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Design and Implementation of E-Administration System over Network Environment

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Abstract: ***This research paper represents the actual application of the electronic management system in the network environment where this field of research is constantly evolving and is of great importance to the impact it has on the administrative reality of government institutions and modern companies. The new electronic management system was built according to the specifications of the networks as it works according to the network environment and provides access to the servers and through this capacity has been improving the performance of the system because of the networks of the urgent need for modern applications.In this paper, it have been taken under consider the many possibilities that the modern electronic management system has, and these tools represent important additions to this system.The new system is designed in modern ways to work on both the Internet and Intranet or any local network where the system is placed within the servers in order to function correctly.***

Keywords: E-Administration, Network, Internet, Intranet, System

1. Introduction

Management is the process of controlling and organizing the resources available in a particular institution using a particular system. [1] Because of its widespread penetration of technology and the development of management science, the technology has been able to produce E-Administration science.[2] Electronic management is defined as a set of software systems that perform normal paper management functions and increase the efficiency, ability and speed in accomplishing work far from normal paper routines. [3] Modern electronic management systems reduce the effort to accelerate the process of management within the institution or the company operating in this system, where these systems accelerate the work and reduce the effort as it speeds up the work through the work of the functions on their personal computers quickly and using the network in which With regard to reducing the effort, instead of the employee in the institution to go from one place to another to transfer a specific document is simply using the electronic management system in order to send this document in seconds to each person connected to the system.[4]

Modern electronic management systems connect all employees working within the organization with an internal network that connects them together in a way that allows these employees to use this system within the organization through their personal computers, which contain the required specifications for the use of these systems. Employees connect to the network and open browsers or special programs to access the system and then use the functions of the system according to the aims and functions of employees. The e-administration system facilitates user access to each other by using a network environment as the network environment allows connected computers to exchange Information and data through these networks and the carrier medium. Figure 1 represents how employees within an organization interconnect with an electronic management system.

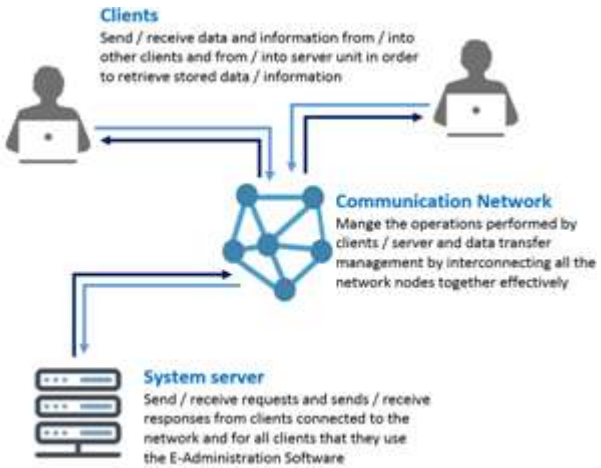

Figure 1: E-Administration system representation

The network acts as the intermediary that combines the connected nodes and connects them to each other to enable them to use the system in the server, which in turn is connected to the network for the process of linking the system with all nodes connected to the network. [5] In order for the user to access the server, he must be connected to the network either in a wired or wireless manner that enables him to access the system.

2. Literature Survey

This part of the paper reviews previous experiences in electronic Administration Systems.

AniMatei, Diana and Camelia Ianc (2000) Explains the process of transition to electronic systems as these systems represent the future outlook for development in this area. How to transform the routine paper system into electronic systems was explained through the conversion of management systems and the use of different software systems that perform the work of electronic administration. It also discussed the process of transition to e-government and its successful experience in the process of converting from paper transactions to electronic systems based on the Internet. Which enabled citizens to access the electronic

systems of government institutions and thus facilitate many transactions to reduce the effort to citizens. [6]

Hélène Michel (2005) in her research, she discussed the transformation to electronic systems in France and how to integrate e-government systems with electronic management systems. These systems represent important developments for citizens' lives. The research created a narrow relationship between the conveniences of French citizens using e-government systems instead of paper transactions. E-government systems and e-governance systems and such systems of an important organizer of the work of the e-government system as the electronic management system is working to organize the transfer of data and organize the process of reviewing and storing this. [7]

CatalinVrabie (2015) through her research published in the 5th World Conference on Learning, Teaching and Educational, she discussed the transition to electronic management systems and its relationship to modern electronic learning systems. These systems are working to increase the innovation of the education sector in terms of performance and outcome. Specifically, this study proved that there is a strong relationship between electronic management systems and e-learning systems, since the use of efficient electronic management system will be sufficient to create an electronic education system with high capacity and efficiency in terms of performance and outcome. [8]

3. System General Structure

In this section, the general structure of the system is reviewed. Figure 2 represents the general structure of the proposed electronic administration system within the network environment, which in turn connects the institutions to each other or connects within the organization one of the individuals, where the network represents the main nerve of this system.

The system was built in practice to be in line with the process of covering the faculties of Mustansiriya University in Baghdad, where the network was linked to each other to form the link between these colleges and linking these colleges with a centralized electronic management system for the process of facilitating the management of laboratories, students' affairs and other documents and transferring data between these colleges.

From the general form of the system, it is possible to observe the internal electronic management process and the installation of the internal system through which employees can perform their work efficiently and fast, where the system contains two main processes, namely the process of electronic supervision and the process of the electronic correspondence.

The electronic archiving process is used in order to save documents for employees within the system in order to increase the security of this information because the servers of the system are fully secure and contain a graphic encryption of these files. For the second process is electronic correspondence and represents the main axis of the system as the system works the work of e-mail With all the possibilities contained in the e-mail in the new electronic management system and all its functions known to send messages and files to everyone who has the service of this network.

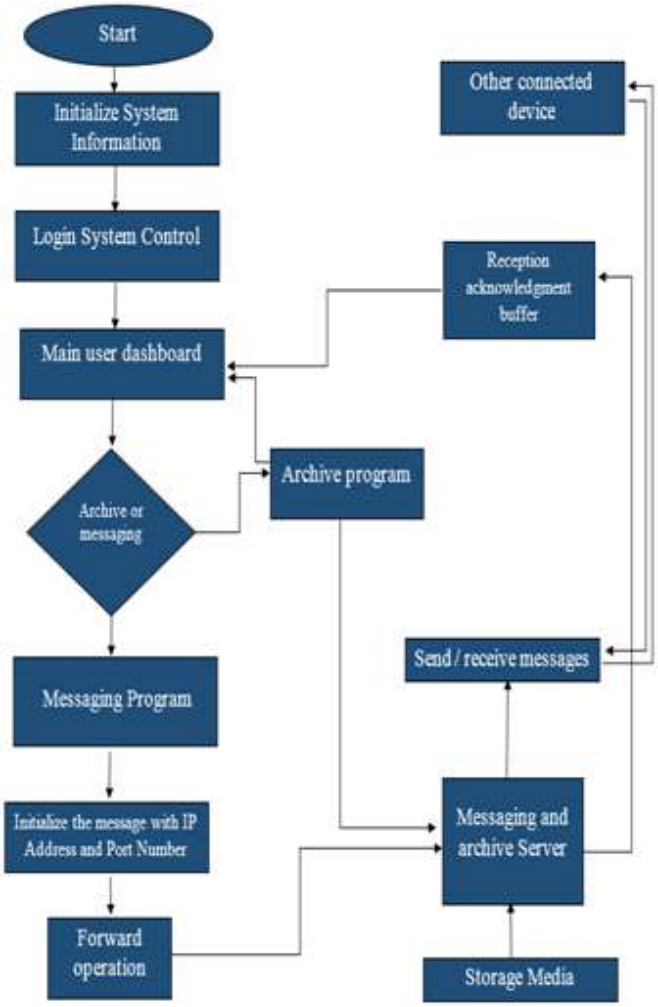

Figure 2: E-Administration system general structure

4. System Algorithms

There are many algorithms used in this program, but for the sake of brevity, the main algorithms used in the new electronic administration system are:

4.1 Access Control Algorithm

This algorithm controls user access to the system through the system's user name and password system, through which the system identifies the authorized users from the unauthorized access to the system and the algorithm text as in algorithm 1

ALGORITHM 1: Control Access Algorithm
Input: Client_INFO, SESSION_(auth_user), username, password
Output: SESSION_(auth_user)=Authenticated

Start
SESSION_START() // starting the session of the system
SESSION_(auth_user)=""
Client_INFO.client_username= user_input(username)
Client_INFO.client_password=user_input(password)

```
if
(Client_INFO.client_username&&Client_INFO.client_pass
word)
        {
       ⟦SESSION⟧_(auth_user)="Authenticated"
        }
       else {SESSION_(auth_user )=" " " "}

       if (SESSION_(auth_user ) !="Authenticated")

       Page_Redirect (LoginPage)

       End
```

4.2 File management algorithm

This algorithm is concerned with the process of managing files within the system, including the process of transferring and arranging files within their files so that the user can recover these files when needed. The mathematical algorithm is represented by algorithm 2

ALGORITHM 2: File Managment Algorithm

```
Input :File_type, SESSION_operation,
Output :File_uploaded,File_retraive

Start
if(SESSION_operation=Archive)
{
File_uploaded(File_type)
Convert(UploadedFile(File_type))
Store(File_Stream)
}
else  if(SESSION_operation=Retraive)
{
       retraive(Address(FileName))
 Convert(retraivedFile(RequestedFile))
reassemble(⟦File⟧_Stream)
}
       While(Not end of File)
{
       if(File_type,Type != .pdf)
File_retraive=  prevent(File_Stream)    }
End
```

4.3 E-mail algorithm

This algorithm is concerned with the process of mail exchange between users of the system and the process of selecting the type of mail and attached files and checking these files as the type of data allowed as files are only the pdf and not any other formula because of the security characteristics of this type of files. Mathematical representation of the algorithm represented by the algorithm 3

ALGORITHM 3: E-Mail Algorithm

```
Input :destination_address, message_info,  File_attach,
SESSION_operation
Output :⟦message⟧_acknowledgment,⟦File⟧_stored

Start
if(SESSION_operation=NewMail)
{
UploadedFile = ⟦File⟧_uploaded(⟦File⟧_attach)
⟦File⟧_Stream=Convert(UploadedFile(⟦File⟧_type))
⟦File⟧_stored=Store(⟦File⟧_Stream)

message_info.content
message_info.subject
DestinationAddress=IP_Conversion(destination_address
)
Message_encapculation=Encapsulate
(MessegeSubject,MessegeContent)
msgPack=packet(Message_encapculation,DestinationAd
dress)
while (msgPack.address  !=currentAddress)
{
Rout (msgPack)
}

If(destination_address= currentAddress)
⟦message⟧_acknowledgment(msgPack)
}
End
```

4.4 Signature algorithm: This algorithm represents a layer of data security to the system as it works to confirm the identity of the person who performed the digital signature on the algorithm through which the user can know the person or entity that has signed the digital e-mail sent as described in algorithm 4.

ALGORITHM 4: E-Mail Algorithm

```
Input :⟦user⟧_info, ⟦user⟧_(reciever_addr),
⟦message⟧_id, ⟦SESSION⟧_operation
Output :⟦message⟧_signed,⟦DBrecord⟧_updated

Start
if(⟦SESSION⟧_operation=Sign)
{
RetraiveRecord = MSG_Addr(user_senderaddr)
userComment= user_info.comment
SignedMail=Sign(RetraiveRecord ,userComment)
}
if(SESSION_operation= Signed)
{
DBrecord=UPDATE(message_id,SignedMail)
}

End
```

4.5 Hashing algorithm

It is the algorithm used to encrypt data using the secure hash function algorithm, whereby the user name and password are entered into the database in order to prevent hackers from accessing this important information, as the data appear unintelligibly, making system more secure and shown in algorithm 5

ALGORITHM 5: Hashing Algorithm
Input:user_username, user_password, ⟦user⟧_id, ⟦SESSION⟧_operation
Output:user_encryptedInfo,DBrecord_store

Start
if(SESSION_operation=Login)
{
user_username= user_input
user_password= ⟦user⟧_input
user_encryptedInfo(username) =SHA(user_username
user_encryptedInfo(password) =SHA(user_password

DBrecord_store=Store(user_encryptedInfo)
}
End

4.6 Communication algorithm

The most important algorithm that establishes the communication between the sender of the message and the recipient through the network connected to the system and through which the address of the sender and recipient is determined for the process of sending and receiving the correct image and notify the user in the event of correct access to data and also notify the user in the absence of access Data to their correct destination as shown in algorithm 6

ALGORITHM 6: Communication Algorithm
Input :user_equipment, baseStation_address, Destination_IP
Output :packet_Acknowleged

Start
user_message= user_equipment .getMessage
Connection_Establishment = ⟦LTE⟧_link (user_equipment.getDevice,Destination_IP)
while (Connection_Establishment=TRUE) & (Routing⟧_(Message) !=Destination_IP)
{
Connection_Establishment.IPAddr .PortNo
Connection_(usage.IPAddr),Connection_(usage.PortNo))
Forward_Message=Socket (user_message,Connection_socket)
Routing_(Message)=route(Forward_Message,baseStation_address)
packet_Acknowleged (Routing_(Message))

5. System Programming

The new electronic management system is available on many advanced programming techniques through which the system is equipped with the latest technologies in order to deal with the development in the world of software and the most prominent of these technologies.

5.1 Object Oriented Programming

Object Oriented Programming (OOP) is a kind of modern programming that makes the system a sophisticated software system through the process of inheritance of software between different types of system files through the inheritance in the programming of ironing, through which the system is able to deal with multiple users at the same time and provide the same conditions And their software capabilities as shown in Figure 3.

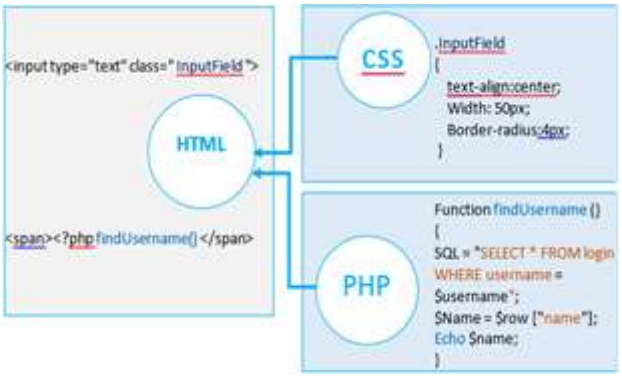

Figure 3: E-Administration system OOP

5.2 Model, View and Control (MVC)

This advanced software technology is used to isolate the software components of the system from each other and this provides a great ease for developers and programmers in order to deal with the system to give greater comfort and a wider area for programmers for the adjustment and the addition of their code easily and without the complexityand as shown in figure 4

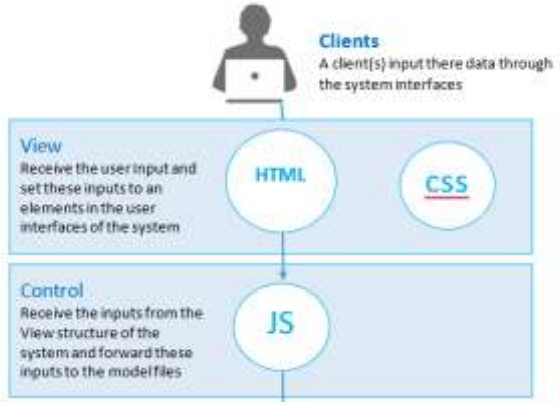

Figure 4: E-Administration system MVC

6. System Implementation

The system was implemented on an internal local network in the faculties of Mustansiriya University where a plan of action was developed according to this scope and linking the universities of Mustansiriya with an internal local network that includes these colleges where each faculty was considered as a node in the system, which allows this contract to transfer data and information with each other through the management system The node also allows the sub-nodes of the system to communicate with the main contract for data transmission. The main node acts as a main distributor for all sub-nodes connected to it and works to

connect the network to the subcomponents in order to connect to the servers which contains electronic management system. Figure 5 shows the main nodes within the university colleges.

Figure 6: E-Administration system distribution

Each sub node has a basic address within the network where this node is known from this address. For example, if an employee of the Faculty of Science wants to send a message to another staff member in the Faculty of Education, the staff member at the Faculty of Science opens the system through the program browser and writes the address of the program on the network And logging into the program in order to use the system functions. Then the user in the Faculty of Science sends a new message to the employee in the Faculty of Education via the page of the new messages and attach the files if any and then press the transmitter in a timely manner This message will be directed from the employee in the Faculty of Science (node) to the server of the Faculty of Science The main node) in order to redirect the message to the main node of the Faculty of Education and thus work on delivering the message through the main node of the Faculty of Education to the recipient in the Faculty of Education through the address contained in the message within its internal structure.

7. System results

After the system was actually applied to the local network, the results and the time taken for each system performance were recorded. The results are as shown in Table 1. The table shows the results of the time taken by the system to perform the various functions and the time it took to perform the algorithms. Which takes the algorithms in order to carry out its tasks.

Operation	*Time in second*	*Number of bytes*
Access control	0.002	86
File management	0.01	90
New message	0.05	12000
New archiving	0.04	10000
Signature	0.003	86

8. Conclusion and Future work

The electronic management system is very easy to process institutes and companies through which the institution or company can exercise management in a digital and high efficiency and also is an electronic messaging system where the new system allows the process of electronic correspondence in addition to electronic archiving processes, which is concerned with the preservation of documents, What's new with the most current programming methods. The new system works in a network environment where it is designed to work on the local and global network environment, such as the Internet. Once the system is installed in the server storage units and the servers are designated as the main system servers and then give the system within these servers a distinctive address to be accessed from through browsers and through personal computers, laptops and even mobile devices.

In the future, it is possible to develop many possibilities in the field of electronic administration, including modifying the algorithms to be more powerful and effective and also improve the security level of data in the electronic management system by adding modern and powerful encryption algorithms used in modern applications and also can use the https protocol, which represents the protection layer Basic user data which in turn can protect user data from danger. Many features can be added to the electronic management system such as statistics, reports and artificial intelligence, which allows the user more comfortable and easy to deal with the system.

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