DESIGN AND IMPLEMENTATION OF A SCHOOL INFORMATION MANAGEMENT SYSTEM.

A CASE OF KITAGATA SECONDARY SCHOOL.

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DECLARATION

We , **Tushabire Adah and Nahamya Joseph Stuart** declare to the best of our knowledge that this research report is our own work as a product of our commitment and that it has never been submitted to any academic institution for any academic award.

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Date ....9th oct 2010.....

APPROVAL

This project has been written and submitted to the school of computer studies for examination under my supervision as the university supervisor.

……

KASUUBO ESTHER.

Date……09/08/2020……

DEDICATION

This work is dedicated to all those who supported us both financially and economically.

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LIST OF ACRONYMS

KSS.	Kitagata secondary school
CASE.	Computer Aided software engineering
DBMS	Database management system
SDLC	System development life cycle
DFD	Data flow diagram
UPSs	Uninterruptible power supplies
MDI	Modified data interface
E-R diagram	Entity relational diagram
WWW	World wide web

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Abstract.

The availability of data and information is an important aspect and resource for all the details concerning certain entity or subjects when required. Therefore it is important that the resource is stored and easily retrieved for consumption when ever required in its correctness, consistency, and reliability. This project was directed towards designing and implementing a shared data management system that is capable of enabling data accessibility and sharing of resources in order to reduce the cost of operation of kitagata secondary school.

It is also intended to provide the relevant security measures so that all the unauthorized and unauthenticated users are denied access to the precious data and information concerning the school (K.S.S).

CHAPTER ONE

1.0 General Introduction

1.1 Background

Kitagata secondary school (K.S.S.) is a school that started its operation in the year of 1980 with a population of about fourty to fifty (40-50) students in four classes of senior one, senior two, senior three and senior four and now its estimated to be around seventy hundred fifty (750) Students. The school started with only O' level that is ordinary level of only senior one to senior four. Kitagata secondary school was under the management of Reverend Asiimwe who was the headmaster since the school was church founded in Kitagata in Sheema southern part of Bushenyi district in western Uganda.

Kitagata secondary school has four departments that is; Academics, Accounts, Students affairs, and the Administration. It operates a paper based system for its data storage and thus it is prone to high cost of operation, data redundancy, insecurity etc.

This research project is based on problems associated with the traditional way of keeping, manipulating and sharing data. Traditional systems come with a lot of problems. Such problems include; data redundancy, high cost of operation, data insecurity and others.

1.2 Statement of the problem.

In most organizations and schools like Kitagata Secondary School inclusive, for which work appears to be of increasing complexity and uncertainty, the crucial task for organizations is to improve data storage and customer satisfaction by provision of high quality data and service in the most reliable way. In Kitagata senior secondary school, there are reports of poor storage of data, lack of data integrity, high cost of data maintenance, and higher rate of data redundancy, reduced data quality and poor data management policies. The cause of this situation has not been exposed, which makes the current study a necessity. Based on problem stated, the purpose of the study is to evaluate the effect of implementing a data management system in Kitagata Senior Secondary School in Bushenyi district.

1.3 Objectives

1.3.1 Main objective

The main objective of this study was to develop and implement a data management system to enable data accessibility and sharing of resources in order to reduce the cost of operation.

1.3.2 Specific objectives

i. To investigate the cause of data insecurity design at Kitagata Senior Secondary School.
ii. To design and develop a shared data management system and maintain data integrity of Kitagata secondary school.
iii. To implement and reduce on data redundancy and cost on data storage of Kitagata secondary school

1.4 Research Questions

i. How can the cause of data insecurity be investigated at Kitagata Secondary School?
ii. How can a shared data management system be developed and designed on data integrity at Kitagata Secondary School?
iii. How can data redundancy and cost of storage be reduced at Kitagata Secondary School?

1.5 Scope of study

1.5.1 Geographical scope

Kitagata Secondary School is found in southwestern part of Uganda, in Bushenyi distict,its about 2km from Bushenyi town. It is located near Kitagata town which joins all the roads from Ishaka to kabale through Ntungamo and Kabwohe to Rukungiri. Kitagata secondary school is also located near Kitagata hot springs which is found along Ntungamo road.

1.5.2 Research scope

The scope of study confined it self on how to develop and implement a sharable database system for Kitagata Secondary School. It further covered the technology required to access the database via a local network. The study was carried out in the departments of Accounts

where the bursar availed the necessary information from students as pertaining their payments, administration where their director and head master gave the strategic future plans about the school, to enable the system work for long, and information on whether the school can support such project. From the department of education, the director of studies gave information about admission requirements, subjects offered, and how the report cards must look like. Finally, the director of students provided information about the different students at the school. Such data included; whether the school had day and boarding students, students with special needs, games played, places of birth, age, religion and any other important information. Lastly, accompanying information was collected from the other staff member using a sample of fifteen out of twenty six (16/26) and at least ten students chosen randomly from each class, with the aim of studying whether the students felt inconvenienced by the current system.

1.6 Significances

After the project was completed, the departments were able to share information from more efficiently, the cost of operation was reduced hence more profits, at the end of the study, the school was in position to produce high quality document say report cards from a printer and no longer a type writer, a lot of time was saved, and the data integrity achieved fast data accessibility was achieved at the end of the study, students were more efficiently served at the end of the project.

1.7 Conceptual frame work

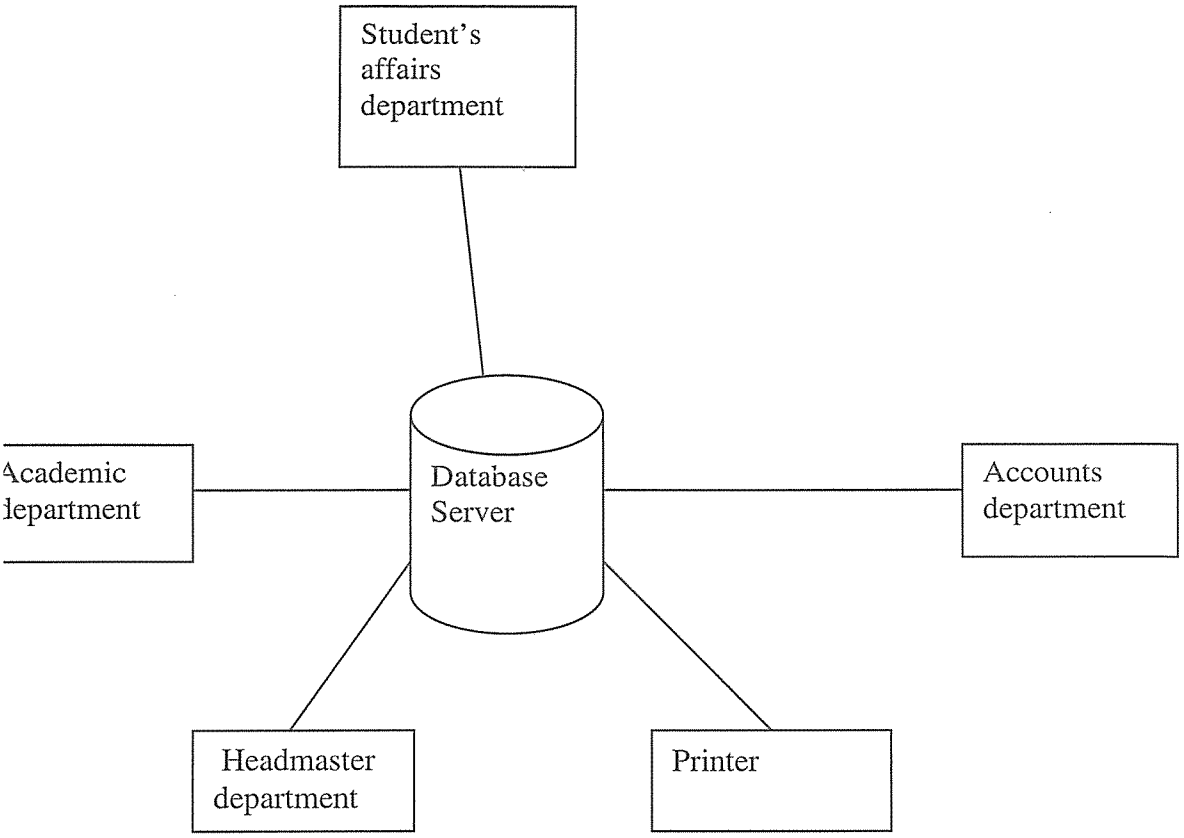


Figure 1the conceptual flame work

The diagram above shows an abstract view of the project under study. All the four different departments will have six different interfaces with one for the headmaster, accounts, department of students' affairs, and academics departments with each interface having password. And information will be got from the database server. A network printer will be connected onto the server computer (database server computer) to assume that all documents being printed are approved and authorized by the database administrator.

CHAPTER TWO.

Literature Review.

2.0 Introduction.

The aim of this chapter was to explore the in depth of the concept of a shared computer based database system. The purpose was to find out and suggest procedures that were recommended to build and operate such a system. This information was mainly extracted from published database system books, internet and previously published journals and dissertations for example (long, 1989), Hutchinson, 2000).

2.1 Scope

The literature about the system that was developed duel so much on information system that makes use of databases. Knowledge from the books about how to send and operate networks and in particular Ethernet cabled LANS. The review has put into consideration related systems that have previously been developed. It digs deep into how databases can be designed, how an interface can be created, and how such system can be put into use and maintained. It also covered problems anticipated and how they could be troubleshot.

It further looked at how the client/server network could be set up and the technology that could be used to share the different resources. It also covered the kind of computers and other devices that were reliably used in setting up a network that enabled sharing of the database. It suggested the different areas where such a system was applied and the problems that such a system cable used to solve. The review further tackled the different techniques that is Interview, Questionnaires and Document analysis that were used in collection of data, how to analyze the data, how to develop the system itself suggested various methodologies and tools that were used (Laudon, 2002).

Finally it looked at different development tools such as different operating systems, programming languages, DBMS, servers etc.

2.2 Data management system.

According to Long (1989), data management, encompasses the storage, retrieval, and manipulation of data. Many existing information systems were designed using traditional approaches to data management but the trend has shifted to the use of database approach to develop new information systems. The database is the resource for all computer based information systems. A database "is a collection of files that are in some way logically related so that data redundancy is minimized".

2.2.1 Benefits of Database environment.

According to James Martin, (1983), greater access to information the structure of an integrated database provides enormous flexibility in the type of reports that were generated and the type of online inquiries that were made. Better control; a database management system allowed data to be centralized for improved data security. By centralizing data, advanced data structure was used to control redundancy. Data structures, "refers to the manner in which the data elements and records are related to each other". More efficient software development and programming techniques are more easily available and data are independent of the application programmers.

2.2.2 Approach to Database management.

According to Long, (2002), there are three fundamental approaches to design database system namely; Hierarchical approach, Network DBMS approach and, the relational DBMS approach. Hierarchical DBMS approach; although network and relational DBMS technologies are considered superior to the hierarchical DBMS technology, the hierarchical approach remained the most commonly used. This was more as a result of momentum than choice. Information management system a hierarchical product was by 1968 the game on shelves and this made it become more popular. It can be run on today's hardware. It does not have the scope of features of more sophisticated network and relational DBMS.

Nevertheless, all the new developments in the area of database management system use network or relational technologies. Hierarchical DBMS was based on three structures, actually an uprooted tree turned upside down. They were easy to understand and conceptualize

Network or CODASYL DBMS

According to Long,(2002), this approach to database management systems has been gaining momentum through the 1980's in contrast, to the network DBMS, here data was accessed by content rather than by address. This approach used the computer to search the database for the desired data rather than accessing data through a series of indices and physical addresses, as with both hierarchical and network DBMS. Here the data structure was defined in logical rather than physical attempts. Until recently; relational DBMS out perform network DBMS because "relational structure provides greater flexibility in accessing information". And provide companies with greater opportunities to increaser productivity.

2.3 Advantages of using computer databases.

According to Williams, Sawyer, and Hutchinson, the following are the advantages of using computer databases.

Reduced data redundancy: In file management systems, some of the same data files were repeated in different files; by contrast the information appeared just once but information was made available to different users moreover co-currently and this lowered down the expenses of space.

Improved data integrity: Reduced redundancy increased the chances of data integrity.

Data that is accurate, consistent, and up to date because each updating change was made in only one place.

More programs independent: With database, the program and the file formats are the same, so that one programmer or even several of them can spend less time maintaining files.

Increased user productivity: Database management systems are fairly easy to use, so that users get their requests for information answered without having to resort to technical manipulations.

Increased security: Although various departments may share data in common in access to specific data information can be limited to selected files. Thus, through the use of passwords, a student's financial, medical, and grade information in a school is made available only to those who have a legitimate need to know.

Disadvantages;

Cost issues; installing and maintaining a database is expensive particularly in a large organization.

Data vulnerability issues. Although a database can be restricted access, its always possible unauthorized users will get passed the safe guards.

Privacy issue: a database may hold unsanctioned information that may be used for unintended purposes this puts peoples lives at risk. (Hutchinson and Sawyer, 2000)

2.4 Accuracy and completeness of data.

According to Williams, Sawyer, Hutchinson, (2000), Databases including public databases such as nexis, lexis, dialog, and dow jones News/Retrieval can provide you with more facts and faster facts but not always better facts.

Penny wiliams, professor of broadcast journalist at Buffallo state collage in NEW York and formally a television achor and reporter, suggests there are five limitations to beat in mind when databases for research. And these are; you can't get the whole story. For some purposes, databases are only a foot in the door, it's not the gospel just because you see some thing on the computer screen it does not mean that all is accurate. Numbers, names, and facts may need to be verified in other ways, know the boundaries: once database does not have it all, find the right words: you have to know which key words to use when searching a database for data.

History is limited: most public databases, Davis says, have information going back to 1980, and a few into the 1970s, but have information earlier.

2.4.1 Analysis and design.

According to Williams, Sawyer, Hutchinson, (2000), once data is gathered, the researcher needs to come to grips with it and analyze it. Many analytical tools or modeling tools are available. Modeling tools enable the analyst to come up with pictorial representation of the system. Examples are CASE tools, dataflow diagrams, flow charts, connectivity diagrams, grid charts, decision tables and others.

CASE tools: (computer aided software engineering) is a software program that automate many activities in the SDLC and are also used to analyze various aspect of the system.

2.4.1.1 Data flow diagrams: a data flow diagram also known as process model, graphically shows the flow of data through a system that is, the essential process of a system along with in puts, outputs, and files. (Hutchinson, 2000)

2.4.1.2 System flow charts also called the **system flow diagrams**. A system flow chart diagram shows the major inputs, outputs, and processes of a system. In some cases a system flowchart can be used in place of DFD (data flow diagram); in other cases it is useful to supplement. (Hutchinson, 2000)

2.4.1.3 Grid charts; this shows the relation ship between data on input and data on out put documents. (Williams, Sawyer, Hutchinson, (2000)),

2.4.1.4 Decision tables; this shows the decision rules that apply when a certain conditions occur and what actions to take. That is, it provides a model of a simple structured decision-making process. It shows which conditions must occur in order for particular actions to occur. (Williams, Sawyer, Hutchinson, 3rd edition)

2.5 Data dictionary.

According to Williams, (2000), a data dictionary system is a system that stores, maintains, and reports on the contents of the firm's data dictionary. It is a set of programs to manage the data dictionary capacity. The data dictionary system provides information both to the users of the data base environment and to the database environment it self. A data dictionary system may be annual system or a computer based system. Data dictionary content; the data dictionary is capable of storing a wide variety of documentation about the firm's data but also the process acting on the data and the environment in which data exists.

Data

- Field
- Group
- Record
- File
- File relationship
- User views
- Database

Processes

- Program
- Report
- Screen
- Transaction
- Job

Environment

- System
- Department (people)
- Terminal
- Communication line
- Disk storage
- Processor
- Operating system.

Data dictionary field entities. According to Williams, Sawyer, Hutchinison,(3rd edition), the data it self is documented from the field level of database level. For each level the data dictionary entities and the relationship between entities at the level are defined. In addition a large number of relationships must be documented for the field. Data dictionary report entities are great deals of information that must be stored in the data in data dictionary for each field. Fields are just one of the entities that are documented in the data dictionary. Maintenance of data dictionary information; for each of the other entities and for each entity's relationship to the other entities, the data dictionary would contain information that is relevant and important. A considerable a mount of information has to be entered into the data dictionary. Too much it may seem, however, all this information and more must be collected during the development and maintenance life time of an information system. Storing all documentation in the automated data dictionary rather than in written documents means that the documentation of an information system can be more easily and more accurately maintained.

According to Admaski, Pratt,(1991), data dictionaries can be categorized into number of ways, first, a data dictionary that is free-standing runs independent of a specific DBMS. This type is sometimes also called an independent or stand-alone data dictionary. Most data dictionaries are not free standing rather; they are integrated (sometimes called dependent data dictionaries run only in conjunction with specific DBMS products). The trend is towards t integrated data dictionary, many data base management systems have one. However, most integrated data dictionaries do not handle all the items. Fields and files are usually documented but not to the extent.

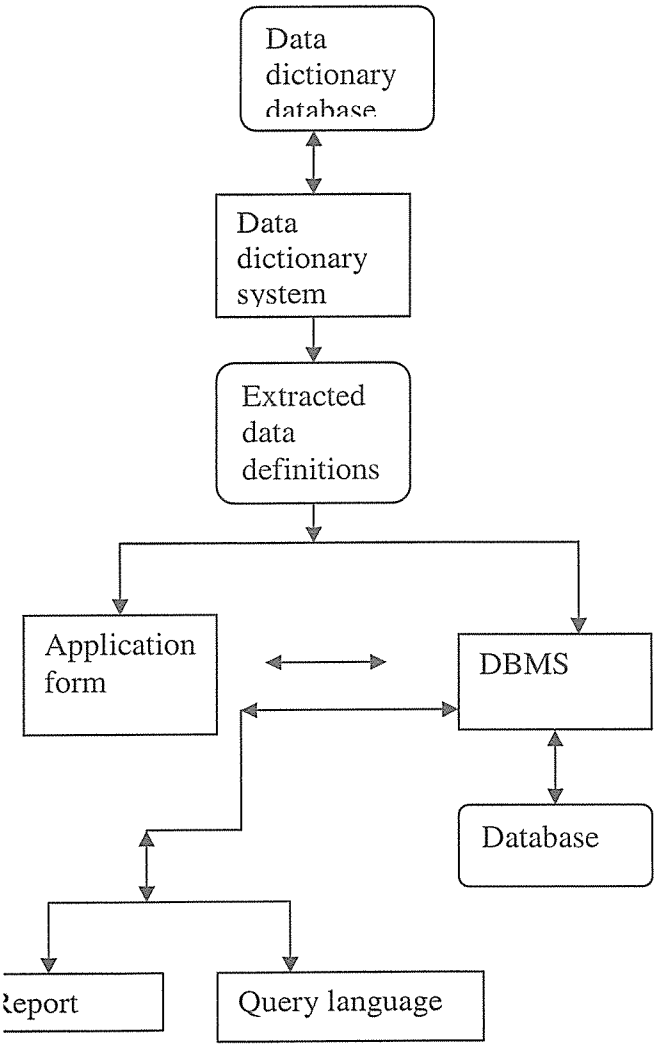
Another way of categorizing data dictionaries is to distinguish between the active data dictionary and passive data dictionary. Active data dictionary is simply a documentation tool for users of the environment. Information can be entered and maintained then reported in a variety of ways. There is no interaction between the data dictionary and other environmental components such as programs and the data base.

According to Adamski,(1991), data dictionary systems typically support a number of functions, the most common functions described are; entry and maintenance, control and management, reporting and software environment. Entry and maintenance; a data dictionary system must allow for the entry and maintenance of entities and their

characteristics. This capacity is implemented in some systems with a key word language trough batch processed programs.

Control and management; a data dictionary integrated with DBMS most often has its data structured as part of the database. However, the normal authorization and recovery services of the DBMS are used to protect the data dictionary against unauthorized update and access and to recover the data in the event damage. Reporting; the data dictionary system must also be able to provide a wide range of reports to the users of the environment. These users represent a wide a cross section of the firm .they include members of the database administration groups, programmers, analysts, designers, and others within the information systems department, users auditors. Each user group requires reports that address their particular view point and informational need. Software environment interaction; while working with passive data dictionary, entities made to the data dictionary do not cascade the other software components in the environment, also entities made to the other software components have no effect on data dictionary. This means that the field level documentation placed in the data dictionary also must be directly entered into the program and database DDL in an appropriate form.

Figure2Interface between the data dictionary and other software components accuring prior to execution.



CHAPTER THREE

METHODOLOGY.

3.0 Introduction.

This chapter is giving the methodology that the researcher used in coming up with the proposed system. It covered the following key areas of the project development organization unit that were studied, study population, sample size, research instruments, data collection, and presentation, data analysis and analysis of user requirements, development of the system, design techniques and tools for the system, development tools for the system, information system plan, and the limitations of the study and contingency measures that were used.

3.1 Research design.

The researchers used purposeful methods to select respondents who were able to give reliable and accurate information by virtual of the positions they held in the target population. The approach that was used was quantitative approach where the following was suggested; In each of the departments, a total of five including the department head and other deputies were interviewed with the purpose of getting the kind of information that was used in their respective departments. Ten students from each class were given questionnaires to know the kind of information that was usually acquired from them. The techniques that were used are as follows; in a group of five students, the group members voted one of them who acted on their behalf. Finally from the rest of the staff members, a total of fifteen selected randomly were both interviewed and questioned using closed ended questionnaires. The cashier further suggested how their information could be kept free from hackers and he also provided necessary financial documents to be analyzed.

3.2 Area of research.

The organization studied was Kitagata senior secondary school, a government owned secondary school found in Bushenyi district (Uganda). This school was chosen because its size has grown very fast and the file based system that is currently used has become inefficient. That is why we chose to come with a more efficient database system. The database was required to store, manipulate information, and provide means for retrieval. It

was further required to print out financial report such as receipts, report card, and students and staff members whereabouts and others. The key areas that were studied include the administration, accounts, academic affairs, and student's welfare, and the reports that the school prints.

3.3 Target population

The population that was studied included; Administration: The director of the school, head master, and the assistants. A total of four people were studied. Information requirements included; the growth rate, future plans about the school and other expectations. More information was further collected from the accounts department; the bursar and any other two members from the same department .The information needed included; amount of fees structure, the maximum number of installments, and the means of payment whether in the bank or direct to the cashier and any other valuable data. The academic department: The dean, his/her deputy, and any other three from the same department. Information of interest was data about students, the format of reports and any other documents produced in that department. The students were also interviewed to get supplementary information about the school and what they expected of the school.

3.4 Research procedure.

Prior to the study, a letter was submitted to the target organization or school requesting for permission to carry out his or her study. That letter required an accompaniment letter from the relevant authority possibly from the faculty that shown the organization the urgency of the study. The researcher telephoned to inquire for or physically move to the organization to find out whether the request was accepted. After the request was accepted, the researcher was at the venue for at least two days studying the way things were done and became familiar with the organizations activities and determined which data collection methods worked best in the different departments. Different techniques as she/he were applied to get the information required. Finally after he collected, depending on the format of the data, a data analysis technique was applied to analyze the data.

3.5 Sampling techniques.

The study was carried out in the departments of Accounts where the bursar availed the necessary information from students as pertaining their payments, administration where their director and head master gave the strategic future plans about the school, to enable the system work for long, and information on whether the school can support such project. From the department of education, the director of studies gave information about admission requirements, subjects offered, and how the report cards must look like. Finally, the director of students provided information about the different students at the school. Such data included; whether the school had day and boarding students, students with special needs, games played, places of birth, age, religion and any other important information. Lastly, accompanying information was collected from the other staff member using a sample of fifteen out of twenty six (16/26) and at least ten students chosen randomly from each class, with the aim of studying whether the students felt inconvenienced by the current system.

3.6 Sample size.

In each of the departments, a total of five including the department head and other deputies were interviewed with the purpose of getting the kind of information that was used in their respective departments. Ten students from each class were given questionnaires to know the kind of information that was usually acquired from them. The techniques that were used are as follows; in a group of five students, the group members voted one of them who acted on their behalf. Finally from the rest of the staff members, a total of fifteen selected randomly were both interviewed and questioned using closed ended questionnaires. The cashier further suggested how their information could be kept free from hackers and he also provided necessary financial documents to be analyzed.

3.7 Data collection techniques

3.7.1 Research instruments

3.7.1.1 Interview

"An interview is an oral administration of questionnaire or an interview schedule", (Olive and Abel, 1999). Interviews are to face encounters. To obtain accurate information through

interviews, a researcher needs to obtain maximum cooperation from respondents. Thus, one must establish a friendly relationship prior to conducting an interview.

3.7.1.2 Questionnaires

Questionnaires are commonly used to obtain important information bout the population. Each item in the questionnaire is developed to address specific objective. And therefore, a questionnaire must be well thought of so as to avoid cases such as; confusing respondents as to the nature of information required. Also a bad questionnaire discourages respondents to the extent of discarding the questionnaire and this may leave out important information required in the study.

3.7.1.3 Document analysis review

The first documents the analysts seek out were the organization's chart that enabled him study and understand flow of authority and information. The analyst further reached document that described the problem at hand such documents included; documentation of the current system, constitution, enrolment records, accounting records, brochures showing fees structures and any other relevant reports. Data was gathered from the above sample. The fact that the sample size was not large, interview and questionnaire techniques were used interchangeably for administrators from all the departments. From the dean of academic affairs, interview and the document analysis was used, with document analysis aimed at looking at the end of the reports that are given to the students at the end of the term. The secretaries and office messengers were observed in order to determine the flow of information among the different departments in the organization and where the researcher did not understand, questions were asked but the researcher kept interview method at a maximum since they would give wrong information on the basis that the system aimed at making them loose their jobs. Questionnaires were used for getting data from students. Finally, physical measures were broken to determine the distance from one office to another that enabled us estimate the cables and other devices to be used while setting up a net work.

3.8 Development tools.

The system under the study was developed and used on any of the following operating system; windows Xp, windows 2003 (SP1, SP2, SP3). Windows Vista and Windows 2007. Microsoft access was used as the DBMS that is the database was created using Microsoft access. The database had a visual basic 6.0 interface. The cables were Ethernet cables and the server computer run windows server operating system.

3.9 User requirements

The system development addressed the following; Create Database; improvise means of accessing information in the database, print relevant reports and some calculations as were requested by the users of the system. The system was shared on the network and thus the researcher designed and configured the network in a way that enabled sharing of resources. The system was able to notify the user when he/she entered wrong data.

CHAPTER FOUR.
SYSTEM ANALYSIS AND DESIGN

4.0. Introduction

This chapter describes the system analysis and design of a school information management system that was designed at Kitagata secondary school.

4.1 Old system

Kitagata secondary school old system operates a paper based system for its data storage and thus it is prone to high cost of operation, data redundancy and insecurity so that's why we decided to come up with a new school information management system which is computer based system.

4.1.1 Weaknesses of the old system

In Kitagata senior secondary school, there were reports of poor storage of data, lack of data integrity, high cost of data maintenance, and higher rate of data redundancy, reduced data quality and poor data management policies. The cause of this situation has not been exposed, which makes the current study a necessity.

4.2 The new system

4.2.1 Advantages of the new system

Based on the weaknesses of the old system stated, the advantages of the new system were to evaluate the effect of implementing a school information management system in Kitagata Secondary School in Bushenyi district which include the following;

Reduced data redundancy: In file management systems, some of the same data files were repeated in different files; by contrast the information appeared just once but information was made available to different users moreover co-currently and this lowered down the expenses of space.

Improved data integrity: Reduced redundancy increased the chances of data integrity.

Data that is accurate, consistent, and up to date because each updating change was made in only one place.

More programs independent: With database, the program and the file formats are the same, so that one programmer or even several of them can spend less time maintaining files.

Increased user productivity: Database management systems are fairly easy to use, so that users get their requests for information answered without having to resort to technical manipulations.

Increased security: Although various departments may share data in common in access to specific data information can be limited to selected files. Thus, through the use of passwords, a student's financial, medical, and grade information in a school is made available only to those who have a legitimate need to know.

4.3 System requirements

4.3.1 Hardware

These requirements include all the tangible components of the computer system. They include the following; System units; these refer to the computers themselves that actually do the processing of information. Monitors or visual display units; these refer to the components that output information in soft copy so that one can read, edit, manipulate etc. Keyboards; these are the standard input devices with which the system user feeds data into the system. Mice; these help in the manipulation of files and in the issuing of commands to the computer. They generally issue commands to system. Printers; these hard ware components help produce hard copies from soft copies. In a networked environment like this one, only one is enough. Photocopiers; these duplicate hard copies. If the organization has enough printers, they are not really necessary. Optical scanners; the hardware components convert documents from hard copy forms to their soft copy forms. They save time that would otherwise have been spent in retyping these documents. External hard disks; these are external mass data storage devices with storage capacities of hundreds of gigabytes. Other hardware Requirements include; routers, switches, DVD variables, and modems.

4.3.2 Software requirements

The software requirements include the following;

Database management system, operating system, browsers like internet explore, search engines like yahoo, Anti-viruses, and office like Microsoft office.

4.3.3 Security requirements

They include the following; Virus secure operating systems, like Linux and UNIX where Unix is a multi-tasking operating system that has built in networking capacity and versions that can run all kinds of computers. Because it can run with relatively simple modifications on different types of computers. Unix is also used for website management. Unix provides protection to users files and directories from accidental or deliberate damage by other users in the system, intranet and extranet, intranets are internal cooperate net works that use the infrastructure and standards of the internet and WWW. They connect all the types of computers, one of the greatest consideration of an intranet is security making sure that sensitive school data accessible on intranets is protected from the out side world. The meaning of doing this is a security system called fire wall. It is a system of hardware and software that connects intranet to external networks such as the internet.

4.4 Design

4.4.1 Entity relational diagram

E-R diagram can express the over all logic structure of database graphically. E-R diagrams are simple and clear. Qualities that may well account in large part for the wide spread use of the E-R models. Such diagrams consist of the following major components;

Rectangles which represent entity sets, ellipses which represent attributes, diamonds which represent relationship sets, lines which link attributes to entity, double ellipses which represent multivalued attributes, dashed ellipses which donate derived attributes, double rectangles which represent weak entity sets, and double lines which indicate total participation of an entity in a relationship set. Composite objects are objects that contain other objects.

The E-R diagram data model is based on a perception of a real world that consists of a set of basic objects called entities, and relationship among these objects. The model is intended

primarily for the database design process. It was developed to facilitate database design by allowing the specification of a school schema such schema represents the overall logical structure of the database. The overall structure can be expressed graphically by E-R diagram. Below is the E-R diagram model for the four departments of Kitagata secondary school.

E.R diagram for Kitagata secondary school

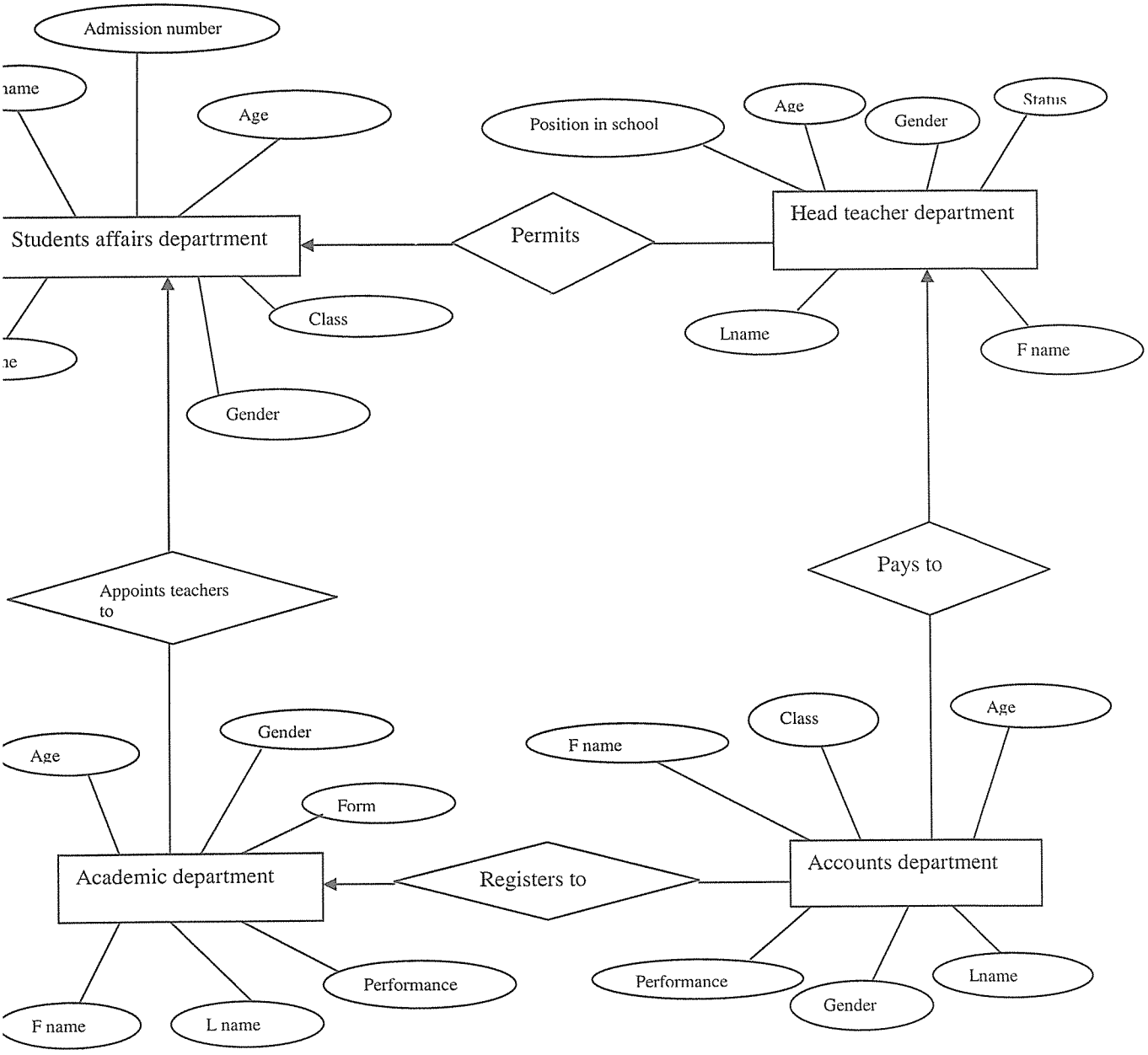


Figure3 E-R diagram

4.4.2 Data dictionary

Most databases management systems to day have a data dictionary component. A data dictionary is a central storehouse of data about the school's data. It is a database, or set of files, containing the definition, characteristics, structure and usage of data within a firm.

a data dictionary contains the fundamental definitions, characteristics, and uses of data; that is it describes what the data is and information about data, such as where it is stored and how it is stored. A data dictionary system is a system that stores, maintains, and reports on the contents of the firm's data dictionary. It is a set of programs to manage the data dictionary capacity. The data dictionary system provides information both to the users of the data base environment and to the database environment it self. A data dictionary system may be annual system or a computer based system. Data dictionary content; the data dictionary is capable of storing a wide variety of documentation about the firm's data. Below is the data dictionary of kiatagata secondary school.

STUDENTS AFFAIRS DEPARTRMENT (Admission number, Age, F name, Class, Gender, L name).

HEADTEACHER DEPARTMENT (F name, Age, Gender, Status, position in school, L name).

ACADEMIC DEPARTMENT (Performance, F name, L name, Form, Gender, Age).

ACCOUNTS DEPARTMENT (Class, F name, Lname, performance, Age, gender).

4.4.3 physical design

4.4.3.1 Choice of Microsoft Access.

- It is easy to learn.
- It is more reliable.
- It is also more secure application due to its inclusion of passwords for each persons account.
- It is an open source software therefore, it is possible for any one to use and modify.
- It was also the most readily available application from where we were building the system from more so at the institute.
- It is efficient in developing platform like Windows and UNIX environments.

4.4.3.2Microsoft visual basic

Microsoft visual basic was a very useful application in the construction of interfaces.
The reason of using Visual Basic was because it is simple and yet secure tool in creating of applications. It is also compatible with variety of plat forms and databases.

4.4.3.3 Choice of Microsoft Visual Basic.

- It facilitates embedding of other web programming like java.
- It is very easy to learn and one can make graphical user interface that can be viewed eve with out internet explorer being installed.
- It is interpretable by all web browsers.

4.5 Interfaces and forms.

The interface forms include , login form, MDI form, the academic, students affairs, head teacher and the accounts which contain the following fields; first name (F.NAME), last name (L.NAME),Age(AGE), Gender(GENDER), Admission number(ADMISSION.NO.), Performance(PERFORMANCE), Position in class(POSITION IN CLASS), Status(STATUS). The command buttons in the interfaces include, ok button and cancel button in login form,

Login form

Log in and password, prevents un authorized people from gaining access to the system it self for the directories and files of another user. User name and password require one to declare their identification before logging into the system.

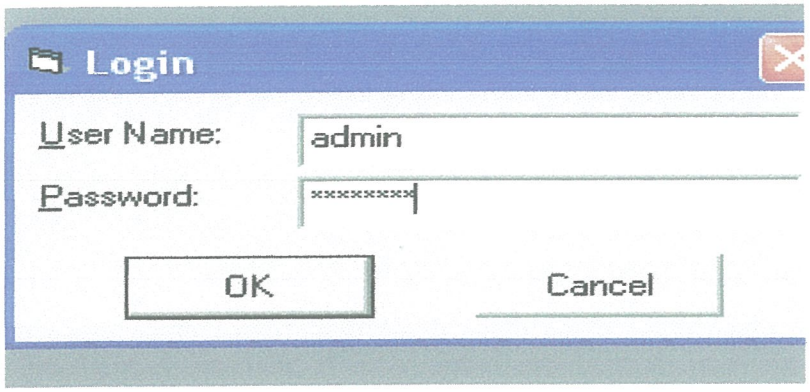


Figure4 login form

MDI interface form. The multiple document form allows the user to select from it other forms that is through MDI form one can view other forms.

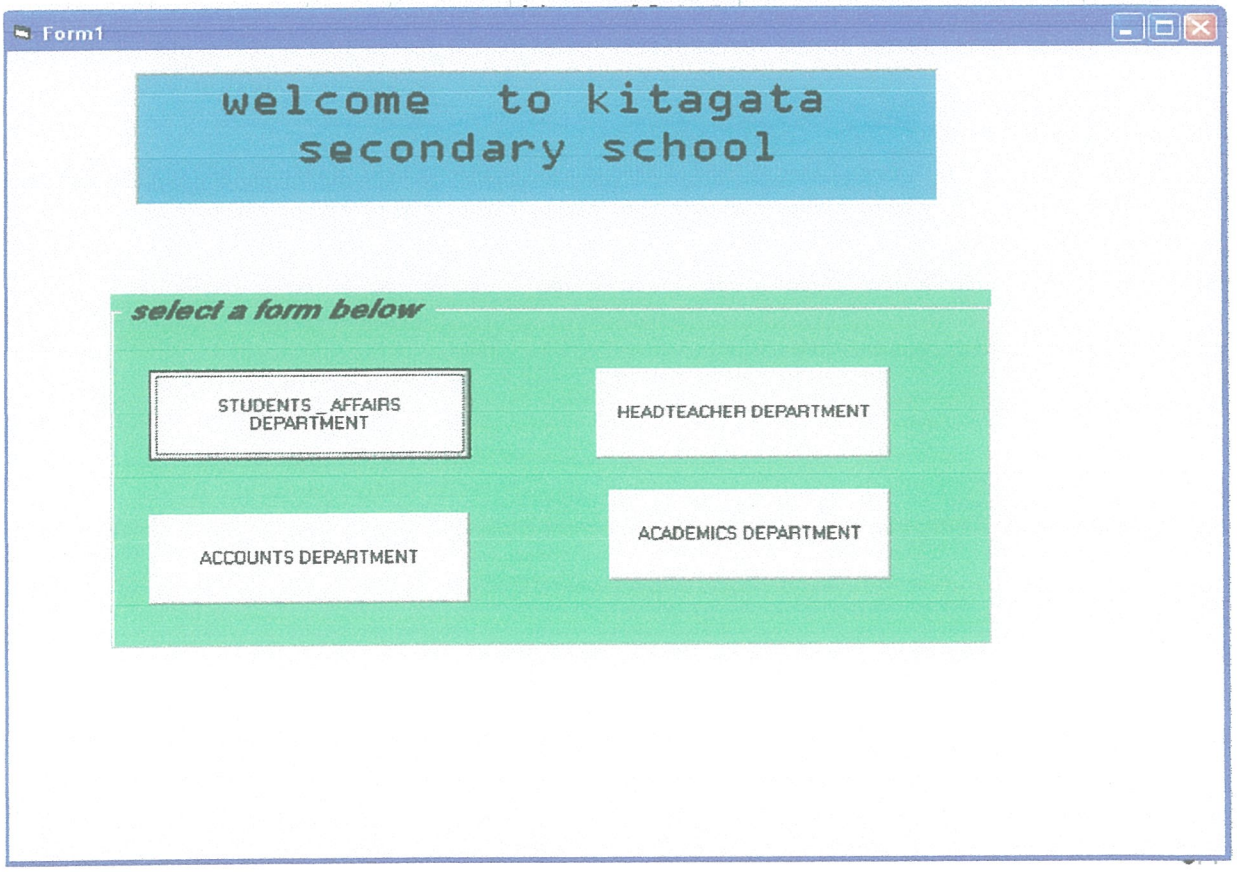


Figure 5 MDI form

Students affairs interface form. This interface form allows storing of students information in the school in the students affairs department.

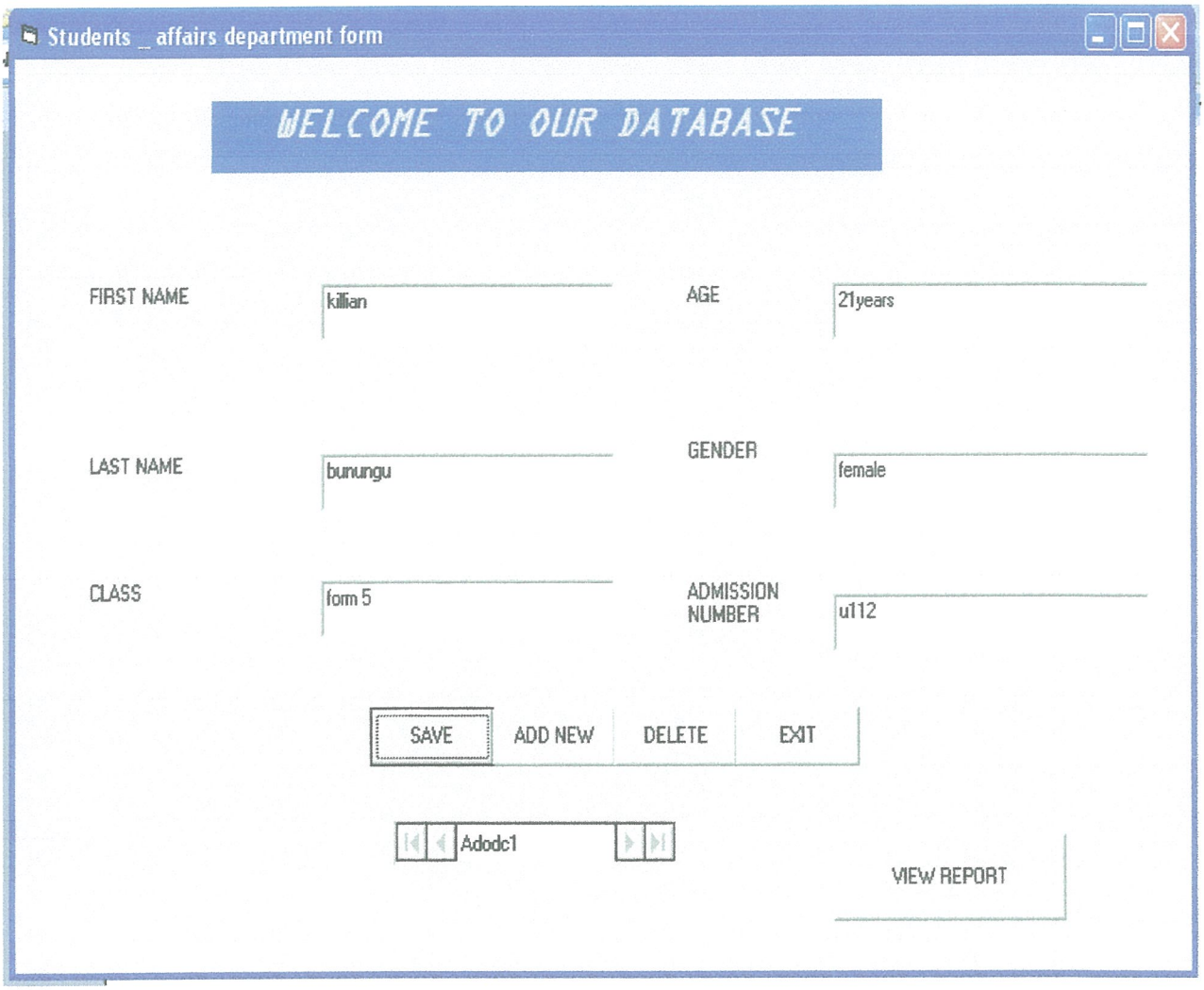


Figure 6 students affairs interface form

Headteacher department interface form. This form allows storing teachers information in the headteacher department.

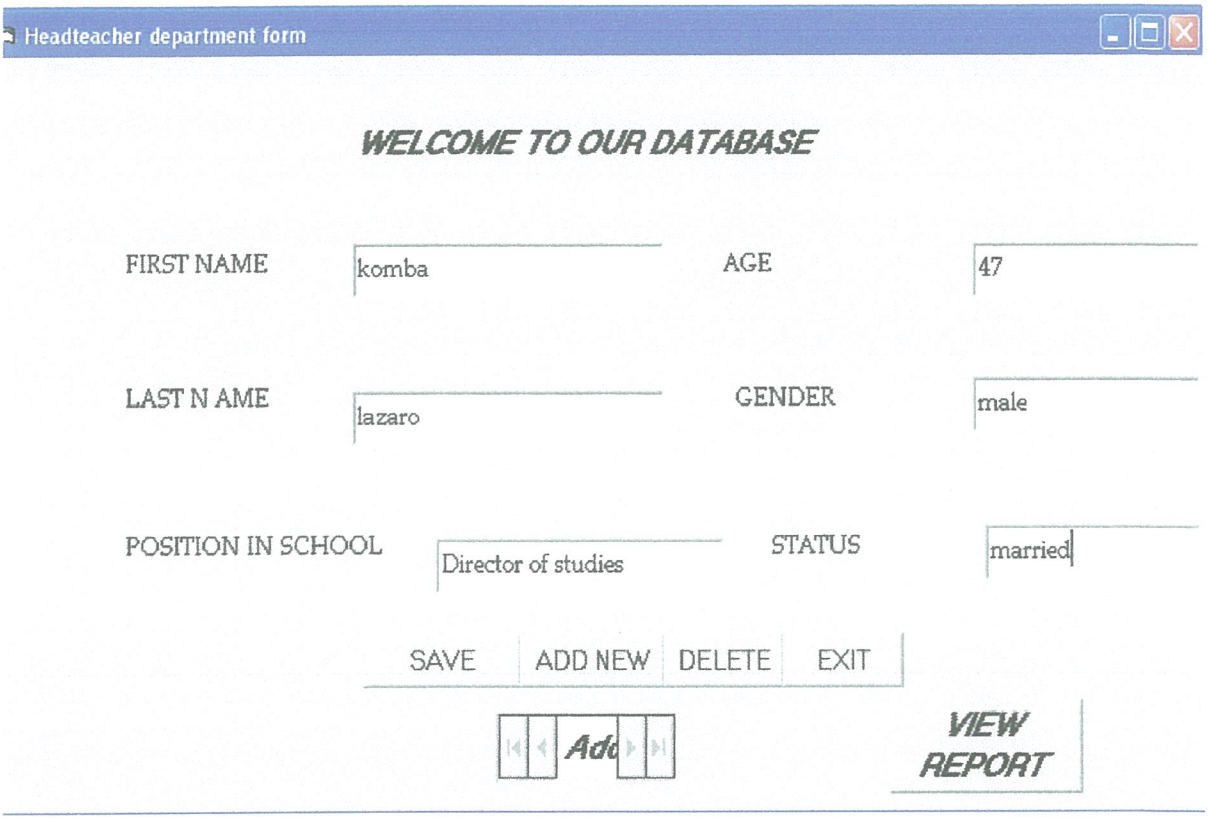


Figure 7 head teacher interface form

Accounts department interface form. This interface form is used by Kitagata secondary school to keep information about students in the accounts department

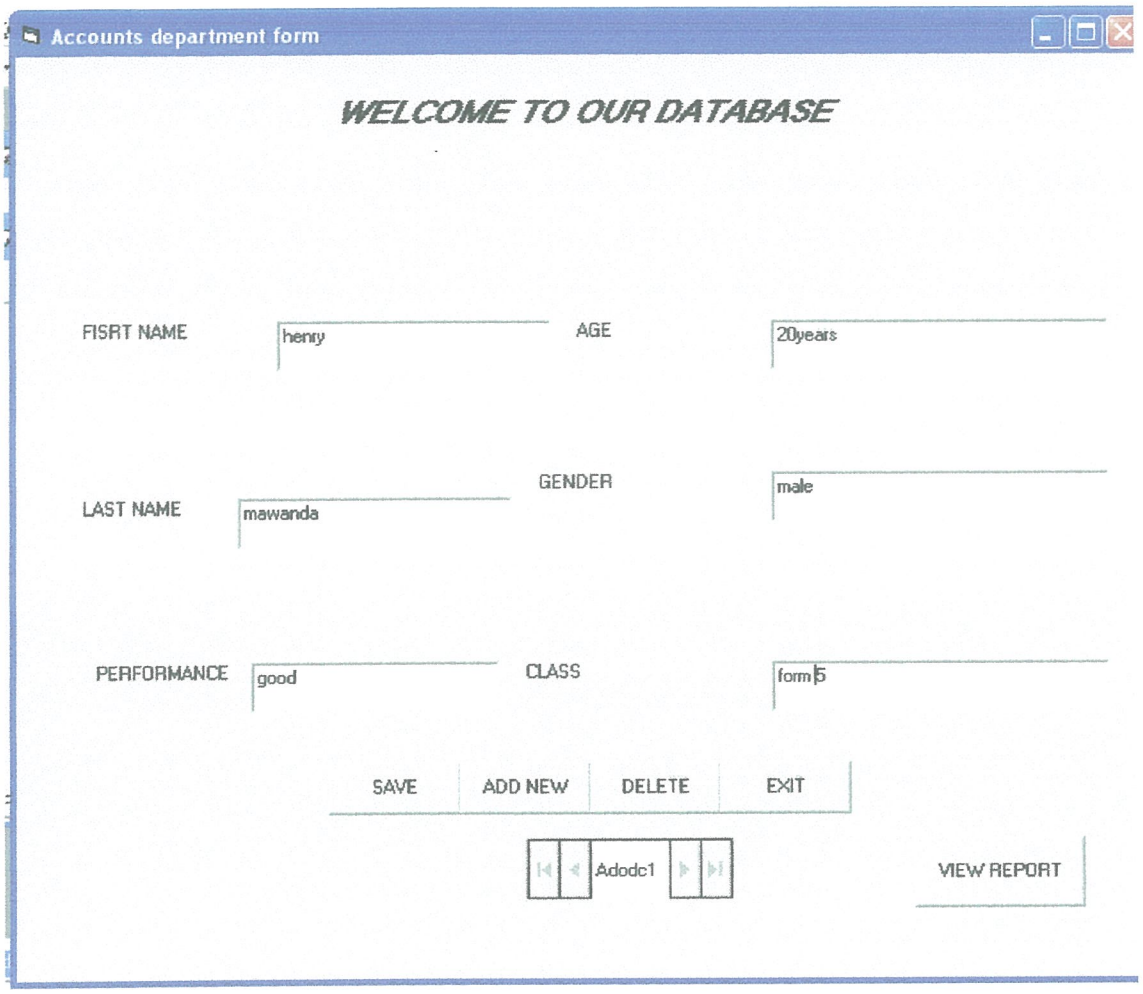


Figure8 accounts department interface form

Academic department interface form. This form helps Kitagata secondary school to keep and store the students information concerning their academics.

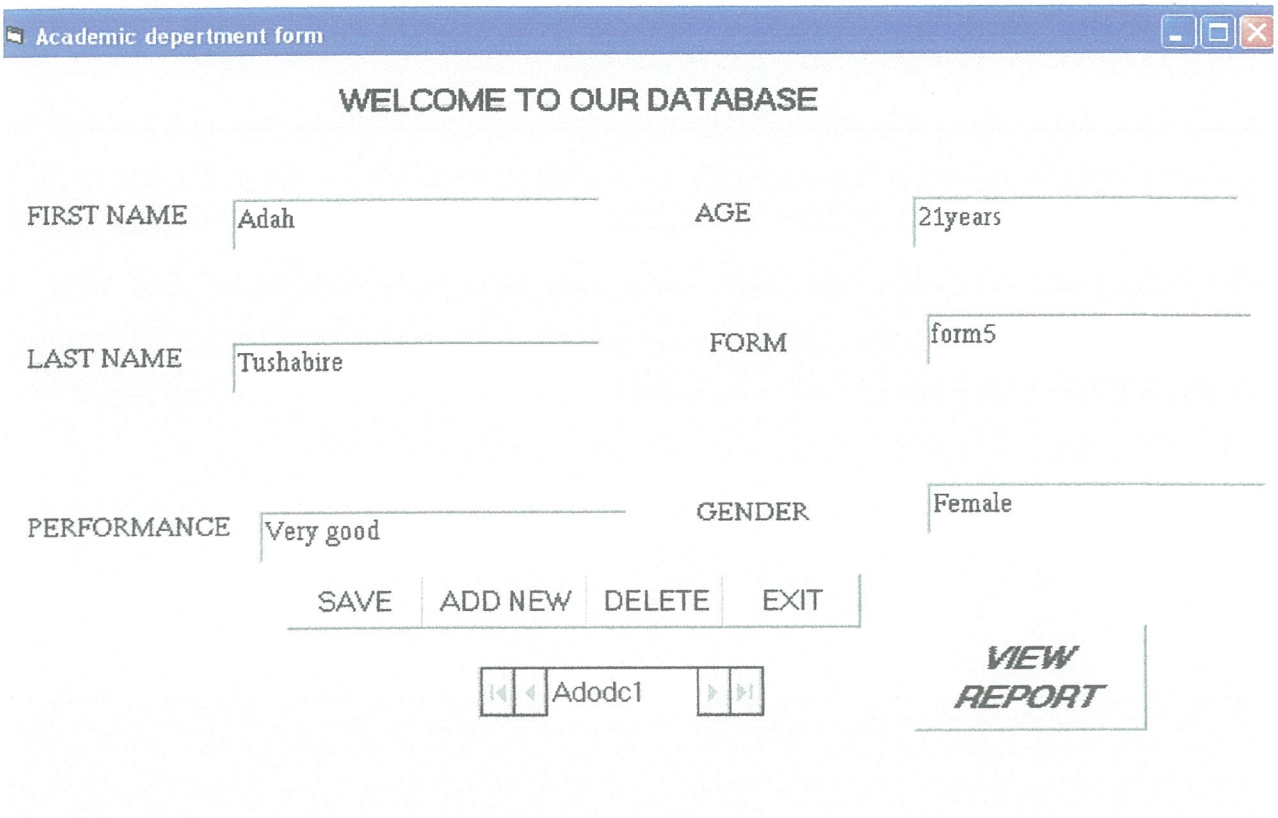


Figure9 Academic department interface form

4.5.1 The command buttons

The command buttons include; save, delete, add new, view report and exit.

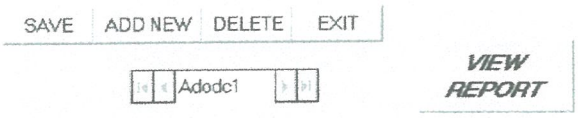


Figure 10 command buttons

I. **Delete command button**.

The command button DELETTE erases the contents of the text fields.

II. **Add new command button**

If a database accepts changes, we can add records. To add a record:

1. It creates a new record executing the method **AddNew**. Now the current record is the new record.

2. It assigns values to the fields of the new record writing the information manually in the controls of the form or writing code.

3. If the record has been introduced through the written code, keeps the new record executing the method **Update**. After this operation, the current record becomes the one that was it before AddNew.

III. Save command button.

The command button save saves the contents of the text fields

4.5.2 The tool box controls

The tool box controls that were used consist of the following; TextBox, Command button, Label, and adodc control as described below.

1. TextBox control

Figure 11 text box control

This control is used to place text generated by code, or to receive for input from the user. The text can be of several lines, but it is necessary to activate the property multi-line (MultiLine). By this way multiline can carry out automatic adjustment of end of line (word wrapping). An important property is text (Text) that returns as a character string the content of the box.

2. Command Button control

Figure 12 command button control

This button is used to execute a specific action when it is pressed, generally for the click of the mouse. The graphic appearance of these buttons is as the keys. Two properties of this control are Default and Cancel that are used to create the buttons OK and Cancel that answer to the keys Enter and Esc respectively

3. Label control

Figure 13 label control

It is used to show text that you cannot change for the user like messages.

This control is also one of the most utilized, although its utility is restricted to the visualization of data in the same one, not allowing the introduction of data on the part of the user.

4. Adodc Control

This control allows to establish the connection with databases. Their use is of a lot of interest. Using the **adodc** can be connected to a database to edit, to visualize and to upgrade one or more records.

 To be positioned in the first record. This same function can be carried out Using the method **Move First**.

 To be positioned in the previous record. This same function can be carried out using the method **Move Previous**.

 To be positioned in the next register. This same function can be carried out using the method **Move Next**.

 To be positioned in the last record. This same function can be carried out using the method **Move Last**.

Adodc control has two properties that belong together with two objects for access to the data: **Recordset** and **Database**.

The property **Recordset** is a reference to the object underlying **Dynaset** of the adodc control, in the same way that the property Database is a reference to the object Database. This allows, like leave in the previous examples, to use the properties and methods of these objects to manipulate the information of the database. If to be connected to the specified database the adodc control uses the properties **Connect**, **DatabaseName** and **RecordSource**, then it opens an Dynaset object, if it uses the properties **Connect**, **Exclusive** and **ReadOnly**, then it opens an object Database.

It can execute many access operations to a database without writing anything of code. The only thing that has to make is to add adodc control to the form and to tie to the same one other controls to visualize the designed data of the database. When it pulls up the application, the information will be visualized automatically. The changes that it makes about that information will be automatically kept in the database as soon as it changes record.

4.6 System implementation.

Implementation was done using Microsoft Access and Visual Basic 6.0. Microsoft Access was used for creating databases where the records for the school would be stored and retrieved at a later stage in case of need. The major reason for the choice of Microsoft Access was the requirements themselves as in the user requirements for the system, which included a more secure and bigger database in nature. It was used to store data and integrated database management and maintenance into a single environment. With a clear graphical user interface. It was also a better performance capacity compared to other applications. The database was created using Microsoft Access and users accessed it over a visual basic interface. On all the machines a shared document folder was created and this folder enabled that all important information was stored to ensure that authorized users did not access it.

4.7 Sample codes.

4.7.1 Login form codes.

```
 Public LoginSucceeded As Boolean
Private Sub cmdCancel_Click()
   'set the global var to false
   'to denote a failed login
   LoginSucceeded = False
   Me.Hide
End Sub

Private Sub cmdOK_Click()
   'check for correct password
   If txtPassword = "password" And txtUserName = "admin" Then
      'place code to here to pass the
      'success to the calling sub
      'setting a global var is the easiest
      LoginSucceeded = True
      Me.Hide
      Form1.Show
```

```
  Else
    MsgBox "Invalid Password, try again!", , "Login"
    txtPassword.SetFocus
    SendKeys "{Home}+{End}"
  End If
End Sub
```

4.7.2 MDI form codes

```
Private Sub Command1_Click()
Unload Me
frmstudents.Show
End Sub

Private Sub Command2_Click()
Unload Me
frmaccounts.Show
End Sub

Private Sub Command3_Click()
Unload Me
frmheadteacher.Show
End Sub

Private Sub Command4_Click()
Unload Me
frmacademics.Show
End Sub
```

4.7.3 Students affairs department codes

```
Private Sub Command1_Click()
Rem add new records
Adodc1.Recordset.AddNew
Text1.SetFocus
```

```
End Sub

Private Sub Command2_Click()
Dim ctl As Control
For Each ctl In Controls
If TypeOf ctl Is TextBox Then
ctl.Text = ""
End If
Next ctl
End Sub

Private Sub Command3_Click()
'Delete item from database
Dim Rvalue As Integer
Rvalue = MsgBox("Are you sure you want to delete this item?", vbQuestion +
vbYesNo, "Delete Item")
If Rvalue = vbNo Then Exit Sub
Adodc1.Recordset.Delete
Adodc1.Recordset.MoveNext
If Adodc1.Recordset.EOF Then
  If Adodc1.Recordset.BOF Then
    MsgBox "You must add an item.", vbOKOnly + vbInformation, "Empty
Database"
    Call Command3_Click
  Else
    Adodc1.Recordset.MoveFirst
  End If
End If
Text1.SetFocus
End Sub
```

```
Private Sub Command4_Click()
Unload Me
Form1.Show
End Sub

Private Sub Command5_Click()
DataReport4.Show
End Sub
```

4.7.3 Academic affairs department codes

```
Private Sub Command1_Click()
Rem add new records
Adodc1.Recordset.AddNew
Text1.SetFocus
End Sub

Private Sub Command2_Click()
Dim ctl As Control
For Each ctl In Controls
If TypeOf ctl Is TextBox Then
ctl.Text = ""
End If
Next ctl
End Sub

Private Sub Command3_Click()
'Delete item from database
Dim Rvalue As Integer
Rvalue = MsgBox("Are you sure you want to delete this item?", vbQuestion +
vbYesNo, "Delete Item")
If Rvalue = vbNo Then Exit Sub
Adodc1.Recordset.Delete
```

```
Adodc1.Recordset.MoveNext
If Adodc1.Recordset.EOF Then
 If Adodc1.Recordset.BOF Then
  MsgBox "You must add an item.", vbOKOnly + vbInformation, "Empty
Database"
  Call Command3_Click
 Else
  Adodc1.Recordset.MoveFirst
 End If
End If
Text1.SetFocus
End Sub
Private Sub Command4_Click()
Unload Me
Form1.Show
End Sub


Private Sub Command5_Click()
DataReport1.Show
End Sub
```

4.7.4 Head teacher codes department codes

```
Private Sub Command1_Click()
Rem add new records
Adodc1.Recordset.AddNew
Text1.SetFocus
End Sub

Private Sub Command2_Click()
Dim ctl As Control
For Each ctl In Controls
```

```
If TypeOf ctl Is TextBox Then
ctl.Text = ""
End If
Next ctl
End Sub

Private Sub Command3_Click()
'Delete item from database
Dim Rvalue As Integer
Rvalue = MsgBox("Are you sure you want to delete this item?", vbQuestion +
vbYesNo, "Delete Item")
If Rvalue = vbNo Then Exit Sub
Adodc1.Recordset.Delete
Adodc1.Recordset.MoveNext
If Adodc1.Recordset.EOF Then
  If Adodc1.Recordset.BOF Then
    MsgBox "You must add an item.", vbOKOnly + vbInformation, "Empty
Database"
    Call Command3_Click
  Else
    Adodc1.Recordset.MoveFirst
  End If
End If
Text1.SetFocus
End Sub

Private Sub Command4_Click()
Unload Me
Form1.Show
End Sub
```

```
Private Sub Command5_Click()
DataReport3.Show
End Sub
```

4.7.5 Accounts department codes

```
Private Sub Command1_Click()
Rem add new records
Adodc1.Recordset.AddNew
Text1.SetFocus
End Sub

Private Sub Command2_Click()
Dim ctl As Control
For Each ctl In Controls
If TypeOf ctl Is TextBox Then
ctl.Text = ""
End If
Next ctl
End Sub

Private Sub Command3_Click()
'Delete item from database
Dim Rvalue As Integer
Rvalue = MsgBox("Are you sure you want to delete this item?", vbQuestion +
vbYesNo, "Delete Item")
If Rvalue = vbNo Then Exit Sub
Adodc1.Recordset.Delete
Adodc1.Recordset.MoveNext
If Adodc1.Recordset.EOF Then
  If Adodc1.Recordset.BOF Then
    MsgBox "You must add an item.", vbOKOnly + vbInformation, "Empty
Database"
```

```
    Call Command3_Click
  Else
    Adodc1.Recordset.MoveFirst
  End If
End If
Text1.SetFocus
End Sub

Private Sub Command4_Click()
Unload Me
Form1.Show
End Sub


Private Sub Command5_Click()
DataReport2.Show
End Sub
```

4.8 Unit and integration testing.

Unit testing is a method of testing the correctness of a particular module of source code. This was used to isolate each part of the program and show that the individual parts are correct. Testing provided a written contact that the piece must satisfy and the benefit of encouraging researchers to make changes to the code since it is easy for the researcher to check if the piece is still working properly and provides an example of what piece of code is supposed to do how it should handle failures. This was used to ensure proper functioning of consistency checking. Unit testing helped to eliminate uncertainly in the piece themselves. By testing the parts of a program first and then testing the sum of its parts made integration testing easier

4.9 System testing and maintenance.

4.9.1 System testing.

Before the system was brought into use, it was tested. The alpha (first) testing was done by the designer, still the system went through the beta testing by the school administrators together with the designer and after it went through the acceptance testing which was used by users themselves.

4.9.2 System maintenance

To keep the system functioning at an acceptable level, proper maintenance was needed. The system needeed more enhancements to match with the changing environment of user requirements. Correct errors that were not discovered during testing and adopt evolution of the software and hardware plat form it run on.

All this was done in system maintenance.

4.10 Conversion strategies and security issues.

4.10.1 Conversion strategy.

The system was implemented by Kitagata secondary school if it realized its funds. This included conversion from old system to a new system. The process of converting from old information system to a new information system involved converting hard ware and software files. The conversion strategies which were adopted include;

i. ***Direct conversion***. This involved switching from the old system to the new system at once. However, this was appropriate after this system was properly used on all the available resources at the school and provided compatible and error free.

ii. ***Parallel conversion***. This involved running both the old and new systems simultaneously while comparing the results and as time goes on, decisions were made on whether to go on with their old system. However, this was possible only if there was enough resources to run both the old and the new system. It was obviously recommended because there are benefits in taking this approach. If the new system fails, the organization can switch to the old one.

4.10.2 Security issues.

The department of academic affairs, students' affairs, and the headmaster were not allowed to change anything in the database unless they log in using the servers account which is only known by the administrator. This ensured security of the school's information. The accountant was permitted to edit the database on condition that he opened his account from the server's computer.

Uninterruptible power supplies (UPSs) were placed to protect against any power cutbacks or surge.

Hardware was handed with care and protected from damage due to natural hazards like fire. Restrictions of physical access to the system's environment were needed to prevent the system from unauthorized or the system being stolen.

CHAPTER FIVE

Achievements, Recommendations and Conclusion

5.0. Introduction

This part of research report is dedicated to provide achievements, recommendations for the future and conclusions.

5.1. Achievements.

The following were achieved during the study

- The researcher first identified the problem that existed and then proposed a new system, he then carried out a study of the system using data collection techniques like interviews and questionnaires and document analysis.
- The researcher made an evolution of existing system by studying the current information.
- The weakness of the existing system were identified which the researcher analyzed and the requirements were determined that led to the design of the new system.

The new system was able to:

- Identify and display records for all the departments in the school.
- Also log to the school departments and find all the details for the school.
- Allow system administrators to update, add, delete the schools details.
- Enable the departments to be able to share information more efficiently.
- Reduce on the cost of operation hence more profits where the school is in position to produce high quality document say report cards from a printer and no longer a type writer.
- Save more time and achieve data integrity.
- Achieve fast data accessibility.
- Serve students more efficiently.

5.2 Risk assessment, limitations and possible solutions

Risk can not be ruled out and these range from health that the researcher might fall sick, lack of the required knowledge about certain techniques and lack of enough funds to fund the project and failure to finish the project on time

- There wars a problem of limited time which did not enable us to reach all the necessary people to consult and interview.
- There was also the problem of limited money to support us throughout the project hence hindering finishing everything in the required time.
- Some respondents for example the staff UN willing to answer as they took us as spies.

5.3 Solutions

However, these can be over come by applying the following techniques;

Ensure that you break the project into milestones can be accomplished in periods less than a month and Endeavour to follow the project schedule that will enable you make a good evaluation of the project and there after help you finish on time.

Plan and use the available funds sparingly and if possible set aside exact money such that in case of any thing you can beef it up. Endeavour to make enough research about the various techniques to be used so as to reap good results where necessary hire or ask more that you think to understand the techniques and tools better.

5. 4 Management.

The system has been developed to allow a sharable management of data by school administrators of kitagata secondary school.

5.5 Linking to the school web site.

The system has to be connected to the database server web site for the head teacher, student's affairs (deputy), Accounts, Academic affairs (dean) to access the information very fast.

5.6 Conclusions.

This project on designing and implementing of a school information management system was able to develop and implement data accessibility and sharing of resources in order to reduce the cost of operation.

APPENDICES

APPENDIX 1

BUDGET

The cost of break down was as below:

Item	No.	@	Amount
Computers	4	600,000/=	2,400,000/=
Printer	1	350,000/=	350,000/=
Switch	1	80,000/=	80,000/=
Cables	150 meters	400/=	60,000/=
OS	1	30,000/=	30,000/=
Anti virus	1	30,000/=	30,000/=
NIC	4	20,000/=	80,000/=
UPS	4	75,000/=	300,000/=
Training	2 weeks	100,000/=	100,000/=
Transport	all		100,000/=
Miscellaneous			200,000/=
Total			**3,730,000/=**

Table*1 *the budget

APPENDIX 2

SCHEDULE

The table below shows the way activities were scheduled to follow one another.

Task	Event	Period
Planning	-system report -feasibility analysis -project plan -Schedule -Risk assessment	2 weeks
Analysis	-Current analysis -System requirements -Surveys	3 weeks
Design	-Conceptual design -Logical design -Physical design -Documentation	3 weeks
Development	- Creation of data structures -Coding -Testing	4 weeks
Implementation	-Data conversion -System conversion -Documentation	3 weeks

Table2 project schedule

APPENDIX 3

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APPENDIX 4

Sample Questionnaire.

Dear Respondent,

We are by the names of **Tushabire Adah and Nahamya joseph stuart** students of Kampala International University, pursuing Diploma in computer science, the importance of this document was to gather information that guided us in the design and implementation of a shared data management system at Kitagata senior secondary school. We kindly request you to fill the below questionnaires, appropriate to facilitate our research investigation for the betterment of our society and country as a whole. We assure you that the information you will provide will be highly confidential preserved and appreciated.

Much Regards.

Tushabire Adah and Nahamya Stuart

SECTION A: QUESTIONS

NB; Tick or Write where appropriate

Question 1

What is your name?

.....

Question 2

How old are you?

.....

Question 3

Gender..... Male ☐ Female ☐

Question 4

Which responsibilities do you hold in the school?

Director ☐ Head teacher ☐ Teacher ☐ Student ☐

Question 5

For how long have you been in the school?

1-2 yrs ☐ 2-5 yrs ☐ more than 5yrs ☐

SECTION B

This part is to be filled by the head teacher, deputy head teacher and director only.

Question 6

a) What is the total number of students in your school?

.....

.....

b) W hat do you expect the number of students would be in five years from now?

.....

.....

Question 7

How many classes does the school have?

.....

.....

Question 8

a) How many teachers do you have?

.....

.....

b) What is their level of education?

.....

.....

SECTION C: About the system.

To be answered by all the participants.

Question 9

Briefly explain how students and other relevant information is stored at the school?

.....

.....

Question 10

a) What are the challenges of using the method above?

.....

b) Do you think there are challenges of using this method? (Yes or no) support your answer.

.....

.....

c) If the above answer is yes, suggest the ways of eliminating them.

.....

.....

Question 11

a) A database is a collection of logically related data. Do you think a database system would help solve the problem in question 10b) above?

.....

Question12

a) Define what you understand by a shared data management system?

.....

.....

b) Does the school have computers?

Yes ☐ No ☐

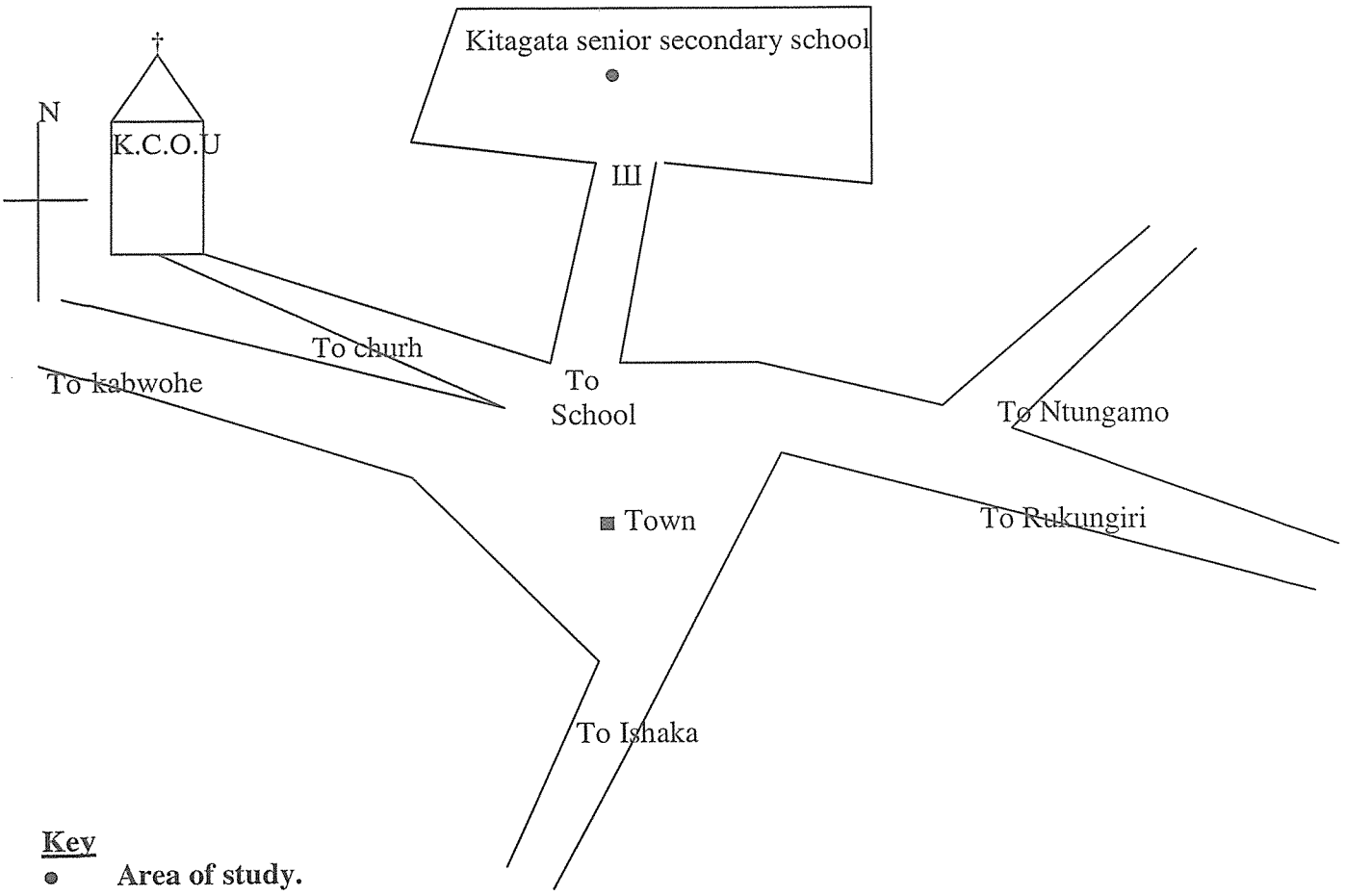
Could you please give us a word of advice?

.....

Thank you.

APPENDIX 5

MAP OF KITAGATA SENIOR SECONDARY SCHOOL



Key

- ● **Area of study.**
- ■ **Kitagata town.**
- **III** **the school's main gate.**
- **Roads**

Figure14 the map of Kitagata senior secondary school.