NETWORKING OF DEWAN

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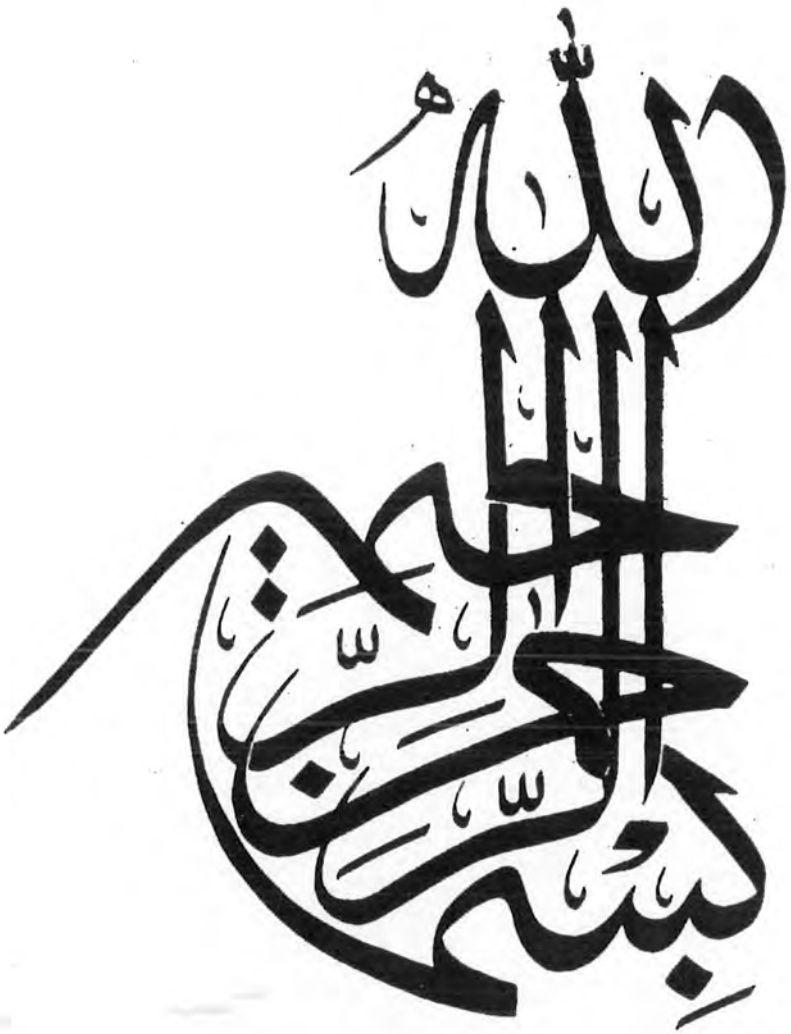

Dedication

To our dearest parents and loving family for their moral and financial support and to our respectable teacher who motivated, supported and encouraged us in our studies and to all our friends class fellows seniors who have helped us in our project and gave us courage and moral support in the completion of our final project.

DECLARATION

We hereby declare that this report neither as a whole nor a part there of has been copied out from any source. It is further declared that we have developed this network and this report entirely on the basis of our personal efforts made under the sincere guidance of our project supervisor Mr. Munawer Tiwana. If any part of this software proved to be copied or found to be a report of some other, we shall standby the consequences.

No portion of the work presented in this report is submitted in support of any application for any other degree of qualification of this or any other University or institute of learning. We further declare that this software and all associated documents, reports and records are submitted as partial requirements for the degree of post graduate of Computer Science.

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ACKNOWLEDGEMENT

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We would like to express our profound and sincerest gratitude to **Mr. MUNAWAR TIWANA** lab in charge of Computer center, Quaid-E-Azam university ISLAMABAD. He deserves our appreciation that contributed a lot making our project successful and meaningful.

Special thanks to our team mates for their joint efforts. It was indeed their team work which made it possible to accomplish such a big task in short time.

FINAL APPROVAL

This is to certify that the dissertation submitted by AMAN ULLAH BUTT & ATIF SALEEMI is accepted in its present from by the Computer Center, QUAID-I-AZAM University Islamabad as satisfying the dissertation requirement for the award of Post Graduate Diploma in Computer Sciences.

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CHAPTER # 1

INTRODUCTION

Introduction

DEWAN group of industries is the one of the leading group of industries in the Pakistan.
This group has more than 8 industrial units in different industrial sectors.
Some of them are as under.
Dewan Sugar mill (Karachi)
Dewan Motors (Karachi)
Dewan Textile (Karachi)
Dewan Fiber (Texila)
These all-industrial units are working under the head of dewan group of industries.
For such a big setup they have to maintain there proper networking setup to maintain it.

Dewan Selman Fiber (TEXILA)

DEWAN SELMAN FIBER is also one of the members of the dewan group of industries.
It is formed in March 1990.at this time it has only on polyesters plant but
After that they have extended their business and now it has four manufacturing plant in it
They are
Unit 1.
Unit 2.
Unit 3.
Unit 4.

Unit 1

Unit 1 is the first plant of it and it is formed in 1990.it's the polyester plant. And more than 1200 employees are working in it
It has produced more than 36 bundles of polyester in a day.

Unit 2

Unit 2 is the second plant of the Dewan Fiber it is formed in 1994 and it is also the polyester plant and it has more than 800 employees in it and produced 24 bundles of polyester in a day.

Unit 3

Unit 3 is formed in 1996 and it is the acrylic fiber plant and it has more than 600 employees and a production of 18 bundles of it.

Unit 4

In 1998 the Dewan Group of industries purchased 75%shares of the DHAN FIBER (hattar) and changed its name to unit 4.
It is also the polyester plant and it has more than 1800 employees in it and it produced more than 30 bundles of polyester in a day.

Head Office

THE DEWAN group of industries has its main office in the Islamabad and it has the connectivity with its entire industrial sector. And the whole setup is manage from this main head office so it's very necessary for such a big setup to connect it with the LAN or wan networking for sharing the resources.

Main Store

The dewan selman fiber (hattar) has a main store in its premises and it handles all the production and all the purchases. So there is the need to maintain the proper record of all

The production and purchases and also inform the management about all this properly and regularly.

Main Lab.

The dewan selman fiber (hattar) has the main lab in its premises also called it lab.
It has the whole networking setup. This lab is fully equipped with the latest equipments
And have the ability to handle the whole set up of networking in LAN and WAN.
So we have to do the connectivity of LAN in the entire premises and in the wan with the main head office Islamabad.

LAN Networking

The Dewan Salman want to connect its main four dept with the LAN net working in its premises with the main it lab . And it wants to give more than 4 connections in each dept. And we have to configure two servers in the main lab one for the databases and other for the authentications. The dewan selman have the LAN networking in its all-industrial sectors for handling the whole entire set up now they want to establish in the dewan selman fiber.

WAN Networking

THE Dewan Salman Fiber has the WAN connectivity with all the industrial sectors and also with the offices they are in
Lahore.
Islamabad.
Karachi.
Sajawal.

This group has the WAN networking of its entire unit with the offices and also with the main office Islamabad so we have to make connectivity of Dewan Salman fiber Hattar with the main office in the Islamabad.

Licensed Software

This group of industries is using all licensed software's to maintain there quality of the networking and this group of industries using licensed software's for the proper functioning of there net work.

Branded Machines

The Dewan selman group of industries use all the branded machines to maintain there whole network and for the quality network. They use the branded machines of IBM and all the hard ware devices of IBM to proper functioning of the whole network.

CHAPTER # 2

EFFECTIVE COST AND POTENTIAL GROWTH

Effective Cost And Potential Growth Concept

While doing the networking of any organization one of the major aspect that have to be in under consideration is the effective cost and potential growth.

What is Effective Cost?

Effect cost means to get more in less resources it take a very active role in all financial related assignment because we have to consider the minimization of cost so it may be more effective and beneficial for the organization with in the declared budget.

In the problem of networking it must be considered that we have to minimize the cost but not beyond the quality, for this purpose. We have to do the several works.

Requirement Ideas

Under this heading we have to consider the whole requirement of the organization as well as the idea of chairman about the networking of this organization.
In the problem we have to consider that what actually the organization is doing and what it should required from its networking and which type of information it want to be shared.

Accounts Clearing

For the purpose of effective cost it is very necessary that we have the idea about the reserved budget for networking and also have the clearing from the accounts department for this budget. So that we should purchase and use what ever we like for the suitable network.

Quality Goods

For the effective cost it is very necessary that hole the product used in networking are very high quality and economically.

After the clearance from accounts and having a clear idea about our budget we have to make list of all quality products available in market for this purpose.

Quotations

After these selecting quality goods from the market, the next step is to collect their quotations and compare them in select the suitable one, which is more economical and highly warranted.

Purchase of Goods

After selecting the suitable quotations the final step is to purchase the product. It is very necessary to consider the quality of goods is same as mentioned in the quotation and also the quality.

What Is Potential Growth Concept?

There is always a chance of expansion of the network for this matter a network administrator must consider the expected expansion for the specific period because there is always a need to expend a network in an organization for this one should must consider that expansion before starting network.
For this one should be the following step.

Five year plan

To handle the problem of potential growth one should do this step that the may thoroughly studied the future five year plan of an organization and also previous if it is to consider the rate of expansion and make the idea of expected development and need of an organization for further five year.

Consider the Area of Network

After the reading the five-year plan one should consider the whole area of network and possible expansion on it for further five year that he should make the idea about the exact requirement for the product of network.

Purchase Extra Goods

After considering the exact area and purchase of product one should purchase some extra goods to meet the future requirement.

Extra connection

After purchasing the extra goods and considering the exact area while making of cables and their wiring one should give possible and expected connection for the network to reduce the cost of wiring and save the time.

CHAPTER # 3

PROBLEM SPECIFICATION

Problem Specification

"DSF" have a wide departmental network in its premises and it also have the external sharing with its head office and all other DSF Group of industries.
DSF have more then twelve departments stated in "Hattar industrial area Taxila", but we have to connect the most important four department
Unit 1, unit 2, unit 3, unit 4 named as department 1,2,3,4, main store, main lab in LAN networking.
In WAN networking we have to connect the main I.T Lab in DSF at Hattar with its main office Islamabad.

Department 1

The department first of the DSF Hattar was the first department 1990. It was only department that time and its polyester department. In this department more than 1200 employees are working and the system in this department has to maintain the record of the whole production and its employees.
This department produce more than 36 bundles of polyester in a day It's the main department of the firm and biggest one we have to give two main clients connected with the central lab one on the counter table and other the manger room.

DEPARTMENT 2

2nd department start working in 1994 having approx 800 employees. It is also the polyester plant and the system in this plant has to maintain the production detail and the whole information about the employee.
This department produced more then 24 Bundles of polyester in a day. We have to give 3 clients in it one on the day counter table one at the store and 3rd on the manager table.

DEPARTMENT 3

The 3rd department was started its work in 1996. It is the ACROLIC department having 600 employees and the system has to maintain there whole the database and we have to connect the 2 clients in department with the central lab. On the counter table and other in the manager room to establish the LAN networking.

DEPARTMENT 4

In 2000 DSF purchase more then 75% share of Dhan Fiber stated in Hatter and changes its name to department 4. It's also the polyester plant having 1600employees and the system have to maintain the production and the employee's database.

We have to connect 4 clients in it with the center lab. The distance between the central lab and department 4 is more then 1km and its very difficult to use the LAN networking.

Main Store

Main store is stated in the Dewan Fiber in Hatter and it's very necessary to connect it with the central lab share the resources with whole networks. We have to give only one client at the counter table and to connect it with the central lab. This system contains the whole information about the purchase and issues from the stores.

Main Central Lab

In the main central lab we have to configure the 3 main servers and to make the batch panel cabinet to organizing the whole instruments such as HUB and SWICHES for the better result in the main central lab we have to configure 3 main servers First for the LAN networking, Second for the WAN networking and Third for the whole data base.

CHAPTER # 4

SYSTEM ARCHITECTURE

Introduction of Architectural Design

The network architecture of an organization is the structure or structures of the network, which comprise network components, the externally visible properties of those components, and the relationships among them.

The architecture is not the operational network. Rather it is a representation that enables a network administrator to
Analyze the effectiveness of the design in meeting its stated requirements,
Consider architectural alternatives at stage when making design changes is still relatively easy.
Reducing the risks associated with the construction o f the network.

This definition emphasizes the role of "network components" in any architectural representation. In the context of architectural design, a network component can be something as simple as a program module, but it can also be extended to include databases and "middleware" that enable the configuration of a network of clients and servers. The properties of components are those characteristics that are necessary to an understanding to how these components interact with other components. At the architectural level, internal properties (e.g., details of an algorithm) are not specified.

Architectural Complexity

A useful technique for assessing the overall complexity of proposed architecture is to consider dependencies between components within the architecture. These dependencies are driven by information/control flow within the system.

Sharing dependencies represent dependence relationships among consumers who use the same resource or producers who produce for the same consumers. Constrained

dependencies represent constraints on the relative flow of control among a set of activities.

Mapping Requirements into a network Architecture

The network requirements can be mapped into various representations of the design model. The architectural styles represent radically different architectures, so it should come as no surprise that a model to a variety of architectural styles does not exit. In fact, there is no practical mapping for some architectural styles do not exist. In fact, there in is no practical mapping for some architectural styles, and the designer must approach the translation of requirements to design for these styles in an ad hoc fashion.

The type of information flow is the driver for the mapping approach required. In the following sections we example two flow types.

Transform Flow

Recalling the fundamental system model (level 0 data flow diagram), information must enter and exit software in an "external world" form. For example, data typed on a keyboard, tones on a telephone line, and video images in a multimedia application are all forms of external world information. Such externalized data must be converted into an internal form for processing. Information enters the system along paths that transform external data into an internal form. These paths are identified as incoming flow. At the kernel of the software, a transition occurs. Incoming data are passed through a transform center and begin to move along paths that now lead "out" of the software. Data moving along these paths are called outgoing flow. The overall flow of data occurs in a sequential manner and follows one, or only a few, "straight line" paths. When a segment of a data flow diagram exhibits these characteristics, transform flow is present.

Transaction Flow

The fundamental system model implies transform flow; therefore, it is possible to characterize all data flow in this category. However, a single data item, called a transaction that triggers other data flow along one of many paths, often characterizes information flow. When a DFD takes the form transaction flow is present.

Transaction flow is characterized by data moving along an incoming path that converts world information into a transaction. The transaction is evaluated and based on its values, flow along one of many action that is initiated, the hub of information flow from which many action paths emanate is called transaction center.

It should be noted that, within a DFD for a large system, both transform and transaction flow may be present. For example, in a transaction- oriented flow, information flow along an action path may have transform flow characteristics.

Transform Mapping

Transform mapping is a set of design steps that allows a DFD with transform flow characteristics to be mapped into a specific architectural style.

Design Steps

The step begins with a re-evaluation of work done during requirements analysis and then moves to the design of the software architecture.

Step 1. Review the Fundamental network Model.

The fundamental network model encompasses the level 0 DFD and supporting information. In actuality , the design requirements specification. Both documents describe information flow and structure at the software interface.

Step 2. Review and Refine Data Flow Diagram for the Software.

Information obtained from analysis models contained in the software requirements specification is refined to produce greater detail. Each transform in the data flow diagram exhibits relatively high cohesion. That is, the process implied by a transform performs a single, distinct function that can be implemented as a module.

Step 3. Determine whether the DFD has Transform or Transaction Flow Characteristics.

In general, information flow within a system can always be represented as transform. However, when an obvious transaction characteristic is encountered, a different design mapping is recommended. In this step, the designer selects global (software wide) flow characteristics based on the prevailing nature of the DFD. In addition, local regions of transform or transaction flow are isolated.

Evaluating the DFD, we see data entering the software along one incoming path and exiting along three outgoing paths. No distinct transaction center is implied (although the transform establishes alarm conditions that could be perceived as such). Therefore, an overall transform characteristic will be assumed for information flow.

Step 4. Isolate the Transform Center by Specifying Incoming and Outgoing Flow Boundaries.

In the preceding section incoming flow was described as a path in which information is converted from external to internal form. Outgoing flow converts from internal to external from. Incoming and outgoing flow boundaries are open to interpretation. That is, different designer may select slightly different points in the flow as boundary location. In fact, varying the placement of flow boundaries can derive alternative design solutions. Although care should be taken when boundaries are selected, a variance for bubble along a flow path will generally have little impact on the final program structure. Flow boundaries for the example are illustrated as shaded cures running vertically through the flow. The transforms (bubbles) that constitute ate transform center lie within the two shaded boundaries that run from top to bottom. An argument can be made to readjust a boundary (e.g., an incoming flow boundary separating read sensors and acquire response info could be proposed). The emphasis in this design step should be on selecting reasonable boundaries, rather than lengthy iteration on placement of divisions.

Step 5. Perform "Fist-Level Factoring."

Program structure represents a top-down distribution of control. Factoring results in a program structure in which top-level modules perform decision making and low-level modules perform most input, computation, and output work, Middle-level modules perform some control an do moderate amounts of work.

When transform flow is encountered, a DFD is mapped to specific structure (a call and return architecture) that provides control for incoming, transform, and outgoing information processing. A main controller resides at the top of the program structure and coordinates the following subordinate control function.

Step 6. Perform "Second-Level Factoring"

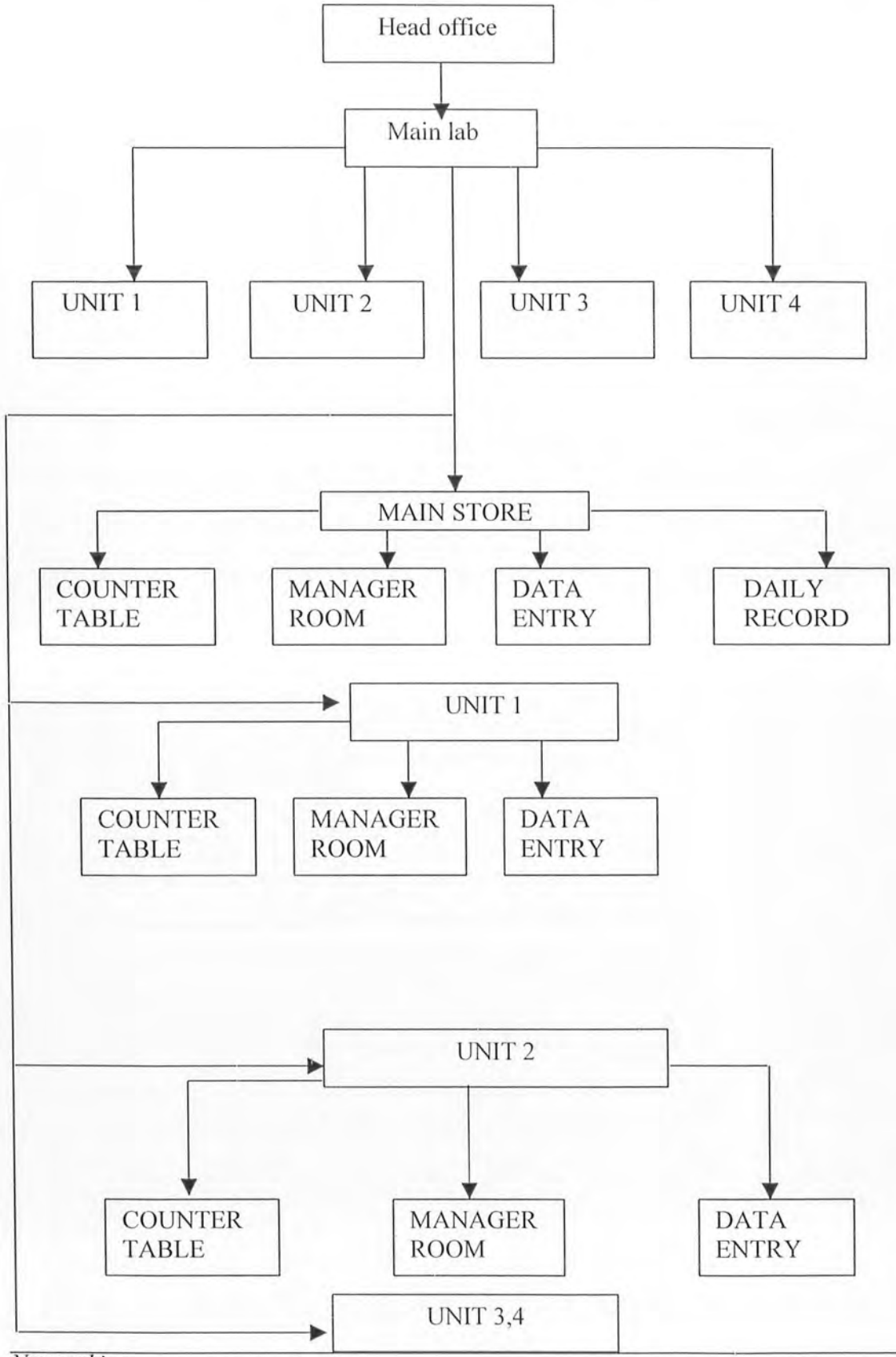
Second level factoring is accomplished by mapping individual transforms (bubbles) of a DFD in to appropriate modules within the architecture. Beginning at the transform center boundary and moving g outward along incoming and then outgoing paths, transforms are mapped into subordinate levels of the software structure.

Second-level factoring for incoming flow follows in the same manner. Factoring is again accomplished by moving outward from the transform center boundary on the incoming flow side.

Step 7. Refine the first-iteration architecture using design heuristics for improved software quality.

Applying concepts of module independence refine a first –iteration architecture can always. Modules are exploded or imploded to produce sensible factoring, good cohesion, minimal coupling, and most important, and maintained without grief.
Refinements are dictated by the analysis and assessment methods described briefly as well as practical considerations and common sense.

Architectural Design Of DSF



CHAPTER # 5

INTRODUCTION TO LAN

Introduction To LAN

LAN (local area networks)

Local area networks are generally called LANs are privately owned networks within a single building or campus of up to a few kilometers in size. They are widely use to connect personal compute and workstation in company offices and factories to share resources (printers) and exchange information.

LANs are distinguished from other kind of networks by three characteristics

- Their size.
- Their transmission technology.
- Their topology.
- Limited boundaries geographically (meters to kilometer).
- It also simplifies network.

Data Rate

- NORMAL LAN (traditional LAN) = 10mbps
- FAST = 100mbps
- HIGH SPEED = 1000mbps

Topology

Topology is a physical arrangement of one system and cabling is called topology of the network.

LANs Topology

Four topologies are used within LAN.

1. BUS
2. TREE
3. STAR
4. RING

Cables

BUS:

Base band coaxial cable, broadband coaxial cable, twisted pair cable.

TREE:

In tree topology only broadband coaxial cable is used.

RING:

Twisted pair cable, baseband coaxial cable is used.

STAR:

Only twisted pair cable is used is used in the star topology.

NIC (Network Interface Card):

BUS:

Network interface card with BNC (British navel connector) connector.

TREE:

BNC connector with same interface card is used in tree topology.

RING:

NIC is not used in that topology.

STAR:

NIC is used with RJ45 cable. A Rj45 pin port is connects 4 pair of cable. NIC have the ability to remove the data.

Terminator

BUS:

In this topology simply a resistive terminator is used, they function of this terminator is to remove and dead the signal from the cable.

R= 50(ohm)

TREE:

The same terminator is used in tree topology only at the one side of cable and on the other side another device headend is used. Which receive data.

RING:

There is no terminator is used in ring topology.

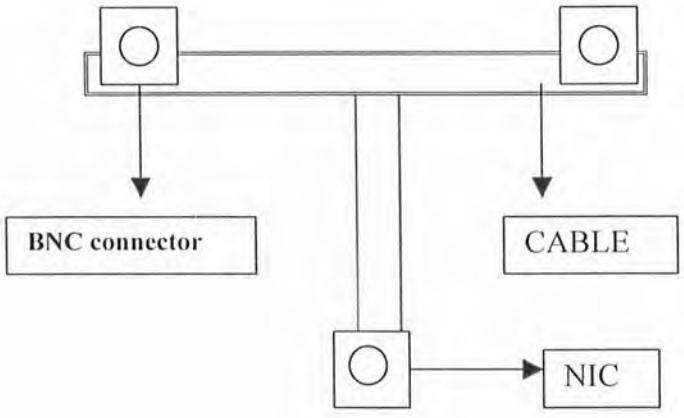
STAR:

There is no terminator is used in star topology.

BNC TEE:

BUS:

It is a "T" shape hardware device used to connect cable with the computer cable is connected on the both corners of the T on the upper side and on the lower side this device is connected with the connected with network interface card.



TREE:

The same BNC tee is used in tree topology.

RING:

There is not such device is used in the ring topology.

STAR:

There is not such device is used in the star topology.

Connectors

BUS:

BNC (British navel connector) is used in bus topology.

TREE:

Tree topology uses the same BNC.

RING:

In ring topology, repeater are used for connecting with cable.

STAR:

RJ45 connectors are used in star topology. It is an 8-pin connector; it is used to connect 4 pair of cable.

Access Algorithm

BUS:

ETHERNET because this network are based on single access algorithm "CSMA/CD (carrier sense multiple access/collusion detection.

TREE:

ETHERNET because this network are based on single access algorithm "CSMA/CD (carrier sense multiple access/collusion detection.

RING:

In ring topology the access algorithm is "TOKEN"only that station can send the data that have the token others are Wait State.

STAR:

ETHERNET because this network are based on single access algorithm "CSMA/CD (carrier sense multiple access/collusion detection.

Central Device

BUS:

TERMINATOR is use to remove dead the signal from the cable. Bus is a passive topology; the electrical signal from a transmitting computer is free to travel the entire length of the cable. Without termination, when the signal reaches the end of the wire, it bounces back and travel back up the wire. When a signal echoes back and forth along an unterminated bus, it is called ringing. To stop the signal from ringing, you attach terminators at either end of the segment. The terminators absorb the electrical energy and stop the reflections.

TREE:

The terminator is used on one side but on the other side a "HEADEND" IS USED

- HEDAEND is use to receive the packets of data and retransmit the data which lies on the different branches. Headend control the branches of the branches.

RING:

REPEATER is used in ring topology.

- It is able to receive the data.
- Store the data.
- Transmit the data.
- Source is transmit and remove the data from the network.
- An acknowledgement bit is attached with to the data.

STAR:

HUB is used in the ring topology, the function of the hub is to accept the data from any port and retransmit the data to all other port.

There are two different types of hub.

- PASSIVE HUB: simples electronic relay no processing on the data.
- ACTIVE HUB: that hub make the regeneration of the of data

Feasible Environment

BUS:

The bus topology is often used when a network installation is small, simple, or temporary.

TREE:

The tree topology is gernalization of the bus topology.

RING:

Ring are used in high performances networks, networks requiring that bandwidth reserved for time sensitive feature.

STAR:

When Network expansion is expected, and when the greater reliability of a star topology is needed.

Benefits

BUS:

- The bus is simple, reliable, in very small networks, easy to use, and easy to understand.
- The bus requires the least amount of cable to connect the computers together and is therefore less expensive then other cabling arrangement.
- It is easy to extend a bus. Two cables can be joined into one longer cable with a BNC barrel connector, making a longer cable and allowing more computers to the network.

TREE:

- Single point failure is only effected on that branch.

RING:

- Because every computer is given equal access to the token no one computer can monopolize.
- The fair sharing of the network to allows the network to degrade gracefully (continue to function in a use full, if slower, manner rather then fails ones capacity is exceeded) as more users are added.

STAR:

- It is easy to modify and add new computer to a star network without disturbing the network.
- The center of the star network is a good place to diagnose network faults.
- Single point failure don't necessary brig down the whole star network, the hub deduct the network fault.
- You can use several cable types in the same networks with the hub, which can accommodate the multiple types.
- 90 to 95 percent network is based on star network.

Drawbacks

BUS:

- Heavy network traffic can slow a bus topology considerably, cuz any computer can transmit at any time.
- Each barrel connector weakens the electrical signal.
- It is difficult to troubleshoot a bus. Breakage in the cable stops the transmitting the data.

TREE:

- Trouble shooting is time consuming.

RING:

- Failure of one computer on the ring can effect the whole network.
- It is difficult to troubleshoot the ring network.
- Adding or removing computers disrupts the network.

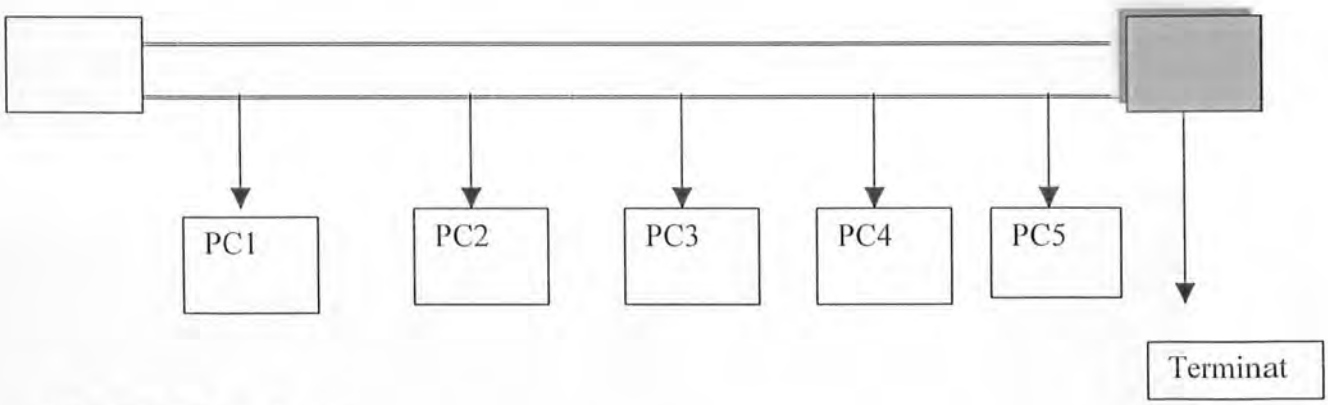
STAR:

- If the central hub fails, the whole network fails to operate.
- Many star network require a device at the central point to rebroadcast or switch network traffic.
- Its cost more to cable a star network cuz all network cables must be pulled to one central point.

Structures And Operation Of Topologies

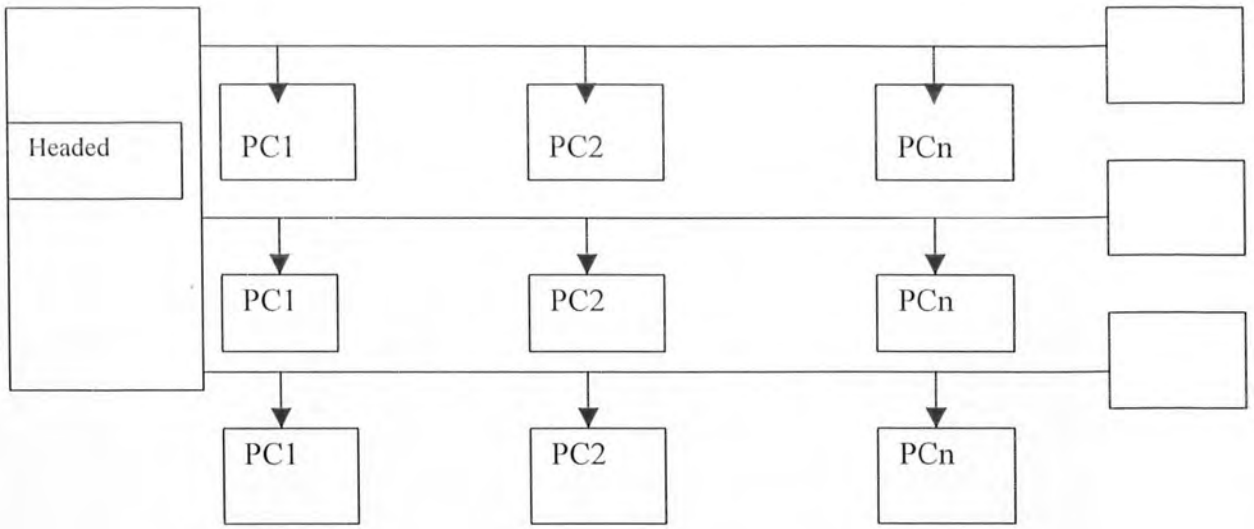
BUS Topology

All the station will share the single medium, multiple point configurations, and more then two devices connected to the medium.



TREE Topology

Tree is an extension of bus, many buses joint in tree network. The transmission medium is a branching cable with no closed loop. The tree layout begins at a point known as "HEADEND" one or more cables start at headed each of these may heave branches. With the bus and trees, no special action needs to be taken to remove frames from the medium, when a signal reaches the end of the medium; the terminator absorbs it.

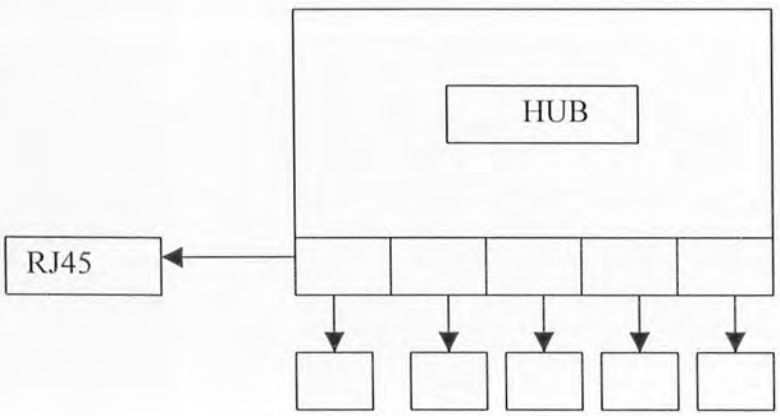


STAR Topologies

In star topologies each station is directly connected to a common central node hub.

In star topology, although the arrangement is physically a star, it is logically a bus.

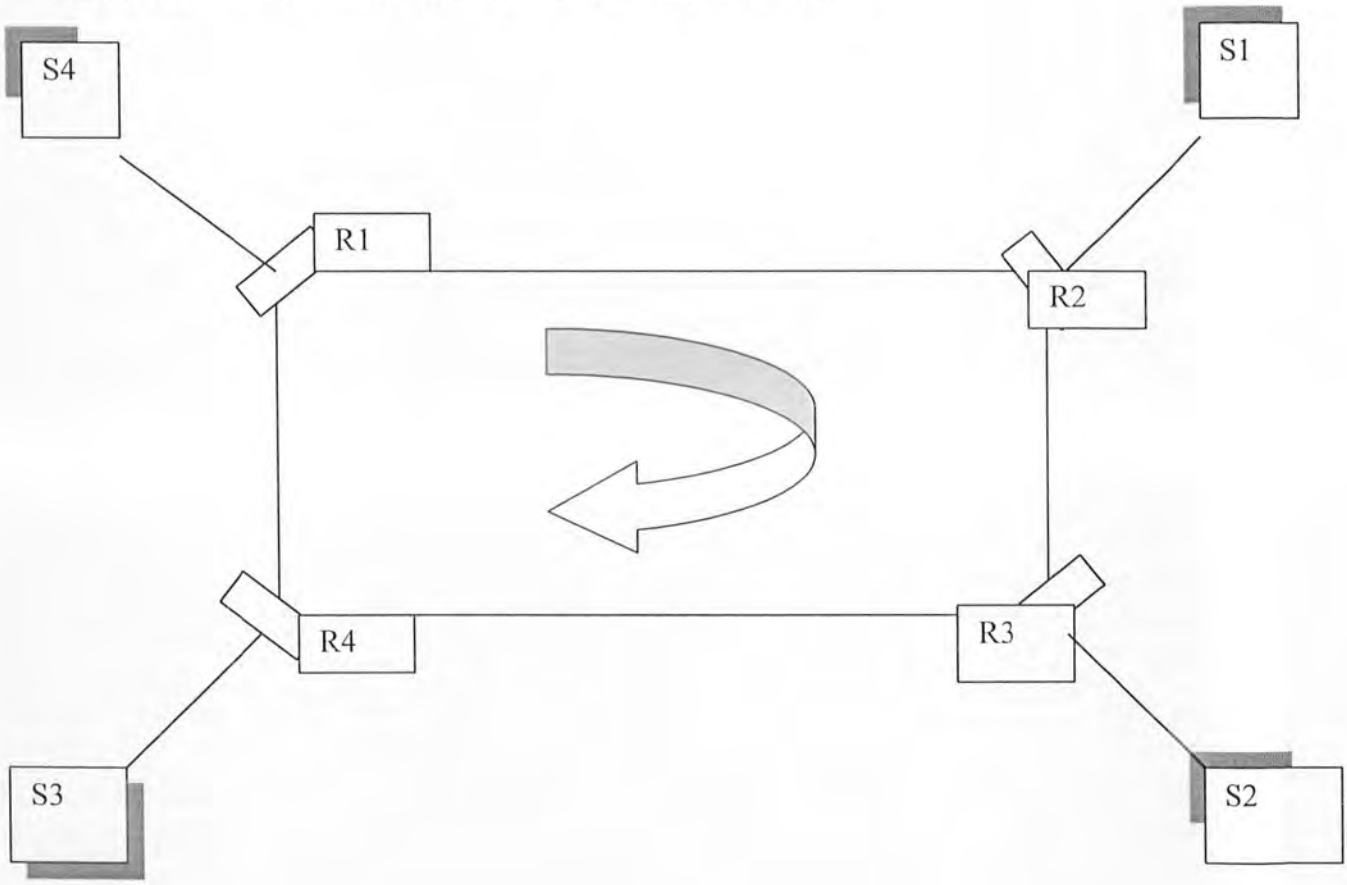
All other station receives the transmission from any station and only one station at time may successfully transmit.



RING Topology

In ring topology, the network consist of a set of repeater joined by point-to-point link in a closed loop.the links are unidirectional, that is data is transmitted in one direction only. so that data circulate around the ring in one direction either clockwise or anticlockwise.

In ring topology, because multiple station shares the ring, medium access control is needed to determine at what time each station may insert frames.



MESH Topology

A true mach topology has a link b/w each device in the network.

Benefits

The major benefit of the mach topology is fault tolerance.

- Guaranteed communication.
- Easy to trouble shoot

Drawback

- Difficulty of installation
- Cost of maintaining.

CHAPTER # 6

INTRODUCTION TO WAN

Introduction To WAN

WAN (wide area network)

Wide area networks generally cover a large geographical area, require the crossing of public right-of-ways, and rely at least in part on circuits provided by a common carrier. WANs have implemented using one of the following technologies:

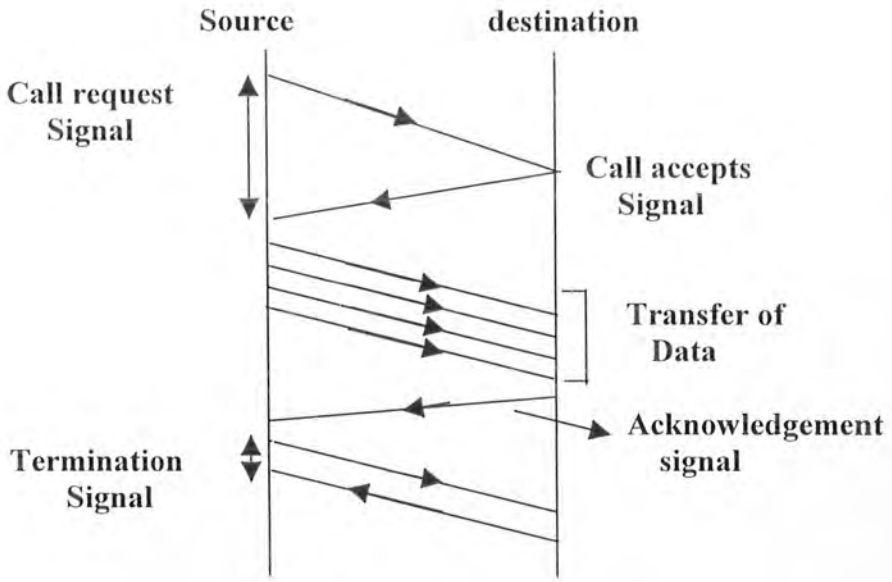
a. Circuit switching
b. Packet switching.
c. Frame relay.
d. ATM networks

Switching

Switching is a Technique that can determine how connections are made and how data is handled on WAN.

Circuit Switching

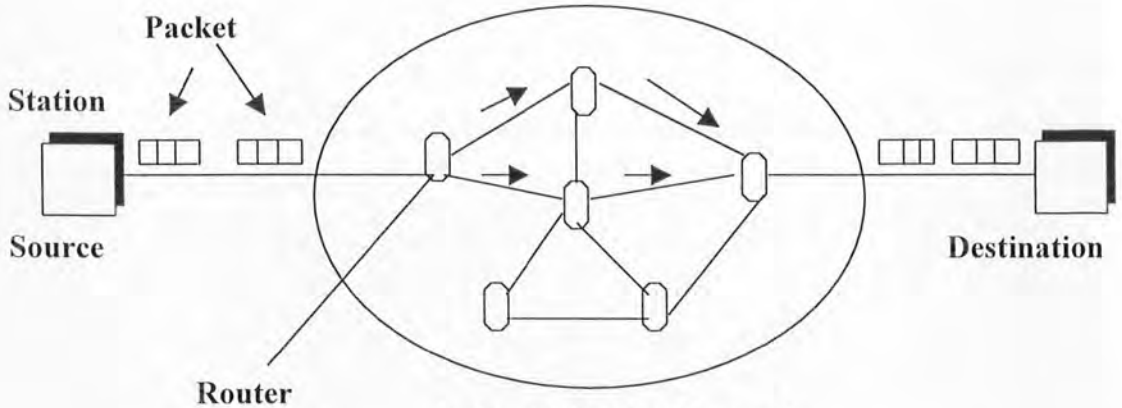
Circuit Switching is a type of WAN in which a dedicated path is established between source and destination before transmission of data through different modes.



Circuit Switching

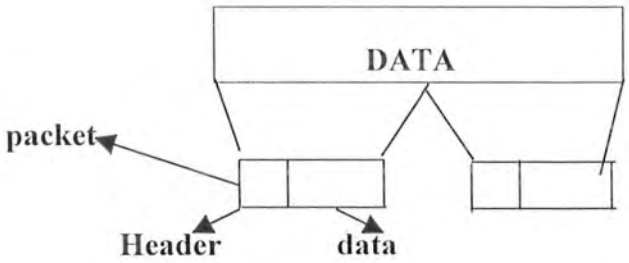
Packet Switching Network

- In packet Switching network, data is sent in packets routed through different paths and data is in digital form. All packets do not follow the same route.



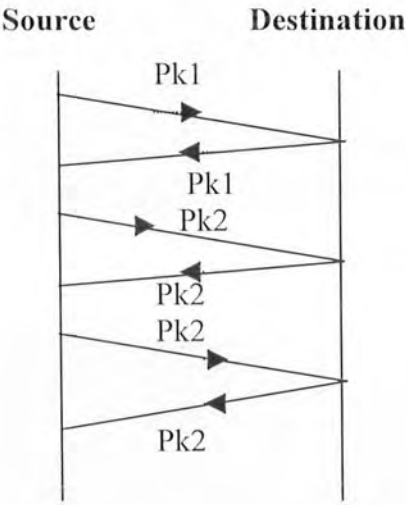
Packet Switching Network

In packet Switching, messages are divided into packets consist of heads and data. Each packet has source, destination and intermediate mode address and information.



Frame Relay Technology

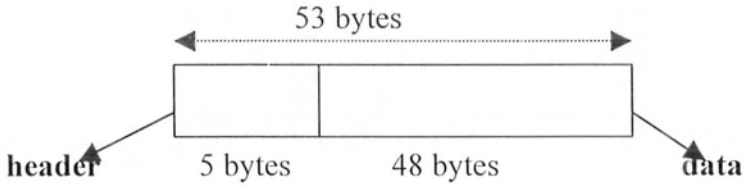
Frame Relay is packet switching network service that uses variable length packet to provide high-speed data transmission rates.



ATM/ Cell Relay Technology

ATM is descendent of packet switching. Its high-speed advantage comes from transmitting uniform data packets that are fixed in size i.e. 53 bytes and further subdivided into data frame

PACKET



CHAPTER # 7

HARDWARE SPECIFICATION

Hardware Specification

Servers

A = Win 2000 only for the data base 24hrs service.

B = Win 2000 acting as oracle database server.

C = Win 2000 acting as file server (file and proxy server only for faculty)
24hrs connected with the Internet.

D = Win 2000 acting as PDC, proxy, FTP, file server (file and proxy server are only for faculty members)

Proxy Tool = MS proxy 2.0 on server D

Web server = a pache 1.3

Data base = Oracle 8

HARDWARE CONFIGURATION FOR SERVERS

Server A = Sun server 450 and sun server 250.

Server B = Compac server MC 370.

Server C = Compac server 550.

Clints = Pentium servers (IBM branded)

HARDWARE SPECIFICATION

Hardware Specification (Client System):

Numbers of clients used are 50.

Hardware Specification For Clients

ITEM NAME	QUANTITY	DESCRIPTION
Main Board	1	Intel Original
Microprocessor	1	300MHz
Hard Disk	1	20GB
RAM	1	64MB
Display Adapter	1	2MB
Network Adapter	1	Branded
Floppy Drive	1	Branded
Sound Card	1	Full Duplex
Monitor	1	IBM
Keyboard	1	IBM
Mouse	1	IBM

Hardware Specification For Servers

Item Names	Quantity	Description
Main Board	1	Intel Original
Microprocessor	1	450MHz
Hard Disk	1	20GB
RAM	1	128MB
Monitor	1	Compac
Keyboard	1	Compac
Mouse	1	Compac
Display Adapter	1	4MB
Floppy Drive	1	Branded
CD ROM	1	50X

NETWORK

A group of computers connected together in a way that allows information to be exchanged between the computers.

Local Area Network (LAN)

A network of computers that are in the same general physical location usually within a building or a campus If the computers are far apart (such as across town or in different cities). Then a Wide Area Network (WAN) is typically used.

NODE

Any thing that is connected to the network . While a node is typically a computer, it can also be something like a printer.

Segment

Any portion of a network that is separated by a switch,briddge or router, from other parts of the network.

Backbone

The main cabling of a network that all of the segments connect to typically the backbone is capable more information than the individual segments. For example, each segment may have a transfer rate of 10Mbps (megabits per second: I million bits a second), while the backbone may operate at 100 Mbps.

CHAPTER # 8

SERVERS

SERVERS

PROCESSOR (Server)

Windows 2000 Server

Windows 2000 server is a file, print, and application server, as well as a web server platform and contains all feature of windows 2000 professional plus many new server specific functions, at the core of windows 2000 is a complete set of infrastructure services base on Active directory service. Active Directory services centralize the management of the user, groups, security services and network resources.

Product Highlights

- The Intel ® Pentium® 3 processor with 512 KB L2 cache
- 512KB Advanced Transfer Cache (on-die, full-speed level 2(L2) caches with Error Correcting Code (ECC).
- 32KB(16KB/16KB) non-blocking, level 1 (L1) cache.
- That incorporates Data prefect logic (DPL), which anticipates the data needed by the application and pre-loads it into the advance transfer cache, designed to further increase the processor and application performance.
- P6 Dynamic Execution micro architecture including multiple branch prediction, data flow analysis and speculative execution.
- Internet streaming SIMD extensions, consisting of 70 instructions that enable advanced imaging, 3d streaming audio and video, speech recognition and an enhance Internet experience.
- Intel® MMX™ media enhancement technology.
- Dual independent bus (DIB) architecture increase bandwidth and performance over single bus processor.
- Address ability for caching up to 64 GB of memory.
- Data integrity and reliability feature such as Error Correction Code, Fault analysis and Recovery for both system and L2 cache buses.

- Versions based upon Intel's 0.13, 0.18 and 0.25 micron manufacturing processes for increased processor core frequencies and reduced power consumption.
- Fully compatible with existing Intel architecture based software.
- Their server is used for Authentication

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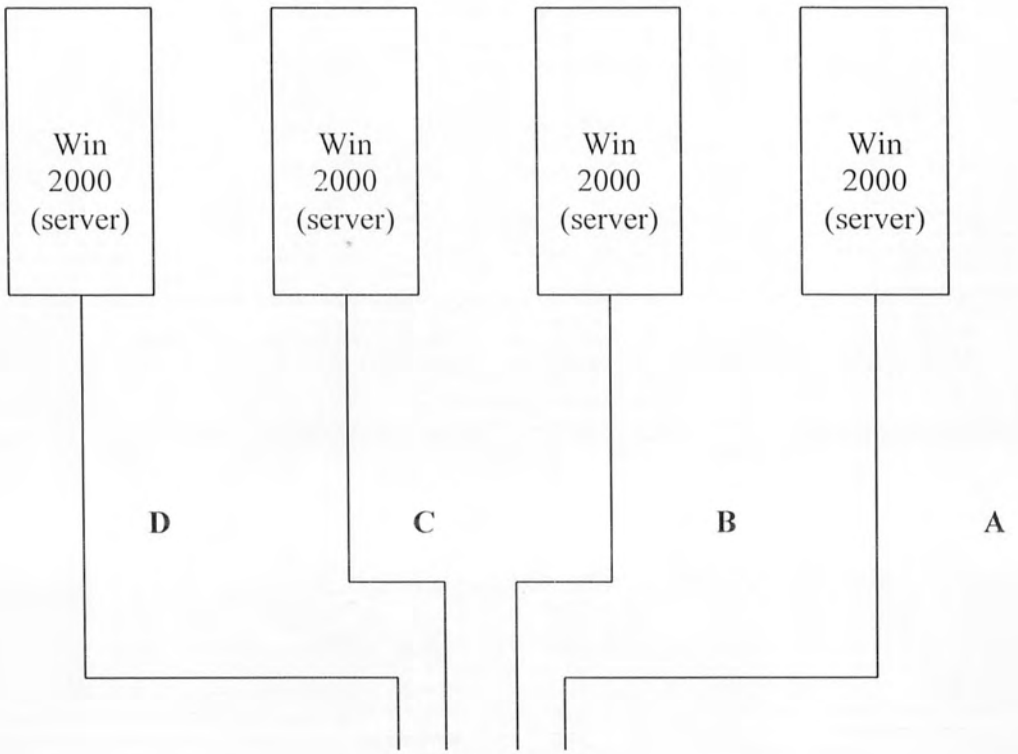
FUNCTIONALITY OF SERVERS

In Dewan there are 1 lab in total. The entire departments are connected with star topology. There is a main lab where 4 servers are installed and all the networking equipment is there. The detailed specification of server is as under:



In these pictures we have to specify the four servers working in the main lab.

SERVER FUNCTIONALITY (Software specification)

A. Sun solorist server and the system is also sun solorist using Linux, as operating system to maintain the database the entire client is hosts at that server.

B. Win 2000 acting as BDC & oracle Database server

C. WinNT 4.0 acting as BDC, mail, web, proxy, file server
24 hrs connected to Internet.

D. WinNT 4.0 acting as PDC, proxy, FTP, file Server
24 hrs connected to Internet.

DOMAIN

There are 5 domains department 1, department2, department3, department4 and store. Every member has a roaming profile on the network. Member can login from any place and will get his desktop setting. All the rights of installing/uninstalling are with the administrators and normal users cannot do this.
Members can use telnet to RED Linux 7.2 server for database.

SOFTWARE SPECIFICATION

Software specification of workstation:

- MS Office 2000
- Windows 2000 professional
- SPSS
- VISIO
- Flash
- Dream weaver
- Swish
- Adobe
- PhotoShop
- Microsoft visual FoxPro 6.0

- Xpower 2.0
- Borland C++
- Visual C++
- Java
- Java beans
- Java applets
- Microsoft personal web server
- Personal oracle 8 for windows
- Winzip
- Cold Fusion
- Adobe page maker 6.5 +
- Adobe GoLive 1.5
- 3D studio Max

Software specification of server

- Apache 1.3
- Oracle 8i
- Mailer deamon 3.5 (for mail server)
- MS Proxy 2.0 (on server D)
- Wingate 3.5 (on server C)
- Windows 2000 server
- Linux 7.2
- Squid (for Linux)

INTERNET CONNECTION

At dewan there are 3 Internet connections in total. The detail of this connection is as under:

- One Dedicated Dial up connection from Sparcom
- One Regular Dial up connection from sparcom
- One Regular Dial up connection from Apollo

Dedicated Dial-up line is being used for hosting the web site of dewan.

SECURTY IMPLEMENTATION

At Dewan fiber the Lab are protected from hackers through FIREWALLS. The firewalls are used at ports. Because all the hacking is done through ports. How the firewalls work is given in details below.

Basically, a firewall is a barrier to keep destructive forces away from your property. In fact, that's why it's called a firewall. Its job is similar to a physical firewall that keeps a fire from spreading from one area to the next.

What It Does

A firewall is simply a program or hardware device that filters the information coming through the Internet connection into your private network or computer system. If the filter flags an incoming packet of information, it is not allowed through.

Firewall helps protect computers inside a large company. The company will therefore have hindered of computers that all have network cards connecting them together. In addition, the company will have one or more connections to the Internet through something like T1 or T3 lines. Without a firewall in place, all of those hundreds of computers are directly accessible to anyone on the Internet. Aperson who knows what he

or she is doing can probe those computers, try to make FTP connections to them, try to make telnet connection to them and so on. If one employee makes a mistake and leaves security hole, hacker can get to the machine and exploit the hole.

With a firewall in place, the landscape is much difficult. A company will place a firewall at every connection to the internet (for example, at every T1 line coming in to the company). The firewall can implement security rules. For example, one of the security rules in side the company might be:

- Out of the 150 computers in side the company, only one of them is permitted to receive public FTP traffic. Allow FTP connection only to that one computer and prevent them on all others. Dewan can set up rules like this for FTP service, web service, telnet serves and so on in addition, the company can control how member connect to web sites, further files are allowed to leaved the company over the network and so on. A firewall gives a company tremendous control over how people use the network.

Firewall views one or more of three methods to control methods following in and out of the network:

- **Packet Filtering** – packets (small chunks of data) are analyzed against a set of filers. Packets that make it thought the filters are sending to the requesting system and all others are discarded.
- **Proxy Service** – information from the Internet is retrieved by the firewall and then sends to the requesting system and vice versa.
- **Stateful inspection** – a newer method that does not examine the contracts of each packets butt instead compares certain key parts of the packet to a database of trusted information. Information traveling from inside the firewall to the outside is monitored for specific defining characteristics, and then in coming information is compared to these characteristics. If the comparison yields a reasonable match, the information is allowed thought. Otherwise it is discarded.

Customizing the Firewall

Firewalls are customizable. This means that you can add or remove filter based on several conditions. Some of these are:

- IP addresses Each machine on the Internet is assigned a unique address called an IP address. IP addresses are 32-bits numbers, normally expressed as four "octal" in a "dotted decimal number". A typical IP address looks like this: 216.27.61.137. For example, if a certain IP address out side the company is reading to many files from a server, the firewall can block all traffic to or from that IP address
- Domain names: because it is hard to remember the string of numbers that make up an IP address, and because IP addresses some times need to change, all servers on the internet also have human-readable names, called **domain names**. For example it is easier for most of us to remember www.hotmail.com than it is to remember 216.27.61.137. A company might block all access to certain domain names, or allow access only to specific domain names.
- Protocols: the protocols are the predefined way that some one who wants to use a service talks with that service. The "someone" could be a person, but more often it is a computer program like a web browser. Protocols are often text, and simply describe how the Clint and server will have their conversation. The HTTP in the webs protocols. Some common protocols that you can set firewall filters for include

    - **IP** (internet protocol) – the main delivery system for information over the Internet.
    - **TCP** (Transport Control Protocol) - used to break apart and rebuild information that travels over the Internet.
    - **HTTP** (Hyper Text Transfer Protocol) - used for web pages
    - **FTP** (File Transfer Protocol) – used to download and upload files.
    - **UDP** (User Diagram Protocol) – used for information that requires no response, such as streaming audio and video.

- ❖ **ICMP** (internet Control Message Protocol) – used by a router to exchange the information with other routers.
- ❖ **SMTP** (Simple Mail Transport Protocol) – used to send text-based information (e-mail).
- ❖ **SNMP** (Simple Network Management Protocol) – used to collect system information from a remote computer.
- ❖ **Telnet** – used to perform commands on a remote computer.

The company might set up only one or two machines to handle a specific protocol and ban that protocol on all other machines.

- Ports any server machine makes its services available to the Internet using numbered ports, one for each service that is available.
  For example, if a server machine were running a Web (HTTP) server and an FTP server, the Web server would be available on port 21. The company might block 21 accesses on all machines but one inside the company.
- Specific words and phrases: this can be any thing. The firewall will sniff (search thought) each packet of information for an exact mach of the text listed in the filter. For example, you could instruct the firewall to block any packet with the word "X-rated" in it. The key here is that it has to be an exact match. The "X-rated" filter would not catch "X-rated" (no hyphen). But you can include as many word, phrases and variations of them as you need.

What it protects you from

There are many creative ways that unscrupulous people use to access or abuse unprotected computers:

- **Remote login** When some is able to connect your computer and control it in some from. This can range from being able to view or access your files to actually running programs on your computer.
- **Application backdoor** Some programs have special futures that allows for remote access. Other contains bugs that provide a backdoor, or hidden access, that provides some level of control of the program.
- **SMTP session hijacking** SMTP is the most common method of sending e-mail over the Internet. By gaining the access to a list of e-mail address, a person can send unsolicited junk e-mail (spam) to thousands of users. Redirecting the e-mail through the SMTP server of an unsuspecting host, making the actual sender of the spam difficult to trace does this quite often.
- **Operating system bugs** like applications , some operating system has backdoors. Others remote access with insufficient security controls or have bugs that an experienced hacker can take advantage of.
- **Denial of service** You have probably heard this phrase used in news report on the attack on major web sites. This type of attack is nearly impossible to counter. What happen in that hacker send a request to the server to connect to it? When the server responds with an acknowledgement and tries to establish a session, it cannot find the system that made the request. By inundating a server to slow to a crawl or eventually crash.
- **E-mail bombs** an e-mail bomb is usually a personal attack. Someone sends you the same e-mail hundreds or thousands of times until your e-mail system cannot accept any more massages.
- **Macros** To simplify complicated procedures, many applications allow you to create a script of commands that the application can run. This script is known as a macro. Hacker have taken advantage of this to create their own macro that, depending on the application, can destroy your data or crash your computer.

- **Viruses** Probably the most well known threat is computer viruses. A virus is a small program that can copy itself to other computers. This way it can spread quickly from one system to the next. Viruses range from harmless messages to erasing all your data.
- **Spam** Typically harmless but always annoying, spam is the electronic equivalent of junk mail. Spam can be dangerous though. Quite often it contains links to Web sites.

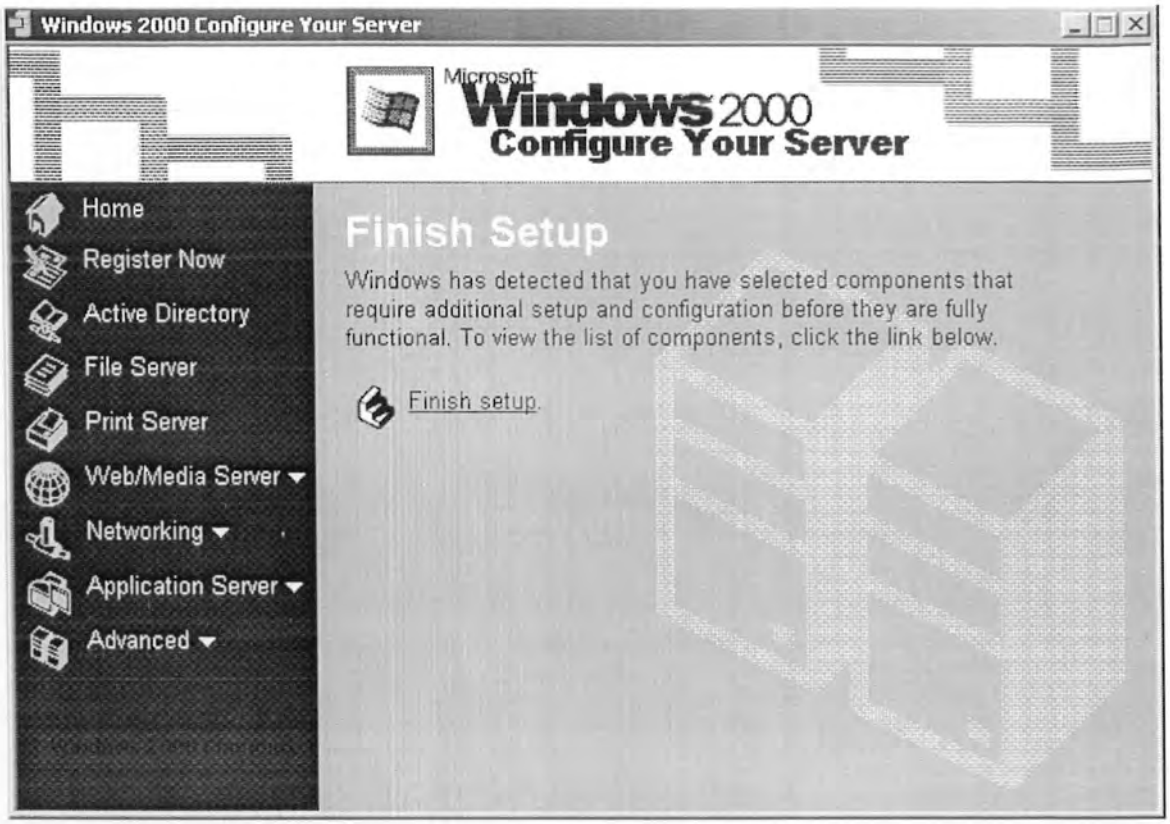


Figure 8.1

When the installation is complete this window is appear on the desktop this will help to configure your server step by step. It contains the following options such as Active directory and server application options.

CHAPTER # 9

SOFTWARE INSTALATION

Server Hardware and Operating System

The servers are a computer like any other. It has a hard disk on which to store data, a cpu to computer with and a network interface adapter to connect it to the rest of the network .it also has an operating system to control the hardware and to provide the network services that make a server the heart of network activity.

Server hardware

The server is the focal point of network. Most network operations are communications with the server. For this reason the server must be fast in order to quickly respond to client request and it must have enough capacity

To store files and perform tasks for many users average personal computers

If we also want to put the fastest network card in the servers as well as use the fastest hard drives we can afford all the servers files must come off the hard drives and go out through the network adapter, so any improvement in these two items will enhance all aspects of the servers performance.

Client and server hardware requirements

Component	client	server
Processor	486orgreater	Pentium or risc-Based preferred,
Display	VGA or SVGA	VGA or SVGA
Hard disk space	About 20GB plus The storage space for a single user and applications	About 40GB plus storage space for single user
Memory	At least 16MB	At least 32MB

This is the hardware requirement for the minimum client and servers of the networking.

The Network Operating Systems

A network operating system (nos) is very similer to a regular client operating system such as windows or os/2 in than it controls the basic functions of the computers. Network operating system network services such as file and print sharing and user account management. Technically the only difference between a server and a client computer is the software each one runs. Servers run network operating system and clients run client network access software. A complete network requires two types of network software:

- The network operating system, which runs on the server and allows you to share server's resources such as hard disk space, printer, and cd -roms.
- Client network access software, which runs on the client and provides access to the resources shared by the server.

Client Software

The purpose of the client network software is to make the services that are available on the network appear to be local to the client computer. This way, application software can be written without regard to where printers, hard drives, and so on, are located.

Client software works by intercepting calls to dos for printing and file services. The network client software determines whether the drives latter refer to a local drive or to a NetWare simply passes the request to the local operating system.

Network client software is referred to differently in different operating system. In novel NetWare, the network client software is called a requester, whereas in Microsoft and IBM networks, client software is called a redirector.

Server Software

Servers are the waiters of the network world they exist simply to listen for and satisfy the requirements of clients. Because servers actually store most of number of the data on a network, they provide a convenient location to perform a number of other services such as

- Managing user account
- Security
- Central licensing
- Data protection
- Multitasking and multiprocessing

Windows 2000 Server Installation

During installation the windows 2000 setup program ask you to provide information about how to install and configure windows 2000. You should gather all the necessary information good preparation helps you avoid problem during and after the installation. You should do the following tasks before starting installation.

Verify that your computer meets the minimum hardware requirements. Your hard disk should meets the minimum space requirements and preferably have a minimum 2 Giga bites of free disk space.

- Check all hardware (network adaptor, video driver, sound card, CD-Rom driver, PC card and so on) for compatibility by checking the windows 2000 hard ware compatibility list (HCL).
- Chose file system that meets your requirements and provides the services you need chose NTFS unless you need more then one operating system.
- Select a licensing mode. You can switch to Per-seat from Per-server mode after installation, but not per-server from per-seat.
- Chose the type of network group (workgroup or domain) your computer will join.
- Select the installation method setup boot disk, CD-Rom or over the network.

Configuring The Network Adapter Card

Depending on the type of card you use, you may have to provide the IRQ and port setting for the card. Your adapter card manual will tell you whether or not you will need this information and how to set or determine what the settings are.

You will also have to determine, which network protocols you want to use.

Windows 2000 gives you three choices:

TCP/IP: Good for the large networks that use routers, networks directly connected to the Internet, and experienced network administrator. Installing TCP/IP requires you to know the TCP/IP

Number for your server

IPX: Good for large routed networks and networks connected to novel NetWare file servers, IPX is fast and easy to setup.

NETBEUI: Good for small non-routed networks or workgroups, net-Beui is the fastest and easiest to setup of all the transport protocols.

Active Directory Configuration

Active directory services are the directory services included with windows 2000 server. It extends the functionality of previous directory services and adds new features. Active directory services are secure, distributed, partitioned, and replicated. It is designed to work well in any size installation. From a single server with few hundred objects to thousands of server with million of objects.

IP address.

Every computer in a TCP/IP networks requires an IP address an IP address is four numbers (between 0 and 255, inclusive) separated by periods. 128.110.121.45 is a valid IP address.

Subnet mask

The subnet mask distinguishes the portion of the IP address that is the network ID from the portion that is the station ID .the subnet mask 255.255.0.0, when applied to the IP address given above, would identify the network ID as 128.110 and station ID as 121.45. All station in the LAN should have the same network ID but have different station ID.

Default gateway

A TCP/IP network must have a gateway to communicate beyond the LAN identification by the network id. A gateway is a computer or electronic device that is connected to two different networks and can move TCP/IP data from one to the other.

DNS Configuration

DNS is most commonly associated with Internet. However private networks used DNS extensively to resolve computer host name and to locate computer with in their local networks and the network. DNS name resolution is different then the name resolution

provides by wins. Wins resolve net bios name to IP address, while DNS resolve IP host name to IP address. IP host name resolve using DNS or other means.

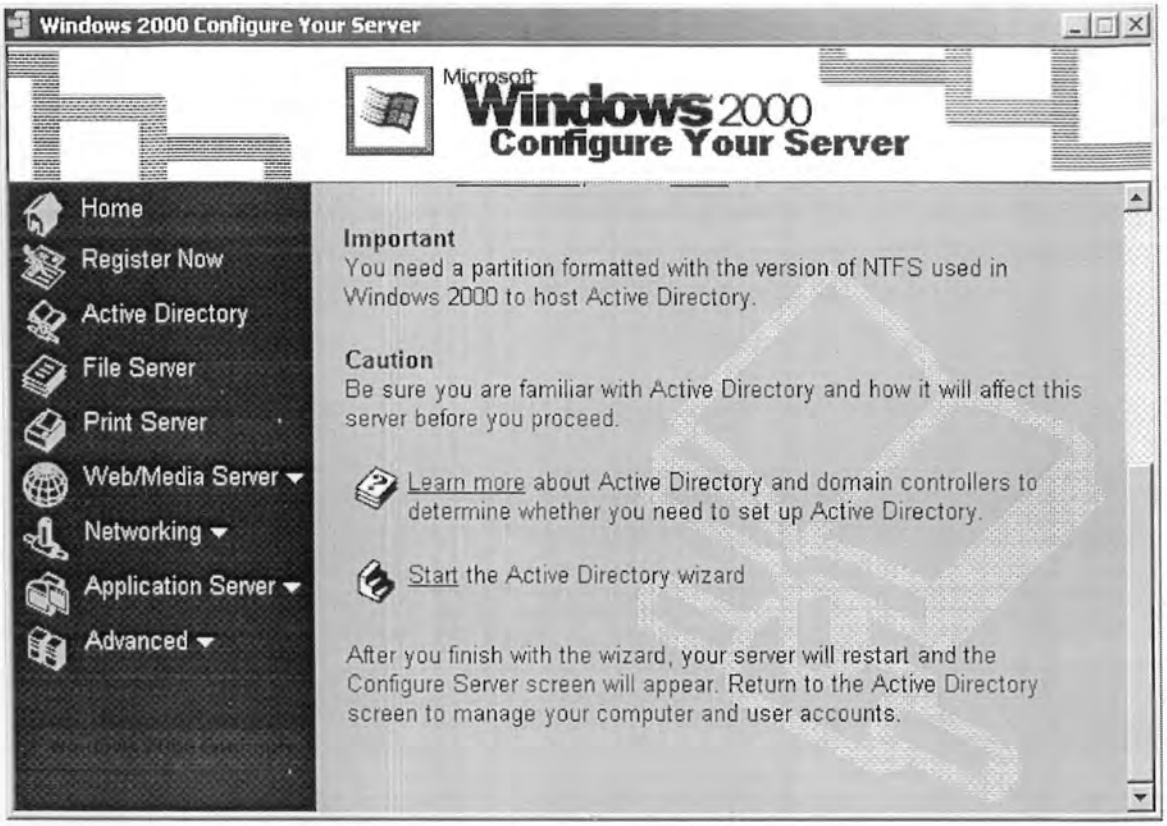


Figure 9.1

When click on the option of the Active directory in the main window this window will appear before you after pressing the start option the Active directory wizard will start which guides you to configure your Active directory.

Figure 9.2

When you select the start option in Active directory Wizard this Active directory Wizard will start, which guides you the whole installation process.

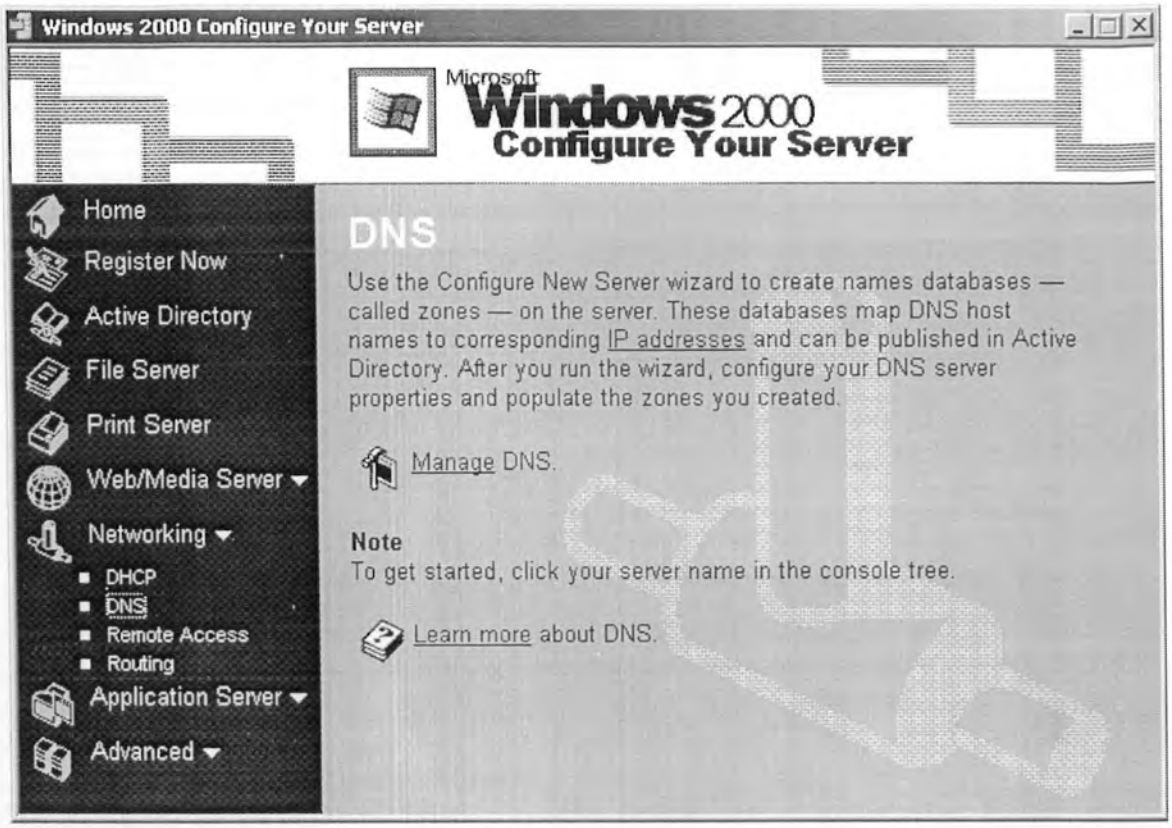


Figure 9.2

This wizard will help you to configure DNS. This wizard will start when you select the DNS option under the networking in the main window.

CHAPTER # 10

CABLES

Twisted pair

Twisted-pair cable uses one or more pairs of two twisted copper wires to Transmit signals. It is commonly used as telecommunications cable.

When copper wires that are close together conduct electric signals, there is a tendency for each wire to produce interference in the other. One wire interfering with another in this way is called *crosstalk.* To decrease the amount of crosstalk and outside interference, the wires are twisted. Twisting the wires allows the emitted signals from one wire to cancel out the emitted signals from the other and protects them from outside noise.

Twisted pairs are two color-coded, insulated copper wires that are twisted Around each other. A twisted-pair cable consists of one or more twisted pairs in a common jacket.

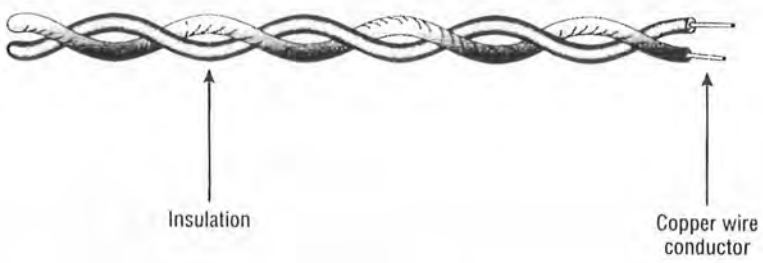


Figure-10.1

Unshielded Twisted-Pair Cable

Unshielded twisted-pair (UTP) cable consists of a number of twisted pairs with a simple plastic casing. UTP is commonly used in telephone systems.

Figure-10.2

The Electrical Industries Association (EIA) divides UTP into different categories by quality grade. The rating for each category refers to conductor size, electrical characteristics, and twists per foot. The following categories are defined:

• Categories 1 and 2 were originally meant for voice communication and can support only iow data rates, less than 4 megabits per second (Mbps). These cannot be used for high-speed data communications. Older telephone networks used Category 1 cable.

• Category 3 is suitable for most computer networks. Some innovations can allow data rates much higher, but generally Category 3 offers data rates up to 16Mbps. This category of cable is the kind currently used in most telephone installations.

• Category 4 offers data rates up to 20Mbps.

• Category *5* offers enhancements over Category 3, such as support for Fast Ethernet, more insulation, more twists per foot, and data rates of 100Mbps and higher, but Category *5* requires compatible equipment and more stringent installation. In a Category S installation, all media, connectors, and connecting equipment must support Category *5,* or per-formance will be affected.

Data-grade UTP cable (Categories 3, 4, and *5)* consists of either four or eight wires. A UTP cable with four wires is called a two-pair. Network topologies that use UTP require at least two-pair wire. You may want to include an extra pair for future expansion.

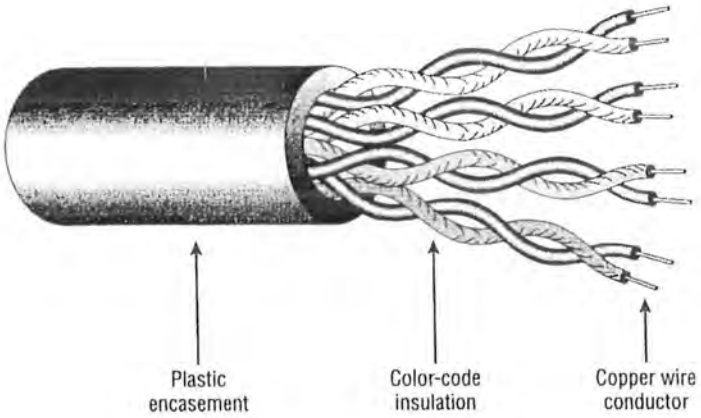


Figure-10.3

Because UTP cable was originally used in telephone systems, UTP installations are often similar to telephone installations. For a four-pair cable, you need a modular RJ-45 telephone connector. For a two-pair cable, you need a modular RJ- 11 telephone connector. These connectors are attached to both ends of a patch cable. One end of the patch cable is then inserted into a computer or other device, and the other end is inserted into a wall jack. The wall jack connects the UTP drop cable (another length of cable) to a punch-down block.

The other side of the punch-down block is wired to a patch panel. The patch panel provides connectivity through patch cables to other user devices and connectivity devices. Figure 2.16 shows how UTP might be installed.

UTP's popularity is partly because UTP was first used in telephone systems. In many cases a network can be run over the already existing wires installed for the phone system, at a great savings in installation cost.

Shielded Twisted-Pair Cable

The only difference between shielded twisted-pair (STP) and UTP is that STP cable has a shield usually aluminum polyester between the outer jacket or casing and the wires.

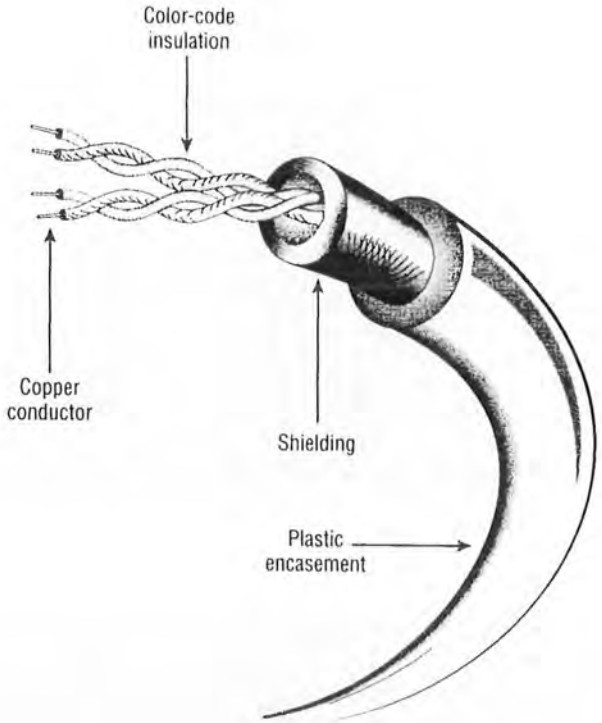


Figure-10.4

The shield makes STP less vulnerable to EMJ because the shield is electrically grounded. If a shield is grounded correctly, it tends to prevent signals from getting into or out of the cable. It is a more reliable cable for LAN environments. STP was the first twisted-pair cable to be used in LANs. Although many LANs now use UTP, STP is still used.

Transmission media specifications from IBM and Apple Computer use STP cable. IBM's Token Ring network uses STP, and IBM has its own specifications for different qualities and configurations of STP.

Coaxial Cable

Coaxial cable, commonly called coax, has two conductors that share the same axis. A solid copper wire or stranded wire runs down the center of the cable, and this wire is surrounded by plastic foam insulation. A second conductor, a wire mesh tube, metallic foil, or both surround the foam. The wire mesh protects the wire from EMJ. It is often called the shield. A tough plastic jacket forms the cover of the cable, providing protection and insulation.

Coaxial cable comes in different sizes. It is classified by size (RG) and by the cable's resistance to direct or alternating electric currents (measured in ohms, also called impedance).

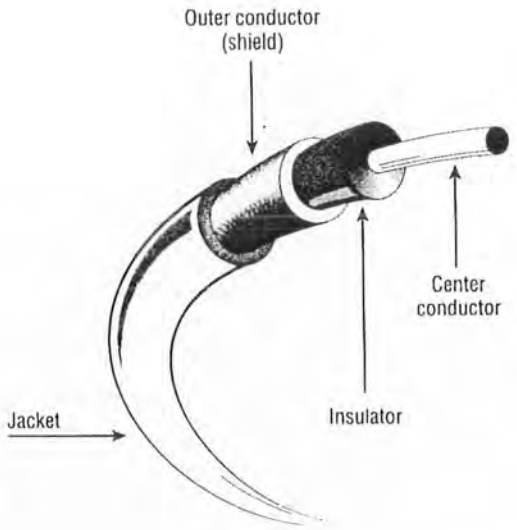


Figure-10.5

The following are some coaxial cables commonly used in networking:

- 50-ohm, RG-8, used for Thick Ethernet
- 50-ohm, RG-58, used for Thin Ethernet
- *75-ohm, RG-59,* and RG-11, used for cable TV
- 93-ohm, RG-62, used for ARCnet

Coaxial cable has the following characteristics:

- Cost: Coaxial is relatively inexpensive.
- The cost for thin coaxial cable is less than STP or Category 5 UTP.
- Thick coaxial is more expensive than STP or Category S UTP but less than fiber-optic cable.

Installation

Installation is relatively simple. With a little practice, installing the connectors becomes easy, and the cable is resistant to damage. Coaxial cable is most often installed either in a device-to-devi daisy-chain (Ethernet) or a star (ARCnet). The interface may involve T connectors or vampire clamps (or taps). Coaxial cable must be ground and terminated. Grounding completes the electrical circuit. Termination keeps the signals that reach the end of the cable from reflecting and causing interference.

Optic Cable

Fiber-optic cable transmits light signals rather than electrical signals. It is enormously more efficient than the other network transmission media. As soon as it comes down in price (both in terms of the cable and installation costs), fiber-optic will be the choice for network cabling.

Each fiber has an inner core of glass or plastic that conducts light. The inner core is surrounded by cladding, a layer of glass that reflects the light back into the core. Each fiber is surrounded by a plastic sheath. The sheath can be either tight or loose.

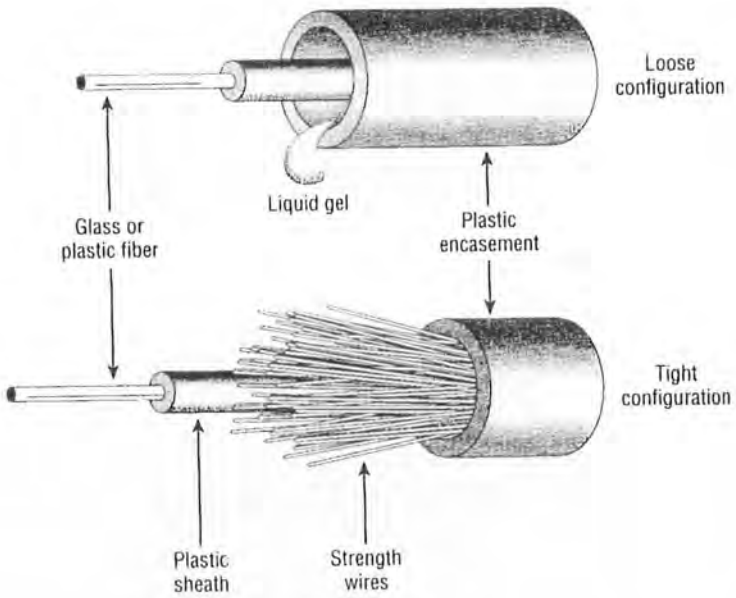


Figure-10.6

A cable may contain a single fiber, but often fibers are bundled together in the center of the cable. Optical fibers are smaller and lighter than copper wire.

One optical fiber is approximately the same diameter as a human hair.

Optical fibers may be multimode or single-mode. Single-mode fibers allow a single light path and are typically used with laser signaling. Single-mode fiber can allow greater bandwidth and cable runs than multimode but is more expensive. Multimode fibers use multiple light paths. The physical characteristics of the multimode fiber

make all parts of the signal (those from the various paths) arrive at the same time, appearing to the receiver as though they were one pulse. If you want to save money, look into multimode, since it can be used with LEDs (light-emitting diodes), which are a more affordable light source than lasers.

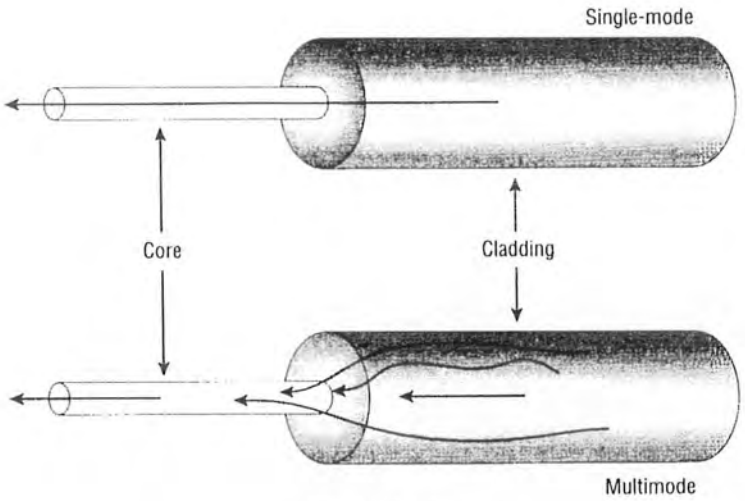


Figure-10.6

CHAPTER # 11

HARDWARE DEVICES

Hubs

All networks (except those using coaxial cable) require a central location to bring media segments together. These central locations are called *hubs* (or multipart repeaters or concentrators). The easiest way to understand this concept is to think of the necessity of connecting multiple cables. If you just connected the media segments together by soldering them, the signals would interfere with each other and create problems. A hub organizes the cables and relays signals to the other media segments.

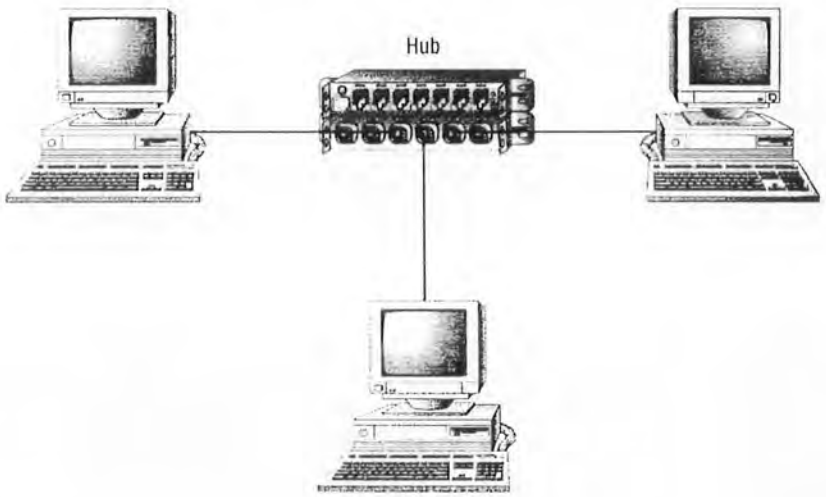


Figure-11.1

Keep the following items in mind when working with hubs:

- There is a limit to the number of hubs that can be connected to each other to extend a network. The limit is typically four, but the maximum number of hubs depends on the type of network topology used.

- When possible, connect each hub directly to a server network card rather than to another hub.

- Label the connections on the hub. This can save you hours of troubleshooting.

- The more hubs data passes through, the slower the connection. There are three main types of hubs: passive, active, and intelligent.

Passive Hubs

A passive hub simply combines the signals of network segments. There is signal processing or regeneration. Because it does not boost the signal and in fact, absorbs some of the signal, a passive hub reduces by half the maximum cabling distances permitted. For example, if a segment normally allows a able transmission distance of 200 meters (656 feet), the distance between passive hub and a device can be only 100 meters (328 feet). Also, with a
Hub, each computer receives the signals sent from all the other computers connected to the hub.

Active Hubs

Active hubs are like passive hubs except that they have electronic components that regenerate or amplify signals. Because of this, the distances between devices can be increased. The main drawback to some active hubs is that they amplify noise as well as the signal, depending on whether they function as simple amplifiers or as signal regenerators. They are also much more expensive than passive hubs. Because some active hubs function as repeaters (as described in the next section), they are sometimes called multi-port repeaters.

Intelligent Hubs

In addition to signal regeneration, *intelligent hubs* perform some network management and intelligent path selection. A switching hub chooses only the port of the device where the signal needs to go, rather than sending the signal along all paths. Many switching hubs can choose which alternative path will be the quickest and send the signal that way. One advantage to this is that you can permanently connect all transmission media segments because each segment will be used only when a signal is sent to a device using that segment.

Repeaters

All transmission media attenuate (weaken) the electromagnetic waves that travel through them. Attenuation therefore limits the distance any medium can carry data. Adding a device that amplifies the signal can allow it to travel farther, increasing the size of the network. For example, if you are connecting computers that are more than 100 meters (328 feet) apart using a lOBaseT Ethernet cable, you will need a device that amplifies signals to ensure data transmission. Devices that amplify signals in this way are called *repeaters.*

Repeaters fall into two categories: amplifiers and signal-regenerating repeaters. Amplifiers simply amplify the entire incoming signal. Unfortunately, they amplify both the signal and the noise. Signal-regenerating

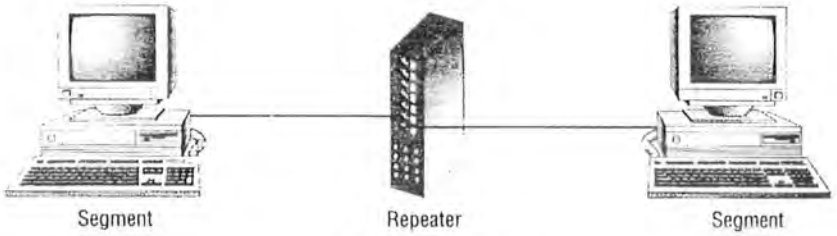


Figure-11.2

Bridges

Repeaters create an exact duplicate of incoming data by identifying it amidst the noise, reconstructing it, and retransmit ting only the desired information. This reduces the noise. The original signal is duplicated, boosted to its original strength, and sent.

Because repeaters simply deal with the actual, physical signals on a network, they operate at the Physical Layer of the 051 models.

Bridges connect network segments. The use of a bridge increases the maximum possible size of your network. Unlike a repeater, which simply passes on all the signals it receives, a bridge selectively determines the appropriate segment to which it should pass a signal. It does this by reading the address all the signals it receives. The bridge reads the physical location of the sour and destination computers from this address. The process works like this:

I. A bridge receives all the signals from both segment A and segment B.
2. The bridge reads the addresses and discards (filters) all signals from ment A that are addressed to segment A, because they do not need to cross the bridge.
3. Signals from segment A addressed to a computer on segment B are retransmitted to segment.
4. The signals from segment B are treated in the same way.

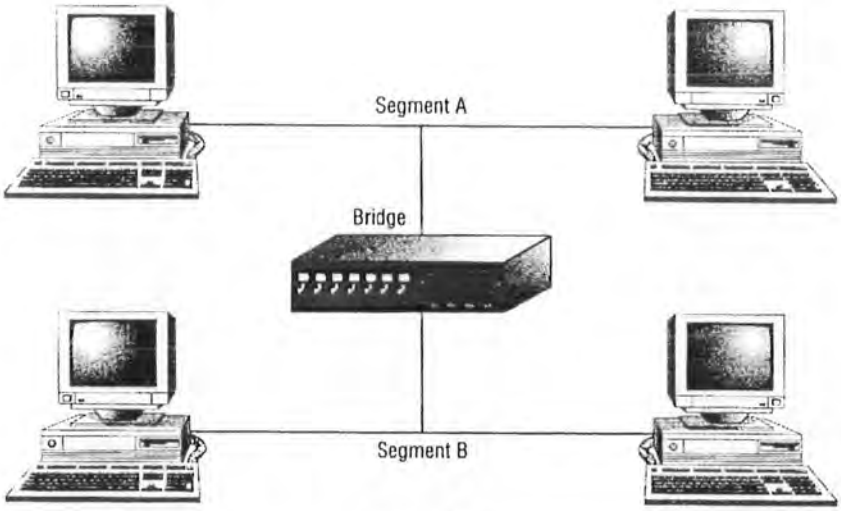


Figure-11.3

Through address filtering, bridges can divide busy networks into segments and reduce network traffic. Network traffic will be reduced if most signals are addressed to the same segment and do not cross the bridge. To use a bridge effectively, networks are often divided into groups by physical location and shared resources (such as printers, network servers, and applications). If most signals do not frequently cross the bridge, using bridges can help reduce traffic on your network.

Routers and Brouters

One basic mechanism in internetworking is routers. *Routers* are devices connect two or more networks. They consist of a combination of hardware and software. The hardware can be a network server, a separate computers a special black box device. The hardware includes the physical interfaces~ the various networks in the Internet work. These interfaces can be Token 14 Ethernet, TI, Frame Relay, Asynchronous Transfer Mode (ATM), or any number of other technologies. The two main pieces of software in a route the operating system and the routing protocol . Management software cans another software component of a router.

Routers use logical and physical addressing to connect two or more logically separate networks. They accomplish this connection by organizing the large network into logical network segments (sometimes called *sub networks* or *subnets).* Each of these subnetworks is given a logical address. This allows the networks to be separate but still access each other and exchange data when necessary. Data is grouped into packets, or blocks of data. Each packet, in addition to having a physical device address, has a logical network address.

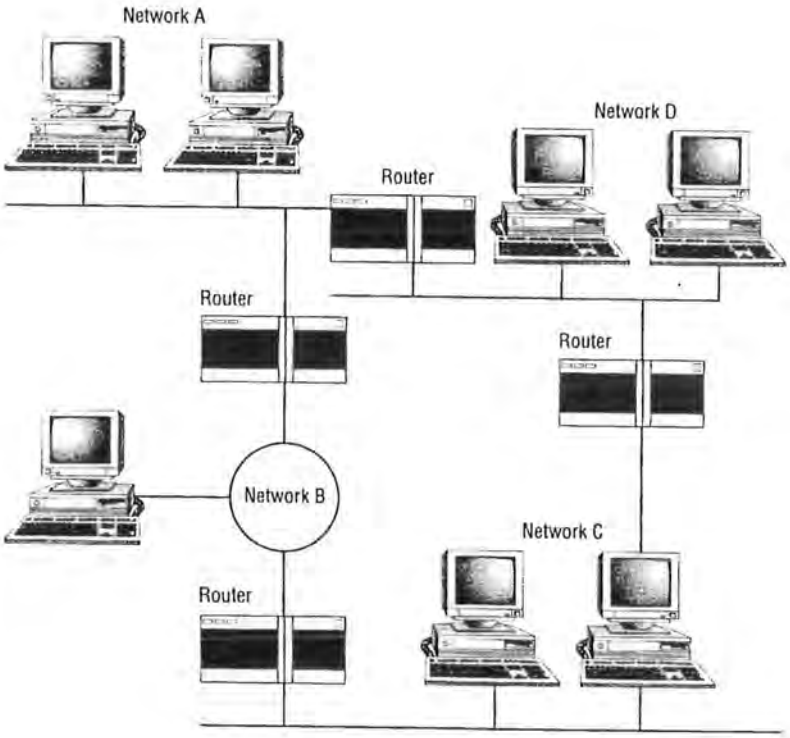


Figure-11.4

The network address allows routers to more accurately and efficiently calculate the optimal path to a workstation or computer. Routers perform a function very similar to that of a bridge, but routers keep the networks separate. Because they must check both the device address and the network address, router processing is generally slower than

the device address and the network address, router processing is generally slower than bridge processing. However, routers are more "intelligent" than bridges because they use algorithms to determine

Gateway

Routers can successfully connect networks with protocols that function in similar ways. When the networks that must be connected are using completely different protocols from each other, however, a more powerful and intelligent device is required. A *gateway* is a device that can interpret and translate the different protocols that are used on two distinct networks. Gateways can be comprised of software, dedicated hardware, or a combination of both. Although gateways can function at the Network layer, for the exam think of gateways as operating at the upper layers of the 051 model, above the Network layer. In other words, they function at the Transport, Session, Presentation, and Application layers. When you need to have different environments communicating, you may wish to consider a gateway.

A gateway can actually convert data so that it works with an application on a computer on the other side of the gateway. For example, a gateway c~ receive e-mail messages in one format and convert them into another forma You can connect systems with different communication protocols, language and architecture using a gateway.

CHAPTER # 12

IMPLIMENTATION

Network Implementation

Introduction

In the development of system implementation includes the activities that take place to convert from old to new system. There are aspects of implementation, which are as follows:

- Training Personnel
- Conversation Procedures
- Post Implementation

Training Personnel

Even a well designed and technically elegant system succeeds or fails of the way that operated and used

The training of a system includes:

Training of the System Operators: so as to ensure that they are able to handle all possible operations

User Training: Basically trained to trouble shoot the software

Conversion

Conversation is process of changing from the old system to new system.

Various methods of conversion

- Parallel System
- Direct Cut Over
- Pilot Approach
- Phase in Methods

Parallel System

In this system user continue to operate the old system in a accustomed manner at the same time begins using the new system, this is the safest conversion approach since it

guarantees that in case of any error the organization can still fall back to the old system without loss of time and revenue.

The approach for this system is parallel approach.

Direct Cutover

By this approach the old system converted to new system abruptly, this conversion system is more preferable in purchase or turnkey system.

Pilot Approach

In this approach a working version of the system is implemented in one part of organization and the remaining part of organization with the old system, this approach has an advantage of providing a sound providing ground before fully implemented.

Phase in Methods

This method is used when it is not possible to install a new system throughout the organization all at once.

Proposed System

Since the user has to get familiar with the newly assigned system which might take some time so the recommended and most suitable form of conversion for implementation of the system is the parallel conversion until the user become fully familiar with the operational details of the newly developed computer based information system.

Post Implementation

After the system has been implemented and conversion is completed a review of the system will be conducted by the analyst, user so as to assure the transition process.

Staff Requirements

There are some function re4quired to perform for data management especially when the software is newly installed

- To handle the errors some times occurs during the execution
- Sometimes the data may overflow or lost
- There may be some other problems with the staff before or at least they are not familiar with the computers, then new staff will be hired to operate the system as CGT is already using the computers and staff runs different packages so the newly installed system will be able to understand easily the staff for the new system should have following qualities

- The staff must be familiar with some computer packages
- They must be quite efficient with their work
- After the training they must be able to handle the newly installed computer based system

CHAPTER # 13

NETWORK TESTING

Definitions of Testing

Hetzel's Definition

Testing is the process of establishing confidence hat a program system does what it is supposed to do.

Myers's Definition

Testing is the process of executing a program or system with the intent of finding errors.

Practitioner's Views of Network Testing

- Checking programs against specification
- Finding bugs in the programs
- Determining user acceptability
- Insuring that the system is ready for use
- Gaining confidence that it works
- Showing that the program performs correctly
- Demonstration that the errors are not present
- Understanding the limits of performance
- Learning what the system is not able to do
- Evaluating the capability of the system
- Verifying the documentation
- Convincing oneself that the job is finished

Revised Definition of Testing:

Hetzel

Testing is any activity aimed at evaluating an attribute or capability of a program or system and determines that it meets its required results.

A Definition of Quality

Quality means "meet requirements"

Testing and Quality

- Quality is not intangible
- The purpose of testing is to make quality visible
- Testing is the measurement of software quality.

Typical Network Quality Factors

Functionality (Exterior Quality)

- Correctness
- Reliability
- Usability
- Integrity

Engineering (Interior Quality)

- Efficiency
- Testability
- Documentation
- Structure

Adaptability (Future Quality)

- Flexibility
- Reusability
- Maintainability

Software Testing: A Foundation

Any purposed testing methodology must provide a means of answering the following major questions.

1. What should be tested?
2. When should testing start and stop?
3. Who does the testing?

Testing Practice

Three common levels of testing

1. **UNIT TESTING:** Testing the individual client as they are written.
2. **SYSTEM TESTING:** Testing of group of clients.
3. **ACCEPTANCE TESTING:** Testing to verify the readiness for implementation or use.

Typical Unit Testing Process

OBJECTIVES: Confirm that address is coded correctly

WHO DOES IT? Usually a network administrator

WHAT IS TESTED?

- Data is transferring.
- IP configuration testing.
- Loop back testing..

WHEN COMPLETE: Usually when administrator comfortable and has no known defects.

TOOLS AND AIDS: Not commonly employed

Typical Network Testing Process

- **OBJECTIVES**: Assemble clients into a working system. Determine readiness for acceptance.
- **WHO DOES IT?** Test leader for test group.
- **WHAT IS TESTED?**
  - System requirements and function.
  - System interface.

WHEN COMPLETE: Usually when majority of requirements are met, no major defects remaining.