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The Development of Intranet Office Chat Application System

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ABSTRACT

In Nigerian Universities the manual communication method is still very much in existence to convey information from and to various departments. This is actualized by non-academic personnel assigned to deliver mails or memos from one office or department to another. In often times the personnel walk or uses a means of available transportation to deliver these mails/memos to the receiving office within the university environment. Most cases, the memos/mails end up missing in transit or may not arrive at the recipient office as at when needed, resulting to delay in decision making. Therefore, this research work tends to resolve the aforementioned flaws by developing an Intranet-enabled Chat System Application to aid communication services within Nigerian universities. The system under consideration is a web-based application designed to be accessed through internet connectivity on the intranet. The structured system analysis and design methodology (SSADM), a technical approach to online application system design and implementation, was the methodology used in this study. The suggested system was created with the use of open source web technologies including MySQL, PHP, and HTML. Through asynchronous string transfer known as Chatting-Between-Each-Other, the proposed system's numerous features allow students and academic and non-academic personnel inside the school to connect with one another. Experimentation results shows that the application works/runs as expected.

1.0 INTRODUCTION

Presently, information and its exchange is conducted, stored and transmitted through the internet [1]. By using internal communication platforms known as intranets, businesses are rapidly expanding their own information and communication infrastructures. Many businesses all over the world use intranets to address these kinds of issues. As a result, these platforms appear to be crucial for businesses in their day-to-day operations, as they aid staff in completing their assignments. According to a study by [2] Global Institute, if staff members are connected to one another, for instance through an intranet, performance may increase by 20–25 percent. An intranet is a network that is only available to systems operating within the same enterprise. A file exchanged over this network is private to the network domain and not accessible to the general public. Any company, regardless of size, requires a communication infrastructure.

An intranet or internet-based chat system can be used for information sharing and question-asking. Engaging in synchronous text, video, audio, or multicast communication via a computer network with one or more individuals is known as chat [3]. To encourage open and sincere conversation without worrying about privacy violations or eavesdropping, it is necessary to maintain communication confidentially. Additionally, organizations ought to retain ownership of their chat communications. An organization's capacity to securely communicate with a colleague gives it a significant competitive edge over rivals. Thus, a secure chat system is one that facilitates conversation between two or more individuals within an organization through the internet, while making a concerted effort to reduce the possibility of being intercepted by unauthorized parties [4]. Intranet platforms are important, but so is how they are designed, especially when it comes to utilizing a user-centered design approach. According to Nielsen study [5], a designer could significantly boost return on investment by designing with usability in mind. A user-centered design would increase the intranet chart system application's efficiency while maintaining its low cost and high value. Conversely, it is evident that intranets are crucial for improving employee performance in today's businesses. However, employees can access intranets because they are typically available through a computer or mobile device with internet connectivity [6].

The intranet can be defined as a platform that can be accessed only by an organization when connected to a specific network. The platform offers information and services from the organization's internal IT systems. It can also be described as a set of content shared by a well-defined group within a single organization. An intranet is a network within an organization that uses Internet technologies to enable users to find, use, and share documents and Web pages [7]. Intranets are used by businesses to communicate with their staff. Employees can access intranets from anywhere in the world, irrespective of their physical location, and they are often protected by one or more firewalls connected by secure, perhaps virtual, networks. One of the problems with intranets is that, in contrast to the Internet, their users are employees rather than consumers, and as such, their requirements and objectives are different [8].

An Intranet links information resources that are typically dispersed throughout the company, making it easier for employees to manage information overload. This is one

benefit of using an Intranet as an enabling technology. This is only really helpful, though, if the intranet is made to be user-friendly [9]. By the end of 1994, intranets were being employed in larger enterprises. "Intranet Genie" was the name of one of the first widely used commercial intranet programs that provided messaging, document sharing, and other features.

The "Intranet Genie" was developed to help staff members communicate and work together. However, the "Intranet Genie" was challenging to deploy and not very user-friendly [10]. Although intranets have changed significantly since the "Intranet Genie" era, many of the features it carried with it are still in place and are utilized on intranets today [11]. An intranet ought to act as a portal to all applications or as a toolkit that offers everything you'd need for a digital workspace [12]. As was previously noted, intranets follow a variety of trends. A framework of the evolution of intranet is further illustrated in Figure 1.

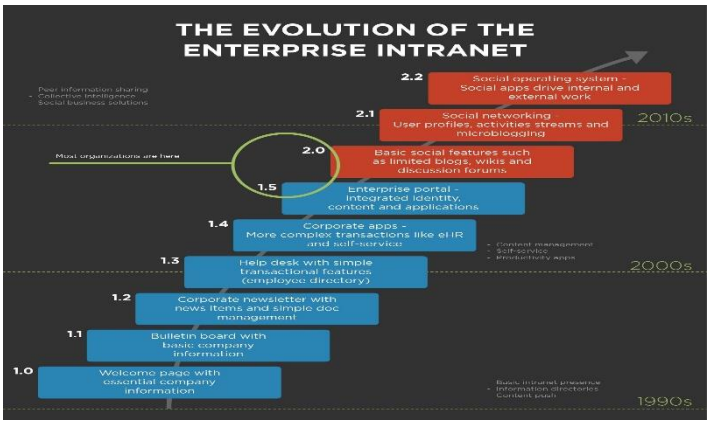


Figure 1: Evolution of the enterprise intranet [11].

These developments could serve as inspiration for intranet designers and convey a sense of innovation. There are numerous principles that intranet designers might take into account to aid in the design process. Creating a well-thought-out intranet design is crucial, as it can become expensive if it fails to satisfy user expectations [13]. Therefore, the implementation of an online chat system application within a company is made easier by the construction of an intranet.

Chat system application have engaged on greater infrastructural status amid digital platforms, reconciling the environment of work as well as private and social life [14]. For example, WahtsApp is described by researchers as an innovative platform that enables interactive sessions across the globe anytime anywhere. Chat application systems enable individuals to transmit and retrieve information via the internet or intranet [15]. Presently, this type of system software is developed into smart devices such as mobile phones. Therefore, users can interact with each other, transmit text/voice/video messages through the internet. According to [16], chat application system is referred to instant messaging system that allows individuals to share messages and information with one another in real-time.

In recent years, chat application system has been developed to aid instant communication in diverse human works of life. Gao et al., [17] developed an interactive ChatGPT for intelligent driving. The ChatGPT is built into vehicles, enabling drivers to interact with the vehicle while in motion. It has the capability to inform the driver to limit its speed when exceeding the required Kilometer/hour designated for a specific route. If the driver ignores the message, the car will automatically come to a halt. But if the driver consented to the message by reducing its speed, it will applaud the driver and continue in motion. Consequently, [18] developed a Chat-Bot system for supporting touristic experience in cultural heritage sites in southern region. The Chat system has the ability to manage, via the integration of pattern recognition and intelligent context awareness mechanisms used for communicating with users and source for a particular tourist needs. For instance, it guides tourists to various heritage sites as requested by tourist and pre-informed them about the features of that heritage site beforehand.

Most banks across the globe have also introduced live chat systems to their mobile and internet banking platforms. It helps potential customers to address challenges that arise while using either the mobile or internet banking platform. Customers can easily live chat a bank representative for inquiries or laying complain such as transaction failure or any other related bank service issues. In turn the representative respond by providing possible solutions to resolve these issues in real-time or near real-time basis. In the study of [19], the influence of technological traits and user confidence on customers' awareness of live chat usage in mobile banking was revealed. Some user perceptions envisage that they barely receive responses while communicating via chat system to bank representative from during office peak hours. This is due to the fact that most of the banking staff are engaged with office duties attending to customers in bank. Thereby, neglecting enquires and complains posted on the chart system.

The major problem that still lingers in most Nigerian Universities at present, is not having access to modern communication services such as the intranets. This often leads to misplaced information or delayed communication delivery within various departments in the universities. Academic/nonacademic staff finds it elusive to communicate to one another, and even to students alike. Oftentimes, it's disappointing obtaining crucial information at late hours that could be used to make decisive decision to achieve important goals. In addition, the inability to access colleagues for information without trekking/walking from ones' desk or office, group work cannot be done independently with intermediate synchronous response from all members in the group in one location. Also, instant message delivery to all client on the system cannot be actualized due to the inefficiency of the manual based method of communication, such as moving from office to office to submit memos and reports by facilitators. Message broadcast within split of second has always been a challenge. Therefore, this research work proposed an Online Intranet-enabled Chat System Application to resolve the aforementioned challenges. The significant of this study is

to minimize the flaws of the existing communication platforms used in some university communities in Nigeria, particularly Delta State University, Abraka. Nigeria, situated in a town called Abraka in Ethiope East Local Government Area. It comprises of three site namely site 1, 2 and 3, with student population of over 25,000 and workforce (academics/non-academics) of about 5000. The contributions of the research works are listed as follows.

i. Design and implement an online intranet-enabled chat system application for information delivery.
ii. Analyze and evaluate the performance of the proposed system based on its functionalities to resolve the challenges of the existing system.

The rest of this paper is structured as follows: Section II describes the research methodology adopted to actualize the proposed system. Section III provides a detailed analysis and evaluation of the proposed system result. Finally, we concluded our research work in Section IV.

2.0. Research Methodology

It is imperative to deploy the accurate methods to realize the objectives of this research. The methodology adopted in the course of this research consists of the Analysis of the existing system, outline the specification of the proposed system, use of unified modeling tools to implement the design of the proposed web application system, use of qualitative method to analyze the proposed system. Also, uploading the developed system solution onto a free web server for performance evaluation based on its functionalities.

2.1. Analysis of the Existing System

The existing chat system of most academic institutions in Nigeria (using Delta State University as Case study) is domicile on their websites. It is designed specifically to enable the public, particularly prospective students ask frequent questions bordering their admission status and how to find their way around the university premises or environment. Also, bona-fide students can ask questions regarding school fees payments and other related questions bordering their academic status. However, most of these chat systems are prone to some challenges which includes the inability to provide enabling access to staff members (academic/nonacademic) to interact or share information during and after work hours. Unable to provide access for group work to done unconventionally with provisional synchronous response from all staff members in the group in a specific location. Files or documents cannot be transferred via the chat system as well as instant message delivery. In addition, the existing chat system lacks the functionalities that will enable academic/nonacademic staffs and students to interact and share timely information.

Design and Implementation of the Proposed System

The requirements of the proposed system are obtained with utilization of observation technique. A detailed observation was carried out on the existing chat system domiciled on Delta State University Website. Furthermore, the chat system of other academic institution's websites was observed and accessed which leads to the requirements of the proposed web chat application system, outlined as follows;

i. The proposed chat system should allow users to login using their registered user name and password for security purposes.
ii. It should enable staff members and bona-fide student to register by entering their personal and academic details.
iii. It should be able to deny access to unrecognized username or password user.
iv. It should provide a platform for private group chat and instant messaging.
v. It should have the functionality for uploading and sharing of files or documents.

Unified modelling language (UML) has been adopted in this research to aid the design of the proposed systems. The UML is a tool utilized to provide a standard pattern of visualizing the design of a system. It consists of various diagrams developed to aid system and software developers visualize the components and functionalities of a system. Use case, Activity and Sequence diagrams will be used to design the proposed chat web application system.

Use case diagram is a graphical representation of user(s) in interacts with the proposed system. The use case diagram of the proposed system comprises of two major categories of users namely university staff and administrator. The university staff interact with the system as captured in Figure 2. On the other hand, the administrator is saddled with the responsibility to confirm the ID and Password of staff/student (clients) whenever they login to the system. It also responsible for managing the chat handler ensuring broadcast message to all users in private or public chat platform. Making sure that interaction between chat server and diverse users (clients) are successful.

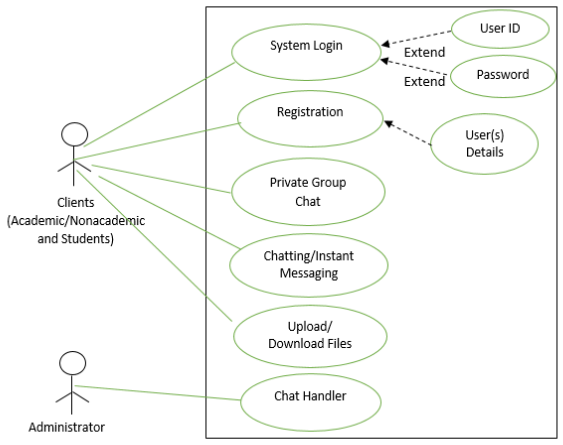


Figure 2: Use case diagram

Activity Diagram Activity diagram is used to model the activities or processes and workflow of the proposed chat system. It illustrates the processes and operations that occurs when users are interacting on the system. It further demonstrates how the components of the proposed system interacts together actualize its goal. The proposed system verifies the authenticity of user(s) login details (ID and

Password) at the point of login. If the login details supplied is not valid, it either requested the user to register as a first timer or revalidates the user login details as depicted in Figure 3. Thereafter, the system confirms the login or registered details, ensuring its validity before connection is establish between the client/user (s) and server. When connection is fully established, users can interact with each other by gaining access to the private chat group session, chatting, sending instant messaging and uploading and downloading of files. The user(s) also initiate end session when he/she has completed its tasks. On the other hand, the system automatically shut-down when it is idle for more than five minutes.

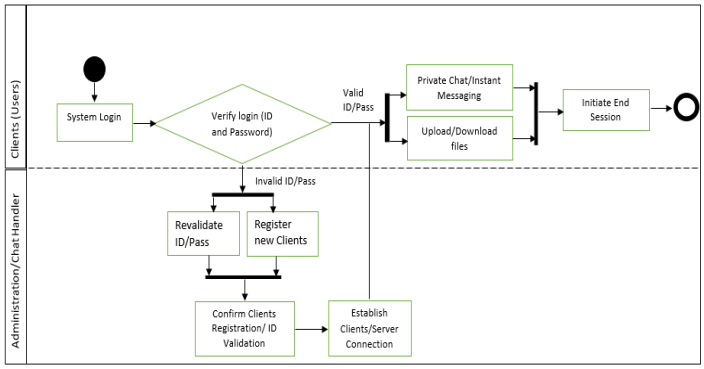


Figure 3: Activity Diagram of the Proposed Chat System

Relational database model was adopted for the development of the proposed chat system application database, implemented using PHP and MySQL. It stores and provides access to related data records that are correlated to another in the proposed system. Consequently, the proposed system database stores the details of client activities while using the system as captured in Figure 4.

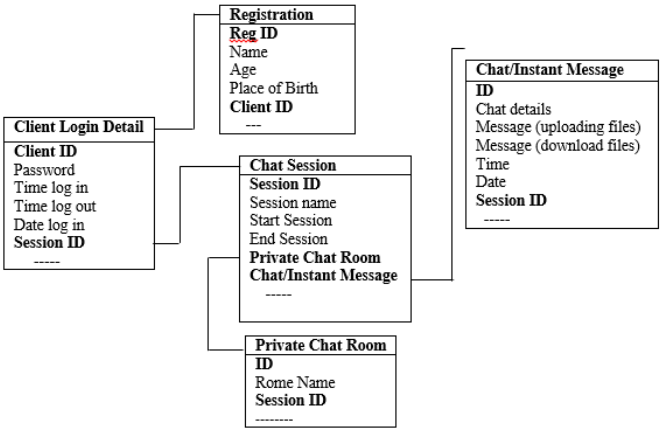


Figure 4: Database Design of the Proposed System

Qualitative analysis was adopted to analyze the proposed system development. It was complemented using a pseudo-code (algorithm) to illustrate how the proposed system was implemented. Also, adapting a flow chart diagram to demonstrate the processes and operations involved while using the system. Pseudo-code is well-defined sequential processes of what an algorithm or computer program must execute, conveyed in a natural language.

The proposed Chat system was implemented using Open Source Web development technologies namely, Hyper Text Markup Language (HTML), Hyper Text Preprocessor (PHP) and My Structured Query Language (MySQL). HTML and PHP are both programming languages, utilized to implement the proposed Chat front-end system. This was done by embedding the PHP scripting into HTML codes that runs on a server. The features of the server used consists of 16Gigabyte of RAM, 1Terabyte of free hard disk space, Intel Dual Core (7) Processor and 2003 Server Operating System. Additionally, the back-end (database) of the proposed Chat system was implemented using MySQL running on the server. At the initial stage, the chat system verifies the login details of a potential client, to ascertain if the details are accurate or correspond with the existing details provided at point of registration. If the login information is incorrect, the system automatically revalidates the login details, by either requesting the client to reset login information (User ID and Password), or register as a new client as illustrated in Figure 5.

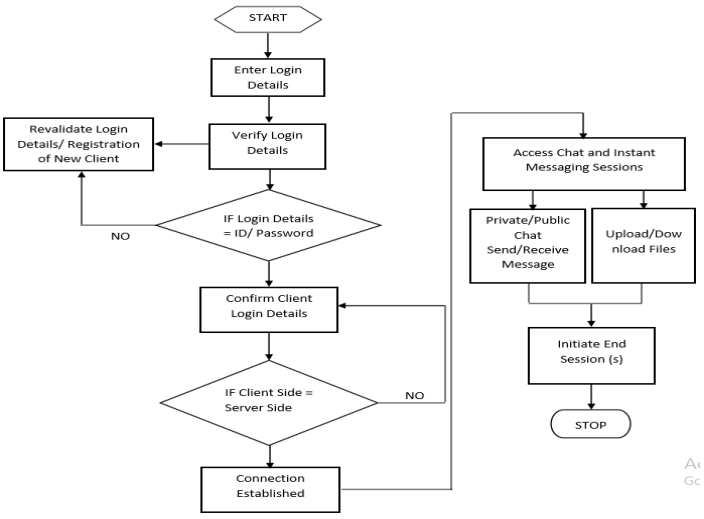


Figure 5: Flow Chart of the Proposed System

The database of the proposed system warehouses the details of every client that uses the chat system. In simple words, clients must register their personal information with login details provided, before they can have access to chat system. Hence, connection is established between the client and the server (i.e. the chat system) if it is confirmed that the login details provided be the client is accurate, then it can proceed to the chat terminal sessions. The client is either allowed to set up a private chat group or public chat on the terminal. Additionally, the chat system provides templates instant messages, leveraging the stress of the client to formulate a message before sending it to the recipient. Furthermore, the system allows clients to upload and download large files such as picture/video files.

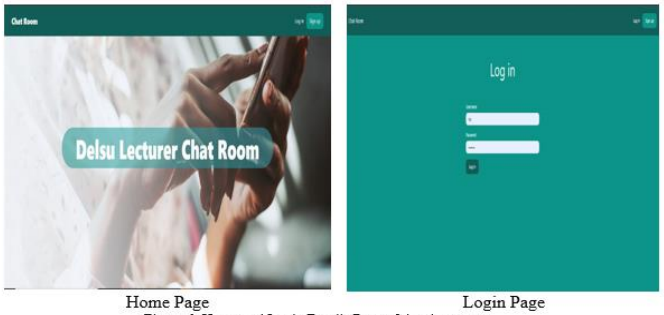
To further buttress how the proposed system was implemented, the pseudo-code for the Chat system is duly expressed as follows. In lines 1 to 2 verifies the validity of the client login detail whether it is accurate. If it is inaccurate the login detail is revalidated either by resetting details or

register as a new client. Connection is established in lines 4 to 6 if the login detail of the client is accurate as initially captured in the server upon registration. In line 7 the system may request for a repeat of revalidation of login detail if a time out session occur due to system interruption. Public and private chat sessions are accessible in lines 8 to 10 when initiated by the client. Also, instant messages and uploading/downloading of large files are initiated in lines 11 to 12. All chat sessions are stopped or ends by the client after usage in lines 13 to 19. In line 20, the entire processes of the proposed system end when the client logout as indicated below. Additionally, communication between clients on chat system is enabled with the asynchronous string transfer called Chatting-Between-Each-Other.

```
Algorithm of Chat System
Let Identification Number = ID
    Password = PWD
    Login Details = ID_PWD, New Client =NC
    Confirmation and Validation of New Client Registration/Login details=CFNCR_VDIDPWD
    Client/Server Connection = CS_Conn,
    Initiate Chat Session/Instant Messaging=IN_CSIM
    Chat Session = CS
    Instant Messaging = IM
INPUT    = ID_PWD
OUTPUT = CHAT SESSIONS
START
1.    Verify ID_PWD                                    //Entry of Login Details
2.    If ID_PWD = False; Then Revalidate ID_PWD        //Revalidate user Identification number and password
3.      Else Reginter NC;                              //Register as new user or client
4.    Do CFNCR_VDPWD                                   //Confirmed new client registration/validation of user login details
5.      If CFNCR_VDPWD = True; Then Established CS_Cnn
6.        Access Chat Sessions
7.          Else Repeat Line 1
8.    While IN_CSIM                                    //Initiating Chat and Instant Messaging Sessions
9.          If Initiation of CS = True; Then Access Public Chat Session
10.           Access Private Chat Session
11.           ElseIf Initiation of IM = True; Then Send/Retrieve Instant Messages
12.               Upload/Download Files
13.             Else End Sessions
14.           End ElseIf
15.         End if
16.     End While
17.     End If
18.   End Do
19.   End If
20.   End
```

3.0. Result & Discussion

The proposed Chat web application system was successfully implemented and its outcome demonstrate the functionalities of the system requirements as expected. The Chat system is lunched from the web browser, enabling staff and student of the university to login with their registered user name and password, as depicted in Figure 6. The login information supplied by the user is verified to ascertain its authenticity. The user is allowed to access chat system services if his/her login information supplied is accurate, else it will revalidate the information or request the user to re-register his/her details.



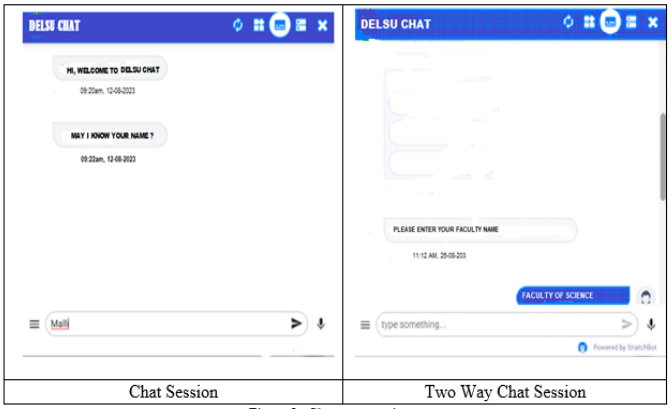
Home Page Login Page

Figure 6: Home and Login Details Page of the chat system

Users have the privilege to utilize the services of the chat system after login successfully. This can be done by making selection of services from the drop down menu at the right top most panel of the main menu page, as captured in Figure 7. The Services ranges from Chat room (private/public session), electronic mailing, uploading and downloading of files. The user may also exit the application system at this stage if he/she wish to do so.

Figure 7: Main Menu Page of DELSU Chat System

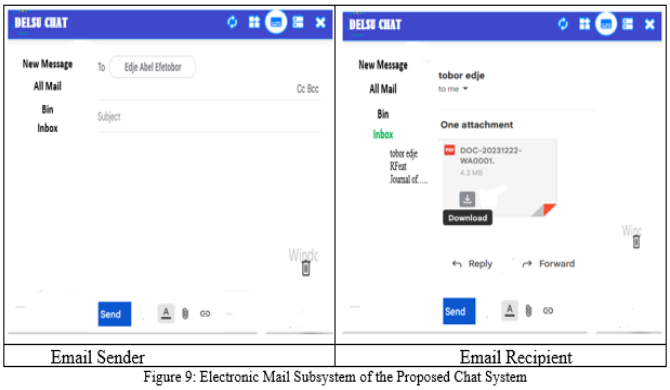
An example of chat room session is illustrated in Figure 8. The interface also depicts menu controls. A user or client uses the menu to either have access to public or private chat session, sending/receiving instant messages, and downloading/uploading of large files (e.g. picture and video files). It also allows the user(s) to chat using voice recording system by selecting the microphone icon situated at the bottom right corner.



Chat Session Two Way Chat Session

Figure 8: Chatroom sessions

The proposed system also renders E-mailing service to client. It allows client or a user to send mail messages to recipient and vise-vasa, as illustrated in Figure 9. The left side of the mailing subsystem comprise of menu controls to aid the user compose new messages, view all mail messages received over a period of time, have access to previous mail messages and deleting or bin messages that are no longer relevant. It also has control icons which include send, attachment etc. At clicking or selecting the send icon button, a typed message is automatically forwarded to the recipient. Moreso, the attachment icon enables user(s) to upload files (e.g. picture, video and music etc.) ready to be forwarded. Client can also download files received from the sender.



Email Sender Email Recipient

Figure 9: Electronic Mail Subsystem of the Proposed Chat System

The outcome of the proposed chat system demonstrated its feasibility and effectiveness, to bridge the pending challenges of communication between academic/nonacademic staff and students, as well as the principal officers of the university community. Lecturers in different faculties and departments can easily communicate or send information to one another, Likewise, students have direct access of communication or sending critical information to their lecturers based on their academic performance status. Additionally, other vital information relevant to student's welfare both on and off campus premises are communicated to students in real time.

The proposed chat system will be of great befit to the university management in the aspect of record keeping. All intended users must register by supplying their personal information on the system before they can login or have access to the services rendered. The information is captured and stored with the support of the database system domiciled in the proposed chat web application system. Thus, will enable effective and efficient management of student population in the university environment as opposed to the manual method of communication.

4.0. Conclusion

The proposed Chat-bot system application was successfully developed to resolve the challenges of the existing chat system with the utilization of HTML and PHP programming language, together with MySQL. It actualizes user requirements such as easy login by using registered user name and password. Also, allow users access services such as chat room for private and public conversation between two or more client or user. The email service is also available, enabling messages, uploading and downloading of files to be send and received respectively. In the future, an improved Chatbot system will be developed with the support of artificial intelligent technique to further speed up the communication process between clients, identify or detect the location of both the sender and receiver in real time.

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