

**DESIGN AND IMPLEMENTATION OF ONLINE VOTING SYSTEM**

**CASE STUDY: KAMPALA INTERNATIONAL UNIVERSITY**

**BY**

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Fulfillment of the requirements for the award of a Degree**

**Of Bachelor of Computer Science and Bachelors of**

**Information Technology of Kampala**

**International University**

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## DECLARATION

We, Eliud Omondi Olum and Akankwasa Moses declare that this Graduation project is from our own findings and has never been produced by any body else for the same award in our institution.

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## **APPROVAL**

This is to approve that this Graduation Project report entitled "*DESIGN AND IMPLEMENTATION OF ONLINE VOTING SYSTEM*" was written and Conducted under my Supervision.

Mr. Ssegawa E. James Kiggundu

Signature:..... Date:.....

## **DEDICATION**

This project is dedicated to all those who provided us with the opportunity to learn and also to all those who believed in our ability to succeed: May the Almighty God bless them abundantly for their good work they have done in our entire studies.

## **ACKNOWLEDGEMENT**

Our appreciation and sincere gratitude go to our competent professional supervisor Mr. Ssegawa E. James Kiggundu for his valuable time, encouragement, guidance and supervision during the course of the study. Without her, this book would not have been what it is. My humble thanks go to all the lecturers and entire staff of Computer Studies of Kampala International University who have equipped us with the necessary skills and knowledge to apply throughout the entire project.

Special thanks to all our friends and classmates of Kampala International University and for those whose names have not appeared here we shall always remember your contributions which are engraved deep in our heart and you will be acknowledged in our mind always. Also thanks to the general staff at the Kampala international university guild union for allowing the researchers to carry out their research in their organization. Thank you and the Almighty God bless you all.

Finally, I will not forget the Almighty God who has given us the will and guidance throughout this time of developing the project. It is by His grace that we have come this far.

## **ABBREVIATIONS AND DEFINITIONS**

**PIN**..... Personal Identification Number

**HTTPS**.....Hyper Text Transfer Protocol over Secured Socket Layer

**Key**.....Key is a combination of bits values which are used for encrypting/decrypting a plain text

**GUI**.....Graphical User Interface

**WTP**.....Web Tools Platform

**TLS**.....Transport Layer Security

**KIU**.....Kampala International University

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## ABSTRACT

The report provides a technical analysis and reviews of a database driven website which has been designed and constructed by the researcher to assist the Kampala International University guild union in conducting its elections. In designing the database driven website, the researcher has used Macromedia Dreamweaver 8, PHP language and MySQL server. In the design of the user interfaces, Macromedia Dreamweaver 8 has been used for its support in incorporation of graphics in the process of PHP programming.

The study involved the design and implementation of a web based system for Kampala International University that will provide easy, accurate and in time registration of voters and election results. The problem was analyzed carefully and steps to solve it were drawn. Various literatures were reviewed in chapter two of this document. This was done in order to get an overview of what has been done before concerning the problem. An overview of web based systems is given as well as various concepts concerning its implementation. The development methodology and tools has been discussed in detail in chapter three. This includes knowledge acquisition and analysis, data collection techniques, development tools and system validation. Details of the new system like system specification for the new system are discussed in chapter four. System testing, data conversion and loading and system evaluation details has been also discussed in chapter five. Finally, chapter six contains the conclusion and recommendations

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.0 Introduction**

Kampala International University is a private university which was founded nine years ago and has two campuses in Uganda; the main campus in Kampala is along Kansanga Ggaba road and the School of Health Sciences (KIU Western campus) in Bushenyi along Kasese road, with another campus in Tanzania, and branches in Kenya. Kampala International University has a student population of fifteen thousand, according to Dr.Otanga Rusoke, the director of admissions at KIU. KIU has a vision of becoming a premier institution of International repute which necessitate the need of embracing the ever-changing technological advances, hence the introduction of online voting system.

Michael Ian Shamos, (1993), defines online voting as the use of computers or computerized voting equipment to cast ballots in an election. He continued to say that this term is used more specifically to refer to voting that takes place over the Internet. Electronic systems can be used to register voters, tally ballots, and record votes.

According to Williams, (2006), e-voting is an election system that uses encryption to allow a voter to transmit their secure and secret ballot over the internet. The system encompasses legal, regulatory, behavioral, and sociological aspects of the paper based system, while adding additional convenience and security to the overall voting process.

#### **1.1 Background of the topic**

Most of the university students come from different countries where Information and Communication Technology (ICT) has been implemented and which plays a valuable role in carrying out day-to-day activities like use of internet for social networking, electronic learning and research and so much more. In particular, students are used to participating in Web-based networking-one of the key ways that online communities engage with each other.

Over 99% of University students know how to use internet and it has become essential part of their life. Therefore, the implementation of online applications saves time and it is fast.

Today universities in developed and developing countries have started introducing the use of Information and Communication Technology (ICT) in voting process. For example, in mid-2007, Coventry University began developing an online e-voting system and Cambridge University Students' Union (CUSU) in 2009. This system is new to the guild elections committee of Kampala International University and the implementation of online voting system does not sound as a challenge to the students, but rather an opportunity to alleviate them from the traditional paper based voting system.

## **1.2 Statement of the Problem**

Since the inception of Kampala International University, the voting process has been conducted each and every academic year. However, the current voting system used for this purpose was paper based; right from registration process till the voting and counting stage. According to Katongole Denis, a guild president of K.I.U, 2009, he emphasizes that this system is susceptible to fraud in that electoral officials may connive with the candidate of their choice and declare him as winner in a dubious way. Besides, it leaves out students who are busy and far away from campus during the process of voting. Kamau (student), states that the paper based system is slow in generating results of guild elections and besides, record management for guild elections is not secure enough. The proposed system is faster in generating results of guild election in just 6 hours, and also creates an opportunity for busy and eligible distant students (voters) to participate in the voting process using internet. The system is secure because it uses security algorithms that can keep the confidentiality of the data at rest as well as at communication lines. Therefore, implementing the state of art technology in Kampala International University that can reduce the major problems as seen on the current manual system/paper based vote casting system is necessary.

## **1.3 Purpose of Study**

The purpose of the study was to develop and implement a fully integrated, interactive, flexible and scalable online voting system that replaces the current paper based voting system.

## **1.4 Objectives**

- i. To investigate and analyze the current voting system used at Kampala International University.
- ii. To investigate and analyze the causes of voting fraud that emerge from using traditional paper based voting system.
- iii. To design and model a secure and a robust online voting system for Kampala International University.
- iv. To implement standard security algorithms that can keep the confidentiality of the data at rest as well as at communication lines.

## **1.5 Research Questions**

In this project, we tried to answer such questions as;

- i. How does the current voting system works?
- ii. What are the causes election frauds in the paper based voting system used at Kampala International University?
- iii. What are the requirements needed to develop an online voting system for Kampala University?
- iv. What security techniques are required to develop a secure online voting system Kampala International University?

## **1.6 Scope of the Study.**

### **Geographical Scope**

The study was carried out at the Main branch of Kampala international University, an institution of higher learning which is located in Kansanga, 3 Km from Kampala City off Ggaba Road.

## **Research Scope**

The study focused on the development and implementation of an online voting system for Kampala International University. The system contains modules that constitute students (voters) and candidates' registration and voting.

### **1.7 Significance of the Study.**

The system captures candidates' credentials and students' (voters') information and authenticates eligible voters to participate in the voting process.

It captures ballots, tallies them and outputs the results of candidates for each faculty in time unlike the traditional paper based voting system.

The system provides a storage mechanism for guild election results since it is supported by a backend database.

## 1.8 Conceptual Framework

The conceptual framework shows how the registration officer, voter and the electoral officer interact with the system.

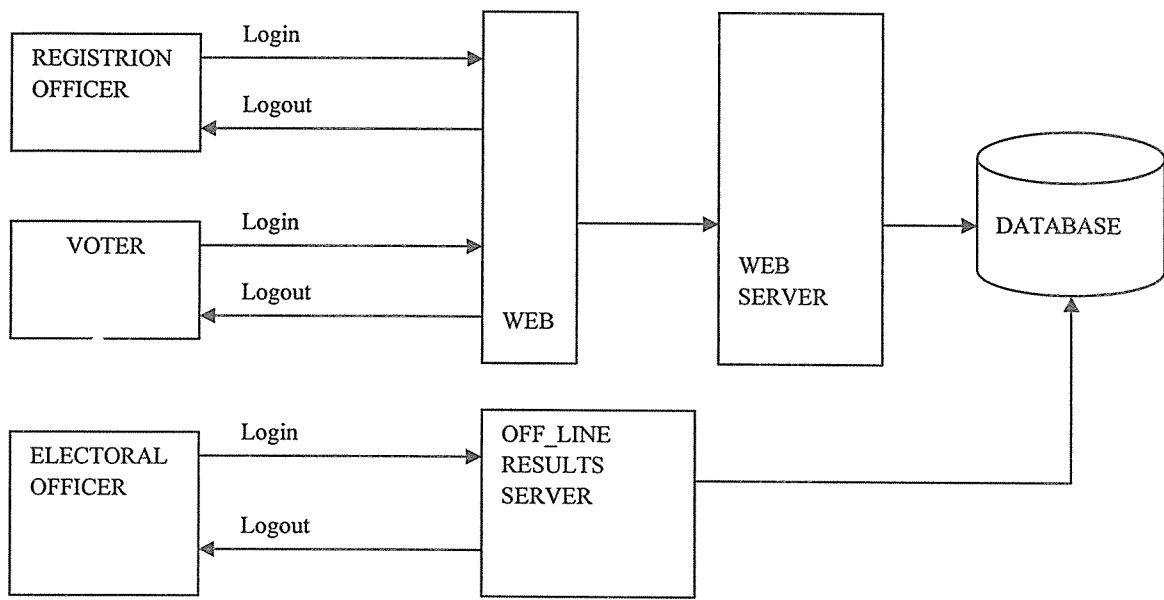


Figure 1.1: Conceptual framework.

## CHAPTER TWO

### LITERATURE REVIEW

#### **2.0 Introduction**

This chapter provides a review of the already existing literature about online voting system done by previous writers. Related information was mainly extracted from the Internet.

#### **2.1 Online Voting System**

Michael Ian Shamos, (1993), defines online voting as the use of computers or computerized voting equipment to cast ballots in an election. He continued to say that this term is used more specifically to refer to voting that takes place over the Internet. Electronic systems can be used to register voters, tally ballots, and record votes.

According to Williams, (2006), E-voting is an election system that uses encryption to allow a voter to transmit their secure and secret ballot over the internet. He advocates that electronic voting can reduce election costs and increase civic participation by making the voting process more convenient.

#### **2.2 Case study of Coventry University**

It is located in the heart of the Midlands, United Kingdom. Initially, student voting at Coventry University was carried out using a traditional paper-based system, where students had to attend polling stations on campus at specific times, and ballots were counted by hand. This was an expensive, complicated process involving polling clerks, ballot boxes, and numbered, perforated voting papers. Until mid-2007, when Coventry University began developing an online e-voting system using Microsoft® Office SharePoint® Portal Server 2003, that increased both efficiency and participation, while reducing costs. It also supported collaboration, provided sophisticated content management, and offered secure access to essential information that can be shared by authorized users. The university saves thousands of pounds a year and projecting a modern, hi-tech image to both students and educators.

### **Benefits of the new system of Coventry University.**

According to Peter Yeadon Director of the Customer Relationship Management & Portal Development Programmer-Coventry University, the new system achieved much compared to the old paper based system. With the implementation of SharePoint Portal Server 2003, elections became much easier to administrate and more accessible to all students, including those on international placements. By reducing the time and complexity associated with paper-based voting, the system helped the university to make significant financial savings every year. For every election, the Student Union saved around £1,000 in administrative and staff costs compared with the old paper voting system. Coventry University was able to set up a weighting system to improve the integrity of elections. There was a guaranteed result, monitored by an independent receiver, adding to the transparency of the vote. Students vote at anytime, from anywhere, as long as they have access to the Internet. Students gained greater confidence in a secure, anonymous voting system and were more likely to participate in elections. Available online : (<http://www.microsoft.com/resources/casestudies.html>).

### **2.3 Case study of Cambridge University.**

The Cambridge University Students' Union (CUSU) developed an Online Voting System which lets organizations around the University to set up online votes in a secure manner. This system is run across two separate web servers:

1. A setup server; this is the part of the system where Societies and other groups can set up new ballots.
2. The high-security voting server; this is where the voting actually takes place, and where upcoming/current/previous ballots are listed and where their results are shown.

### **How the online voting system of CUSU works.**

The voting open automatically at a time specified when the vote was set up. If the voter (as authenticated) is on the electoral roll for that vote, he is able to submit his vote by entering his choices on a form. The form prevents users from submitting invalid votes. Submission of a ballot paper results in three things:

1. The vote is marked against their username in the list of voters, thus preventing them voting again.
2. When the eligible voter votes, the master system mailbox receives an e-mail for auditing purposes. This is also blind-carbon-copied to the voter, so the voter cannot be identified.
3. Voters cannot change/delete their vote after voting, or vote again.

At the time the vote closes, the list of votes associated with each token is published at the end of the vote, enabling people to perform a count themselves. The BOB system (name used for voting system) includes a counting implementation using the program called Opens TV. However, it is the Returning Officer's responsibility to perform an additional count if they do not trust this count implementation. The list of vote's tokens cast is published immediately the whole ballot is closed. Aaron Smith (2009) expresses his worry that the vote audit logs may be altered since the System Administrators have access to the server logs.

### **Benefits of online voting system**

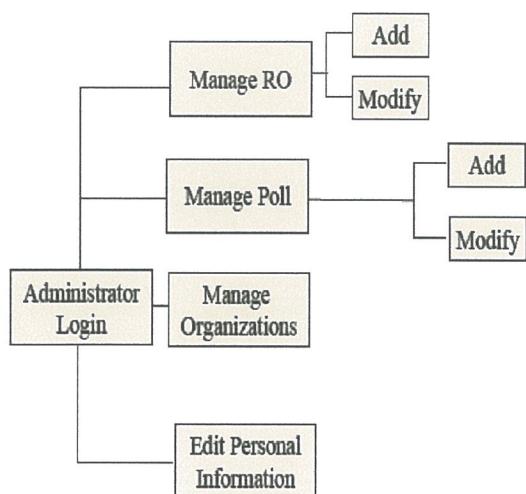
According to Aaron Smith, (2009), an online voting system increases voter responses. Low response rates are often due to a lack of time or motivation in having to complete forms and make the effort - or remember - to post them. A secure online voting option allows voters to access any ballot via the internet wherever they are, whenever they like. Because most people are online at some point during the day, they would be more inclined to complete a simple, three-minute online form than pick up a pen, manually complete a set of questions, put the form in an envelope and take it to the ballot box. Other benefits of online voting systems are that they considerably cut back on the manpower and facilities needed for manual response handling, as well as providing a modern image for the institution conducting the election. Michael Ian Shamos, (1993), asserts that with online voting, encryption technologies ensure that the ballot is secure, and a separation of voters' choice from his or identity by the system ensures that the ballot is secret. Available online: ([http://www.cusu.ac/online\\_voting.html](http://www.cusu.ac/online_voting.html)).

## 2.4 Case study of Trent University

### System Overview

Ayepoll was a name given to an online voting system for Trent University. All user interaction was performed remotely through the user's web browser. Users of ayePoll were categorized into three classes: Administrator, Returning Officers and Voters. A running version of the system had only one Administrator but it typically had multiple returning officers and voters. The administrator was responsible for managing user accounts, polls, system resources and logs and for the health and safekeeping of the system. Returning officers had the responsibility of managing a poll as assigned by the administrator, whereas voters only had the ability to submit ballots on polls in which they are admitted.

### Hierarchy of GUI Screens



Source: ([http://www.ayepoll.trent.ac/online\\_voting.html](http://www.ayepoll.trent.ac/online_voting.html)).

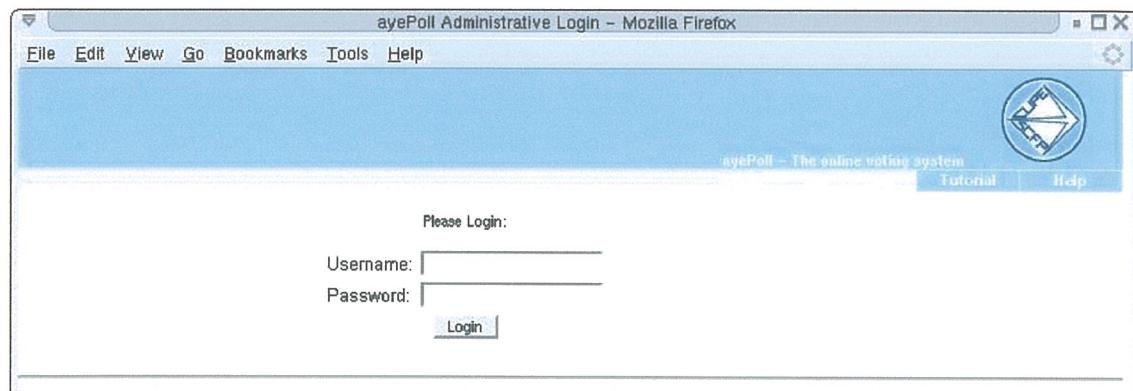
### System Security

The security of the system rotated around the administrator. It was the responsibility of the administrator to ensure that the system operates securely. The administrator maintained a strong password (preferably one with more than 6 characters including numbers and not comprised of words from the dictionary) and ensured no one gets access to this; He regularly reviewed event logs in the system and ensured that no suspicious activity takes place such as repeated failed

attempts to login etc. It was also the responsibility of the administrator also to ensure that no person gets direct access to the machine in which the system is running be it physical or remote access as data integrity cannot be guaranteed when people tamper with the system from the outside. It was also the responsibilities of the administrator to ensure that all packages and systems in which ayePoll depend on are present at the time of polling. In this regard, the administrator had the responsibility to ensure that bugs in PHP, PostgreSQL, Debian GNU/Linux, Apache are patched quickly as unpatched systems can open doors to intruders. Available online: ([http://www.ayepoll.trent.ac/online\\_voting.html](http://www.ayepoll.trent.ac/online_voting.html)).

The voter had to use correct user name and the password in order to login the system as seen below;

### **The ayepoll login\_form.**



**Source:** ([http://www.ayepoll.trent.ac/online\\_voting.html](http://www.ayepoll.trent.ac/online_voting.html)).

After logging into the system, a voter went direct to vote a candidate of his choice as seen below;

The screenshot shows a web-based application for managing elections. At the top, there's a navigation bar with links for Home, Manage Returning Officers, Manage Polls, Edit Personal Information, and Manage Organizations. To the right of the navigation is a logo for 'ayepoll - The online voting system' and links for Tutorial and Help.

The main content area displays the configuration for a new poll:

- Poll Title:** New Poll for TISA - Trent International Students Association
- Owner Organization:** TISA - Trent International Students Association
- Responsible (primary) Returning Officer:** Joey Palooka

**Poll Scrutineers:**

Name	Status
Ralph Jarvis	active
Jim Emburg	active
Joey Palooka	active

How many scrutineer confirmations are required for results to be accepted?

Buttons at the bottom: Save and Cancel.

**Source:** ([http://www.ayepoll.trent.ac/online\\_voting.html](http://www.ayepoll.trent.ac/online_voting.html)).

## CHAPTER THREE

### METHODOLOGY

#### **3.0 Introduction**

This chapter introduced the research design and discussed the target population. It also gave the target population where the research is going to be conducted giving the sampling technique to be used and size of the target population. This chapter also discussed research instrument, modeling tools and development tools the researcher used.

#### **3.1 Research design**

The researchers used both quantitative and qualitative methods of data collection and analysis to study and analyze the target population which included the voters, the electoral board, the registration officer and the security officer which were providing security during the voting process.

#### **3.2 Target population**

The study included the would be voters who are students, it also included both the registration officer and the electoral board, it also included candidates from the academic year 2009/10 guild election and lastly it included the security official who were responsible for providing the security.

#### **3.3 Sampling technique and size**

The researchers used stratified sampling technique in which the population was divided into sub population such that the elements within each sub-population were homogeneous. Simple random sample were then selected independently from each sub population in addition respondents were identified depending on the ones willingness and availability to take part in the exercise. Each homogeneous sub population included ten respondents which were picked randomly.

### **3.4 Research instruments**

Data from the field were obtained by using a combination of the following data collection instruments.

#### **3.4.1 Observation**

Here, the researcher used both camera and eyes to observe and record how the election was being conducted right from the registration process to the actual voting. Observation method was preferred because information was to be collected without the full knowledge of the respondent

#### **3.4.2 Questionnaires**

These were pre-formatted written set of questions to which the respondent were to record their answers. Furthermore questionnaires were administered personally to the respondent. The questionnaires were prepared because they save time especially when the group is large and they can also be used for future reference.

### **3.5 Data processing and analysis.**

Data from the field collected by the researcher was then processed using computer packages such as SPSS and Excel. From the processed data the researchers were able to get measures of central tendency such as mean and also measures of dispersion such as frequency distribution. This were of great importance in analysis of the data collected

### **3.6 Modeling tools**

Data modeling is a method used to define and analyze data requirements needed to support the business processes of an organization. The data requirements are recorded as a conceptual data model with associated data definitions

The researchers used the following modeling tool

#### **3.5.1 Use case diagram**

Use case was used to model the system in that it gives graphical representation of the whole system indicating the roles of both internal and external actors to the system. This helped in

getting the functional and non functional requirements of the system thereby helping the researchers in modeling of a system that captured all there requirements.

### **3.6 Development tools**

The development tools were broadly classified into four. These were programming tools, web designing tools, database development tools and security tools

#### **3.6.1 Programming tools**

##### **3.6.1.1 PHP Version 4.0.6**

PHP is a general purpose scripting language suited for web development. It generally runs on a web server, any PHP code in a requested file is executed by the PHP runtime usually to create dynamic web page content. It is also used for command line scripting and client side graphical user interfaces (GUI) applications. It can be applied on most web servers. Many operating systems and platforms and can be used with many rational database management systems. It is available free of charge.

##### **3.6.1.2 Java Script**

Java Script is a client side programming language. Any code that is written in Java Script is actually run from the user's browsers than from the server. The Advantage of Using Java Script is that it supports Validation. It can provide a great solution when validating input forms on the client's side. If a user misses to fill a required criterion in the form, then Java Script validation can generate a pop up message as a warning to the user. This kind of validation is taken to be better than a server side validation.

#### **3.6.2 Web designing tool**

##### **3.6.2.1 Macromedia Dreamweaver version 8**

The choice of macromedia Dreamweaver roots from the fact that it allows for creation of standard web pages. It also has added functionality in that it allows and gives option of interaction with other development tools such as PHP and MySql.

### **3.6.3 Database Management System**

The database was powered by MySQL version 4.1. It was used for managing the system database. MySQL has some better qualities which make it preferable compared to other relational database management systems. It is multithreaded, multi-user database management system, supports all known platforms including Windows-based platforms, requires less hardware resource for storage as well as for execution, much faster, supports Unicode character storage and more than that, it has free version product.

### **3.6.4 The Apache HTTP Server version 1.3**

Apache is an open source web server. It is fast and scalable. Besides, it can handle simultaneous requests from user agents and is designed to run under multitasking operating systems. It can also handle changes in request.

## CHAPTER FOUR

### DATA PRESENTATION AND ANALYSIS

#### **4.0 Introduction**

The chapter was about presentation and analysis of the data related to the current voting process at Kampala international university. The study specifically focused on the security risks faced by the current voting process, transparency of the whole electoral process and areas of improvement.

During data analysis and presentation of findings, tables and figures were used while frequencies and percentages were used to describe the findings. Data was also analyzed and presented by the help of bar graphs and pie charts.

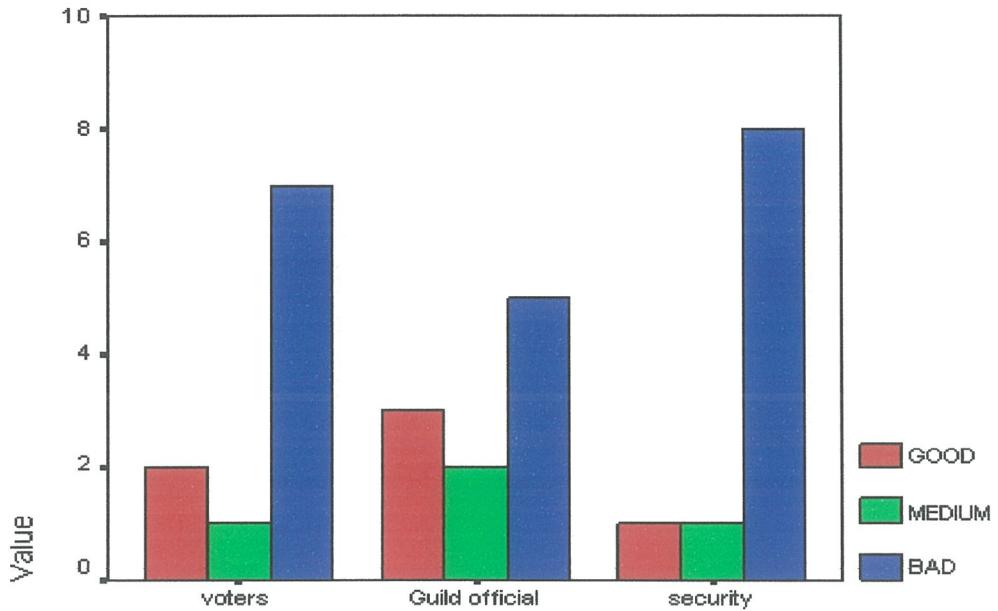
#### **4.1 Data presentation and analysis**

The preceding pages shows the question asked to the respondents and there answers were put in a tabular form from which bar graphs were generated. The graphs were analyzed and the researchers made deductions from them

##### **A: rating the level of transparency in the electoral process.**

**Table 4.0:** table result of rating the transparency level of electoral process

	Good	Medium	Bad
voters	2	1	7
Guild official	3	2	5
security	1	1	8



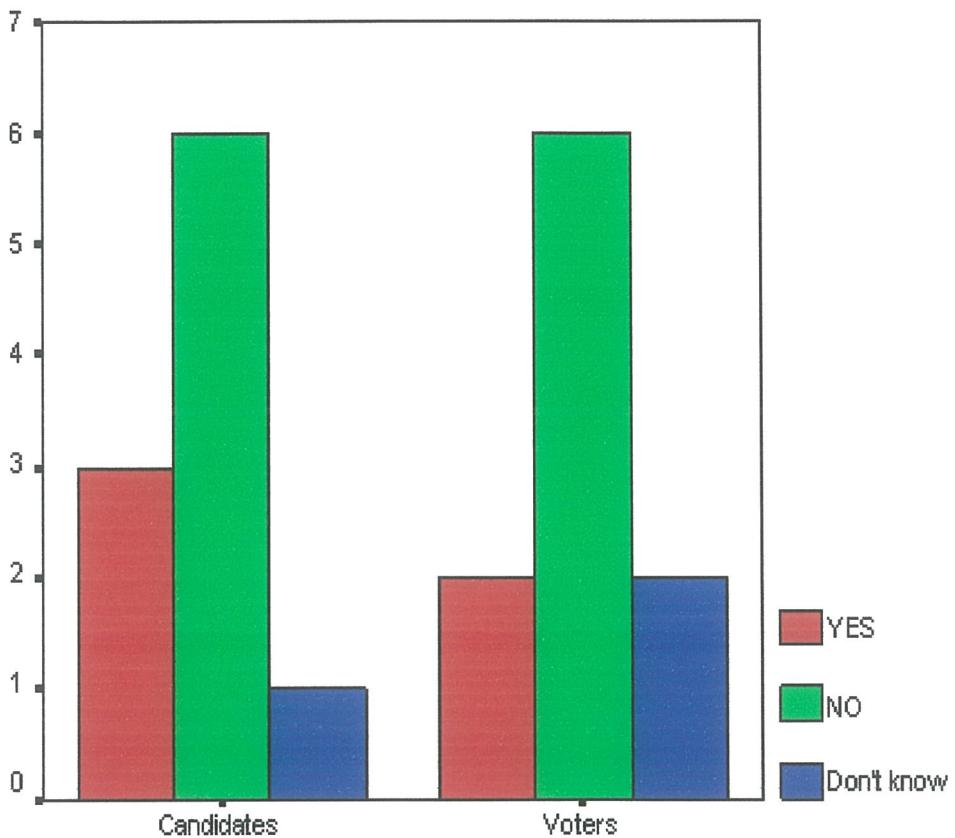
**Figure 4.0 graphical representations of respondents on level of transparency**

From the tabular data presented from the respondent and the corresponding bar graph we can deduce that more than half of the voters, guild official and security personnel have lowly rated the transparency level of the Kampala international university electoral process

#### **B: Access to the voters register prior to voting.**

**Table 4.1:** table result of access to voter register

	Yes	No	Don't know
<b>Voters</b>	<b>2</b>	<b>6</b>	<b>2</b>
<b>Candidates</b>	<b>3</b>	<b>6</b>	<b>1</b>



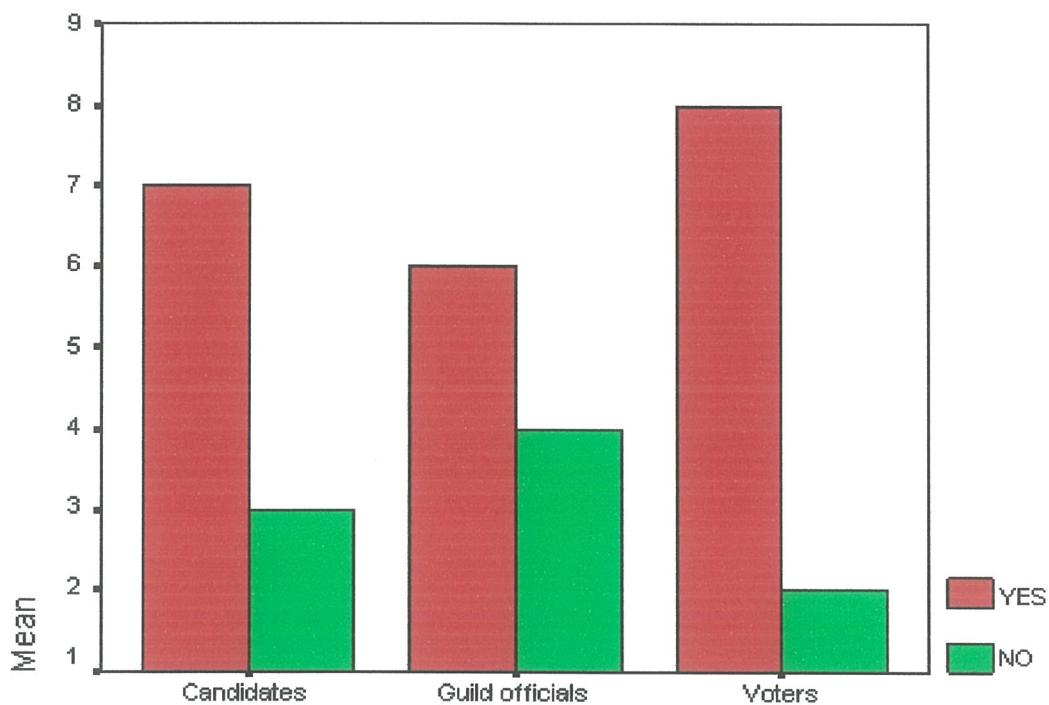
**Figure 4.1 graphical representations of respondents**

From the findings given above we can deduce that ninety percent (90%) of the respondent do not have access to voters register prior to election.

#### **C: Support a change to a new voting system**

**Table 4.2:** table result of support for change to new system of voting

	<b>Yes</b>	<b>No</b>
<b>Voters</b>	<b>8</b>	<b>2</b>
<b>Candidates</b>	<b>7</b>	<b>3</b>
<b>Guild officials</b>	<b>6</b>	<b>4</b>



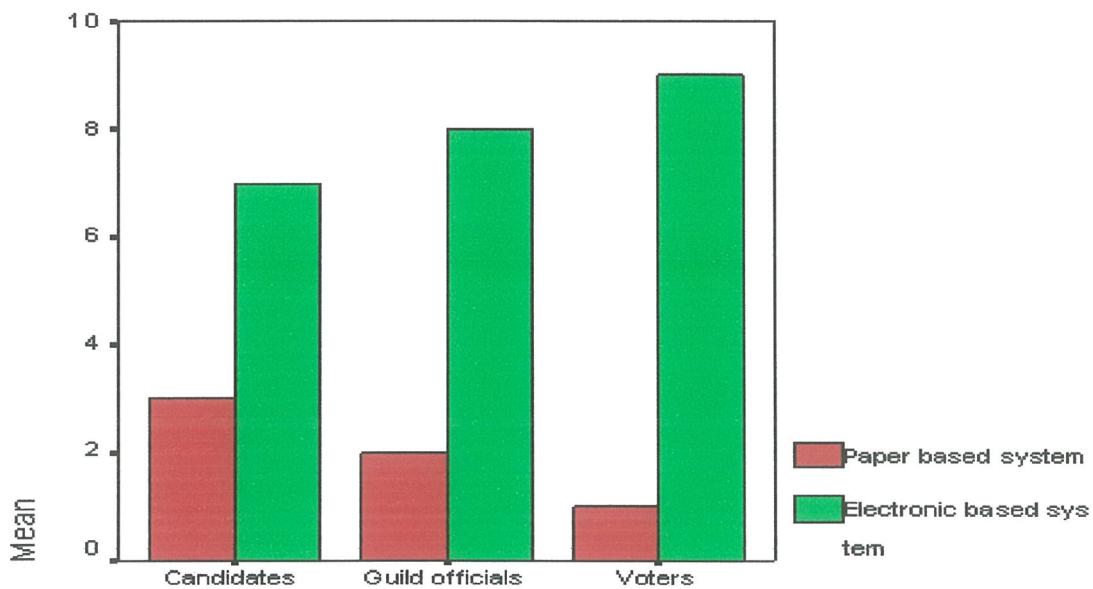
**Figure 4.2** graphical representations of respondents

From the findings represented above we can deduce that the eighty percent (80%) of the respondent are in support of a new voting system.

#### D: Choosing between electronic voting system and paper based system.

**Table 4.3:** table result of preference between paper based system and electronic based system

	Paper based system	Electronic based system
<b>Voters</b>	<b>1</b>	<b>9</b>
<b>Candidates</b>	<b>3</b>	<b>7</b>
<b>Guild officials</b>	<b>2</b>	<b>8</b>



**Figure 4.3 graphical representations of respondents**

From the findings represented above more than eighty percent (80%) were in support of the electronic based form of voting

## **CHAPTER FIVE**

### **SYSTEM ANALYSYS, DESIGN AND DEVELOMENT**

#### **5.0 Introduction**

This chapter discussed how the current voting system works. It also discussed the gaps researchers found with existing system. This chapter also presented the proposed system, its requirements and also advantages the proposed system over the current system.

#### **5.1 The current system**

The current voting system is paper based. With this system the voters register are collected from the individual faculties. at the time of the election which is conducted by the election board chosen by the current holders of the guild office, the voters are then to vote per faculty where each student will have to present any identification showing whether he/she is a bonafide voters, he/she is then given two ballot papers both for faculty member of parliament and presidential candidate. after the end of voting exercise which usually runs from as early as seven in the morning till six in the evening, the votes are then counted per faculty then the total for presidency from each faculty is summed together and the results announced by the head of the election board.

#### **5.1 Gaps realized with current voting system**

The gaps realized with the current voting system are:-

##### **5.1.2 Easy of manipulating voters register**

With the current system, voters registers is easy to manipulate in that this voters register is usually taken three days to the election, with it is not subjected to the scrutiny by the individual candidates, voters registers can easily be manipulated to induce non existent voters, this cast aspersion to the transparency of the whole exercise.

### **5.1.3 Easy of manipulating the election board**

The election board with current voting system is selected by the current guild official, this can be a loop hole in the voting in that current guild officials with vested interest can manipulate the whole exercise of choosing the election board putting those who can serve there purpose probably of rigging the election .

### **5.1.4 Manual counting of votes**

With the current voting system the votes are counted manually; this process is tedious, time consuming and prone to errors.

### **5.1.5 Delay of announcement of results**

Manual counting of votes take time in that with votes of more than sixty percent of the university; counting all this votes is a process which takes time and with the voting ending at six in the evening the votes counts take more than six hours to tally all the votes, this thereby takes the whole exercise till late at night hence its subject to manipulation.

## **5.2 New system**

### **5.2.1 New system design**

#### **5.2.1.1 System Architecture**

The architecture chosen for the system is three tiers. The first layer runs on the client side, the second layer at the middle layer and the third layer will be the database system. The system will run using web technology. This architecture provides greater application scalability, high flexibility, high efficiency, lower maintenance, and reusability of components. Since each tier runs on a separate machine, it improves systems performance. The system uses dynamic web technology, i.e., adding and retrieving data to and from the data store whenever requested is possible. It requires a client side program which is accessed by the Election officer, by the registrar, by the voter and also an interface that communicate with the external system. It needs server side functions that implement the functional requirements and the database system that stores data.

## **Client Tier**

The client side there are three kinds of users. The first user is the Election Officer. This person is responsible for adding critical data to the system, like candidates names and all the other details concerning the election. The final report indicating the results from the election is also generated by this person.

The second user of the system is the registrar. The role of this person is registering the eligible voters. The privilege to access the system is given by the Election Officer. The interface accessed by the registrar is web form.

The third user is the voter; the role of this voter is casting votes. The interface used by the voter is web form. As vote casting is processed at the polling stations, which are distant from the database server.

## **Middle Tier**

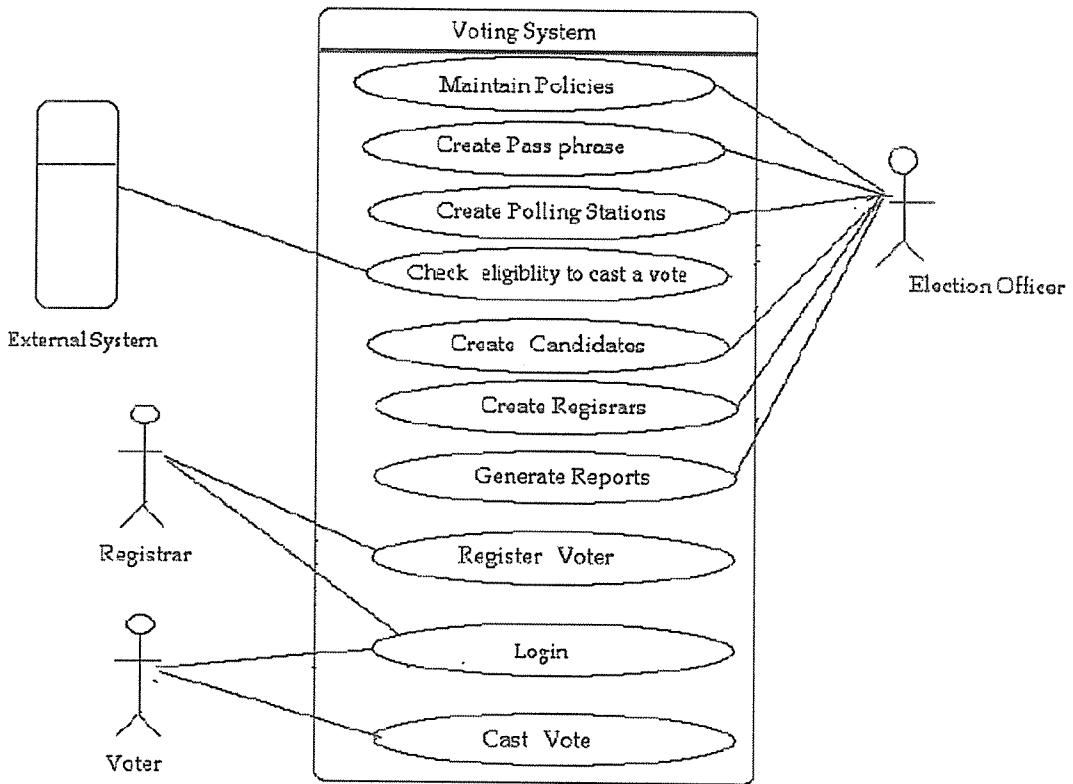
The middle tier contains the core part of the vote application, i.e., the web server. The web server handles all requests coming from the client machines. The requests are different with its type, for example; request for data insertion, request for report generation and others. It is also the web server which manages the responses that are forwarded to the client machines. When the data is submitted from the client machines, first it will be handled by the functions of the web server.

## **Data Tier**

The system uses three databases. The first database called student\_register is the one which stores information about the students. It stores student information such as first name, last name, registration number, year of study, username and pin that is used for identifying student as a voter.

The second database is the candidate\_register. It is here that all the information regarding the individual candidates will be stored. This database will interact with the student\_register database at the time of voting where the latter will be used to authenticate the voters.

The third database called admin which will be used to authenticate the election officer and registration officer.



**Figure 5.1: Diagram showing use case model of the system.**

### 5.2.1.2 Database design.

The process of database design generally consists of a number of steps which are not all necessary in all cases. To create the database, the researcher started by determining the data to be stored in the database. Then the researcher identified the relationships between the different data elements by looking out for the dependencies in the data that is where one piece of information is dependent upon another (when one piece of information changes, the other will also change). Using wamp5 (Apache Friends), the researcher created a three set of databases called admin, Candidate register and Student register together with there tables. Below shows the screen shot of the databases together with the respective tables

The screenshot shows the phpMyAdmin interface for a database named 'admin'. The left sidebar lists the database 'admin (2)' and its tables: 'election\_officer' and 'registration\_officer'. The main area displays a table of data for these two tables. The table has columns: Table, Action, Records, Type, Collation, and Size. The 'election\_officer' table has 1 record, while the 'registration\_officer' table also has 1 record. Both are InnoDB type with latin1\_swedish\_ci collation and a size of 16.0 KB. A summary row indicates 2 table(s) with a total of 2 records. Below the table, there are buttons for 'Check All / Uncheck All' and 'With selected:'. At the bottom of the page, there is a 'Create new table on database admin' form with fields for 'Name:' and 'Number of fields:', a 'Go' button, and a link to 'Open new phpMyAdmin window'.

Table	Action	Records	Type	Collation	Size
<input type="checkbox"/> election_officer		1	InnoDB	latin1_swedish_ci	16.0 KB
<input type="checkbox"/> registration_officer		1	InnoDB	latin1_swedish_ci	16.0 KB
<b>2 table(s)</b>	<b>Sum</b>	<b>2</b>	<b>InnoDB</b>	<b>latin1_swedish_ci</b>	<b>32.0 KB</b>

**Figure 5.2: database admin with tables**

The database admin contains two tables. The first table is called `election_officer` which is used to authenticate election officer and the second table is called `registration_officer` which is used to authenticate registration officer.

The screenshot shows the phpMyAdmin interface for the 'student\_register' database. The left sidebar lists the database structure with seven tables: access\_register, applied\_science, business\_register, computer\_register, education\_register, law\_register, and social\_science\_register. The main area displays a table of these seven tables, showing details like Action, Records, Type, and Collation. A summary row at the bottom indicates 7 table(s) with a sum of 15 records, all of type InnoDB and collation latin1\_swedish\_ci.

Table	Action	Records	Type	Collation
access_register		3	InnoDB	latin1_swedish_ci
applied_science		1	InnoDB	latin1_swedish_ci
business_register		1	InnoDB	latin1_swedish_ci
computer_register		3	InnoDB	latin1_swedish_ci
education_register		1	InnoDB	latin1_swedish_ci
law_register		1	InnoDB	latin1_swedish_ci
social_science_register		5	InnoDB	latin1_swedish_ci
<b>7 table(s)</b>	<b>Sum</b>	<b>15</b>	<b>InnoDB</b>	<b>latin1_swedish_ci</b>

Check All / Uncheck All    With selected:

[Print view](#) [Data Dictionary](#)

Create new table on database student\_register

**Figure 5.3 database student\_register with tables**

This database contains seven tables: access\_register, applied\_science, business\_register, computer\_register, education\_register, social\_science\_register. These tables are used in the registration of voters and can only be accessed by the registration officer.

The screenshot shows the phpMyAdmin interface for the 'candidate\_register' database. The left sidebar lists the database and its 14 tables. The main area displays a table of these 14 tables, each with columns for Action, Records, Type, and Collation. A summary row at the bottom indicates 14 table(s) with a total of 19 records.

Table	Action	Records	Type	Collation
access_mp	[Actions]	0	InnoDB	latin1_swedish_ci
access_president	[Actions]	0	InnoDB	latin1_swedish_ci
applied_science_mp	[Actions]	2	InnoDB	latin1_swedish_ci
applied_science_president	[Actions]	2	InnoDB	latin1_swedish_ci
business_mp	[Actions]	1	InnoDB	latin1_swedish_ci
business_president	[Actions]	1	InnoDB	latin1_swedish_ci
computer_mp	[Actions]	3	InnoDB	latin1_swedish_ci
computer_president	[Actions]	2	InnoDB	latin1_swedish_ci
education_mp	[Actions]	0	InnoDB	latin1_swedish_ci
education_president	[Actions]	0	InnoDB	latin1_swedish_ci
law_mp	[Actions]	3	InnoDB	latin1_swedish_ci
law_president	[Actions]	3	InnoDB	latin1_swedish_ci
social_science_mp	[Actions]	1	InnoDB	latin1_swedish_ci
social_science_president	[Actions]	1	InnoDB	latin1_swedish_ci
14 table(s)		Sum	19	InnoDB
<a href="#">Check All / Uncheck All</a>		With selected:		

**Figure 5.4: database candidate\_register with tables**

This database contains fourteen tables which are access\_mp, access\_president, applied\_science\_mp, applied\_science\_president, business\_mp, business\_president, computer\_mp, computer\_president, education\_mp, education\_president, law\_mp, law\_president, social\_science\_mp, social\_science\_president. These tables hold the result of the candidates during voting.

### 5.2.2 New system operation

The new system unlike the current voting system will be computer based. With this system, voters will be registered electronically, the voters coming with any form of identification such as school's identification card or green card the registration officer then register the student as a voter, this details are feed on to a database called student registration. This database has seven tables representing the different faculties. Before login on to the registration the registration officer himself has to provide the correct username and passwords.

The screen shots of the registration officer login form and the voters' registration forms are shown on the preceding pages

**Figure 5.5 Login form registration officer**



On opening the system, registration officer is presented with the above interface here the registration officer is presented with a login form where he has to present correct username and password from which he/she can be able to login to the system

**Figure 5.6 Registration form**



The image shows a registration form titled "REGISTRATION FORM FOR LAW" for the "KIU GUILD ELECTION". The form is set against a green background featuring the KIU logo and the slogan "EXPLORING THE HEIGHTS". The form consists of several input fields:

FIRST NAME	<input type="text"/>
LAST NAME	<input type="text"/>
REGISTRATION NUMBER	<input type="text"/>
FACULTY	<input type="text"/>
YEAR OF STUDY	<input type="text"/>
PIN	<input type="text"/>
USERNAME	<input type="text"/>

At the bottom of the form are two buttons: "Submit" and "Reset".

Above is a sample of a registration form for the faculty of law where a law student being registered has to fill with the help of registration officer

After the registration process is done the role of the registration officer ends there .when the actual voting day reaches it is the election officer who takes over the system. First registration officer has to be authenticated using correct username and password provided by the external system. The registration officer having provided the correct username and password is then taken to the voting interface. In this interface each voter will first choose the faculty he/she is in from which he will be faced with an authentication form where the voter has to provide correct username and password given during the time of election failure to which he/she won't be able to vote. on providing the correct username and password the voter is then presented with first guild presidential voting form followed by the faculty member of parliament.

The preceding diagrams shows election officer authentication form, voting interface, authentication form for voters and voting form for guild president and faculty member of parliament and a message screen after successfully voting

Figure 5.7 Login form election officer

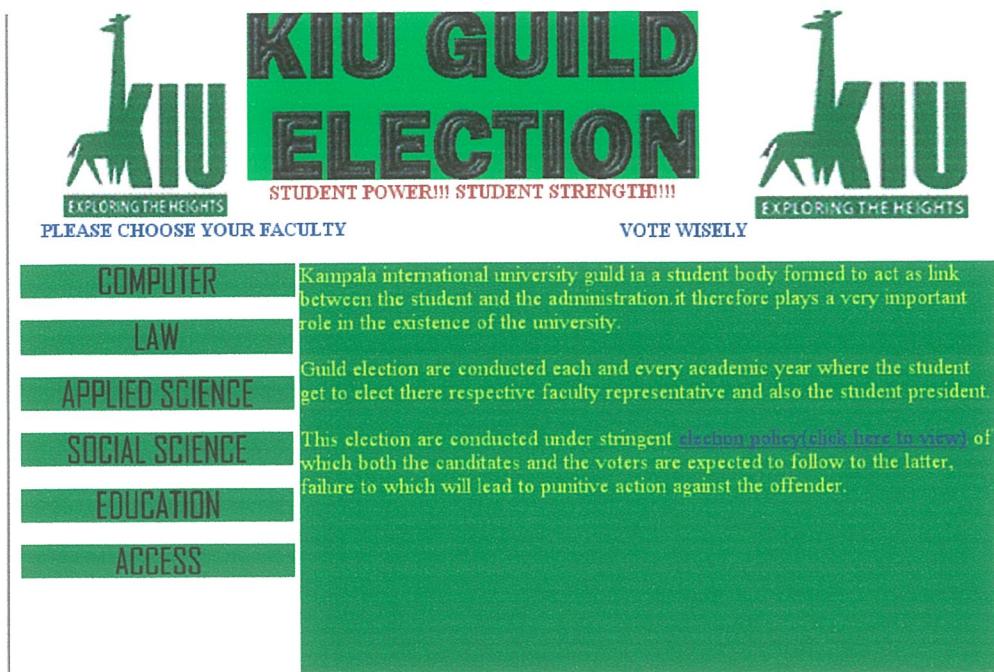


The image shows a web-based login form titled "KIU GUILD ELECTION LOGIN FORM". The background features the KIU logo with the tagline "EXPLORING THE HEIGHTS" and a green color scheme. The login form consists of two input fields: "USERNAME" and "PIN", each with its own input box. Below the PIN field are two buttons: "Submit" and "Reset".

USERNAME	<input type="text"/>
PIN	<input type="text"/>
<input type="button" value="Submit"/> <input type="button" value="Reset"/>	

This interface provides the login form for the election officer where he/she has to provide correct username and password failure to which he can not log into the system.

Figure 5.8 voting screen (homepage).



On successfully login in the election officer is presented with the above interface where the voters coming to vote will first have to choose the faculty he/she is in.

Figure 5.9 authentication form for voters



The image shows a login form for voters at the time of voting. The background is green with white text. At the top left is the KIU logo with the tagline "EXPLORING THE HEIGHTS". In the center, it says "KIU GUILD ELECTION". Below that, in a larger, stylized font, it says "Login form for applied science". The login form itself has two input fields: "USERNAME" and "PIN". Below the PIN field are two buttons: "Submit" and "Reset".

USERNAME	<input type="text"/>
PIN	<input type="text"/>
<input type="button" value="Submit"/> <input type="button" value="Reset"/>	

The above interface show a login form for voters at the time of voting where the voter has to be present correct username and password he/she used during registration failure to which he/she will not be allowed to vote.

Figure 5.10 voting form for presidential

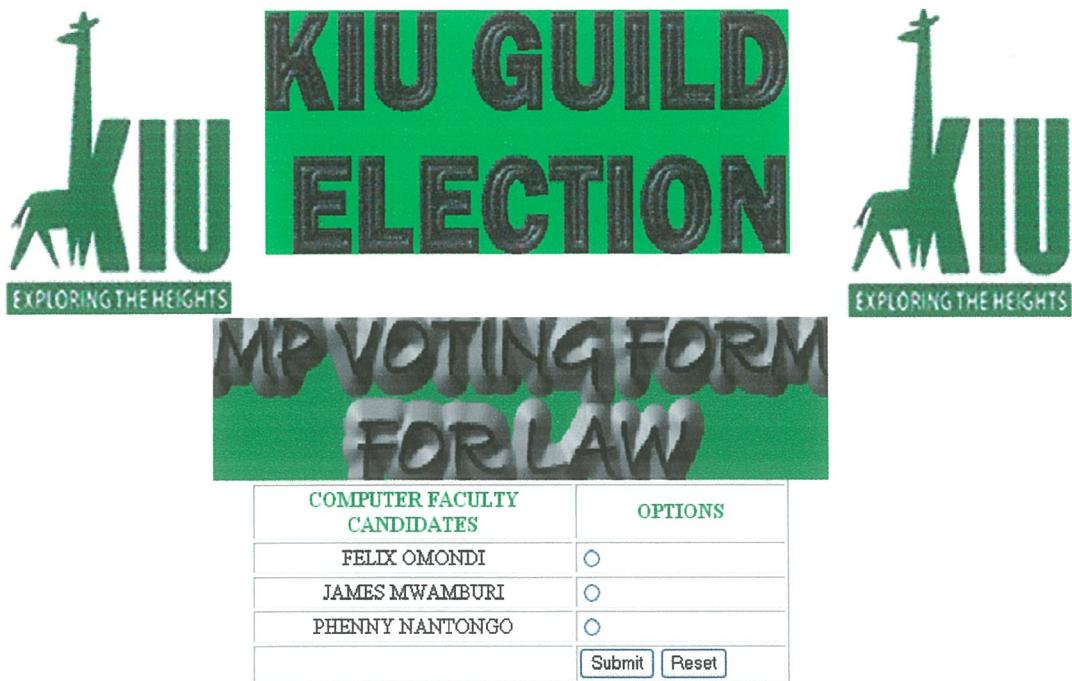


The image shows a voting interface for the KIU Guild Election. At the top, there is a green banner with the text "KIU GUILD ELECTION" in large, bold, black letters. Below the banner, there is a logo consisting of two stylized giraffes and the letters "KIU" in green, with the tagline "EXPLORING THE HEIGHTS" underneath. The main title "PRESIDENTIAL VOTING FORM FOR LAW" is displayed in large, bold, black letters. Below the title is a table with three rows, each representing a presidential candidate. The table has two columns: "PRESIDENTIAL CANDIDATES" and "OPTIONS". The candidates listed are ELIUD OMONDI, AKANKWASA MOSES, and KEVIN MUGANE. Each candidate has a corresponding row with a blue radio button in the "OPTIONS" column. At the bottom of the table are two buttons: "Submit" and "Reset".

PRESIDENTIAL CANDIDATES	OPTIONS
ELIUD OMONDI	<input type="radio"/>
AKANKWASA MOSES	<input type="radio"/>
KEVIN MUGANE	<input type="radio"/>

On successful voting in the voter is presented with the above interface where he/she has to vote for the short listed presidential candidates.

**Figure 5.11 Voting form for faculty MP**



The image shows a voting interface for the KIU Guild Election. At the top, there is a green banner with the text "KIU GUILD ELECTION" in large, bold, black letters. Below the banner, the text "MP VOTING FORM FOR LAW" is displayed in a stylized font. On the left side, there is a logo featuring a giraffe and the letters "KIU" with the tagline "EXPLORING THE HEIGHTS". On the right side, there is another logo featuring a giraffe and the letters "KIU" with the tagline "EXPLORING THE HEIGHTS". Below the banner, there is a table with the following data:

COMPUTER FACULTY CANDIDATES	OPTIONS
FELIX OMONDI	<input type="radio"/>
JAMES MWAMBURI	<input type="radio"/>
PHENNY NANTONGO	<input type="radio"/>

At the bottom of the table, there are two buttons: "Submit" and "Reset".

The interface on the previous page shows the faculty of computer Member of Parliament voting form here the voter clicks on the candidate that he/she is voting for after which he/she presses submit button.

**Figure 5.12 Voting form for faculty MP**

CONGRATULATION!!!!!!!!!!!!!!

YOU HAVE SUCCESSFUL VOTED

[PLEASE HERE TO GO TO HOME PAGE](#)

On successful voting the user is presented with the above interface congratulating him/her for successfully voting.

### **5.3 Strengths of the new system**

The new system has many advantages compared to the current system, these are:-

- The system provides for registration of voters which will be used to authenticate voters the time of voting this voter's register is accessible to anyone before the time of election thereby ensuring transparency of the whole exercise.
- The new system also offers a unique way of voting where again the voter has to give the correct username and password to be allowed to vote.
- The new system also has a security feature where both the election officer and registration officer have to be authenticated to ensure before carrying out their respective roles.
- The election results with proposed system will be announced much earlier than the current system which took more than six hours before the results were announced.
- With the electronic computation, minimal errors will be realized.
- Few personnel will be required to conduct the election; this ends up in reducing the cost of conducting the election.

### **5.4 The new system requirements**

The new system will have the following requirements.

#### **5.4.1 Hardware requirement**

The new system in order to run efficiently will require the following:-

Minimum of Pentium III workgroup computers with the following specifications:-

COMPONENT	SPECIFICATION
Processor	Pentium III, IV or higher
RAM	128MB
Hard Disk	40GB
Monitor	XVGA Resolution 800 x 600 17 inch

**Table 5.1: Hardware Requirement of the workgroup computers.**

The new system will require a computer which will serve as a server and should have the following specification:-

COMPONENT	SPECIFICATION
Processor	Dual core or higher
RAM	3GB
Hard Disk	RAID IMPLEMENTED 360GB
Monitor	XVGA Resolution 800 x 600 17 inch

**Table 5.2: Hardware Requirement of server**

#### **5.4.2 Software requirements**

The new system will have the following requirement:-

SOFTWARE	SPECIFICATION
Operating System	Windows XP service Pack 2, Windows 2000 RS,
Antivirus	Mcfee virus scan
Application Software	Wamp 5.0.1

**Table 5.3: Software Requirement of the new system**

#### **5.4.3 Security requirements**

The new system will require that every user that interacts with the system will be presented with appropriate authentication form that will require him/her to give correct username and password in order to be allowed to login in. this username and password are compared to the one initially provided if the they do not much one can not be able to proceed. This security feature prevents unauthorized individuals from accessing the system.

The will also be a guard stationed at the server room from which accessibility to the server will be given to no one at the time of the election.

## 5.5 New system implementation

Kampala International University School of Computer Studies was used as a case study of this project. The main objective of this project was to design, test and implement a robust and secure electronic voting system for Kampala international university. The project was implemented with MySQL database server which is the most popular open source database system and PHP programming language on a windows platform.

### 5.5.1 A sample code for Login Page

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">

<html xmlns="http://www.w3.org/1999/xhtml">

<head>

<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
<title>Untitled Document</title>

<style type="text/css">

<!--.style1 {color: #FF0000;
font-weight: bold;}--></style>

</head><body>

<table width="1039" border="0" cellpadding="0" cellspacing="0">
<!--DWLayoutTable-->

<tr> <td colspan="3" rowspan="2" valign="top"></td>
<td width="12" height="209">&ampnbsp</td>
<td width="404" valign="top"></td>
```

```

<td width="14">&nbsp;</td>
<td colspan="2" rowspan="2" valign="top"></td>
<td colspan="5" valign="top">
</tr> <tr>
<td height="253">&nbsp;</td>
<td colspan="6" valign="top"><form ACTION="/STUDENT_REG/index.php" id="login" name="login" method="POST">
<p>&nbsp;</p>
<p>&nbsp;</p>
<table width="490" border="1">
<tr>
<td width="237"><div align="center">USERNAME</div></td>
<td width="237"><label>
<input name="USERNAME" type="text" id="USERNAME" size="45" maxlength="45" />
</label></td>
</tr> <tr>
<td><div align="center">PIN</div></td>
<td><input name="PIN" type="password" id="PIN" size="45" maxlength="45" /></td>
</tr> <tr>
<td>&nbsp;</td>
<td><label>
<input type="submit" name="Submit" value="Submit" />
<input type="reset" name="Submit2" value="Reset" />
</tr> <tr>
<td height="288">&nbsp;</td>
<td>&nbsp;</td>

```

```
</tr></table>  
</body></html>
```

## 5.6 System changeover

Refers to time from the start to a running of the new system until the withdrawal of support from IT department except for maintenance purposes.

Implementation of this system involved change from manual to a new computer system hence need to change both required data and procedures thus the system is highly favored by direct changeover

The main tasks involved in changeover include: These tasks have been implemented whilst developing the database.

- **Data conversion:** The databases contain master files that support the new system.
- **File set up:** The files (tables) have been created in the database using MYSQL. These files have been tested for accuracy to reflect the original data (records).
- **Procedure conversion:** This involves the method of change over. This system should be implemented directly (direct changeover) since it's a complete replacement of the manual to computer system however it's most risky. It's recommended that it's used only when system testing has been exhaustive and users have complete confidence in the new system.
- **Control procedures.** The main reason for introducing new system is to improve system performance hence in this system new controls have been implemented to help improve system productivity.

### **Advantage of direct changeover**

- Quick and most complete.

### **Disadvantages of direct changeover**

- Insecure. No fall back system if the new system fails.
- Requires thorough preparations so that the conversion exercise is carried out when it will least inconvenience operations e.g. at night or weekend (Sunday).

## **5.7 Testing**

Testing involves verifying whether the whole system is operational in the correct way.

Three types of testing were applied:

**Program testing** (the analyst loads the program into the computer and tests its viability i.e. testing the logic of the program after coding). He makes sure that the system meets the user requirements.

**System testing** is where the new system is tested and verified that it is compatible both with the software and the hardware.

**Clerical testing** that involves making sure that the personnel's in the company are in a position to use the system. It also involves testing the interface of the new system.

## **CHAPTER SIX**

### **DISCUSSION, RECOMMENDATION AND CONCLUSION**

#### **6.0 Introduction**

This chapter presents the discussion, recommendation and conclusion in line with the study objectives and research question related to the studied topic of the online voting system.

#### **6.1 Discussion of the Findings.**

The discussions of the findings were presented in accordance with the research objective of the study.

##### **6.1.1 To investigate and analyze the current voting system used at Kampala International University**

The first objective of our research was to critically analyze how the voting exercise takes place, right from nomination of election board, registration of candidates and voters, the campaign period, the actual voting, announcement of results and post election.

This study revealed a lot of loop holes in the current voting system for instance from the questionnaires we administered to the voters eighty percent (80%) were dissatisfied with how the election was being conducted stating that long queues during election time, student being send away at the actual voting day, delay in announcement of the results. the candidates generally questioned the transparency of the whole process citing massive irregularities in the nomination of the election board, voters buying during election day, massive rigging of election in favour of one of the candidates.

The researchers also made an observation that the current voting system is slow hence lot of queues are realized at the time of election, this locks out some voters. The researcher also observed that the counting process is marred with a lot of confusion and it takes an average of six hours to count, tally all the votes and announce the results.

#### **6.1.2 To investigate and analyze the causes of voting fraud that emerge from using traditional paper based voting system**

The researchers other objective was to investigate the causes of fraud that emerge from using the traditional paper based voting system. The researchers critically analyzed the voting process and made the observation that the boxes used to voting are not transparent for one to actuate that indeed they are empty before the beginning of the voting process. The researcher also observed the counting process is chaotic giving gap for vote stashing to take place.

The researchers also administered questionnaires on the voters asking them which area of the electoral process they think that it susceptible to fraud, seventy percent (70%) of the respondent cited the voting where they went further to state that it very is easy for a voter to stash more than one vote at the ballot box since also the ballot papers can easily be made, the other thirty percent (30%) of the respondent cited the voting counting process.

#### **6.1.3 To design and model a secure and a robust online voting system for Kampala international university**

The researchers other objective was to design and model a secure and a robust online voting system for Kampala international university.

the researchers were guided by the weaknesses of the current system hence the researchers were able to come up with a system that was not paper based which with questionnaire administered to the respondent asking them to chose between electronic voting system and paper based system, eighty percent (80%) of the respondent preferred electronic based voting system with the remaining twenty percent (20%) going for paper. this finding necessitated the researcher to model and design an electronic voting system.

### **6.2 Recommendation**

We recommended before the application is put into full use, it should be tested in sample field to eliminate any bugs that may not have been identified at the time of development password levels may be increased to higher levels depending on the confidentiality of the stored data. The current system password is basically low level. If opportunity allows we hope that the features that have

not been implemented in this application but were originally desired features will be implemented in order on the efficiency, reliability, and user friendliness.

### **6.3 Conclusion**

From the findings realized from both the questionnaire administered and the observations made by the researchers, paper based system of voting had a lot loopholes right from the nomination of election board to the conclusion of the whole election exercise. This therefore cast aspersions to the nobility of the goals that this exercise is to achieve which is to fairly unite and represent students' views to the administration hence competence is needed on the elected candidates. The students though will feel not adequately represented if wrong people assume office.

With the above stated facts it is prudent to say that the guild election should be conducted in a manner that befits it. It should be made as transparent as possible where the whole exercise should be taken away from human hands (which is prone to errors and biasness) right from the registration to actual voting counting process, this can only be realized using an electronic system of voting. This if implemented properly will see rise in voters' turnout and also results that are devoid of anomalies will be achievable.

## BIBLIOGRAPHY

1. DATE, C.J (2000) *"An Introduction To Database Systems"* \_Seventh Edition Thomson Press, New Delhi
2. *Business Information Systems 11th International Conference*, BIS 2008, Innsbruck, Austria, May 5-7, 2008. Proceedings
3. CS French (1992), "Computer Science Fourth Edition", DP publications L.T.D Guernsey
4. Downes, Green, Mairlot (2003) "*Dreamweaver MX-PHP Web Developmen*"t, New York
5. Sarah .E. Hutchinson and Stacey.C.Sawyer (2000), "Computers, Communications And Information Seventh Edition", Irwin Me \_Graw, New York
6. Chen, P. P. and Zvieli, A., "Entity-Relationship Modeling of Fuzzy Data," *Proceedings of 2nd International Conference on Data Engineering*, Los Angeles, February 1986, pp. 320-327
7. Delaney, Kalen, et al (2007) "Inside SQL Server 2005: *Query Tuning and Optimization*". Microsoft Press
9. James Martin, (1976). "*Principals of database management*", Prentice Hall of India Private LTD, Delhi
10. J. Carroll, Wiley, (1995) "*Scenario-Based Design.*" New York, NY
11. Dittman et. al, 2001. "*Systems Analysis and Design Methods*", Irwin /McGraw-Hill; 5<sup>th</sup> Edition, New York
12. Jeffrey, Lonnie and Kelvin, (2000)." *System Analysis And Design Methods*".\_Fifth Edition, Irwin Mc Graw\_Hill , New York

## **APPENDICES**

### **Appendix A: Questionnaire Guide**

The researchers are in Kampala International University, faculty of computer studies. The researchers are conducting research on the voting system of Kampala international university

The case study is Kampala International University main campus. The purpose of the study is to fulfill the researchers' academic requirements. Therefore, the researchers kindly request you to answer the following questions.

**NOTE:** Your response will be treated with the highest degree of confidentiality.

#### **Background / personal information**

Name.....

Age.....

Sex .....

Year of study (if a student).....

Faculty (if a student).....

#### **Tick the answer of your choice**

##### **Question 1:**

How do you rate the level of transparency in the electoral process?

GOOD

MEDIUM

BAD

**Question 2:**

Do you have access to the voters register prior to voting?

- YES       NO       DON'T KNOW

**Question 3:**

Would you support a change to a new voting system?

- YES       NO

**Question 4:**

If you were told to choose between electronic voting system and paper based system which one will you prefer?

- ELECTRONIC SYSTEM       PAPER BASED SYSTEM

## Appendix B: Sample Codes

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"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">

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<!--
.style1 {
    color: #FF0000;
    font-weight: bold;
}
.style2 {
    color: #0000FF;
    font-weight: bold;
}
.style3 {
    font-size: 18px;
    color: #FFFF00;
}
.style4 {
    color: #0000CC;
    font-weight: bold;
}
-->
</style>
```

```

</head>
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<td width="5" height="176"></td>
<td colspan="3" valign="top"></td>
<td width="14">&nbsp;</td>
<td colspan="2" rowspan="3" valign="top"></td>
</tr>
<tr>
<td height="16"></td>
<td width="54"></td>
<td width="89"></td>
<td width="409"></td>
<td></td>
</tr>
<tr>
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<td colspan="3" valign="top"><div align="center"><span class="style1">STUDENT POWER!!! STUDENT STRENGTH!!!! </span></div></td>
<td></td>
</tr>
<tr>
<td width="229" height="17"></td>
<td width="14"></td>

```

```
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td width="194"></td>
<td width="16"></td>
</tr>
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class="style2">PLEASE CHOOSE YOUR FACULTY </span></div></td>
<td>&nbsp;</td>
<td valign="top"><div align="center" class="style4">VOTE WISELY </div></td>
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</tr>
<tr>
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```

```
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bgcolor="#009900"></embed>

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<p>&nbsp;</p>

<p>&nbsp;</p>

<p>&nbsp;</p> <p>&nbsp; </p></td>

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<td colspan="7" valign="top" bgcolor="#009900"><p class="style3">Kampala international university guild ia a student body formed to act as link between the student and the administration.it therefore plays a very important role in the existence of the university.</p>

<p class="style3">Guild election are conducted each and every academic year where the student get to elect there respective faculty representative and also the student president.</p>

<p class="style3">This election are conducted under stringent <a href="electionpolicy.pdf">election policy(click here to view)</a> of which both the candidates and the voters are expected to follow to the latter, failure to which will lead to punitive action against the offender. </p></td>

<td>&nbsp;</td>

</tr>

<tr>

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</tr>
</table>
</body>
</html>
```

## **Appendix C: budget**

<b>ITEM</b>	<b>COST</b>
Transport	75,000
Communication (Airtime)	65,000
Stationary	20,000
Internet Surfing	75,000
Miscellaneous	100,000
<b>Total</b>	<b>335,000/=</b>

