based XML
- Basic of JSP Technology
- Features of Web Services
- Concept of Java Servlets
- Detailed about JavaBeans Classes
- Basic of JSP

## **Block Structure**

**Unit 1: Representing Web Data**

**Unit 2: Web Services**

---

# UNIT 1: REPRESENTING WEB DATA

---

## Unit Structure

### 1.0 Learning Objectives

### 1.1 Introduction

### 1.2 XML-Documents and Vocabularies

#### 1.2.1 Versions and Declaration

### 1.3 Namespaces JavaScript and XML

### 1.4 Ajax-DOM based XML processing Event-oriented Parsing

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#### 1.6.3 XSLT

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### 1.8 Case Study on Related Technologies

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### 1.10 JSP Technology

### 1.11 JSP and Servlets

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#### 1.11.2 Basic JSP

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### 1.15 Let Us Sum Up

**1.16 Answers for Check Your Progress**

**1.17 Glossary**

**1.18 Assignment**

**1.19 Activities**

**1.20 Case Study**

**1.21 Further Readings**

---

## **1.0 Learning Objectives**

---

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

- Basic of Ajax-DOM based XML processing
- Structure of JSP Technology
- Idea about Template-based Transformations
- JSP and Servlets

---

## **1.1 Introduction**

---

Java is an object oriented programming language, so in java programming, main two features are supported that is class and object. Basically we know that class is collection of objects and object is an instance of class. The uses of the java libraries of class spread the programmer efficiency by allowing computer programmer to focus on the functionality unique to their job. The library classes are generally planned with some typical usage pattern in observance, and the performance may be suboptimal if the actual usage differs. We deliver an approach for rewriting applications to use different customized versions of library classes that are generated using a combination of static analysis and profile information.

---

## **1.2 XML-Documents and Vocabularies**

---

In general XML parlance a "vocabulary" is a set of element types and attributes designed to be used together for some purpose. A given vocabulary may be "encompassing", meaning that it is intended to be used as the main or only

vocabulary for a given document, or "enabling", meaning it is intended to be integrated into and used with encompassing vocabularies.

### 1.2.1 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 names 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>

XML Declaration:

There are many examples showing declaration of XML:

Without parameters:

```
<?xml >
```

With version definition:

```
<?xml version="1.0">
```

With all parameters:

```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
```

With all parameters in single quotes:

```
<?xml version='1.0' encoding='iso-8859-1' standalone='no' ?>
```

### Check your progress 1

1. The XML declaration is present in the \_\_\_\_\_line of XML document.
  - a. first
  - b. second
  - c. middle
  - d. last

---

## 1.3 Namespaces JavaScript and XML

---

Namespace is a box which contains identifiers, functions and methods. It gives a level of direction to its contents so that it will be well distinguished and organized.

### XML Namespaces

XML Namespaces provide a method to avoid element name conflicts.

#### Name Conflicts

In XML, every element are considered and declared by developer which appear as conflict when mixed with XML documents from various applications. The XML carries HTML table information as:

```
<table>
<tr>
  <td>Apples</td>
  <td>Bananas</td>
</tr>
</table>
```

This XML carries information about a table:

```
<table>
  <name>African Coffee Table</name>
  <width>80</width>
  <length>120</length>
</table>
```

In this, when XML fragments were added together, there appears name conflict. Both contain a <table> element, but the elements have different content and meaning.

The namespace are defined by xmlns attribute in start tag of element where it declares the following syntax. xmlns:prefix="URI".

```
<root>
  <h:table xmlns:h="http://www.academicsolution.com">
    <h:tr>
      <h:td>Maths</h:td>
      <h:td>Science</h:td>
    </h:tr>
  </h:table>
  <f:table xmlns:f="http://www.academicsolution.com ">
    <f:name>Maths</f:name>
    <f:width>20</f:width>
    <f:length>30</f:length>
  </f:table>
</root>
```

We see that:

Xmlns attribute in first <table> element shows h: prefix as qualified namespace. In this, 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.

## Namespace in JavaScript

It is noticed that JavaScript doesn't provide namespace, hence function, method, object, variable in JavaScript will not work out, while it can be easily created in JavaScript. JavaScript is an object which can be framed easily.

```
//declare a function
function calculateTax(item) {
    return item.price * 1.40;
}
var product = function (cost) {
    this.cost = cost;

    this.getCost = function(){
        return this.cost;
    };
};
function doTaxCalculations() {
    var p = new product(100);
    alert(calculateTax(p.getCost()));
}
```

### Check your progress 2

1. Namespace does not contains:
  - a. identifiers
  - b. functions
  - c. software
  - d. methods

---

## 1.4 Ajax-DOM based XML processing Event-oriented Parsing

---

Ajax is only a name given to a set of tools that were previously existing. 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:

- HTML for the interface.
- CSS for the look and feel.
- JavaScript (ECMAScript) for local processing, and DOM (Document Object Model) to access data inside the page or to access elements of XML file read on the server.
- The XMLHttpRequest object 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 a var
var doc = xhr.responseXML;

// Read the first element
var element = doc.getElementsByTagName('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 text/html or an XML document. The later 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 adds the ability for your users to toggle your webpage's
font size, with persistent cookies then used to remember the setting</description>
</item>
<item>
<title>Keyboard/ Mouse Buttons</title>
<link>http://www.javascript.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.javascriptkit.com/javatutors/loadjavascriptcss.shtml</link>
<description>External JavaScript or CSS files do not always have to be
synchronously loaded as part of the page, but dynamically as well. In this tutorial,
see how.</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 activexmodes=["Msxml2.XMLHTTP", "Microsoft.XMLHTTP"] //activeX
versions to check for in IE
    if (window.ActiveXObject){ //Test for support for ActiveXObject in IE first (as
XMLHttpRequest in IE7 is broken)
        for (var i=0; i<activexmodes.length; i++){
            try{
                return new ActiveXObject(activexmodes[i])
            }
            catch(e){
                //suppress error
            }
        }
    }
    else if (window.XMLHttpRequest) // if Mozilla, Safari etc
        return new XMLHttpRequest()
    else
        return false
}
```

```
var mygetrequest=new ajaxRequest()
if (mygetrequest.overrideMimeType)
mygetrequest.overrideMimeType('text/xml')
mygetrequest.onreadystatechange=function(){
  if (mygetrequest.readyState==4){
    if (mygetrequest.status==200 || window.location.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].getElementsByTagName('link')[0].firstChild.nodeValue+'"'>
output+=rssentries[i].getElementsByTagName('title')[0].firstChild.nodeValue+'</
a>'
        output+='</li>'
      }
      output+='</ul>'
      document.getElementById("result").innerHTML=output
    }
    else{
      alert("An error has occurred making the request")
    }
  }
}
mygetrequest.open("GET", "javascriptkit.xml", true)
mygetrequest.send(null)
</script>
```

### Check your progress 3

1. Ajax is a set of:
  - a. quotes
  - b. technologies
  - c. codes
  - d. all of above

---

## 1.5 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.BufferedReader;
import java.io.FileReader;
import java.io.IOException;

public class SAXExpand {
    public static void main( String[] argv ) {
        try {
            InputSource inputSource =
                new InputSource(
                    new BufferedReader(new FileReader(argv[0])));
            CompactReader saxReader = new CompactReader();
            SAXSource source = new SAXSource(saxReader,inputSource);
```

```
StreamResult result = new StreamResult(System.out);
    TransformerFactory tFactory =
        TransformerFactory.newInstance();
    Transformer transformer = tFactory.newTransformer();
    transformer.transform(source,result);
} catch (TransformerException ex){
    System.out.println("TransformerException"+ex);
    ex.printStackTrace();
} catch (IOException ex) {
    System.out.println("IOException"+ex);
    ex.printStackTrace();
    }
}
```

Here, reading of file and generation of SAX events are done by CompactReader which is a special XMLReader since CompactReader will able to implement XMLReader interface that shows many methods but only few of them are really important.

SAX parsing events are sent to event handler where we define accessor methods which are for user of handler. Parse method, uses similar algorithm as ones used for the DOM approach where parse uses CompactTokenizer instance of same class applied with DOM.

It is noticed that many processing is done inside to expand method which receives name of current element as parameter which initially creates AttributesImpl data structure which is populated with names and values of all attributes.

### Check your progress 4

1. SAX events using:
  - a. XMLReader
  - b. XHTMLReader
  - c. HTMLReader
  - d. All of above

---

## 1.6 Selecting XML Data

---

The data can be easily selected and formatted in XML using FOR XML clause which is valid in SELECT statement that returns results of SELECT statement in many XML formats. Consider a SELECT statement:

```
SELECT Employee_ID, First_Name_VC, Last_Name_VC  
FROM Employee_T
```

Executing SELECT statement in Query Analyzer will have standard results as shown:

Employee_ID	First_Name_VC	Last_Name_VC
1	Ajit	Mathur
2	Rohit	Mathur
4	Sonu	Mathur

On taking SELECT statement and adding FOR XML clause:

```
SELECT Employee_ID, First_Name_VC, Last_Name_VC  
FROM Employee_T FOR XML RAW
```

Hence the total different set of results:

```
XML_F52E2B61-18A1-11d1-B105-00805F49916B
```

```
<row Employee_ID="1" First_Name_VC="Ajit"  
Last_Name_VC="Mathur"/><row Employee_ID="2" First_Name_VC="Rohit"
```

```
Last_Name_VC="      Mathur      "/>"/><row      Employee_ID="4"
First_Name_VC="Sonu" Last_Name_VC="Mathur"/>
```

Representing  
Web Data

### 1.6.1 XPATH Transformations

XSLT are W3C recommendations which defines XML document transformation that transform documents into XSL-FO for printing or viewing as general XML-aware programming and transformation language with XSL-FO without XSLT.

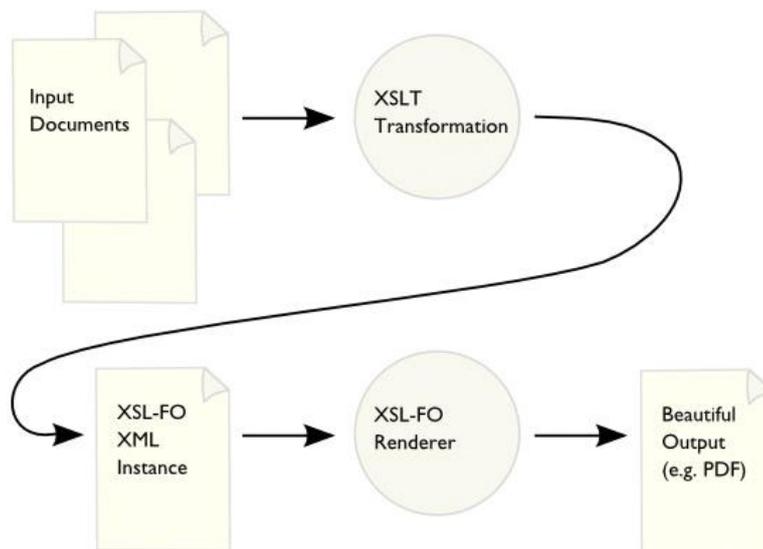


Fig 1.1 XPATH transformations

XSL Transformations transforms XML documents into XML documents, text documents or HTML documents. Using XSLT, processors can operate not only on XML but on anything that looks like XML which are:

- relational database tables
- geographical information systems
- file systems

Many cases, XSLT processor will work directly from database of XDM instances which operates on multiple input files in various formats that will treat all as if they were XML files.

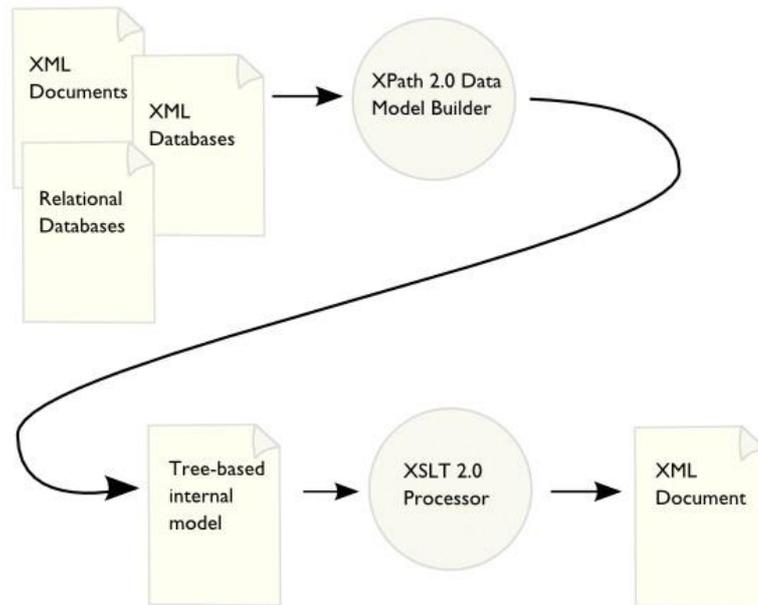


Fig 1.2 XSLT process

## 1.6.2 Template-based Transformations

XSLT uses template based approach to transformation document in form of template which describes certain input element. In case of formatting letter to generate HTML for Web, we need a template in order to match underlined passage and shows in italics:

```
<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!
```

### 1.6.3 XSLT

XSLT is a language for transforming XML documents into XHTML documents or to other XML documents. XSLT is used to transform an XML document into another XML document, or another type of document that is recognized by a browser, like HTML and XHTML. Normally XSLT does this by transforming each XML element into an (X)HTML element.

With XSLT you can add/remove elements and attributes to or from the output file. You can also rearrange and sort elements, perform tests and make decisions about which elements to hide and display, and a lot more.

#### **Check your progress 5**

1. XSL Transformations transforms:
  - a. HTML documents into XML documents
  - b. XML documents into XHTML documents
  - c. XHTML documents into HTML documents
  - d. XML documents into XML documents

---

## 1.7 Displaying XML Documents in Browsers

---

Internet Explorer helps in viewing XML documents in the browser same as viewing HTML pages. Similar to HTML, XML has no predefined display properties hence it needs separate style sheet which shows how XML data should be displayed. This separation of XML content from its presentation allows the content to be easily repurposed.

To see XML file in Internet Explorer, you have to specify style sheet with following.

Use the default style sheet showing file as collapsible tree.

Specify style sheet at top of XML file, in href attribute 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 among the following information is incorrect in respect to XML?
  - a. It is same as HTML
  - b. It has predefine display properties
  - c. It contains separate style sheet
  - d. All of above

---

## 1.8 Case Study on Related Technologies

---

Consider main components of XML DB Web Services application:

- Browser
- SOAP client
- Web Services Server
- Oracle XML DB on Oracle9i

In fig 1.3 we see that XML DB Web Services Main Components

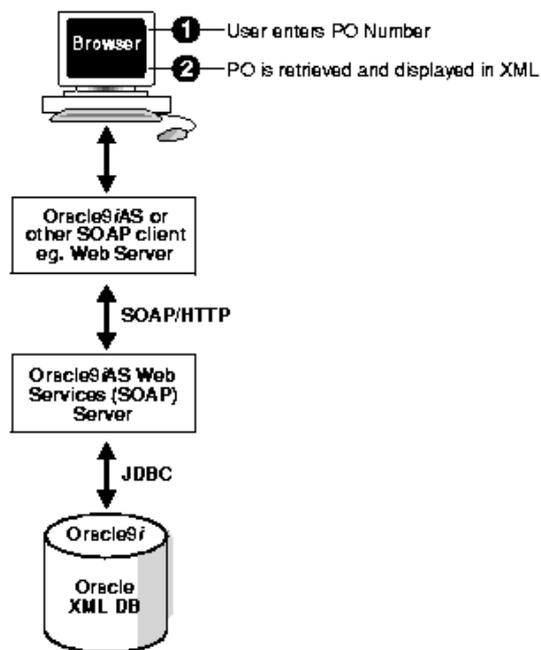


Fig 1.3 XML DB Web Services Main Components

---

## 1.9 Separating Programming and Presentation

---

In java, 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.

You will able to use Internet Explorer to view XML documents in browser same as HTML pages. Like HTML, XML has no predefine display properties hence it needs separate style sheet which shows how XML data should be displayed. This separation of XML content from its presentation allows the content to be easily repurposed.

### Check your progress 7

1. The purpose of special tags is to:
  - a. insert Java programming codes
  - b. insert XML codes
  - c. see the working of code
  - d. none of these

---

## 1.10 JSP Technology

---

JavaServer 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 a 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.

### **Check your progress 8**

1. JSP provides good way of:
  - a. writing dynamic content
  - b. writing static content
  - c. mixing static and dynamic contents.
  - d. all of above

---

## **1.11 JSP and Servlets**

---

It is seen that in an individual Computer, there can be many operations at a particular time; hence the management is required on all running processes that

### **1.11.1 Running JSP Applications**

To create Dynamic Web Project with a minimal structure consider:

- Choose menu bar and select File → New → Other.
- Select Web → Dynamic Web Project in New Project dialog box
- Click the Next button
- Enter "jspHello" as a project name
- Select Minimal Configuration from the list of possible configurations
- Click Next button twice in order to move Java window to Web Module window
- Select Generate web.xml check box and click Finish button.

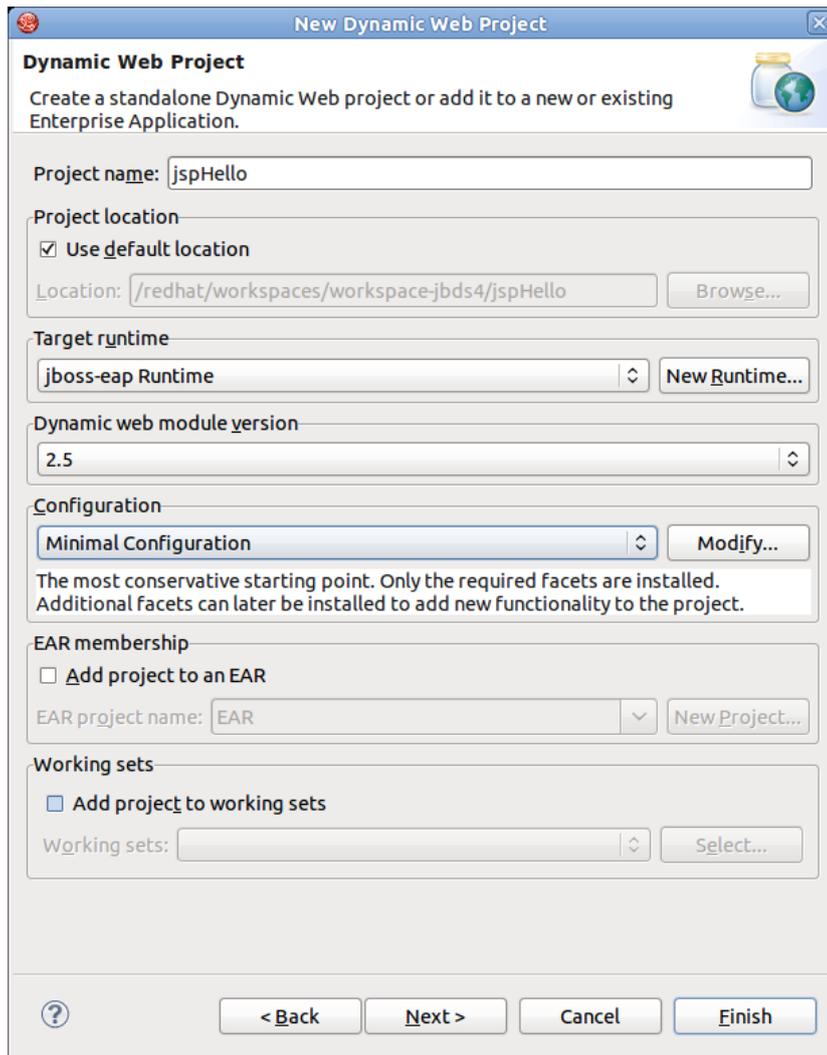


Fig 1.4 New project

You will find jspHello node in upper-left Package Explorer view

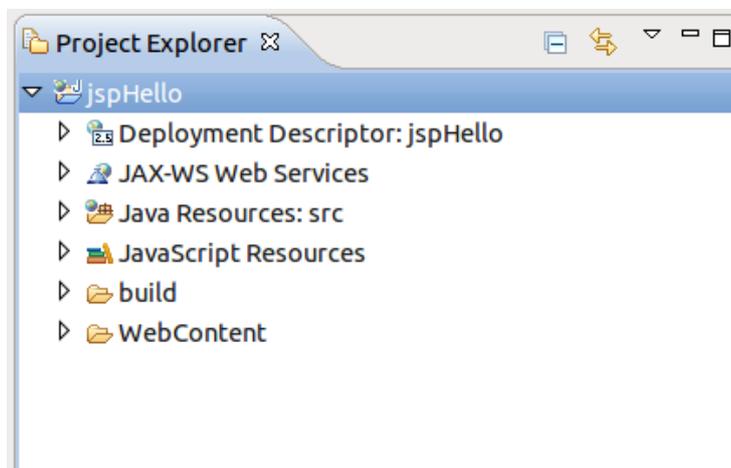


Fig 1.5 Explorer window

Here create JSP page which shows "Hello World!" message by:

- Right-click WebContent folder and selecting New → JSP.
- Type hello.jsp for a file name and click the Next button.

Further choose a template for JSP page and select New JSP File (xhtml) template and click the Finish button.

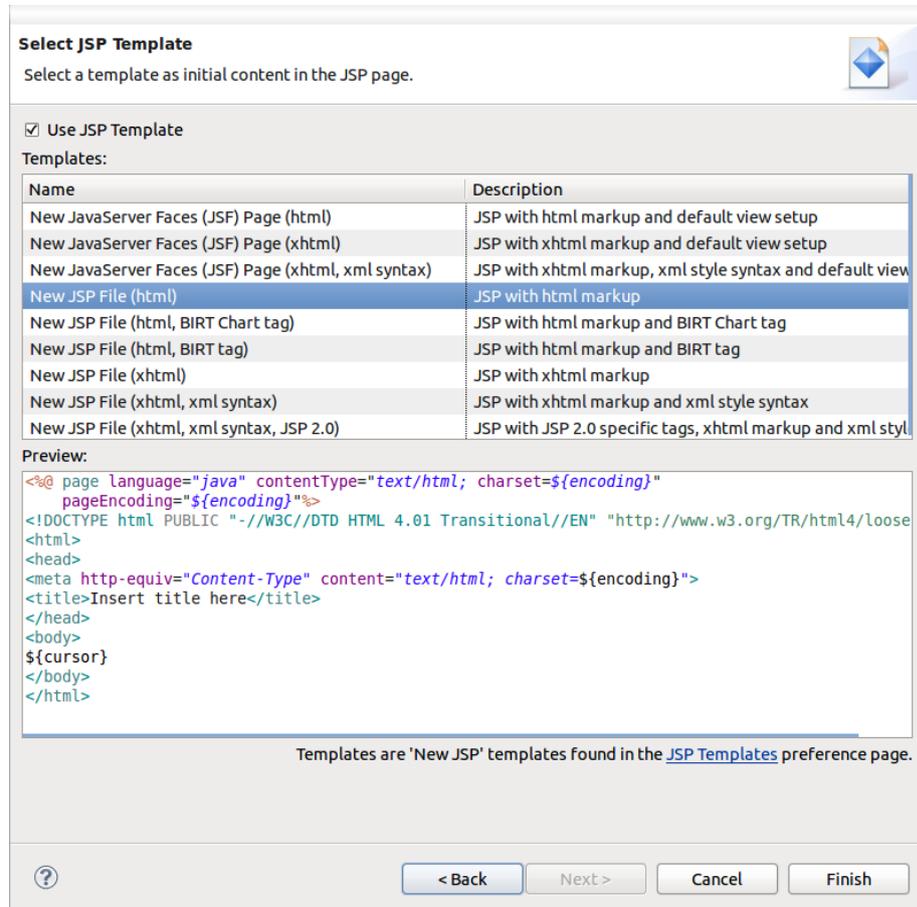


Fig 1.6 JSP Template

## 1.11.2 Basic JSP

A typical Java servlet contains three groups of methods:

- init()
- destroy()
- doGet() and doPost()

init() runs once when the servlet is loaded into server while destroy() runs once when servlet is unloaded. The service() runs once per HTTP request (e.g., doGet() runs once per GET request, doPost() run once per POST request). The

service() methods takes two arguments: request and response, encapsulating HTTP request and response messages respectively. A PrintWriter object called out is used for writing out the response message to the client over the network.

```
public class MyServlet extends HttpServlet {  
    // Instance variables or methods, e.g., database Connection, Statement, helper  
    methods  
  
    .....  
  
    .....  
  
    // init() runs only once when the servlet is loaded into the server  
    public void init() { ..... }  
  
    // doGet() runs once per HTTP GET request  
    // It takes two arguments, representing the request and response messages  
    public void doGet(HttpServletRequest request, HttpServletResponse response)  
        throws IOException, ServletException {  
  
        // Set the MIME type for the response message  
        response.setContentType("text/html");  
  
        // Create a Writer to write the response message to the client over the network  
        PrintWriter out = response.getWriter();  
  
        // The programming logic to produce a HTML page  
        out.println("<html>");  
        out.println( ..... );  
        out.println("</html>");  
    }  
  
    // doPost() runs once per HTTP Post request  
    public void doPost(HttpServletRequest request, HttpServletResponse response)  
        throws IOException, ServletException {  
  
        .....  
    }  
}
```

```
// destroy() runs only once when the servlet is unloaded from the server.  
public void destroy() { ..... }  
}
```

### Check your progress 9

1. Which command will execute when servlet is loaded in server
  - a. init()
  - b. destroy()
  - c. service()
  - d. none of above

---

## 1.12 JavaBeans Classes and JSP

---

JavaBean is a special Java class written in Java which is coded as per JavaBeans API specifications with special characteristics:

- It provides a default, no-argument constructor.
- It should be serializable and implement the Serializable interface.
- It may have a number of properties which can be read or written.
- It may have a number of "getter" and "setter" methods for the properties.

Consider an example of JavaBean showing student class having certain properties:

```
package com.tutorialspoint;  
public class StudentsBean implements java.io.Serializable  
{  
    private String firstName = null;  
    private String lastName = null;  
    private int age = 0;  
    public StudentsBean() {  
    }  
    public String getFirstName(){  
        return firstName;  
    }  
}
```

```

}

public String getLastName(){
    return lastName;
}

public int getAge(){
    return age;
}

public void setFirstName(String firstName){
    this.firstName = firstName;
}

public void setLastName(String lastName){
    this.lastName = lastName;
}

public void setAge(Integer age){
    this.age = age;
}
}

```

### 1.12.1 Tag Libraries

JavaBean has two types of components for tag library:

- tag library descriptor file
- tag handlers

Such type of JSP uses tags in library within its page.

#### The TLD File

Tag library descriptor file is XML document showing various library having information about library with every tag in library that are mainly used by JSP container for validating tags. Here we see that there appears some header information followed by elements that defines tag library having elements:

`<taglib>`

The tag library itself.

`<tlibversion>`

The tag library's version.

`<jspversion>`

The JSP specification version the tag library depends on.

`<shortname>`

showing simple default name with mnemonic value. It is seen that `<shortname>` used as preferred prefix value in taglib directives and/or to create prefixes for IDs.

`<uri>`

A optional URI that uniquely identifies the tag library.

`<info>`

Then each tag contained in the library is described. There can be one or many tags per library. There is only one TLD element required for all tags, and that is the one used to specify a tag handler's class: `<tagclass>classname</tagclass>`

There are various other elements used to describe tags. Which elements a tag uses will depend on how the tag is implemented in the handler. We'll get to that discussion in the section below.

If a tag has attributes associated with it, then each attribute must be described within the `<tag>` element. If an attribute is required by a tag, `<required>` is set to "true" or "yes". To allow a runtime expression value to be used by the tag, the `<rtexpvalue>` is set to "true" or "yes". For each attribute of a tag, a Bean-like getter/setter method needs to be defined in the handler class. It's also possible to define scripting variables for use in tags. This is accomplished using a `TagExtraInfo` class and will be discussed in the tag handler section. If a `TagExtraInfo` is to be used, the class must be defined using the `<teiclass>classname</teiclass>` within the tag definition.

A sample TLD named `oreillySample.tld` looks like

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
```

```
<!DOCTYPE taglib PUBLIC "-//Sun Microsystems, Inc.//DTD JSP Tag Library 1.1//EN"
```

```
"http://java.sun.com/j2ee/dtds/web-jsptaglibrary_1_1.dtd">
<taglib>
  <tlibversion>1.0</tlibversion>
  <jspversion>1.1</jspversion>
  <shortname>oreillySamples</shortname>
  <info>OReilly Sample Tag library</info>
<!--A Simple tag -->
<tag>
  <name>hello</name>
  <tagclass>oreilly.examples.Hello </tagclass>
<!--Body content can have a value of
  empty: no body
  JSP: body that is evaluated by container, then possibly processed by the tag
  tagdependent: body is only processed by tag; JSP in body is not evaluated.
-->
<bodycontent>empty</bodycontent>
<info>
  This is a simple hello tag.
</info>
<!-- Optional attributes -->
<!-- personalized name -->
<attribute>
  <name>name</name>
  <required>>false</required>
  <rtexpvalue>>false</rtexpvalue>
</attribute>
</tag>
</taglib>
```

## The Tag Handler

The tag is defined in a handler class. TagSupport is the base class used for simple tags. It can be found in the javax.servlet.tagext package. What your tag is implementing will depend on what methods could potentially be called and what needs to be implemented. TagSupport and TagBodySupport supply default implementations of the methods listed below.

If your Tag Handler:

You need to implement the following methods:

has no attributes and no body

doStartTag, doEndTag, release

has attributes

doStartTag, doEndTag, set/getAttribute1...N

has a body with no interaction

doStartTag, doEndTag, release

has a body with interaction

doStartTag, doEndTag, release, doInitBody, doAfterBody

A more advanced feature is the use of scripting variables. Typically an attribute is passed to the tag that contains the ID of the object to be used. The usual operation is that the tag handler retrieves a scripting variable value object using pageContext.getAttribute(name), performs some processing on it, and then sets the scripting variable's value using the pageContext.setAttribute(name, object). In addition to setting the value of the variable within the tag handler, you must define a class derived from TagExtraInfo that provides information to the JSP container about the nature of the variable. That class is then listed in the <teiclass> attribute of the tag.

The Java code for the tag defined in the oreillySample.tld file would look like

```
package oreilly.examples
```

```
import javax.servlet.jsp.*;
```

```
import javax.servlet.jsp.tagext.*;
```

```
/**
```

```
 * This is a simple tag example to show how content is added to the
```

```
 * output stream when a tag is encountered in a JSP page.
```

```
*/
public class Hello extends TagSupport {
    private String name=null;
    /**
     * Getter/Setter for the attribute name as defined in the tld file
     * for this tag
     */
    public void setName(String value){
        name = value;
    }

    public String getName(){
        return(name);
    }
    /**
     * doStartTag is called by the JSP container when the tag is encountered
     */
    public int doStartTag() {
        try {
            JspWriter out = pageContext.getOut();
            out.println("<table border=\"\1\">");
            if (name != null)
                out.println("<tr><td> Hello " + name + " </td></tr>");
            else
                out.println("<tr><td> Hello World </td></tr>");
        } catch (Exception ex) {
            throw new Error("All is not well in the world.");
        }
        // Must return SKIP_BODY because we are not supporting a body for this
        // tag.
    }
}
```

```
        return SKIP_BODY;
    }
/**
 * doEndTag is called by the JSP container when the tag is closed
 */
    public int doEndTag(){
        try {
            JspWriter out = pageContext.getOut();
            out.println("</table>");
        } catch (Exception ex){
            throw new Error("All is not well in the world.");
        }
    }
}
```

### 1.12.2 Files

The Java code generator produces a single Java file from each Uniface signature. The generated Java file defines one class that corresponds to the Uniface component signature. Java implementation signature information is used, if it is provided; if it is not, the Uniface signature information is used.

#### JAR Files

JAR files are the standard Java mechanism to package and distribute Java classes and supporting resources. SilverStream provides a point and click user interface that allows you to create and manipulate JAR files, JavaBeans, and Enterprise JavaBeans (EJBs).

#### Batch file

You run the .bat file that is generated to compile the Java source files and build the Java archive file named ExportFile.jar. For processing of the batch file, you must install Sun Microsystems JDK 1.3 or higher. The PATH environment variable must include the \bin directory of the JDK to run the Java compiler javac.exe, and the Java archive program jar.exe.

### Check your progress 10

1. Tag library descriptor file is;
  - a. HTML document
  - b. XML document
  - c. XHTML document
  - d. all of above

## 1.13 Supports for the Model

Before developing the web applications, we need to have idea about design models. There are two types of programming models (design models)

- Model 1 Architecture
- Model 2 (MVC) Architecture

### 1.13.1 View

#### Model 1 Architecture

Servlet and JSP are the main technologies to develop the web applications. Servlet was considered superior to CGI. Servlet technology doesn't create process, rather it creates thread to handle request. The advantage of creating thread over process is that it doesn't allocate separate memory area. Thus many subsequent requests can be easily handled by servlet.

JSP overcomes almost all the problems of Servlet. It provides better separation of concern, now presentation and business logic can be easily separated. You don't need to redeploy the application if JSP page is modified. JSP provides support to develop web application using JavaBean, custom tags and JSTL so that we can put the business logic separate from our JSP that will be easier to test and debug.

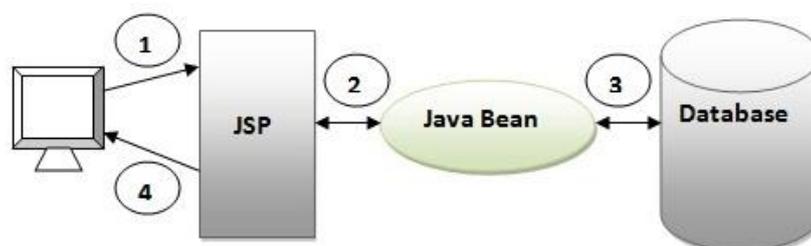


Fig 1.7 Model 1 Architecture

## Model 2 (MVC) Architecture

Model 2 is based on the MVC (Model View Controller) design pattern. The MVC design pattern consists of three modules model, view and controller.

Model: The model represents the state (data) and business logic of the application.

View: The view module is responsible to display data i.e. it represents the presentation.

Controller: The controller module acts as an interface between view and model. It intercepts all the requests i.e. receives input and commands to Model / View to change accordingly.

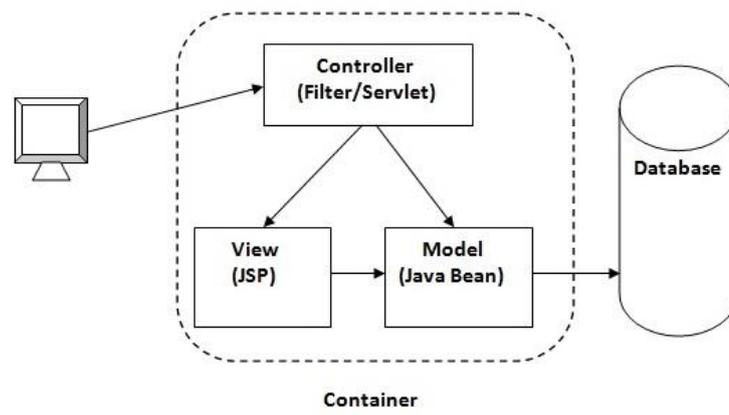


Fig 1.8 Model 2 Architecture

### 1.13.2 Controller Paradigm

Adaptability Previously, expansive part based frameworks raise inquiries for how with a an undertaking for simple advancement Furthermore support same time securing your information What's more reputation, particularly starting with new developers also unwitting clients. Those addresses may be previously, utilizing those Model, View, control (MVC) structural engineering. A structural engineering for example, such that MVC is a configuration example that depicts a repeating issue What's more its result the place the result will be never precisely the same for each repeat.

To utilize that Model-View-Controller MVC standard adequately you must get it those divisions from claiming work inside the MVC triad. You Additionally must see all the how the three parts of the triad speak with one another What's more with different animated perspectives Furthermore controllers; the offering of a absolute mouse, keyboard Also presentation screen "around a few provisions requests correspondence Furthermore participation. On settle on the best

utilization of those MVC standard you need additionally should research those accessible subclasses for see Also controller which provides primed aggravated beginning focuses to your provisions.

In the MVC plan design, requisition stream may be interceded by a focal controller. The controller delegates solicitations on an proper handler. Those controllers will imply by which the client interacts with those web requisition. Those controllers may be answerable for those enter of the model. An immaculate GUI controller acknowledges enter from those client Also instructs those model and viewport with perform activity In light of that information. In an invalid enter may be sent of the controller from the view, the model informs the controller on regulate the see that slip struck them and on tell it will attempt once more.

A web requisition controller could a chance to be considered perfect concerning illustration particular see since it need visual part. It might a chance to be really make you quit offering on that one or additional html structures done An web provision Furthermore In this manner the model might likewise direct the thing that the controller ought to presentation Likewise enter. The controller might generate html should permit the client information an inquiry of the web requisition. The controller might include that fundamental parameterisation of the singular type component thereabouts that those Servlet could see those enter. This may be unique in relation to a GUI, really back-to-front, the place the controller is sitting tight Furthermore acting once event-driven information from mouse or graphics tablet.

The controller adjusts those model representing, alternate encapsulates, an application's benefits of the business rationale alternately state. It captures not main the state of a transform or system, as well as how the framework meets expectations. It notifies whatever eyewitness point when whatever information need to be changed. Those models might execute those database inquiries in case point.

Control will be afterward normally sent back through the controller of the fitting perspective. Those perspectives will be answerable for the yield of the model. An immaculate GUI see connects with a model Also renders its substance of the presentation surface. On addition, when those model changes, the view port naturally redraws those influenced and only the picture to reflect the individuals' progressions. A web requisition see only transforms the state of the model under discernable html. The sending camwood make executed by a lookup on mapping for whichever An database or a record. This gives detached coupling the middle of

those model and the view, which aggravate an provision significantly simpler to compose and look after.

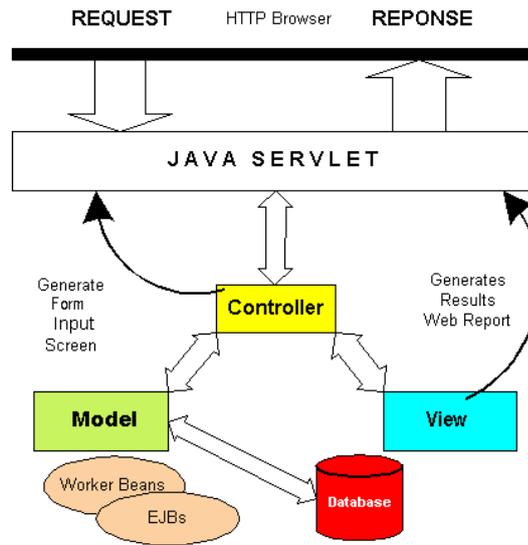


Fig 1.9 Model view

Dividing web application into Model, View and Controller separates the presentation from business logic. If MVC architecture is designed, then a Model contains various views and controllers that does not necessarily have Java Servlet for placing security login, user authentication and database pooling. After all these latter have nothing to do with the business logic of the web application or the presentation.

### Check your progress 11

1. Which among the following information is correct?
  - a. Servlet technology helps in creating source code
  - b. CGI technology is better than Servlet
  - c. Servlet technology doesn't create process
  - d. CGI will able to handle requests easily

---

## 1.14 Case Study on Related Technologies

---

Consider a case study of e-bookshop:

Database: ebookshop

Table: books

```

+-----+-----+-----+-----+-----+
| id | title          | author    | price | qty |
| (INT) | (VARCHAR(50)) | (VARCHAR(50)) | (FLOAT) | (INT) |
-----
| 1001 | Java for Self          | Asheesh    | 11.11 | 11 |
| 1002 | More Java              | Asheesh    | 22.22 | 22 |
| 1003 | Java for dummies      | Ajit Mathur | 33.33 | 33 |
| 1004 | Playing with Java     | Asheesh Mathur | 44.44 | 44 |
| 1005 | Teaspoon of Java     | Rohit Mathur | 55.55 | 55 |
-----

```

Database: ebookshop

Table: order\_records

```

-----
| id | qty_ordered | cust_name | cust_email | cust_phone |
| (INT) | (INT) | (VARCHAR(30)) | (VARCHAR(30)) | CHAR(8) |
-----

```

You can create the database by running the following SQL script:

```

create database if not exists ebookshop;
use ebookshop;
drop table if exists books;
create table books (
  id int,
  title varchar(50),
  author varchar(50),
  price float,
  qty int,
  primary key (id));
insert into books values (1001, 'Java for Self', 'Asheesh', 11.11, 11);

```

```
insert into books values (1002, 'More Java', 'Asheesh', 22.22, 22);  
insert into books values (1003, 'Java for dummies', 'Ajit Mathur', 33.33, 33);  
insert into books values (1004, 'Playing with Java', 'Asheesh Mathur', 44.44, 44);  
insert into books values (1005, 'Teaspoon of Java', 'Rohit Mathur', 55.55, 55);  
drop table if exists order_records;  
create table order_records (  
    id      int,  
    qty_ordered int,  
    cust_name  varchar(30),  
    cust_email varchar(30),  
    cust_phone char(8));  
select * from books;
```

---

## 1.15 Let Us Sum Up

---

In this unit we have learnt that Java is an object oriented programming language, so in java programming, main two features are supported that is class and object. Basically we know that class is collection of objects and object is an instance of class.

It is studied that Ajax is only a name given to a 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.

We see that JavaServer 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).

---

## 1.16 Answers for Check Your Progress

---

<b>Check your progress 1</b>
------------------------------

**Answers:** (1 - a)

**Check your progress 2**

**Answers:** (1 - c)

**Check your progress 3**

**Answers:** (1 - b)

**Check your progress 4**

**Answers:** (1 - a)

**Check your progress 5**

**Answers:** (1 - d)

**Check your progress 6**

**Answers:** (1 - b)

**Check your progress 7**

**Answers:** (1 - a)

**Check your progress 8**

**Answers:** (1 - c)

**Check your progress 9**

**Answers:** (1 - a)

**Check your progress 10**

**Answers:** (1 - b)

**Check your progress 11**

**Answers:** (1 - c)

---

## 1.17 Glossary

---

1. **Web server** - A program that accepts requests for resources
2. **Servlet** - Java technology based web component, managed by container forming dynamic content.

---

## 1.18 Assignment

---

Explain the features of SAX parsing?

---

## 1.19 Activities

---

Study file organisation in Ajax file system.

---

## 1.20 Case Study

---

Study the types of JavaServer Pages.

---

## 1.21 Further Readings

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1. Sierra, Kathy; Bates, Bert; Basham, Bryan. Head First Servlets & JSP. O'Reilly Media.
2. Brown, Simon; Dalton, Sam; Jepp, Daniel; Johnson, Dave; Li, Sing; Raible, Matt. Pro JSP 2. Apress.

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## **UNIT 2: WEB SERVICES**

---

### **Unit Structure**

- 2.0 Learning Objectives**
- 2.1 Introduction**
- 2.2 JAX-RPC-Concepts**
- 2.3 Writing a Java Web Service**
- 2.4 Writing a Java Web Service Client**
- 2.5 Describing Web Services**
  - 2.5.1 WSDL
- 2.6 Representing Data Types**
  - 2.6.1 XML Schema
- 2.7 Communicating Object Data**
- 2.8 SOAP Related Technologies**
  - 2.8.1 Software Installation
- 2.9 Storing Java Objects as Files and Databases**
- 2.10 Java Servlets**
- 2.11 Let Us Sum Up**
- 2.12 Answers for Check Your Progress**
- 2.13 Glossary**
- 2.14 Assignment**
- 2.15 Activities**
- 2.16 Case Study**
- 2.17 Further Readings**

---

### **2.0 Learning Objectives**

---

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

- Concept of JAX-RPC-Concepts
- Understand about Java Web Service Client

- Detailed about Representing Data Types
- Basic of SOAP Related Technologies
- Idea of Java Servlets

---

## 2.1 Introduction

---

As is the case with any client-server paradigm, in the world of web services there are web service providers and web service consumers. Server-Side SOAP is a tutorial which deals with how to build and provide web services using Apache SOAP. Java web service application perform communication through WSDL. There are two ways to write java web service application code: SOAP and RESTful.

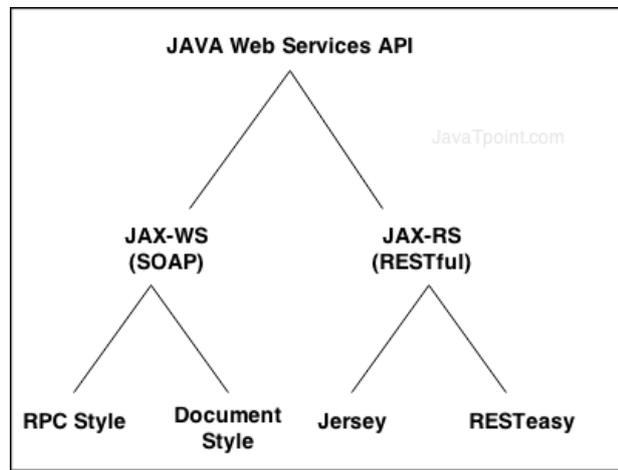


Fig 2.1 Java Web Service

---

## 2.2 JAX-RPC

---

JAX-RPC stands for java API to XML-based RPC. JAX-RPC may be engineering to fabricating web benefits with customers that use remote methodology calls (RPC) Furthermore XML. Regularly utilized over dispersed client-server model, RPC instrument empowers customers to execute methods for different frameworks.

Clinched alongside JAX-RPC, An remote technique bring may be spoke to Eventually Tom's perusing an XML-based protocol for example, such that cleanser. The cleanser detail characterizes the envelope structure, encoding rules, and assemblies for speaking to remote technique calls Also reactions. These calls

with more reactions are transmitted similar to cleanser messages (XML files) through http.

An RPC-based Web administration is an accumulation for methods that will be called by remote customer again those web. To example, an ordinary RPC-based Web administration is stock quote administration that takes a cleanser (Simple item entry Protocol) solicitation to those value of a specified stock Furthermore returns those cost by means of cleanser.

Web administration aggravates itself accessible will possibility customers by describing itself in Web administrations portrayal dialect (WSDL) archive. A WSDL depiction may be an XML record that provides for every last one of correlated data over Web service, including its name, the operations that could be called on it, the parameters to the individuals operations, and the area for the place will send solicitations. A Web client utilizes WSDL archive with uncover the thing that the administration offers what's more entryway to entry it.

JAX-RPC may be in view of the RPC model, it offers past fundamental RPC. For one thing, it will be time permits to send finish documents What's more likewise archive pieces. Done addition, JAX-RPC helps cleanser message handlers, which make it could be allowed with send a totally assortment from claiming messages. Also JAX-RPC could a chance to be developed will would one-way informing with more of request-response style from claiming informing typically done with RPC. Another propelled characteristic may be extensible kind mapping, which provides for JAX-RPC even now that's only the tip of the iceberg adaptability over the thing that could make sent.

Creating Web administration utilizing JAX-RPC may be shockingly not difficult. Those administration itself is essentially two files, an interface that pronounces the service's remote methods What's more a population that executes the individuals methods. There is a little more to it, in that the service needs to be configured and deployed, but first, let's take a look at the two main components of a Web service, the interface definition and its implementation class.

```
package coffees;
import java.rmi.Remote;
import java.rmi.RemoteException;
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 1

1. RPC stands for:
  - a. Remote Methodology Calls
  - b. Remove Method Calling
  - c. Removed Methodology Calls
  - d. Remote Member Calls

---

## 2.3 Writing a Java Web Service

---

We can create a web service application using Java. Java API for XML Web Services (JAX-WS) 2.0, JSR-224, relies heavily on annotations as specified in Metadata Facility for Java Programming Language (JSR-175) and Web Services Metadata for Java Platform (JSR-181) along with annotations of JAX-WS 2.0 specification. You can write web service application in normal Java class in which exposed methods are annotated with web service annotations @WebService and @WebMethod. Consider an code example:

```
@WebService
public class AddNumbersImpl {
    @WebMethod(action="addNumbers")
    public int addNumbers(int number1, int number2)
        throws AddNumbersException {
        if (number1 < 0 || number2 < 0) {
            throw new AddNumbersException(
                "Negative number cant be added!",
                "Numbers: " + number1 + ", " + number2);
        }
        return number1 + number2;
    }
}
```

While making web service from scratch or on existing Java class, WSIT features are enabled with configuration file as `wsit-<package>.<service>.xml` which is written in WSDL format such as:

```
wsit-enabled-fromjava/etc/wsit-fromjava.server.AddNumber-sImpl.xml
```

The settings in `wsit-<package>.<service>.xml` file incorporated by WSIT run-time in WSDL which generates for web service. So when client requests web service's WSDL, run-time embeds any publicly visible policy assertions contained in `wsit-<package>.<service>.xml` file into 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 {
    @WebMethod(action="addNumbers")
    public int addNumbers(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 2

1. \_\_\_\_\_ is the basis for Web services.
  - a. CGI
  - b. PHP
  - c. CSS
  - d. XML

---

## 2.4 Writing a Java Web Service Client

---

Dissimilar to creating web administration provider, making a web administration customer requisition dependably begins for a existing WSDL record. This methodology may be comparable of the procedure you use with manufacture and administration from existing WSDL record. Those WSDL document that the customer expends now holds those WS-\* approach assertions

(and, over a portion cases, whatever worth-included WSIT approach assertions that expand Sun's implementation, At could securely be overlooked by different implementations). Most of the policy assertions are defined in the WS-\* specifications. Sun's implementation processes these standard policy assertions

The approach assertions portray any prerequisites starting with the server and also any nonobligatory features those customer might use. Those WSIT raise instruments and run-time surroundings recognize the WSDL's arrangement assertions with more design themselves appropriately, that reasonably is expected. Though a unsupported declaration will be found, an lapse message describing those issue will a chance to be shown.

Typically, you recover those WSDL straightforwardly from web administration supplier utilizing the wsimport apparatus. Those wsimport device At that point generates those comparing java source book to the interface portrayed Eventually Tom's perusing the WSDL. Those java compiler, javac, will be afterward known as will gather the sourball under population files. The modifying code utilization the created classes with get the web administration.

The client Java file shows functions of web service client with code showing the AddNumbersClient.java file that gives in the sample.

```
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().getAddNumbersImplPort();

            int number1 = 10;
            int number2 = 20;
```

```
System.out.printf ("Invoking addNumbers(%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.getFaultInfo ().getDetail ());
} finally {
    ((Closeable)port).close();
}
}
}
```

This file specifies two positive integers that are to be added by the web service, passes the integers to the web service and gets the results from the web service via the `port.addNumbers` method, and prints the results to the screen. It then specifies a negative number to be added, gets the results (which should be an exception), and prints the results (the exception) to the screen.

**Check your progress 3**

1. WSDL Stands for \_\_\_\_\_.
  - a. Web Services Development Language
  - b. Web Services Description Language
  - c. Web Services Design Language
  - d. none of these

---

## 2.5 Describing Web Services

---

Web administration will be whatever bit about product that makes it accessible over those web and employments a institutionalized XML informing framework. XML may be used to encode that corresponds with web administration. For example, customer invokes web administration eventually perusing sending XML message for comparing XML reaction. Similarly as know correspondence is done XML, web administrations would not tied to whatever person working framework alternately modifying language--Java with Perl; Windows provisions might talk for UNIX requisitions.

Web benefits would self-contained, modular, distributed, dynamic provisions that describes, publish, locate, alternate conjured over organize products with supply chains. These provisions gives chance to local, distributed, alternately web-based and web administrations that needs manufactured ahead of highest priority on open guidelines for example, TCP/IP, HTTP, Java, HTML, Also XML.

Web administration will be an accumulation for open conventions and principles utilized for trading information between requisitions alternately frameworks. Product requisitions composed to various modifying dialects What's more running with respect to different platforms that uses web benefits on return information again machine networks similar to those web Previously, a way comparable to inter-process correspondence on single PC. This interoperability is because of the utilization from claiming open guidelines.

The basic web services platform is XML + HTTP. All the standard web services work using the following components

SOAP (Simple Object Access Protocol)

UDDI (Universal Description, Discovery and Integration)

## WSDL (Web Services Description Language)

### 2.5.1 WSDL

Web Services Description Language (WSDL) will be a XML-based dialect utilized with depict those benefits a business offers and should give an approach for people and different organizations should get the individuals administrations electronically. WSDL is the foundation of the widespread Description, Discovery, Also coordination (UDDI) activity spearheaded Toward Microsoft, IBM, also Ariba. UDDI is an XML-based registry to organizations worldwide, which empowers organizations on rundown themselves Also their administrations on the web.

Web Services Description Language (WSDL) structures the support for those first Web administrations detail. The accompanying figure illustrates the utilization from claiming WSDL. Toward the left will be An administration supplier. At the good will be An administration shopper. Those steps included to giving and expending a administration are:.

Administration supplier depicts its administration utilizing WSDL. This definition will be distributed will a repossess about benefits. The repossess use widespread description, discovery with more combination having different manifestations of directories with extra use.

Administration shopper issues you quit offering on that one or additional queries of the repossess with spot administration and figure out how on impart for that administration.

Part of the WSDL provided by the service provider is passed to the service consumer which shows service consumer what the requests and responses are for the service provider.

The service consumer uses the WSDL to send a request to the service provider.

The service provider provides the expected response to the service consumer.

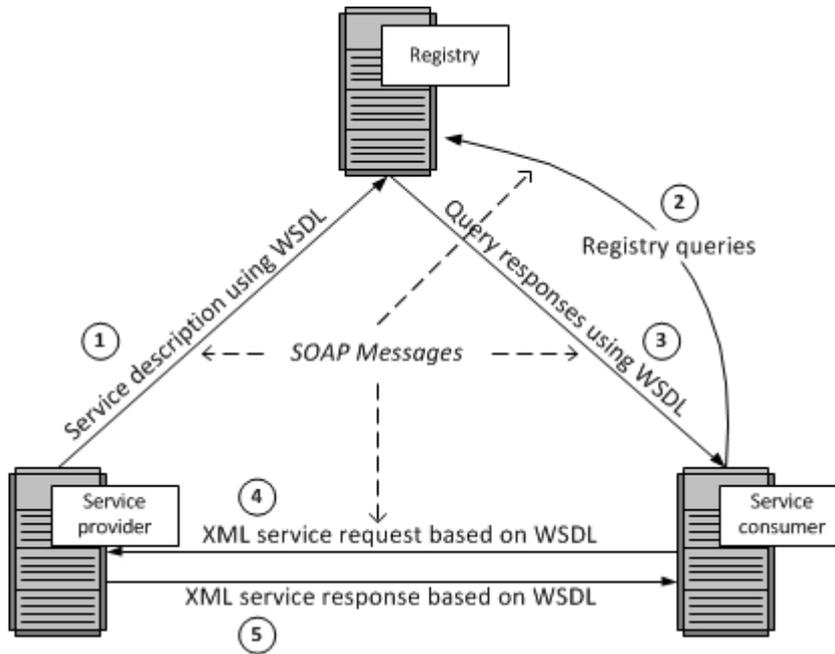


Fig 2.2 WSDL setup

### Check your progress 4

1. Which of the following is a directory service where enterprises register and search for web services?
  - a. WSDL
  - b. UDDI
  - c. SOAP
  - d. None of the above

## 2.6 Representing Data Types

Know programming languages point out different information sorts over which with store different sorts of information. Those simple, alternately primitive, information sorts need aid equitably comparable crosswise over modifying languages. However, there would unpretentious contrasts that keep regulate mapping between dialects. These contrasts available a test on making a web administration that is receptive to any customer provision.

To guarantee the broadest reach, web administrations help an combination from claiming primitive information sorts that could a chance to be encoded and serialized utilizing XML.

Those accessible information sorts rely on upon the protocol that the web administration utilization. For example, HTTP-GET What's more HTTP-POST conventions would both restricted to name/value pairs. However, cleanser considers a richer utilization of XML will encode with more serialize complex information structures for example, classes.

Those information sorts underpinned via web administrations the cleanser protocol may be utilized are specifically associated with the information sorts that could make serialized under XML. Asp. Net serializes with more deserializes XML utilizing those XmlSerializer class.

### 2.6.1 XML Schema

XML Schema shows structure of XML document same as DTD which is having syntax as "Well Formed" that validates against XML Schema which is both "Well Formed" and "Valid". XML Schema is XML-based alternative to DTD:

```
<xs:element name="note">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="to" type="xs:string"/>
      <xs:element name="from" type="xs:string"/>
      <xs:element name="heading" type="xs:string"/>
      <xs:element name="body" type="xs:string"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
```

It shows as:

`<xs:element name="note">` defines the element called "note"

`<xs:complexType>` the "note" element is a complex type

`<xs:sequence>` the complex type is a sequence of elements

`<xs:element name="to" type="xs:string">` the element "to" is of type string (text)

`<xs:element name="from" type="xs:string">` the element "from" is of type string

`<xs:element name="heading" type="xs:string">` the element "heading" is of type string

`<xs:element name="body" type="xs:string">` the element "body" is of type string

Features:

XML Schemas:

- Powerful than DTD
- Written in XML
- Extensible to additions
- Support data types
- Support namespaces

Characteristics:

- It helps XML files to describe of its own format.
- It shows independent groups of people that agrees for interchanging data.
- It helps in verifying data.
- It supports Data Types
- It describes document content
- It define restrictions on data
- It validate correctness of data
- It convert data among various data types

### **Check your progress 5**

1. DTD contains specifications about markup used in document except
  - a. browser name
  - b. size of element name
  - c. entity declarations
  - d. element declarations

---

## **2.7 Communicating Object Data**

---

The exchange of data between heterogeneous database systems is becoming a key issue in several application domains. XML is emerging as the standard mean for data exchange over the web. As for object oriented databases storing complex information, it is important to be able to exchange both objects and object schemas. Here we propose two approaches for translating database objects into XML documents which are both human readable and suitable for system based queries, thus preserving object semantics. Both approaches have been validated by a running prototype.

Message-based communication allows you to expose a service to your callers by defining a service interface that clients call by passing XML-based messages over a transport channel. Message-based calls are generally made from remote clients, but message-based service interfaces can support local callers as well.

### **Check your progress 6**

1. \_\_\_\_\_ is emerging as standard means for data exchange over web.
  - a. HTML
  - b. XML
  - c. CGI
  - d. all of these

---

## 2.8 SOAP Related Technologies

---

SOAP (Simple Object Access Protocol) is a messaging protocol that permits projects that run on divergent working frameworks (such as Windows and Linux) to speak utilizing Hypertext Transfer Protocol (HTTP) and its extensible markup language (XML).

Since web conventions need aid introduced with accessible to utilization, so eventually perusing major working framework platforms like http and XML give at-hand result that allows projects running under separate working frameworks for system that impart for one another. SOAP specifies precisely how will encode a http header with XML record in order that a project for person workstation brings system to additional PC with more pasquinade along majority of the data. SOAP also tags how those known as system camwood exchange An reaction. Notwithstanding its incessant matching with HTTP, cleanser backs different transport conventions and also blacks.

SOAP characterizes those XML-based message configuration that Web service-enabled provisions utilize should convey and inter-operate for one another( over those Web. The heterogeneous surroundings of the Web requests that requisitions backing a regular information encoding protocol Furthermore message configuration. SOAP is a standard for encoding messages over XML that conjure capacities over other provisions.

SOAP will be practically equivalent to to remote methodology Calls (RPC), utilized within a significant number advances for example, DCOM What's more CORBA, Be that as dispenses with A percentage of the complexities of utilizing these interfaces. Cleanser empowers requisitions on call works starting with other applications, running once At whatever equipment platform, in any case for diverse working frameworks alternately modifying dialects.

SOAP calls would a significant part less averse with get through firewall servers, since http will be normally Port 80 compliant, the place other calls might make blocked to security reasons. Since http solicitations need aid as a rule permitted through firewalls, projects utilizing cleanser with correspond might be beyond any doubt that the system could convey for projects anyplace.

### 2.8.1 Software Installation

SOAP has a looser coupling between the client and the server than some similar distributed computing protocols, such as CORBA/IIOP, and it provides

easier communication for a client and server that use different languages. SOAP exposes a standard way for processes to communicate, yet it leverages existing technologies.

SOAP requests are easy to generate, and a client can easily process the responses. One application can become a programmatic client of another application's services, with each exchanging rich, structured information. The ability to aggregate powerful, distributed Web services allows SOAP to provide a robust programming model that turns the Internet into an application development platform.

SOAP provides a standard so that developers do not have to invent a custom XML message format for every service they want to make available. Given the signature of the service method to be invoked, 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 very familiar command sequence:

```
perl Makefile.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'
```

### **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-Client     --[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.

### Check your progress 7

1. SOAP is \_\_\_\_\_ which allows applications exchange information over HTTP.
  - a. XML-based protocol
  - b. .NET-based protocol
  - c. JAVA-based protocol
  - d. PHP-based protocol

## 2.9 Storing Java Objects as Files and Databases

Database is collection of tables having records with fields which serves as basic units of information. Hence, database is backend system which keeps all the information. Finally, a field is a particular datum within that record: for example, an employee's expendability rating.

**Object Storer.** This interface describes the frontend object database process: scattering a Java object into fields within backend storage, and gathering those fields back into a Java object.

**Object Storage.** This interface describes the backend object database process: storing object fields in a database and retrieving them from the database.

To actually make use of the system, you must connect an Object Stored with an Object Storage. So, we next need to nail down the data structures that will be communicated between these interfaces:

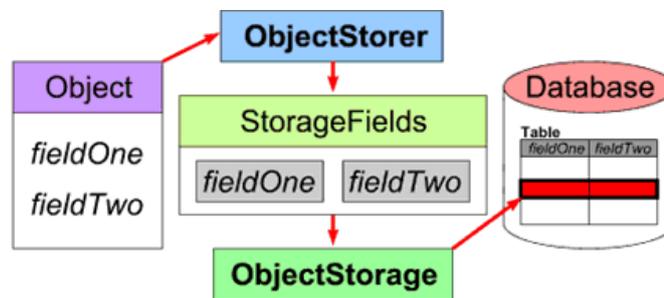


Fig 2.3 Database

**Storage Fields.** This class encapsulates information about the object being stored, including the names, types, and values of all its fields. An ObjectStorer will hand the information to an ObjectStorage for placement in the database.

**Retrieval Fields.** This class encapsulates information about the record that was retrieved from the database, including the names and values of all fields. The difference from StorageFields is that the backend need not maintain type information about the fields; that is automatically determined during the retrieval process.

**Check your progress 8**

1. Before storing in database, Object store will pass data to
  - a. Storage field
  - b. Object Storage
  - c. both a and b
  - d. Neither a nor b

---

## 2.10 Java Servlets

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Servlets is component-based, platform-independent strategy which fabricates web-based applications, without execution limits of CGI projects. Servlets bring entry of whole gang for java APIs, including the JDBC API should get endeavor databases.

Java Servlets is web engineering organization to java which appear as initial web innovation organization for java with many people having new web innovations which have been landed since. Still, java Servlets need aid exceptionally useful, both with more for certain utilize situations. Java Servlets are and only the java endeavor version (Java EE). You will requirement on run your java Servlets inside An Servlet perfect "Servlet Container" (e. G. Web server) with the end goal them to fill in.

Java Servlets are server-side java system modules that transform Also response customer solicitations and actualize all the servlet interface. It aides to upgrading Web server purpose with insignificant overhead, supporting for help.

Servlet goes about as between those customer and server while servlet modules run on those server, they might accept with react will solicitations aggravated Eventually Tom's perusing those customer. Also reaction questions of servlet the table a helpful best approach will handle http solicitations with many send quick information once more of the customer.

### Check your progress 9

1. Which among the following information about servlets is correct?
  - a. It execute inside address space of a Web server.
  - b. It serves as platform-independent because they are written in Java.
  - c. It contains full functional Java class libraries.
  - d. All of above.

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## 2.11 Let Us Sum Up

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While studying this unit, we have learnt that Server-Side SOAP is a tutorial which deals with how to build and provide web services using Apache SOAP.

JAX-RPC stands for java API to XML-based RPC. JAX-RPC may be engineering to fabricating web benefits with customers that use remote methodology calls (RPC) Furthermore XML

Web administration will be whatever bit about product that makes it accessible over those web and employments a institutionalized XML informing framework.

The exchange of data between heterogeneous database systems is becoming a key issue in several application domains. XML is emerging as the standard mean for data exchange over the web.

SOAP (Simple Object Access Protocol) is a messaging protocol that permits projects that run on divergent working frameworks (such Concerning illustration Windows What's more Linux) on speak utilizing Hypertext Transfer Protocol (HTTP) and its extensible markup language (XML).

Database is collection of tables having records with fields which serves as basic units of information. Hence, database is backend system which keeps all the information. Finally, a field is a particular datum within that record: for example, an employee's expendability rating.

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## 2.12 Answers for Check Your Progress

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**Check your progress 1**

**Answers:** (1 - a)

**Check your progress 2**

**Answers:** (1 - d)

**Check your progress 3**

**Answers:** (1 - b)

**Check your progress 4**

**Answers:** (1 - b)

**Check your progress 5**

**Answers:** (1 - a)

**Check your progress 6**

**Answers:** (1 - b)

**Check your progress 7**

**Answers:** (1 - a)

**Check your progress 8**

**Answers:** (1 - c)

**Check your progress 9**

**Answers:** (1 - d)

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## 2.13 Glossary

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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.

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## 2.14 Assignment

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Write short note on Server-Side SOAP.

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## 2.15 Activities

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Collect some information on JAX-RPC.

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## 2.16 Case Study

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Generalised the exchange of data between heterogeneous database systems.

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## 2.17 Further Readings

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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.

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## **Block Summary**

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In this block, you have learnt and understand about the basic of XML-Documents and Vocabularies. The block gives an idea on the study and concept of exchange of data between heterogeneous database systems. You have been well explained on the concepts of Ajax-DOM based XML processing Event-oriented Parsing.

The block detailed about the basic of Server-Side SOAP techniques. The concept related to displaying XML documents in Browsers will also be explained to you. You will be demonstrated practically about XPATH Transformations technique.

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## **Block Assignment**

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### **Short Answer 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?

### **Long Answer Questions**

1. Write short notes on Simple Object Access Protocol?
2. Write short note on XML-Documents and Vocabularies?
3. Write note on Template-based Transformations in XML documentation?

**Enrolment No.**

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

Unit No	1	2	3	4
Nos 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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____ _____
Language and Style	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____ _____
Illustration used (Diagram, tables etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____ _____
Conceptual Clarity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____ _____
Check your progress Quest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____ _____
Feed back to CYP Question	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____ _____

3. Any Other Comments

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“

*Education is something  
which ought to be  
brought within  
the reach of every one.*

”

- Dr. B. R. Ambedkar



**Dr. Babasaheb Ambedkar Open University**  
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Ahmedabad-382 481.