

5. Computing Environments

Introduction

Computing Environment is a collection of computers, software, and networks that support the processing and exchange of electronic information. It can collaborate across various software installed on different machines at different physical and geographical locations as well, such an environment is called Distributed Computing Environment. Figure 5. 1 shows how different computers are connected with each other globally, also they can be connected with different devices like cell phones.

Critical applications (refer glossary) and bulk data processing require computer environments which can guarantee high reliability and stability. Most such large scale, high end commercial system architectures (refer glossary) are referred as Mainframes.



Figure 5.1 : Computing Environments

5.1 Mainframe Computing Environment

It usually refers to one or more very big computer(s) capable of supporting a large number of simultaneous users and doing bulk calculations and data processing. It is usually used for extensive operations like Enterprise Resource Planning (refer glossary) or transaction processing. The Mainframe environment (Refer Figure 5. 2) is expensive and ensures very high level of security and reliability supporting massive throughput (refer glossary) . For example consider banking applications like calculating balance of multiple customers who are doing their transaction simultaneously from different locations. Also generating account statements for all customers at the end of every month. These are all bulk operations requiring speed and accuracy. Mainframes have come a long way from the ENIAC (Electronic Numerical Integrator And Calculator) developed in 1942 to today's IBM z series of mainframes which are used in organizations like National Aeronautics and Space Administration (NASA).

Software for mainframes are written in following languages:

- Common Business-Oriented Language (COBOL)
- Job Control Language (JCL)



Figure 5.2: Mainframe Computing Environment

5.1.1 Storing Data on a Mainframe

On computers data is stored in the form of binary bits that is, 0s and 1s . Characters like A..Z are formed with 8 bits called as Bytes. When we press a key on the keyboard eight bits get emitted from the cable. All the keys are represented with an unique combination of binary numbers that is 0s and 1s. As we use 8 bits to store a single character, $2^8 = 256$ different type of patterns can be stored. On Mainframes, we use a unique 8-bit pattern to store each character. This representation of characters and data in mainframe is referred as Extended Binary Coded Decimal Interchange Code (that is EBCDIC). Here, every character uses storage of one byte in memory.

For example, in EBCDIC,

The number 1 is represented as 1111 0001.

The number 2 is represented as 1111 0010.

5.1.2 Mainframe Datasets

On a mainframe the information is stored in datasets (files -refer glossary). Each dataset should have an unique name of maximum 44 characters long in this format:

XXXXXXXX.XXXXXXXXXX.XXXXXXXXXX (For example, AGY0232.CUSTOMER.DATA)

Following points should be considered while creating mainframe datasets.

- A dataset name consists of segments or qualifiers.
- Each qualifier has maximum eight characters and are separated by a period(.).
- The qualifier or segment should start with a capital letter (alphabet).
- The operating system looks into the segments to keep a track of groups of datasets. The first segment of the dataset name is its High-level Qualifier (HLQ).
- Datasets should have meaningful names. For example, Customers data should be stored in a file named CUSTOMER.DATA. Here customer and data are the two segments or qualifiers of your dataset name.

To access or log-in to Mainframes, we need a TSO (refer glossary) USER-ID, which is similar to user-id that we use to login to a windows machine.

Suppose your TSO-id is AGY0232. So give the High-level qualifier AGY0232 to all your datasets. This way you can identify the datasets belonging to you.

For example, name your Customer dataset as AGY0232.CUSTOMER.DATA.

Mainframes have Security software products like RACF(Resource Access Control Facility) which control access to datasets. For example, you may want to grant read-only access to the file AGY0232.CUSTOMER.DATA to other users. This will prevent other users from making any changes to your dataset.

5.1.3 Mainframe Programing

High level language like COBOL is used for Mainframe programing. There are online mainframe compilers available as well as software like Hercules can be installed on any Operating System to simulate a mainframe environment.

IBM's MVS Operating system (Multiple Virtual Storage (refer glossary)) up to release 3.8j(released in the year 1981) is also available. IBM provides a pre-configured starter system in which you can do some coding to describe the configuration to be installed. This is called System Generation (Sysgen) that is, the process of setting up or installing an operating system on the mainframe.

We can code COBOL-Programs and run them using a Job (JCL – Job Control Language) on a Mainframe-Computer using its TSO User-id for a given time. Refer Figure 5. 3 for the basic skeleton of a COBOL Program. A COBOL program is written in structures called divisions. Divisions in turn can have many sections. Sections can have many paragraphs.

The Mainframe terminal has 80 columns on a line for coding. The area from columns 8 to 11 is called Area A. The area between columns 12 to 72 is called Area B. Refer Figure 5. 4 for a sample program to display a message Hello World.

A COBOL program has following divisions:

- **IDENTIFICATION DIVISION** – This division records useful information like author name or date when the program was created. It should at least have the program name or ID.
- **ENVIRONMENT DIVISION** - This division tells the computer about the other resources that the program will interact with (that is, its environment) such as printers, disk drives, other files etc.
For example, SOURCE-COMPUTER. IBM PC.
This information tells the configuration of the computer on which the program will execute.
- **DATA DIVISION** – This division defines the names that the program will use to refer to the data that it manipulates.
For example, USER-NAME PIC A(15)

The PIC (or the Picture clause) states that the data stored in this USER-NAME will be of type alphabets only and a maximum of 15 characters (like Tom or John) can be stored in USER-NAME.

- **PROCEDURE DIVISION** – It is the starting-point of the COBOL-Program. The programing instructions must be written inside this PROCEDURE DIVISION. In PROCEDURE DIVISION we can write instructions one-after-the other. The Mainframe executes these instructions one-by-one and step-by-step sequentially. The last-instruction must be STOP RUN to stop running the COBOL Program.

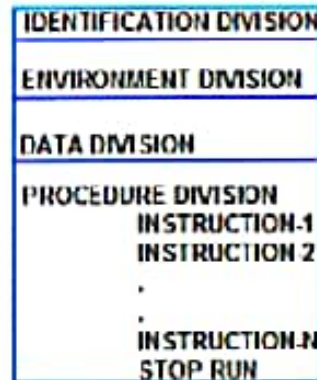


Figure 5.3 : COBOL Program Skeleton

EDIT	AGY0232.COBOL.FILE	Data set saved
Command ==>		Scroll ==> CSR
<COLS>	-----1-----2-----3-----4-----5-----6-----7-----	
000001	IDENTIFICATION DIVISION.	
000002	PROGRAM-ID. PRG-HELLO-WORLD.	
000003		
000004	ENVIRONMENT DIVISION	
000005		
000006	DATA DIVISION	
000007		
000008	PROCEDURE DIVISION.	
000009	DISPLAY "Hello world!".	
000010	STOP RUN.	

Figure 5.4 : COBOL Program

5.2 Networks

A computer network joins two or more different categories of computing devices enabling them to communicate to each other by sending and receiving instructions. A computer network can be wired or wireless. Also, smaller networks in turn may be connected to larger networks through bridges, gateways or routers (refer glossary) . Communication in a network follows certain rules that is, it is protocol (refer glossary) based.

Following are the major categories of a Computer Network:

- **LAN (Local Area Network)** : A LAN connects computer devices over a short distance. A networked office, school or home usually contains a single LAN and occasionally it may

connect a group of nearby buildings. LAN is mostly connected using a technology called Ethernet (refer glossary).

- **WAN (Wide Area Network)** : A WAN is a geographically-dispersed collection of multiple LANs. Various LANs are connected to a WAN using a router. The Internet is the largest WAN and it spans the Earth. WAN networks exist under collective or distributed ownership and management and do not belong to any single organization.
- **WLAN (Wire Less Area Network)** : A Wireless Local Area Network (WLAN) links two or more devices using some wireless method that is without any physical cables. This enables the to move around within a local coverage area while being connected to the network. WLANs are used in places like in-home networks, airplanes, trains, restaurants, hotels.

Computer networks (refer glossary) can be classified according to the hardware and associated software technology that is used to interconnect the individual devices in the network like electrical cable, optical fiber, and radio waves (wireless LAN).

A well-known family of communication media is collectively known as Ethernet. Ethernet uses various standards and media to enable communication between computer devices.

Wireless LAN technology connects computer devices without the use of wires or cables.

These devices use transmission mediums like radio waves or infrared signals as shown in Figure 5. 5 where a desktop computer, a laptop and a cell phone are all connected using wireless technology.



Figure 5.5 : Computer Network

5.2.1 Wired Technologies

Wired networks are of following types:

- a. Twisted Pair
- b. Coaxial Cable
- c. Optic Fibre

a. Twisted Pair

It is the most widely used medium for telecommunication. It is made of copper wires that are twisted into pairs.

- Ordinary land line telephones are a good example where the wires consist of two insulated copper wires that are twisted into pairs.
- Computer network cabling (wired Ethernet) consists of 4 pairs of copper cabling that can be utilized for both voice and data transmission. This twisting of two wires together helps to reduce crosstalk (refer glossary) and electromagnetic induction.
- Its transmission speed varies from 2 million to 10 billion bits per second. The Twisted pair cables are of two types: Unshielded Twisted Pair (UTP) and Shielded Twisted-Pair (STP).
 - The unshielded cables are individually covered but do not have any wrapping or layer surrounding the twisted pair that is why they are called unshielded.
 - The shielded cables are individually covered and the twisted pair is wrapped in a foil shielding to help provide a more reliable data communication. They are preferred over unshielded cables based on their advantage of reduced Electromagnetic interference (disturbance that affects an electrical circuit resulting into loss of data).



Figure 5.6: Wired Technology : Ethernet Cable

b. Coaxial cable

It is generally used for cable television, office buildings, and other work-sites for local area networks.

- The cables consist of copper or aluminium wire surrounded by an insulating layer, which in turn is surrounded by a conductive layer. This insulation helps in minimizing interference and distortion.
- Its transmission speed is between 200 million bits per second to more than 500 million bits per second.

c. Optical fibre

It is a glass fibre. It makes use of pulses of light to transmit data.

- Its advantages over metal wires include less transmission loss, immunity from electromagnetic radiation, and very fast transmission speed, up to trillions of bits per second.
- Different colours of lights can be used to increase the number of messages being sent over a fibre optic cable.



Figure 5.7: Wired Technology: Coaxial Cable

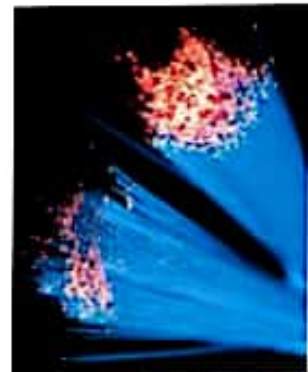


Figure 5. 8: Wired Technology : Optic Fibre

5.2.2 Wireless technologies

Wireless network refers to computer network that is not connected by cables of any kind. Wireless networks can be of following types:

- **Wireless PAN** - Wireless personal area networks (WPANs) interconnect devices within a relatively small area, generally within a person's reach. Bluetooth radio or invisible infrared light provide a WPAN for connecting a headset to a laptop.
- **Wireless LAN** - A wireless local area network (WLAN) links two or more devices over a short distance using a wireless method providing a connection through an access point for Internet access. The use of spread-spectrum or OFDM (refer glossary) technologies may allow users to move around within a local coverage area, still remaining connected to the network.
- **Wireless mesh network** - It is made up of radio nodes organized in a mesh topology (Refer section 2.2.3 Network Topology). Each node forwards messages on behalf of the other nodes. Mesh networks can automatically re-route around a node that has lost power.
- **Wireless MAN** - Wireless metropolitan area networks are a type of wireless network that connect many wireless LANs. WiMAX is an example of Wireless MAN.
- **Wireless WAN** - Wireless wide area networks are wireless networks that typically cover large areas, like networking neighbouring towns and cities.

- **Cellular network** - A cellular network or mobile network is a radio network distributed over land areas known as cells. Each cell has at least one fixed-location transceiver (It is usually installed on a communication tower and basically has the role of sending and receiving signals), known as a cell site or base station. These cells are joined together to provide radio coverage over a wide geographic area and enable a large number of portable transceivers (e.g., mobile phones, tablets) to communicate with each other.

Following Technologies are used to support the Wireless network connections:

- **Terrestrial microwave communication** – It uses Earth-based transmitters and receivers resembling satellite dishes (Refer Figure 5.11). Terrestrial microwaves are in the low-gigahertz range limiting all communications to line-of-sight. The relay stations are placed approximately 48 km (30 mi) apart.
- **Communications satellites** - These communicate via microwave radio waves. These waves are not deflected by the Earth's atmosphere. These satellites stationed in space typically in geosynchronous orbit 35,400 km (22,000 mi) above the equator (Refer Figure 5.10) can receive and relay data, voice and TV signals.
- **Spread spectrum** (refer glossary) technologies use a high-frequency radio technology to enable communication between multiple devices in a limited area.
- **Infrared communication** can transmit signals for small distances typically less than 10 meters. It uses line-of-sight propagation which limits the physical positioning of communicating devices.



Figure 5.9: Wireless Technology - Bluetooth



Figure 5.10: Wireless Technology – Communication Satellites

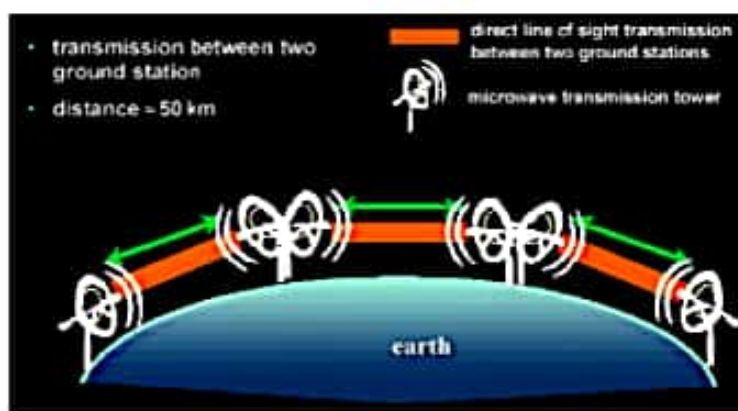


Figure 5.11: Wireless Technology – Terrestrial Microwave

5.2.3 Network topology

A network topology is the layout describing how the nodes (all computer terminals) of a computer network are interconnected. Common layouts are explained as follows:

Bus Network

All nodes are connected to a common cable which is called a Bus.

Advantages

- Implementation is easier.
- Best Topology for small networks.

Disadvantages

- Due to the cable length, the number of nodes that can be connected is also less.
- It can perform well for a limited number of nodes only.
- If the main cable or the Bus fails, then all the nodes connected to it also fail to serve.

Star Network

All nodes are connected to a central node or hub. This layout found typically in a Wireless LAN, where each client connects to the central Wireless access point.

Advantages

- As it is centralized in nature, it is simple in terms of operation.
- It also keeps each device isolated in the network. It means if one node stops working, it does not affect the function of other nodes.

Disadvantage

- The whole network operation is dependent on the central hub. The entire network fails if the central hub fails.

Ring Network

Advantage

- There is no requirement of a central server as the communication between two nodes channelizes through all the intermediate nodes.

Disadvantages

- Even if a single node of the network fails, it can cause the entire network to fail.
- Entire network is affected whenever any change or movement is made for a network node.

Mesh Network

Each node connects with a random number of neighbours such that there is at least one traversal from each node to any other. Here each node has the responsibility of propagating the data.

Advantage

- This arrangement of the network nodes makes it possible to transmit data from one node to many other nodes at the same time.

Disadvantage

- In an arrangement where each node is connected to every other node of the network, many of the connections may serve no major purpose as they behave as redundant connections.

Fully Connected Network

Each node connects with all the other nodes in the network.

Advantages

- A fault in one terminal on the network will not affect other nodes, as the data has multiple redundancy paths that can be used.
- Data transfer rates can be kept at an acceptable level as whenever network usage is high the data can be transmitted via different route hence reducing network clogging.

Disadvantage

- It requires a large amount of wiring.

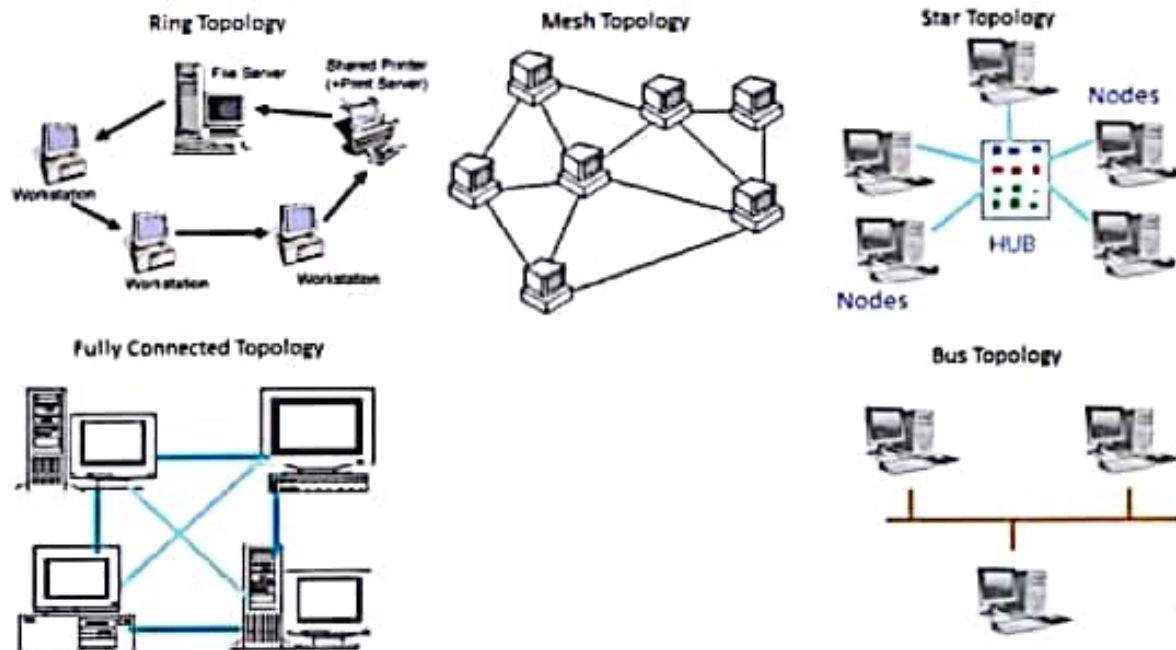


Figure 5.12: Network Topology

5.2.4 Network Programming

Computer network programming involves writing computer programs that communicate with each other across a computer network. We need two separate programs for this. The Client program initiates the communication and the server program which waits or listens for the communication from client. Both endpoints of the communication flow are called network sockets. Network programming is also known as socket programming.

Network Programming can be implemented using any language which needs to provide following network layer functions. Refer Figure 5.13.

- `socket()` creates a new socket, identified by an integer number, and allocates system resources to it.
- `bind()` is used on the server side to associate a socket with a socket address structure, that is a specified local port number and IP address.
- `listen()` is used on the server side and it causes a bound TCP socket to enter listening state.
- `connect()` is used on the client side to assign a free local port number to a socket. For TCP socket, it causes an attempt to establish a new TCP connection.
- `accept()` is used on the server side to accept a received incoming attempt to create a new TCP connection from the remote client. It creates a new socket associated with the socket address pair of this connection.

- `send()-recv()`, `write()-read()` or `sendto()-recvfrom()` can be used to send and receive data to/from a remote socket.
 - The methods `send()` and `recv()` are used for sockets using TCP that is Transmission Control Protocol like HTTP. This mechanism has error checking and guarantees no data loss. It is used for all such applications where you can not allow data loss like browsing websites.
 - The methods `sendto()` and `recvfrom()` are used for sockets using UDP (User Datagram Protocol like Voice over Internet Protocol or VOIP used to make phone calls using internet. This has lower level of security and does not guarantee that the data will reach its destination.)
- `close()` causes the system to release resources that are allocated to a socket. The connection is terminated in case of TCP sockets.
- `unlink()` removes the file names created for the socket. So now the socket is removed and new socket with same name can be created when required.

Some additional methods that can be used are as follows:

- `gethostbyname()` and `gethostbyaddr()` are used to resolve host/server names and addresses.
- `select()` is used for one or more of a provided list of sockets to be ready to read or ready to write.
- `poll()` is used to check the socket's state. The whole set of sockets can be tested to see if we can read or write to any socket or if an error occurred.
- `setsockopt()` is used to set the socket option for the given socket. These options can be like `SO_KEEPALIVE` (keep the connection alive by periodic transfer of messages), `SO_BROADCAST` (Allows a single message to be sent (broadcasted) to all the networked clients) , etc.
- `getsockopt()` gives the current value of a socket option for the specified socket.

5.3 Internet

The Internet is a network connecting computers from across the world enabling data exchange between them. Internet consists of independent hosts following the protocols. The World Wide Web is a way of exchanging information over this medium of internet. The system consists of at least two computers connected in such a way that at any instance of time one acts as a client (requesting data or service) and the other machine works as a host or server (providing the data or service).

The Internet can be accessed almost anywhere in many ways. Data cards, mobile phones, hand-held game consoles and cellular routers provide wireless connection to the Internet.



Figure 5.14: Internet Connection Sharing

5.3.1 Internet Protocols

A protocol is a common means or rules for unrelated objects to communicate with each other.

A protocol is a description of:

- The messages that are understood by both the communicating objects.
- The arguments or data that these messages may be supplied with.
- The types of results returned by these messages.
- The information that is preserved despite modifications to the state of an object.
- Any exceptional situations that needs to be handled during this communication.

The protocol used for data flow or communication between the networks connected in an internet is called Internet Protocol. The Internet protocol suite is a model architecture that divides methods into a layered system of protocols.

The layers represent the scope or environment in which their services operate. (Refer Figure 5.15). The layers are as follows:

- **Application Layer** - It is the space for the application-specific networking methods used in software applications like a web browser program.
- **Transport layer** - It connects applications on different hosts via the network (like client-server model) with appropriate data exchange methods.
- **Internet layer** - It enables computers to identify and locate each other via Internet Protocol (IP) addresses. It connects them to one another via intermediate (transit) networks. (Refer Figure 5.16).
- **Software layer** - It is the link layer and provides connectivity between hosts on the same local network link, such as a local area network (LAN) or a dial-up connection.

The model known as TCP/IP, is designed to be independent of the underlying hardware.

Internet Protocol (IP) is the most prominent component of the Internet model. It provides addressing systems (IP addresses) for computers on the Internet.

IP Version 4 (IPv4) is the initial version of Internet Protocol. It was designed to address up to approximately 4.3 billion (10⁹) Internet hosts and is still in dominant use.

A new protocol version IPv6 was developed in the mid-1990s and is currently in growing deployment around the world. It provides vastly larger addressing capabilities and more efficient routing of Internet traffic.

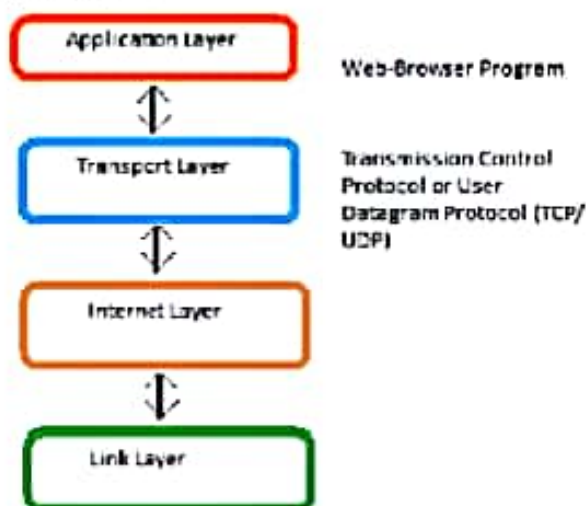


Figure 5.15: Internet Protocol Layer

5.3.2 Internet Routing

IP forwarding also known as Internet routing is a process used to determine the path for your data contained in structures called datagrams or packets (refer glossary) . The process uses routing information to make decisions and is designed to send a packet over multiple networks.

Internet Service Providers (ISPs are the organizations that provide access to internet) connect their customers to those of other ISPs.

At the top of the routing hierarchy are Tier-1 networks held by large telecommunication companies which exchange traffic directly across to all other Tier-1 networks via agreements such that they don't have to pay each other for the data transferred every now and then .

Tier-2 networks buy Internet transit from Tier-1 ISP to reach the global Internet. That is, to reach a remote network, the smaller ISPs have to connect to first Tier-1 network which in turn may be connected to that remote network. For this connectivity they have to pay some amount.

ISPs generally use a single upstream provider for connectivity. They may use multihoming (refer glossary) to provide protection from problems with individual links.

Internet exchange points hold the physical connections between multiple ISPs.

Computers and routers use routing tables (Refer Figure 5.17) to direct IP packets among locally networked machines. These tables can be constructed manually or automatically via DHCP (Dynamic Host Configuration Protocol) for an individual computer or a routing protocol for routers themselves. In single-homed networks, a default route usually points up toward an ISP providing transit. The higher-level ISPs use the Border Gateway Protocol (refer glossary) to determine paths to any given range of IP addresses across the complex connections of the global Internet.

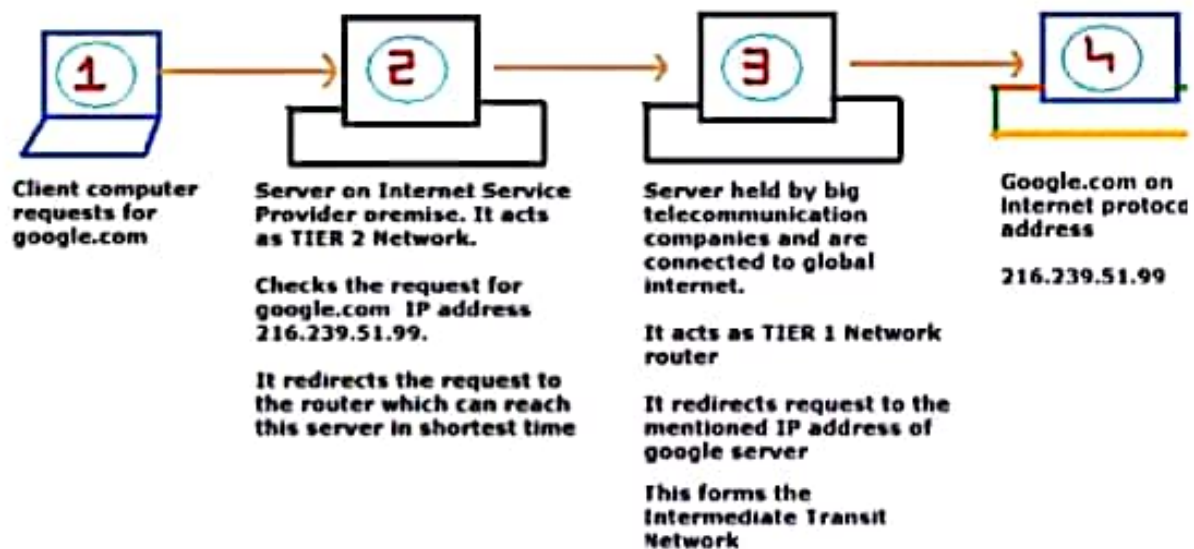


Figure 5.16: Network Routing

Routing Table					
Routing table					
Destination	Gateway	Metric	Type	Proto	Interface
0.0.0.0	wolga-cities	3	rem	rip	net1
default	wolga-cities	3	rem	rip	net1
loopback	loopback	3	dir	local	lo0
paris mynet.COM	loopback	0	dir	local	lo0
132.147.246.0	paris-cities	0	dir	local	net1

Figure 5.17: Routing Table

5.4 Websites

A website is a set of related web pages containing information in form of text, images, audio, video etc. A website is hosted on one or more web server(s) and can be accessed by internet. World Wide Web (WWW) is the term used to refer collection of all public websites.

A web page is a single document written in plain text. It is formatted using instructions of Hypertext Markup Language (HTML).

The general features of a website are described as follows:

A protocol is a common means or rules for unrelated objects to communicate with each other.

A protocol is a description of:

- The home page of a website contains an introduction to that site and links to other related pages or to other websites.
- A website can be owned by an organization or an individual also.
- Websites may host static content that remains same for all the viewers or they may host dynamic content that changes as per the visiting user's preferences.

- To access a website, we need its address. For example, www.tcs.com
- The letters in the website address after the last dot(.) indicates the type of websites. For example, .com means Commercial Organization, .edu refers to educational sites, .gov is for government websites, .jobs means job websites, etc.
- A website is accessed using Hypertext Transfer Protocol (HTTP) . It may also use encryption (HTTP Secure, HTTPS (refer glossary)) to provide security and privacy.
- The user's web browser understands the HTML instructions and displays the page content accordingly.

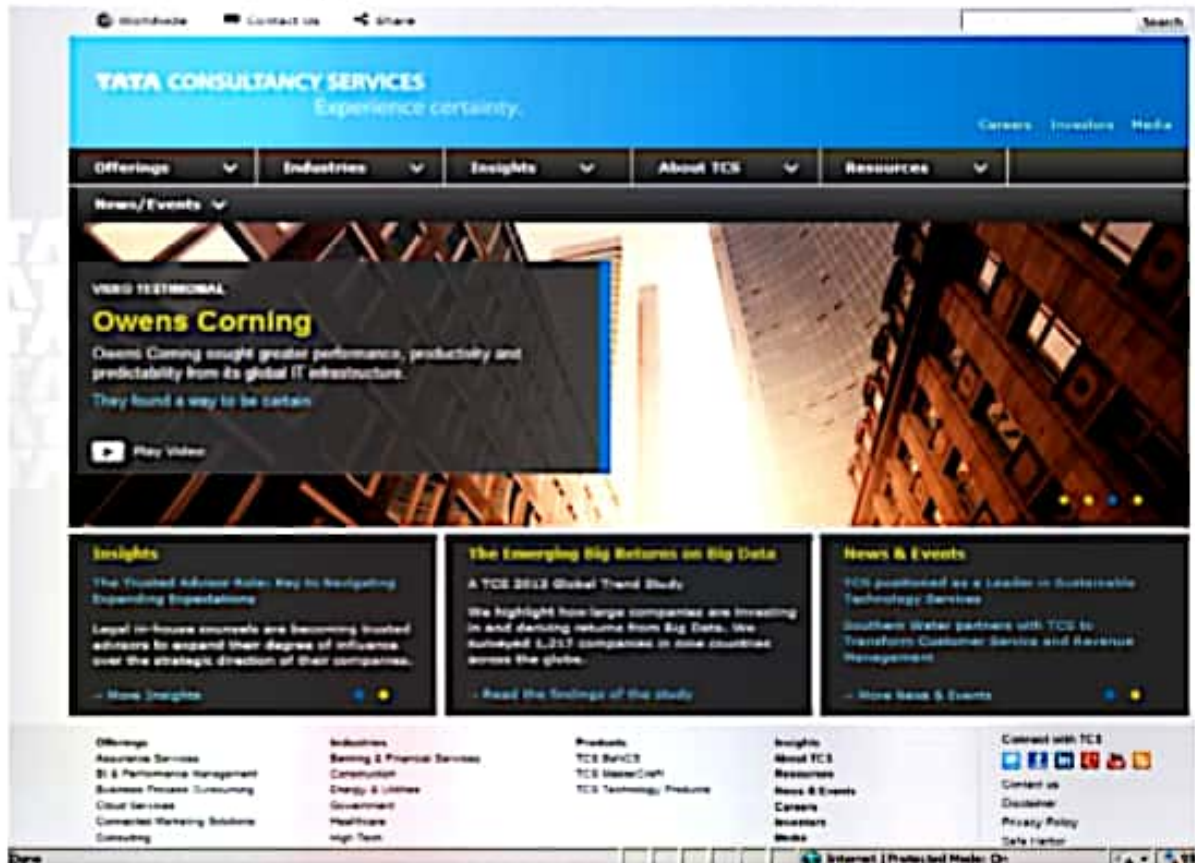


Figure 5.18: Websites

5.4.1 Static website

A static website usually displays the same information (static information) to all visitors. It is similar to a printed brochure.

It provides consistent and standard information for a considerable long period.

The website may however receive updates occasionally. These updates are done using a manual process to edit the text, photos and other content. This kind of editing requires a software and basic skills to use it.

Static websites can be edited using the following categories of software:

- Text editors - Here content and HTML markup are manipulated directly within the editor program. For example, Notepad, Notepad++.
- WYSIWYG (refer glossary) offline editors – These provide a GUI interface. The output is in form of HTML markup generated automatically by the editor software. For example, Microsoft FrontPage and Adobe Dreamweaver

- **WYSIWYG online editors** – These can be used to create online web pages including widgets, blogs, and other documents containing images and other media. For example, SnapEditor.
- **Template-based editors** - These allow quick creation and uploading of web pages to a web server. A detailed HTML knowledge is not required. You just need to pick a desired template from available options and add pictures and text to it without directly writing or updating HTML code. For example, RapidWeaver and iWeb.

5.4.2 Dynamic Website

A dynamic website has the ability to change or customize itself frequently and automatically at some specific time interval or based on some criteria.

Dynamic websites offer dynamism in two aspects : Code and Content. The dynamic code execution is not visible to the user. The user can see the dynamic content only.

- **Dynamic code** - The code is executed on the fly based on some user event. Scripting languages like Javascript, Ajax are used for this. A website with dynamic code has following characteristics:
 - It recalls all the bits of information from a database and consolidates them in a predefined format.
 - It interacts with users in various ways like using cookies for finding previous history.
 - Direct interaction using form elements and mouse hovers also reflect the user event and cause the dynamic code to execute.
 - It can display the current state of a interaction between users. It can capture information personalized to the requirements of the user.
- **Dynamic content** - The web page content keeps on varying based on some criteria, either predefined rules or variable user input.
 - For example, a news website can use a predefined rule which tells it to display all news articles for today's date and for your country or location only.
 - Such a website automatically shows the most current news articles on any given date.

Consider a retail website which allows a user to input a search request for the keyword like Guitar. In response, the content of the web page will spontaneously change and will then display a list of Guitar and music products like CDs (Compact Disks) and DVDs (Digital Versatile Disk).

Summary

- Computing Environment is a collection of computers, and various software in a network. All these computers collaborate with each other for storing, processing and exchanging electronic information.
- Mainframe computing environment is capable of doing bulk calculations with very high level of accuracy, security and speed.
- Mainframe programs are written using COBOL and JCL. We need a TSO (refer glossary) user id to access the time slot on a mainframe server.
- A computer network joins two or more computing devices so that they can communicate with each other. Networks can be of two types that is, wired or wireless.
- Twisted pair, Coaxial cables and Optic fibre technologies are used to connect a wired network.
- Terrestrial Microwave, Satellites, Spread Spectrum and Infrared technologies are used to connect various computing devices without wires.
- Computer networks can have their nodes connected in forms like Bus, Star Ring, Mesh or Fully Connected topology.
- Network or Socket programming can be done using various programming language and all of them provide the basic methods for reading and writing to a network and listening for requests from the client.
- Internet connects computers across the world. It is based on protocols. Each computer in the internet is identified by an IP address.
- The communication between two computers may be routed through various networks.
- A Website may be accessed using http protocol from anywhere on the internet. It can be of two types: Static and dynamic.
- Static websites are like the profile of a company or product and does not change often and displays the same details to all visitors.
- Dynamic websites change their content as per time and user preferences like news, e-commerce websites.
- Dynamic code - The code is executed on the fly based on some user event. Scripting languages like JavaScript, Ajax are used for this. A website with dynamic code has following characteristics:
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Glossary

Term used	Description
Border Gateway Protocol	It is an exterior gateway routing protocol that enables groups of routers (called autonomous systems) to share routing information such that efficient and loop-free routes are established. It is used within and between Internet Service Providers (ISPs).
Bridge	A Bridge is a box with ports (usually two) to connect LAN segments or similar networks within a limited geographic area. It examines the data passing through it and can recognize where it came from, and forwards it to the connected LAN.
Critical Applications	Applications that are highly secure and accurate. For example Banking applications as they deal with monetary transactions or Applications involved in controlling Air Traffic or guiding satellites.
Crosstalk	Crosstalk (XT) is any phenomenon by which a signal transmitted on one circuit or channel of a transmission system creates an undesired effect in another circuit or channel. For example pieces of speech or signalling tones leaking from other people's connections in a telephone call.
Datagram	A datagram is a basic transfer unit associated with a network service. It does not guarantee the delivery, arrival time, and order of arrival. It can be compared to a postal mail delivery service where the user provides the destination address but receives neither any guarantee of delivery nor any confirmation upon successful delivery.
Encryption	Encryption is the process of encoding messages (or information) in such a way that eavesdroppers or hackers cannot read it, but authorized parties can. The communicating parties must usually agree on a symmetric secret key before they wish to communicate. The plain text message can then be coded by using the key and an algorithm. Once received it can be decoded using the same key and converted to readable plain text.
Enterprise Resource Planning	ERP (Enterprise Resource Planning) facilitates the information exchange between all business functions inside an organization. ERP systems have following characteristics: A common database is used to support all applications. The whole application has a consistent look and feel. Easy modular installation of the system.
Ethernet	Xerox Corporation in cooperation with DEC and Intel in 1976 developed Ethernet as an architecture for Local Area Network

	(LAN). It uses either bus or star topology and its version 100Base-T supports data transfer rates greater than 100 Mbps.
Files	Computer or Digital files are same as paper documents stored in computer memory. A computer file stores information and is always available for computer programs whenever required.
Gateway	A Gateway links two different types of networks. Also, it usually involves converting to and from different protocols. For example, it can convert a TCP/IP protocol based information into a NetWare IPX based information.
Large scale, high end commercial system architectures	These are the computers having their architecture defined by redundant internal engineering, extensive input-output facilities, very high reliability, high security, strict backward compatibility, high hardware and computational utilization rates to support massive throughput. These computers are the most expensive and technically sophisticated and run without any interruptions for long time period.
Massive throughput	Massive or HTC (High-Throughput Computing) systems are more suited to running multiple independent software on multiple processors at the same time. These applications calculate the operations per month or per year. The HTC is about how many jobs can be completed over a long period of time instead of how fast an individual job can complete.
Multihoming	Multihoming is used to increase the reliability of a client IP network. It also eliminates network connectivity as a potential single point of failure.
MVS system	Operating Multiple Virtual Storage Operating System is one of the perfect solution for business problems that resulted from the need to run more applications. It maximized processing potential by providing multiprogramming and multiprocessing capabilities. Files are properly called data sets in MVS. MVS is now a part of IBM's z/OS.
OFDM	Orthogonal Frequency-Division Multiplexing is a method of encoding digital data on multiple carrier frequencies. It is widely used for wide-band digital communication applications such as digital television and audio broadcasting.
Packet	A packet is a formatted unit of data traveling in a network. A packet consists of two kinds of data: control information and user data. The control information contains source and destination addresses and error detection codes. A good analogy is to consider a packet to be like a letter where the control information is the envelope and the data area represents the written letter inside the envelope.
Protocol	The information exchanged between devices on a network or other communications medium is governed by rules or conventions that can be set out in a technical specification called a communication protocol. The specification defines the nature of communication,

	the data exchanged and state-dependent attributes. Each message has an exact meaning intended to provoke a defined response.
Router	A router is a regular computer with (at least) two ports, used to connect different types of networks. It differs from bridges as it operates at the network level and uses IP addresses. Routing involves two basic activities: Running routing algorithms to determine the routes as per routing tables Using the routing tables to move data across the network
Spread Spectrum	In telecommunication and radio communication, spread-spectrum techniques are methods by which a signal (For example, an electrical, electromagnetic, or acoustic signal) generated with a particular bandwidth is deliberately spread in the frequency domain, resulting in a signal with a wider bandwidth.
TSO	Time Sharing Option used in IBM Mainframes for access to the mainframe computer during a paid fixed time slot.
WYSIWYG	Acronym for What You See Is What You Get. It implies a user interface that allows the user to view something very similar to the end result while the document is being created.