VEB-BASED STORE RECORDS MANAGEMENT SYSTEM A CASE STUDY OF UGANDA TECHNICAL COLLEGE, BUSHENYI

BY

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A PROJECT REPORT SUBMITTED TO THE FACULTY OF SCIENCE AND TECHNOLOGY IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF BACHELORS DEGRE OF COMPUTER SCIENCE OF KAMPALA INTERNATIONAL UNIVERSITY

DECLARATION

I Tukahirwa Deziranta hereby declare that this project report is my original work and has not been published and/ submitted for any Diploma/Degree award to any University or Institution of Higher learning before.

Signed by

Deziranta..... Date.....17/09/2013.....

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APPROVAL

This project report titled; Web-based store's records management system (SRMS), a case study of Uganda Technical College, Bushenyi has been submitted for examination with my approval

Signed by

1. ..... Date 17th - 09 - 2013

Mr. Akampurira Paul

(Supervisor)

2. ..... Date 17th - 09 - 2013

Eng. Begumisa Generous Tugume

(Supervisor)

DEDICATION

To my husband Mr. Nimukama Anthony for his untiring and immeasurable support,
Children: Aidan Nimusiima and Ariadne Nimwesiga, who have been my great inspiration during this whole period while pursuing this course.

"Good things in life are not easily accomplished, but when accomplished, they will always be reckoned for many generations to come."

ACKNOWLEDGEMENT

I would like to extend my great thanks to the almighty God for his great love for me.

My sincere appreciation goes to Kampala International University Faculty of Science and Technology staff, more especially so to my supervisors, Mr.Akampurira Paul and Eng.Generous Tugume, without whose help this work would not be as it appears. Munihizi Bonny for having made my academic success worth and social life comfortable at Kampala International University.

Last but not least, I acknowledge all my friends, relatives and in laws for spiritual, financial, material support and guidance rendered to me, I beg you not to

Special thanks to finalists of IT/CS(2013) especially my course mates of Computer Science; Nayebare Julian, Munina Abel, give up on me because the struggle continues.

MAY GOD BLESS YOU ABUNDANTLY

ACRONYMS

MIS	Management Information System
ERD	Entity Relationship Diagram
DFD	Data Flow Diagram
IS	Information System
DBMS	Database Management Systems
DSS	Decision Support Systems
ISO	International Standards Organisation
IT	Information Technology
SDLC	Systems Development Life Cycle
UTC,B	Uganda Technical College, Bushenyi
VDU	Video Display unit
MFS	Manual Filling System
ERMS	Electronic Records Management Systems
SRMS	Store Records Management System
HIPO	Hierarchical Input Processing Output
ASCII	American Standard Code for Information Interchange

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ABSTRACT

This project is about a web based store records management system. Uganda Technical College, Bushenyi was used as a study. The current system was found to be completely manual faced with numerous problems like duplication, loss of records, huge storage space and time consuming. A computerized system was designed using tools like, Class diagrams, DFDs, SQL, HTML, JAVA and JAVA SCRIPT. This system is fast, convenient in terms of storage, makes it easy to share information and it is user friendly. Computerization of store records management system is therefore recommended for use in all secondary schools, Technical institutes and colleges, universities, shops, industries, in other wards everywhere where a store for records exists in Uganda

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter includes the background, statement of the problem, purpose, objectives, research questions, scope, and significance of the study.

1.1 Background of the study

Good management of records and information is fundamental to a well functioning organization since it supports business activities and provides a basis for efficient service delivery. It also provides the mechanism whereby both the private and public sectors can account for their decisions and actions. Records provide evidence for the public to confirm or claim their public rights and entitlements, as well as providing individuals with evidence to justify government decisions and a mechanism whereby they can have trust in private enterprise. Moreover, good records management is simply good business practice. This is in contrast to bad records management witnessed in traditional manual filling system (MFS) which is prone to insecurity, storage wastage, inaccurate results, poor accountability, slow access and retrieval of records. This means there is inefficiency in service delivery, poor decision making and poor resource monitoring in companies that are still relying on Manual File System for records management.

1.1.1 Historical background of Uganda Technical College,Bushenyi

UTCB was founded in 1956 as Kahaya Memorial Rural trade school by then Ankole Kingdom Government. It was enrolling the then primary six leavers to train in carpentry and joinery and brick laying. Later in 1958, courses that include leather tanning, shoe making, pottery and ceramics were introduced. In 1974, it was upgraded to Kahaya Technical school and elevated to Bushenyi Technical Institute in 1982 with a standard entry requirement of 'O' level certificate. In 1984, it was upgraded to a technical college and named Uganda Technical College, Bushenyi admitting 'A' level students.

Since then, there has been a tremendous change in population, infrastructure and courses, which is a justification that there exists large amounts of store records. It now has a population of about 350 students acquiring skills in areas of Civil, Electrical, Mechanical engineering, Information and

Computing Technology (ICT), Industrial Ceramics, Architecture and Water Engineering who are awarded National Diplomas by UBTEB (Uganda Business and Technical Examinations Board). Teaching and non teaching staff is about 100 in number. Considering the population, instructional materials and infrastructural developments, there is a lot of items being kept in store, and the load of work handled per day, a lot of records are generated which are handled manually. Various reports are generated periodically for use at different levels of management. The College is required to make quarterly reports to the Ministry of Education and Sports for planning purposes and Heads of departments are required to submit monthly reports. Production of these reports using manual system is not only difficult but also time consuming. Because all this is done with pen and paper, sharing of these records among the heads of departments is usually difficult and time consuming.

Heads of Departments spend more time looking for information than they spend on caring for the students who are the main target that is; disseminating knowledge to students. There was a lot of paper work which was kept in the store. It was the researcher's considered view that a computerized system that handled the huge records, quicken the generation of reports, ease the sharing of store records and store the huge amount of data more efficiently and effectively was needed to replace the current manual system.

1.2 Problem Statement

Uganda Technical College, Bushenyi has a store records department which is under the accounts department. Records (large amount of record) are kept in a traditional file based system, records like; catering supplies, computer accessories, stationery, mechanical equipments, civil equipments, electrical accessories, estate tools for different departments in the college. Access and retrieval of data items took not only a lot of time but also became manual and hectic for the records manager.

Processing/computations on data items was by head and a calculator which made computed results develop errors and be inaccurate. Data sharing between departments was by moving physically to stores to check in the files this sometimes led to requisition of items which may even be in store leading to wastage of time and energy and resources (money). Updating of data item was done every time new items were brought or taken out of store ,this means there was re-writing the same data several times hence data redundancy. The Manual Filling System (MFS) used required plenty of space for file storage.

Therefore, considering this observation, Uganda technical college, Bushenyi was facing a problem of time wastage, delays, data redundancy and difficulty in data access and retrieval in store records department.

1.3 Objectives

1.3.1 Main Objective.

The main objective of this study was to develop a web based store records management system that would streamline records store wastage, retrieval and accurate data manipulation plus reporting.

1.3.2 Specific Objectives

i. To analyze the existing store records management system.
ii. To find out the requirements needed to come up with the new store records management system
iii. To design the new web-based store records management system
iv. To test and implement the new web based store records management system.

1.4 Research Questions

The following questions were used to guide the researcher:

1. How do analyse the status of the old store records management system ?
2. How do you find out the requirements of the web based store records management system ?
3. How can the new store records management system be designed ?

1.5 Scope of the Study

1.5.1 Content scope

The research involved the records management system of UTC-B and stayed more on store records management department of the College, particular focus was put on the tasks associated with the records management at UTC-B. The scope of this system specification was limited to products that are usually termed 'electronic records management systems'. Digital objects created by email, word processing, spreadsheet and imaging applications(such as text documents, and still and moving images), where they were identified to be of business value, were managed within electronic records management systems that meet the functional requirements in this system specification.

1.5.2 Geographical scope

The study was carried out in Uganda Technical College - Bushenyi in store records section which is under accounts department.

1.5.3 Time scope

The study was carried out in a period of 4 months that is from April to July 2013. This generated a detailed analysis of the existing store records management system that helped in design of an efficient store records management system of store records at UTC-B.

1.6 Significance of the study

1. There will be automation and streamlining of administrators work flow since there is reduced store records errors and readily available necessary information on which to base their decisions.
2. Information on store records will be accessed easily and conveniently in the College snce the system is web based.
3. Paper work will be considerably reduced with the introduction of computer-assisted method of storing the records. Misplacement of records, space for keeping the paper files, molding / depreciation of paper and enormous financial burden will be reduced.
4. There will be no delays or missing paperwork that used to add time to requisition and procurement of new or missing items in store
5. Periodic reports will be easier to make and in time. Since the necessary data is available in one place and the computer is able to manipulate it like sorting, stratifying, carry out computations, then the reports are easy to make unlike using the manual system where functions like computations are difficult to handle.
6. More so, to the researcher, she will have fulfilled the requirement for the award of a bachelors degree in computer science of KIU.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

Literature review includes discussions about the web based store's records management system. In this chapter, literature review presents the guiding topic of the study that includes previous writings about systems used in store's records management.

2.1 Analysis of the existing store records management system

2.1.1 Manual Filling System

Manual filling system is a system which does not use any computer devices in data storage, access and retrieval. All data is kept, accessed and retrieved in other ways, mainly paper, filing, Graphs and diagrams by hand instead of using computer software to do them (Reynolds, 2003). However, examples of manual systems given in the literature are generally of systems where written data is stored on paper and there is a relatively simple translation to a computerized model as referenced by (Lederman & Johnston, 2006)

2.2 Requirements study about a web based store records management system

2.2.1 Web based system

Web-Based system refers to those applications or services that are resident on a server that is accessible using a Web browser and is therefore accessible from anywhere in the world via the Web. ISO 15489-1: 2001.

2.2.1 Records management system

An Records Management System is a computer program (or set of programs) used to track and store records.The National Archives in the UK has published two sets of functional requirements to promote the development of the electronic records management software market (1999 and 2002) ISO 15489-1: 2001.

2.3 The design of a web based store records management system

2.3.1 Database design

Database design is the process of producing a detailed data model of a database (Gehani, N, 2006). This logical data model contains all the needed logical and physical design choices and physical storage parameters needed to generate a design in a Data Definition Language, which can then be used to create a database. A fully attributed data model contains detailed attributes for each entity. The term database design can be used to describe many different parts of the design of an overall database system. Principally, and most correctly, it can be thought of as the logical design of the base data structures used to store the data. In the relational model these are the tables and views. In an object database the entities and relationships map directly to object classes and named relationships. However, the term database design also applies to the overall process of designing, not just the base data structures, but also the forms and queries used as part of the overall database application within the database management system(DBMS) (M. Hernandez,2013). The designer must determine the relationships between the different data elements and Superimpose a logical structure upon the data on the basis of these relationships.

Types of database designs

Conceptual design

Once a database designer is aware of the data which is to be stored within the database, they must then determine where dependency is within the data. Sometimes when data is changed you can be changing other data that is not visible. For example, in a list of names and addresses, assuming a situation where multiple people can have the same address, but one person cannot have more than one address, the address is dependent upon the name. When provided a name and the list the address can be uniquely determined; however, the inverse does not hold - when given an address and the list, a name cannot be uniquely determined because multiple people can reside at an address. Because an address is determined by a name, an address is considered dependent on a name.

Logical design

Once the relationships and dependencies amongst the various pieces of information have been determined, it is possible to arrange the data into a logical structure which can then be mapped into the storage objects supported by the database management system.

Physical design of the database

The physical design of the database specifies the physical configuration of the database on the storage media. This includes detailed specification of data elements, data types, indexing options and other parameters residing in the DBMS data dictionary. It is the detailed design of a system that includes modules & the database's hardware & software specifications of the system.

2.3.2 The user interface design of the system

User interface design is the design of websites, computers, appliances, machines, mobile communication devices, and software applications with the focus on the user's experience and interaction (Dr. Reinhard Oppermann ,2001). The goal of user interface design is to make the user's interaction as simple and efficient as possible, in terms of accomplishing user goals—what is often called user-centered design. Good user interface design facilitates finishing the task at hand without drawing unnecessary attention to itself. Graphic design may be utilized to support its usability. The design process must balance technical functionality and visual elements (e.g., mental model) to create a system that is not only operational but also usable and adaptable to changing user needs.

Interface design is involved in a wide range of projects from computer systems, to cars, to commercial planes; all of these projects involve much of the same basic human interactions yet also require some unique skills and knowledge. As a result, designers tend to specialize in certain types of projects and have skills centered around their expertise, whether that be software design, user research,web design, or industrial design. User interface design has been a topic of considerable research, including on its aesthetics. Standards have been developed as far back as the 1980s for defining the usability of software products. One of the structural bases has become the IFIP user interface reference model. The model proposes four dimensions to structure the user interface , (Dubrovnik, Croatia, September 2007).

- The input/output dimension (the look)
- The dialogue dimension (the feel)
- The technical or functional dimension (the access to tools and services)
- The organizational dimension (the communication and co-operation support)

2.4 System testing

System testing is an investigation conducted to provide stakeholders with information about the quality of the product or service under test. Software testing can also provide an objective, independent view of the software to allow the business to appreciate and understand the risks of software implementation. Test techniques include, but are not limited to the process of executing a program or application with the intent of finding software bugs (errors or other defects).

Software testing can be stated as the process of validating and verifying that a computer program/application/product:

- meets the requirements that guided its design and development,
- works as expected,
- can be implemented with the same characteristics,
- and satisfies the needs of stakeholders.

The main levels during the development process are unit-, integration-, and system testing that are distinguished by the test target without implying a specific process model. They are;

2.4.1 Unit testing

Unit testing, also known as component testing, refers to tests that verify the functionality of a specific section of code, usually at the function level. In an object-oriented environment, this is usually at the class level, and the minimal unit tests include the constructors and destructors. These types of tests are usually written by developers as they work on code (white-box style), to ensure that the specific function is working as expected. One function might have multiple tests, to catch corner cases or other branches in the code. Unit testing alone cannot verify the functionality of a piece of software, but rather is used to assure that the building blocks the software uses work independently of each other. Unit testing is a software development process that involves synchronized application of a broad spectrum of defect prevention and detection strategies in order to reduce software development risks, time, and costs. It is performed by the software developer or engineer during the construction phase of the software development lifecycle. Rather than replace traditional QA focuses, it augments it. Unit testing aims to eliminate construction errors before code is promoted to Quality Assurance; this strategy is intended to increase the quality of the resulting software as well as the efficiency of the overall development and Quality Assurance process.

2.4.2 Integration testing

Integration testing is any type of software testing that seeks to verify the interfaces between components against a software design. Software components may be integrated in an iterative way or all together ("big bang"). Normally the former is considered a better practice since it allows interface issues to be located more quickly and fixed. Integration testing works to expose defects in the interfaces and interaction between integrated components (modules). Progressively larger groups of tested software components corresponding to elements of the architectural design are integrated and tested until the software works as a system.

2.4.3 System testing

System testing tests a completely integrated system to verify that it meets its requirements In addition, the software testing should ensure that the program, as well as working as expected, does not also destroy or partially corrupt its operating environment or cause other processes within that environment to become inoperative (this includes not corrupting shared memory, not consuming or locking up excessive resources and leaving any parallel processes unharmed by its presence).

2.4.4 Acceptance testing

At last the system is delivered to the user for acceptance testing. Here the user of the system has to be satisfied with the functionality of the system that has been designed following the requirements specifications that were gathered.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter aims at giving an account on how the system was designed all together. The methodology looks at the design and the interfaces of the system and how the system can be used to meet its requirements. It constitutes the methods and tools that were used by the researcher to gather information and data from various people as well as the limitations that were encountered during the study.

3.1 Area of the study

This research was carried out at Uganda Technical College, Bushenyi in stores section accounts department. The researcher carried out the feasibility study during College days and Holidays because all the time she could access administrators, academic and support staff as far as collection of information was concerned.

3.2 Study population

The study population was carried out among the staff and item suppliers of Uganda Technical College, Bushenyi who are 450 in number.

3.2.1 Sample size

The study included a representation of a sample of 75 respondents from Uganda Technical College, Bushenyi who among others were the teaching staff, non teaching staff and items suppliers who were chosen for the study. A special caution was taken to ensure equity in representation and gender equality to avoid or minimize biased results.

Table1: The target group

Respondent	Frequency	Percentage (%)
Teaching staff	35	47
Non teaching staff	25	33
Item suppliers	15	20
Total	75	100

3.3 Sampling method

The researcher used simple random and purposive sampling techniques when selecting the respondents for the study. This is because she wanted to cover the whole college and minimize bias

3.4 Sources of Data

There were mainly two major sources of data namely; Primary data which was to be got from selected respondents. Secondary data was the other source of data which was got from related literature like accounting records of Uganda Technical College, Bushenyi, published text books and internet.

3.5 Data collection methods and instruments

Data was collected by the use of questionnaires, interviews, observations, and internet as in order to gather data about the topic being researched.

3.5.1 Questionnaires

The researcher designed a series of questions that respondents answered at their own convenience, in order to get to know at length the strengths and weaknesses of the records management system, the decisions they take with the available data, how soon they process records to get results. Questionnaires were used because respondents had enough time to give reasonable answers compared to interviews, respondents had a chance to write requirements without influence or fear of anything, and give detailed answers thereby contributing towards system development.

3.5.2 Interviews

Face to face interviews were conducted so as to hear from the persons dealing with records management. This method was used to obtain first-hand information on how people feel about the current system being used, their hopes for the future system and recommendations they had to give. Interviews were used because:

- Interviews are cheaper and quicker to conduct because respondents give answers there and then compared to questionnaires that require typing, printing costs.

- The researcher gets primary data first hand form the respondent, while questionnaires, one can never know who filled the questionnaires.
- With interviews, the researcher gets a chance to ask the same questions again for clarity.
- The interview was used because it gives accurate information and good response rate.
- It is also suitable for literate and illiterate

3.5.3 Observation

Observation was used whereby the researcher observed how data in store was being recorded, processed and the methods used in storing data. The technique was so useful for collecting data from staff. This method of data collection enabled the researchers to witness a firsthand operation of the old system or manual system. Direct observation is the surest method of learning as a scientist and this method was richly employed because it offers the following advantages.

- It gives more detailed and context related information
- It permits the collection of information on facts not mentioned in the interview
- It permits tests of the reliability of the responses to the questionnaires
- View operations of a program as they are actually occurring
- Can adapt to events as they occur

However Observation method becomes tiresome and time costly considering the volume of work being carried out.

3.6 Data Processing and Analysis

After collecting data, it was analyzed using Ms. Excel in generating tables and figures. Data from the field was processed, analyzed quantitatively using simple statistics, tables, pie charts percentages.

3.7 Ethical considerations

The data collection involved the use of introductory letter from the Kampala International University that was taken to the company where the research was conducted. The data provided in questionnaires by respondents was treated with utmost confidentiality.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DESIGN

4.0 Introduction

Chapter four presents data presentation, analysis and design of the new store records management system.

4.1 Data presentation

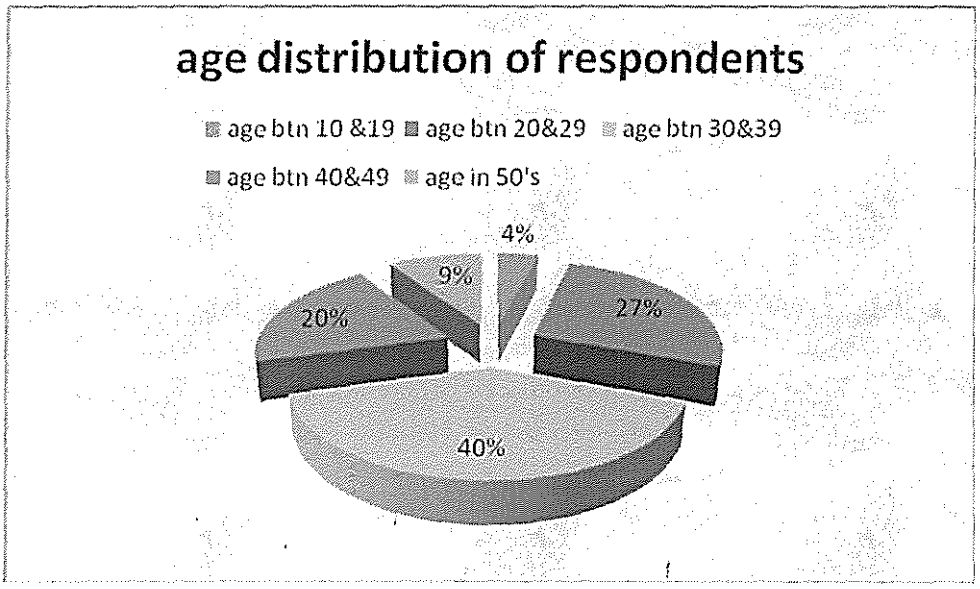
The researcher issued 75 questionnaires and got responses from 70 respondents, and a few (5) did not return the questionnaires. Data related to gender, ICT knowledge, security of the current system, need for a computerized system were obtained and summarized as below

Table 2: Age distribution of respondents

Category	Range	Frequency	Percent of Sample
Age	10-19	3	4%
	20-29	20	27%
	30-39	30	40%
	40-49	15	20%
	50+	2	9%

The majority of participants were between the age of 30 and 39 years and this represented 40% .Those between the ages of 10 and 19 years were 4%, 20 and 29 years were 27% and the participants who were between the age of 40 and 49 were representing 20%. The sample had only 7 representing 50 years of age and above which was 9%.

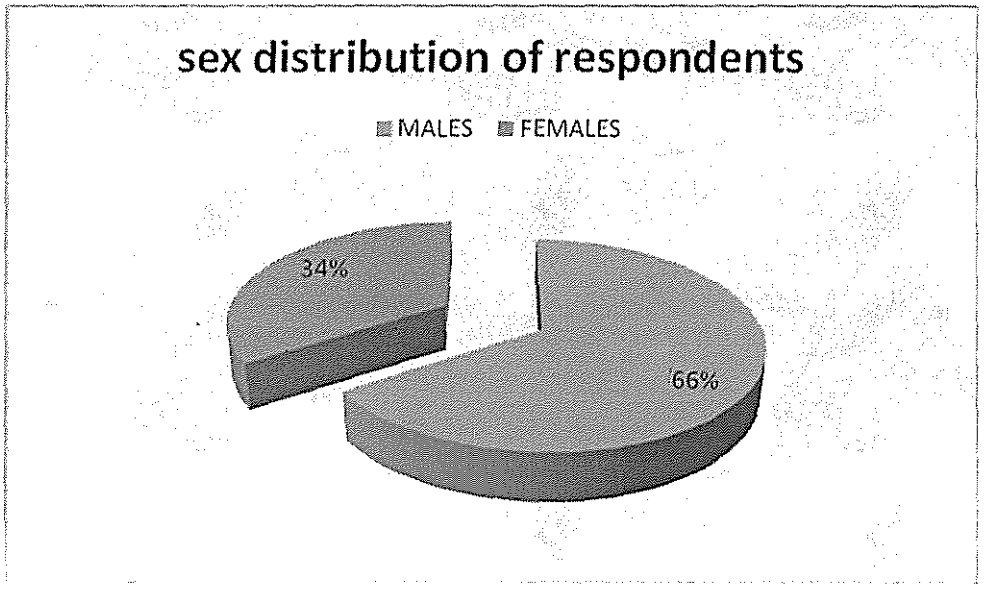
Figure 1: The age distribution of the respondents in percentages



source : Store records management system currently used in UTC, B

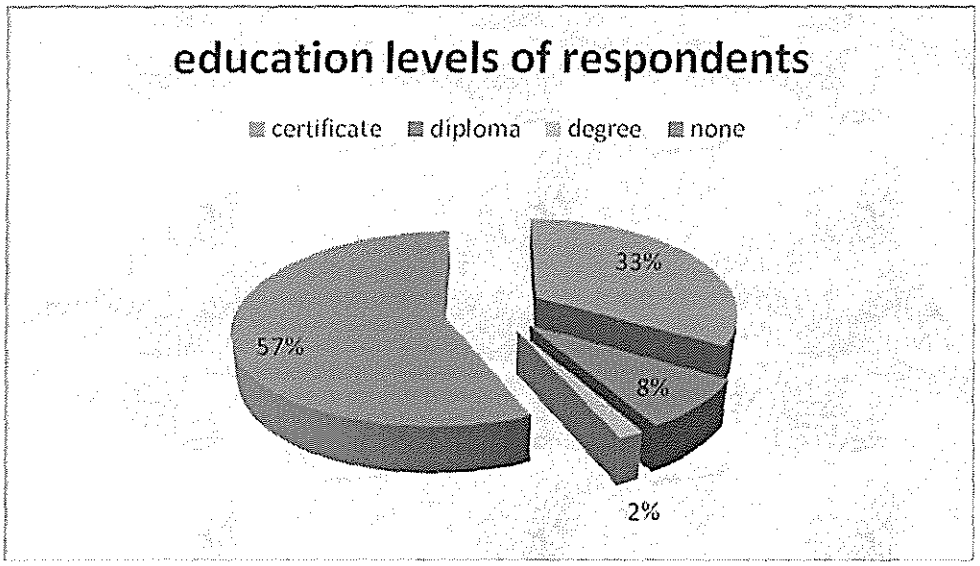
Sex distribution

Figure 2: The pie chart below shows the sex distribution of respondents



Source: Store records management system currently used in UTC, B

Figure 3: shows the level of ICT skills



Source: Store records management system currently used in UTC, B

The figure above indicates the different levels in ICT skills and literacy. Literacy among the respondents is poor; 57% had no skills at all ,only 1 person had a degree with 2%, 20 had certificates with 33% and those who had diplomas were 5 with 8%. This clearly indicates that the level of ICT skill is very low contributing towards the weaknesses in the current, manual system. The lack of adequate knowledge in ICT is a hindrance to the store records system at UTC-Bushenyi.

Table 3: Shows findings for the current store records system

Type	**Frequency**	**Percentage (%)**
Manual	53	76
computerised	15	21
Both	2	03
Total	70	100

Figure 4: shows the distribution of types of systems used at UTC,B

The systems used in UTC, Bushenyi are largely manual, as 76% of the sample testifies that the current records system is manual above. This calls for a computerised system, compared to 21% who say it is computerised because MS word is used for word processing thats is typing monthly reports

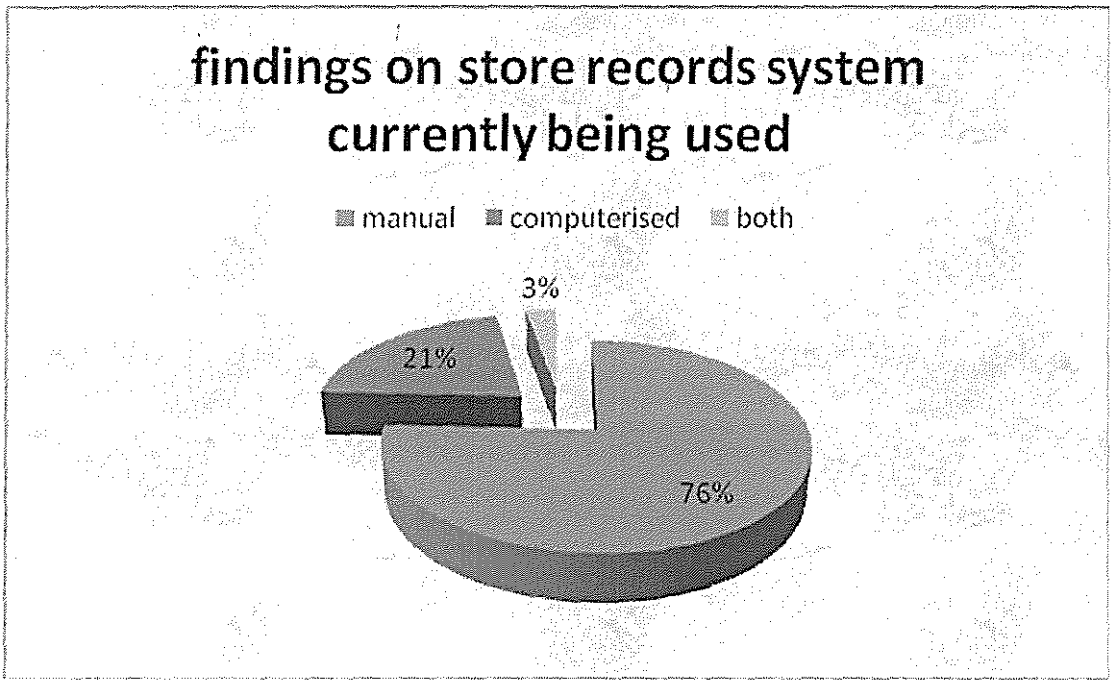
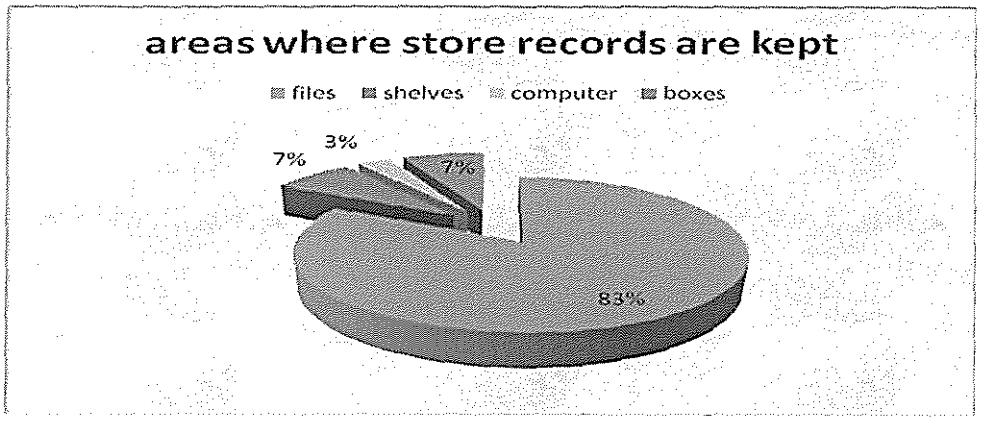


Table 4: Areas where store records are kept

Area	Frequency	Percentage (%)
computer	02	03
Files	58	87
shelves	05	07
Boxes	02	03
Total	70	100

Figure 5: shows areas where store records are kept

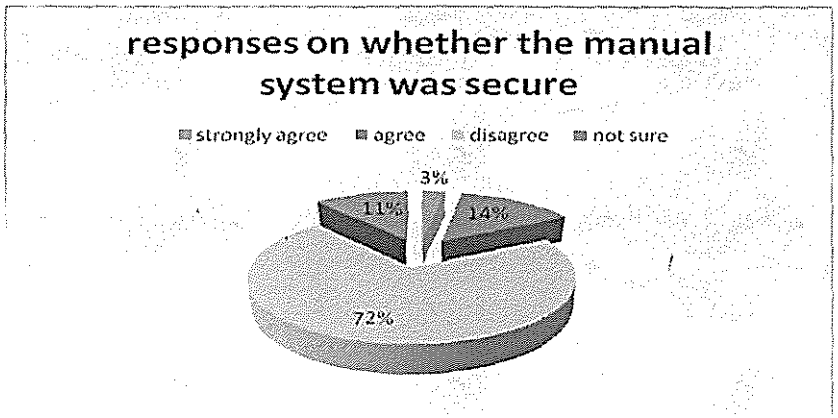


Source: Requirements analysis for the new system

Table 5: Shows findings on the level of security in the current system

Level	Frequency	Percentage (%)
Strongly agree	02	03
Agree	08	11
Not sure	10	14
Disagree	50	72
Total	70	100

Figure 6: Shows findings on the level of security in the current system



ource: Requirements analysis for the new system

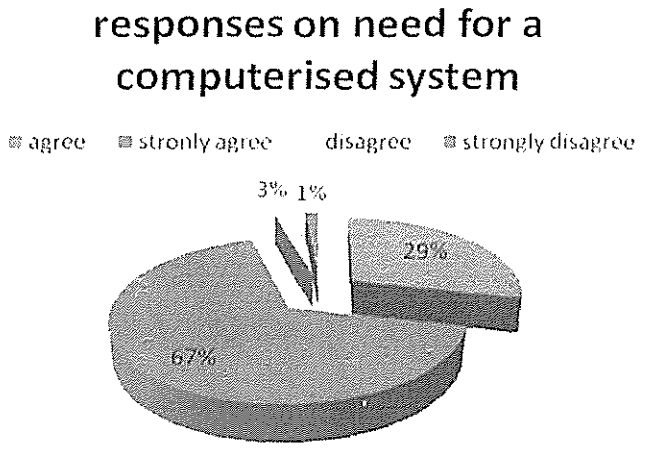
The current system has a lot of inconsistencies in data and information security as revealed by some of the staff at UTC,B during the interview. The largest percentages 72% agree that it is not effectively secure. This is not a good indicator for any information system. 14% agree and only 3% are not sure at all.

Table 6: shows respondents that preferred to use a computerized system

Response	Frequency	Percentage (%)
Strongly disagree	01	01
Disagree	02	03
Agree	20	29
Strongly agree	47	67
Total	70	100

Source: Part 2: requirements for the new system

Figure 7: shows findings on respondents who preferred computerised systems



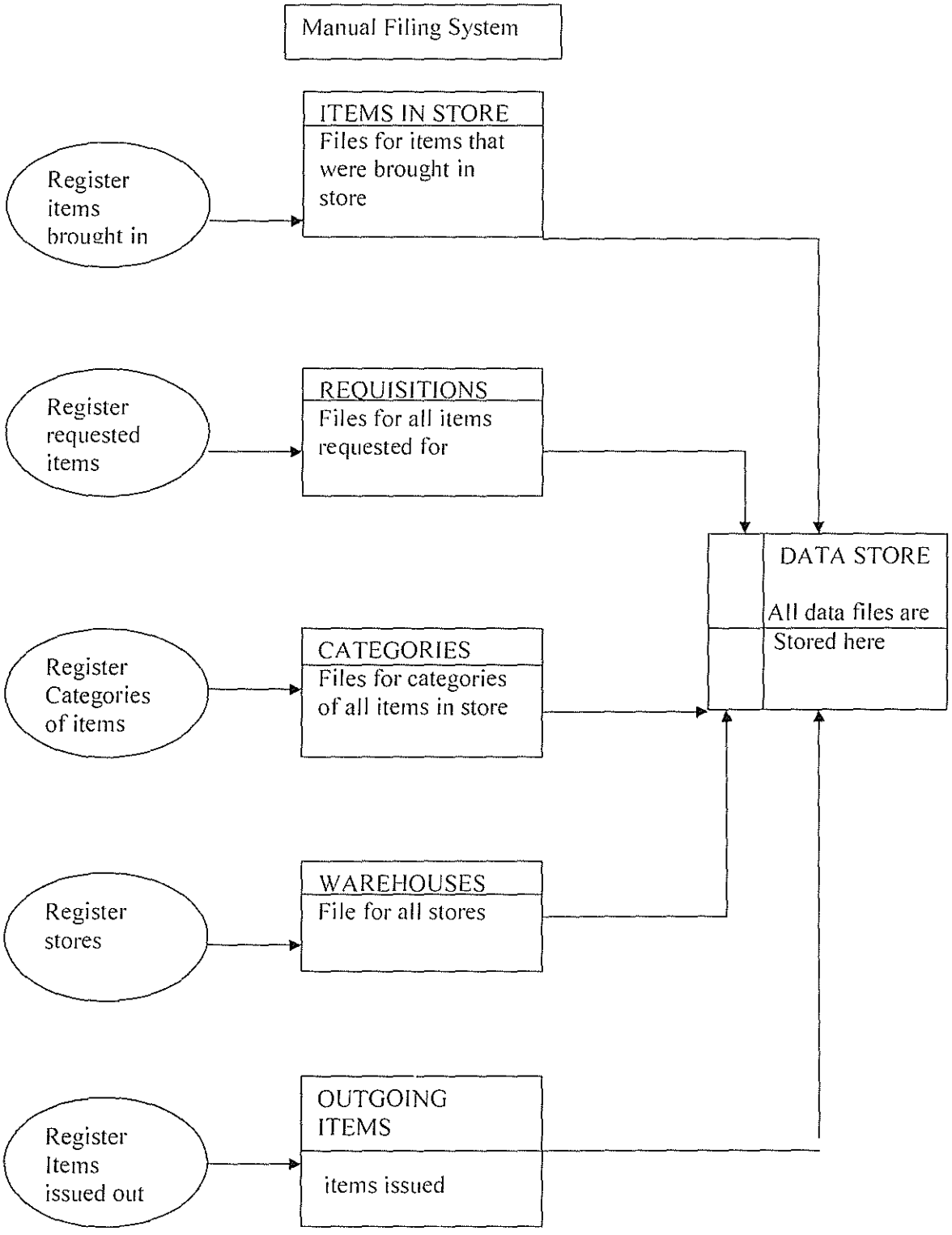
Source: Part 2: Requirements analysis for the new system

4.2 Analysis of the old System

4.2.1 Manual Filing system

UTC,B used to register store items using a manual filing system where they could write their details like item names, category, batch no, date of expiry, invoice/order no, quantity, minimum stocking level , maximum stocking level etc. They used to store all files in a data store or room where they could pick files for reference when an item is needed. The old manual filing system is clearly shown by using a data flow diagram below

Figure 8: Data Flow Diagram of the Old store records management System



4.2.2 Problems of Existing System

Considering the previous section, there were many problems associated with the existing manual system, they included the following:

1. It was evident that there was a lot of duplication in recording of the items with the manual stock cards and stock books being used
2. There was a problem of storage of these stock books and receipt files which were opened and closed at the beginning and end of every year
3. Information retrieval from these sources was not easy
4. There was a problem in decision making as there was inadequate information.
5. People waited for a long time as the store record officer looked for a particular item in the file following item tags, remember the items were many.

4.3 Requirements for the new system

Requirements specification focused on what the college would want the system to do for them, and so give all the required information so that the system could be developed on relevant information hence being able to effectively provide the intended solutions. During the feasibility study, an analysis was carried out to establish the basic requirement for the development records management system. The availability of necessary requirements and the commitment of the management to assist in this project was a key factor to the success of the project.System requirements include;

4.3.1 Functional requirements

Functional requirements include the input, process and the output procedures needed for the effectiveness of the software application system. The following tasks are performed by the system; Data capture and storage; The system provides users with the ability to save, retrieve and backup data, accept and process inquiries, update the database, and produce reports on demand decision making process. The system also authenticates and validates users, it has searching capabilities for the entities in the database. The system provides a mechanism which ensures that all updates corresponding to a given transaction are made to avoid update anomalies. Functional requirements include;

Software requirements

IDE: Netbeans IDE 7.0; Development and testing tool.

Application development languages: Java, HTML and Javascript.

Database development language: sql .

Application server software: Glassfish 3.0.1; For hosting the system

Database server software: MySQL : For hosting the database

Hardware Minimum requirements (Host Machine)

- Computer system with 1gb RAM, 80GB HDD, PENTIUM IV processor and above
- Computer network
- Windows operating system:Ms win 7,xp

Note: Since the system is web-based, client machines may not need these minimum requirements, as long as they can browse(web browsing). Over 90% of the work is done on sever side.

4.3.2 Non-Functional requirements

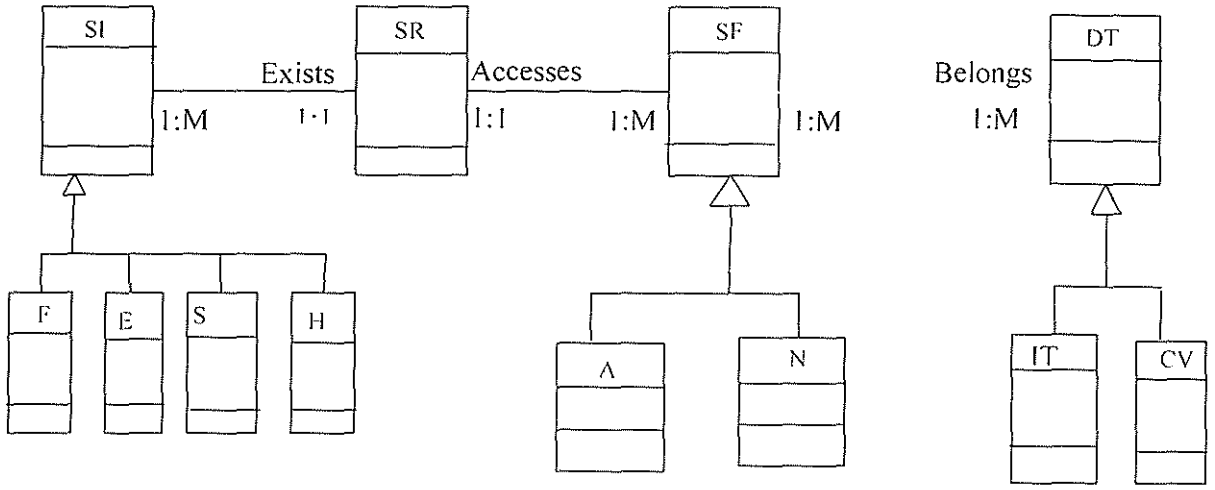
The following non-functional tasks are performed by the system;

It ensures reduced data redundancy, repetition and congestion. It has improved data security, back up, integrity and reliability by use of passwords and user names. It use standard queries, pages and reports to assist in data storage and retrieval other than the traditional lengthy programs and commands. The system is efficient in production of relevant data as and when it is required, has a user friendly interface for the system users to adopt easily, is easy to operate by users to save time during its usage and easy to maintain and adapt to by users. Example of non functional requirements includes network.

4.4 Design of the new system

4.4.1 The logical design of the system

Figure 9: Class diagram of store records management system



KEY

SI Store Items	A Admin
SR Store	N Normal
SF staff	IT Information Technology
DT Department	CV Civil

F Food items

E Estate items

S Stationery items

H Hard ware items

Figure 10: Data Flow Diagram of the New System

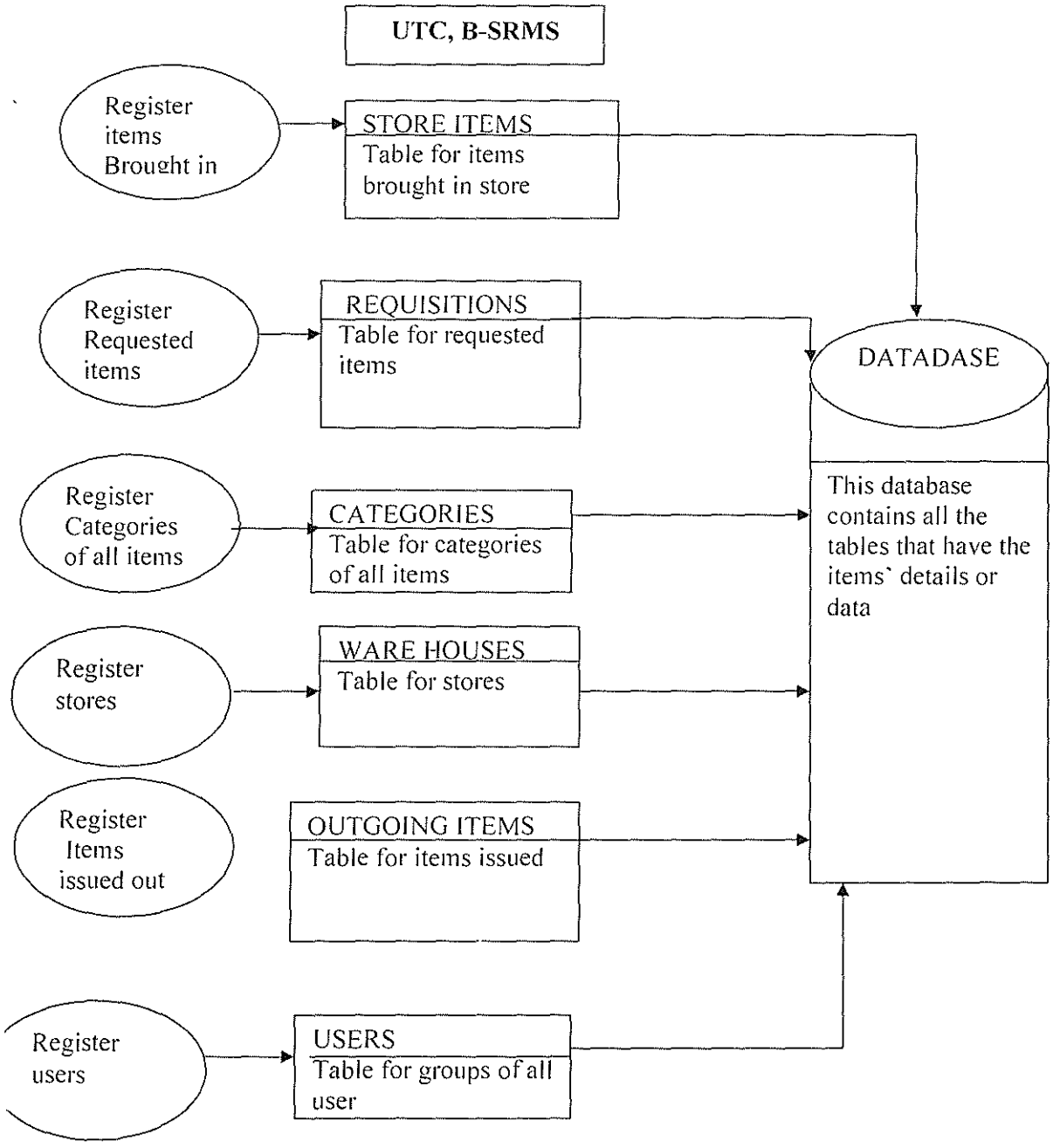


Figure 11: UTC,B records management system flow chart

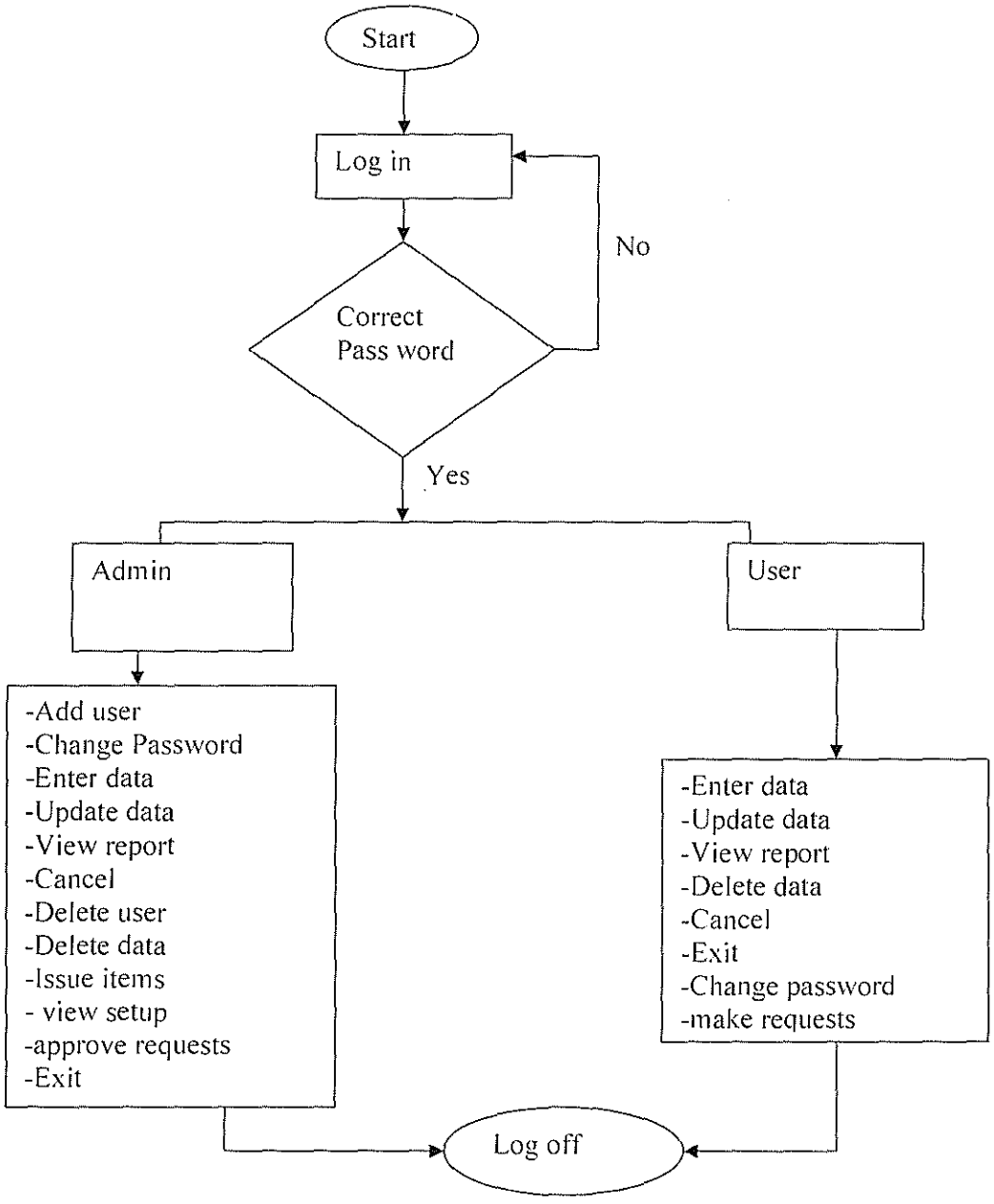
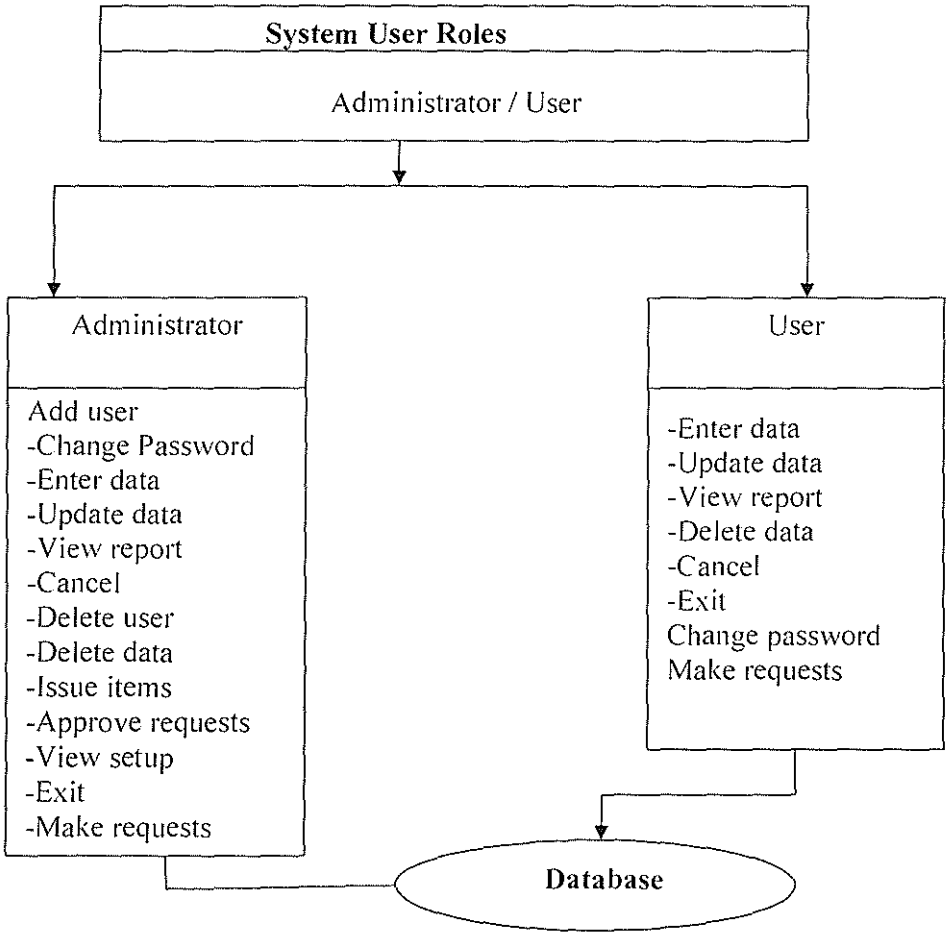


Figure 12: UTC,B records management system flow chart



4.4.2: The conceptual design of the database

The database contains the following tables

Table 7: store items

Store items table contains the details of all the items in store.

Field	Type	Size	Description
Serial_no	Bigint		Unique no assigned to item
Asset_cat	Bigint		Category of items
Item_name	Varchar	80	Item name
Count_init	Varchar	30	Minimum item stock level
Minimum_qxy	Int		Maximum item stock level
Maximum_qxy	Int		

Primary key (serial_no) Foreign key (asset_cat) references categories (serial_no)

Table 8: Categories

This table stores all the details of categories of the items in store

Field	Type	Size	Description
Serial_no	Bigint		serial no. for categories
Cat_name	Varchar	80	Category name
Cat_id	Varchar	80	Category identification no.
Rec_year	Small_int		Year of the record
Rec_month	Tinyint		Month of the record

Primary key (serial_no)

Table 9: ware houses

This table stores all the details of the physical stores with in UTC,B.

Field	Type	Size	Description
Serial_no	Bigint		
Hall_name	Varchar	80	Name of the store
Location	Varchar	80	Where it is located on the college
Room	Varchar	80	
Main_usage	Varchar	80	
Free_space	Tinyint		

Primary key (serial_no)

Table 10: user groups

This table stores details of all user groups

Field	Type	Size	Description
Serial_no	Bigint		
Group_level	Bigint		
Group_name	Varchar	30	
Description	Varchar	100	

Primary key (serial_no)

Table 11: Requisitions

This table stores the details of all requests for store items made

Field	Type	Size	Description
Serial_no	Bigint		
Item	Bigint		
req_qxy	Float		
Req_by	Bigint		
Description	Varchar	255	

Primary key (serial_no) Foreign key (item) store items(serial_no)

Table 12: outgoing items

This table stores all items issued out

Field	Type	Size	Description
Serial_no	Bigint		
Item	Bigint		
Request	Bigint		
Issued_qxy	Bigint		
Issued_from	Bigint		
Issued_to	Varchar	80	
Return_date	Varchar	25	
Issue_statement	Varchar	255	

Primary key (serial_no)

Foreign key (item)references store items(serial_no)

Foreign key (issued_from)references ware houses(serial_no)

Table 13: Audit tray

This table stores all log events

Field	Type	Size	Description
Serial_no	Bigint		
Rec_no	Bigint		
Remote_host	Varchar	30	
Page_url	Varchar	150	
Activity	Varchar	80	
Rec_year	Tinyint		

Primary key (serial_no) Foreign key (inserted_by)references register(serial_no)

Table 14: trash tray

This table stores all items deleted/trashed

Field	Type	Size	Description
Serial_no	Bigint		
Source_table	Varchar	20	
Rec_no	Bigint		
Username	Bigint		
Rec_year	Smallint		
Rec_month	Tinyint		
enabled_yesno	Tinyint		
trashed_yesno	Tinyint		

Primary key (serial_no)

Foreign key (username)register(serial_no)

Table 15: Register

This table stores all users registered to use the system

Field	Type	Size	Description
Serial_no	Bigint		
Department	Bigint		
Name	Varchar	100	
Reg_no	Varchar	40	
User_group	Tinyint		
Account_name	Varchar	40	
Password	Varchar	40	
Issue_statement	Varchar	255	
Account_status	Tinyint	3	
Rec_month	Tinyint		

Primary key (serial_no)

Foreign key (department)references department(serial_no)

Table 16: Departments

This table stores all items issued out

Field	Type	Size	Description
Serial_no	Bigint		
Faculty	Bigint		
Dept_name	Varchar	80	
Dept_short_name	Varchar	80	
Dept_head	Varchar	180	
Description	Varchar	80	
Acad_year	Varchar	15	
Rec_year	Smallint		

Primary key (serial_no) Foreign key (faculty)categories(serial_no)

Table 17: Pages

This table stores all pages of the interface

Field	Type	Size	Description
Serial_no	Bigint		
Mapping	Varchar	100	
Caption	Varchar	30	
Infor	Varchar	255	
Text_1	Varchar	255	
Order_integer	Bigint		
Subpage_yesno	Tinyint		

Primary key (serial_no)

4.4.3 Physical design of the system

The physical design relates to the actual input and output processes of the system. This is laid down in terms of how data is input into a system, how it is verified/authenticated, how it is processed, and how it is displayed as In Physical design, following requirements about the system are decided.

1. Input requirement,
2. Output requirements,
3. Storage requirements,
4. Processing Requirements,
5. System control and backup or recovery.

Put another way, the physical portion of systems design can generally be broken down into three sub-tasks:

1. User Interface Design
2. Data Design
3. Process Design

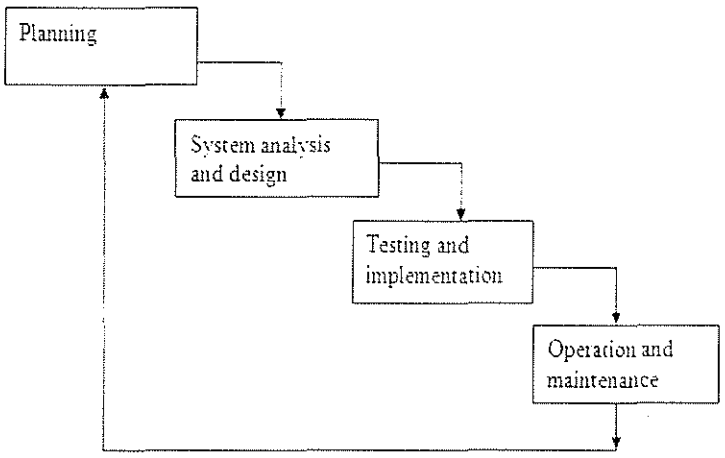
User Interface Design is concerned with how users add information to the system and with how the system presents information back to them. Data Design is concerned with how the data is represented and stored within the system. Finally, Process Design is concerned with how data moves through the system, and with how and where it is validated, secured and/or transformed as it flows into, through and out of the system.

4.4.4 System design method

Traditional water fall method

A traditional water fall method of system development life cycle, (SDLC) was used in the design and construction of the system. It comprises of Planning, Analysis, Design, Implementation and maintenances phases. SDLC was considered suitable for this project because it provides thoroughness, (Jeremy, 2008).

Figure 13: A traditional water fall model



Planning

During this stage, store records keeping problems were identified, and information technology solutions were discussed. Multiple alternative projects were suggested and their feasibility analyzed. Operational feasibility was assessed, and it was determined whether or not the project fits with the current working environment. In addition, an economic feasibility investigation was conducted to judge the costs and benefits of the project. Technical feasibility was analyzed to determine if the available hardware and software resources were sufficient to meet expected specifications.

System Analysis Phase

This was the second phase in which requirements were studied and structured. Detailed data on user and system requirements was obtained by document analysis, interviews and examination of work environments. Observation of work environment and document review was used to identify technical information, which might not have been easy to be comprehended by interview methods.

System design phase

In systems design, the design functions and operations were described in detail, including screen layouts, business rules, process diagrams and other documentation. The output of this stage

describes the new system as a collection of modules or subsystems. This stage took as its initial input the requirements identified in the approved requirements document. For each requirement, a set of design elements were produced as a result of interviews, workshops, and/or prototype efforts. Design elements described the desired software features in detail, and generally included functional hierarchy diagrams, tables of business rules, business process diagrams, pseudo-code, data flow diagrams and a complete entity-relationship diagram with a full data dictionary. These design elements intended to describe the software in sufficient detail that skilled programmers may develop and customize the software with minimal additional input design.

Testing phase

The code was tested at various levels in software testing. Unit, system and user acceptance testing was performed.

Operations and maintenance

The deployment of the system included changes and enhancements before the commissioning or sunset of the system. Maintaining the system is an important aspect of SDLC. As key personnel change positions in the organization, new changes should be implemented.

CHAPTER 5

TESTING AND SYSTEM IMPLEMENTATION

5.0 Introduction

This involves the system testing and processes of converting the system specifications into executable program (system implementation).

5.1 System testing

Testing was carried out to ensure that system software created is working correctly and efficiently. Testing is aimed at examining the internal efficiency and external effectiveness of the software. External effectiveness of the system tests to verify the functionality of the software in relation to the system design and internal efficiency tests the efficiency of the developed computer code and the documentation. Generally tests at this stage were more concerned with testing of the system accuracy, reliability of various components, the capability with range of inputs, the usual operating conditions and frequency inputs.

5.1.1 System testing levels that were done

Functional Testing

This is a type of black box testing that is based on the specifications of the software that is to be tested. The application is tested by providing input and then the results are examined that need to conform to the functionality it was intended for. Functional Testing of the software was conducted on a complete, integrated system to evaluate the system's compliance with its specified requirements.

There were five steps that were involved when testing an application for functionality.

Steps	Description
I	The determination of the functionality that the intended application is meant to perform.
II	The creation of test data based on the specifications of the application.
III	The output based on the test data and the specifications of the application.
IV	The writing of Test Scenarios and the execution of test cases.
V	The comparison of actual and expected results based on the executed test cases.

Unit Testing

This type of testing was performed before the setup was handed over to the testing team to formally execute the test cases. Unit testing was performed on the individual units of source code assigned areas. The goal of unit testing is to isolate each part of the program and show that individual parts are correct in terms of requirements and functionality.

Integration Testing

The testing of combined parts of an application to determine if they function correctly together was done.

System Testing

This is the next level in the testing and tests the system as a whole. Once all the components were integrated, the application as a whole was tested rigorously to see that it meets Quality Standards. System testing was so important because of the following reasons:

- System Testing is the first step in the Software Development Life Cycle, where the application is tested as a whole.
- The application is tested thoroughly to verify that it meets the functional and technical specifications.
- The application is tested in an environment which is very close to the production environment where the application will be deployed.
-

- System Testing enables us to test, verify and validate both the business requirements as well as the Applications Architecture.

Regression Testing

Whenever a change in a software application is made it is quite possible that other areas within the application have been affected by this change. To verify that a fixed bug hasn't resulted in another functionality or business rule violation ,Regression testing carried out. The intent of Regression testing is to ensure that a change, such as a bug fix did not result in another fault being uncovered in the application.

Acceptance Testing

This is arguably the most importance type of testing as it is conducted by the Quality Assurance Team who will gauge whether the application meets the intended specifications and satisfies the client's requirements. The QA have a set of pre written scenarios and Test Cases that are used to test the application.

5.2 System implementation

System Implementation was done to ensure that the system developed was working according to requirements specifications.

5.2.1 Samples of system interfaces

Figure 14:The Login page

Type localhost:8080/store in the address bar of a web browser and then click on OK to load the page.

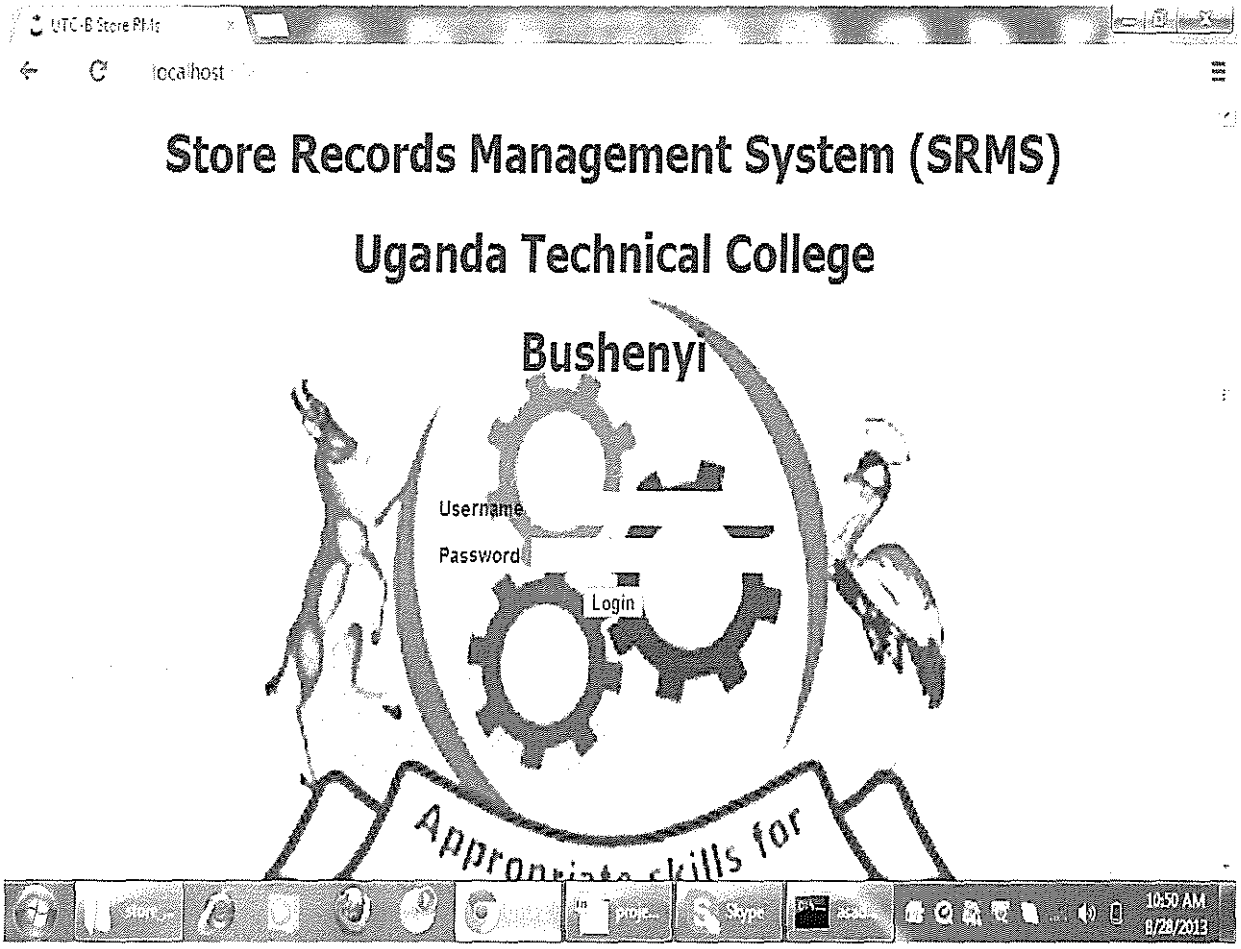


Figure 15:Welcome page

This welcome page is accessed on sucessessfuly logging in

Figure 16: Store items page

This page is where details of items in store are entered,edited,requested and issued from.

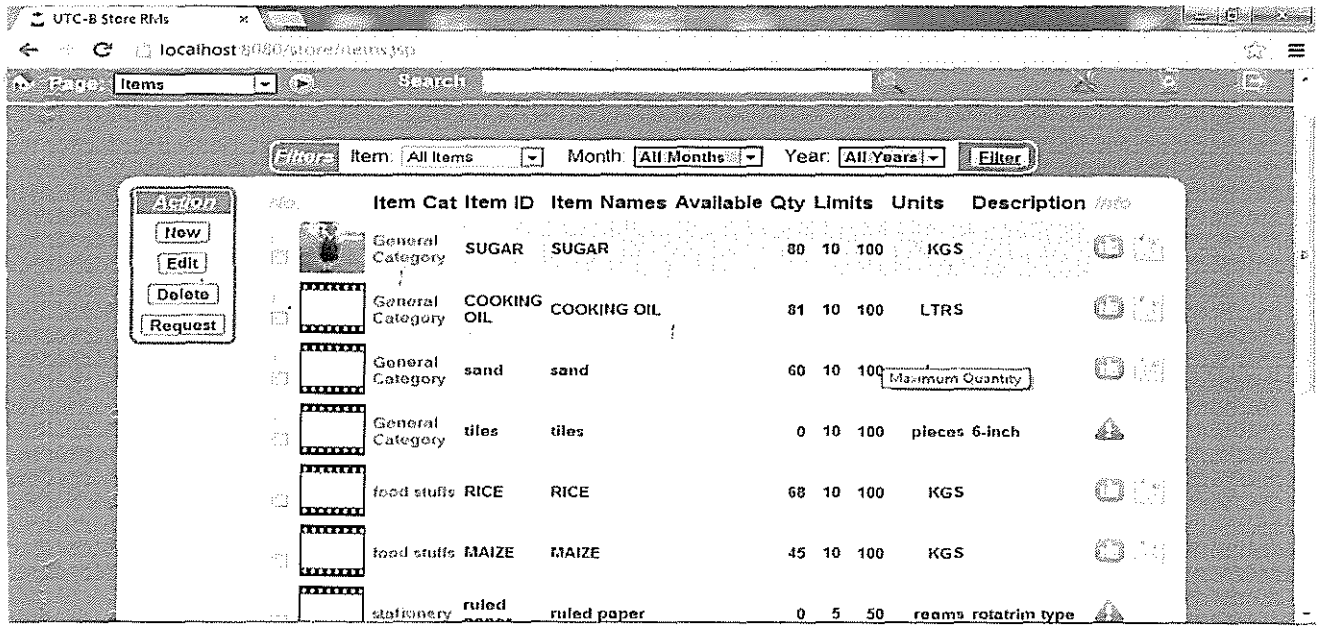


Figure 17: Stockcard page

This page has entries of item transactions within days,months,years, hours,seconds,minutes.

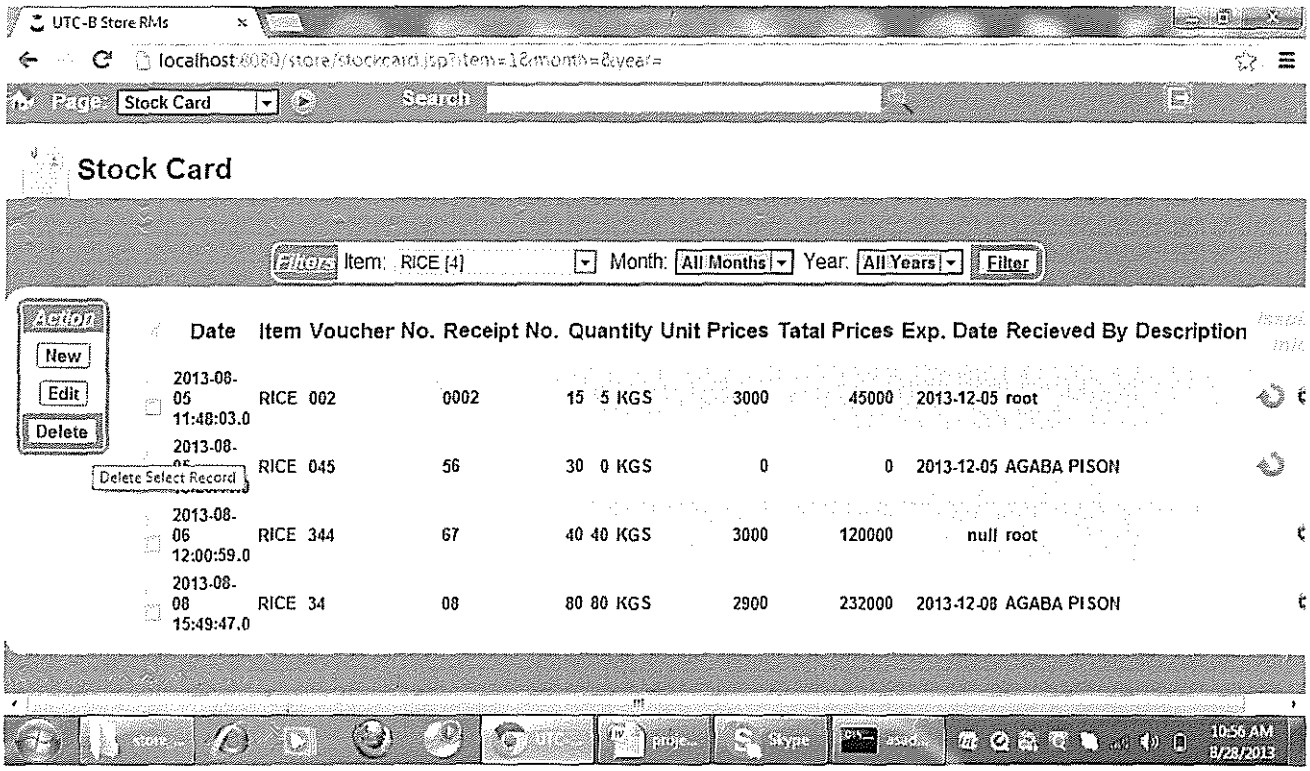
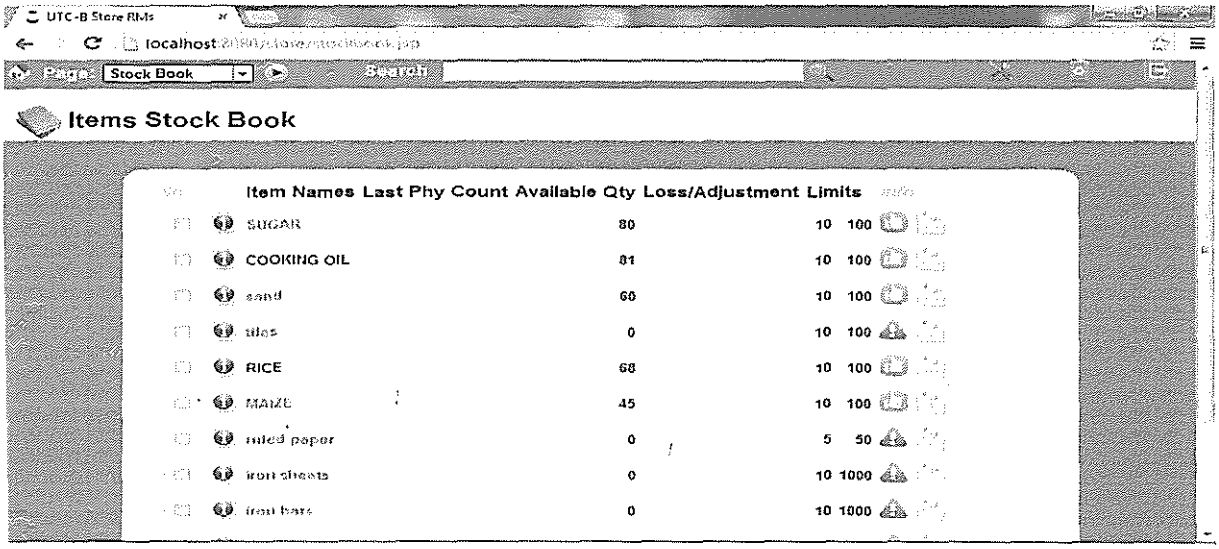


Figure 18: Stockbook page

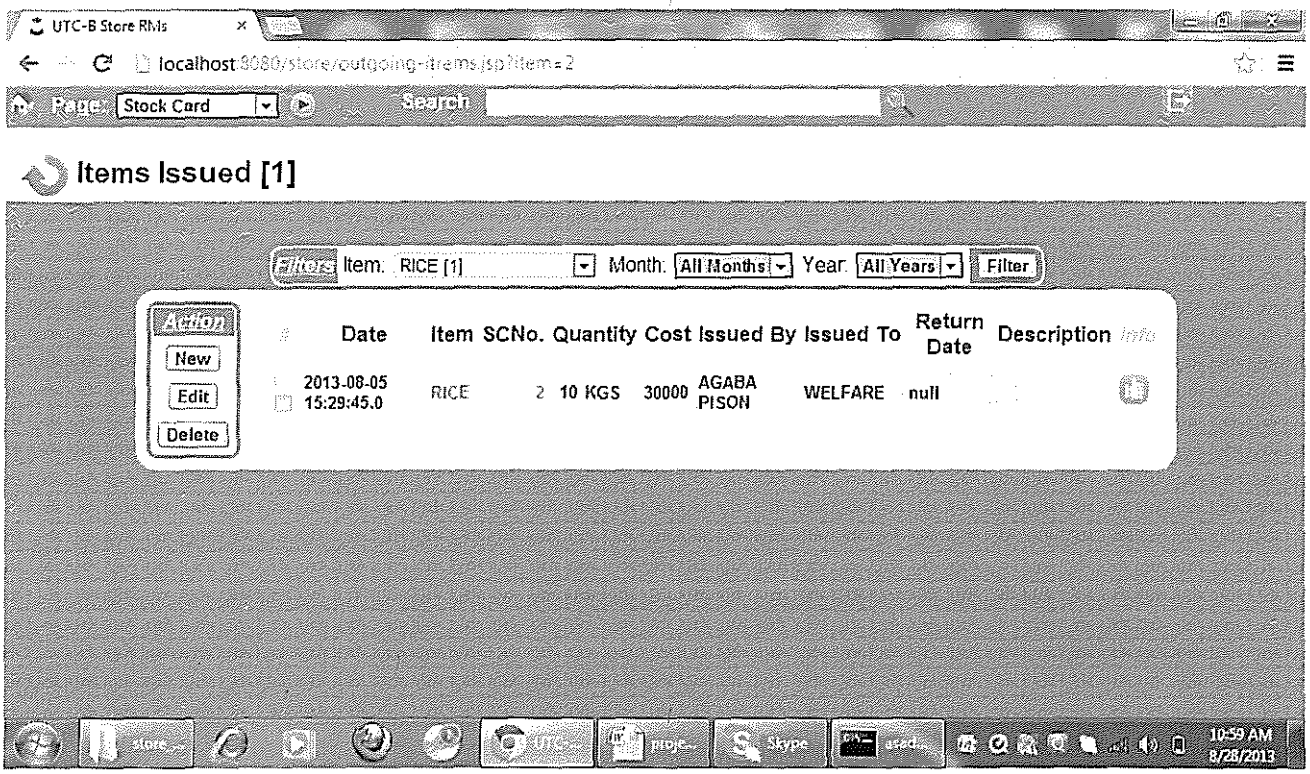
This form page has summarised information on total items in store



NB: Red colour symbol bears a warning that the item is over stocked considering maximum stock evels for rice which were set to Max=100;

Figure 19: Items issued out page

This page displays items which were isued out and their return date if necessary



Report Forms

Reports are easily generated as sampled below

Figure 20: Page for easy access to report generation

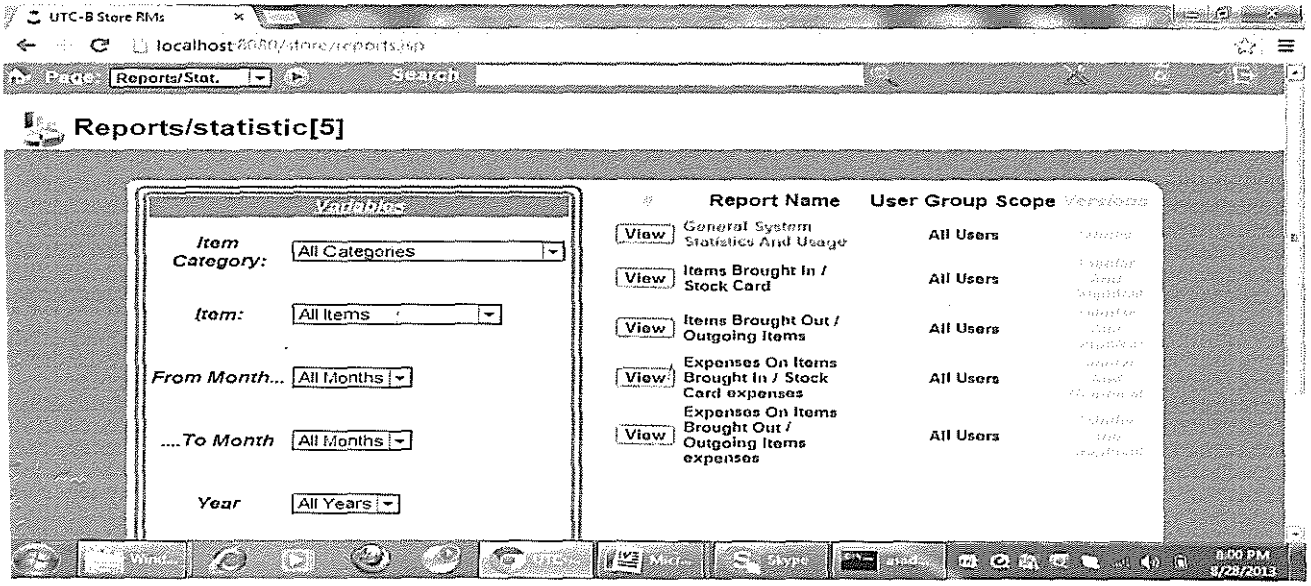
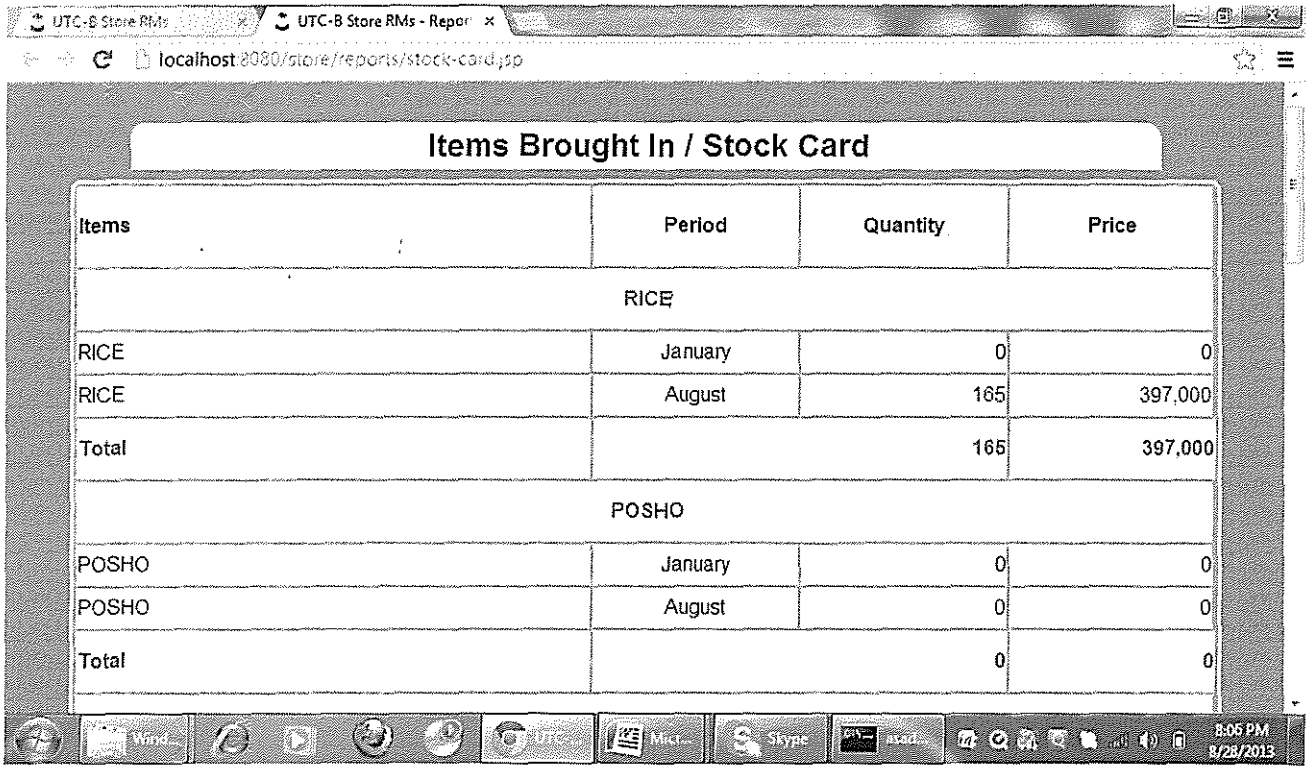


Figure 21: Report on all items in store in tabular format



Items Brought In / Stock Card

Items	Period	Quantity	Price
RICE			
RICE	January	0	0
RICE	August	165	397,000
Total		165	397,000
POSHO			
POSHO	January	0	0
POSHO	August	0	0
Total		0	0

Figure 22: Report on all items in store in histogram format

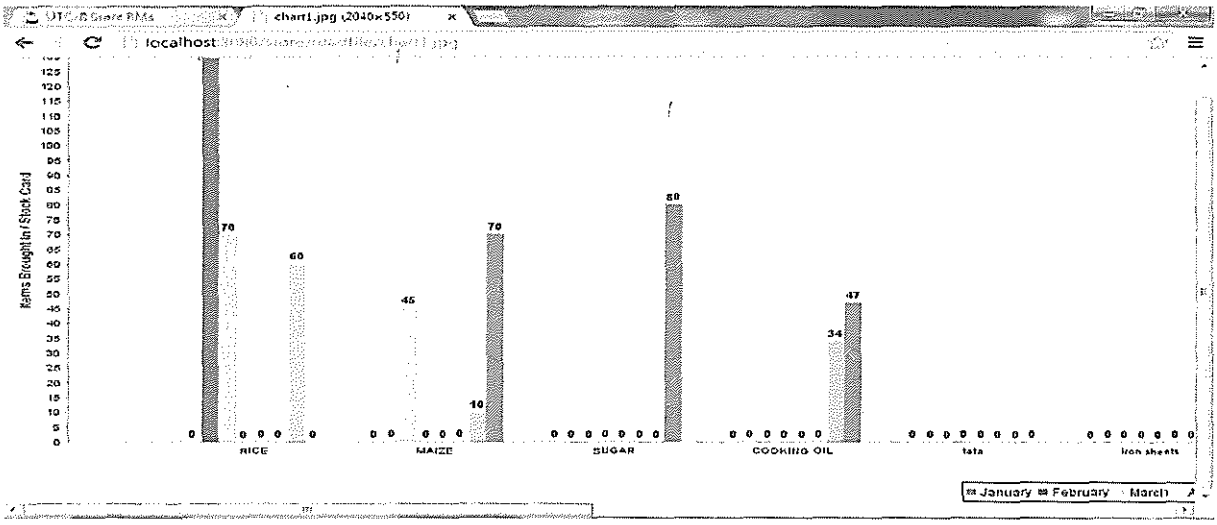
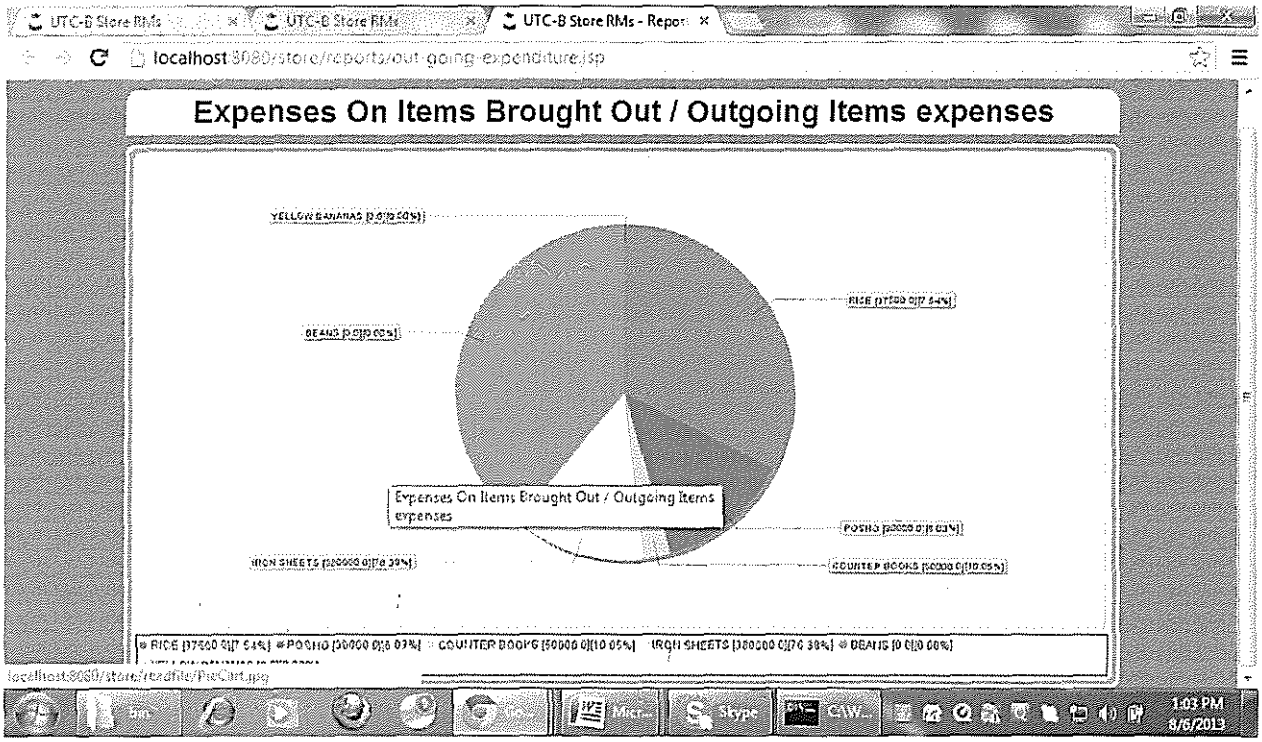


Figure 23: Report on expenses of items brought in store in a pie chart form



CHAPTER 6

PROJECT DISCUSSION, RECOMMENDATIONS AND CONCLUSIONS

6.0 Introduction

This chapter discusses the work carried out in this project. It examines how the objectives of the project were achieved using Uganda Technical College, Bushenyi as the case study. The design, implementation, conclusions and recommendations are discussed.

6.1 Discussion

The purpose of the study was to build a web-based store management system to replace the existing manual system. The case study was Uganda Technical College, Bushenyi in southwestern Uganda. To achieve the objectives of study, the existing system was studied and analysed, by comparing the strong and weak points of the system. Stake holders were interviewed, documents reviewed and observation techniques were employed. Existing literature was also analyzed. Implementation was done using

IDE: Netbeans IDE 7.0; Development and testing tool.

Application development languages: Java, HTML and Javascript.

Database development language: sql .

Application server software: Glassfish 3.0.1; For hosting the system

Database server software: MySQL : For hosting the database

. The new system is therefore able to do the following:

1. Capturing of store Items is done once; on reception as opposed to the manual system where an Item is re-recorded every time it is taken out or brought in stores. This avoids duplication and saves time.

2. Retrieve Information from the database as quickly as one searches on the screen compared

to the old system which involved paper files which were vulnerable to displacement and damage.

3. Authenticate the users with the access control facility to prevent unauthorized users from accessing the data.

4. Validate the entries by prompting the user whenever a wrong command is entered to avoid unnecessary errors that can distort information.

5. Update the database whenever new information is entered

6. Reports are generated quickly and correctly, unlike in the old system where information would be scattered in charts

6.3 Recommendation

A more comprehensive study to exploit the full benefits of the new technology in this field of store records management is highly recommended. This may be able to unveil more gaps and therefore improve on the system more than this study has been able to do. The Government, the Ministry of education and sports in particular should step in to have all secondary schools, technical institutes and colleges, universities computerize their records management systems by providing the necessary funds for such projects. Given the current power situation in Uganda, the system would be rendered useless if measures are not put in place to avert power problem. The researcher therefore recommends that a standby generator be considered such that when power goes off the system does not stop working. Training of the College staff in minimum computer skills is paramount. It was found out that heads of departments are not equipped with ICT facilities in their offices. Without networked computers in heads of departments offices, system implementation will be difficult therefore it is recommended that each head of department gets access to a networked computer and a training program in ICT skills be made a priority.

6.4 Conclusions

Basing on the findings and analysis, computerization of store records management is a venture worth to invest in. Once taken seriously and embraced, there are a lot of benefits that can be realized therein. Both the College and the community it is serving will benefit from it. For example it ensures that necessary items are always in store at the right time and in the right place so this reduces on stress of abrupt purchases that ends up becoming expensive and even compromising quality of items since one will run to nearby source of item missing out on looking for the best choice. Store records

errors that were resulting from lack of information for proper decision making on the part of administrators are minimized. Records which were stored in the records center, in files and sometimes get lost there, are now stored electronically and are more safe. Therefore there is right information at the point of care. Periodic reports which are generated with the help of a computer are more accurate and quick. Therefore with the introduction of computerization, the problem of late reporting and errors in the reports are no more. It is important to note that this system is based on a local area network. This facilitates the sharing of data in different departments. This helps personnel access the data at their departments instead of moving from department to department looking for information which is time consuming.

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APPENDIX B:

THE QUESTIONAIRE

Dear respondent, the questions below are meant to help the researcher improve his/her understanding of the current store records management system at Uganda Technical College, Bushenyi. Computerized system is a system that helps users to capture and store data. The proposed computerized system will help to improve service delivery in your organization. Your response is highly appreciated. Thank you.

Part 1: Analysis of the store records management system existing at UTC,B

a) Age : 10-19 ☐ 20-29 ☐ 30-39 ☐ 40-49 ☐ 50+ ☐

b) Sex: male ☐ Female ☐

c) Occupation: ☐

d) Education Levels in ICT: certificat☐ Diploma ☐ Degree ☐ Other ☐

1. What system is being used in the stores records management at UTC, Bushenyi?
   a. Manual (files and papers ☐ b. computerized ☐ c. both ☐

   d. others (please specify) ☐

2. Is the system mentioned above easy to use?
   a. Yes ☐ b. no ☐
3. If your answer above is no, state why
   a. Tiresome ☐
   b. Looking for a record is hard ☐
   c. Records can easily get lost ☐
   d. Comparing records is hard ☐
   e. Records can be duplicated ☐
4. If your answer is yes in question 2, state why
   a. Files are given item tags to trace records ☐
   b. It is secure because we lock the door ☐
   c. We can easily find records of 4 years a go ☐
   d. Creating reports is easy ☐

Part 2: Requirements analysis for the new system

Tick in the check box provided

1. Where do you keep store records?
    a. Files ☐
    b. Cabins/shelves ☐
    c. Computer ☐
    d. Others (please specify) ☐
2. Is this method secure?
    a. strongly agree ☐
    b. agree ☐
    c. disagree ☐
    d. strongly disagree ☐
    e. not sure ☐
3. If your answer is c and d above, chose why?
    a. Files easily get mixed up/misplaced ☐
    b. Files can easily catch fire ☐
    c. They can be stolen ☐
    d. Can be spoilt by natural disasters ☐
    e. Can be spoilt by careless personnel ☐

APPENDIX C

ORGANISATION STRUCTURE OF UTC-B