LOCAL NETWORK TELECONFERENCE SYSTEM

[1]EkaOcheOgbaji,[2]Agene Emmanuel Innocent and[2]Henry Ugochukwu

[1]The Department of Mathematics and Statistic Federal University Wukari Taraba State, Nigeria.

[2]The Department of Mathematics and Computer Science Kwararafa University Wukari Taraba State, Nigeria.

E-Mail:ogbajieka@yahoo.com; Tel.:07030314905

ARTICLE INFO

Corresponding Author:
EkaOcheOgbaji

ABSTRACT

In this work, local network Teleconference System was developed, which is the art of invention and need of many organizations for the purpose of reducing cost, risk and time wastage. Computerization of a video conference is an important aspect to consider in the lives of every organization. A situation where meetings and other crucial gatherings such as conference, lectures, media briefing and others can be actualized by a single click of the mouse . This work has contributed in the development of computer based Teleconference system. This work bridge the geographical distance between two or more offices in an organizations, which making it more useful tool in an organization. We create a telecommunication system which is achieved using system analysis and design, which afterwards its integration produced a desired system. The system was achieved using VB.Net and run on a window 7 version of operating system. In view of the result, we recommend teleconference system to be implemented in all schools, hospitals, financial institutions and other organization which will make communication effective, cheap, promote effective, efficient and improved service delivery, thereby promoting profit oriented activities and save time and transportation cost

KEYWORDS: *Teleconference, bridge, design.*

INTRODUCTION

1.1 Background

As computer and electronics technology continues to grow over the ages from what it used to be during its preliminary stages, many new innovations continue to flood the industry, creating machine and avenues through which human activities can be enhanced.

The advent of the internet offered better opportunity for inventors to think of better ways of making the communication of information from source to target in real time and with less cost. Much equipment has been developed to this effect. Further improvement has given birth to what is now known as teleconference. The word **'tele'** means distance. The word '**conference** means consultations, discussions [1]. Through teleconferencing two or more locations situated at a distance are connected so that they can hear or both chat with each other. It allows the distant sites to interact with each other. The participants present at a particular time but in diverse place **[**2]. The term teleconference started in 1960 as a vision from American Telephone and Telegraph (AT & T), an article by Marvin Minsky, who outlined his vision for an adapted version of the older concept of tele-operation that focused on giving the remote participation a feeling of actually being present [1]. A teleconference system is a high-end conferencing system and service usually employed by enterprise-level corporate offices. Teleconference conference rooms use state-of-the art room designs, video cameras, displays, sound-systems, computers and processors, coupled with high-to-very-high capacity bandwidth transmissions. Application examples could be cited within emergency management and security services, hospitals, government, education, industries and organizations [2, 3, 4].

2.0 Materials and Methods

2.1 Analysis of the existing system

Tele-presence has long existed as open chat. The core technology used in teleconferencing system is digital compression of web based document sharing and steadily interchanging of words in real time. The hardware or software that performs compression is called a codec (coder/decoder). Compression rates of up to 1:500 can be achieved. The resulting digital stream of 1s and 0s is subdivided into labeled packets, which are then transmitted through a digital network of some kind (usually ISDN or IP). The other components required for a videoconferencing system include:

- **Policy sharing:** This enables the organization to share their policies or documents within their domain.
- **Video output**: computer monitor, television or projector
- **Conversation Tracking/History:** This enables you to have access to the previous conference conversations or talks.
- **Data transfe**r: analog or digital telephone network, LAN or the Internet.

- **Compute**r: a data processing unit that ties together the other components, does the compressing and decompressing, and initiates and maintains the data linkage via the network.

There are basically two kinds of videoconferencing systems: **Dedicated systems** have all required components packaged into a single piece of equipment, usually a console with a high quality remote controlled video camera. These cameras can be controlled at a distance to pan left and right, tilt up and down, and zoom. They became known as PTZ (Pan-Tilt-Zoom) cameras. The console contains all electrical interfaces, the control computer, and the Software or Hardware-based codec. Omni directional microphones are connected to the console, as well as a TV monitor with loudspeakers and/or a video projector. There are several types of dedicated videoconferencing devices:

a. Large group videoconferencing is non-portable, large, more expensive devices used for large rooms and auditoriums.

b. Small group videoconferencing is non-portable or portable, smaller, less expensive devices used for small meeting rooms.

c. Individual videoconferencing is usually portable devices, meant for single users, have fixed cameras, microphones and loud-speakers integrated into the console.

2.1.1 Conferencing layers

The components within a Conferencing System can be divided into several different layers: User Interface, Conference Control, Control or Signal Plane and Media Plane. Teleconferencing user Interfaces could either be graphical or voice responsive. Many of us have encountered both types of interfaces; normally we encounter graphical interfaces on the computer or television, and Voice Responsive we normally get on the phone, where we are told to select a number of choices by either saying it or pressing a number. User interfaces for conferencing have a number of different uses; it could be used for scheduling, setup, and making the call. Through the user interface the administrator is able to control the other three layers of the system.

Conference Control performs resource allocation, management and routing. The Media Plane controls the audio and video mixing and streaming. This layer manages Real-Time Transport Protocols, User Datagram Packets (UDP) and Real-Time Transport Control Protocols (RTCP). The RTCP and UDP normally carry information such the payload type which is the type of codec, frame rate, video size and many others. RTCP on the other hand acts as a quality control Protocol for detecting errors during streaming.

2.1. 2 Multipoint teleconferencing

Simultaneous teleconferencing among three or more remote points is possible by means of a Multipoint Control Unit (MCU). This is a bridge that interconnects signals from several sources (in a similar way to the audio conference call). All parties signal's the MCU unit or the MCU unit can also signal the parties which are going to participate, in sequence. There are MCU bridges for IP (Internet Protocol) and ISDN-based videoconferencing (Integrated Services Digital Network). There are MCU's which are pure software, and others which are a combination of hardware and software. An MCU is characterized according to the number of simultaneous calls it can handle, its ability to conduct transposing of data rates and protocols, and features such as Continuous Presence, in which multiple parties can be seen on-screen at once. MCUs can be stand-alone hardware devices, or they can be embedded into dedicated videoconferencing units. The MCU consists of two logical components:

a. A single multipoint controller (MC), and

b. Multipoint Processors (MP), sometimes referred to as the mixer.

The MC controls the conferencing while it is active on the signaling plane, which is simply where the system manages conferencing creation, endpoint signaling and in-conferencing controls. This component negotiates parameters with every endpoint in the network and controls conferencing resources while the MC controls resources and signaling negotiations, the MP operates on the media plane and receives media from each endpoint.

The MP generates output streams from each endpoint and redirects the information to other endpoints in the conference.

Some systems are capable of multipoint conferencing with no MCU, stand-alone, embedded or otherwise. These use a standards-based technique known as "decentralized multipoint", where each station in a multipoint call exchanges video and audio directly with the other station with no central "manager" or other bottleneck. The advantages of this technique are that the video and audio will generally be of higher quality because they don't have to be relayed through a central point. Also, users can make ad-hoc multipoint calls without any concern for the availability or control of an MCU. This added convenience and quality comes at the expense of some increased network bandwidth, because every station must transmit to every other station directly.

2.1.3 Teleconferencing Modes

Teleconferencing systems have several common operating modes that are used:

a. Creation of participants (members)

b. Continuous Presence.

In creation of participants all the people must register (signup) for them to participate in the conference.

Continuous Presence mode displays multiple participants at the same time.

The MP in this mode puts together the streams from the different

End-points and puts them all together into a single video image. In this mode, the MCU normally sends the same type of images to all participants.

Typically these types of images are called .layouts and can vary depending on the number of participants in a conference.

2.1.4 Limitations of the existing system

Some observers argue that three outstanding issues have prevented teleconferencing from becoming a standard form of communication, despite the ubiquity of teleconferencing-capability. These issues are:

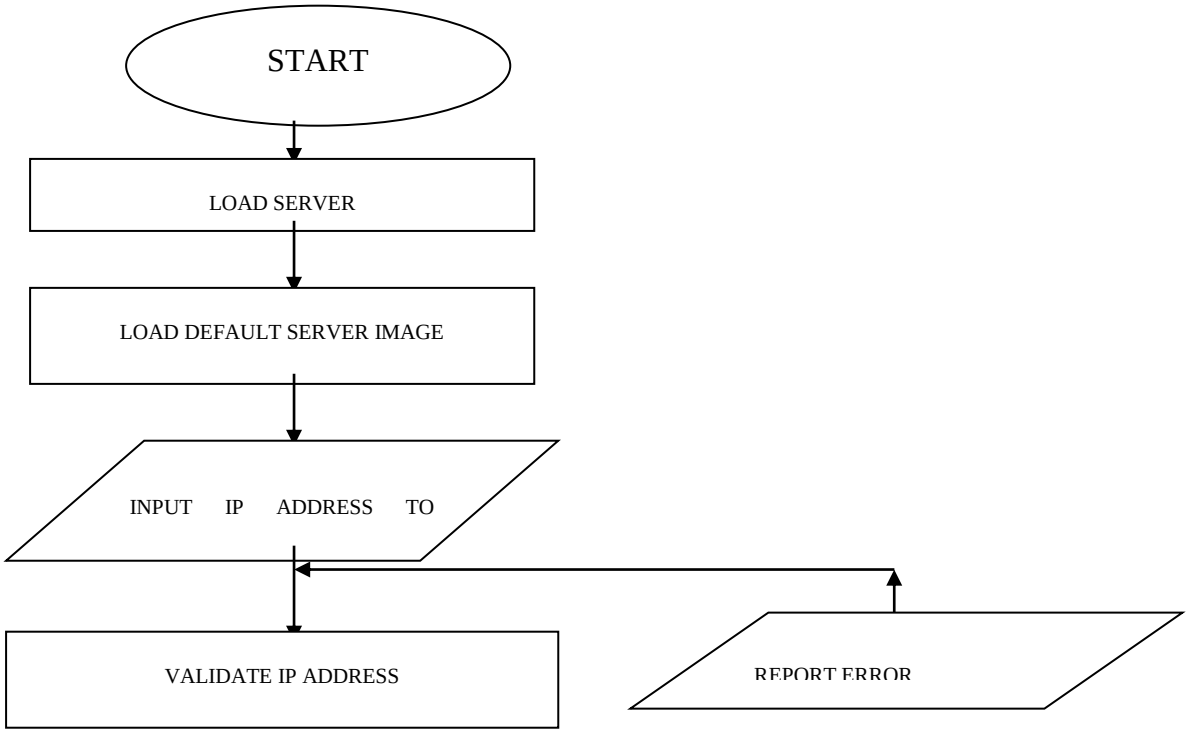
1. **Determination of the actual location:** The actual location of the members cannot be determined due to some factors like camera, GPS software

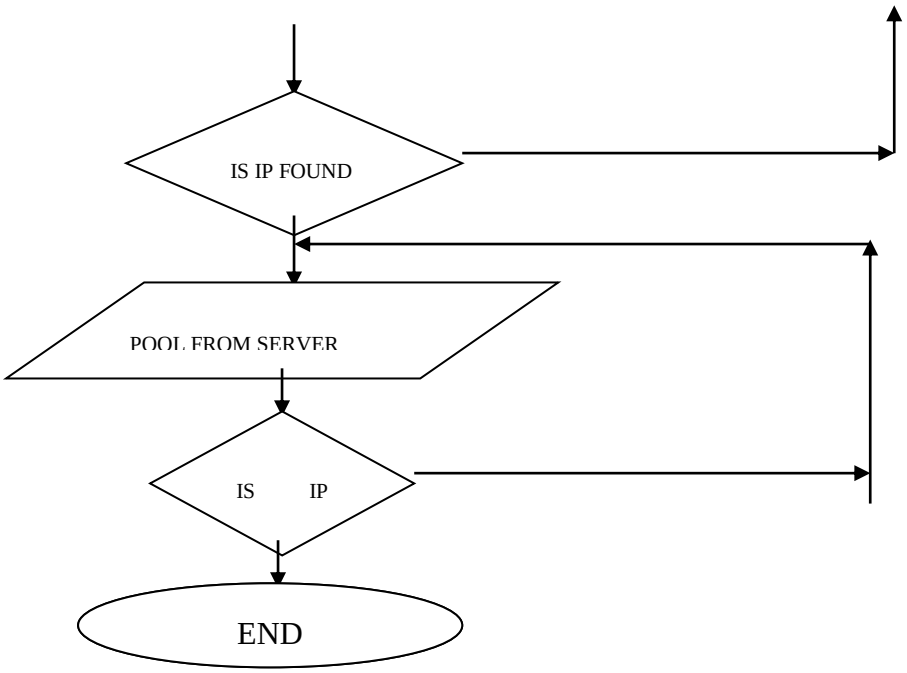
2. **Signal latenc**y: The information transport of digital signals in many steps needs time. In a telecommunicated conversation, an increased latency larger than about 150–300 ms becomes noticeable and is soon observed as unnatural and distracting.

Therefore, next to a **stable large bandwidt**h, a small total round-trip time is another major technical requirement for the communication channel for interactive teleconferencing.

2.2 Analysis of New System

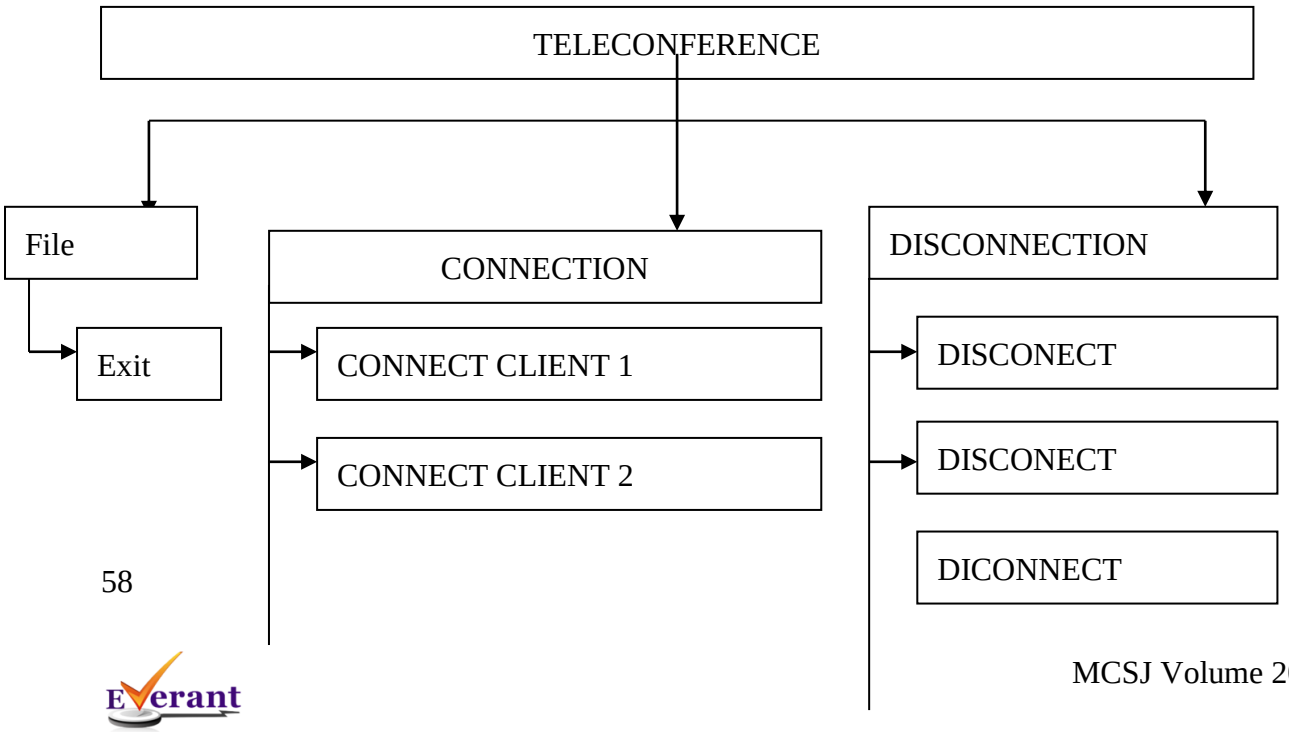
System Flow Chart

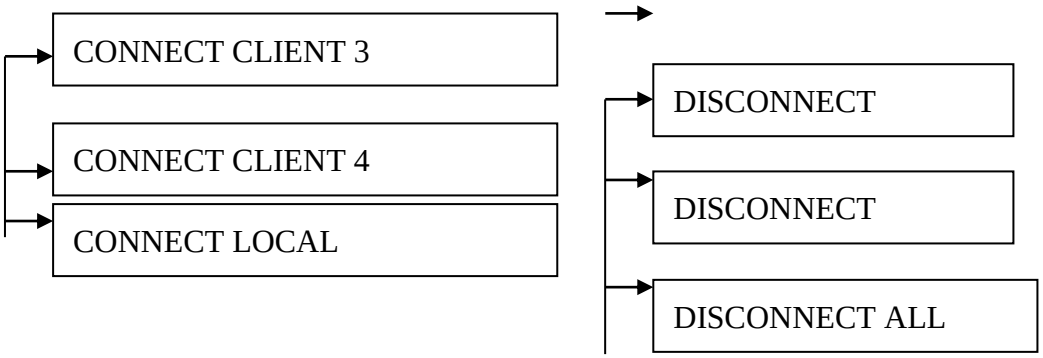




This is the flowchart of the program, it shows the different stages involved in the operation of the program. The organization of the program flowchart above describes the directional path in which the teleconference application is executed. Firstly, the server setup is started in which the server application is configured then the teleconference application is also launched. The various clients now inputs their unique IP address in the field provided and it is in turn validated by the server, the server will then pool the image and voice required for communication. A user may decide to leave the conference by automatically disconnecting itself from the server.

TOP DOWN DESIGN





2.1SYSTEM DESIGN

This is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements.

The design and analysis conducted were divided into two sections. These are:

a. Input Interface

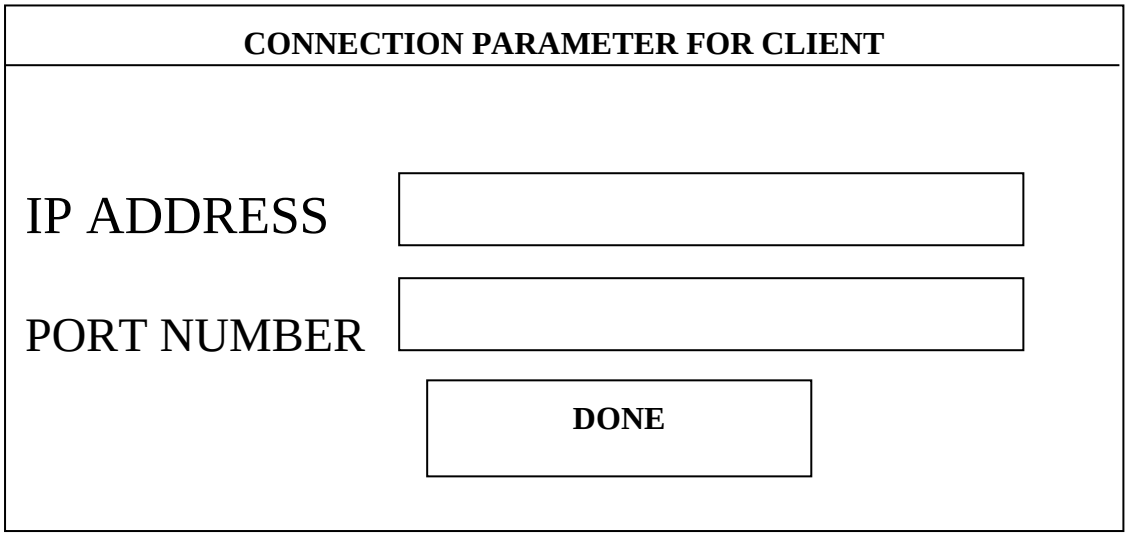
b. Client interface (output)

2.10.1Input Interface Design

The system allows users to log-in with their IP address and port number.

The input from therefore was design to accommodate keyboard input with a few command buttons that allows the user to click for certain instructions to execute.

FIGURE 2.1 INPUT INTERFACE DESIGN

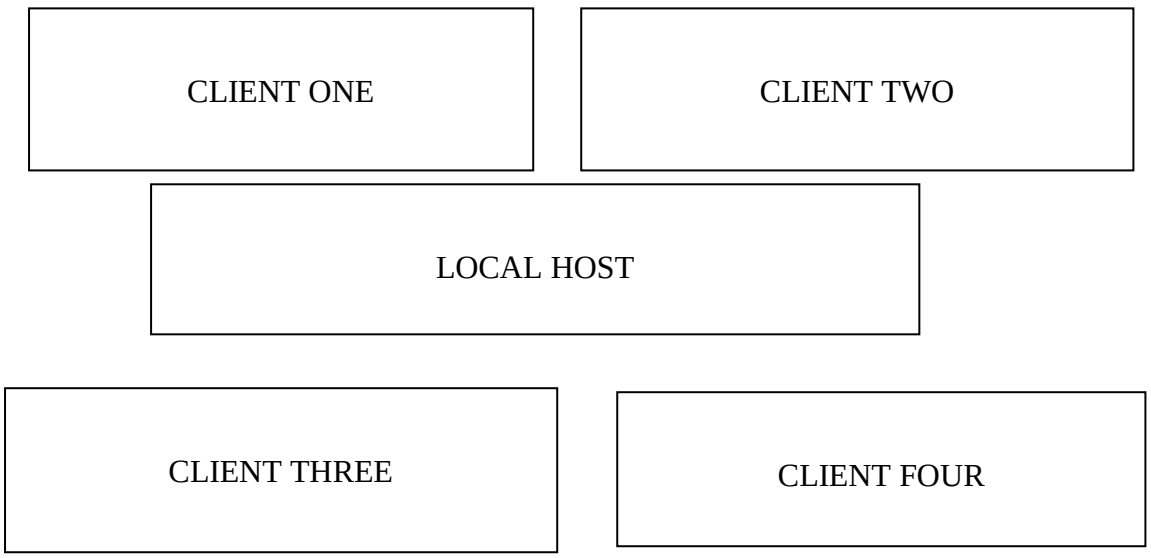


2.8.2 Client Form

The client interface was designed to allow the participants in the teleconference system to see the picture images of each other. Therefore the design must be able to contain the tool that facilitates it. The design utilized the windows media tool and a link that is able to communicate with the streaming server.

The form has several units for several participants. This means that there is no maximum number of users can make the system saturated.

FIGURE 2.2 INTERNAL DESIGN INTERFACE



2.3 Output Form

The output interface was designed to allow the participants in the teleconference system to see the images of each other as well as hear the voices of one another over the network. Therefore the design must be able to contain the tools that facilitate these. The design utilized the windows media tool and a link that is able to

Communicate with the streaming server. Here, connection provides a drop down menu where different clients including the host can connect to each other. Unlike connection, disconnection provides a drop down menu where the different clients including the host can disconnect from each other.

3. Implementation, Testing And Integration Of The New System

3.1 Choice of development tool

The programming language deployed in the implementation of this system was visual basic.Net this choice was informed by its flexibility and most availability. Visual basic.Net provides the required tools that will be used to transmit information across a network. Also the

3.2 SYSTEM REQUIREMENT

This involves technical facts about my project. They are divided into 3 subheadings:

3.3. SOFTWARE REQUIREMENT: the system must run on

a. Window XP or higher versions

b. Video streaming server and visual basic.net must be installed

3.4 HARDWARE REQUIREMENT: The system must have the following:

a. HDD size should be at least 2GB

b. Ram size is 128mb and above'

c. Audio sound card

d. CD-ROM

e. High quality VGA

f. Network capability

g. Web camera

h. Sound speakers

i. Microphone.

Here all the input and output are design to use the basic input and output devices such as mouse, and keyboard.

3.5 IMPLEMENTATION

This is the realization of an application or execution of a plan, idea, model, design, specification, standard, algorithm or policy.

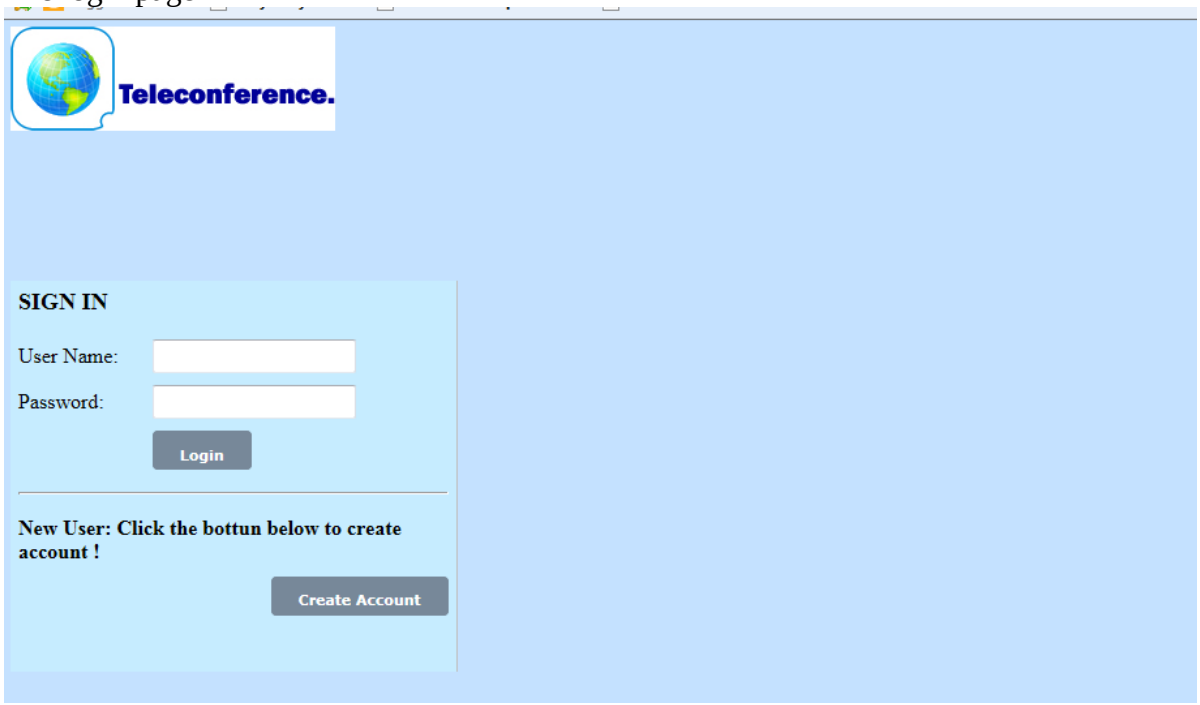
The new system is designed to be put into efficient use. Here, we will look into the various technical aspects that influenced the successful implementation of this system and determine the effective operation of the system. System implementation follows the approval of the system proposals and its objectives, thus it is to arrive at a satisfactory, implemented, completed, and function evaluated automated system. It also embodies the preparation of resources including equipment's and personnel.

Before communication can take place, the users must be on the same network and they must all have each other's unique IP address which will serve as their connection number. The first user to start up the connection is automatically the host and other users that will connect to the host are called the clients, a client can connect to a host by automatically clicking on the host name on the list of usernames on the dash board.

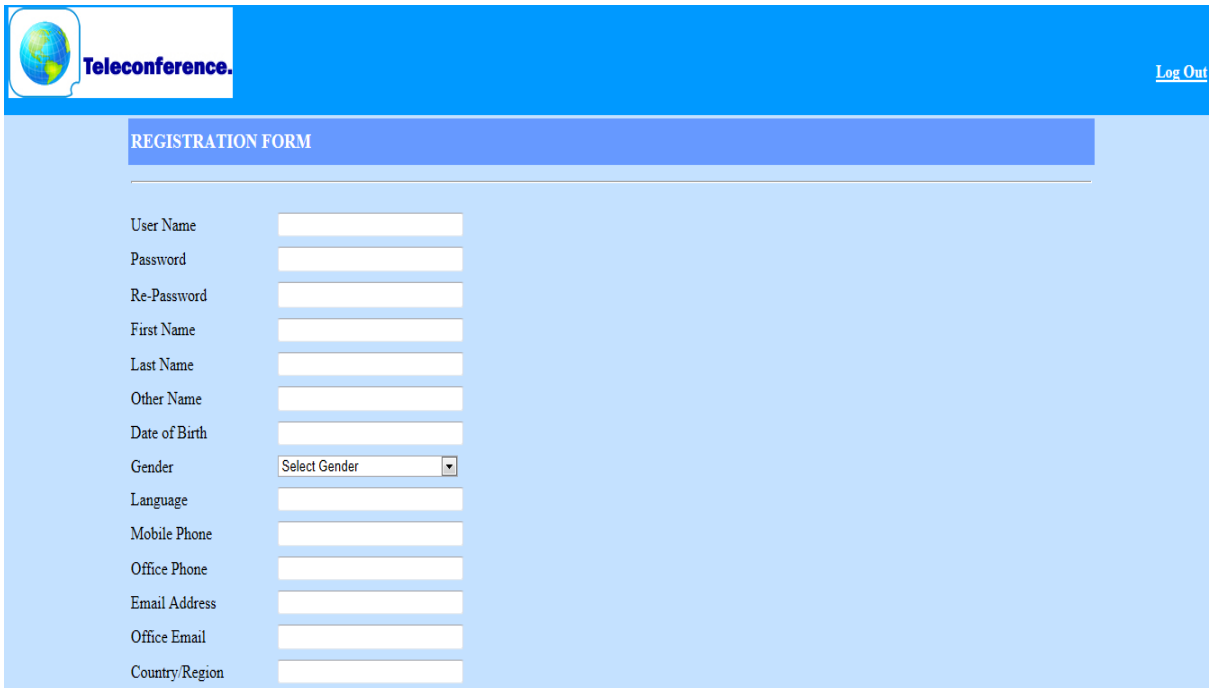
SCREEN SHOTS

LOGIN PAGE: This is where access is gained into the conference room by inputting of one's username and password.

The login page

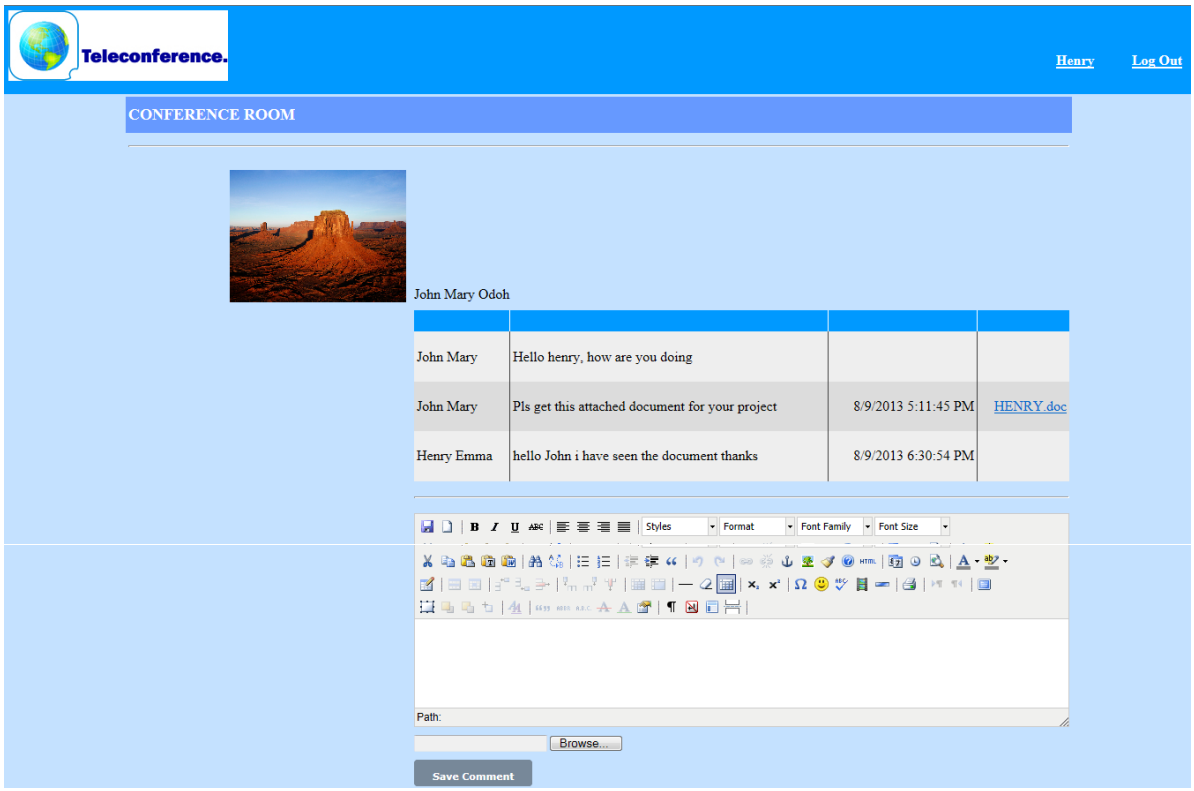


Registration page



Welcome /desh-board page: this page show the staff that are currently online.

Conference room page



3.6 SYSTEM TESTING

Testing presents an interesting anomaly for the software programmer where he attempts to build software from an abstract concept to a tangible product. During testing, the programmer creates series of test cases to discard preconceived notions of the correctness of software just developed and overcome a conflict of interest that occur when errors are uncovered. As a secondary benefit, testing demonstrates that the software functions appear to be working according to specification, that behavioral and performance requirements appear to have been met. In addition, data collected as testing is conducted provide a good indication of software reliability and quality as a whole.

Testing should begin in the small and progress toward testing in the

Large, 80 percent of all errors uncovered during testing will likely be traceable to 20 percent of all program components. The components would be isolated and thoroughly tested. Testing ensures that internal operations are performed according to specifications and all internal components have been adequately exercised. The type of testing carried out was unit testing which involves testing the various modules separately.

FIGURE 3.1 UNITS TESTING

THE TEST DATA	EXPECTED TESTED RESULT	ACTUAL TEST RESULT
MAIN FORM	Login page where username and password is entered.	Shows login page where members and new users can access the conference site, from creating new user to login with your username and password.
CLIENT INPUT PARAMETER FORM	Area to be used for registration	Shows client space for registration into the conference site.

THE TEST DATA EXPECTED TESTED RESULT ACTUAL TEST RESULT

MAIN FORM: Result expected to see is the login screen immediately the software is run. When the software runs, the clients and local host can see and communicate with each other.

3.7INTEGRATION

System integration is the successful putting together of the various components, assemblies, and subsystems of a system and having them work together to perform what the system was intended to do. After successfully designing the input and output module and testing them to make sure that they are working properly, the modules were merged together to make up the complete system. Integration follows the phase in the development life cycle, as shown in below and is intertwined with the testing.

Requirement	Design	Coding and Testing	Integration and Test	Acceptance	Deployment

Figure3.2: Integration's Place in the Development Life Cycle

4. Conclusions

Computerization of a teleconference is an important aspect to consider in the live of every organization. A situation where meetings and other crucial gatherings such as conference, lectures media briefing and others can be actualized by a single click of the mouse is not just interesting but a sought after. This work has contributed in the development of computer based Teleconference system.

Potential Conflicts of Interest

Unsteady power supply: There was continuous power failure most time especially during the implementation stages of the project. Although this is more or less a common problem in this country, its negative impact becomes more apparent, unbearable and crippling when you are working against time. Power Holding Company should do a better job by ensuring that there is at least a fairly steady power supply.

Difficulty in gathering the necessary materials: this was due to financial constriants I could not gather more than I got which though was enough for the project research work.

Lack of software: this is a major problem faced in achieving the video aspect of the workbut hopefully other researchers could validate that aspect of the work.

References

[1] Anderson, J. S. Historical Overview of Telecommunications in the Health Care Industry, *the American Journal of Distance Education*, 1(2) (**1987**), 53-60.

[2] Baker, M.H. Distance Teaching with Interactive Television Strategies that Promote Interaction with Remote Site Students, *Humanities and Social Science Dissertation Abstracts International*,55 (8)(**1995**), 1250 –1255.

[3] Bates, T. Technology in open learning, and distance education: A guide for decision makers Vancouver, *the Commonwealth Learning and the Open Learning Agency*.(**1991**)

[4] Bates, T. Technology, open learning and distance education, London: Rout ledge. (**1995**)

[5] Bloom, B. S. Taxonomy of Educational Objectives Handbook: The Cognitive Domain, New York: David McKay Company Inc. (**1956**)

[6] Collins, M. P. and Berge, Z. L. Guiding Design Principles for Interactive Teleconferencing, paper presented at the Pathways to Change. (**1994**)

[7] http://en.wikipedia.org/wiki/Teleconference

[8] http://www.adobe.com/products/adobeconnect/tech-specs.html

[9] www.google.com/patents/USA4516156