

**DESIGN AND IMPLEMENTATION OF COMPUTER NETWORKING
WITH TIMER SOFTWARE**

(A CASE STUDY OF MATH/COMPUTER SC. DEPT. FUTMINNA)


BY

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PGD/MCS/2005/2006/1181

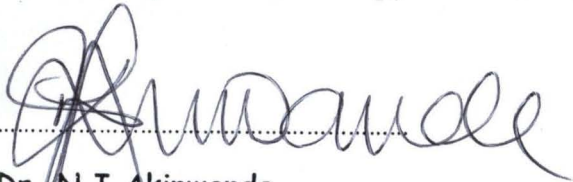
BEING A PROJECT SUBMITTED TO THE DEPARTMENT OF
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Certification Page

This is to certify that this project work "Design and implementation of Computer Networking with Timer Software" (a case study of Mathematics/Computer Science Department Federal University of Technology Minna, Niger State) was carried out by Ajayi Ebenezer Akinyemi with Registration Number FUTMinna/PGD/MCS/2005/2006/1181 in the year 2005/2006 academic session in partial fulfillment of the requirement for the award of Post-Graduate Diploma (PGD) in Computer Science in Department of Mathematics/Computer Science Department Federal University of Technology Minna, Niger State.

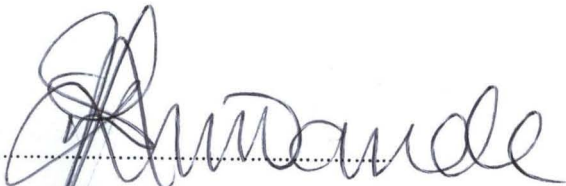


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DEDICATION

This project work is dedicated to Almighty God- the Alpha and Omega, the beginning and the end, my Lord Jesus Christ and unto the Holy Spirit who give the grace and strength through out my stay in Federal University of Technology, Minna and to my Angel "Miss Yusuf Banke Ajayi".

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My sincere thank goes to God Almighty for his guidance and protection over my life all through my stayed in Federal University of Technology, Minna. Indeed, I've come, seen and the Lord gives me the grace to overcome.

I acknowledge the efforts of my honorable and ever dynamic supervisor, Dr. N.I. Akinwande for his guidance, patience and assistant through the period of this project. I also thank my able Head of Department and his co-lecturers for making me what I am. More grease to your elbow!

My profound gratitude goes to my dearly parent Mr. and Mrs. Omoniyi Ajayi for their parental care, I say, don't be weary, get ready, for the battle is not yet over but I pray at the end, we shall have the course to rejoice together and you will eat from the fruit of your labour.

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I will not forget you my "In-Law" to be Mr. & Mrs. Yusuf, Bro Femi Ambross, Bro Bisi Yusuff (My Running Mate), Tayo Yusuff, Bukky

Yusuff, OdunAyo Yusuff, Mrs. Olobatoke, Mrs. Obatomi(Iya Agba), Mr. Tope Ibitomi for all your care. The Lord is your strenght.

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To my friends, I must say a big thanks to you Aladesoite Isaiah, COF(Committee of Friend) Idah chapter , Apesin Bamidele,BukkyDele, Lekan Aworinde, Lakeshade, Ayesimi Ibidun,Ifelola Ibitomi (Iwalewa), Achor Hillary, Faysal, Isah (2face & Idibai), Adaji Adamu(Mongo-pack), Favour Salami(Favour Mine), Prince Olayemi (Dangiska),Isaac of Access Bank(Pali),Edet,Kazeem(Alfa), Muhammed, Hajia, Adijo, Umaru(Bad Boy),Garuba, Bukky FUT, Sarah FUT(Emi-mimo) and a lot of others who had contributed in one way or the other make this project a reality.

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TABLE OF CONTENT

| | |
|---------------------------------------|--------|
| TITLE PAGE | i |
| Certification | ii |
| Dedication | iii |
| Acknowledgement | iv-v |
| Table of content | vi-vii |
| Abstract | viii |
| | |
| CHAPTER ONE | |
| 1.0 Introduction | 1 |
| 1.1 Statement of Problem | 1 |
| 1.2 Aim and Objective | 2 |
| 1.3 Scope and Limitation | 2 |
| 1.4 Definition of Terms | 3 |
| | |
| CHAPTER TWO | |
| 2.0 Literature Review | 4 |
| 2.1 Network Consideration | 4 |
| 2.2 Network Component | 5 |
| 2.3 Network Model | 6 |
| 2.4 Classification of Network | 8 |
| 2.5 Networking Operation System (NOS) | 10 |
| 2.6 O.S.I Model | 14 |
| 2.7 Network Media | 17 |

CHAPTER THREE

| | | |
|-------|-------------------------|----|
| 3.0 | Network Design | 31 |
| 3.1 | Topologies | 31 |
| 3.2 | Network | 33 |
| 3.3 | Popular Protocol Suites | 34 |
| 3.4 | Type of Network | 43 |
| 3.4.1 | ARCNET | 43 |
| 3.4.2 | Ethernet | 44 |
| 3.4.3 | Token Ring | 47 |
| 3.4.4 | F.D.D.I | 47 |

CHAPTER FOUR

| | | |
|-------|---|----|
| 4.0 | LAN Configuration And Software Installation | 49 |
| 4.1 | LAN Devices | 49 |
| 4.2 | Hardware Requirement | 50 |
| 4.2.1 | Server Specification | 50 |
| 4.2.2 | Client Specification | 51 |
| 4.3 | LAN Configuration | 51 |
| 4.4 | Cyber Café Software installation | 53 |

CHAPTER FIVE

| | | |
|-----|--|-----------------|
| 5.0 | NETWORK IMPLEMENTATION: Network Administration, Management and Troubleshooting | Services, 54 |
| 5.1 | Network Services | 54 |

| | | |
|-----|-------------------------|----|
| 5.2 | Network Administration | 56 |
| 5.3 | Network Management | 57 |
| 5.4 | Network Troubleshooting | 59 |

CHAPTER SIX

| | | |
|-----|--|----|
| 6.0 | Summary, Conclusion and Recommendation | 62 |
| 6.1 | Summary | 62 |
| 6.2 | Conclusion | 62 |
| 6.3 | Recommendation | 63 |

| | |
|-------------------------|-----------|
| <i>REFERENCE</i> | 64 |
|-------------------------|-----------|

APPENDICES

ABSTRACT

Globally, most business ideas and operations are facilitated by uninterrupted flow of information. Businesses have grown to the extent of using the latest up-to-date information available and shared between Computer facilities in form of electronic information transfer. This project work is concerned with the design of Computer Networking (Local Area Network) with Timer Software for the improvement on the services of system infrastructure in the Computer Laboratory, Department of Maths/Computer Science, Federal University of Technology Minna in order to produce high throughput.

CHAPTER ONE

1.0 INTRODUCTION

In the world today, the importance of electronic information transfer can not be overemphasized. Many Organization Companies and Industries have grown and their appetite for timely information is inexhaustible. Their businesses have grown to the extent of using up-to-date information for running high business deals and improving productivity. Every Organization, Company or Industry focuses on how to have fast access to information and optimized earning.

Decision and Policy making in such organizations depends solely on good database, information accessing protocols, sharing of available resources, flexibility of the system (Hardware and software), cost effectiveness and system reliability. In view of the importance of Electronic Information transfer and change in the environment location of the Computer Laboratory, Department of Maths/Computer Science, Federal University of Technology, Minna, there is a need for the improvement on the network arrangement in the Computer Laboratory to improve resource sharing , faster throughput and information access. This therefore necessitated this project "**Design and Implementation of Computer Networking (Local Area Network) with Timer Software**

1.1 STATEMENT OF PROBLEMS

Before the introduction of Computer networking, the existing system poses the following problems.

- i. No sharing of Computer resources among users
- ii. Operational Cost is very high.
- iii. The existing system does not aid research for Lecturer/Software development.
- iv. Maintenance is difficult and expensive
- v. The existing system is prone to error and errors without standard error correction techniques

1.2 AIMS AND OBJECTIVES OF THE PROPOSED SYSTEM

The project is about the Design and Implementation of Local Area Network with Timer software. The network is expected to serve the department by producing service in:

- a. Computer Laboratories for students
- b. Research for Lecture/Software development
- c. Internet center/Business center

The objective of the project is as follows:

- To provide resource sharing among the "Networked computer"
- To provide high performance in Cyber café and business center

1.3 SCOPE AND LIMITATION

The scope of this project is limited to Local Area Network.

1.4 DEFINITION OF TERMS

BRIDGE: This is a device that allows the segmentation of a large network into two smaller, more efficient networks. It monitors information traffic on both sides of the network so that it can pass packet of information to the correct location.

CLIENT: This is a computer that uses the services that a server provides. The client is usually less powerful than the server.

ISP: This is an Internet service provider. It provides internet services to various people.

LAN: This is also known as **Local Area Network**. This type of network consist of a set of nodes that are interconnected by a set of links covering a relatively small geographical area ranging from a few feet to a kilometer.

MEDIA: This is a physical connection between the devices on the network.

MAN: This is **Metropolitan Area Network**. It is a group of LANs located in a city.

MODEM: This is also known as **Modulation Demodulation**. This is a device that converts digital information to analog information and vice versa.

PEER: This is a Computer that acts as both Client and Server.

PROTOCOL: This is the written rules used for communications. They are languages that Computer uses to talk to each other over a network.

NOS: This is **Network Operating System**. It coordinates the activities of multiple computers across a network. The **NOS** act as a director to keep the network running smoothly.

SERVER: This is a powerful computer that provides services to the other Computer on the Network.

CHAPTER TWO

2.0 LITERATURE

HISTORY OF COMPUTER NETWORKING

Computer networks started in the early 60's. The major event viewed as the beginning of the technology and the reason for networking was the necessity to share expensive resources more effectively. The early system (RTDS for IBM 360 GECOS III for the Honeywell 600, Demand for the UNIVAC 1108 and TSS18 for the PDP 8) provided the means by which user could simultaneously (from user's perceptive) share and use the expensive Central Processing Unit (CPU) and associated resources (**John Mark** in 1960). The early development made computers more accessible to a wider number of individuals.

The second event in the timeline to networking was the development and introduction of communication oriented software and hardware components such as Asynchronous Line Protocols (SDLC, Bisync), Intelligent Terminals and Line concentrators. These developments led to the development of large disjointed system such as Airline Reservation System, Banking Information System, Credit Reporting and Information System and Remote Booking and Point of Sales Keeping. These still were not network but disjointed system that communicated sporadically using leased lines or telephone circuits to transfer information.

A feature, which ultimately provided the economic reason to interconnect computers to fixed networks, was the drastic drop in Computer equipment cost and the improvement in performance. When taken together, the factors resulted in the inception of the early network. The goal of network was to provide more effective use of the various computer resources via resource sharing and to provide for effective dissemination of information and more computing powers to users.

Thus the first operational network was Arpanet (Advance Research Project Agency Network), which was constructed by **Bolt, Beranet, and Newman** of **Cambridge, Massachusetts**, under the contact of **Arpa** and came on-line in 1969 using Packet Communication. This and the early network provide the vehicle to research many of the issues in Inter-Computer Communications and to set the groundwork to provide the stimulus to researcher to refine technologies seen in this network.

In 1980, due to the advent of relatively cheap PCs, there is a provision for **stand-alone** Computers, mainly IBM. Compatible machine running Microsoft's Operating Systems and Apple Macs. They were single-user systems that excited a wide range of application. The PCs were initially isolated, with data and applications being transferred and loaded on disks. However, increasingly they became connected to work group Local Area Networks (LAN). A server on the LAN provided centralized

file and print facilities. In this LAN-based mode of operation, the client machines store and run application locally but use the server to store common data and provide print facilities.

In today network, the user's machine access both application and data on networked servers. The network is very reliable and it can be LAN, MAN or WAN. User on network can access all the servers and all users' machine. Server can also access other servers, enabling one server to draw on applications or services they provide.

2.2 NETWORK COMPONENT

The under listed items are the components of network:

- i. Server
- ii. Client
- iii. Peer
- iv. Media
- v. Resources
- vi. User
- vii. Protocol

SERVER: This is a computer that provides services to the other computers on the network.

CLIENT: This is a computer that uses the services that a server provides. The client is usually less powerful than the server.

PEER: This is a computer that acts as both a client and a server.

MEDIA: This is a physical connection between the devices on a network.

RESOURCES: These are anything that is available to a client on a network. Examples of such are Printer, Data, Fax devices, Information etc.

USER: This is any person that uses a client to access resources on the network.

2.3 NETWORKING MODEL

Network model describe how information is process by the computers on the Network. Data can be processed by Client, Central Server, or everyone. The best server model for your needs is generally determined by the application you need to run.

The three basic models of Network are:

- a. Centralized
- b. Collaborated
- c. Distributed

A. CENTRALIZED NETWORK

This type of network keeps all data in a location assuring that everyone is working with the same information. These networks give the ability to access the mainframe from a remote location.

CHARACTERISTIC OF CENTRALIZED NETWORK

- ñ All data are stored in a location
- ñ It is easy to backup data
- ñ Terminal do not require a floppy drive
- ñ All information are kept in the server
- ñ The chance of Network being infected with a virus is low.
- ñ The server needs to be powerful system with a lot of storage space.
- ñ Termination does not require real processing or storage capacity of their own.

ADVANTAGES OF CENTRALIZED NETWORK

- ñ Easy back up
- ñ Security is guarantee
- ñ Low cost of implementation

DISADVANTAGE OF CENTRALIZED NETWORK

- ñ Slow Network access
- ñ If the users have a variety of needs, meeting these needs in a centralized computing network is difficult because user's applications and resources have to be set up separately.

B. COLLABORATED NETWORK

This allows computers to share processing power across a network. Application can be written to use the processing on other complete

jobs more quickly. These types of network can be faster, users are not limited to the processing power of one system to complete tasks.

CHARACTERISTICS OF COLLABORATED NETWORK

- ñ Users are not limited to the processing power of one system to complete tasks, i.e. is has the ability to process tasks on multiple system
- ñ It allows users to share data, resources and services between them self.

DISADVANTAGE OF COLLABORATED NETWORK

- ñ Susceptible to viruses
- ñ Difficult to backup
- ñ File synchronization

DISTRIBUTED NETWORK

This is type of network where all work is done on the server, data storage and processing is done on the local workstation. This allows for faster access to data. This type of network accommodates user with a variety of needs, yet it allows them to share data, resources and services. Computers in distributed network are capable of working as a stand-alone system but are networked together for increased functionality.

CHARACTERISTICS OF DISTRIBUTED NETWORK

- ñ Server does not need to be as powerful and expensive
- ñ Its accommodates user with a variety of needs
- ñ Computers are capable of working as a stand - alone system.

ADVANTAGES OF DISTRIBUTED NETWORK

Quick Access: - Each computer can store and process its own data. Moving these tasks from the server to the workstation allows for quicker access to data.

Multiple Uses: - With each workstation handling its own processing of data, user can be doing many types of work simultaneously.

DISADVANTAGES OF DISTRIBUTED NETWORK

Virus Susceptibility: - Any user can introduce an infected file, which may quickly spread throughout the network.

Back difficulty: - If data is spread throughout the network, it can be difficult to backup all needed files.

File Synchronization:- When files are stored in several locations, making sure users are working the same version can be difficult.

2.4 CLASSIFICATION OF NETWORK

A network is no longer just a group of computers in one office or even one large building. Networks are constantly being connected to each other to form larger Internets. An Internet is a large network made up of connected smaller networks.

The sizes of networks are generally classified into three different groups namely:

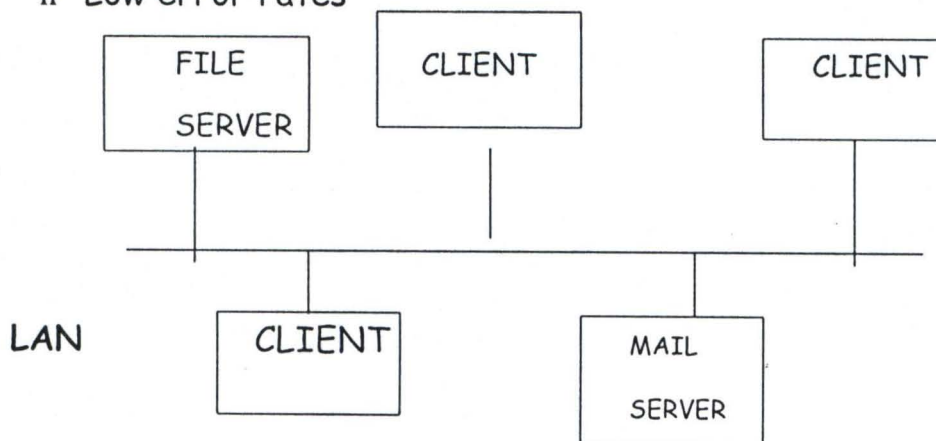
- i. Local Area Network (LAN)
- ii. Metropolitan Area Network (MAM)
- iii. Wide Area Network (WAN).

LOCAL AREA NETWORK (LAN)

This is a type of network that consists of set nodes that are interconnected by a set links covering a relatively small geographical area ranging from a few feet or a kilometer usually 50km apart.

CHARACTERISTICS OF LOCAL AREA NETWORK

- ñ Small areas, usually in one office or building
- ñ High speed
- ñ Most inexpensive equipment
- ñ Low error rates

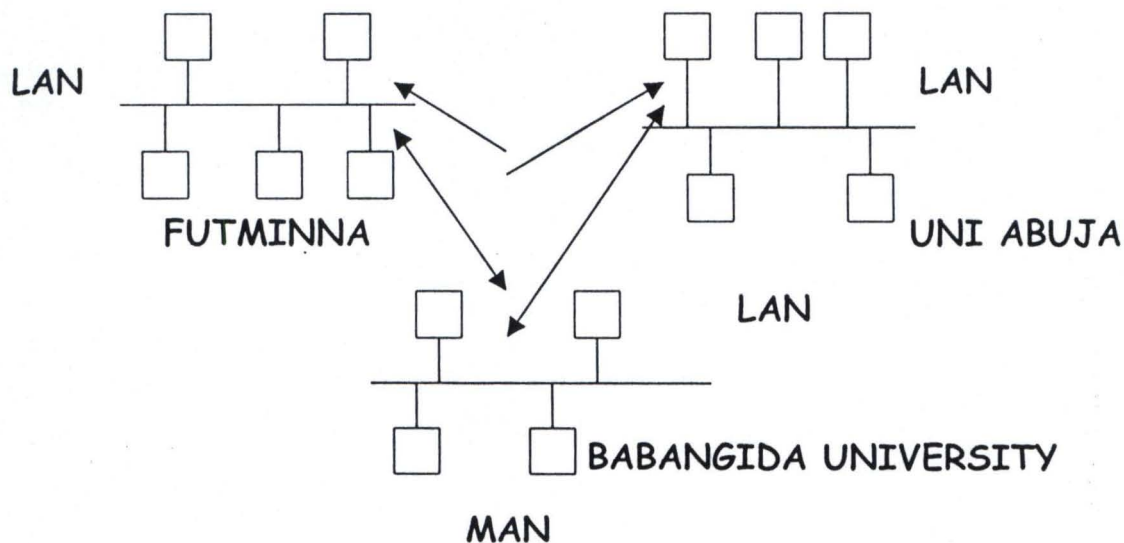


METROPOLITAN AREA NETWORK (MAN)

This is a group of Local Area Network located in a city.

CHARACTERISTICS OF MAN

- ñ Large area than a LAN - usually a large campus or organization spread over a city - size
- ñ Slower than a LAN, but faster than a WAN
- ñ Expensive equipment
- ñ Moderate error rates



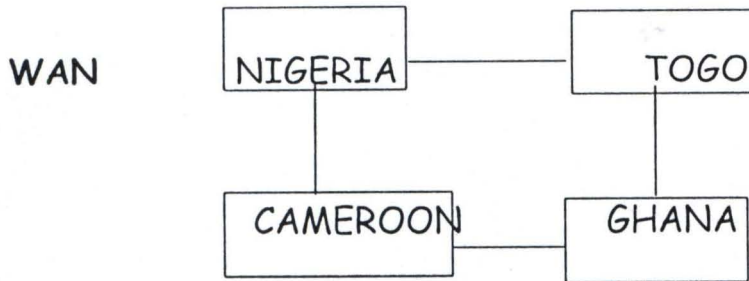
WIDE AREA NETWORK (WAN)

This is a type of network that connects nodes in a larger geographical area, usually on hundreds of kilometers such across a country or continent.

CHARACTERISTICS OF WAN

- ñ It can be as large as worldwide
- ñ Usually much slower than LAN speed

- ñ Highest possible error rate of all types
- ñ Expensive equipment



2.5 NETWORK OPERATING SYSTEM (NOS)

This coordinates the activities of multiple computers across a network. The NOS acts as a director that keeps the network running smoothly. It provides the control and management of all the components connected to the network only (Send-Receive). At the upper level, it manage input output devices, storage devices, computers and the associated software processes operation on the system.

The Network Operating System (NOS) allows users to request for services while being oblivious to whether it is local or remote request. For tight control of devices dispersed over a wide range, an integrated distribution operation system with services for synchronizing processes and distributed control is necessary.

FUNCTION OF NETWORK OPERATING SYSTEM

The NOS provide the following function:

- i. Processor and Memory Management

- ii. Input and Output Devices Management
- iii. Network management
- iv. File management

TYPES OF NETWORK OPERATION SYSTEM

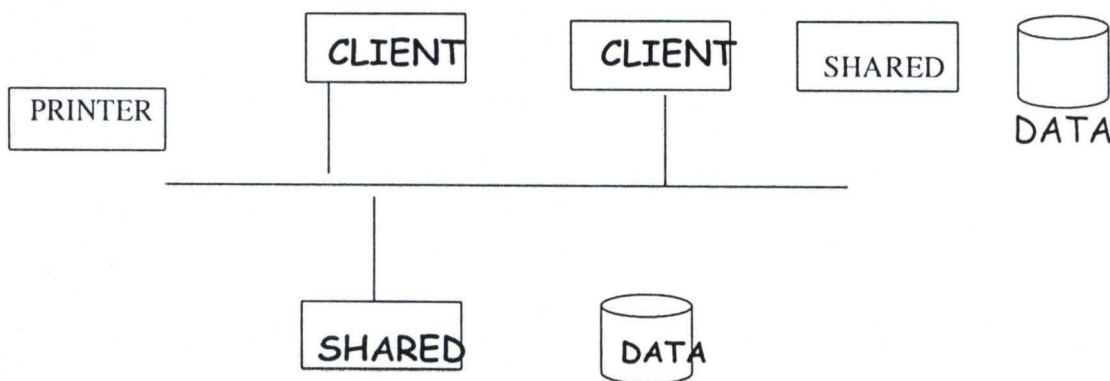
There are two major types of network operation system namely:

- i. Peer-to-Peer Network Operating System
- ii. Client/Server Network Operating System

PEER-TO-PEER NETWORK OPERATING SYSTEM

In this type of NOS, each workstation acts as both a client and a server. This is no central repository for information and no central server to maintain. Data and resources are distributed throughout the network and each user is responsible for sharing data and resources connected to their system.

PEER-TO-PEER NETWORK WITH SHARED RESOURCES



The following operating system associated with Peer-To-Peer Networking

- a. Windows 95

- b. Windows for workgroups
- c. Windows NT workstation
- d. OS/2
- e. Netware Lite

CHARACTERISTICS OF PEER-TO-PEER NOS

- ñ It is meant for small office
- ñ Users can keep their data their own local workstation
- ñ It allows them to handle their own security and bypass the need for a large and expensive server.

ADVANTAGES OF PEER-TO-PEER NOS

- ñ Inexpensive
- ñ Easy Setup
- ñ Easy Maintenance

DISADVANTAGES OF PEER-TO-PEER NOS

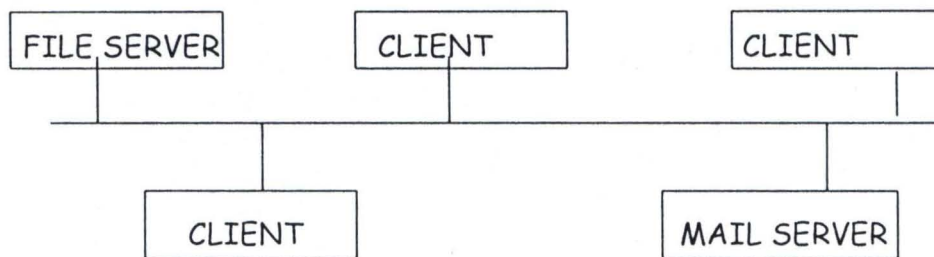
- ñ No central administration
- ñ Scattered data
- ñ Difficult -to-locate resources
- ñ Weak security
- ñ Dependent on user training

ii. CLIENT-SERVER NETWORK OPERATING SYSTEM

In this type of Network Operating System, there is one computer (usually larger than the client), which is dedicated to handling our files and/or information for the client. The server controls the data as well as printer and other resources that the client needs to access. It is very fast with a better processor. It requires much storage space to contain all the data that needs to be shared to the client. Server allows the client to be less functional because they only request resources. They are known as INTELLIGENT COMPUTER.

CHARACTERISTICS OF CLIENT-SERVER NOS

- ñ It provide service to other computer
- ñ Security is easily maintained
- ñ Ease of accessing and backing up data



CLIENT-SERVER NETWORK

Server can be either dedicated server or specialized service server

- A. Dedicated server can be divided into
 - i. File and print server

ii. Application server

FILE AND PRINT SERVER

These servers are optimized to hand out files to client and to handle printing requests. They are mainly used to store data application. When a client runs an application from a file and print server, it copies the needed files down locally and runs the application. No application processing is done on server everything is done on the client.

APPLICATION SERVER

Application servers are almost opposite of file server. The application runs is stored on the client. Requests are then sent to the server to be processed and the processed information is sent back to the client. This way, the client processes little information, and everything is done by the server. A good example of this is a databases application with a front-end on the client. A front-end is a small application that runs on a client, which sends and receives information to and from the server. The front-end acts mainly as an interface to the database stored on the server. When a user at the client ends needs information from the database, an instruction is sent from the client to server telling the server to search for that information. The server then sorts through the database, locates the information that was requested, and sends the answer back to the client.

B. Specialized Server: This is the server that has a single specialized purpose. The types of such server are:

- i. Mail server
- ii. Communication server

MAIL SERVER: This is a server specifically set up to handle client E-mail needs.

COMMUNICATIONS SERVER: Communication server is set up to handle remote user dialing into your network. The communication server applications are normally put on a separate server for security.

The operating system that client-server supports are Window NT, Novell's NetWare etc.

ADVANTAGES OF CLIENT-SERVER NETWORK OPERATING SYSTEM

- ñ Centralized Security
- ñ Dedicated server
- ñ Easy accessibility
- ñ Easy backup
- ñ Synchronized files

DISADVANTAGE OF CLIENT-SERVER NETWORK OPERATING SYSTEM

- ñ Dependent an administration
- ñ Expensive server

2.6 OPEN SYSTEM INTERCONNECTION MODEL

OPEN SYSTEM: This is a model that allows any two different Computers to communicate regardless of their underlying architecture.

OPEN SYSTEM INTERCONNECTION

This comprises a set of recommendation for conceptual protocol layer necessary in every open communication network. OSI suggest a way of organizing network protocols and looking at various levels of their functionality.

OPEN SYSTEM INTERCONNECTION MODEL

This is a layered framework for the design of network systems that allows for communication across all types of computers. It consists seven separate but related layers, each of which defines a segment of the process of moving information across a network. Layer one; two and three are the network support layer. It deals with the physical aspects of moving data from one device to another. Layer four, five, six and seven are referred to as user support layer. They allow interoperability among unrelated software layer.

PURPOSE OF OSI MODEL

OSI model offers the following function:

- ñ Network hardware and software designers can allocate tasks more effectively among network resources.
- ñ A network layer can be replaced easily by a layer from another network vendor.

- ñ Processes from mainframes can be off-loaded into FEDs or another network control devices.
- ñ Network can be upgraded easier by replacing individual layer instead of the entire software system.

ADVANTAGE OF LAYERING

The following are the advantage of layering:

- i. Standard interfaces between layers allow internal development within a particular layer to evolve.
- ii. Alternative services may be offered at a given layer by having different options or routes through the layer
- iii. Internal mechanisms of each layer are invisible to the other layers.
- iv. Layer may be completely removed if not required, or a simplified version can be used as substitute where appropriate.

OSI MODEL

| |
|---------------------|
| APPLICATION |
| PRESENTATION |
| SESSION |
| TRANSPORT |
| NETWORK |
| DATA LINK |
| PHYSICAL |

OPEN SYSTEM INTERCONNECTION LAYER

OSI layer comprises of the following:

- i. Physical
- ii. Data Link
- iii. Network
- iv. Transport
- v. Session
- vi. Presentation
- vii. Application

PHYSICAL LAYER (LAYER 1)

This is the bottom most layer which transmits the instructed raw bits streams over a physical medium the layer relates the electrical, optical, mechanical and functional interfaces to the cable.

It is also responsible for transmitting bit from one computer to another. It defines the data encoding and bit synchronization to ensure that when a transmitting host sends I bit, it is received as I bit.

DATA LINK (LAYER 2)

This is the layer that next to physical layer. It send data from the network layer to the physical layer. On the receiving end, it packages raw bits from the physical layer into data frames (a data frame is an organized logical structure in which data can be placed).

NETWORK LAYER (LAYER 3)

This layer is responsible for addressing message and names to physical addresses. It determines the route from source to the destination computer. It determines which path the data should take based on network condition priority of service and other factors. It also manages traffic problems on the network such as pack of switching routing and controlling the congestion of data.

TRANSPORT LAYER (LAYER 4)

It provides an additional connection level between the session layers. It ensures that packets are delivered error - free in sequence with no losses or duplication. This layer repackages message dividing long message into several packets and collecting small packets together to be transmitted efficiently over the network.

At the receiving end, the transport layer impacts the messages the message reassemble the original message and typical send and acknowledgement of receipt.

SESSION LAYER (LAYER 5)

This allows to application on different computer to establish use and end connection called a session. It performs name recognition and function such as security needed to allow two applications to communicate over the network.

RESERVATION LAYER (LAYER 6)

This layer determines the format use to exchange data among network computer. At the sending computer, the layer translate data from a format sent down from the application layer into commonly recognized intermediately format. At the receiving Computer, it translates the intermediary format into a final format.

APPLICATION LAYER (LAYER 7)

This is the topmost layer of O S I model. It represents the services that directly support user application such as software for the transfers, for database access and for E-mail, the layer handle general Network access flow control and error recovery.

2.7 NETWORK MEDIA

2.7.1 NETWORK ADAPTER

This is commonly known as network interface cards (NICs) or Network card. It is responsible for moving data from the Computer to the transmission media. The network adapter transforms data into signals that are carried across the transmission media to its destination. One the signals reach the destination devices, the NICs translate the signals back into information the computer can process. The circuitry on the card that does the conversion of the signal is known as a TRANSCEIVER. Ethernet can run over a few different cable types but

the main circuitry on all the Ethernet cards should be the same, only the transceiver should be different.

The following are the type of Network Adapter:

- i. I S A : Industry Standard Architecture
- ii. M C A : Micro Channel Architecture
- iii. E I S A : Extended industry standard Architecture
- iv. V E S A : Video Electronic Standard Association
- v. P C I : Peripheral Component Interface
- vi. PCMCIA : Personal Computer Memory Card International Association

NETWORK ADAPTER PORT

This is a part that allow adapter card to connect to the network media. The type of connector you can use may depend on the brand of network adapter you chose or the type of network to which it is connecting.

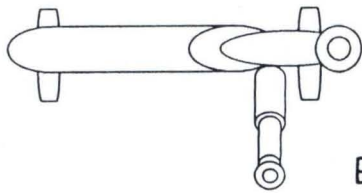
TYPE OF CONNECTOR

- i. BNC Connector
- ii. RJ-45 Connector
- iii. DIX Connector
- iv. AUI Connector

BNC CONNECTOR

This is used in Attached Resource Computer Network (ARCNET) and in thin Ethernet (10 Base - 2). The connector is a small, round cylinder with two small prongs on the outside that allows a connector to attach

to it. BNC looks like T connector. It is used to connect the network adapter to the two pieces of coaxial cable.



BNC CONNECTOR

RJ - 45 CONNECTOR

The RJ - 45 connector looks much like a normal telephone cable connector, but larger. It uses twisted pair cabling with four pairs of wires. A normal telephone jack uses an RJ - 11 connector, which is a twisted pair with two pairs of wires.

DIX CONNECTOR

These connectors are not used often anymore but were widely used when thick Ethernet was popular DIX is a 15-pin connector with two rows of pins. A cable was attached to the NIC through this port and was attached to the thick Ethernet cable by use of a "Vampire tap" The tap had to be drilled into the cable and tightened down. DIX stands for three companies that invented it: Digital, Intel, and Xerox.

AUI CONNECTOR

This is also known as Attachment Unit Interface. It is a renamed DIX connector. It is mainly use today for external transceiver.

2.7.2 BOUNDED MEDIA

Bounded Media are also known as wires or Network cable. They are referred to as bundle media because the signal travels through a physical media shielded on the outside (bounded) by some material. Bounded media are made up of a central conductor (usually copper) surrounded by a jacket material. Bounded media are great for LANs because they offer high speed, good security, and low cost.

The following are the characteristic to look for in selecting or chosen a cable:

- i. **COST:** Cost can be an important consideration when deciding on a network cable
- ii. **CAPACITY:** This is characteristic to be considered when choosing a cable. "How fast will it go" matter most. Cable speed is referred to as bandwidth and is an important characteristic of a media type.
- iii. **ATTENUATION (MAXIMUM DISTANCE):** Depending on what you need to network together, the maximum cable distance may also be considered.

TYPE OF BOUNDED MEDIA

Three common types of bounded media are

- (a) Coaxial
- (b) Twisted Pair
- (c) Fiber Optic

2.7.2.1 COAXIAL CABLE

Coaxial cable gets its name because it contains two conductors that are parallel to each other, or on the same axis. The inner conductor in the cable is usually copper. The copper can be either a solid wire or a standard material. Outside this central conductor is a non-conductive material. It is usually white, plastic like material, used to separate the inner conductor from the outer conductor. The outer conductor is a fine mesh made from copper.

The actual network data travels through the center conductor in the cable should be grounded at one end to dissipate this electrical interface.

The most common coaxial standard are:

- 50-Ohm RG-7 or RG 11: used with thick Ethernet
- 50-Ohm RG-58: used with thick Ethernet
- 75-Ohm RGG-59: Used with cable television
- 93-Ohm RGG-62: Used with ARCNET

CHARACTERISTICS OF COAXIAL CABLE

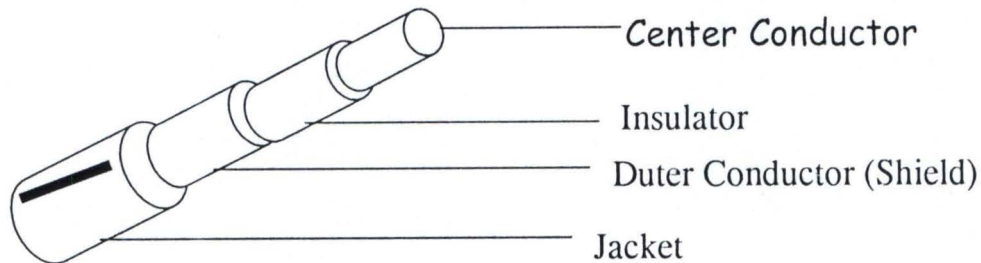
- Low Cost
- Easy to Install
- Up to 10 MPs capacity
- Medium attenuation
- Medium Immunity from EMI

ADVANTAGES OF COAXIAL CABLE

- Inexpensive
- Easy to wire
- Easy to expand
- Moderate level of EMI immunity

DISADVANTAGE OF COAXIAL CABLE

- Signal cable failure can take down an entire network.



COAXIAL CABLE

2.7.2.2 TWISTED CABLE

Twisted - pair cable is made up of pairs of solid or standard copper twisted around each other. The twists are done to reduce the vulnerability to Emi and cross talk. The number of pairs in the cable depends on the type. The copper core of the cable is usually 22-AWG ors 24-AWG, as measured on the American Wire Gauge standard.

It is lightweight, easy to install, in expensive, and support many different types of networks. It can also support speed of up to 100 Mbps.

There are two varieties of twisted pair cable namely:

- a. Unshielded twisted pair (U T P)
- b. Shielded twisted pair (S T P)

UNSHIELDED TWISTED PAIR (UTP)

U T P data cables consist of two or four pairs of twisted cables. Cable with two pair use RJ-11 connectors, and four-pair cables use RJ-45 connectors. It can be either grade or data grade, depending on the application. UTP cable normally has an impedance of 100 ohms. UTP costs less than shielded twisted pair. They are five levels of data grade cabling namely:

- i. **Category 1:** This category is intended for use in telephone lines and low speed data cable.
- ii. **Category 2:** category 2 includes cabling for lower- speed network. These can support up to 4 Mbps implementations.
- iii. **Category 3:** This is a popular category for standard Ethernet network. These cables support up to 16 but are most often used in 10 Ethernet situations.
- iv. **Category 4:** This is used for longer distance and higher speeds than category 3 cable. It can support up to 2 20 Mbps.

- v. **Category 5:** This cable is intended for high-performance data communications. This is the highest rating for UTP cable and can support up to 1000 Mbps.

CHARACTERISTIC OF UTP

- ñ Low cost (but slight is higher than coaxial)
- ñ Easy to install
- ñ High-speed capacity
- ñ High attenuation
- ñ Susceptible to EMI
- ñ 100-meter limit

ADVANTAGES OF UTP

- ñ Easy installation
- ñ Capable of high speeds for LANs
- ñ Low cost

DISADVANTAGE OF UTP

- ñ Short distance due to attenuation

SHIELDED TWISTED PAIR (STP)

STP is similar to UTP but has a mesh shielding that protects it EMI, which allows for higher transmission rates and longer distances without errors. STP is usually used in TOKEN RING.

STP has difference levels and they are describe below:

- i. TYPE 1: Type 1 STP feature two pairs of 22-AWG, with each pair foil wrapped inside another foil sheath that has a braid ground.
- ii. TYPE 2: This type includes type I with four telephone pairs sheathed to the outside to allow one cable to an office for both voice and data.
- iii. TYPE 6: This type features two pairs of stranded, shielded 26-AWG to be used fore patch cable.
- iv. TYPE 7: This type of STP consist of stranded, 26-AWG wire
- v. TYPE 9: Two pairs of shielded 26-AWG, used for data, comprise this type of cable.

CHARACTERISTICS OF STP

- ñ Medium Cost
- ñ Easy of installation is medium due to grounding and connectors.
- ñ Higher attenuation, but the same as UTP
- ñ Medium immunity from EMI
- ñ 100-meter limit

ADVANTAGE OF STP

- ñ Shielded
 - Faster speed than UTP and coaxial

DISADVANTAGES OF STP

- ñ More expensive than UTP and coaxial
- ñ More difficult installation
- ñ High attenuation rate.

2.7.2.3 FIBER- OPTIC CABLE

Fiber optic cable makes use of light transmit data. In a fiber cable, light only moves in one direction. For two communication to take place, a second connection must be made between the two devices, which why you examine fiber cable you notice it is actually two strands of cable each strand is responsible for one direction of communication.

A laser at one device sends pulse of light through this cable to the other device. These pulses are translated into 0's and 1's at the other end. In the center of the fiber cable is a glass strand, or core. The light from the laser travels through this glass to the other device. Around the Internet core is a reflective material know is cladding. No light escapes the glass core because of this reflective cladding. Fiber optic cable has a bandwidth of more than 2 gbps.

CHARACTERISTICS OF FIBER-OPTIC CABLE

- ñ Expensive
- ñ Very hard to install
- ñ Capable of extremely high speed
- ñ No EMI problems

DISADVANTAGES OF FIBER-OPTIC MEDIA

- ñ Hard to install
- ñ Expensive

2.7.2.4 ELECTRICAL PROPERTIES OF BOUND MEDIA

- i. **RESISTANCE:** when electricity moves through a media meets resistance. When moves resistance is met, more electricity is lost during transmission. The resistance causes the energy to be covered to heat. Cable with small diameters has more resistance than cable with large diameter.
- iii. **IMPEDANCE:** The loss of energy from an alternating current (AC) is impedance. It is measured in Ohms. DC travels through the core of the wire while AC travels on the surface.
- iv. **NOISE:** Noise is a serious problem for cabling and is sometimes hard to pinpoint. Noise can be caused by radio interference (RFI) or electromagnetic interference (EMI). Some common causes are fluorescent light, transformation, power Company on a bad day, and nearly anything else that creates an electrical field, noise can be easy to avoid if you plan your cable installation well.
- v. **ATTENUATION:** This is the fading of the electrical signal over a distance.
- vi. **CROSS TALK:** This is when the signal from one cable is leaked to another by an electrical field. An electrical field is created whenever an electrical signal is sent through a wire. If two wires

are close enough and do not have enough EMI protection, the signal may leak and cause noise on the other wire.

2.7.3 UNBOUNDED MEDIA

Unbounded media is also known as **WIRELESS** media. This media does not use any physical connector between the two devices communication. The transmission is sent through the atmosphere, but sometimes it can be just across a room. Wireless media is used when a physical obstruction or distance block the use of cable media.

TYPE S OF UNBOUNDED MEDIA

The three main types of wireless media are:

- a. Radio wave
- b. Microwave
- c. Infrared

2.7.3.1 RADIO WAVE

Radio wave has frequencies between 10 KHz and I GHz. Radio wave include the following type

- ī Short-wave (SW)
- ī Very -high frequently (VHF) television and radio
- ī Ultra-high frequently (UHF) television and radio.



RADIO TOWER

Radio wave transmission can be into the three categories

- i. Low power, single frequency
- ii. High power, single frequency
- iii. Spread spectrum

i. LOWER POWER, SINGLE FREQUENCY

This system transmits on one frequency and has low power output. The normal operating range on these types of devices is 20-25 meters. The speed of this system varies from 1 Mbps to 10Mbps. Attenuation is a problem with these devices due to the low power output that is allowed.

CHARACTERISTICS OF LOW POWER SINGLE FREQUENCY

- ñ Low cost wireless media
- ñ Simple installation with reconfigured equipment
- ñ 1 Mbps to 10Mbps capacity
- ñ High attenuation, which can limit range to 25 meters
- ñ Low immunity to EMI

ii. HIGH POWER, SINGLE FREQUENCY

This system is similar to low power, single frequency but the only different is that the device can communicate over greater distances. Transmission can be line of sight or bounced off the atmosphere for longer distance.

CHARACTERISTICS OF HIGH POWER, SINGLE FREQUENCY

- ñ Moderate cost for wireless media
- ñ Easier installation than low-power solution
- ñ 1 Mbps to 10Mbps capacity
- ñ Low attenuation for long distances
- ñ Low immunity to EMI

iii. SPREAD SPECTRUM

This system uses several frequencies at once provide reliable transmissions that are resistance to resistance. Spread spectrum communicate makes use of the following method transmit information.

- i. Direct- sequence modulation and
- ii. Frequency hopping

DIRECT- SEQUENCE MODULATION:- This break data chips and transmits the chips across several frequencies. The receiver knows which data to collect on the different frequencies and assembles the accordingly.

FREQUENCY- HOPING: This system strict timing to switch frequencies. Both the sender and receive are sets to change frequencies at specific time. Burst of data are sent on one frequency, and them the machine switch to another frequency for the next data bust.

CHARACTERISTICS OF SPREAD SPECTRUM

- ñ Moderate cost
- ñ Simple to moderate installation
- ñ 1-6 Mbps capacity
- ñ High attenuation
- ñ Moderate immunity to EMI

2.7.3.2 MICRO WAVES

Microwave travel at higher frequencies than radio waves and provide better throughput as a wireless network media. Microwave transmission requires the sender to be within sunlight of the receiver.

Communication system can be:

- i. Terrestrial microwave and
- ii. Satellite microwave

TERRESTRIAL MICROWAVE

Terrestrial microwave transmission is used to transmit wireless signals across a few miles. The system is often used to cross roads or other barriers that cable connections are difficult. This system requires that direct parabolic antennas be pointed at each other. Relay towers can be used as a repeater to extend the distance of the transmission. Terrestrial microwave operates in the low Giga-hertz range.

CHARACTERISTICS OF TERRESTRIAL MICROWAVE

- ñ Moderate to high cost
- ñ Moderately difficult installation
- ñ 1-10Mbps capacity
- ñ Variable attenuation
- ñ Low immunity to EMI

SATELLITE MICROWAVE

Satellite microwave transmission is used to transmit signal throughout the world. These systems use satellite in orbit 50,000 km above the earth. Satellite dishes are used to send the signal to the satellite where it is then sent back down to the receiver's satellite.

This transmission use directional parabolic antennas within line-of site. The large distance the signal travel can cause propagation delays. These systems can provide average bandwidth but it lack advance security and protection from interference.

CHARACTERISTICS OF SATELLITE MICROWAVE

- ñ High cost
- ñ Extremely difficult and complex installation
- ñ 1-10Mbps capacity
- ñ Variable attenuation
- ñ Low immunity to EMI

2.7.3.3 INFRARED

The technology of infrared is similar to the use of a remote control for a television. Its frequency is below visible light. Because of its high frequency, it allows high-speed data transmission. Obstructions obstructing the sender or receiver and any interference from light sources can affect infrared transmission. These systems are susceptible to electromagnetic interference and can be used successfully where certain types of cable media fail. This type of transmission falls into the following two categories.

- a. Points-to-point
- b. Broadcast

POINT-TO-POINT

This transmission utilizes high beams to transfer signal directly between two systems. Point-to-point requires direct alignment between devices. This system is susceptible to interference from anything that can block the path of the beam. It provides a high level of security. Many laptops and PDAs (personal data assistants) use point-to-point transmission.

CHARACTERISTICS OF POINT-TO-POINT

- ñ Wide range of costs
- ñ Moderately easy installation
- ñ 100kbps -16Mbps capacity

- ñ Variable attenuation
- ñ High immunity to EMI

BROADCAST

Broadcast infrared transmission use a spread signal, one broadcast in all directions, instead of direct beams. This helps to reduce the problems of alignment and obstruction. It allows multiple receivers of signal. Broadcast infrared operates in the same frequencies as point-to-point infrared and is susceptible to interference from light sources.

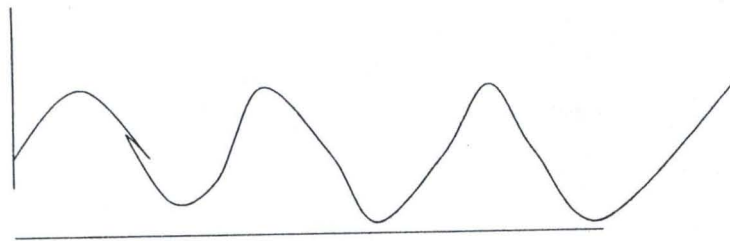
CHARACTERISTICS OF BROADCAST INFRARED

- ñ Inexpensive
- ñ Simple installation
- ñ 1 Mbps capacity
- ñ Variable attenuation
- ñ Moderate immunity to EMI

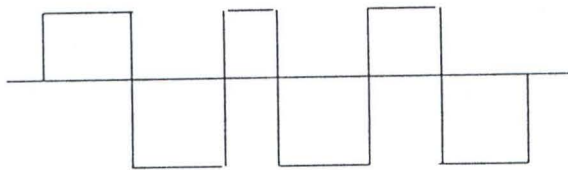
2.7.4 DATA TRANSMISSION

Data transmission is the way in which data is being transferred in the network. Data transmission across the network can occur in two forms namely:

- i. Analog
- ii. Digital



ANALOG SIGNALING



DIGITAL SIGNAL

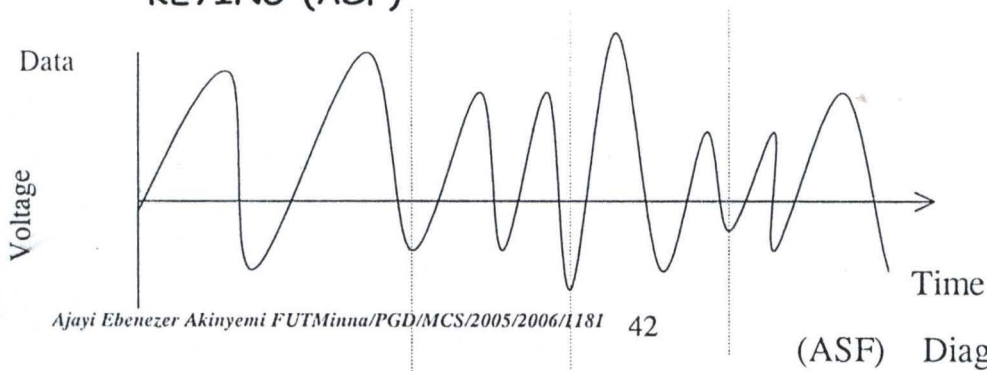
ANALOG SIGNALING

An analog signal takes form of a wave, which smoothly curves from one value to the next. The analog wave start at zero, increase to its high peak, recedes past zero to its low peak, and then rise to zero this change in the wave is know as the wave cycle.

CHARACTERISTICS OF ANALOG SIGNAL

The following are the characteristic of analog signal:

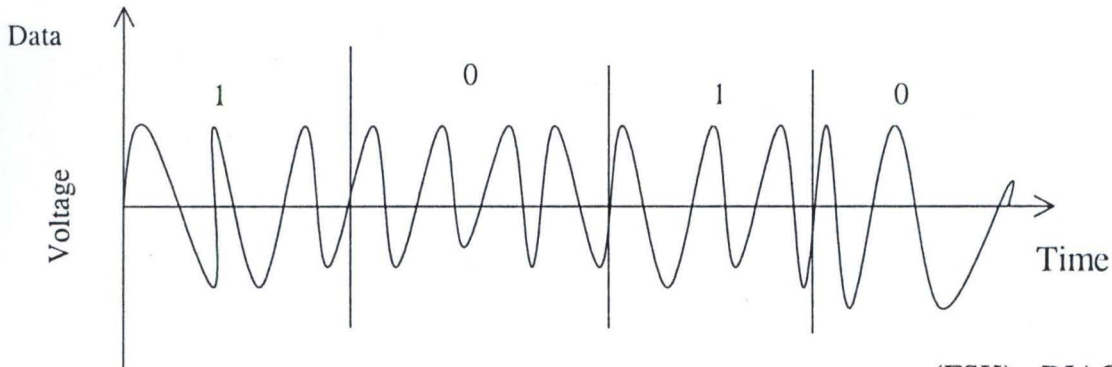
- i. **AMPLITUDE:** This is the signal strength and is measured as the distance from the zero baselines to the high peak. The method use to encode data using amplitude is called **AMPLITUDE SHIFT KEYING (ASF)**



(ASF) Diagram

FREQUENCY: This is the time it makes signal to complete its cycle. Frequency is measured in Hertz. The method use to encode data value using frequency is called

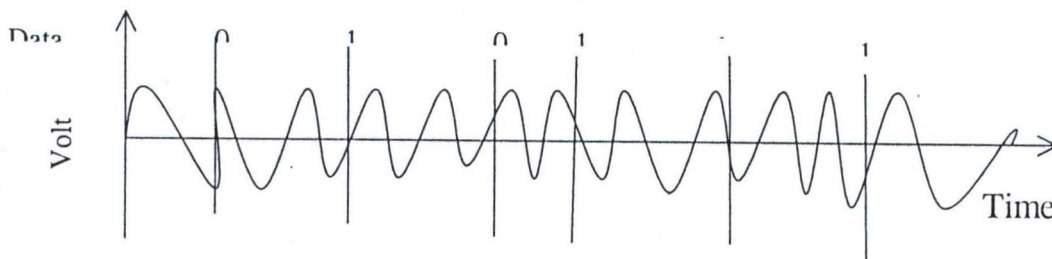
FREQUENCY SHIFT KEYING (ASK)



(FSK) DIAGRAM

PHASE: This is determined by comparing the cycles of two signals of the same frequency. Phase is measured in degree. The method use to code data value using phase is called

PHASE SHIFT KEYING (PSK)



(PSK) DIAGRAM

ADVANTAGES OF ANALOG SIGNALING

- ñ Allows multiple transmission across the cable
- ñ Suffers less from attenuation.

DISADVANTAGES OF ANALOG SIGNALING

Suffer from EMI and noise

Can only be transmitted in one direction without sophisticated equipment

ii. DIGITAL SIGNALING

This is a king signal that changes from 0 to 1 instead of smooth curve in analog signaling, digital jump directly to the next value. Digital signals are synchronized in bits. This can be clocked by either sending a separate clocking scheme across the network with the bits, or by using a guaranteed state-change clocking scheme.

ADVANTAGES OF DIGITAL SIGNALING

- ñ Equipment is cheaper and simpler than analog equipment
- ñ Signal can be transmitted on a cable bi-directionally.
- ñ Digital signals suffer less from noise and interference

DISADVANTAGES OF DIGITAL SIGNALING

- ñ Only one signal can be sent at a time
- ñ Digital signals suffer from attenuation

CHAPTER THREE

3.0 NETWORK DESIGN

3.1 TOPOLOGY

Topology can be defined as the interconnection of network nodes. This can be classified into the following:

- (a) PHYSICAL TOPOLOGY (b) LOGICAL TOPOLOGY

PHYSICAL TOPOLOGY: - This refers to the way in which the end points of computers are connected electronically. It involves how cable and computer are connected together.

LOGICAL TOPOLOGY: - This is the method in which the information is passing between the workstation and main server.

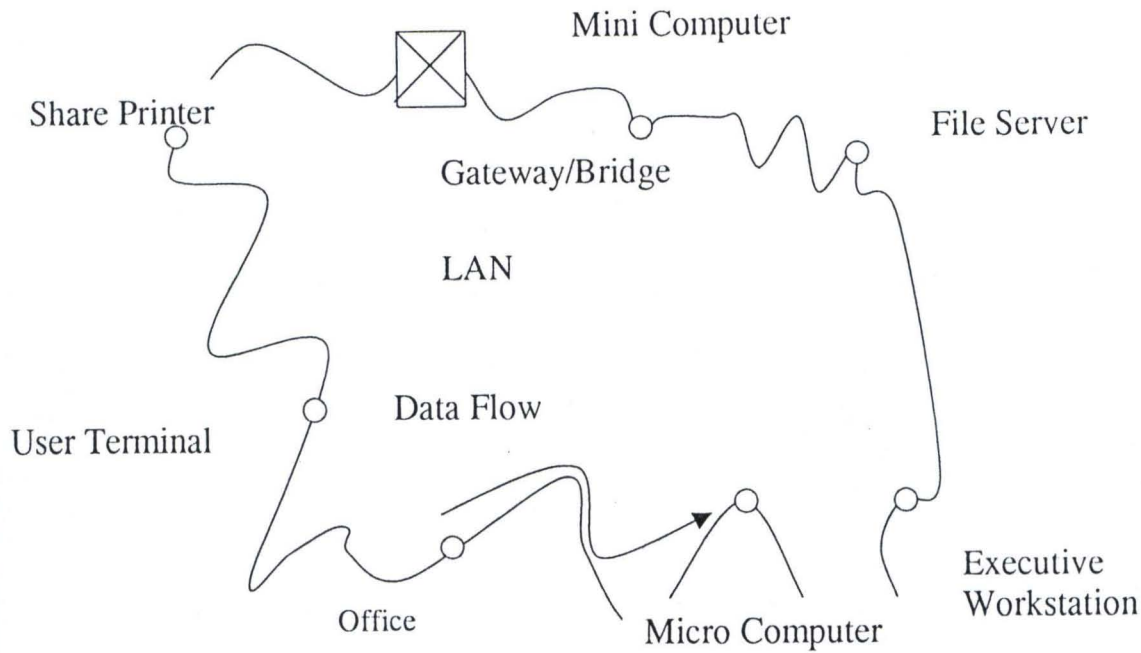
TYPES OF TOPOLOGY

The following are the types of topology

- i. Ring Topology
- ii. Bus Topology
- iii. Star Topology

RING TOPOLOGY

Ring topology connects all the terminals or microcomputers with one continuous loop. Within this loop, data travels in one direction only making a complete circle around the loop.



ADVANTAGES OF RING TOPOLOGY

- It provides an orderly network in which every device has access to the token and can transmit
- It performs well under heavy load.

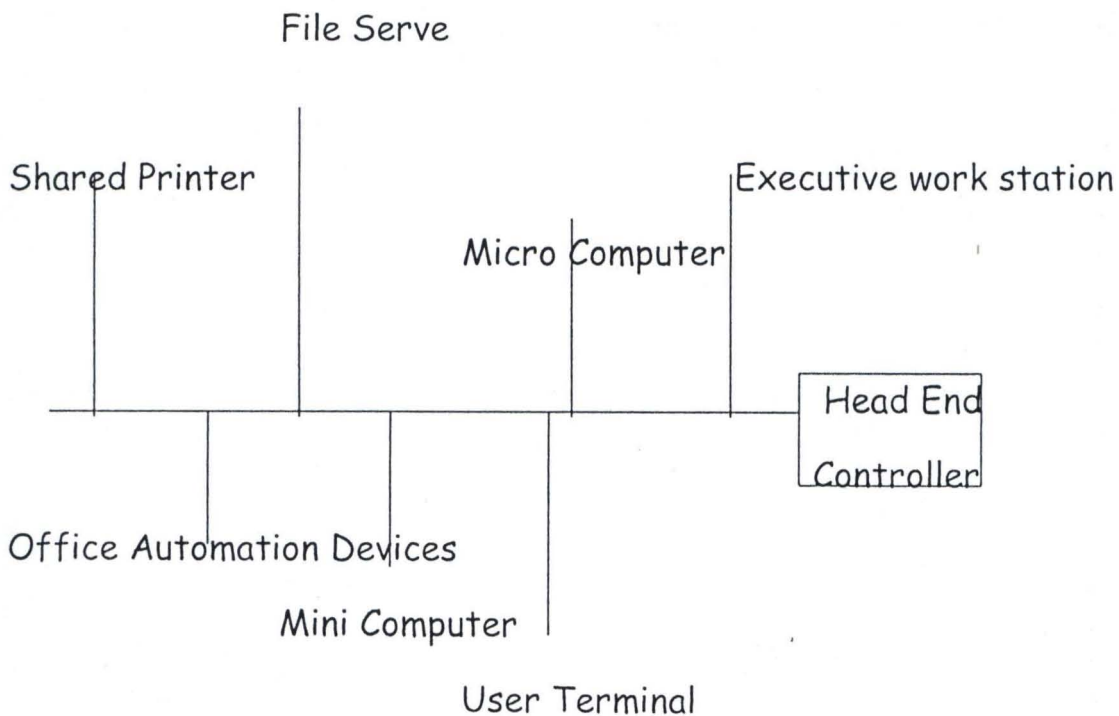
DISADVANTAGES OF RING TOPOLOGY

- Malfunctioning workstations and cable create problems for the entire network
- Changes made when adding or removing a device affect the entire network

BUS TOPOLOGY

In this type of topology, each of the terminals or microcomputers is connected to a signal cable that runs the entire length of the network.

Messages travel directly to or from the intended terminal or microcomputer.



BUS TOPOLOGY DIAGRAM

ADVANTAGES OF BUS TOPOLOGY

- ñ Easy to install and configure
- ñ Inexpensive
- ñ Easy extended

DISADVANTAGE OF BUS TOPOLOGY

- ñ Performance degrades
- ñ Barrel connector used to extend the cable lengths can weaken the signal
- ñ Troubleshooting a bus can be quite difficult

STAR TOPOLOGY

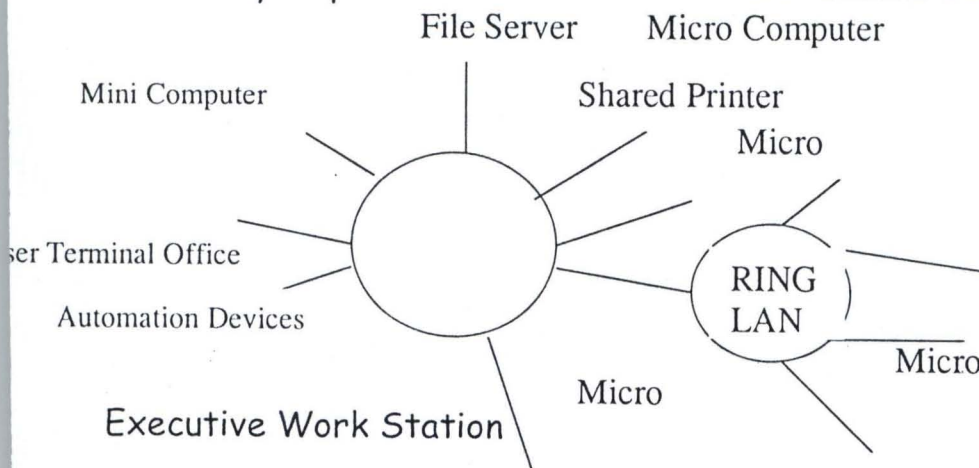
Star topology uses a separate cable for each workstation. This cable connects the workstation to a central device, typically a hub. This configuration provides a more reliable network that is easily expanded.

ADVANTAGES OF STAR TOPOLOGY

- ñ Easily expanded
- ñ Easier to troubleshoot
- ñ Multiple cable types supported by hubs

DISADVANTAGE OF STAR TOPOLOGY

- ñ The hub can be a single point failure
- ñ Requires more cable than most other topologies
- ñ May require a device to rebroadcast signals across network



STAR TOPOLOGY DIAGRAM

3.2 NETWORK PROTOCOL

PROTOCOL is a set of rule and convention used to impose standardize structured language for the communication between multiple parties. For example, a protocol might define the order in which information is exchange between two parties. Therefore, Network protocol can be defined as a set of rules and conventions used to impose standardize structured languages for the communication between multiple computers. It defines the order in which information is exchange between two Computers. Networks protocol may determine packet size, information in the header, and how data is stored in the packet.

PROTOCOL SUITE: - This is a collection of protocols that work together to form a single system to handle networking devices. It can be defined as a set of many layers, and is usually part of the operating system kernel on machines connected to the Internet.

ROUTABLE PROTOCOL:- This is the ability of a protocol to communicate across the router. This type of protocol needs extra layers to handle the routing feature.

NON ROUTABLE PROTOCOL:- This is the type of protocol that cannot be routed and are limited to smaller LANs. These are as large as they are today. Non-routable protocols are usually faster and provide better transfer speeds due to fewer overheads.

CONNECTIONLESS PROTOCOL:- This is a type of protocol that sent out data across the network with no feedback as to whether it arrived

at the destination device or not. This type of protocol is mainly used when there is a need to send data to multiple computers are once or where high speed is needed.

CONNECTION-ORIENTED PROTOCOL:- This is a type of protocol employ when you need to ensure that certain data arrives at its destination. Protocols send acknowledgements to show that data was received successfully.

3.3 POPULAR PROTOCOL SUITES

The following are some popular protocol suites

- i. TCP/IP
- ii. IPX/SPX

TCP/IP PROTOCOL SUITE

TRANSMISSION CONTROL PROTOCOL / INTERNET PROTOCOL (TCP/IP)

This Protocol suite is also known as INTERNET PROTOCOL. This is a suite of industry - stand and protocol. The TCP/IP suite is made up of many protocols. It has a broad feature set due to its large number of open standard protocols.

INTERNET PROTOCOL (IP)

IP is the standard that defines the manner in which the network layers of two hosts interact. These hosts may be on the same network or

reside on physically distinct heterogeneous networks. IP provides a connectionless, unreliable, best - effort packet delivery service.

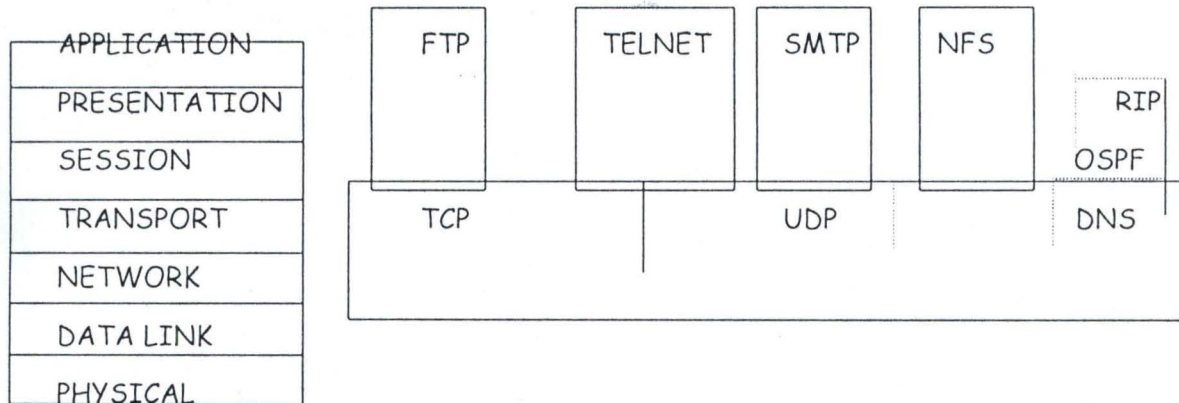
TCP/IP AND THE OSI MODEL: - This original design for TC/IP was started long before the OSI model was developed. Instead of OSI's seven-layer model, TCP/IP was based on DOD (Department of Defense) model with four layers. The four layers can be loosely method to the OSI model in the following ways:-

NETWORK ACCESS LAYER: - This layer corresponds to the physical and data link layer of the OSI model. When TCP/IP was developed, it was made to use existing standards for these two layers so it could work with such protocols as Ethernet and token ring.

INTERNET LAYER: - this layer of the DOD model roughly matches up with the Network layer of the OSI model. Both of these layers are responsible for moving data to other devices on the network. Internet Protocol (IP) is mainly responsible for this job.

HOST-TO-HOST-LAYER:- This one is similar to the transport layer OSI model. The job of both of those layers is to communicate between peers on the network. As a result of this, almost all devices on a TCP/IP network are considered hosts, whether they're workstation, servers, or network-attached printer.

PROCESS/APPLICATION LAYER:- This fourth layer dose the same job as the top three of the OSI model, which is to provide network services.



TCP/IP PROTOCOLS AND NOW THEY CORRESPOND TO THE OSI MODEL

TCP/IP ADDRESS

This is an address that is usually set by the administrator, though it is sometimes automatically set by the network protocol suite used, which allow two Computers on a network to communicate. This address is unique 4-byte address is dotted notation for example 56.88.1.231. IP addresses are handed out by a single organization called InterNIC, so each computer has its own unique address. IP addresses are divided into classes. IP address classes are used to segment the pool of addresses into size corresponding to various organization sizes.

CLASSES OF IP ADDRESS

CLASS A: Class A addresses have one byte for the network and three bytes for the host. For example, the address 56.88.1.231 has a network

number of 56, and the remaining number signify the host. The first byte of Class A network addresses is always between 1 and 127.

CLASS B: Class B address have 2 bytes for the network address and the remaining two for the host address. With this arrangement each class B network can have up to 65,000 hosts. The first byte of class B addresses is always between 128 and 191.

CLASS C: Class C address is the most common. They use the first 3 bytes of the address for the network portion and the final byte for the host. This allows for a great number of networks given out with more than 250 hosts. Class C address always has the first byte between 192 and 223

SUBNET MASK

Subnet mask is responsible for separating the IP address into the host portion and the network portion. It completes computer's address on a TCP/IP network. For example, Class A has one byte for the network and three bytes for host. It has the subnet mark of 255.0.0.0. The 255 in the first byte signify the network address.

STANDARD SUITE PROTOCOLS

| SUBNET MARK | NETWORK CLASS |
|---------------|---------------|
| 255.0.0.0 | Class A |
| 255.255.0.0. | Class B |
| 255.255.255.0 | Class C |

TCP/IP SUITE PROTOCOLS

Bellows are some of the protocols contain in TCP/IP

i. INTERNET PROTOCOL

The Internet Protocol (IP) is a connectionless that sits in the Network layer of OSI model. An IP header is attached to each packet (Data gram) and includes the sources address, destination address, and other information used by the receiving host.

FUNCTION OF IP

- i. It address and route packets accordingly through the network
- ii. It fragment and reassemble packets that were slit in transit

INTERNET CONTROL MESSAGE PROTOCOL

Internet Control Message Protocol (ICMP) provides error reporting for IP. IP cannot detect error when an error occurs on the network. ICMP is up to report errors back to the host that sent IP packet. If a device cannot forward in IP packet on the next network in its Journey, than it will send back a message to the source of that packet using ICMP to explain the error. Some of common types of errors that ICMP can report are:

- i. Destination Unreachable
- ii. Congestion
- iii. Echo Request
- iv. Echo Reply

RIP AND OSPE

Routing Information Protocol (RIP) and Open Shortest Path First (OSPF) are two routing protocols in the Internet protocols suite. RIP uses the number of routers (hops) between the originating computer and the destination to decide the best way to route a packet. OSPF is configured to figure in the hop count, the speed the connection between the hops and the loading balancing to calculate the best way to route packet.

TRANSMISSION CONTROL PROTOCOL

This is a connection-oriented protocol that corresponds to the transport layer of OSI model. TCP opens and maintains a connection between two communication hosts on a network. When an IP packet is sent between them, a TCP header that contains flow control, sequencing, and error checking is added to the packet. Each virtual connection to a host is given a port number so data grams being sent to the host go to the correct virtual connection. For example, an internet web server uses 80, while mail servers usually post 25.

USER DATAGRAM PROTOCOL

This is a connectionless transport protocol and is used when the overhead of TCP is not needed. UDP is responsible for transporting data gram. UDP uses port number (53) similar to TCP, except that do

not correspond to a virtual connection, but to a process on the other host.

ADDRESS RESOLUTION PROTOCOL

This is a protocol that handles the conversion of the address by sending out a discovery packet. This protocol allows computers to communicate with another on a network. The discovery packet is sent out to the broadcast MAC address so every device on the network receives it. The packet contains the request for the owner of the IP address. When the receiving computer with the IP gets the discovery packet, it replies to the originator to let the originator know that it owns that IP. ARP maintains a list of IP and MAC address so as discovery packet is not needed every time communication takes place.

DOMAIN NAME SYSTEM (DNS)

This is the system that converts user-friendly name such as <http://www.ebeconsult.com> to the correct IP address. DNS is a distribution database hierarchy maintained by different organizations. There are a number of maintained DNS servers that point clients to the more specific server at each company.

FILE TRANSFER PROTOCOL

File transfer protocol (FTP) is the file-sharing protocol most commonly used in a TCP/IP environment. This protocol allows user remotely log on to other computer on a network and browse, download and upload file.

One of the main reasons FTP is still very popular is that it is platform independent.

SIMPLE MAIL TRANSFER PROTOCOL (SMTP)

SMTP is responsible for making sure that called e-mail is delivered. SMTP only handles the delivery of mail server and between servers.

DYNAMIC HOST CONGLUTINATION PROTOCOL (DHCP)

DHCP is responsible for automatic IP addressing. Instead of configuration each device on the network manually, the administration does it once for the entire network on the DHCP server. DHCP server is given a range of IP address to hand out to network device. When a computer comes online to the network, it sends out a DHCP request. The nearest DHCP sever responds with all the information to set up TCP/IP on the new client.

TELNET

Telnet allows a user to remotely log to another computer and run application.

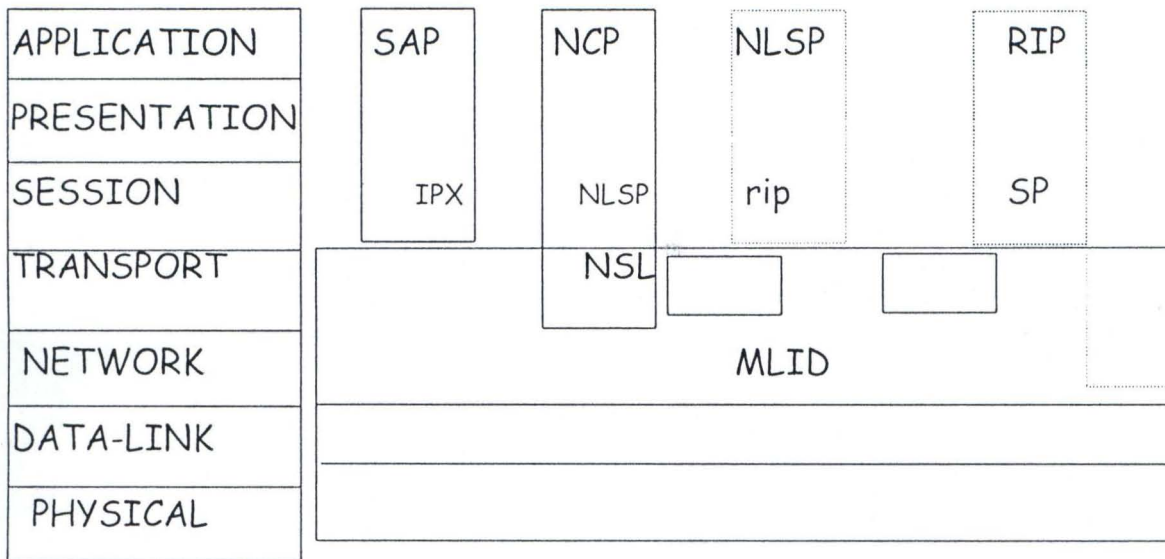
NETWORK FILE SYSTEM

This is an advanced way to share file and disk that FTP and Telnet require you to use a separate client, NFS allows user to connect to notebook drive and use them as if they were local hard drives.

IPX/SP PROTOCOL

Internet Work Packet Exchange/Sequence Packet Exchange protocol suit was developed and maintained by Novell, Inc. IPX/SP protocol suite everything from file and disk sharing to message and application services. IPX/SP functionality is aimed toward requesting and receiving services from large server.

IPX/SP Network makes use to the server-centric NetWare operating system. The IPX/SP protocols and Network application are written so the Network environment is comfortable for users. IPX/SP suite is very functional because it is modular. That is, piece can be removed and replace by protocols from other suite. For example you could remove the main IPX/SP protocol and replace them with other user datagram protocol (UDP) and TCP. Because it is design in modular form, it allows the protocol suite to be very adaptable to other needs and permit IPX/SP to user other types of network. One of the features of the IPX/SPX protocol suite is its ease of use and administration. IPX/SP needs no manual addressing for workstation to function. The only real addressing needed is on the Netware server, and that is just to pick a network address not found on any other connected network. This information is automatically passed on to the network client.



IPX/SP protocol can be divided into

- i. Lower-layer protocol
- ii. Middle IPX/SP and
- iii. Upper layer IPX/SP

LOWER-LAYER PROTOCOL

Lower-layer protocol in the IPX/SP suite corresponds to the link layer of the OSI model. There are no protocols in the physical layer of the IPX/SP suite because it can utilize any popular physical network types, such as Ethernet, token ring, or FDDI. The protocols that work at the data link layer are responsible for media access and interfacing to the network card. There are two protocols in this layer namely:

- a. Multiple link interface driver protocol
- b. Link support layer protocol

a. MULTIPLE LINK INTERFACE DRIVER PROTOCOL

This protocol is concerned with media access. MLID is piece of software that makes the Network card in the computer work that is a network interface board specification. This driver is written to a certain specification called open data link interface IDO specification.

b. LINK SUPPORT

This layer is responsible for making sure data goes to the correct upper-layer protocol. It also makes sure that multiple protocol stacks is load. It serves as an interface between MLID and the upper-layer protocol

MIDDLE IPX/SP SUITE PROTOCOLS

This middle protocols in the IPX/SPX suite map to the network and transport layers of the OSI model. There are responsible for transferring data between devices on the network, as well as carrying some routing functionality. The protocol that is in middle IPX/SP suite protocol is:

- a. IPX
- b. SPX
- c. NISP
- d. RIP

INTERNET WORK PACKET EXCHANGE

This protocol corresponds to the network layer of the OSI model (IPX) protocol corresponds for connectionless data service. It handles the routing of data cross an Internet work, as well as the handle network addressing. In a Netware most data transfers between clients and servers are handling IPX protocol. An IPX address is a combination of the physical MAC address on the network card and a logically assigned network address. Example of such is 123456789ABCD. Socket number in IPX/SP is equivalent of TCP/IP port number. IPX decides the best to a remote device by using one of the built in routing protocols.

SEQUENCED PACKET EXCHANGE (SPX)

SPX is a connection oriented with sequencing and error control. SPX makes up for the inherent unreliability of IPX and because of this reason; SPX rides on tops of IPX to this extra functionality in a similar way that TCP rides on top of IP in the TCP/IP suite. SPX is mainly used when a connection is made across an Internet work device such as a router, or to a print server to service a printing request. SPX uses acknowledgement to ensure delivery. SPX also establishes virtual circuit called connections, between devices. Each connection has its on connection ID to distinguish it. Connection Ids can be tied to upper-layer process.

ROUTING INFORMATION PROTOCOL (RIP)

This is a protocol that is used by IPX to decide the best route through an internet work. It uses the distance. Vector method to calculate hops count (i.e. it counts number of times a piece of data crosses a route before reaching its destination) and then crosses the route with the number of hops.

NETWORK LINK SERVICES PROTOCOL (NLSP)

This protocol uses a link state mechanism to choose the best. NLSP broadcast routing information when a change occurs, not at preset interval. NLSP uses far less bandwidth.

UPPER-LAYER IPX/SP PROTOCOL

The upper-layer protocol in IPX/SP comprises of

- i. Network core protocol
- ii. Service access protocol

Network core protocol corresponds to the Transport, session, presentation and application layers in ISO model while Service Access protocol corresponds to session layer in ISO model.

NETWORK CORE PROTOCOL

This is the "Language" spoken between a Netware client and a server. This protocol handles most NetWare services such as file services,

printing; file locking, resources access and synchronization. NCP functions at the following four layers of the ISO model;

- i. Transport layer- it connects services with segment sequencing, error control, and flow control.
- ii. Session layer-it controls the movement of data from transport layer to presentation layer.
- iii. Presentation layer - It translates character.
- iv. Application layer-it serves as application and service interface to the end-user application.

SERVICE ACCESS PROTOCOL

This protocol allows each computer sharing a resource on the network to send out SAP packet containing information about the resource and where it is located.

3.2 NETWORK TYPE

Network type combine physical layer with the physical topology to form the basic network the different types of network are

- i. Arcnet
- ii. Ethernet
- iii. Token Ring
- iv. FDDI

CHARACTERISTICS OF NETWORK TYPES

- a. Maximum number of clients
- b. Speed
- c. Distance
- d. Media access type

TYPES OF NETWORK

3.4.1 ARCNET

ARCNET (Attached Resource Computer): it is the oldest network types. Data Point Corporation created it in 1977. ARCNET uses passing in combination with a star/bus topology to transmit data at 2.5 Mbps. ARCNET was designed to be a simple, inexpensive, and reliable topology. ARCNET utilizes UTP or coaxial cable hubs as many as 225 computers.

CHARACTERISTICS OF ARCNET

1. Topology-Star to Bus
2. Transmission speed; 2.5Mbps or 20 225
3. Maximum number of network nodes: 225
4. Cable types: RG-62, 90-Ohm or coaxial, UTP, and optic.
5. Maximum network length: 20,000 feet
6. Maximum segment length
 - ñ Coaxial cable 400 feet
 - ñ UTP cable: 400 feet

- ñ Fiber optic cable: 11, 500 feet

ADVANTAGES OF ARCNET

- ñ Reliable, mature technology
- ñ Uses simple technology that is easily installed
- ñ Operates over several cable types

DISADVANTAGES OF ARCNET

- ñ Limited to 255 devices
- ñ Operates at low speed of 2.5 Mbps

3.4.2 ETHERNET

Ethernet is a network standard developed by Intel, Digital and Xerox. It offers for a variety protocols and computer platform: Ethernet is available in three main standards namely:

- i. 10 Base -5
- ii. 10 Base -2
- iii. 10 Base -T

10 Base - 5: 10 Base -5 is also thick Ethernet. It make used of RG-8 cable uses external transceiver and a vampire clamp that fastens directly into the cable, which is wired in a linear bus. 10 Base-5 can have five segments with four repeaters, and only three segments can have workstation.

CHARACTERISTICS OF 10 BASE-5 NETWORK

- i. Topology: Bus
- ii. Media access method: CSMA/CD
- iii. Cable type; 50-Ohm thickness coax cable
- iv. Transmission speed 10Mbps
- v. Maximum number of network nodes: 300
- vi. Maximum number of nodes per segment: 100
- vii. Maximum network of segment; 5;3 of which have connected nodes
- viii. Maximum network length 2,500 meters
- ix. Maximum segment length: 500 meters

10 Base -2:- This was developed as one of the alternatives to 10 Base -5 because the RG-8 cable used in 10 Base -5 is rigid and difficult to work with. 10 Base -2 uses RG-58 cable along with T segment supporting as many as 30 devices, which must be 1.5 feet apart.

CHARACTERISTICS OF 10 BASE -2

- i. Topology -Bus
- ii. Media access method -CMA.CD
- iii. Cable types 50-Ohm, RG-58 coax cable
- iv. Transmission speed: 10 Mbps
- v. Maximum number of network nodes: 90
- vi. Maximum number of nodes per segment:30

- vii. Maximum number of segment 5;3 of which can have connected nodes
- viii. Maximum distance between nodes 0.5 meters
- ix. Maximum network length: 925 meters
- x. Maximum segment length: 185 meters.

10 BASE -T This standard utilizes 22 AWG UTP cables with RJ-45 jacks arranged in a star configuration. This configuration eliminates the single point of failure problem associated with the bus configuration. Each device has a separate UTP cable connection to the hub. The workstation must be at least 2 feet apart and no more than 328 feet from the hub. It follows five segments with up to 512 device standard. Network can be segmented in order to provide network expansion i.e. smaller networks are connected using bridges or routers, giving a larger network.

Topology- Star

Media Access Method -CSMA/CD

Cable types C categories 3-5 UTP

Transmission speed: 10 Mbps

Minimum number of network nodes: 1,024

Minimum number of nodes per segment: 1

Minimum number of segments: 1,042

Minimum distance between nodes: 2.5 Minimum lengths

Minimum segment length: 100 meters

10 Base -100:- 10 Base -100:- is also know as fast Ethernet, which can transmit at either 10Mbps or 100 Mbps. Fast Ethernet can transmit across UTP or fiber optics. 10 Base -100 has three standards, which were developed based on the type of cable used. These standards are:

- ñ 10 Base -100 TX using two pair categories 5 UTP and STP cable.
- ñ 10 Base -100:- T4 using for pair category 3 through 5 UTP cable
- ñ 10 Base -100:- T using fiber cable

This standard allows for several options with Base 100. For 100 Mbps 10 base 100, the adapter and hub must be capable of 100 Mbps transfer rate. Fiber optic provide for greater cable lengths at 100 Mbps than UTP cable. UTP, you limited to two hubs between workstations, and the hub A must be connected using a 5- meter cable. Fiber optic allows a distance of 400 meter between hubs.

CHARACTERISTICS OF 10 BASE -100

Topology -Star

Media access method: CSMA.CD

Cable types: 10 Base -100:-TX: categories 5 UTP

10 Base -100:-T4: categories 3-5UTP

10 Base -100:-FX: categories Optic

Transmission speed: 10 Mbps

Minimum number of nodes per segment

Minimum number of network nodes 1,042

Minimum number of segment 1,042

Minimum distance between nodes; 2.5 meter

Minimum segment length: 100 meter

- ñ 100 Base- TX: 100 meters
- ñ 100 Base- TX: 100 meters
- ñ 100 Base- TX: 2 meters

ADVANTAGES OF ETHERNET

- ñ Flexible standards allowing a variety of equipment
- ñ Inexpensive network option
- ñ High -speed network that can operate at 10 or 100 Mbps
- ñ Easily expanded

DISADVANTAGE OF ETHERNET

Performance degradation under network load

3.5.3 TOKEN RING

This type of network token passing in a physical star configuration connected in a ring hub: it allows devices to have varying priority in accessing the network media.

CHARACTERISTICS OF TOKEN RING

- Topology: Physical Star, Logical ring
- Media access method Token passing
- Cable types: SIP, UTP, and fiber optic
- Transmission speed 4 or 16 Mbps

- Minimum number of network nodes: UTP: 72 and STP: 260
- Maximum number of nodes segment: varies according to the hub
- Maximum number of segment: 33
- Maximum distance between nodes: 2.5 meter
- Maximum network length: No maximum length
- Maximum segment length.

UTP: 45 meters

STP: 101 meters

Frame size

Mbps 4k

16 Mbps: 6k

ADVANTAGES OF TOKEN RING

- Performance under heavy load
- Uses intelligent
- High-speed network capable of 4 or 6 Mbps.

DISADVANTAGE OF TOKEN RING

- Expensive
- Difficult to troubleshoot

3.44 FIBER DISTRIBUTION DATA INTERFACE (FDDI)

FDDI is a token-passing ring network similar to token ring but running over a fiber-optic cable.

FDDI uses concentrators to connect devices. Because it utilizes fiber-optic cable, it is capable of transmission at the rate of 100 Mbps.

FDDI is a token-passing network over the ring, but the method used in FDDI is much different from token-ring. FDDI allows many frames to be transmitted simultaneously. This is possible because the station that controls the token can send several frames without waiting for the previous frame to complete its journey around the ring. The following terms are common to FDDI and they are help in increasing the speed of the network.

- i. Synchronous frame
- ii. Multi frame dialog
- iii. Wrapping

SYNCHRONOUS FRAME: - This is a process of assigning transmission times to certain devices.

MULTI FRAME DIALOG: - This is a process of two devices to transmit to one another without interference.

WRAPPING: - This is the connection made between two rings before and after the break of cable

Topology-Ring

Medial Access Method: Token Passing

Cable types

Transmission speed 100 Mbps

Maximum number of network nodes: 500

Maximum number of nodes per segment: No Maximum number of node per segment

Maximum number of segment -None

Maximum network length: 100 kilometers

Maximum segment length: No Maximum segment length

ADVANTAGES OF FDI

- ñ FDDI is the faster network and is capable of 100 Mbps transfers
- ñ Fiber-optic cable allows signal travel great distance, up to 200 kilometers.
- ñ Dual rings provide a higher level of fault tolerance.

DISADVANTAGES OF FDDI

- ñ Expensive cable and equipment is required
- ñ Workstation can be single point of failure for both rings
- ñ FDDI rings a high level of expertise to install, troubleshoot, and maintain.

CHAPTER FOUR

4.0 LOCAL AREA NETWORK CONFIGURATIONS AND SOFTWARE INSTALLATION

4.1 LAN DEVICES

Local Area Network devices are:

- i. Repeater
- ii. Bridges
- iii. Ethernet hubs
- iv. Switches
- v. Modem
- vi. Routers
- vii. Gateways
- viii. CSU/DSU
- ix. Multipliers

- i. **REPEATER:-** Repeater is a devices used to boost a network signal as it pass through. Repeaters are normally two-port boxes that connect two segments. It works at the physical layer to generate the electrical signal on the network media.

ADVANTAGES OF REPEATERS

- ñ Repeaters easily extend length of a network
- ñ They require no processing overhead, so very, if nay, performance degradation occurs.

- ñ You can connect segment from the same network type that use different types of cable.

DISADVANTAGES OF REPEATERS

- ñ Repeaters cannot be used to connect segments of different network types
- ñ They cannot be used to segment traffic on a network to reduce congestion
- ñ Many types of network have limits on the number of repeaters that used at once.

BRIDGES:- This is a device that allows the segmentation of a large network into two smaller, more efficient networks. It monitors information traffic on both sides of the network so that it can pass packet of information to the correct location.

ADVANTAGES OF BRIDGES

- ñ Bridge extend network segment by connecting them together to makes one logical network
- ñ They segment traffic between network by filtering data it does not need to pass
- ñ Special translation bridges can connect different network type together

- ñ Like repeaters, they can connect similar network types with different cabling.

DISADVANTAGES OF BRIDGES

- ñ Bridge process information about the data they receive which can slow the performance of the network
- ñ Bridge pas all broadcasts
- ñ They cost more than repeaters due to extra intelligent

- iv. **ETHERNET HUBS:-** Ethernet hubs are basically just-port multi-port repeater for UTP cable. Hubs range in size from four ports up to several hundred and are specific to the network type

ADVANTAGES OF HUBS

- ñ Hubs need almost no configuration
- ñ Active hubs can extend maximum network model distance
- ñ No processing is done at the hubs slow down performance

DISADVANTAGES

- ñ Hubs have no intelligence to filter traffic, so all data is sent out all ports whether it is needed or not.
- ñ Since hubs can act as repeaters, networks using them must follow the same rules as repeaters

- ñ Like repeaters, they can connect similar network types with different cabling.

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- v. **MODEM:-** This is a covering digital information from the sender end to analog information and vice-versa
- vi. **ROUTER:-** This is a device that translates information from one network to another. It selects the best path to router a message based on the destination address and original.

4.2 HARDWARE REQUIREMENT

There are the hardware require in order to implement the network.

This can be classified into two

- i. Server Computer
- ii. Client Computer

4.2.1 HARDWARE SPECIALIZATION FOR SERVER COMPUTER SYSTEM

Pentium -IV 2.5 GHz with MMX Technology

512 SD-RAM

52XCD ROM drive

3 1/2 Floppy drives

14" monitor

Network Interface Card

MODEM

Microsoft Window XP

Keyboard

Timer Software

Printer

Scanner

40 GB Hard Disk Drives

4.2.2 HARDWARE SPECIFICATION FOR CLIENT COMPUTER SYSTEM

Pentium III 450 MMX

256 SD RAM

20GB Hard Drive

48 X CD ROM Drive

31/2 Floppy Drive

14" Monitor

Mouse + Pad

Keyboard

Timer Software

Microsoft window XP

LAN CONFIGURATION

- ñ Unplug your computer system
- ñ Put the Ethernet card (Network card on any available PCI slot.)
- ñ Plug your computer and put it on
- ñ Follow the screen instruction when the computer detect your network and install the card with the appropriate driver.

ñ Click on Start, setting and double click on Network. Configuration the following:

ñ Click on add button

ñ Click on the Protocol, Click on the add button, Select TCP/IP protocol. Click ok.

By doing this, it will allow you to set some properties on your network card

ñ Click on the TPC/IP, and then click on the properties

ñ Click IP button

ñ On the primary IP, type the IP address e.g 10.1.1.1 and also type the subnet address e.g 255.0.0 .1 click ok.

ñ Click on File/Printer button. This will allow you to share the file and printer

ñ Check the facility that allow to share file and folder

ñ Check the facility that allow share the printer

ñ Click on the identification tab

i. Enter the name of the computer, the workgroup and the description. Note the name of the workgroup must be the same in order to make the system on the same network see one another

ñ **Click Ok and reboot your computer system**

When Computer system has restarted, Computer will recognize your Network.

It will allow you to enter password, which will give you an access to the network.

On the desktop, double click on the Network Place Icon and you will see the computer Icon together with workgroup. If you do not see the Computer Icon, double click on workgroup and it will display the computer Icon.

NOTE: To confirm whether the network is well configured, you can click on run, type this command **Ping** follow by the IP address then press enter key e.g. Ping 10.1.1.1 it will display the configuration of the Computer.

4.4 TIMER SOFTWARE

This is the software that allows the Login and Logout of the customer on a system in a Cyber Cafe. The program (software) is written using Visual Basic Programming Language codes. It has an interface, which will allow user to type in the User's name and Password based on the time interval a user buys from a Cyber Cafe. The Timer interface reappears when user's time is expire. That is, it has the facility to automatically log a User out after the expiration of the time he/she bought.

INTERFACE



TIMER SOFTWARE INSTALLATION

The software is on disk, double click on the folder of the software (WinDesk) and look for "SETUP"

Double click on the SETUP ICON and follow screen instruction.

Note: The software will be installed on the server alone. The client will trace out their path through the Server Computer by right clicking on the desktop, navigate to the new and click on shortcut. This will allow you to browse the path of the software from the server. When you get the correct path, click on **Ok** button and the program will appear on the client computer.

CHAPTER FIVE

5.0 NETWORK IMPLEMENTATION: NETWORK SERVICES, ADMINISTRATION, MANAGEMENT AND TROUBLE SHOOTING

5.1 NETWORK SERVICE

Networks are meant to makes us more productive by providing services to make us more efficient. Some common services provide by network are:

- i. File services
- ii. Print service
- iii. Message service
- iv. Director service
- v. Application service

i. FILE SERVICE

The primary reason for networking Computer System is for the files services that a network can provide. Instead of copying files to a floppy disk, user can now easily share file.

The following jobs use file service:

- a. File Transfer
- b. File Storage and Migration
- c. File Update Synchronization
- d. Archiving

a. **FILE TRANSFER:** Transferring file electronically is the simplest and most common service on the network. The ability to share files and information across a network allows user to share any information they need and this make them more production than ever. There are other ways to share files, such as coping files to a removable storage device such as a floppy or a zip drive. This method is only possible when all users are located in same office. When users are spread throughout the country and world, this is not an option. Reliable file transfer across the network then become a more noticeable important service.

b. **FILE STORAGE AND MIGRATION:** Data can be stored on many different media, such as Hard Disk, CD-ROMs, and Magnetic tape. Data is said to be stored On-line, Off-line or Near-line depending upon the media on which it's stored.

In On-line storage, it stores information that's readily available on a server. Central data storage on a server is one of the primary users of a network. User can access this data any time. The devices most commonly used for On-line storage is Hard drive.

Off-line storage, data is put on magnetic tape so that it can be loaded back when needed. Off-line storage devices provide a low-cost solution to storing data compare to on-line storage. Suppose you need to keep a large amount of data available to user and user cannot afford to buy

the necessary amount of space on hard disks. Near-line storage is a way to keep data migration off expensive Hard disks but close enough to let user access it. This may be done by using such things as jukeboxes with large numbers of tapes or optical disks. They can automatically put the needed data online. Data is migrated when it is moved from one form of storage to another.

c. FILE UPDATE SYNCHRONIZATION

This network services keeps track of different versions of the same file. If two clients open a file at the same time and try to save the change that each have made, one file will overwrite the other. File update synchronization tries co-ordinate these change.

d. ARCHIVING:

Archiving is the process of backing up data in case of hard disk failure. Several machine both clients and servers can be backed up using the same hardware and software from one location. Using these software and hardware, the administrator can schedule all Computer on the network to be backed up from on location at scheduled interval network will need to be resolved. Old E-mail message will have to be deleted and the space they occupy made available to the system. The type of procedure will have to be performed as user added to or deleted from the network.

ii. **PRINT SERVICE:** - Ability to share print devices is another service that network provides. Before the invention of Computer Network, users had to have a printer attached to their work station. This was costly especially if a user needed to print multiple types of form or paper, since they would need a different printer for each. With network Print Service Companies need only buy small number of printers and share them among all their users.

Other features of print service is queue-based printing and fax services. Queue-Based printing allowing client's application to spool the print job off to a network server. Therefore the application thinks that the job has been printed and lets the user continue to work. While the user continues to work, the network server handles sending the job to the print device.

iii **MESSAGE SERVICES:** Network also allows us to send information across many computers. With these facilities, you can send video, sound, documents and almost any other type of data.

iv. **DIRECTORY SERVICES:** With Directory Services, it enables the user to maintain information about the entire object in your network. An object is anything you can store information about, such as users, printers, shares resources, server etc.

v. **APPLICATION SERVICE:** Application services are basically **client/server process**. The server is providing the application server. With application services, a small application is loaded on the client computers, and the main application and data is loaded on the server. The small application on the client computer is just a front-end to give the user an interface. It does not process any job of its own. The client application sends queries to the server and let it do the processing. The server then returns the requested information.

5.2 NETWORK ADMINISTRATION

Network administration has to do with privacy and security. Network security is the term used to prevent unauthorized user to have access to the network and its resources. In network we have two level securities namely:

- i. Share-level security and
- ii. User-level security

SHARE-LEVEL SECURITY: This relies on a single password to access the resource and its workgroup.

USER-LEVEL SECURITY: This requires a user name and password to log on the resources. User-level security is used domains especially Window 95 Computer in a domain and Window NT work stations and servers in a workgroup or domain.

5.3 NETWORK MANAGEMENT

Network management is the act of managing the network to be efficient over a period of time. Network management has two goals and these are:

- i. To prevent problem where possible
- ii. To prepare for problem that most likely occurs.

Network management has to do with the following:

- a. Monitor and control hard disk space
- b. Monitor network load and performance
- c. Add and maintain user login information and workstation information
- d. Monitor and reset network devices
- e. Perform regular maintenance on software and data store in the servers.
- f. Make regular back up of data and programs stored.

i. MANAGING HARD DISK SPACE: the server's disk is one of the network's primary commodities. Files for network-based program are stored on the disk. Print job that are sent from workstation to network printers are stored on the disk queue before they printed. And in some networks, users' files and data are stored on the network hard disk. If the disk space has filled up, then print job can't be printed and user cannot save their data files. Data file may also be corrupted since data manipulation can't be accomplished.

If the hard disk space must be available at all time for legitimate users of the network. The hard disk space must be checked everyday. Growth of user's file should be controlled to ensure that a single user doesn't monopolize the hard disk. Unwanted files must be deleted and when heavy, Disk defragmentation must be used on such hard disk. Files could be back-up and the disk can be reformatted.

ii. MAINTAINING USER AND WORKSTATION INFORMATION:

Network users have network identification numbers that can be used to monitor security and the growth of the network. A network manger must keep a log of information about the network users such as login ID, Node, Address, Network Address, and some personal information such as phone, name and address. Also, network cabling, workstation type, configuration, and purpose of use should be kept in records. This information can be stored in a database. It can be used to detect problems with data delivery, make change to user's profiles, workstation profiles, account, and support other tasks.

iii. MONITORING AND RESETTING NETWORK DEVICES: A network consists not only of servers and workstation but also a printer, input devices such as scanners and other machines. Some devices may need to be reset daily (such as gateway), while other devices require periodic maintenance. Some types of electronic mail router need to be monitored hourly to make sure they are working

properly. In either case, all devices should be monitored periodically, and a schedule of reset and maintenance should be created to ensure that all network devices work when a user need them.

iv. **MAINTAINING THE SOFTWARE:** Application software, especially database application, needs regular maintenance to rebuild files and space left empty by deleted records. Space not used must be made available to the system, and in many cases index files will have to be rebuilt.

Additionally, as new software upgrade become available, they need to be placed in the network. After an update is placed in the network, file clean up may have to take place. Also, any inappropriateness between the new software on the hard disk and provide efficient access to data on the server's hard disk. Some networks also make use of software to repack files on the hard disk and eliminate file fragmentation.

vi. **MONITORING SERVER PERFORMANCE:-** The performance of the LAN'S server will determine how quickly the server can deliver data to the user. The server must be monitored to ensure they are fragmentation at their peak.

FACTOR THAT DETERMINED THE RESPONSE OF A SERVER

- i. The number of user that are attached to the system
- ii. The server's main memory

THE NUMBER OF USER THAT IS ATTACHED TO THE SYSTEM:

working with the more users will slow the response time. If a specific application has a large number of users, the server that contains the application could be dedicated to serve only that program. Other servers could be used to distribute the load of other programs on the system.

THE SERVER'S MAIN MEMORY

The server's main memory should be monitored to make sure that it is used efficiently. Many servers use RAM as disk buffers. These cannot function if there is not sufficient memory to run the network operating system and the buffers. If a server has to reduce the number of buffers required for I/O, the overall performance of the network will suffer.

Most network provided tools that show statistical data about the use of the network and outline and potential problems. An experienced network administrator uses these statistic to ensure that the network operates at it peak at all time.

5.1 NETWORK TROUBLESHOOTING

Network Trouble shooting is the act of detecting fault/problem in a computer system, isolating the problem and provides a necessary solution to the problem in order to prevent it from re-occurring again.

The following are the steps in network troubleshooting

- i. Set the problem's priority
- ii. Collect information
- iii. Determine possible causes
- iv. Isolate the cause
- v. Study the results.

i. SET THE PROBLEM'S PRIORITY:- Priority need to come to pass in network troubleshooting because every one wanted his or her computer fixed right away. You have to prioritize problems based on things such as the time necessary to fix problem, importance and who has the problem.

ii. COLLECT INFORMATION:- Once you have decided which problem to concentrate on, you must then collect information to help to isolate the trouble. Here, user are a good resource of information, since they are using the network all the time. For example, a simple question such as "what problems have you noticed with network?" This may yield all sort of information.

iii. DETERMINE POSSIBLE CAUSES:- At this point, you should be starting to determine the source of the problem base on the information you collected. You may not know the exact problem, yet you have a small list of possible causes.

iv. **ISOLATE THE PROBLEM:** - At this point, try your most likely solution to see if it fixes the problem.

v. **STUDY THE RESULT**

Carefully study the results for each fix you try. See if the problem was fixed or change in any way. If the problem was not fixed by your solution, keep trying the ideas on your list until either its fixed or you run out of ideas.

EQUIPMENT USED FOR NETWORKING TROUBLESHOOTING

The following are the equipment used for networking troubleshooting:

- i. Digital volt meter
- ii. Time - Domain Reflects meters (TDRS)
- iii. Advance cable testers
- iv. Oscilloscopes
- v. Network monitor
- vi. Protocol analyzers

DIGITAL VOLT METER: - This is a basic electronic measuring device. It is used to check the amount of voltage going through a circuit.

TIME - DOMAIN REFLECT METERS

DVM can tell you if a break exists in the cable but a time domain electrometer can tell you exactly where the break occurred. The TDR uses sonar - like pulse that is sent down the cable. The signal

bounces back from a break in the cable. The TDR calculates the time signal took to go down the cable and back, and computer the distance.

ADVANCED CABLE TESTERS

Advanced cable testers can be used to display information such as:

- ñ Frame count
- ñ Congestion errors
- ñ Network utilization
- ñ Late collisions
- ñ CRC errors
- ñ Network - level statistic
- ñ Protocol statistic
- ñ Information concerning which application is using the network

OSCILLOSCOPE

Oscilloscope is used to show voltage over time. It can be used to check for

- ñ Shorts
- ñ Crimps in the cable
- ñ Breaks in the cable
- ñ Attenuation

NETWORK MONITORS

Network monitors are software program that track and show information about a network. They can generate reports showing utilization, errors, and overall traffic patterns on your network. By watching the growth, you can predict when problems may rise and take productive steps before they do.

PROTOCOL ANALYZERS

Protocol analyzer is a tool used in debugging problem on a network. It is also known as Network analyzer or Sniffed. Protocol analyzer can be hardware only or a combination of hardware and software. They collect information by examining all data going across the network and decoding the information for display.

CHAPTER SIX

6.0 SUMMARIES, CONCLUSION AND RECOMMENDATION

6.1 SUMMARY

The design and implementation of computer networking with Timer software has proved itself superior to the manual method of information transfer in this information age. Computer networking has helped individuals, organizations, companies and industries on how to have fast access to information and management of their resources so as to optimize their cost and maximize their profit.

Design and implementation of computer networking helps in solving heterogeneous problems between computers and this allows a user to communicate through his computer and other communication equipment to another user irrespective of geographical location.

When the system was tested, it was evident that the result is realistic because each computer is able to communicate with one another on the network. The design and implementation of computer networking solves the problem of information accessing, processing transferring and allocation of resources.

On the other hand, the Timer software solves the problem of congestion in real world especially in computer laboratory. It allows each student to have timely access to computer system services.

Research work is also made easy because all information is on the Internet, users can now get information conveniently.

6.2 CONCLUSION

Commuter networking is generally considered an unsuccessful initiative. This is associated with the minds of many with the over hyped network computers that fail to capture significant market share from PCs. However, computer Networking is not dependent on wide-scale network deployment. Infact, one of the key attributes of computer Networking is the ability to support services on heterogeneous terminals of varying capabilities - PCs, high end workstations e.t.c

In the nearest future there will be several hundred million connected computing devices of varying degrees of functionally. Services will be adapted to both device capabilities and the characteristics of the network connection.

6.3 RECOMMENDATION

The emerging Information Communication Technology revolution in Nigeria and the need to utilize the vast information available on the Internet for research, academic pursuit and government in the modern way that is in line with world order calls for the Design and Implementation of Computer Networking with Timer Software in Maths / Computer Laboratory, Federal University of Technology, Minna, Niger

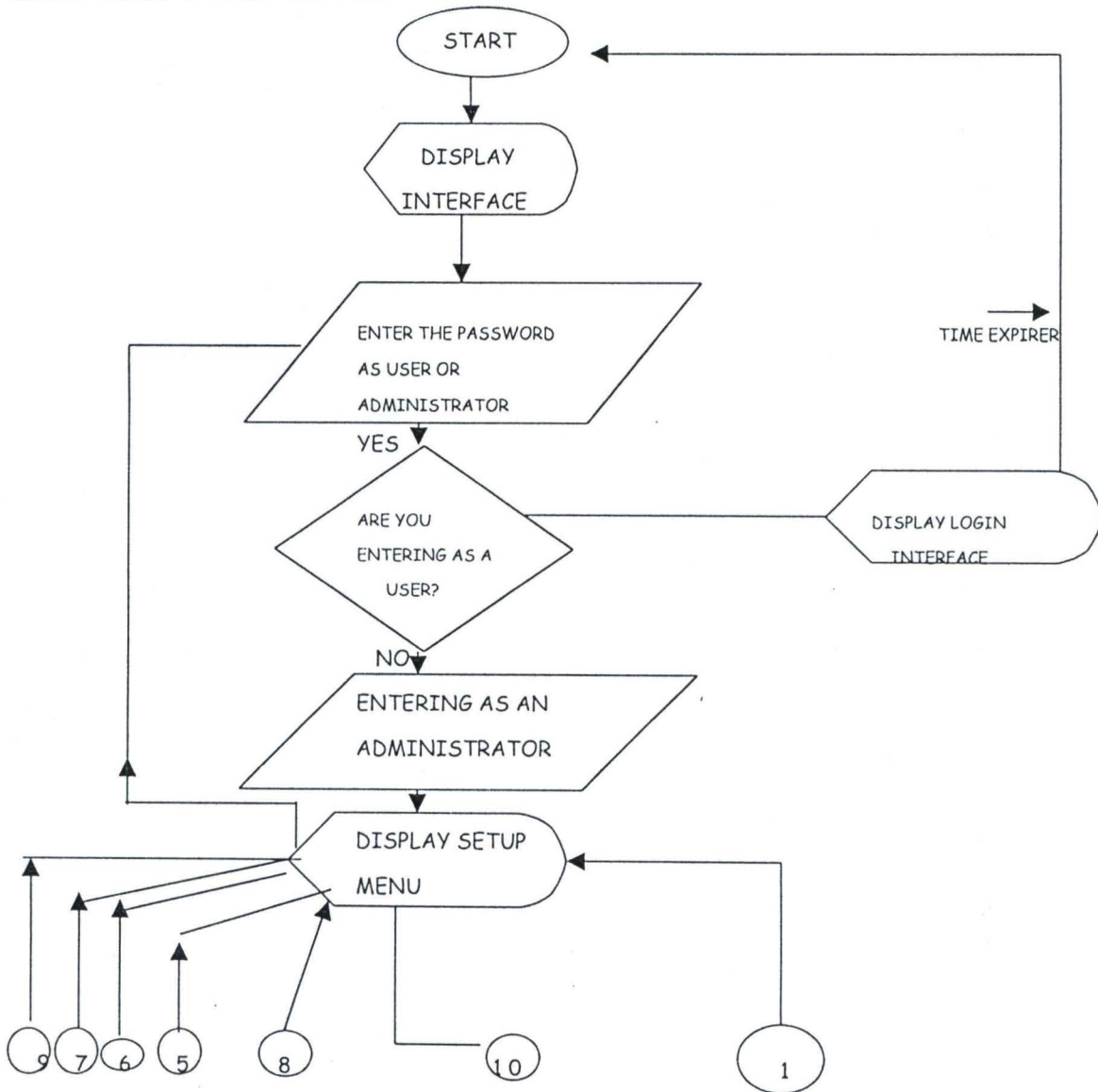
State. Based on the benefit of Computer networking with Timer Software in the society, I hereby made the following recommendation:

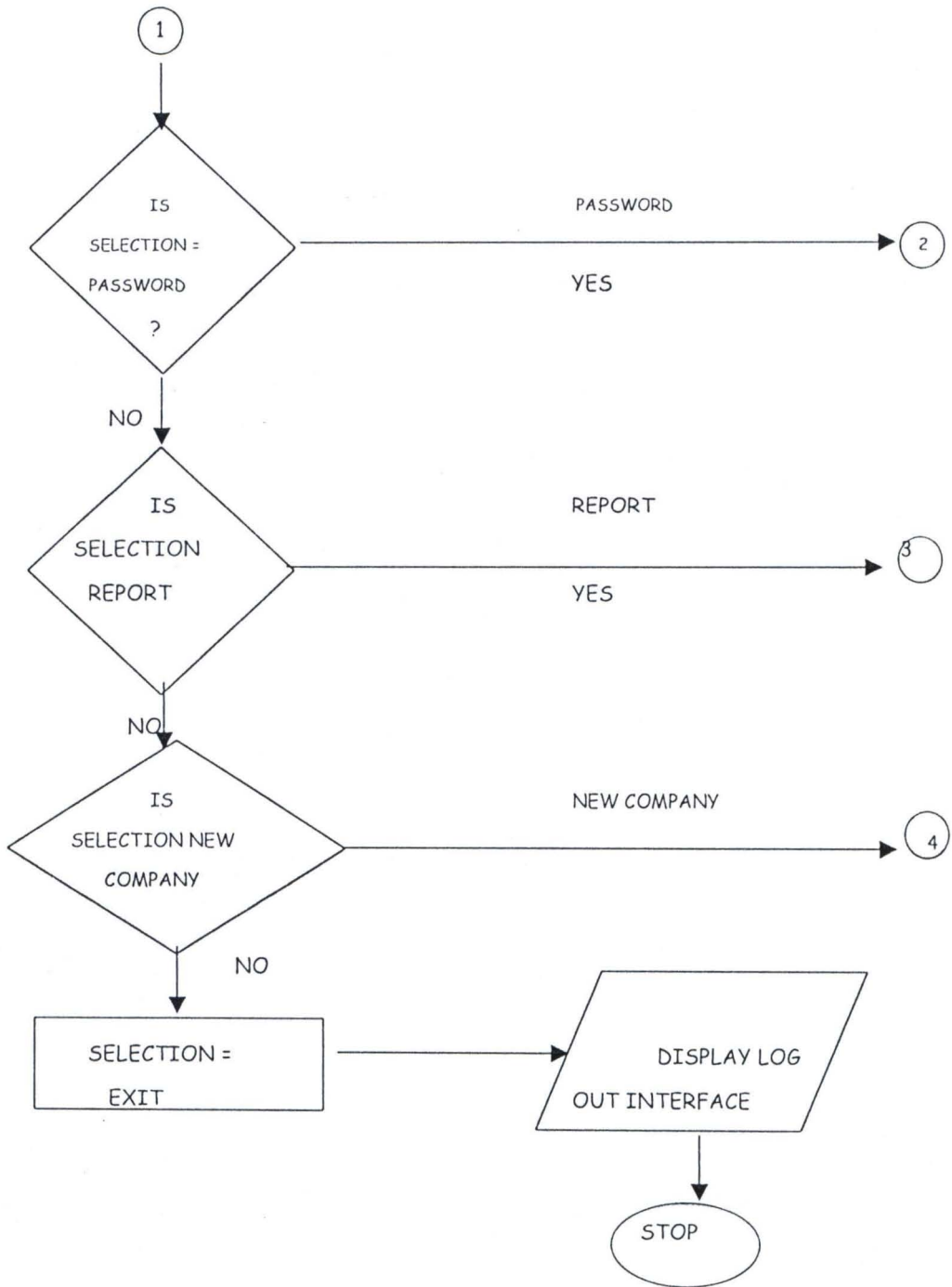
- i. Federal Government should make fund available to every Institution so that ICT can be established in our higher school of learning.
- ii. Institution of higher leaning should see Computer Networking as a tool that aid learning, research and resources sharing. They should make sure that their ICT centre is fully equipped with the necessary equipments such server, clients, Hub e.t.c. so that such center will be able to face the challenges of twenty-first century.
- iii. Users of the network should make sure that they use the network and it resources judiciously in order to achieve the aim and object_{ive} of the innovation.
- iv. Operators should make sure that they are up and doing in order to minimize the risk of networking by putting necessary security measures in places.
- v. Future research on the project work could be on Networking security and evaluation.

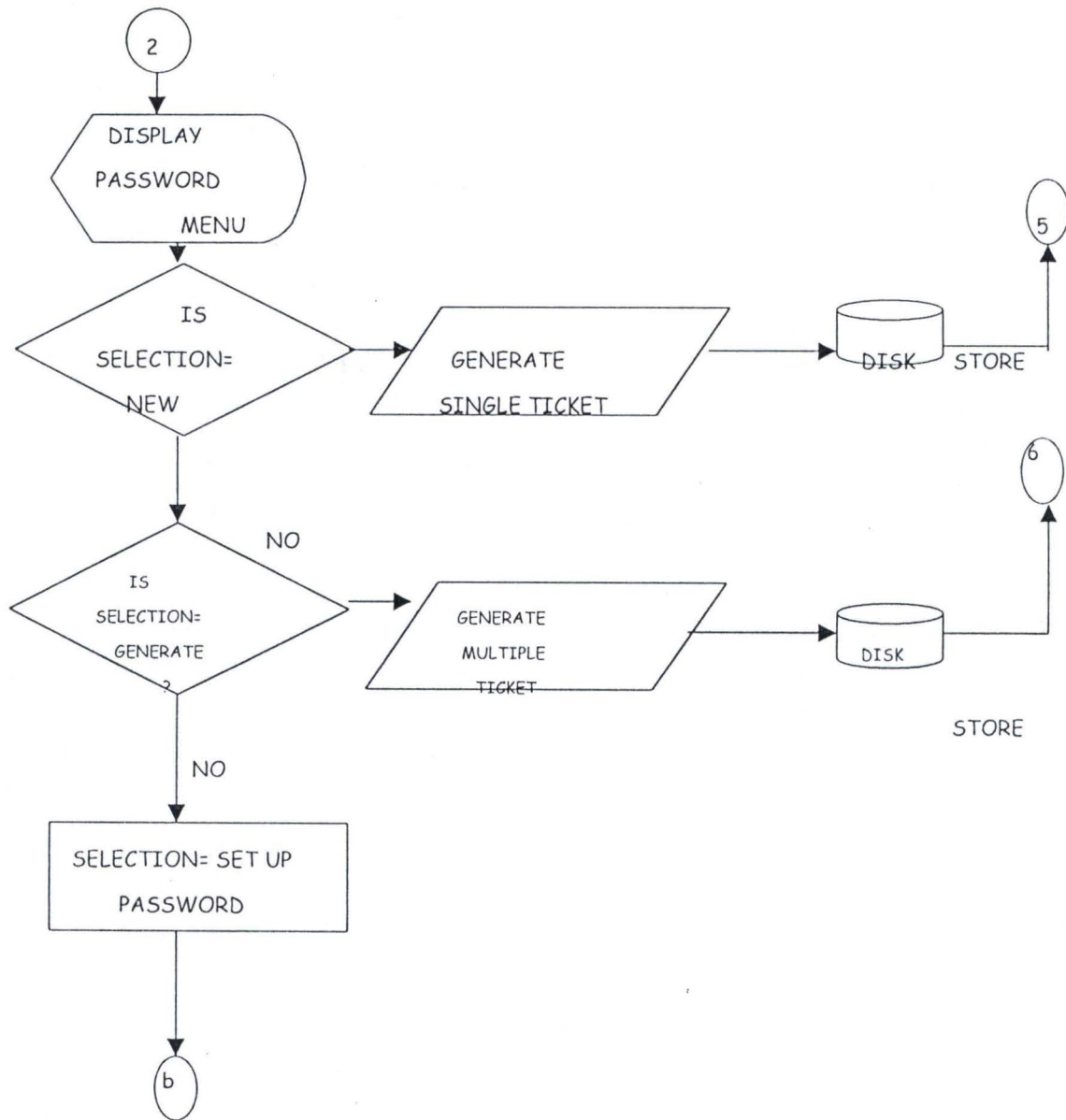
REFERENCES

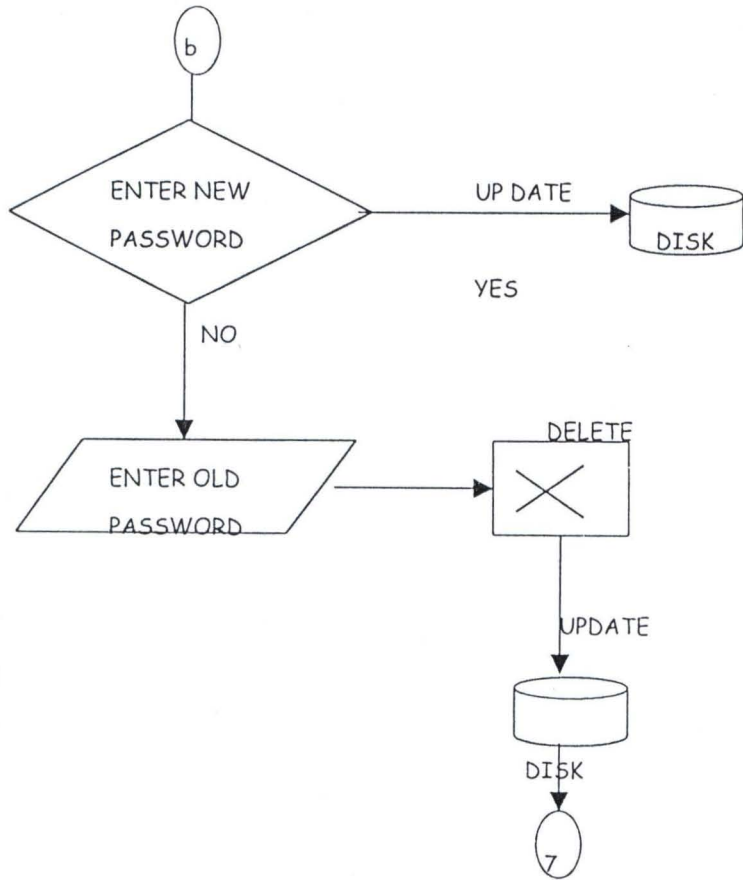
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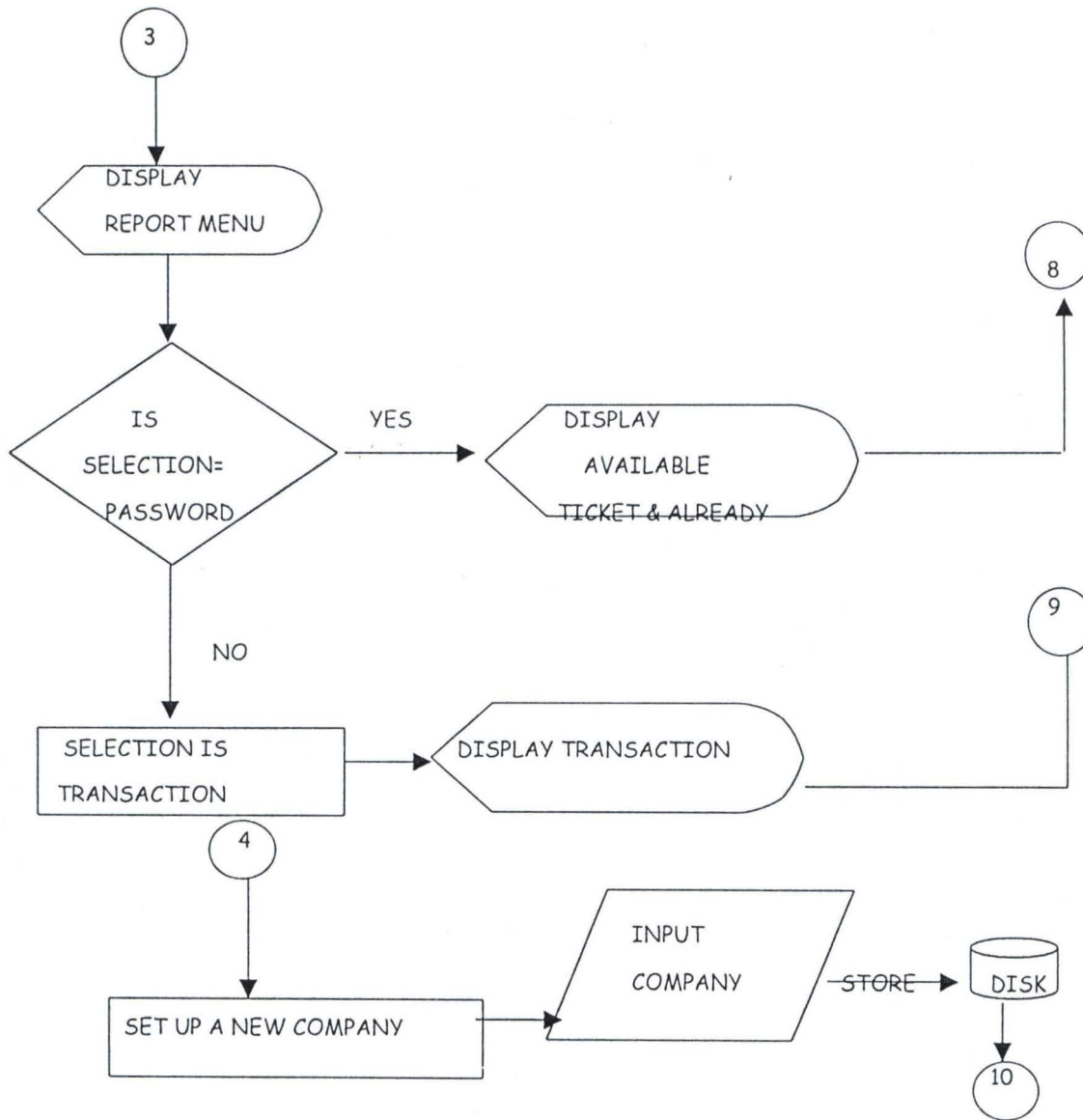
PROGRAM FLOWCHRT











*****Window Interface Module*****

```
Dim Mydb As Database
Dim MyTab As Recordset
Dim myTab1 As Recordset
Dim MyTab2 As Recordset
Dim GiveAccess As Boolean
Dim LostFoc As Boolean
Dim strStorer As String
Dim strtime As String
Dim strCheck As String
```

```
Const intFull =3
'windows always on top.show
Const ConhwndTopmost =-1
Const ConhwndNotopmost =-2
Const ConswpNoActivate =&H10
Const ConswpShowWindow =&H40
Dim hheight As Long
Dim lWidth As Long
```

```
Private Sub cmdOk_Click()
Dim strMe As String
Dim intNewPass As Integer
Dim lonAmt As Long
Dim lonTime As Long
Dim AmtPay As Long
Static Count As Integer
On Error GoTo ErrorHandler
Set Mydb =OpenDatabase(App.Path & "\WinSecOld.mdb")
Set MyTab =Mydb.OpenRecordset("tblTimer")
Set myTab1 =Mydb.OpenRecordset("tblTracking")
Set MyTab2 =Mydb.OpenRecordset("tblAmtSet")
LostFoc =True
strMe =txtPass.Text
'test for zero entry If Len(txtPass) <1 Then GiveAccess =False: Exit Sub
If Len(txtName.Text) <2 Then Exit Sub
If Len(txtPass) >1 Then
'if it is go and marry
If txtPass ="GO&MARRYTOBI" Then
Unload Me
Exit Sub
End
End If
```

```
' SetupPassword =False
'Call SetupPassword to know if the user wants to enter setup
'SetupPassword
```

```
If SetupPassword =True Then
Unload Me
'try and set some viable things about thes form
frmAmtSet.Caption ="Change Setup"
frmAmtSet.cmdOk.Visible =True
```

```

Else
' GiveAccess =False
MsgBox "Invalid User's Password !", vbInformation +vbOKOnly
Set back the terror to good man
SetWindowPos hwnd, ConhwndTopmost, 0, 0, hheight, lWidth, ConswpShowWindow
Or ConswpNoActivate
txtPass.SelStart =0
txtPass.SelLength =Len(txtPass)
txtPass.SetFocus
Exit Sub
End If 'end if for seekTemp =true
End If 'end if for not .nomacth
End With 'end with for with rst
End If 'for if not setuppassword
Else
Exit Sub
End If 'end if for len(txtpass) =0

'na wa ooo
With myTab1
With MyTab2
.Index = "Time"
.Seek "=", intTimeValue
If Not .NoMatch Then
lonAmt =MyTab2![Amount]
' Calculate Amount payed
AmtPay =lonAmt * intTimeValue
End If
End With
'with mytab1 continues
.AddNew
myTab1![User] =txtName.Text
myTab1![Time-In] =Time
myTab1![MnBuy] =intTimeValue
myTab1![AmtPay] =AmtPay
myTab1![DateTrans] =Date
.Update
End With
'try and call deleter in case another person wants to use the password
If intTimeValueR >0 Then
DeletePassword
Unload Me
frmTimer.Show
Else
End If
Exit Sub
ErrorHandler:
MsgBox Err.Description
End Sub

Private Function SeekTemp() As Boolean
'this function looks at the tbltemp if their is Nepa failure when the person is working
Dim strSeek As String

```

```

Dim strUpdateTime As Date
Dim intUpdateTime As Integer
Dim dB As Database, Rss As Recordset
Set dB =OpenDatabase(App.Path & "\WinsecOld.mdb")
Set Rss =dB.OpenRecordset("tblTemp")
strSeek =txtPass.Text
With Rss
    .Index ="Password"
    .Seek "=", strSeek
    If Not .NoMatch Then
        'record found
        strPass =![Password]
        strUsersNames =![Username]
        intTimeValue =![Time]
        PaidAmt =![Amount]
        "na here you start to dey join ooo
        SavePass =![Password]
        blnOnceAccess =![OnceAccess]
        intAccessTime =![Remainder]
        TimerIn =Time
        'note if update time >1 then na nepa else na thief dey come
        strUpdateTime =![UpdateTime]
        intUpdateTime =Minute(TimerIn) - Minute(strUpdateTime)
        If intUpdateTime <2 Or intUpdateTime =2 Then
            'this person must be a thief, a user is still using the password
            SeekTemp =False
            Exit Function
        Else
            End If
        'this is used in frmTimer
        blnAccessOnce2 =blnOnceAccess

        'intacesstime is the time remaining to be used by the owner of the time slash
        intTimeValueR =intTimeValue

        Select Case blnOnceAccess
        Case True
            'if the password has been used once, then the time remaining will be used
            If intAccessTime >0 Then
                intTimeValueR =intAccessTime
                Else
                End If
            Case Else
                'save all money into tblIncome
            End Select

            SeekTemp =True
            Else
            SeekTemp =False
            End If
        End With
    End Function
Private Sub DeletePassword()

```



```

Dim dB As Database, rs As Recordset
Set dB =OpenDatabase(App.Path & "\WinsecOld.mdb")
Set rs =dB.OpenRecordset("tblTimer")
With rs
.Index = "Password"
.Seek "=", strPass
If Not .NoMatch Then
If Not (.EOF And .BOF) Then
.Delete
End If
End If
End With
rs.Close
dB.Close

```

End Sub

Private Function SetupPassword() As Boolean

```

Dim dB As Database, rs As Recordset
Set dB =OpenDatabase(App.Path & "\WinsecOld.mdb")
Set rs =dB.OpenRecordset("tblPassword")
With rs
.Index = "Password"
.Seek "=", txtPass
If Not .NoMatch Then
SetupPassword =True
Else
SetupPassword =False
End If
End With
rs.Close
dB.Close

```

End Function

Private Sub Form_Activate()

Dim booOldValue As Boolean

Dim lonStatus As Long

Dim lonStatus2 As Long

Dim lonSysParam As Long

lonSysParam =97 'for spi_screensaverrunning

'LabelHeading

'disable control Alt +del

'lonStatus =SystemParametersInfo&(lonSysParam, True, booOldValue, 0)

'SetWindowPos hwnd, ConhwndTopmost, 0, 0, hheight, lWidth, ConswpShowWindow Or
ConswpNoActivate

'Me.Height =Screen.Height

'Me.Width =Screen.Width

'ImageIcon.Height =Me.Height

'ImageIcon.Width =Me.Width

cmdOk.Enabled =False

txtPass.Enabled =False

txtName.SetFocus

```

'set initimevalue to 0
intTimeValue =0
intTimeValueR =0
End Sub
Private Sub LabelHeading()
Dim dB As Database, rs As Recordset

    Set dB =OpenDatabase(App.Path & "\WinsecOld.mdb")
    Set rs =dB.OpenRecordset("tblsetup")
    If rs.EOF And rs.BOF Then
        'nothing
    Else
        lblCompanyName.Caption =rs![Name] & ""
        strInstalled =rs![DateInstalled] & ""
        strExpires =rs![ExpiringDate] & ""
    End If
    If Len(lblCompanyName.Caption) <3 Then
        lblCompanyName.Caption ="Http:\www.In-Houseware.com.ng.org"
    With lblCompanyName
        .Font.Name ="Monotype Corsiva"
        .Font.Italic =True
        .Font.Size =28
        .ForeColor =&HFF0000
    End With
    Else
    With lblCompanyName
        .Font.Name ="Lucida Handwriting"
        .Font.Italic =True
        .Font.Size =28
        .ForeColor =&HFF0000
    End With
    End If
End Sub

Private Sub TestExpire()
Dim Ditto1 As Date
Ditto1 =Date
If Ditto1 <CDate(strInstalled) Or Ditto1 >CDate(strExpires) Then
MsgBox "The expiring date for this application is over!" & vbLf & vbCr & vbLf & vbCr & _
    " Please, contact the vendor", vbExclamation, "Countdown Master"
End
Else
End If
End Sub

Private Sub Form_GotFocus()
txtName.Text =strName
txtPass.Text =strPass
End Sub

Private Sub Form_KeyDown(KeyCode As Integer, Shift As Integer)
If KeyCode =91 And Shift =0 Or KeyCode =92 And Shift =0 Then
SendKeys ("{}")

```

```
End If
End Sub
```

```
Private Sub Form_KeyPress(KeyAscii As Integer)
If KeyAscii =91 Or KeyAscii =92 Then
SendKeys ("{}")
End If
End Sub
```

```
Private Sub Form_Load()
'for the disabling cnt +all +Rest
'LabelHeading
If Len(strExpires) >3 Then
'TestExpire
'End If
hheight =Screen.Height
lWidth =Screen.Width
strNoTimes =strNoTimes +1
blnNotRunning =False
End Sub
```

```
Private Sub Form_Unload(Cancel As Integer)
'for the disabling cnt +all +Rest
Dim booOldValue As Boolean
Dim lonStatus As Long
Dim lonStatus2 As Long
Dim lonSysParam As Long
lonSysParam =97
'enable control Alt +del
lonStatus =SystemParametersInfo&(lonSysParam, False, booOldValue, 0)
SetWindowPos hwnd, ConhwndNotopmost, 0, 0, hheight, lWidth, ConswpShowWindow Or
ConswpNoActivate
End Sub
```

```
Private Sub TimerNoOpera_Timer()
'SetWindowPos hwnd, ConhwndNotopmost, 0, 0, hheight, lWidth, ConswpShowWindow Or
ConswpNoActivate
End Sub
```

```
Private Sub txtName_GotFocus()
SetWindowPos hwnd, ConhwndTopmost, 0, 0, hheight, lWidth, ConswpShowWindow Or
ConswpNoActivate
txtPass.Enabled =False
cmdOk.Enabled =False
txtName.SetFocus
End Sub
```

```
Private Sub txtName_KeyPress(KeyAscii As Integer)
KeyAscii =Asc(UCCase(Chr(KeyAscii)))
If Len(txtName) >1 Then
txtPass.Enabled =True
Else
```



```
txtPass.Enabled =False
End If
End Sub
```

```
Private Sub txtPass_GotFocus()
SetWindowPos hwnd, ConhwndTopmost, 0, 0, hheight, lWidth, ConswpShowWindow Or
ConswpNoActivate
txtPass.SetFocus
End Sub
```

```
Private Sub txtpass_KeyPress(KeyAscii As Integer)
KeyAscii =Asc(UCCase(Chr(KeyAscii)))
If Len(txtPass) >1 Then
cmdOk.Enabled =True
SetWindowPos hwnd, ConhwndNotopmost, 0, 0, hheight, lWidth, ConswpShowWindow Or
ConswpNoActivate
Else
cmdOk.Enabled =False
End If
End Sub
```

```
*****Count-Down Manager Setup Module*****
```

```
Option Explicit
```

```
Private Sub Form_Load()
Dim dbs As Database, rst As Recordset
Dim store As String
Set dbs =OpenDatabase(App.Path & "\WinsecOld.mdb")
Set rst =dbs.OpenRecordset("tblSetup")
If rst.EOF And rst.BOF Then
store =""
Else
store =rst![Name] & ""
End If
```

```
If Len(store) >3 Then
mnuAvaPassword.Enabled =True
mnuGenerate.Enabled =True
mnuNew.Enabled =True
mnuPass.Enabled =True
mnuReport.Enabled =True
mnuRptAlready.Enabled =True
mnuRptPassword.Enabled =True
mnuTransaction.Enabled =True
mnuSetupName.Enabled =False
Else
mnuAvaPassword.Enabled =False
mnuGenerate.Enabled =False
mnuNew.Enabled =False
mnuPass.Enabled =False
mnuReport.Enabled =False
```

```
mnuRptAlready.Enabled =False
mnuRptPassword.Enabled =False
mnuTransaction.Enabled =False
mnuSetupName.Enabled =True
End If
End Sub
```

```
Private Sub mnuAvaPassword_Click()
On Error GoTo ErrorAvaPass
Report1.DataFiles(0) =App.Path & "\WinSecOld.mdb"
Report1.ReportFileName =App.Path & "\password.rpt"
Report1.SelectionFormula = "{tblTimer.OnceAccess} =False"
Report1.WindowTitle = "Available Password."
Report1.Action =1
Exit Sub
ErrorAvaPass:
MsgBox Err.Description
End Sub
```

```
Private Sub mnuClose_Click()
Unload Me
frmWindow.Show
End Sub
```

```
Private Sub mnuExit_Click()
Dim booOldValue As Boolean
Dim lonStatus As Long
Dim lonStatus2 As Long
Dim lonSysParam As Long
lonSysParam =97 'for spi_screensaverrunning
'disable control Alt +del
lonStatus =SystemParametersInfo&(lonSysParam, False, booOldValue, 0)
On Error GoTo ErrorExit
Select Case MsgBox("Sure to Exit? ", vbYesNo +vbInformation)
Case vbNo
Exit Sub
Case vbYes
Unload Me
End Select
```

```
End
frmWindow.Show
Exit Sub
ErrorExit:
MsgBox Err.Description
Resume Next
End Sub
```

```
Private Sub mnuGenerate_Click()
With frmSetWin
.Caption = "Generate Password"
.frameAuto.Visible =True
```

```
.frameManual.Visible =False  
.Show  
End With  
End Sub
```

```
Private Sub mnuNew_Click()  
With frmSetWin  
.Caption = "New Password"  
.frameAuto.Visible =False  
.frameManual.Visible =True  
.Show  
End With  
End Sub
```

```
Private Sub mnuRptAlready_Click()  
On Error GoTo ErrorAlready  
Report1.DataFiles(0) =App.Path & "\WinSecOld.mdb"  
Report1.ReportFileName =App.Path & "\passremain.rpt"  
Report1.SelectionFormula = "{tblTimer.OnceAccess} =True"  
Report1.WindowTitle = "Password Already in Use."  
Report1.Action =1  
Exit Sub  
ErrorAlready:  
MsgBox Err.Description  
End Sub
```

```
Private Sub mnuSetupName_Click()  
frmCompanySetup.Show  
End Sub
```

```
Private Sub mnuSetupPassword_Click()  
frmAmtSet.cmdAdd.Visible =True  
frmAmtSet.cmdDelete.Visible =True  
frmAmtSet.cmdOk.Visible =False  
frmAmtSet.Caption = "Add Password"  
frmAmtSet.Show  
End Sub
```

```
Private Sub mnuTransaction_Click()  
hey frmgenerate is the report master  
frmGenerate.Show  
End Sub
```

```
*****Password Generator Module *****  
Option Explicit
```

```
Private Sub Form_Load()  
Dim dbs As Database, rst As Recordset  
Dim store As String  
Set dbs =OpenDatabase(App.Path & "\WinsecOld.mdb")  
Set rst =dbs.OpenRecordset("tblSetup")  
If rst.EOF And rst.BOF Then  
store = ""
```



```
Else  
store =rst![Name] & ""  
End If
```

```
If Len(store) >3 Then  
mnuAvaPassword.Enabled =True  
mnuGenerate.Enabled =True  
mnuNew.Enabled =True  
mnuPass.Enabled =True  
mnuReport.Enabled =True  
mnuRptAlready.Enabled =True  
mnuRptPassword.Enabled =True  
mnuTransaction.Enabled =True  
mnuSetupName.Enabled =False  
Else  
mnuAvaPassword.Enabled =False  
mnuGenerate.Enabled =False  
mnuNew.Enabled =False  
mnuPass.Enabled =False  
mnuReport.Enabled =False  
mnuRptAlready.Enabled =False  
mnuRptPassword.Enabled =False  
mnuTransaction.Enabled =False  
mnuSetupName.Enabled =True  
End If  
End Sub
```

```
Private Sub mnuAvaPassword_Click()  
On Error GoTo ErrorAvaPass  
Report1.DataFiles(0) =App.Path & "\WinSecOld.mdb"  
Report1.ReportFileName =App.Path & "\password.rpt"  
Report1.SelectionFormula = "{tblTimer.OnceAccess} =False"  
Report1.WindowTitle = "Available Password."  
Report1.Action =1  
Exit Sub  
ErrorAvaPass:  
MsgBox Err.Description  
End Sub
```

```
Private Sub mnuClose_Click()  
Unload Me  
frmWindow.Show  
End Sub
```

```
Private Sub mnuExit_Click()  
Dim booOldValue As Boolean  
Dim lonStatus As Long  
Dim lonStatus2 As Long  
Dim lonSysParam As Long  
lonSysParam =97 'for spi_screensaverrunning  
'disable control Alt +del  
lonStatus =SystemParametersInfo&(lonSysParam, False, booOldValue, 0)
```

```
On Error GoTo ErrorExit
Select Case MsgBox("Sure to Exit? ", vbYesNo +vbInformation)
Case vbNo
Exit Sub
Case vbYes
Unload Me
End Select
```

```
End
frmWindow.Show
Exit Sub
ErrorExit:
MsgBox Err.Description
Resume Next
End Sub
```

```
Private Sub mnuGenerate_Click()
With frmSetWin
.Caption = "Generate Password"
.frameAuto.Visible =True
.frameManual.Visible =False
.Show
End With
End Sub
```

```
Private Sub mnuNew_Click()
With frmSetWin
.Caption = "New Password"
.frameAuto.Visible =False
.frameManual.Visible =True
.Show
End With
End Sub
```

```
Private Sub mnuRptAlready_Click()
On Error GoTo ErrorAlready
Report1.DataFiles(0) =App.Path & "\WinSecOld.mdb"
Report1.ReportFileName =App.Path & "\passremain.rpt"
Report1.SelectionFormula ="{tblTimer.OnceAccess} =True"
Report1.WindowTitle ="Password Already in Use."
Report1.Action =1
Exit Sub
ErrorAlready:
MsgBox Err.Description
End Sub
```

```
Private Sub mnuSetupName_Click()
frmCompanySetup.Show
End Sub
```

```
Private Sub mnuSetupPassword_Click()
frmAmtSet.cmdAdd.Visible =True
frmAmtSet.cmdDelete.Visible =True
```

```
frmAmtSet.cmdOk.Visible =False
frmAmtSet.Caption ="Add Password"
frmAmtSet.Show
End Sub
```

```
Private Sub mnuTransaction_Click()
hey frmgenerate is the report master
frmGenerate.Show
End Sub
```

```
*****Time Slice Count Down Module*****
```

```
Dim Mydb As Database
Dim MyTab As Recordset
Dim Timediff As Date
Dim TimeIn As Date
Dim TimeOut As Date
Dim TimeOut2 As Date
Dim SecDiff As Integer
Dim HrDiff As Integer
Dim MinDiff As Integer
Dim TimeIn2 As Date
Dim RealTimeOut As Date
Dim blnFinish As Boolean
Dim Timed As Long
'Windows always on top.show
Const ConhwndTopmost =-1
Const ConhwndNotopmost =-2
Const ConswpNoActivate =&H10
Const ConswpShowWindow =&H40
```

```
Private Sub cmdHide_Click()
Me.WindowState =vbMinimized
End Sub
```

```
Private Sub cmdLogOff_Click()
Dim TimeNow As Date
Dim TimeLeftOver As Integer
Dim HourLeftover As Integer
Dim minLeftover As Integer
Dim secLeftover As Integer
```

```
Dim LeftOver As Date
Dim dbs As Database, rst As Recordset
```

```
TimeNow =Time
Select Case (MsgBox("Are you sure you want to Log Off", vbYesNo +vbDefaultButton2 +
vbInformation, "Log Off..."))
Case vbYes
HourLeftover =Val(txtHrs.Text)
minLeftover =Val(txtMins.Text)
secLeftover =Val(txtSec.Text)
If HourLeftover >0 Then
```



```

HourLeftover =HourLeftover * 60
Else
HourLeftover =0
End If
If secLeftover >30 Then
secLeftover =1
Else
secLeftover =0
End If
TimeLeftOver =HourLeftover +minLeftover +secLeftover

```

```
'na here e stop
```

```

If TimeLeftOver >0 Then
Set dbs =OpenDatabase(App.Path & "\WinSecOld.mdb")
Set rst =dbs.OpenRecordset("tblTimer")
With rst
'.Index ="Password"
'.Seek "=", strPass
'If Not .NoMatch Then
.AddNew
![Password] =strPass
![Usersname] =strUsersNames
![Remainder] =TimeLeftOver
![Time] =intTimeValue
![Amount] =PaidAmt
![OnceAccess] =True
.Update
End With
'say that this man does not finish
blnFinish =False
>Delete all entries in delete Table
Deleter
Unload Me
frmWindow.Show
End If
Case vbNo
End Select
End Sub

```

```

Private Sub Form_Activate()
Dim mySecDiff As Integer
Dim myHrDiff As Integer
Dim myMinDiff As Integer
Dim booOldValue As Boolean
Dim lonStatus As Long
Dim lonStatus2 As Long
Dim lonSysParam As Long
lonSysParam =97 'for spi_screensaverrunning
'disable control Alt +del
lonStatus =SystemParametersInfo&(lonSysParam, True, booOldValue, 0)

```

```

'this boolean tells if a person finish using his time or not
blnNotRunning =True
'this disable the flash timer
TimerFlash.Enabled =False

blnFinish =True
SetWindowPos hwnd, ConhwndTopmost, 0, 0, 160, 75, ConswpShowWindow Or
ConswpNoActivate
Timer1.Interval =1000
TimeIn =Now 'this is the first change
TimeIn =Time
TimeIn2 =TimeValue(TimeIn)
myHrDiff =Hour(TimeIn)
myMinDiff =Minute(TimeIn) +intTimeValueR - 1
If intTimeValueR =0 Or intTimeValueR <0 Then Exit Sub
'this allow a plus 1 back
'to track if blnnotRunning is false
If intTimeValueR >1 Or intTimeValueR =1 Then
If blnAccessOnce2 =False Then
'added extral 2 minutes for login
myMinDiff =myMinDiff +1
Else
myMinDiff =myMinDiff +1
End If ' for if blnaccessonce2 =false
End If ' for if intTimeValue >1

mySecDiff =Second(TimeIn)
TimeOut =TimeSerial(myHrDiff, myMinDiff, mySecDiff)
TimeOut2 =TimeValue(TimeOut)
Timediff =TimeOut2 - TimeIn2
'de la operatione
logical if pm then minus difference from 24 hours
'or else you get nonsense
HrDiff =Hour(Timediff)
If Right(Timediff, 2) ="PM" Then
HrDiff =24 - HrDiff
End If
MinDiff =Minute(Timediff)
SecDiff =Second(Timediff)
SecDiff =5
txtIn.Text =Format(TimeIn, "Long time")
txtOut.Text =Format(TimeOut, "Long time")
tblTell.Caption ="Save your Work ...Oooooo!"
End Sub

Private Sub Form_Unload(Cancel As Integer)
Dim dbs As Database
Dim rs, rst As Recordset
Set Mydb =OpenDatabase(App.Path & "\WinSecOld.mdb")
Set MyTab =Mydb.OpenRecordset("tblTracking")
'Set Mydb =OpenDatabase(App.Path & "\WinSecOld.mdb")
On Error GoTo ErrorHandler

```

```

If Len(strPass) =0 Then Exit Sub
Select Case blnFinish
Case True
    'na here i start adding joinder
    Dim valPass As Long
    Dim valTime As Long
    Dim valRandom As Long
    Set dbs =OpenDatabase(App.Path & "\WinSecOld.mdb")
    Set rst =dbs.OpenRecordset("tblTimer")
    Set rs =Mydb.OpenRecordset("tblIncome")
    With rst
    .Index ="Password"
    .Seek "=", strPass
    If Not .NoMatch Then
    'try and edit the no
    .Edit
    If IsNumeric(strPass) Then
    valPass =Val(strPass)
    valTime =Second(Time)
    valTime =Int(valTime * Rnd) * valTime
    valRandom =Int(2005 * Rnd) +1000
    'randomise
        valPass =Int((valPass * Rnd) +valRandom) +Int(valTime * Rnd) * 3
        rst![Password] =valPass
        rst![OnceAccess] =False
        rst![Remainder] =0
    .Update
    Else
    'if not numeric
    If Not (.EOF And .BOF) Then
    .Delete
    End If
    End If
    'end for if not match
    End If
    End With

```

'save the money needed for the transaction

```

'save all money into tblIncome
    With rs
    .AddNew
    rs![Password] =strPass
    rs![Amount] =PaidAmt
    rs![Minutes] =intTimeValue
    rs![Date] =Date
    .Update
    End With

```

```

'close the database
rst.Close
rs.Close

```



```

    'end here
Case False
' if the person does not finished it is taken care
' of by cmdLogoff
End Select

'na here joinder finish ooooo
With MyTab
.Edit
MyTab![Time-Out] =Time
.Update
End With
Mydb.Close
'still call on the deleter
Deleter
ClearUs
Exit Sub
ErrorHandler:
Exit Sub
End Sub

Private Sub Timer1_Timer()
NewSetUp
End Sub

Private Sub NewSetUp()
If SecDiff =0 And MinDiff =0 And HrDiff =0 And intTimeValueR =0 Then Exit Sub
If SecDiff =1 Then
    If MinDiff >1 Then
        MinDiff =MinDiff - 1
        SecDiff =59
    ElseIf MinDiff =1 Then
        If HrDiff >0 Then
            HrDiff =HrDiff - 1
            MinDiff =59
            SecDiff =60
        Else
            MinDiff =MinDiff - 1
            SecDiff =60
        End If
    ElseIf MinDiff =0 Then
        If HrDiff >0 Then
            HrDiff =HrDiff - 1
            MinDiff =59
            SecDiff =60
        End If
    Else
        Unload Me
        blnOntop =True
        blnNotRunning =True
        frmWindow.Show
    End If
End Sub

```

```

Exit Sub
End If
Else
SecDiff =SecDiff - 1
If SecDiff <1 Then
'MsgBox "Time up please"
Unload Me
blnOntop =True
blnNotRunning =True
frmWindow.Show
Exit Sub
End If
'first if statement end if
End If
txtHrs.Text =HrDiff
txtMins.Text =MinDiff
txtSec.Text =SecDiff
If SecDiff =1 And MinDiff =0 And HrDiff =0 Then
'MsgBox "Time up please"
Unload Me
blnOntop =True
blnNotRunning =True
frmWindow.Show
Exit Sub
End If

'na here e start
If Val(txtHrs.Text) <1 And Val(txtMins.Text) =2 And Val(txtSec.Text) =30 Then
Dim Howmuch As Long
Howmuch =2000
If Me.WindowState =vbMinimized Then
Me.WindowState =vbNormal
CentreForm Me
'this flashess on the scren
Sleep (Howmuch)
Me.Move 0, 0, 2310, 1125
TimerFlash.Enabled =True
Else 'else for if vbminimized
CentreForm Me
'this flashess on the scren
Sleep (Howmuch)
Me.Move 0, 0, 2310, 1125
TimerFlash.Enabled =True
End If
Else
End If
SetWindowPos hwnd, ConhwndTopmost, 0, 0, 160, 75, ConswpShowWindow Or
ConswpNoActivate
End Sub
Private Sub ClearUs()
txtHrs.Text =""
txtMins.Text =""
txtSec.Text =""

```

```
HrDiff =0
MinDiff =0
SecDiff =0
intTimeValue =0
intTimeValueR =0
PaidAmt =0
strUsersNames = ""
frmWindow.txtName.Text = ""
frmWindow.txtPass.Text = ""
blnAccessFirst =True
End Sub
```

```
Private Sub TimerFlash_Timer()
Static booState As Boolean
Dim lonStatus As Long
Dim lonfrmHandle As Long
'Get the form handle
lonfrmHandle =Me.hwnd
' Call flash window function
longstatus =FlashWindow&(lonfrmHandle, booState)
' Flipflop boostate value
booState =Not booState
End Sub
```

```
Private Sub TimeToggle_Timer()
Dim dbs As Database
Dim rs As Recordset
Dim HoursleftOver As Integer
Dim MinuteLeftover As Integer
Dim SecondsLeftOver As Integer
Dim TimeLeftOvers As Integer
Dim Hr As Integer
Dim Minu As Integer
Dim Secon As Integer
```

```
Set dbs =OpenDatabase(App.Path & "WinsecOld.mdb")
Set rs =dbs.OpenRecordset("tblTemp")
Timer =Time
```

```
HoursleftOver =txtHrs.Text
MinuteLeftover =txtMins.Text
SecondsLeftOver =txtSec.Text
```

```
If HoursleftOver >0 Then
HoursleftOver =HoursleftOver * 60
Else
HoursleftOver =0
End If
'let seconds be equals to 1 anytime
SecondsLeftOver =1
TimeLeftOvers =HoursleftOver +MinuteLeftover +SecondsLeftOver
```



```
If TimeLeftOvers >2 Then
TimeLeftOvers =TimeLeftOvers - 1
End If
```

```
With rs
```

```
.Index ="Password"
```

```
.Seek "=", strPass
```

```
If Not .NoMatch Then
```

```
.Edit
```

```
![Password] =strPass
```

```
![Username] =strUsersNames
```

```
![UpdateTime] =Time
```

```
![Remainder] =TimeLeftOvers
```

```
![Amount] =PaidAmt
```

```
![OnceAccess] =True
```

```
.Update
```

```
Else
```

```
.AddNew
```

```
![Password] =strPass
```

```
![Username] =strUsersNames
```

```
![Time] =intTimeValue
```

```
![UpdateTime] =Time
```

```
![Remainder] =TimeLeftOvers
```

```
![Amount] =PaidAmt
```

```
![OnceAccess] =True
```

```
.Update
```

```
End If
```

```
End With
```

```
rs.Close
```

```
db.Close
```

```
End Sub
```

```
Private Sub Deleter()
```

```
'this function looks at the tbltemp and delete password after logoff or quit
```

```
Dim strSeek As String
```

```
Dim dB As Database, Rss As Recordset
```

```
Set dB =OpenDatabase(App.Path & "\\WinsecOld.mdb")
```

```
Set Rss =dB.OpenRecordset("tblTemp")
```

```
With Rss
```

```
.Index ="Password"
```

```
.Seek "=", strPass
```

```
If Not .NoMatch Then
```

```
' record found
```

```
If Not (.EOF And .BOF) Then
```

```
.Delete
```

```
Else
```

```
End If
```

```
End If
```

```
End With
```

```
End Sub
```

*****Class Module Code*****

```
Dim strCheck As String
Public intTimeValue As Double
Public intTimeValueR As Double
```

```
Public intAccessTime As Double
'this is used for test program delete after use
Public strInstalled As String
Public strExpires As String
'this boolean is used to tackle if the user have access the system once
Public blnAccessOnce2 As Boolean
```

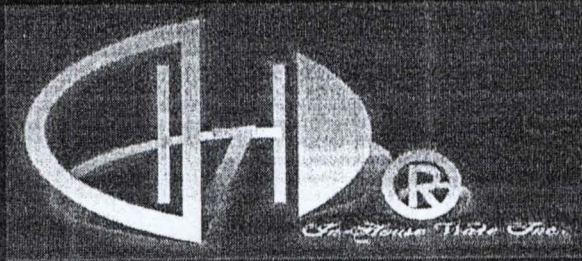
```
Dim strColl As String
Dim strtime As String
'strings to store name and password
Public strName As String
Public strPass As String
```

```
'Boolean to toggle frmtimer
Public blnAccessFirst As Boolean
'boolean to try toggle
Public blnOntop As Boolean
'boolean to toggle if the program is running
Public blnNotRunning As Boolean
'new, new variables
Public SavePass As String
Public PaidAmt As Long
Public strUsersNames As Long
Public blnOnceAccess As Boolean
Public TimerIn As Date
```

```
Declare Sub Sleep Lib "kernel32" (ByVal dwMilliseconds As Long)
Declare Function FlashWindow Lib "user32" (ByVal hwnd As Long, ByVal bInvert As Long)
As Long
Declare Function SystemParametersInfo& Lib "user32" Alias "SystemParametersInfoA" (ByVal
uAction As Long, ByVal uParam As Long, lpvParam As Any, ByVal fuWinIni As Long)
Declare Function SetWindowPos Lib "user32" (ByVal hwnd As Long, ByVal hWndInsertAfter
As Long, ByVal X As Long, ByVal Y As Long, ByVal cx As Long, ByVal cy As Long, ByVal
wFlags As Long) As Long
Declare Function GetActiveWindow Lib "user32" () As Long
```

```
Public Function CentreForm(myForm As Form)
Dim frmWidth As Integer
Dim frmHeight As Integer
frmWidth =myForm.Width
frmHeight =myForm.Height
myForm.Move ((Screen.Width - frmWidth) / 2), (Screen.Height - frmHeight) / 2
End Function
```

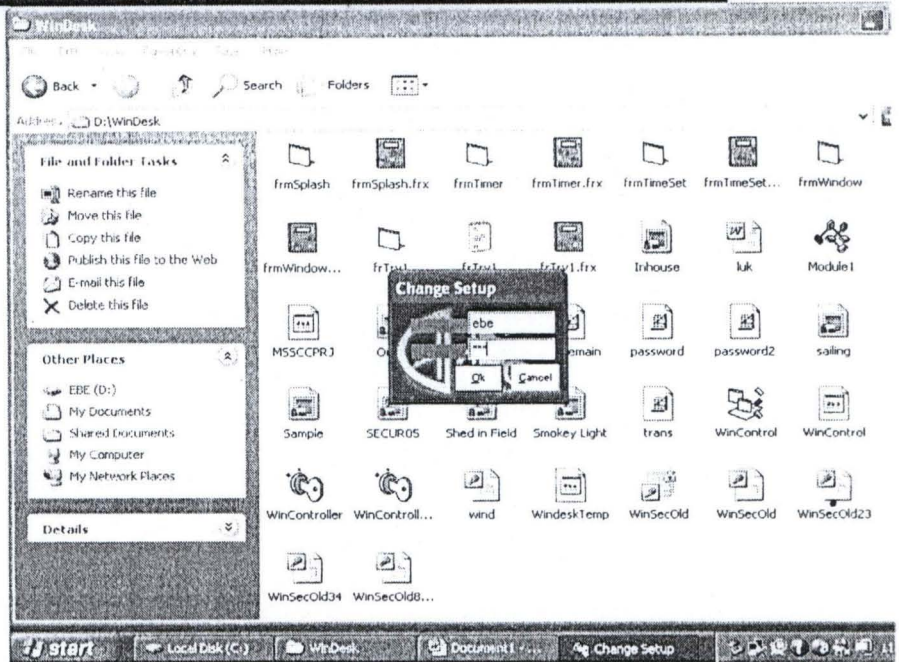

Http: \www.In-Houseware.com



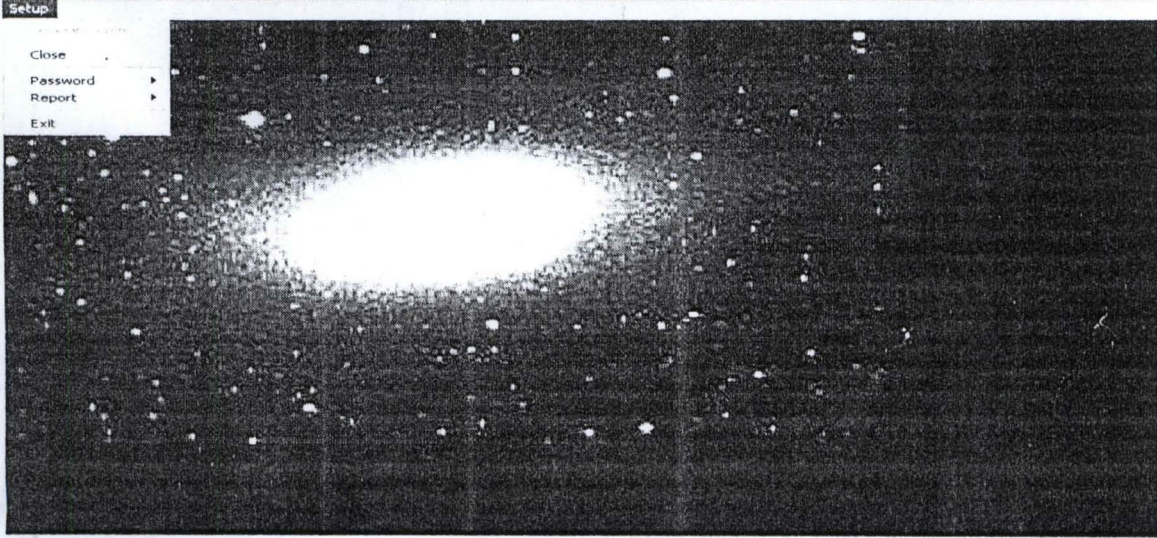
User Name: EBE
User's Pass: ****

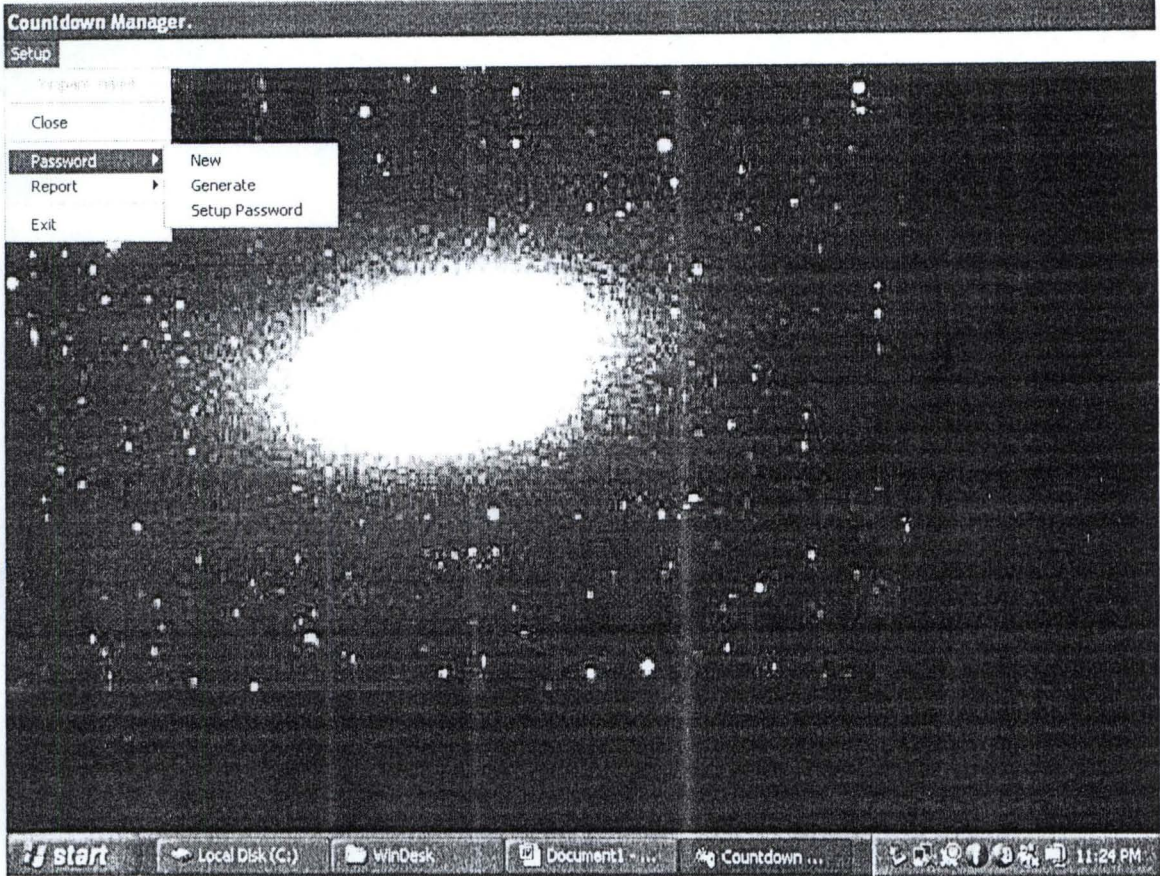
OK

Web Services at its Best...!



Countdown Manager.





Company Setup

Company Name:
FUT MINNA, MATH/SC

Location:
BOSSO CAMPUS

City: Minna State: Niger

Buttons: Ok, Cancel

New Password

Password: [] Ok

Charge Amount: [] Delete

Time Value: [] in Min(s) Cancel

Generate Password

Auto Generate

Start Number End Number

Charge Amount

Time Value in Min(s)

Add Password

Countdown Manager.

Setup

Close

Report Password
Transaction

Exit

Countdown Manager.

Setup

Close

Report Password Available
Transaction Already in Use

Exit

Available Password.

FUT MINNA, MATH/COMP. Sc
Bosso Campus
Minna

Today's Date 8/22/2007

| UserName | Password | Total Time | Ticket Value |
|----------|------------------------------------|--------------|--------------|
| 736547 | 105221 FUT MINNA, MATH/COMP. Sc | 30 Minute(s) | 50 |
| 794927 | 113561 FUT MINNA, MATH/COMP. Sc | 30 Minute(s) | 50 |
| 842415 | 120345 FUT MINNA, MATH/COMP. Sc | 30 Minute(s) | 50 |
| 851193 | 121599 FUT MINNA, MATH/COMP. Sc | 30 Minute(s) | 50 |
| 728007 | 104001 FUT MINNA, MATH/COMP. Sc | 30 Minute(s) | 50 |
| 843346 | 120478 FUT MINNA, MATH/COMP. Sc | 30 Minute(s) | 50 |

678 of 679 7458 of 7459 Total:7459 100%

Report G

A day
 Week(s)
 Month(s)
 Year(s)

Time Slice Countdown

Time-IN Hr(s) Min(s) Sec(s)

12:37:55

0

10

3

Time-OUT

12:47:55

Hide me

Log Off