

REMOTE ADMINISTRATION IN A NETWORK ENTERPRISE

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DEDICATION

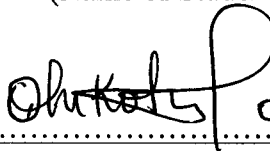
This project work is dedicated to the Almighty God the Maker of Heaven and Earth, my beloved parents, Rev. J .O Olukotun and Mrs. Rebecca Olukotun for their support and assistance throughout my entire life. And also to my sisters: Ibukun and Aanu-Oluwa, my brothers, Adekunle, Adeniyi and Oluwa-Gbenga.

DECLARATION

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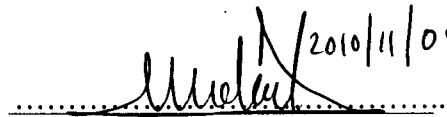
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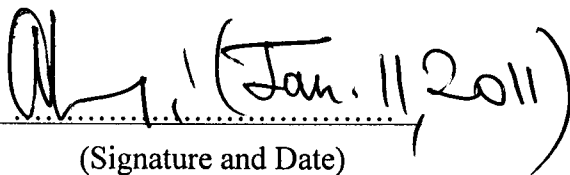
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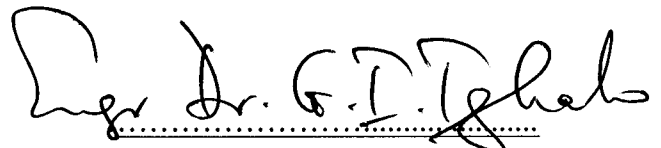
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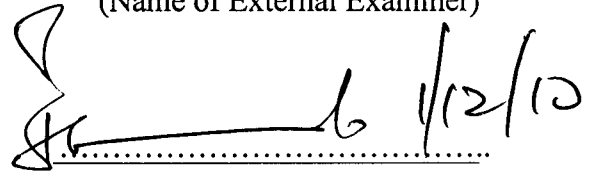
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ABSTRACT

Remote Administration in a Network Enterprise refers to any method of controlling computer(s) from a remote location. It is a comprehensive suite of both hardware and software for setting-up, managing and monitoring of a computer network. The software that is used together with the hardware is design to get the necessary information of the hardware devices in the network which is then displayed on a dedicated computer, designed as the Network Control Terminal (or NCT). Software that allows remote administration is becoming increasingly common and is often used when it is difficult or impractical to be physically near a system in order to use it, or in order to access web material that is not available in one's location, for example viewing the BBC iPlayer from outside the United Kingdom. A remote location may refer to a computer in the next room or one on the other side of the world. The protocols supported by the Remote Administration in Network Enterprise software will depend on the protocol(s) used on the network. In this project, a computer program was designed and developed to provide a central point for a Network Administrator to monitor all the nodes on Transmission Control Protocol/Internet Protocol (TCP/IP) based Local Area Network (LAN). The implementation exploits the rich libraries and latest programming language features introduced in the Visual Basic.Net programming language.

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CHAPTER ONE

INTRODUCTION

1.1 Background To The Study

The concept and implementation of networks provides smooth, efficient, robust and cost-effective business activities in establishment such as banks, tertiary institutions, private and public corporations.

Through computer networking, organizations can reduce operating costs even further by leveraging their previous investment in computers by setting up connections between their usually disparate stand-alone computers and use such connections for data communications, resources and information sharing in a fast and more efficient way.

Computer networks have become a powerful communication tool that many organizations depend on. Also neglecting the Remote administration of a Network Enterprise can lead to many undesirable consequences such as reduced productivity of employees, network unavailability (downtime) which translates directly into a reduced bottom line or a drop in some form of profitability metric in the case of non-profit bearing organizations.

Remote Network administration involves activities that if properly managed in every day running of an organization can reduce the impact of, or if possible, prevent system or network failures thereby ensuring maximum network uptime. This is achieved using a remote administration in a network.

Remote administration of a network enterprise is a comprehensive collection of devices comprising routers, workstations and servers.

Remote Administration in Network Enterprise is common in large network installations especially in network environments that employ expensive communication hardware such as Very Small Aperture Terminals (VSAT). They help to ensure such networks function optimally and/or avoid any form of disruption in network links, if the network is mission critical.

In this project, Remote Administration in a Network Enterprise will be described in details as to how it can be implemented using a computer software for Local Area Networks.

1.2 Problem Definition

The availability of computer networks of different types at many organizations and its associated complexity lead to creation of job roles that require specialized skills. Such job roles are that of the network administrator.

The functions of a network administrator include network planning and designing. It also includes network management activities such as monitoring; fault detection and isolation, defining security policies and users access rights when the network is fully operational.

These days, networks closely model the structure of the enterprise in which they are deployed. Hence, if business offices of organizations are very far apart geographically, the network elements or nodes that make up the network tends to be

far apart too. These facts describe clearly how tedious networks management for an administrator can be if the network spans a large area. An obvious solution might be to employ an administrator for each location of the organization that is a part of its overall internal network. For instance, if the organization has computers in every major city in the country that make up its internal network, then it would have to employ an administrator in each of these cities which can be over an hundred. If it expands to other African countries, it would require at least as many administrators as the number of the cities in each of the countries in which it has a presence.

Unfortunately, the above solution does not scale well for very large networks. Computers are extremely versatile that if properly setup with appropriate software, they can be used to look out for other computers. This brings us to the solution of the problem described above. The solution would be to deploy specialized hardware and a combination of software and communication protocols that would allow an administrator to have a single point or location for all network management activities— A remote Administration in a Network Enterprise.

The Remote Administration in a Network Enterprise can be used to monitor, configure, bring up or isolate any network element, local or remote, from a single point of control which is called the Network Control Terminal (NCT).

1.3 Objectives of the Project

This project aims to achieve the following objectives:

- Remotely assisting others through online Chat.

- Supervising computer or internet usage.
- Access to a remote system's "Computer Management" snap-in
- Provide network management capabilities irrespective of the operating systems the various hosts in the network.
- To enable a network administrator have a single point of control so as to carry out all network management and coordination activities
- Design and develop computer software with a Graphical User Interface that is consistent across specific platforms that can monitor the host in a network by polling information directly from the hosts.
- Shutting down or rebooting another computer over a network

1.4 Research Methodology

A combination of the system analysis and design and some parts of the object oriented analysis and design development methodologies were used in developing the software.

To simplify the eventual system design, where necessary, design patterns were used to reduce design complexity.

In addition, the unified modeling language(UML), a notation used for modeling systems most especially software systems was used to specify the design artifact using clear and intuitive diagrams [8].

1.5 Scope

Given the probable complexity of the software to be developed, it was imperative to limit the scope of the work. The project scope is enumerated below:

- The software will be designed for use in windows operating system.
- TCP/IP is the ideal communication protocol and is the default used on both windows and Linux; this software support both TCP/IP and wireless networks.
- It will be compatible with LANs that use only private class C addresses for host identification. This is to avoid challenges that may arise from the used of the software LANs that employ subnetting or classless IP addresses. Subnetting a network would require that the network mask network address and broadcast address to be computed unlike in the scheme involving a class in which the subnet mask, network and broadcast address have default values defined for them.
- Simple network management protocol (SNMP) is a standard protocol used for managing TCP/IP based networks. It was standardized by the internet engineering task force (IETF). A body saddled with the responsibilities of maintaining internet standards, into request for comment (RFC) 1157. However, to avoid the complexity and extra requirements that is necessary to setup SNMP agents. And management information based system (MIBS) to provide some network data that will be used in network management; its use will not be considered. Instead, I shall rely on the internet control message protocol (ICMP) echo request (ping) for testing link connectivity or host reach ability.

- Message sending from the NCT to network users will be restricted to users on the Microsoft windows platform because the software program that will make the implementation of the feature easy is bundled with the windows operating system.

CHAPTER TWO

LITERATURE REVIEW

2.1 Computer Networks

A computer network is the connection of two or more computer devices via a communication channel for the main purpose of sharing information and resources, such as hard disks and printers ^[1]. Computer networks may be connected directly by cable connection or wireless, or indirectly by telephone lines or satellites. Network services include internet, voice over IP and fax.

The advantages of networks include:

- **Sharing Resources:** Software resources such as files and programs can be shared in a network. Also hardware resources such as printers, hard disk, and scanner can be shared ^[1].
- **Centralized Management:** Networks help keep information reliable and up-to-date. A well managed, centralized data storage system allows multiple users to access data from different locations ^[1].
- **Cost Effective:** Networks allows efficient management of resources. For example, multiple users can share a single high-quality printer, rather than having multiple, possibly lower quality printers on individual computers^[1]

- Security: Network allows authentication before access to any resources in the network. Security can be established at the user as well as at the resource level ^[1].

2.2 Network Components for LAN

The following component comprises a computer network most especially LANs:

- ❖ Media connectors: They are devices that are used to connect a node to the transmission medium ^[1].
- ❖ Computers: Electronic devices that accept data and process them to give information. It can be desktop or laptop.
- ❖ Network Interface Cards (NICs): It is an adapter that is plugged in a slot inside a computer in order to provide interface between the computer and the transmission medium ^[1].
- ❖ Repeaters: They are devices used to amplify and generate the signal from one node to another in a network ^[1].
- ❖ Hubs: They are components that provide a common connection point for computers, printers and other network devices in a Star topology ^[1].
- ❖ Bridges: They are used either to join two networks together or divide large networks into smaller segments ^[1].

- ❖ **Switches:** They are intelligent network devices that segments networks into different subnets^[1].

To manage the exchange of data and sharing of system resources, networks are broadly classified as:

- **Client-Server Networks:** In this type of a network, computers, which requests for a resource are generally referred to as client and the computer, which provides resources to the client's request, are generally referred to as server. In a Client-Server network, a dedicated and centralized server helps in sharing information and maintaining number of users^[1].
- **Peer-to-peer networks:** In this type of a network, each computer acts as a client requesting resources as well as a server providing resources. The network lacks a centralized server that leads to a security problem^[1].

2.3 Categories of Networks

There are many categories of computer networks including:

- **Local Area Network (LAN):** The computers are placed relatively to each other. For example a network within an office connecting users, allowing them to share resources such as files, printer or modem^[2].
- **Metropolitan Area Networks (MAN):** It is relatively larger than LAN and generally extends across a city or a metropolitan. For example, a network connecting the corporate offices of the company located nearby or within the same city^[2].

- Wider Area Network (WAN): It is a network that provides connectivity spanning across large geographical areas, such as states, countries or across globe ^[2].

In addition, the following characteristics are also used to categorize different types of networks:

- Topology: the geometric arrangement of a computer system. Common topologies include a Bus, Star and Ring.
- Protocol: the protocol defines a common set of rules and signals that computer on the network used to communicate. One of the most popular protocols for LANs is called *Ethernet*. Another popular LAN protocol PCs is the IBM token-ring network ^[3].

2.4 Network Topology

Network topology refers to the way networked computers and network resources are connected. The three most widely used topologies are bus, ring, and star. Note that the following network topology diagrams are logical views of the topologies they represent and don't necessarily match the physical (electrical) interconnections on the networks.

- Bus Topology: The bus network topology connects each computer to a single cable. At each end of the cable is a terminating resistor or a terminator. An electrical signal is passed back and forth along the cable past the computers and between the two terminators. The bus carries a message from one end of the network to the other. As the bus passes each computer, the computer checks the destination address on the message. If the address in the message matches the computer's address, the computer

receives the message [3]. If the address doesn't match, the bus carries the message to the next computer, and so on. The limitation of bus networks is the speed of data transmission relative to the number of computers on the network. As more computers are added to the network, more collisions are bound to happen. As more collisions occur, more retransmissions take place and the overall network performance degrades [3].

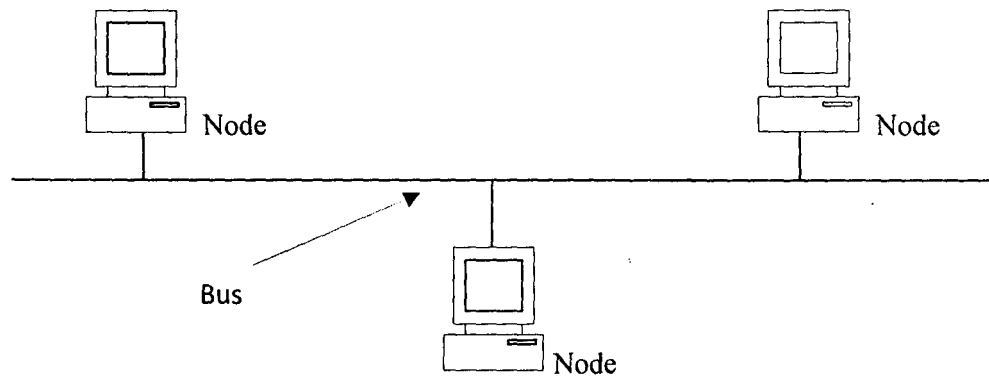


Figure2.4.1. Bus network

- Ring Network: In a ring network, a packet of data (often called a token) is continually moving around the ring from one computer to the next. To send data, a computer on the network must wait for the circulating token to pass by [3]. When the token arrives, it's examined to see whether it's empty. If it's empty, the computer that wishes to transmit adds its data to the token packet and addresses the packet to a destination [3]. As the token passes by the destination computer, the computer looks at the address and because the message is addressed to itself, extracts the data, and replaces the token packet's data with a delivery acknowledgment message [3]. The token then continues to circle the ring and eventually returns to the sending computer.

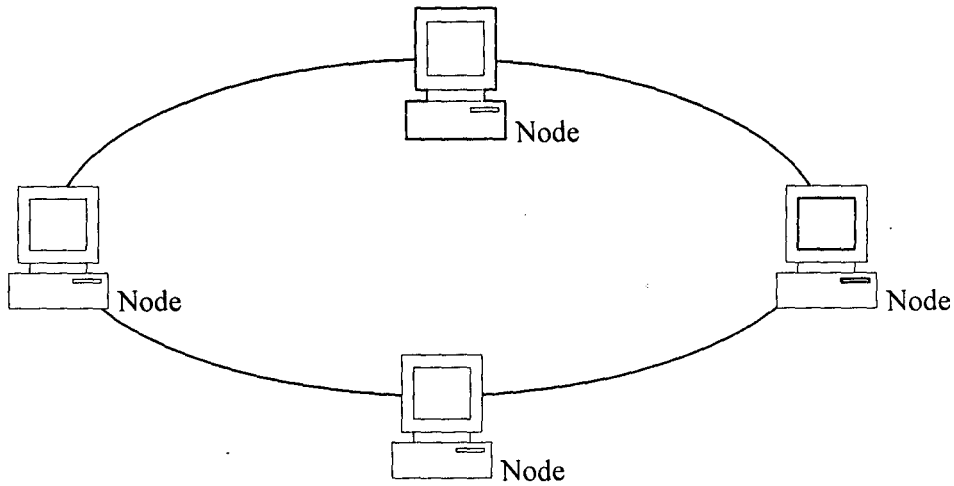


Figure 2.4.2: Ring topology

- **Star Network:** Transmission of data between any two computers in a star network requires that data be sent via the centrally located computer, called a hub ^[3]. The hub provides a common connection for the computers to communicate with one another. The major problem with star networks is that if the centrally located hub is not operating, the entire network becomes unusable ^[3]. A benefit of a star network is that no computer, other than the centrally located hub, can interrupt network traffic ^[3].

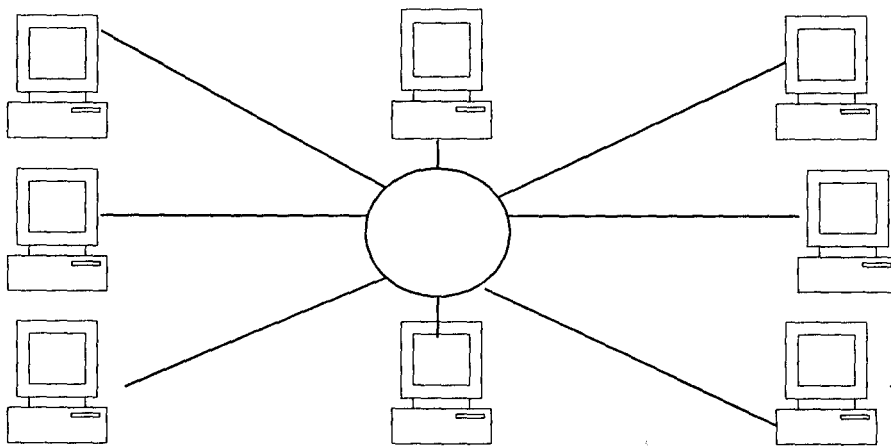


Figure 2.4.3: Star network.

2.5 Computer Network Standards

- The Internet Engineering Task Force (IETF): The IETF is an organization operated under the auspices of the Internet Society (ISOC) that is responsible for developing internet standards. The internet standards are Request for Comments (RFC), a series of documents used as the primary means for communicating information about the internet. Some RFCs are designated by the Internet Architecture Board (IAB) as internet standards, like protocol specifications like SNMP, TCP etc (Larson, 2001, pp.21). RFCs are available from the IETF website as text files ^[3].
- **TCP/IP:** TCP/IP commonly refers to network architecture, but this acronym also refers to 2 protocols that are closely bound: a transport protocol, TCP (Transmission control protocol) we use above a network protocol, IP (Internet protocol). What we designated by TCP/IP model is actually a network architecture of 4 layers in which the TCP and IP protocols have a major role, since they constitute the official and most common implementation. Consequently, TCP/IP means two different things: the 4-layer network architecture, and the set of 2 protocols, TCP and IP ^[3].

As we will see later on, the TCP/IP model has become the model of reference in place of the OSI model. Indeed, contrary to the OSI model, the TCP/IP model was first implemented before being specified. The particular story makes TCP/IP's characteristics, its averages and drawbacks.

The TCP/IP model can indeed be described as 4-layer network architecture. The OSI model was added to ease the comparison between these two major models .

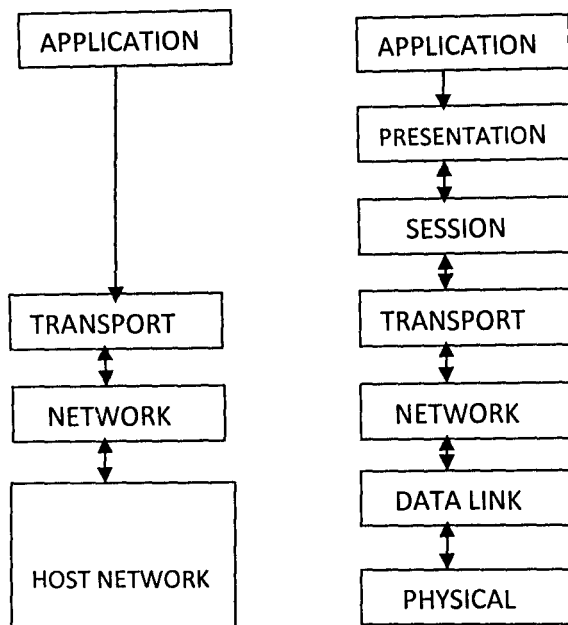


Figure 2.5.1: A Diagram Comparing the TCP/IP to the OSI Model

- Transmission Control protocol (TCP): TCP (RFC 793) is the connection-oriented transport protocol of the PCT/IP protocols stack that creates a virtual circuit between end user applications to provide reliable full-duplex data transmission ^[4].
- User Datagram Protocol (UDP): UDP (RFC 768) is the connection-less transport protocol in the TCP/IP protocol stack that exchanges datagram's, without acknowledgments, so application layer protocols must provide reliability. Any error processing and retransmission of packets must be performed by other protocols ^[4].

2.6 Remote Administration Architectures

Remote Administration composed of two primary components: a server and client(s). The server is the console through which the network administrator performs its network administration functions. Clients are the entities that interface to the actual device being controlled. Bridges, hubs, routers or network servers are examples of managed devices that contain managed object. These managed objects might be hardware, configuration parameters, performance statistics, and so on that directly relate to the current operation of the device in question. These object are arranged in what is known as a virtual information database, called a management information base which can also be called MIB. SNMP allows managers and agents to communicate for the purpose of accessing these objects ^[4].

- A typical client usually implements the full SNMP protocol stores and retrieves management data defined by the MIB; a synchronously signal is an event to the manager becomes a proxy for some non-SNMP manageable network node ^[4].

A typical Remote Administration is usually implemented in full SNMP protocol, capable of querying clients. It gets responses from agents, set variables in client, acknowledge asynchronous events from clients ^[4].

2.7 Popular Available Softwares

2.7.1 Windows:

Available window software use in implementing Remote administration in a Network Enterprise includes Windows Server 2003/2008, Windows XP, Windows XP Media Center and Tablet PC Editions, and Windows Vista Ultimate, Enterprise and Business editions come with Microsoft's Microsoft Management Console, Windows Registry Editor and various command-line utilities that may be used to administrate a remote machine ^[5]. One form of remote administration is remote desktop software, and Windows includes a Remote Desktop Connection client for this purpose ^[5].

Windows XP comes with a built-in remote administration tools called Remote Assistance and Remote Desktop, these are restricted versions of the Windows Server 2003 Terminal Services meant only for helping users and remote administration ^[5]. With a simple hack/patch (derived from the beta version of Windows XP) it's possible to "unlock" XP to a fully featured Terminal Server, one good and easy example is Sala's Terminal Server Patch ^[4]. With this patch it is possible to make a terminal server out of Windows XP Professional, Multimedia Center, and Tablet PC Edition. Windows XP Home can be made to run a full-featured Terminal Service as well, with additional patching ^[5].

Windows Server 2003 comes with built-in remote administration tools, including a web application and a simplified version of Terminal Services designed for Remote administration.

Active Directory and other features found in Microsoft's Windows NT Domains allow for remote administration of computers that are members of the domain, including editing the registry and modifying system services and access to the system's "Computer Management" Microsoft Management Console snap-in ^[5].

Some third-party remote desktop software programs perform the same job.

Remote Server Administration Tools for Windows 7 enables IT administrators to manage roles and features that are installed on remote computers that are running Windows Server 2008 R2 ^[5].

Despite the current availability of these window Softwares, they are very costly. They are not easily implementable ^[5].

2.7.2 Non-Windows

Non-windows Softwares available are VNC which can be used for remote administration of computers, however it is increasingly being used as an equivalent of Terminal Services and Remote Desktop Protocol for multi-user environments, Back Orifice, whilst commonly used as a Script Kiddie tool, claims to be a remote-administration and system management tool. Critics have previously stated that the capabilities of the software require a very loose definition of what "administration" entails ^[5].

Also Linux, UNIX and BSD support remote administration via remote login, typically via SSH (The use of the Telnet protocol has been phased out due to security concerns). X-server

connection forwarding, often tunneled over SSH for security, allows GUI programs to be used remotely. VNC is also available for these operating systems [5].

While Apple Remote Desktop provides Macintosh users with remote administration capabilities, Scriptlogic's Desktop Authority encompasses remote control as a part of remote management. This solution includes: secure web-based access to client machines, real-time diagnostics and troubleshooting, management of the file system, users/groups, registry, virtual memory, reboots and more - without user interaction, interactive remote monitoring and control of the desktop, supports clients running Windows 98 through XP/2003/Vista [5].

ASA (Automated Systems Administration) is a commercial product for remote administration.

2.7.3 Wireless Remote Administration

Remote administration software has recently started to appear on wireless devices such as the BlackBerry, Pocket PC, and Palm devices, as well as some mobile phones [5].

Generally these solutions do not provide the full remote access seen on software such as VNC or Terminal Services, but do allow administrators to perform a variety of tasks, such as rebooting computers, resetting passwords, and viewing system event logs, thus reducing or even eliminating the need for system administrators to carry a laptop or be within reach of the office [5].

CHAPTER THREE

DESIGN AND IMPLEMENTATION

3.1 Hardware Requirement

The hardware requirement can be described as the minimum specification required for effective operation of the developed software. The developed software is a window based application that requires a Local Area Network connection to work effectively.

Below is the hardware requirement for LAN Remote Administrator in a Network Enterprise.

- ❖ A personal Computer (Minimum of Pentium III, 500MHz processor Speed.)
- ❖ 13" Visual Display Unit or more.
- ❖ Minimum of 256MB of Random Access Memory.
- ❖ A Local Area Network (Wired or Wireless.)

UPS (Interruptible Power Supply) for Desktop computers.

3.2 Requirement Document

The design process implemented by presenting a requirements document that specifies the overall purpose of the Remote Administration in a Network Enterprise and what it must do. I refer to the requirements document to determine precisely what functionality the system must include.

Remote Administration in a Network Enterprise is mainly composed to two parts: the hardware component and the software component. However, for the purpose of this project, the software component will be designed and implemented.

The Remote Administration software is typically installed on a dedicated computer designated as the Network Control Terminal (NCT). The NCT serves as a central point of control for all network management activities to be carried out on a network using the Remote Administration software.

When developing Remote Administration application software, it is common to talk about clients and servers. The distinction is increasingly vague, but the side that initiates the conversation is usually considered the server while the side that accepts the request is usually the Client.

Most Remote Administration software are supplied alongside the hardware from hardware vendors and are usually very expensive since they are mostly deployed in large (mission-critical) network installation that use costly transmission media such as very small aperture terminal (VSAT). By virtue of the software being bundled along with hardware, most of the software use proprietary communication protocols that exploit the tight integration between it and the hardware, though it may still be compatible with others such as SNMP that is predominant in TCP/IP networks^[9]. This makes the software to be platform dependent and non compatible with other vendor hardware.

When the Server side of the Remote Administration software is started to its desktop environment the following features are normally visible:

- ❖ Permit easy application of access controls and security policies

- ❖ Provide a snapshot view of the computers in the network enterprise
- ❖ The network configuration settings through which the IP file is loaded and serves as the NCT of the network Enterprise.
- ❖ Connection to the internet to check for updates and fixing of any available bug(s).
- ❖ Shutting down or rebooting another computer over a network.
- ❖ Sending of unicast, multicast or broadcast messages to the clients.
- ❖ Determine if any network node/host is reachable.
- ❖ Capture, view and alter properties of any network node.

Also when the client software successfully boots to its desktop environment the following features are normally visible:

- ❖ The network configuration settings through which the IP file is loaded and serves as the NCT of the network Enterprise.
- ❖ Sending of unicast, multicast or broadcast messages to the clients

The client properties that can be captured include: IP address, Mac address, network interface, link quality, uptime, hardware platform, operating system version and geographical location.

3.2.1 Analyzing the Remote Administration System

The proposed software system is expected to work as follows: on startup it would scan the network for hosts that are online. Once completed successfully, the Mac addresses of all hosts that were determined to be reachable after the network scan are captured from the local machine's Address Resolution Protocol (ARP) cache.

3.2.2 Functional requirements of the proposed system

To capture what the proposed system should do, a technique known as use case modeling is normally employed. This process identifies the use cases of the system, each of which represents a different capability that the system provides to its clients. For example, the server typically has several use cases, such as "Power options," "Streaming Center," "Configuration," "System utilities" and "Messaging." The client typically has a use case feature such as "Messaging."

3.2.3 Designing the Remote Administration System

In the design stage of the Remote Administration system, the system which is a set of components that interact to solve a problem, is made to perform some task on the client's system, to achieve this, the server system must have a user interface that contains software that executes shutdown, log-off, Restart, lock, unlock and take a snap view of the client's system. The System structure describes the system's objects and their interrelationships while the System behavior describes how the Remote Administration system changes as its objects interact with one another. Every system has both structure and behavior. There are several distinct types of system structures and behaviors. For example, the interactions among objects in the system differ from those between the user and the system, yet both constitute a portion of the system behavior.

The following nouns are mentioned in the description of the system:

- i. Network
- ii. Host or node

- iii. Server/NCT
- iv. Network administrator
- v. Platform

The Network Administrator is the only user expected to interact with the system. Therefore, I shall not be modeling him as part of the class diagrams.

The nouns network, host and server can be translated directly into Unified Modeling Language (UML) class diagrams ^[9]. The Network class attempts to model the attributes of a typical real-world network by abstracting away non-layer three devices (i.e. network elements that cannot assume an IP address) such as repeaters, hubs, modems, and cables thus leaving us with access points, routers, workstations and servers which shall collectively referred to as hosts and are modeled using the host class.

The server which has the IP file in one of its folders is essentially like any host physically and logically connected to the network. The only difference is that it serves as the local machine from which the software will be installed and run; this explains why it is designed to subclass the host class. The platform class will be used to initialize the three classes with the private class c network used on the network.

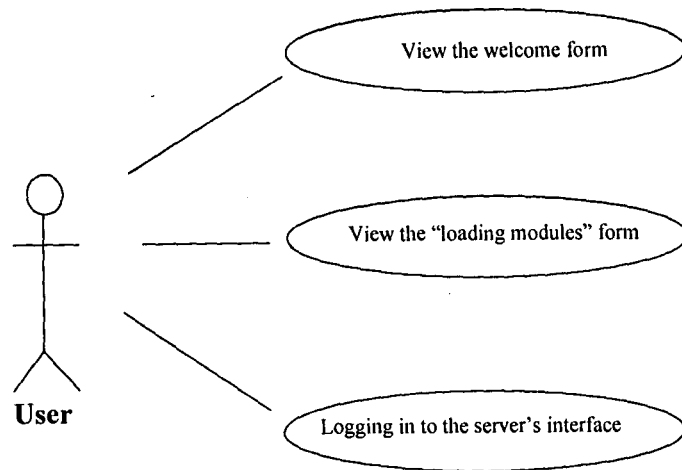


Figure 3.1: Use case diagram for steps involved in logging in to the Server system User interface from the user's perspective.

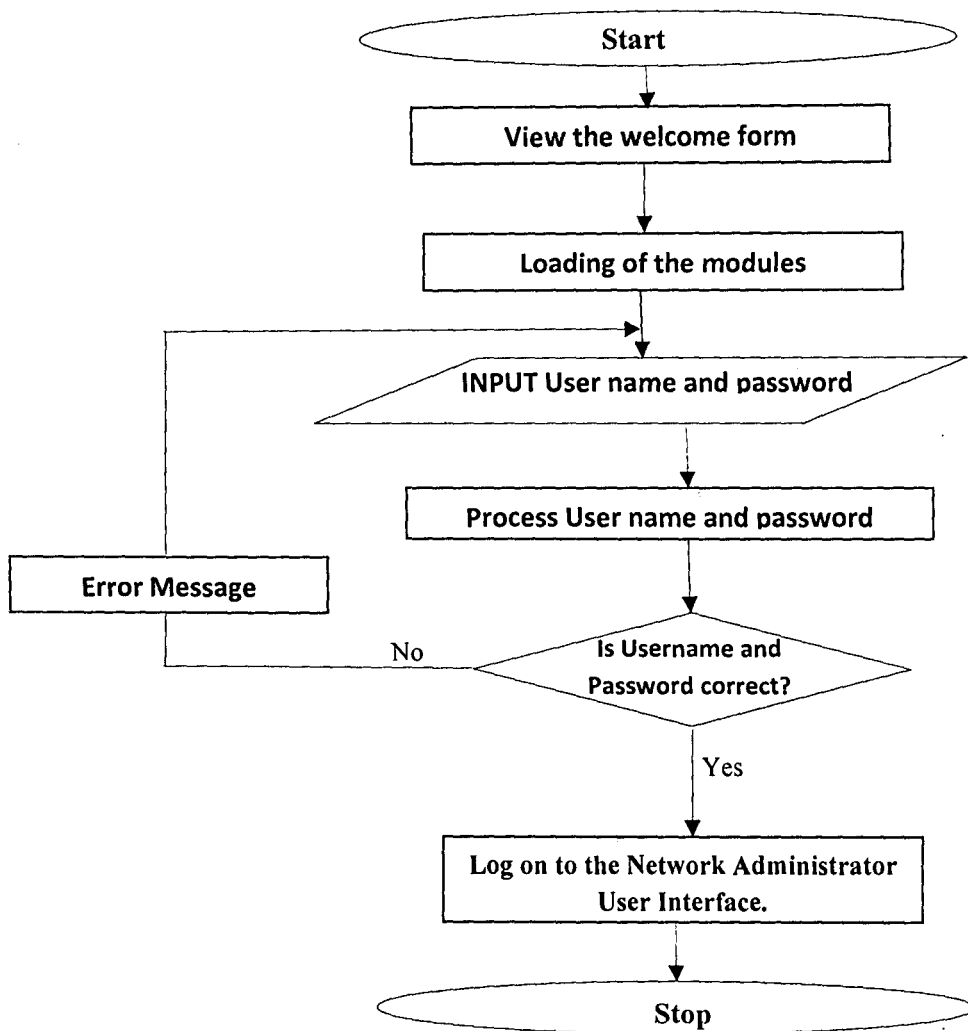


Figure 3.2: Flowchart to log on to the Network Administrator User Interface

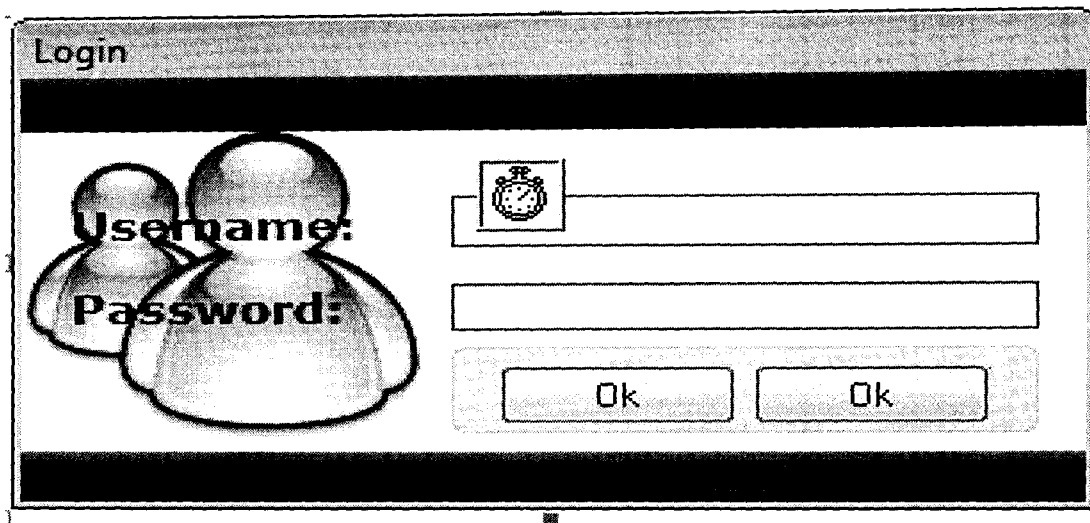


Figure 3.3: The design Interface of the Network Administrator Login Form.

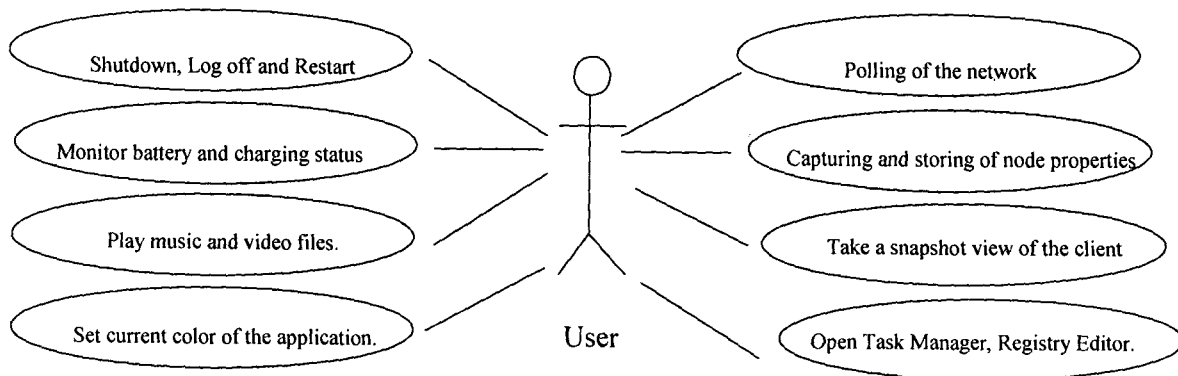


Figure 3.4: Use case diagram for various activities being performed by the Remote Server from the user's perspective.

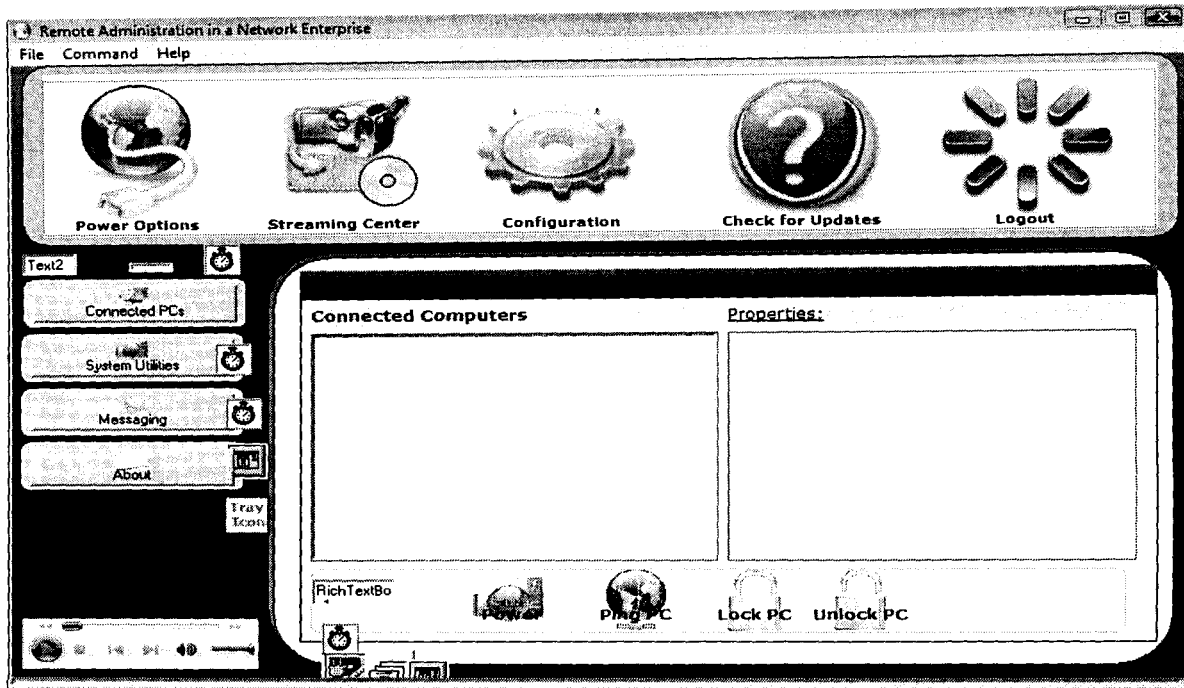


Figure 3.5: The design Interface of the Network Administrator

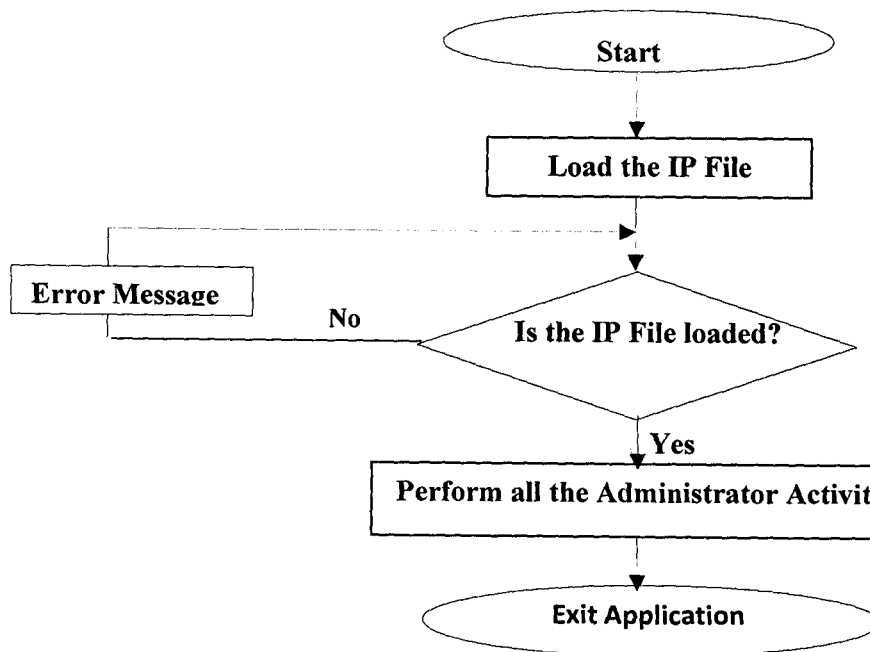


Figure 3.6: Flowchart of activities at the Network Administrator User Interface

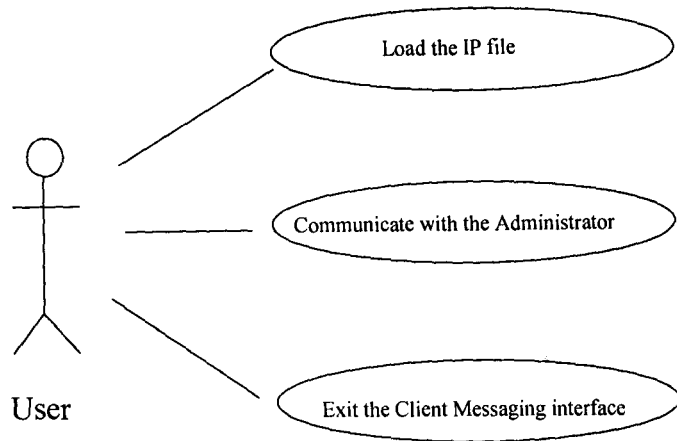


Figure 3.7: Use case diagram for various activities being performed by the Client from the user's perspective.

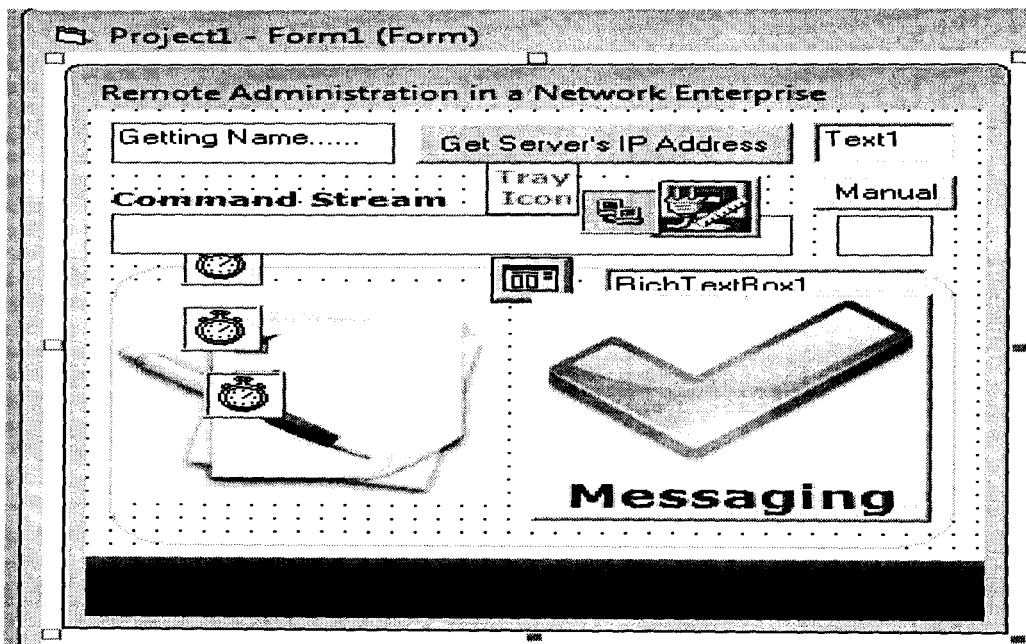


Figure 3.8: The design Interface of the Network Client.

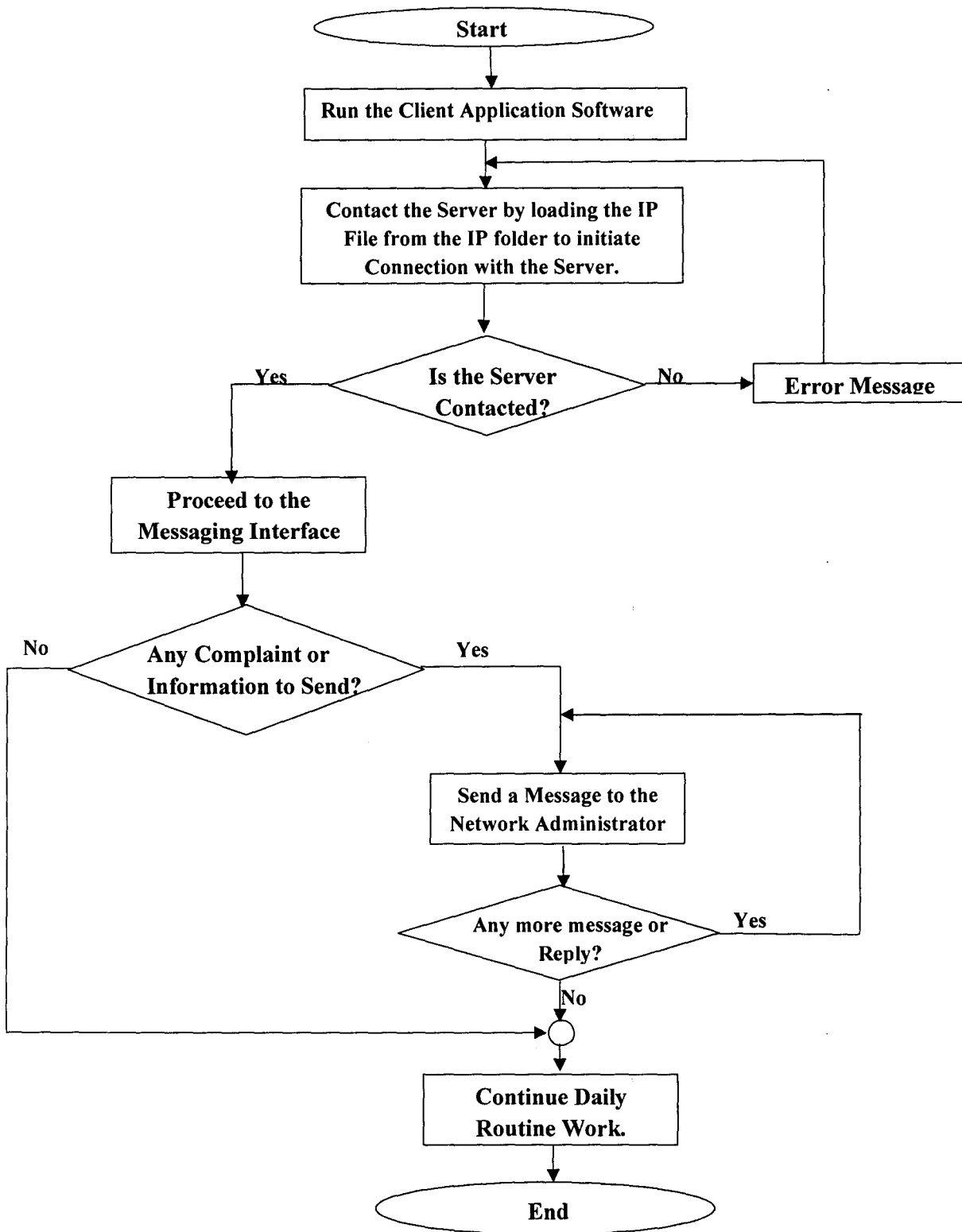


Figure 3.9: Flowchart for the implementation of the Network Client Side.

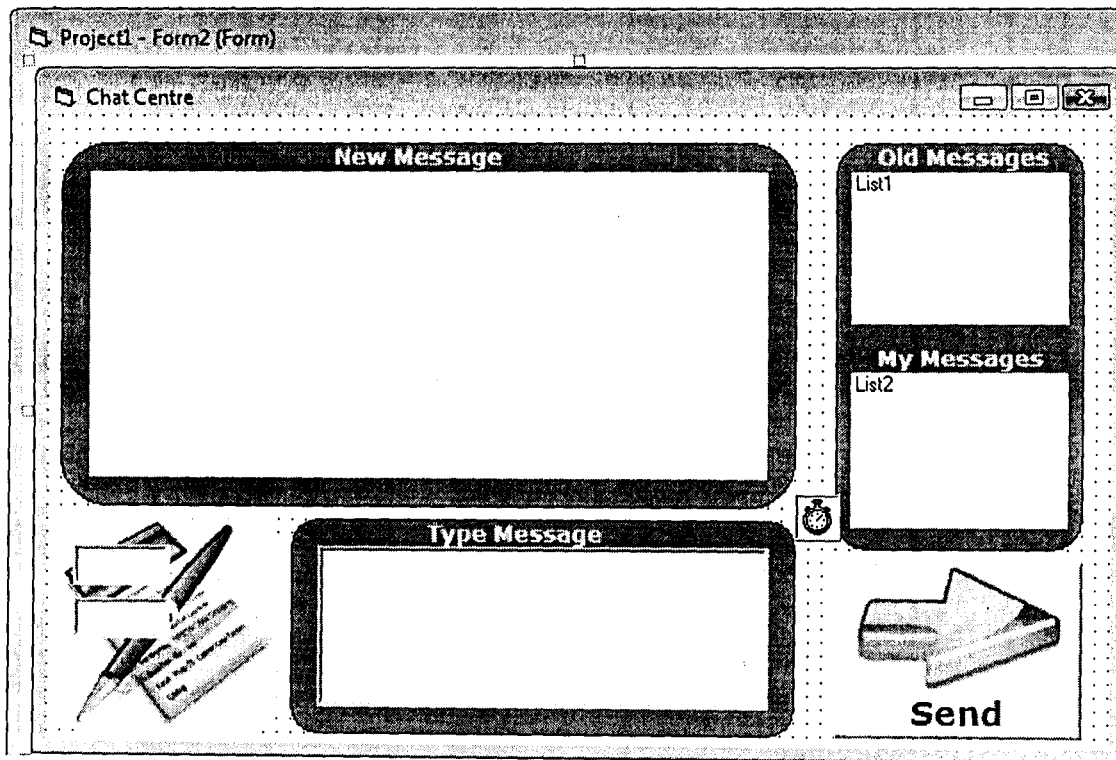


Figure 3.10: The design of the Messaging Interface for the Client Side.

The “New Message” text area displays the recent messages from the Server.

The “Type Message” text area enables the client to type message to be sent to the server or reply any message from the server.

The “Old Messages” text area displays the past messages from the Administrator.

The “My Message” text area displays all the sent messages by the client.

The “Send” command button is responsible for implementing the sending of messages.

CHAPTER FOUR

TESTS, RESULTS AND DISCUSSION

4.1 Configuration

As the name implies it is the necessary settings required to be made on a system for it to work effectively. In this system a configuration is required after the software is installed on a PC.

For a wireless LAN, the computers in the network must set-up an Ad hoc network and the clients must be able to connect to the Network Administrator Network. This is to ensure that the clients are able to load the IP file located in the public folder of the network Administrator.

For the case of the Wired LAN, the Computers in the network must have the same work group name.

4.2 Remote Administration System Features

In the development of this system, specific features were implemented to make the system more efficient and reliable both at the Remote Administrator Side and the Network Client side. This section covers some of these features.

4.2.1 The Remote Administrator Side

When the Remote Network Administrator software is being run, the Remote administrator is required to log on using his/ her username and password before proceeding to the Administrator User interface where all the remote administration Activities takes place. It is required that the Remote must be the first to load the IP file in its public folder. This serves as the Network Connection Terminal (NCT) so that the Network Administrator can remotely know those devices in the network thus, implementing the remote control activities.

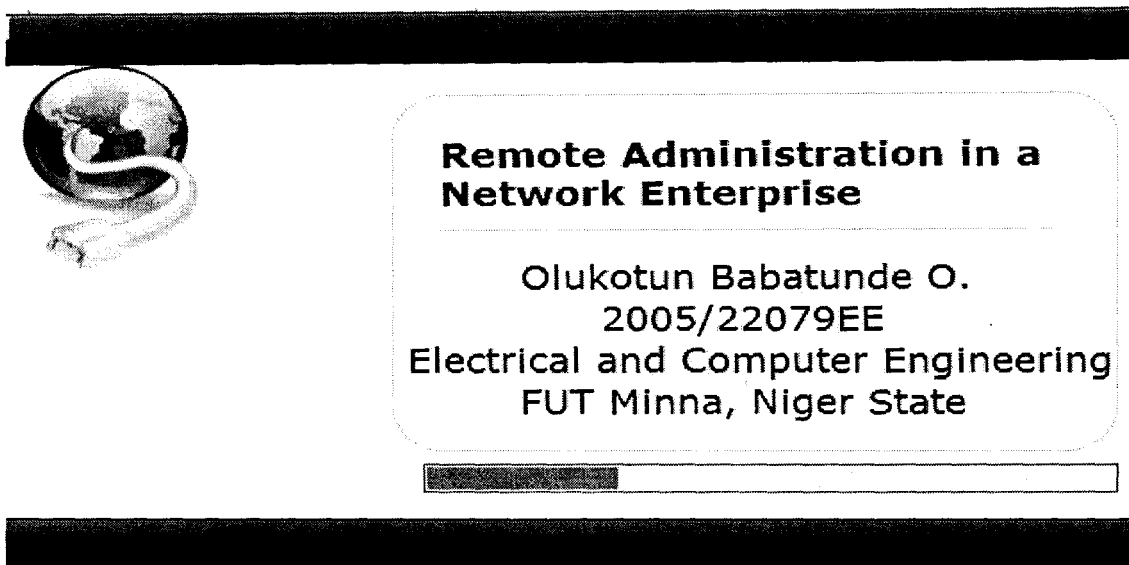


Figure 4.1: The Front page of the Administrator Side.

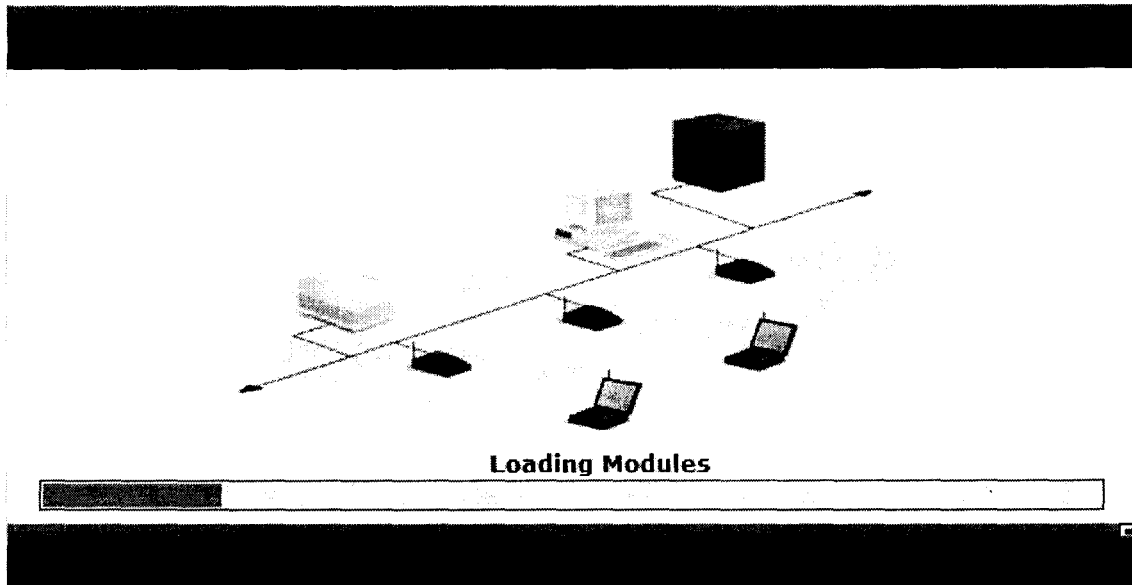


Figure 4.2: The Front page showing the loading of modules for the Administrator.

The image shows a standard Windows-style login dialog box. The title bar at the top left reads "Login". The main area contains a graphic of three stylized human figures on the left. To the right of the figures are two text input fields. The first field is labeled "Username:" and the second is labeled "Password:". Below the input fields are two buttons: "Login" and "Cancel".

Figure 4.3: The Login form for the Administrator.

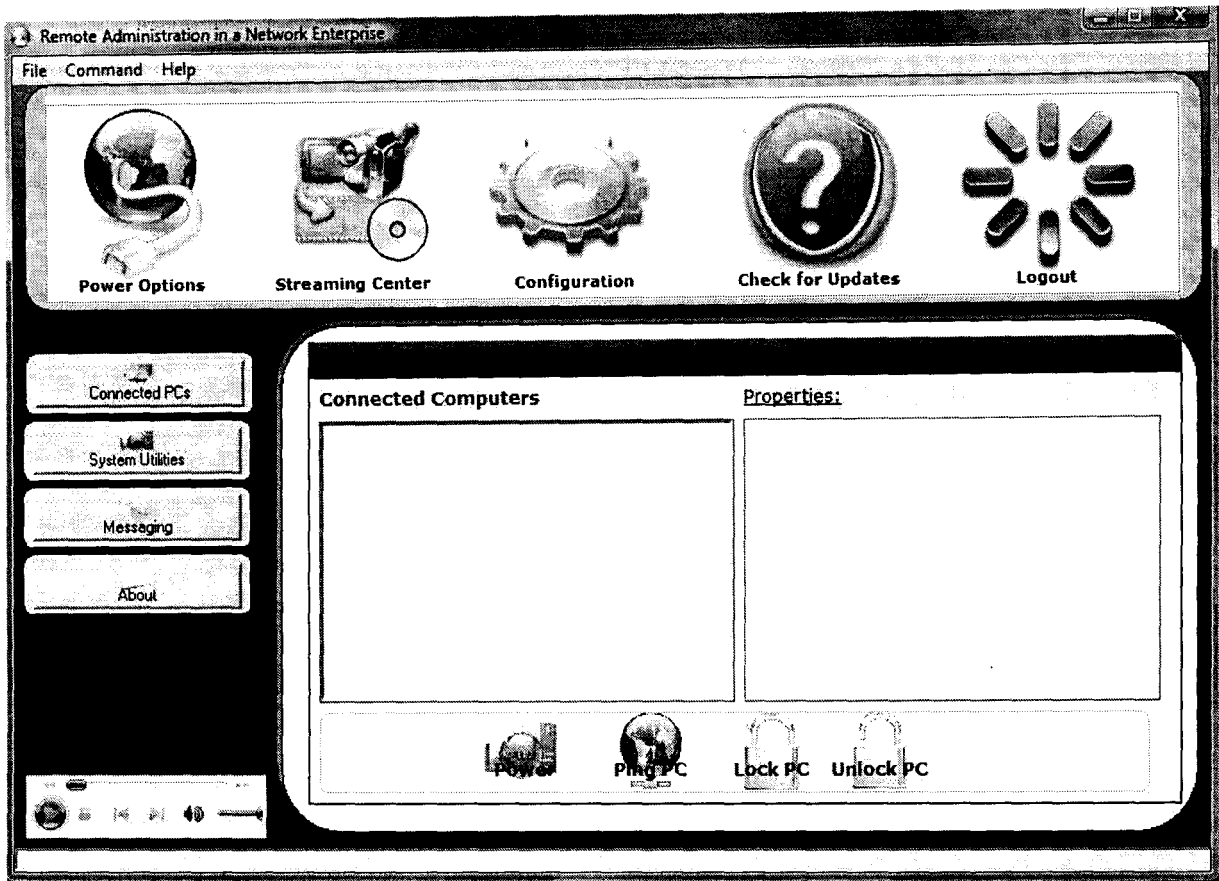


Figure 4.4: The Administrator's Remote Administration User Interface

4.2.2 The Network Client Side

When the Network Client software is being run, the client is required to load the IP folder in the public folder of the Network Administrator. This serves as the Network Connection Terminal (NCT) so that the Network Administrator can remotely know those devices in the network thus, implementing the remote control activities.

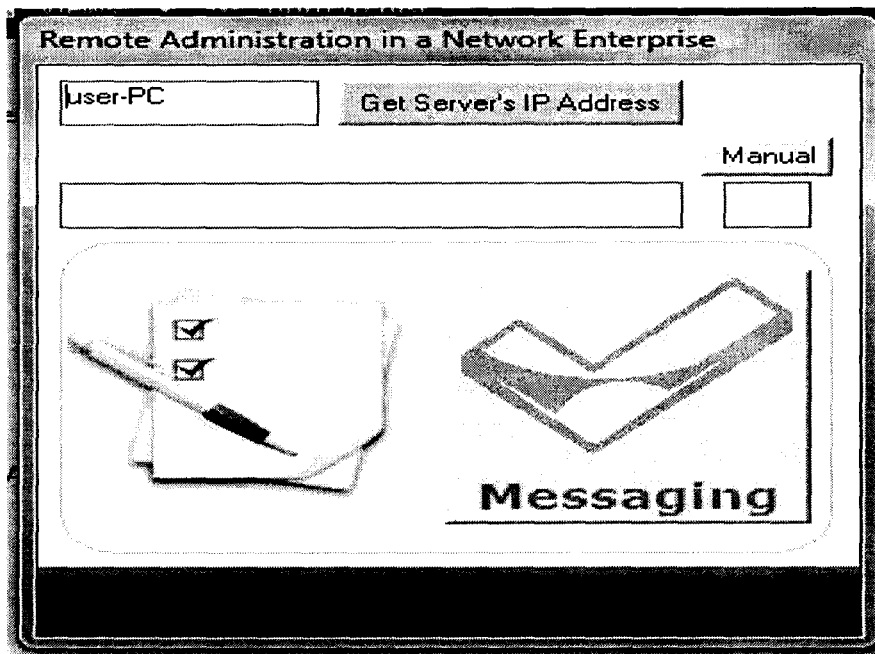


Figure 4.5: The Front page of the Client Side.

When the Front page runs, the name of the pc user is displayed beside the “Get Server’s IP Address” Command button. The client user is then required to get the Server’s IP address by loading the IP file. If the IP file is successfully loaded, the messaging icon turns from grey to green which means the Client now have access to the chatting center where he/she can communicate with the Remote Administrator for any information or complain.

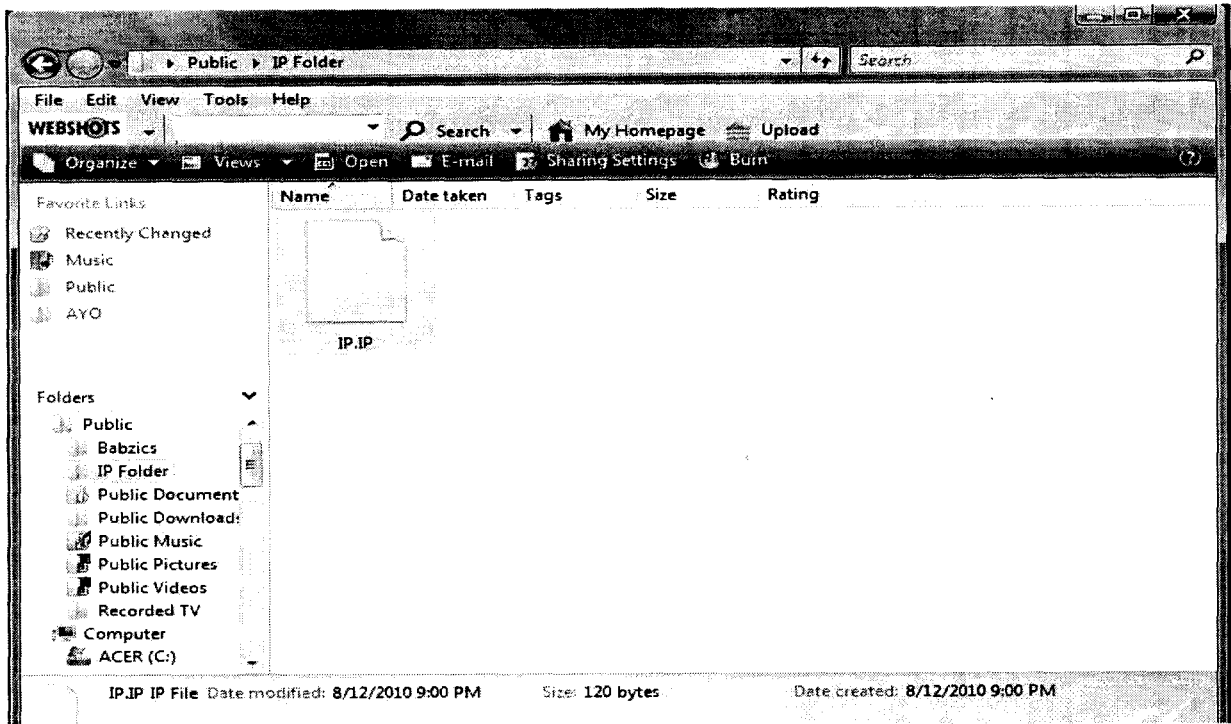


Figure 4.6: Loading of the IP File at the Client Side.

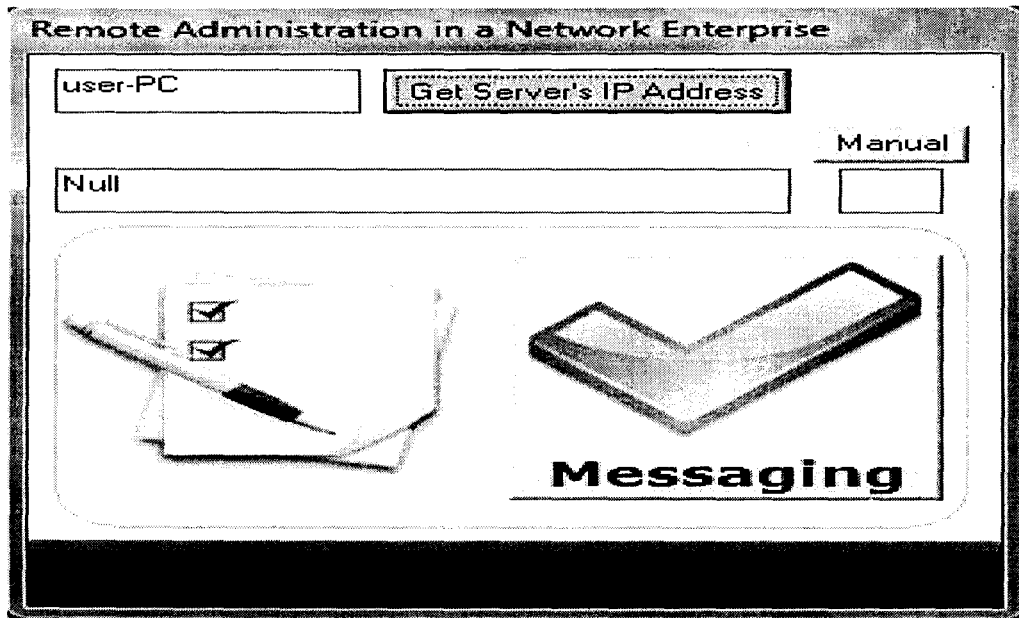


Figure 4.7: The Form indicating Successful loading of the IP file at the Client Side.

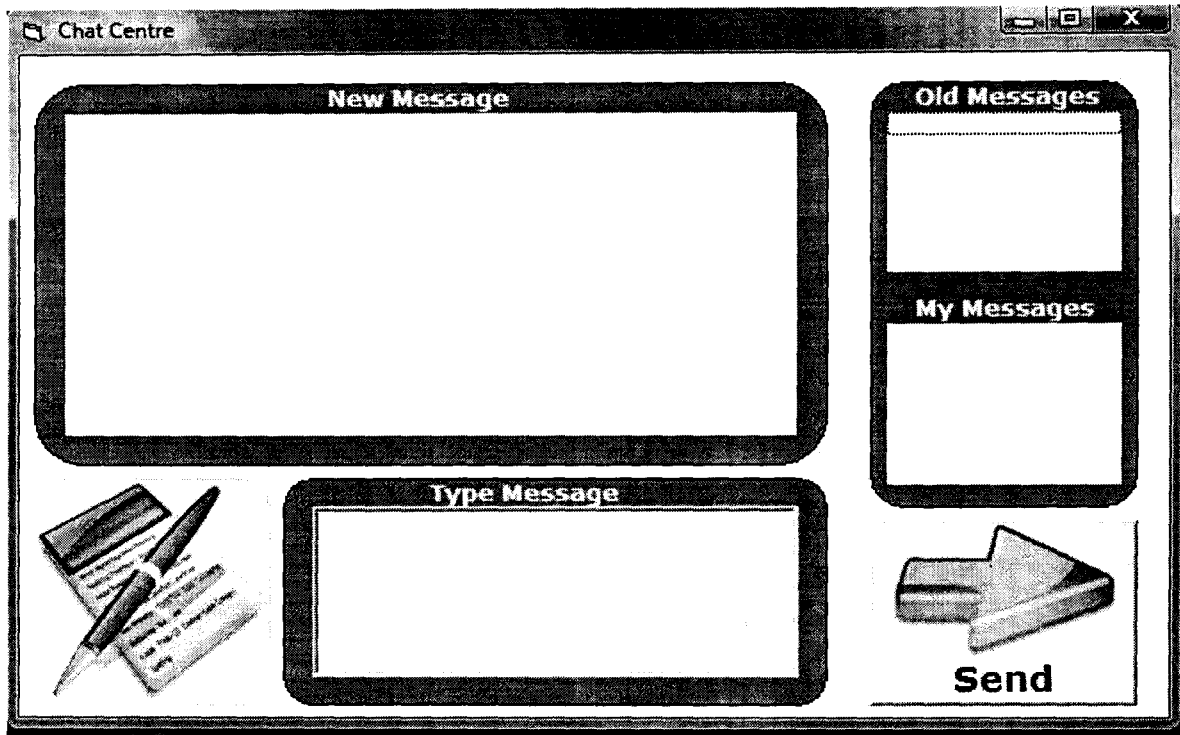


Figure 4.8: The Chatting Centre at the Client Side For communication with the Administrator.

CHAPTER FIVE

SUMMARY AND CONCLUSION

5.1 Introduction

This chapter deals with the summary of findings that were made all through the course of this project work, the conclusion and the necessary recommendation, which will enable the successful implementation and changeover to the newly developed system that could be used in various organizations.

5.2 Summary

The main aim of this project is to enable remote administration in network environment by a Remote administrator especially in business organizations so as to achieve higher productivity from employees and reduce wasting in performing basic operations.

5.3 Conclusion

This project thus far have looked at the vast importance of computers and LAN technologies in remote Administration in a network enterprise, and how they apply to organizations in curbing the problems of low productivity due to lack of remote administration, and the problems associated with manual method of information transfer. It is imperative to state that the dynamism of the computer technology makes it and effective tool

in the management and controls of nodes or computers that requires constant and consistent change in its application.

5.4 RECOMMENDATIONS

Remote Administration in a network enterprise is a dynamic and flexible remote administration system that can be implemented with maximum performance; hence the following recommendations are made:

1. The system could be implemented on a wide area network to enable remote administration between computers that are far apart in terms of distance.
2. The current system of snapshot view of the nodes in the network should be improved upon so as to enable the administrator to take a video view of works done on each of the nodes in the network.
3. The software should be made platform independent so that it can be implemented on various windows operating system.

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