ABSTRACT

Midlands State University Student Cyber Deferment System is an online-computing solution system that allows the current students to defer and resume their studies online and receive the confirmation via email. Student cyber deferment system will give more room to access the information of the student who deferred their studies through use of various cyber computing platforms provided by the system for example 3D Bar and linear graphs .Interviews, questionnaires and observation where used as data gathering methodologies and it was found out that students have to come over to campus to do the deferment process thus time consuming and tiresome and it was difficult to produce a record of student who has deferred their studies during a period of time. The system helps to secure and provide efficient means of carrying out the student deferment processes.

DECLARATION

I, Tinashe Makiwa hereby declare that I am the sole author of this dissertation. I authorize the Midlands State University to lend this thesis to other institutions or individuals for the purpose of scholarly research.

Signature _____ Date _____

APPROVAL

This dissertation entitled "**Midlands State University Student Cyber Deferment System**" by Tinashe Makiwa meets the regulations governing the award of the degree of Bsc Information Systems Honours Degree of the Midlands State University, and is approved for its contribution to knowledge and literal presentation.

Supervisor: _____

Date: _____

ACKNOWLEDGEMENTS

The author wishes to express his sincere appreciation to his supervisor, Mr Mamboko for his generous contribution of time, interest, effort and patience during the development and writing of this dissertation. Your constructive criticism and encouragement deserve a hearty 'Thank you'. Let me also extend my gratitude to the Midlands State University ITS staff for their time and cooperation in the project development. for their support and motivation of this dissertation to seeing it a success. Finally the author thanks the Creator Almighty God who gave me knowledge, life and strength to persevere in completing this work even when it was tough through the

DEDICATION

This research project is dedicated to the ssss family, their unwavering support is magnificent.

TABLE OF CONTENT

Page number

List of Acronyms

CBS   **Cyber Space**

EXO   **Executive Office**

HTML   **Hypertext Markup Language**

ICT   **Information and Communication Technology**

ITS   **Information Technology Services**

IP   **Internet Protocol**

MSU   **Midlands State University**

PHP   **Hypertext Preprocessor**

USB Universal Serial Bus

WWW   **World Wide Wed**

List of Appendices

Page number

CHAPTER ONE: INTRODUCTION

1.1Introduction.

Midlands State University Student Cyber Deferment System is an online-computing solution system that allows the current students to defer and resume their studies online and receive the confirmation via email. The chapter introduces the proposed system by the researcher looking on the background of the Midlands State University pointing out its vision, goals and the mission of statement. The problem identified in the organization by the researcher is defined fully and the objectives of the proposed system are reviewed which will resolve the identified problems. Instruments to be used in the development of the proposed system are also stated showing the advantages of using those instruments chosen. The rationale of carrying out the research study is lastly outlined.

1.2 Background of the organization.

Midlands State University was formed during the year 2000, due to change of education redistribution made by the Ministry of Higher Education and Technology. This stated in 1998 where the Gweru Teachers College stated enrolling students for the degree which was offered by the University Of Zimbabwe called Bachelor with Commerce in education and Bachelor of Science in Education .Gweru Teachers College was then named to Midlands State University after the Minister Of Higher Education basing on the Midlands act of 1999 which emphasizes to have a state university in the Midlands Province. The president of Zimbabwe his Excellency R.G Mugabe accepted the idea and the Midlands State University were established. The new state university was sited at the Gweru teachers college found in Senga one of the suburbs in Gweru.

The university offers two mode of study which are undergraduates and the visiting mode. Undergraduates are full time students enrolled as conventional or parallel which include degree with maximum study time of five years. Only students with the required pass grades of the advanced level are qualified to enter to the university. The visiting mode is for the employed students who have qualifications of O level and relevant certificates and diplomas to the applied degree. Lectures of the visiting school are done one week in a month and their degree takes three years to complete

1.2.1. Organizational Structure

The organizational structure shows the hierarchical lines of communications, authority, rights and duties whilst defining how power, roles and responsibilities are coordinated, controlled and assigned within the organization (Borrington, 2013).Organizational structure is a hierarchical flow line of communication, rights, rules of authority and rights pointing out how roles, responsibility and power are governed and given in the organization. The university is an academic institution led with a Chancellor of all Universities in Zimbabwe, President R.G Mugabe .The Vice Chancellor is selected by the Chancellor taking responsibility of running the institute as a whole. The organizational structure of the university is shown on the below.
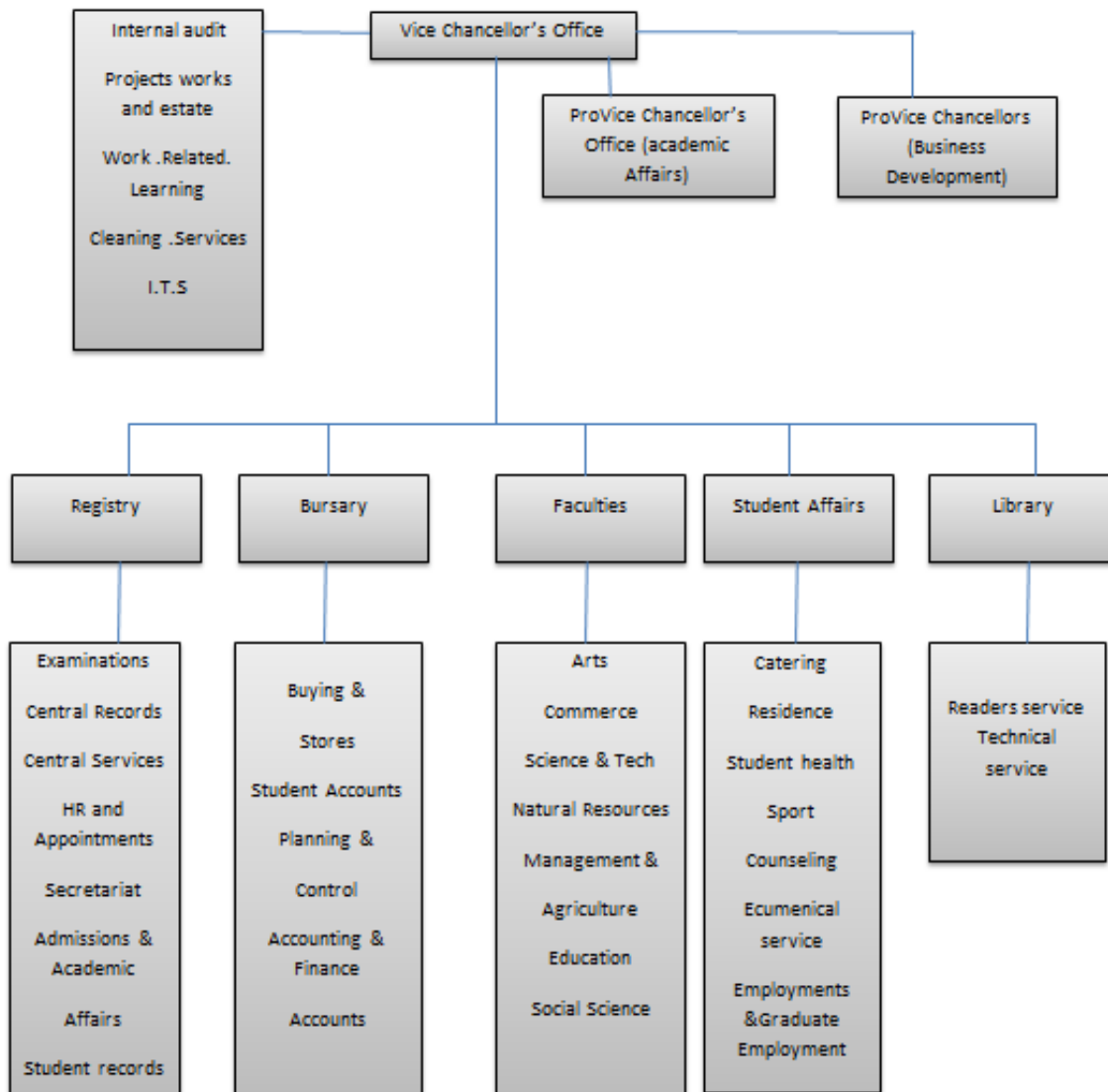
Figure 1.1Ogarno-Gram of MSU Zimbabwe.

1.2.2 Vision.

This is an organization desired destination or where they see themselves in future terms (Tearle, n.d.).The University's vision is to become a totally different, setting pace and a participating state university that releases great students.

1.2.3. Mission Statement.

This is an organization set of rules to be followed that defines all objectives and purpose of existing (Manktelow,n.d.).

- Commitment to improve the performance of the economy through the promotion of managerial skills and generation, dissemination and application of knowledge.
- Commitment to recruitment, motivation and retention of staff in an environment of caring institution.
- Commitment to the use of Information Communication Technology (I.C.T) and the virtual classroom, as principal teaching and training modes of delivery and research.
- Commitment to gender equality and equity in student admissions and staff recruiting policies.
- Commitment to enhance the quality of people's lives through new ideas and skills for sustainable utilization of resources.
- Commitment to promotion of quality of research through both taught and research post.

1.2.4. Goal

To establish a University with ten faculties, eighteen thousand scholars, nine hundred lecturers and four hundred supporting services and staff having excellent services and infrastructure by time 2015 is reached.

1.3. Problem definition.

Problem definition basically involves analyzing a certain system, situation or condition and identifying and outlining the flaws noted within the analyzed domain (McQuain, 2012). Student studies deferment is currently a manual paper work system. A student has to collect the deferment or resumption forms from the student records offices. The forms will have to be filled by the student stating the reason for deferring the studies. The form will have to be signed by the departmental chairperson approving or disapproving the request by the student, if approved the student will have to proceed with the forms to the registrar office, the accounts office, the library and finally submits it to the students records office. The following problems were discovered:

- Students have to follow a long trend process when deferring their studies.
- The current system does not send confirmation when the deferment process is successful.
- Students have to come over to campus to do the deferment process thus time consuming and tiresome.
- It is difficult to produce a record of student who has deferred their studies during a period of time.
- Deferment forms are easily misplaced since there are hard copies.

1.4. Aim.

To develop a cyber-computing solution for the university that allows current students to defer online and receive the confirmation via email.

1.5. Objectives.

- To allow students to request for deferment of their studies on student portals.
- To allow the department chair person and the registrar to accept or reject request of studies deferment by the student.
- To allow students to view their deferment status on their portals.
- Send an email confirmation when deferment of studies is successful.
- Facilitates data visualization thus to provide data and information on deferred students using graphs.
- To allow an automated database backup facility.

1.6. Research Instruments.

MYSQL   Developers could make use of command line utensils, or MySQL graphic user interfaces and web programs that generate then manage SQL databases, construct database assemblies, store data for future uses, review rank, and labor with data archives and is a database implemented on a client server.

P.H.P Coding of the system will be done using PHP programming language. This is a general computer language that is used mainly to develop websites and online based systems. (Olsson, 2013). This language is that it is easier to obtain, it is an open source, and it is easy to use and is compatible with many platforms.

Macromedia Dreamweaver CS6 This is web design software that enables the researcher code and design the interface for the system. The software uses HTML and PHP for coding and designing. The software can be downloaded on the adobe official website. Editing and creating of websites is faster in developing.

1.7. Justification.

- Cyber Spacing is an environment where there is a non-physical communication between individuals over networked computers this will allow all university student data to be kept in a huge computer network database shown in a 3D view.

- Student cyber deferment system will give more room to access the information of the student who deferred their studies through use of various cyber computing platforms provided by the system for example linear graphs .

- With the use of the new HTML.5 clear visual charts are provided and will lead to effective analysis and report.

- Java-Script will lead to efficiency of operations of the studies deferment system which include validation of the system. The proposed cyber deferment system enables efficiency, accuracy and safe circulation of the student information.

- Student cyber deferment system which is under research tries to allow students to defer and resume their studies anyway online regardless of their Geographical barriers using any networked gadget to the internet.

- The proposed cyber deferment system seeks to reduce the workload and the use of paper work since all the process will be automated.

1.8. Conclusion.

Midlands State University uses a manual deferment system this has led to the computerization of the system which is fast and efficient. The process of student studies deferment will be better after the implementation of the new proposed system. Planning will be the next stage which looks at the feasibility and developing the system proposed by the researcher

CHAPTERTWO: PLANNINGPHASE

2.1   Introduction

This section reflects the rationale of developing the proposed system with respect to the business objectives of the institute Midlands State University. The main exercise that will be carried out and highlight the worthiness of building the proposed system are feasibility study. The feasibility study will be carried out under the following categories: technical, economic, social and operational. After establishing whether it is viable to continue with the project, a work plan will be drafted to guide the sequence of activities that will be carried out to deliver and deploy the proposed system. It is imperative to elaborate the business value to be realized if the system is implemented and this chapter also highlights the business value to be accrued after the system is fully operational.

2.2 Reasons for developing a new system

The student studies deferment system at Midlands State University is a manual paper-work based system and the following are the reasons why the Cyber Deferment System is been developed:

➢ If Student Cyber Deferment system is well implemented more time is saved made by the process of student deferment request to be verified since the whole system takes place online.

➢ High risk occurs when doing manual recording since humans are vulnerable in making mistakes. With the proposed system risk is reduced and they will be data integrity and maintaining. There is a risk in manual recording of data as human beings are prone to making errors. The proposed system will minimize that risk and at the same time maintaining data integrity

➢ Adhoc reports will be generated using the Student Cyber Deferment System this will be used with the institute management in making decisions and planning. For example, the proposed system will be able to generate reports for the deferred student per semester.

➢ The proposed Student Cyber Deferment System will send deferment confirmation using email. This will give the student easy access of the student deferment status.

2.3   Business value

The proposed system is mainly focused on operational improvements and excellence and the business value to be realized after the completion of the project can be measured by performance indicators such as transaction processing time, accuracy and system run-time errors (Bloch and Hoyos-Gomez, 2009). Capon (2000) suggests that values are things, people or attitude that groups of people think are very important to be reverend or respected. These performance indicators reflect how the system has improved the existing business processes therefore it is crucial to identify the areas that the project will impact. Basically business value translates the performance change to intangible and tangible value. At Midlands State University, the Student

Cyber Deferment System will bring tangible value like improved deferment processing time, accurate data recording and data-security, and time saving of valuable time by removing some processes. Some of the intangible value includes increased stakeholder user experience and satisfaction.

2.4   FeasibilityStudy

Feasibility study is done to find out if it will be fiscally and achievable to direct a task (Steven and Sherwood, 2009). If feasibility study results propose the project to be viable, then all resources that lead to the success of the project and projected result can start. Katimuneetorn (2008) suggested that feasibility study is a process of evaluating to see whether the project is worthy carrying out. There are four classification of the feasibility study that can be under taken which are:

- Technical
- Economic
- Social
- Operational feasibility.

2.4.1 Technical Feasibility

Basically technical feasibility study focuses on determining whether the technology that is needed to develop and deploy the proposed system is available or not (Thompson, 2003). Technical feasibility can be demonstrated if reliable hardware and software capable of meeting the needs of the proposed system can be acquired or developed in the required time (Agarwal et al, 2010).Technical feasibility ascertain to determine if the proposed system can actually be built and delivered as per objectives defined in the system blueprint.

The table below shows the hardware items that are needed to develop and implement the proposed system.

The Quantity	The Item	Brief Specifications
1	Personal Computer	3 GB RAM

		Core I 3 processor
		2.83 GHz
		350 GB HDD
1	Backup Server	2 GB RAM
		Core I 5 processor
		2 GHz
		250 GB HDD
1	HP jet printer900	
1	Network Modem	GSM Dongle

Table2.1: Hardware Requirements

The table shows the software needed to develop and implement the proposed system.

Software	Version
Operating System	Windows 7 Ultimate
WAMP Server	2.0
Navicat	Premium
Adobe Dream Weaver	Creative Cloud

Table 2.2 Software Requirements

2.4.2 Economic feasibility

Economic feasibility determines whether the project makes financial sense and whether predicted benefits offset the cost and time needed to obtain them (Stair and Reynolds, 2012). If the revenues/benefits to be realized when the project is successfully completed outweigh the costs, and then the project is deemed financially-viable. The economic feasibility exercise is carried out to perform an analysis of costs and revenues associated with the project to be carried out in order to ascertain if it is logical and possible to commence executing the project to completion (Thompson, 2003).Before any funding approval is granted, it is a prerequisite to carry out an economic feasibility study and a technique called cost benefit analysis can be used to highlight the viability of the project to be carried out.

2.4.2.1Costs

These are expenses encountered so as to achieve a certain goal (Hofstrand, 2006). The project to be carried out will make Midlands State University outlay financial resources in order to fund the project from the development stage to the operational stage. Therefore the costs to be incurred will be divided into development costs and operational costs (Smith, 2014).

Development costs

Smith (2014) stated that development costs are costs an organization incur in the preliminary stages to implementation of a project. Development costs are total costs involved in the development of the whole entire project (Zimmer and Scarborough,2005). These are the costs that will be incurred during the development stage of the proposed system. An estimate of development costs are shown in the table below.

Item	Quantity	Estimated Cost (US$)
Client Server	1	800
Backup Server	1	450
Network Modem	1	300
HP jet printer 900	1	500

Total		2050

Table 2.3 Development-costs

Operational costs

These are running costs that are incurred when the system is fully operational, that is, costs incurred on a daily basis. Operational costs are also known as non-discretionary budget (Rouse, 2008).

Operations	2015	2016	2016	Total
	US$	US$	US$	US$
Maintenance Software and Hardware	1 100	1 050	900	3050
Software Licensing	900	850	800	2550

Stationary	200	100	150	450
Training and Development	1000	1100	1050	3150
Total	**3 200**	**3100**	**2900**	**8600**

Table 2.4 Operational-costs

2.4.2.2 Benefits

Great momentous view of financial resources is seen on the project; once the system starts to operate more benefits are likely to accrue which are intangible and tangible benefits.

Tangible benefits

Tangible benefits are benefits capable of being measured that is are quantifiable whereas intangible benefits are not measurable they are not quantifiable and cannot be touched (Barnes etal, 2001).Below are the benefits that are expected by the institute if the Student Cyber Deferment System is successful.

Tangible Benefits	2015 US$	2016 US$	2017 US$	Total US$
Reduced Errors	1000	900	800	2700
Reduced Operational Cost	2000	1900	1900	5800
Reduced Stationery Cost	200	150	100	450
Reduction in labor	2100	2050	2000	6150
Total Tangible Benefits	**5300**	**5000**	**400**	**10700**

Table 2.5 Tangible benefits

Intangible benefits

Cappozi (2012) suggested that intangible benefits involve all of the qualitative advantages of using Student Cyber Deferment System. These are benefits that are difficult to measure in monetary terms but have a significant impact on the business and its processes (WebFinace Inc, 2014). Midlands State University will possibly have benefits from the intangible returns shown below.

Intangible Benefits	2015 US$	2016 US$	2017 US$	Total US$
Company Image Improved	200	130	100	430
Saving Time	250	170	150	570
Stakeholder Satisfaction	300	300	250	850
Total Intangible	**750**	**600**	**500**	**1850**

Table2.6: Intangible benefits

Investment Appraisal

2.4.2.3 Cost benefit analysis

Cost benefit analysis is the present value of all benefits less than all costs, subject to specified constraints (Brent, 2006). The expected cost and likely paybacks are drafted hence facilitating a cost benefit analysis where cost are compared against benefits to determine if it is worthy it to carry out the project. Cost benefit analysis quantifies all the advantages of the project and these are the benefits, it also adds up and quantifies all the disadvantages of the project and these are the cost ,the difference between these values shows whether it is appropriate to carry forward doing the project (Swedberg, 2008).

Description	2015	2016	2017	Total

	US$	US$	US$	US$
Benefits	6050	5600	900	12550
Less costs				
Operational Cost	3200	3100	2900	9200
Net Benefits	**2850**	**2500**	**(2000)**	**3350**

Table2.7Costbenefitanalysis

2.4.2.4 Return on investment (ROI)

Return on investment shows the return/benefits that will be yielded by the initial investment when the project is operation and completed (Wilson, 2010).

Return on Investment =   Total benefits-Total costs   x 100

Investment Total

=   **12550- 10650**   x 100

10650

=   17.8%

Basing on the Return on Investment calculated the project returns 17.8% from the initial investment hence the project has to carry on.

2.4.2.5 Net Present Value (NPV)

NPV is a method of calculating the expected net monetary loss or gain from a project by discounting all expected future cash inflows and outflows to the present point in time (Dawn, 2002). Net present value involves the discounting of the projected cash flows of a capital project to ascertain its value (Barnes etal, 2001). If the project has a positive NPV hence it will be considered as viable. The formulae $1/(1+r)$ ^t can be used to calculate discounting cash flows where r = discounting rate, t= time in years. One of the advantages of NPV is that it reveals the time value of money which other methods do not take into consideration.

Year	Net Cash Flows US$	Discounting Factor	Present Value US$

0	(2050)	1	(2050)
1	2400	0.91	2184
2	2100	0.83	1743
3	1800	0.75	1350
NPV			**3227**

Table 2.8 Net Present Value.

The project has a positive NPV hence it is viable to carry on the project. The Economic feasibility study has shown that it is feasible to commence the project

2.4.3 Social feasibility

Social feasibility involves analyzing how the project to be executed will affect its stakeholders. Social feasibility is an evaluation whether the proposed project will achieve the social change being aimed (Matson, 2000). The system to be developed is an internal system that will be used by the stakeholders at Midlands State University and therefore an evaluation of how the system will have an impact on the employees within the institute is carried out. Katimuneetorn (2008), social feasibility focuses on the influence that the proposed system may have on the social system.

The system will give the room for student to defer their studies where ever there are since all will be done online and on a positive note they will be no more losing of deferment forms and the process will be cut short since there is elimination of paper work. This will also help the student records staff by reducing manual work of signing and approving the deferment forms from students which was time wasting and was in counted with many errors. There will be some staff that might have a negative attitude on the changing of the current system to the new computerized system. Resistance to change might be faced where stakeholders will be comfortable of the current manual systems, however by offering training it will help the stakeholders to understand more about the system hence reducing the probability of resistance to change. The social feasibility study shows that the system will have a positive impact on the stakeholders hence it is socially feasible to carry out the project.

2.4.4   Operational feasibility

Operational feasibility is the ability to utilize, support and perform the necessary tasks or a program, it includes everyone who operates, creates and uses the system (Dawn T, 2001). Operational feasibility is mainly concerned with issues whether the system will be used if it is developed and implemented (Rosenblatt, 2012). This takes a look whether users will accept and be able to use the new proposed system, a system that is operational feasible is the one that is used in full capacity after it has been developed. User manuals which contain all instructions of how to operate the system are used to educate users. From the operational, the project has seen viable to carry out

2.5   Project Plan.

According to Cadle and Yeates (2008) a work plan shows the order in which work will be carried out and the dates at which the activities start and finish. A project plan is a schedule or a timetable for the proposed system and will be produced inside a given time. It will be separated into activities and every activity will be given a period.

2.5.1 Project Schedule

A project schedule is used to show the exact dates and phases that the project will flow.

THE ACTIVITY	START DATE	END DATE	DURATION
Project Proposal	25/06/14	01/07/14	7 days
Planning	02/07/14	09/07/14	7 days
Analysis	10/07/14	17/07/14	7 days

Design	18/07/14	01/08/14	14 days
Coding	02/08/14	23/08/14	21 days
Testing	24/08/14	03/08/14	7 days
Implementation	04/09/14	11/09/14	7 days
Maintenance	28/05/14	On Going	

Table 2.9: Project Schedule.

2.6.1 Gantt chart

Gantt chart is a bar chart that shows breakdown structure of a project schedule (Pipim, 2003).

The Tasks and The Weeks	1	2	3	4	5	6	7	8	9	10	11	12
Proposal	■											
Planning		■										
Analysis			■	■								
Design				■	■							
Coding						■	■					
Testing								■				

Implementation												
Maintenance												
Documentation												

Fig 2.1 Gantt Chart

2.6   Conclusion.

The feasibility study completed uncovered that the project is essentially possible .The following stage is the analysis stage which will assemble data and show how it functions.

CHAPTER 3: ANALYSIS PHASE

3.1 Introduction

The analysis phase involves taking a look at the current system with its alternatives that need to be put in consideration and also the requirements for the developed system. The phase takes a close look at all the information in how it is processed thus the inputs, process and the output of the existing system. The analysis phase clearly in tells how the activities flow in the current system with its entities and how data can be stored.

3.2 Information gathering

To gather information the researcher adopted fact finding techniques which include interviews, questionnaires, meetings and observations that help to bring together problems associated with the current system, it requirements, improvements and user expectations (Vermaat, 2008). O'Brien (2001) stated that information gathering is an important business process. Information being gathered must be relevant, able to meet the requirements and purpose of information finding. This tells that information is so important to the institute and many institutes spend a lot of money obtaining timely, current and relevant information. The researcher used the following information finding methodologies.

3.2.1 Interviews

An interview is a primary technique for gathering information during the analysis phase which entails a face-to-face formal meeting in which facts or statements are elicited from one another (Sauter, 2013). Kvale (1996), stated that interview is an important information gathering tool in qualitative research. With interviews there is direct interaction with the stakeholders of the current system and feeling and expressions can be noted. The interviewer prepares and asks the questions of his or her interesting part.

Advantages

➢ True feeling of the people who use and work with the system were noted since there is use of direct communication.

➢ Real thoughts were gathered from selected people.

- More personal and familiar issues were catered for.

- There was privacy which enhanced the interviewee to contribute freely.

Disadvantages

- Interviews are time consuming, hence criticism may rise since not all users where interviewed.

- Most of the information was limited since some of it is confidential.

3.2.3 Questionnaires

Kvale (2014), questionnaires allow one to reach a large number of audiences and by using specific questions you can get clear data set. Questionnaires are a set of questions that have been printed or written, they have a choice of answers designed for the purpose of a research (Powell and Steele, 1996).The questionnaires were sent to staff members and the students and this was meant to get information both stakeholders. These were made in a way that the stakeholders or the respondents would understand and will not need help, thus straight to the point.

Advantages

- The respondents had some time to Respondents had room to reason and answer without any intrusions.
- As compared to interviews, this was easier since there was no need of monitoring
- Respondents answered the questions more openly expressing their views since they were made to be anonymously filled.
- More time is saved since the questioners were given and distributed at the same time.

Disadvantages

- Some of the questions were wrongly answered due to misreading of some of the questions.
- There was no interaction of the researcher and the respondent since it is indirect communication.

3.2.3 Judgment of method

In an analysis of the above information gathering methodologies it showed that all the methodologies were useful and none is better than the other and they all please the objective of the exercise.

3.3 Analysis of the current system

The analysis will point out how the current system is designed how are its process executed. This also assesses all operations of the current system. It also evaluates the operations of the existing system bring out its weaknesses showing its weaknesses to justify the new developed system.

3.3.1 Description of the existing system

Student studies deferment is currently a manual paper work system. A student has to collect the deferment or resumption forms from the student records offices. The forms will have to be filled by the student stating the reason for deferring the studies. The form will have to be signed by the departmental chairperson approving or disapproving the request by the student, if approved the student will have to proceed with the forms to the registrar office, the accounts office, the library and finally submits it to the student registration office.

3.4 Process analysis

Andersen (1999) suggested that process analysis is a series of related activities that follow a succession path from input until a result or output is produced. Process analysis involves evaluating the chronological sequence of steps that explain how something is done to achieve a certain output which can be predefined or circumstantial (Trischler, 1996). The process analysis is a method and approach that aims to improves the business activities of the organization. This shows how data flows and all the activities which are involved in the current system and can be shown on an Activity Diagram below.

Activity diagram for the current system

```
  ┌─────────┐        ┌─────────────────────────────┐        ┌─────────────────────────────┐
  │         │        │ Student fills studies        │        │ Chairperson Confirms the     │
  │  START  │───────▶│ deferment application form   │───────▶│ application                  │
  │         │        │                              │        │                              │
  └─────────┘        └─────────────────────────────┘        └─────────────────────────────┘
                                                                           │
                                                                           ▼
  ┌─────────────────────────────┐              ◇─────────────────────────────────────────◇
  │ Fill correct details and    │◀─────────────  Are details correct and reason valid?
  │ fill valid reason           │              ◇─────────────────────────────────────────◇
  └─────────────────────────────┘                                         │
                                                                          │ Yes
                                                                          ▼
                                              ┌─────────────────────────────────────────┐
                                              │ Dean Of Faculty approve deferments Form  │
                                              └─────────────────────────────────────────┘
                                                                          │
                                                                          ▼
                                              ┌─────────────────────────────────────────┐
                                              │ Deputy Registrar approves the forms      │
                                              └─────────────────────────────────────────┘
                                                                          │
                                                                          ▼
                                              ┌─────────────────────────────────────────┐
                                              │ Library Confirms Deferment forms         │
                                              └─────────────────────────────────────────┘
                                                                          │
                                                                          ▼
  ┌─────────────────────────┐        No      ◇─────────────────────────────────────────◇
  │ Clear library debts.     │◀──────────────      Do student have
  └─────────────────────────┘                ◇─────────────────────────────────────────◇
                                                                          │
                                                                          │ Yes
                                                                          ▼
                                              ┌─────────────────────────────────────────┐
                                              │ Student Accounts Signs the verified      │
                                              │ deferment forms                          │
                                              └─────────────────────────────────────────┘
                                                                          │
                                                                          ▼
```
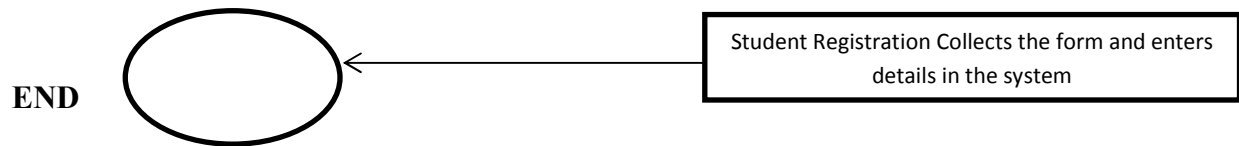
Fig 3.1 Activity Diagram Of Current System.

Key

| Decision | Activity | Start/End | Connector |

The current system inputs

- ➢ Student name
- ➢ Time of deferment
- ➢ Registration number
- ➢ Reason for studies deferment.
- ➢ Student Signature

Processes of the current system

- ➢ Student filling in the required space on application forms
- ➢ Department Chair person confirming the deferment application forms
- ➢ Dean approves or disapproves the deferment application forms
- ➢ Deputy Registrar approves or disapproves the deferment application forms
- ➢ Library Office verifies the student application form
- ➢ Student Accounts Office verifies the student application form
- ➢ Student Registration Office files the Student deferment form.

Outputs of the current system

- ➢ Deferment of Studies

3.5 Data analysis

Brown and Benson (2005) stated that data analysis is the process of inspecting, cleaning, transforming and modeling data with the goal of highlighting useful information, suggesting conclusions and supporting decision making. Robinson (2004) suggested that data analysis in

qualitative research may involve the statistical procedures and periodically data analysis has become an iterative process, meaning data is always gathered and looked at. Two methods will be used to represent the existing system inputs, processes and outputs which are The Context and the Data Flow Diagrams.

3.5.1 Context Diagram

Manning (2014) stated that context diagram is a form of data flow diagram (Level 0) that represents the whole system of the organization. The context do not show more information of how data flows since it contains one process node representing all activities of the whole system with their respective entities. A context diagram shows the system as a single high level process and the relationship that the system shares with other entities in the systems vicinity (Jordan, 2011). The context diagram below shows the processes and the works done in the current system.

Context diagram for the current system
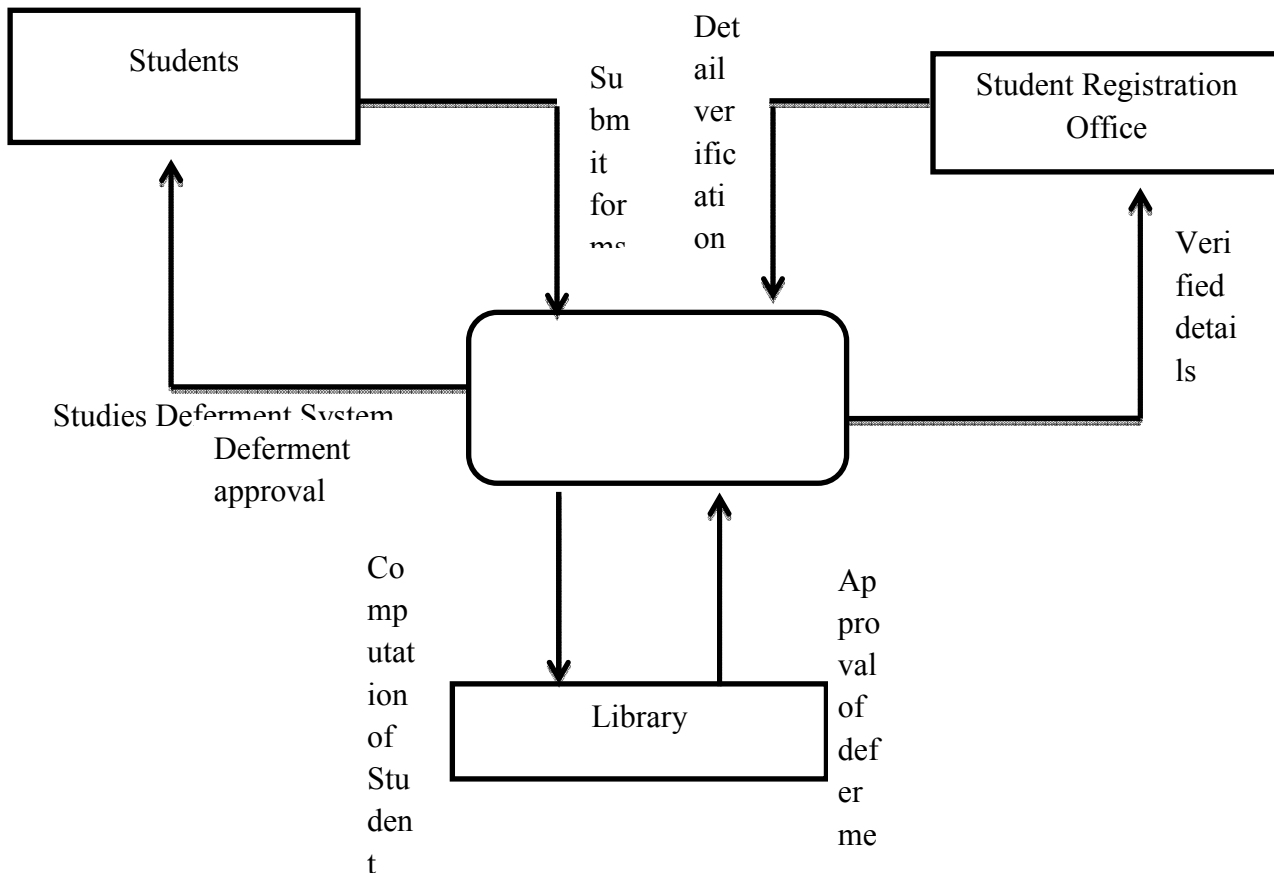
Fig 3.2 Context Diagram of Current System.

Key

EntityProcess   **Data Flow**

3.5.2 Data flow diagram

Manning (2014) stated that a data flow diagram shows how input data is transformed by the system so that at the end we produce output. The current system is manually done and uses paper work. Studies deferment forms are printed and a student can collect them from the student registration offices. This is a two dimensional diagram which displays the flow of information and processes taking place in an information system (Suyama, 2005).

Data flow diagram for the current system

| Student | → Deferment Form → | 1 Collect form | ← Issuing of form ← | Student Registration |

Application details

| Department Chairperson | → | 2 Approve/disapprove form | → | Deferment form |

Approved form

| Dean of Faculty | → | 3 Approve/disapprove form |

Approved forms

| Deputy Registrar | → | 4 Approve/disapprove form |

Approved forms

| Library | → | 5 Verify Student Account |

Verified Forms

| Student Accounts | | 6 Verification of account | | Deferment form |

Fig 3.3 Data Flow Diagram for the current system.

KEY

Entity	Data Flow	Process	Data Store
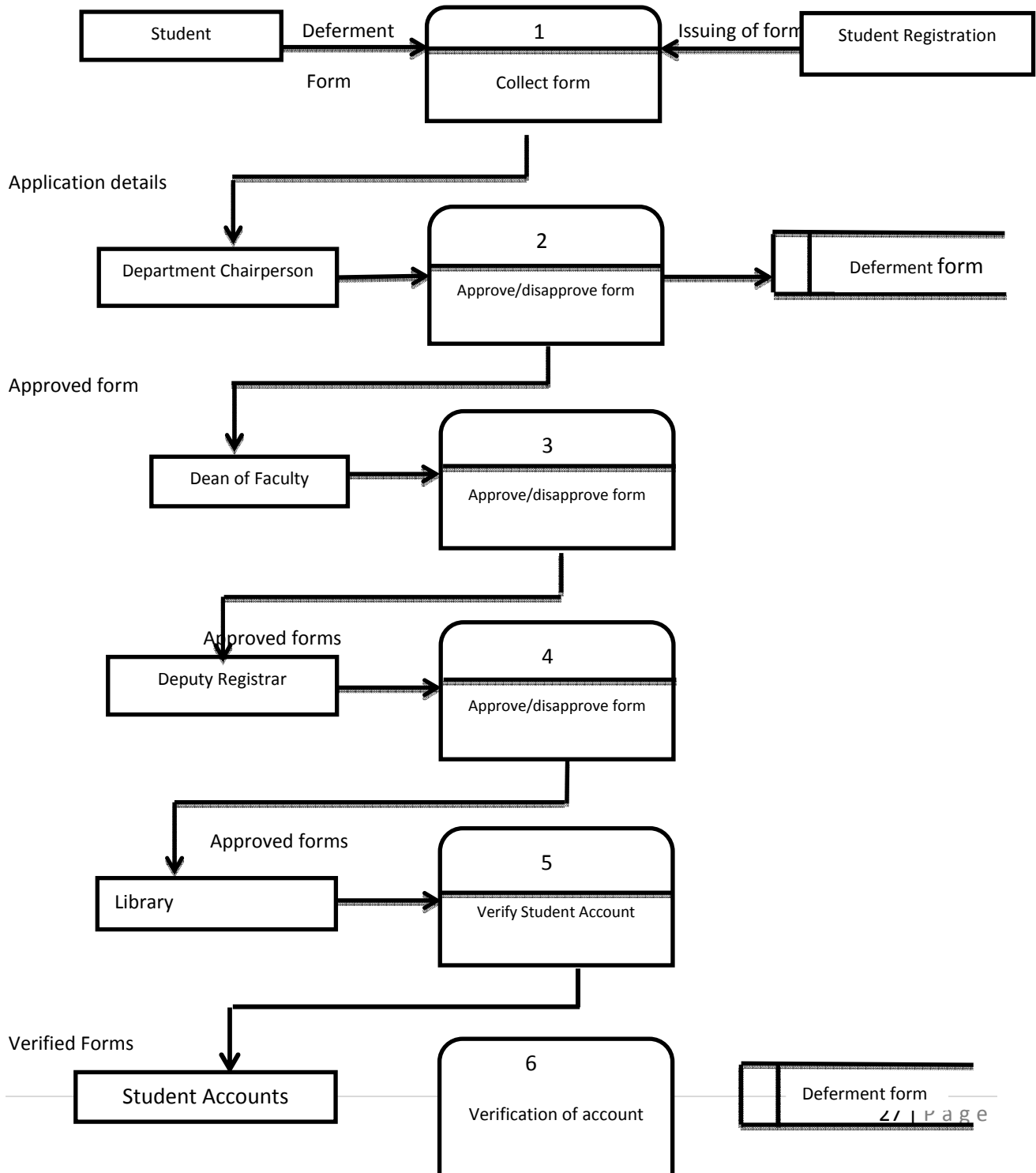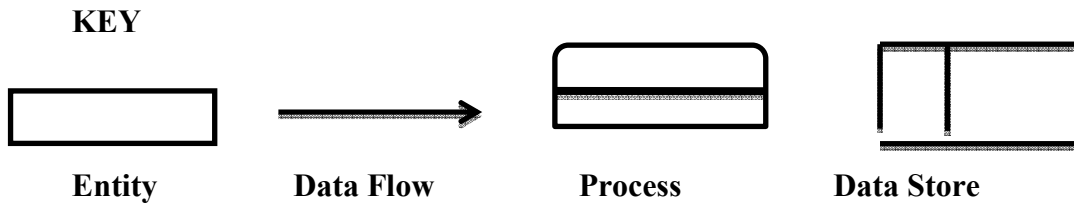
3.6 Weakness of the current system

In the process of investigating advantages and disadvantages of the existing system were discovered as follows:

Advantages

➢ **Low cost:** The existing system was made in such a way that there is no need of equipment to conduct the studies deferment process, a pen is needed to fill up the forms.

➢ **Understandability:** To students the system is easy understandable since the deferment forms will be having empty spaces for them to fill in all details needed and shows all procedures to be followed.

➢ **The system is independent:** In the system verbal contribution is more, not much communication is done online, so the system is secure from outside attackers and other security threats.

➢ **Required outputs delivered:** The system delivers the required outputs to maintain its daily organizational activities.

Disadvantages

➢ With the ever increased new information technology systems the system is now consuming more time for the students to complete the deferment processes.

- Filing of records manually is not properly managed and stored information cannot be easily retrieved for current use, this means it's difficult to locate certain ideas or information of deferred students.

- Information is not updated instantly.

- Generally manual based systems are prone to human error.

- Paperwork cost much in terms of time, stationery and storage.

3.7 Alternatives

An alternative refers to different options that the developer has in building a new system or upgrading the existing system. The following are the alternatives that the developer has.

3.7.1 Outsourcing

Bucki (2014) suggested that outsourcing refers to the purchasing of an already made software package off the shelf, which has been developed by external software development houses. Outsourcing involves acquiring the solution that is needed, that is, the proposed computerized system from an organization outside the company (Setende, 2012). Outlined below are reasons why Midlands State University should not outsource:

Outsourcing required external support of both hardware and software requirements.

- There will be need for specialists in configuration and use of the system.

- Integration with the existing manual system may be difficult.

- The cost of purchasing a ready-made software package is expensive.

- Ready-made software packages are most likely not to suit the required standards of the organization.

- The software packages have no room for the one to customizing it to suit organizational needs.

3.7.2 Improvement of the current system

Bucki (2014) suggested that upgrading the existing system is a cheaper way as compared to outsourcing as development and operational costs are low, but however it has its drawbacks which are:

➢ The institute may lose some of its value as this alternative may fail to meet global standards.

➢ Redesigning the existing system is time consuming and requires one to have complete knowledge of how the system functions.

➢ Operating costs may be high as there may be need for more labor to be hired.

3.7.3 In house development

This is a process whereby the system that is needed by the organization is developed by a project team that comprises of workers of that organization (Setende, 2012). Merriam (2013) stated that organization has the capability of coming up with its own system that is specifically for the institutes like Midlands State University. All the current problems faced in the existing system should be swallowed by the new system to be developed.

In-house development comes with more benefits to the organization and they are stated below:

➢ Organization's long term goals are met.

➢ It cost less to implement since it is developed by internal employees.

➢ The system is flexible to the changes in the technology.

➢ It integrates well with other existing systems in the organization.

➢ The system is in-line with the current trends in information technology and it does meets the required international technology standards.

➢ Easy production of reports as well as quick reference to one's idea, hence delivery of tasks and constant sharing of knowledge is achieved more efficiently.

➢ Incorporation of users' requirements motivates them to like and use the system as they will assume ownership of the system.

3.7.4 Judgment of alternative

The developer chose In-house development despite that improvement of the current system is the cheapest alternative. With in-house development organization's long term goals are met. It is easy to implement since it is developed by internal employees. The system is flexible to the changes in the technology and integrates well with other existing systems in the organization. The system is in-line with the current trends in information technology and it does meet the

required international technology standards and constant sharing of knowledge is achieved more efficiently. Incorporation of users' requirements motivates them to like and use the system as they will assume ownership of the system.

3.8 Requirements analysis

This is a process which involves determining user expectations for the proposed product to be developed and delivered (Rouse, 2007). Marsic (2008) suggested that requirements analysis is the most important part in system development as it determines the success of every system. The developer must take note of the entire user requirement and incorporate them in the system to be developed. If user requirement are not properly taken care of, they may result in high software maintenance costs as there will be need to make a lot of changes until the system satisfy the users. Requirements analysis consists of the following:

3.8.1 Functional requirements

Marsic (2008) mentioned that functional requirements are all processes involved, from input to output and data store to ensure system objectives are met. Functional requirements define the operations and activities that a system should be able to perform (Rouse, 2007).These requirements are relevant to the function specifications that the system has to support and they are as follows:

➢ **Database backup and recovery** :the system should allow backup of the database at periodic times so as to enable recovery of information in the event of a system crash

➢ **Security of user accounts:** The system has to be secure meaning every user must have their own access details and have the leeway to change their passwords whenever they want feel insecure. Also the system must have access levels to distinguish general user from administrator.

- ➤ **Generation of reports:** The system must be able to efficiently produce timely reports which will make it easy for the chairpersons, administrators and the management in their in decision making processes.

- ➤ **Central Database:** The use of a central database enhances real time capturing of uploaded information online and manipulation hence duplication of knowledge shared by one user is minimized. This also makes updates on the system online instantly

- ➤ **Verification and validation:** The system must be able to check and ensure that only authorized users have access to the system and information uploaded will reflect the user so as to reduce or eliminate the temptation by users of entering irrelevant information.

3.8.2 Use Case Diagram

Marsic (2008) described Use Case Diagram as the use of a scenario of the system which is a flow of communication between the users of the system and the system in place and for what purpose. Loton (2013) says that case diagrams are behavior diagrams that are used to describe core elements, processes and actions that take place within the system.

The following is a Use Case Diagram:

Use case diagram
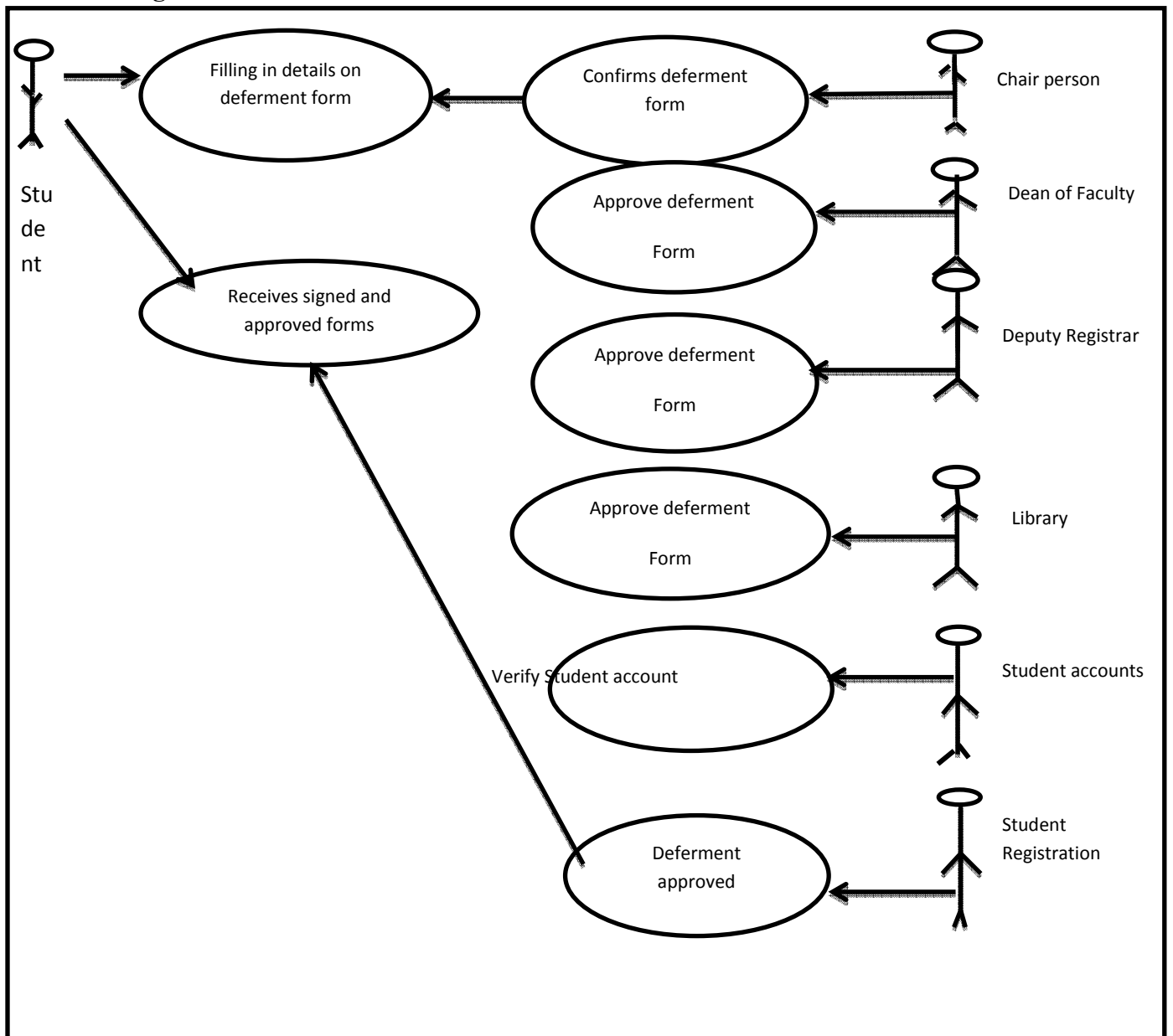
Fig 3.4 Use Case Diagram for the current system.

KEY
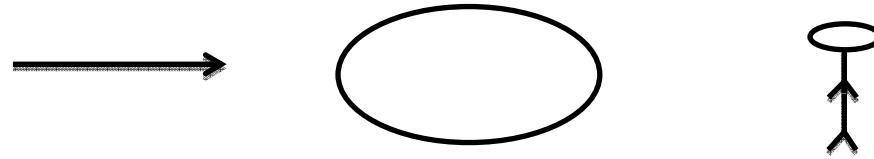
Uses   Use case   Actor

ctional requ

Non-functional requirements are defined as methods that are used to determine the proposed system performance (Rouse, 2007).The proposed system should have the non-functional requirements mentioned below.

Usability

The developed system must have a user friendly interface with menu labels which are easy to understand and also accepting correct and valid information only.

Maintainability

The proposed system should be easy to modify and flexible to add new features.

Response time

The proposed system should offer improved response times when executing its processes.

Reliability

The system to be developed should always be in a position to perform its functions at any given time when a request is made.

Accessibility

The users must be able to access system whenever the need arise.

Operability

The system to be developed must operate according to expectations and user specifications

3.9 Conclusion

To conclude, this chapter gave a clear understanding on how the manual system executes it functionality and in addition giving the developer of the proposed system to clearly understand the problem definition and how to cater for the problems. The next phase, which is the design phase, will highlight how the proposed system will be designed.

CHAPTER 4: DESIGN PHASE

4.1 Introduction

Design phase of the system brings out how the system is going to be constructed in order to meet the requirements of the user. The phase will also be aiming to remove all physical drawbacks of the current system from the user. It clearly shows all functionality of the new system showing attributes description, entities with their relationships with the use of diagrams.

4.2 System design

According to Pressman (2001), system design is the process of determining the architectural details required for the construction of the system. It is a process that involves the design of systems in a methodical and demanding manner that produces a prefect system (Saffer, 2006). With a perfect considerate of the current deferment system, need of showing all performance of the new system according to the functional requirements. This phase has helped to find out the weaknesses of the current system and how the proposed system will overcome the ruled weaknesses.

 The new system will perform the following:

- ➢ Enhance security with the use of user accounts including username and password.
- ➢ Deferment Of Studies Online
- ➢ Send an email of confirmation on deferment of, if process is complete.
- ➢ Generation of Third Dimensional (3D) reports

4.2.1 Overview of the Proposed System

The new system will provide an interface of students and the staff for them to login in to their portal platforms according to their login credentials provided by the administrator. After the student is logged in to portal he/she will be able to apply for deferment of study online by filling up the online deferment application form provided stating the period and the reason why the student is deferring. When the Department Chairperson is logged in he/she will be able to see the deferment request from the student hence verify the student details and approve or disapprove the deferment request, when approved the system will then compute and check if the student owes the school accounts if not then the deferment process will be successful and the system will send an email confirmation to the student.

The Department Chairperson and the Student Registrar will be able to generate 3D reports of the entire student who have deferred their studies for certain period of time.

Functionalities of Proposed System

The Cyber Student Deferment System includes the bellow functionalities.

- ➢ **Student deferment application module –** this will allow student to apply for deferment of study stating the period and the reason why taking the decision.
- ➢ **Administration module**-this is where the system administrator creates the staff accounts that is the chairpersons and the registrar in the data base
- ➢ **Chairperson module –** the chairperson will view the students request for deferment of study, they will be an option of approving or disapprove and also a comment.
- ➢ **Registrar module –**the registrar will also view only approved applications which where firstly verified by the department chairperson. The registrar will also comment on the student request.
- ➢ **Reports module-** the module is found on both the registrar's and the department chairperson portal, where they will view reports of deferred student according to the period selected.

4.2.2 Context diagram

Manning (2014) stated that context diagram is a form of data flow diagram (Level 0) that represents the whole system of the organization. The context do not show more information of how data flows since it contains one process node representing all activities of the whole system with their respective entities. A context diagram shows the system as a single high level process and the relationship that the system shares with other entities in the systems vicinity (Jordan, 2011). The context diagram below shows the processes and the works done in the proposed system.

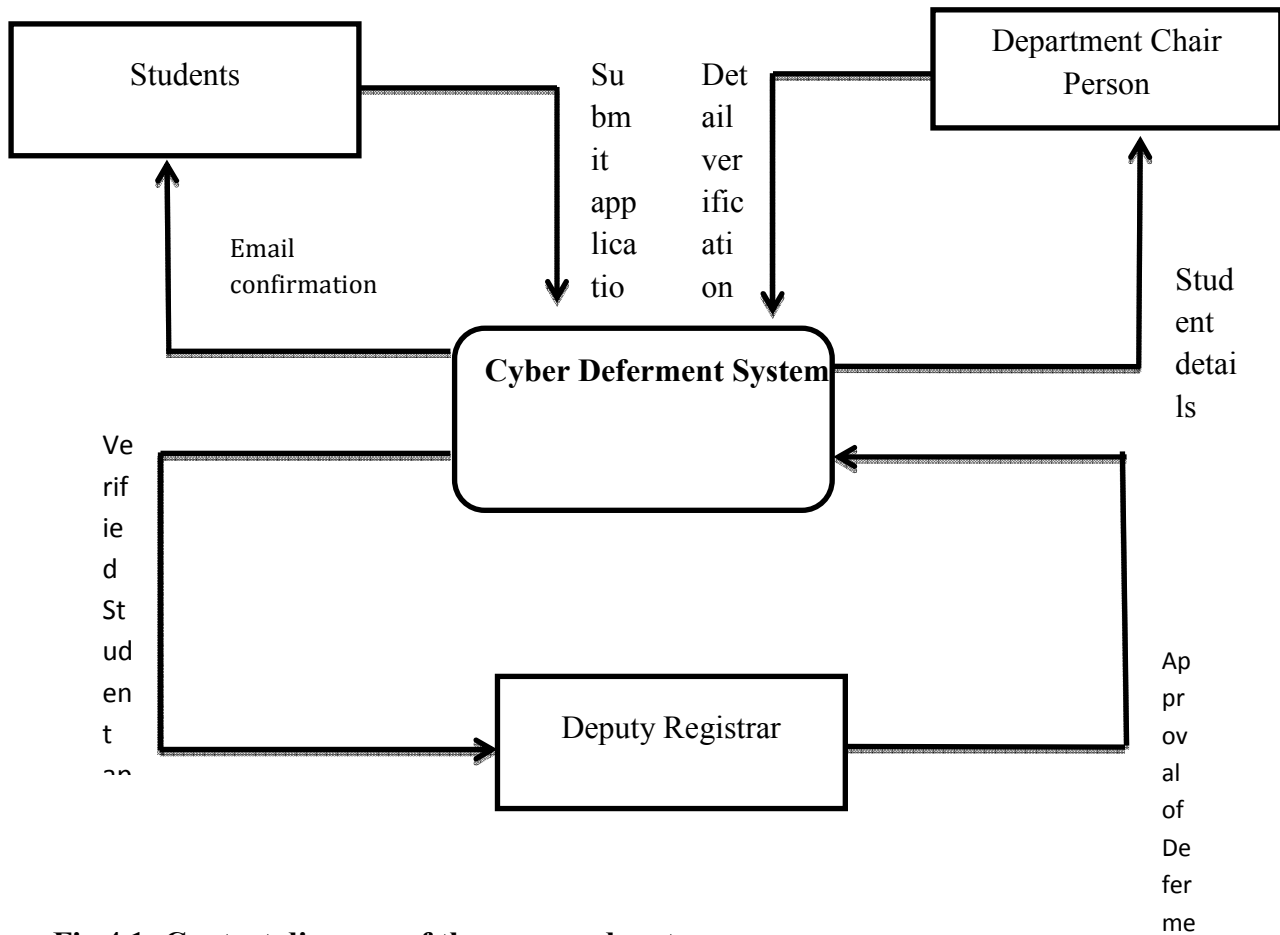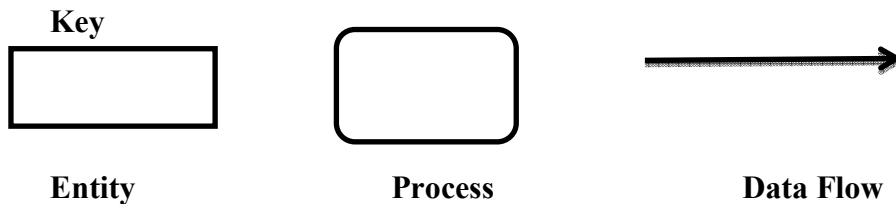**Context diagram for the proposed system**

Fig 4.1: Context diagram of the proposed system

Key

Entity   **Process**   **Data Flow**

4.2.3 Data flow diagram

Manning (2014) stated that a data flow diagram shows how input data is transformed by the system so that at the end we produce output. The current system is manually done and uses paper work. Studies deferment forms are printed and a student can collect them from the student registration offices. This is a two dimensional diagram which displays the flow of information and processes taking place in an information system (Suyama, 2005).

Data flow diagram for the proposed system


```
                              ┌─────────────────┐
                              │        1        │──── Verify account ──────►┌──┬──────────────────────┐
         Login details ──────►│  Student Login  │                           │  │ User Login Registration│
                              │                 │◄─── Account verified ──────┤  │                      │
                              └─────────────────┘
         Student Deferment [

   ┌──────────┐              ┌─────────────────┐
   │ Student  │─────────────►│        2        │
   └──────────┘              │ Apply Studies   │
                             │   Deferment     │
                             └─────────────────┘

   Deferment Application details
                             ┌─────────────────┐
   ┌──────────────┐          │        3        │
   │ Department   │─────────►│ Verify Deferment│
   │ Chairperson  │          │   application   │
   └──────────────┘          └─────────────────┘

   Verified Deferment form
                             ┌─────────────────┐
   ┌──────────────┐          │        4        │
   │ Deputy       │─────────►│ Approve/disapprove│
   │ Registrar    │          │ Deferment application│
   └──────────────┘          └─────────────────┘

                             ┌─────────────────┐
                             │        5        │
                             │ Compute Student │
                             │    account      │
                             └─────────────────┘

                             ┌─────────────────┐
                             │        6        │──── Deferred Student details ──►┌──┬──────────────────┐
                             │  Defer Studies  │                                 │  │Student Registration│
   Email confirmation        └─────────────────┘
```

Email confirmation

Deferred Student details

Fig 4.2: Data flow diagram

KEY

Entity	**Data Flow**	**Process**	**Data Store**
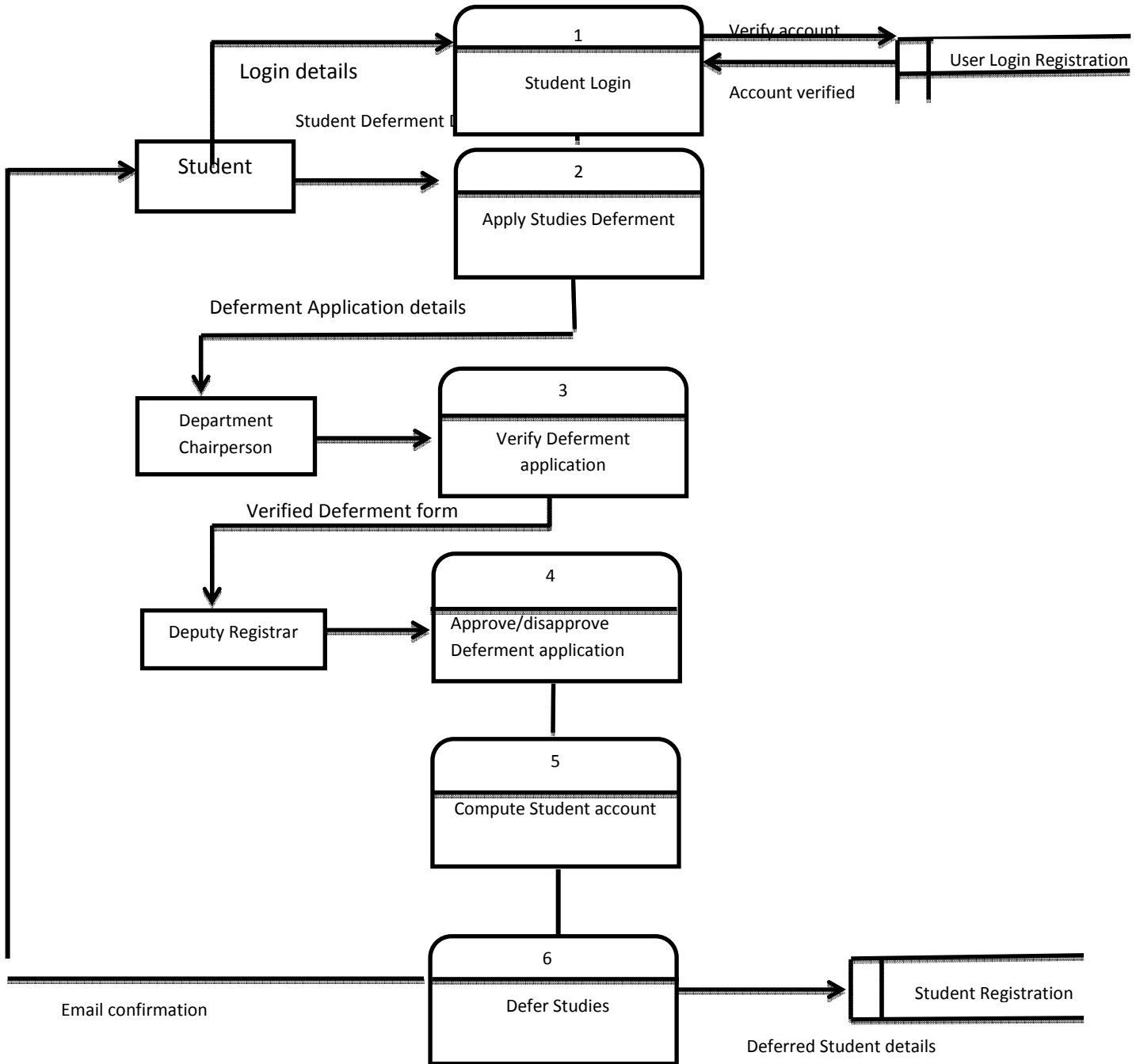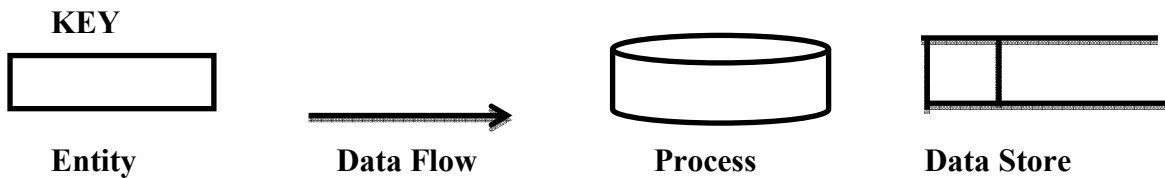
4.3 Architectural design

Pressman (2001) suggested that architectural design is a knowledge that focuses on the structure of the systems components, joining them into one complex and functional whole. The architectural style, the system will adopt, the components structure and properties and unified coherent among these components are taken into consideration. The technical environment, the proposed system will operate in is described in the architectural design. The physical and logical layout with the specifications of software, data, hardware and procedures of the new system as well as people involved is depicted in this design. Below is an architectural design diagram of the proposed system.
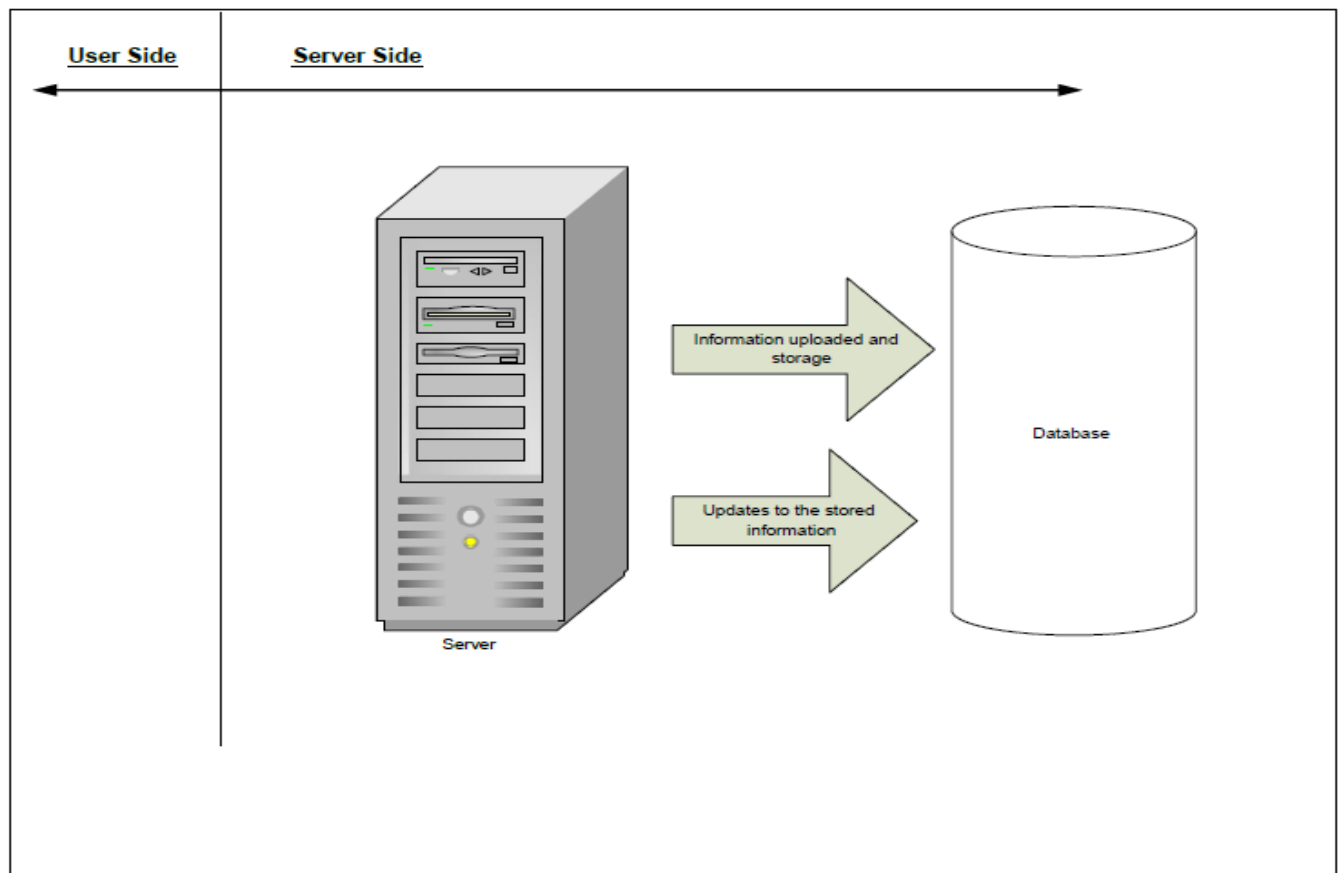
Fig 4.3: Architectural design

In order for a user to have access right to the information inside the server, he or she must have authorization details such as the username and password and once they are correct, the user will

be allowed to access to information and depending on the access level of the user. A firewall will be in place to ensure the system is secure and no unauthorized user will break into the system.

4.4 Physical design

Bleisch (1998) stated that it is important to design both the software and hardware environment in which the new system will resides and work in. It is the design that shows how the components are physically connected in different environments (McCabe, 2010).The physical design focuses mainly on the layout of the proposed system in terms of hardware components and the interaction or communication amongst these components. All user machines or computers will be connected to the Intranet Server. The hardware and software components requirement for the system to function and the environment are taken into account, so as to come up with total design of the system.

The user server must be comprised of the following:

- ➢ 3 GB RAM with Core i3 processor.
- ➢ 350 HDD.
- ➢ Optical mouse
- ➢ Optical keyboard
- ➢ 500 GB HDD backup
- ➢ RJ45 network cables

The administrator of the system will continue using the computers and servers that are in existence within the organization. The system will be installed within the Intranet Server and other necessary software already installed are:

- ➢ Firefox Mozilla 28.1.1 Beta
- ➢ Office 2010Microsoft Office 2007
- ➢ Avast 2014 antivirus
- ➢ Navicat
- ➢ Adobe Cloud Creative

4.5 Database design

Bleisch (1998) stated that database design is an important part in system design to focus on, as this will be the data store for all the user information and it is of paramount importance to the design of a database that will meet user information requirements. It is a way of creating a data model of the database that is very detailed and easy to understand (Stephens, 2010). A successful data store must ensure that information entered in the database is integral, consistency and minimum or no data duplication. In our system, the database is the central point for information storage and retrieval, chair persons, students and administrator will be made successful through the database and hence the design of a database is crucial. The system will be a database management system instead of file based system as a result of the following reasons:

➢ Integrity is achieved, hence elimination of data redundancy.
➢ Improved security through the use of login credentials.
➢ Costs associated with storage are reduced as a result of using one centralized database.
➢ Database management system has services such as backup and recovery.
➢ Centralized database enable concurrence as users can access the database simultaneously.

4.5.1 Physical Database Design

Bleisch (1998) mentioned that this is the actual designing of the systems database and in the database design the schemas within the system are determined and a clear illustration of these schemas is produced. The architectural database design is described as the organization of data inside a database in the form of schemas. The schemas involved include, the internal, conceptual and external schemas and they are specified during the design of a database. Below diagram illustrates the proposed systems database design architecture.
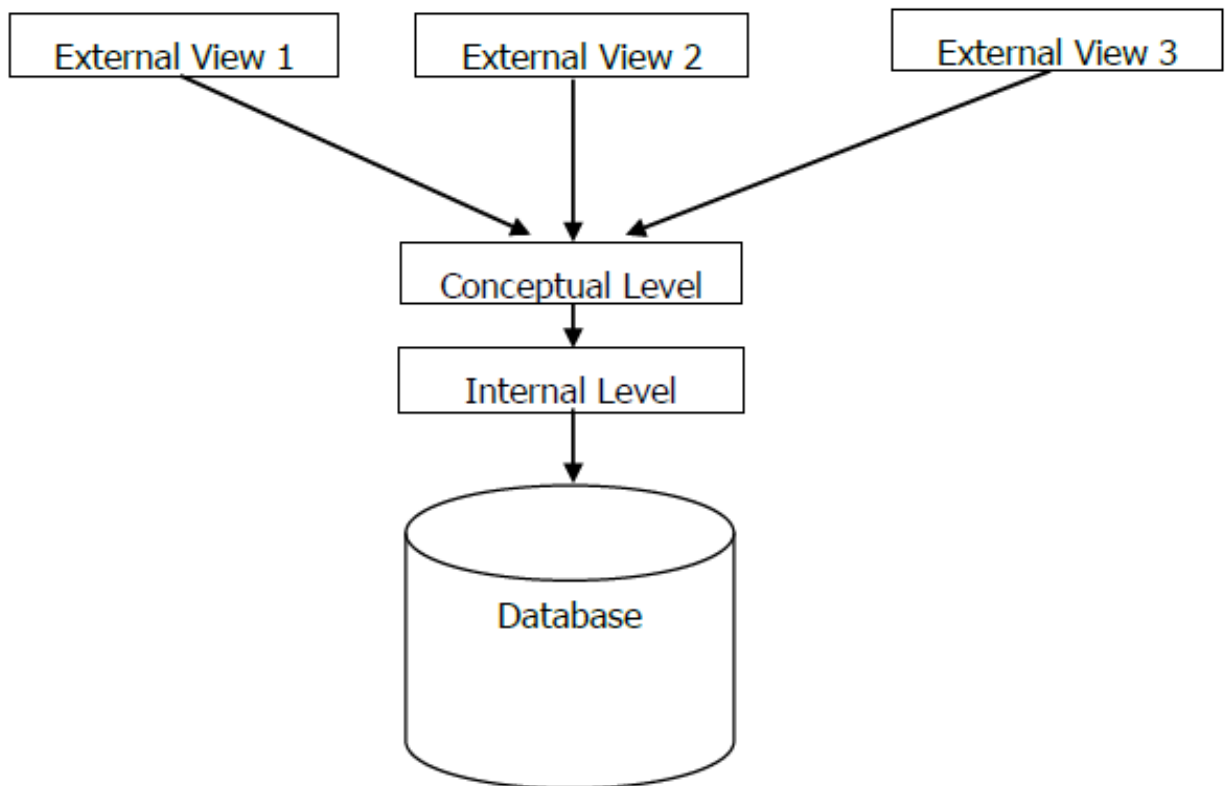
Fig 4.4: Database Architecture

External Schema: The external level represents the users view of the database. It consists of a number of different views of the database, that is, one for each user. External schema shows only the part of the database that is important to the user. Tables in the database can have the following relationships:

➢ One-to-many.

➢ Many-to-many.

Conceptual Schema: The conceptual schema shows the kind of data that resides in the database and the relationships among the data. This is a total view of the data specifications of the organization that is independent of any storage considerations.

Internal Schema: The internal schema explains the physical representation of the database on the computer and this can be done using a programming language. Internal level shows how the data resides inside the database that is the structures of certain data and the way files are organized in terms of particular data structures and file organizations.

Database: It is going to be designed using MySQL, which will be the storage for all information that is going to be entered in the Cyber Deferment System. MySQL is an open source database system that is portable, easy to maintain and it supports network based systems.

The database constitutes of components procedures, users, views and tables, these are logic components and the database administrator must focus on the physical implementation of files.

4.5.2 Logical Database Design

Elmasri (2006) suggested that logical database design involves identifying the entities and relationships among them. These entities of the system are elaborated showing their attributes. The construction of an entity relationship was done so as to express the outcomes of the logic database design.

An entity-relationship diagram is a data modeling technique which shows the entities graphically and the relationship between these entities within a system and also shows the structures of the proposed system database. Entity relationship clearly defines the interaction between the entities and their dependence on each other and all components relationship are illustrated in an entity relationship diagram. It is structured in an organized manner that makes easy for one to navigate and one will be able to determine and identify the relationships among these entities.

The following table shows an entity-relationship table that represents entities and their attributes

Entity	Attributes	Description	Type
Student	Name	Student Name	Var char(20)
	Surname	Student Surname	Var char(20)
	Email Address	Email address	Var char(20)
	Level	Level of student	Int (20)
	Reg Number	Registration number	Var char(20)
	Password	Students' password	Var char(20)
	Program	Degree program	Var char(20)
	User id	User's id number	Int (20)
	Access Level	User Privileged control	Int (20)
Department Chairperson	Name	Chairperson Name	Var char(20)
	Surname	Chairperson Surname	Var char(20)
	Faculty	Chairperson's Faculty	Var char(20)
	Department	Chairperson's Department	Var char(20)
	Email	Chairperson's email address	Var char(20)
	Username	Chairperson's Username	Var char(20)
	Password	Chairperson's Password	Var char(20)
	Access level	Privilege Control	Int (20)
Registrar	Name	Registrar's Name	Var char(20)
	Surname	Registrar's Surname	Var char(20)
	Username	Registrar's Username	Var char(20)
	Password	Registrar's Password	Var char(20)
	Access Level	privilege control	Int (20)
System Administrator	Username	Administrator's Username	Var char(20)
	Password	Administrator's Password	Var char(20)
	Access level	privilege control	Int (20)

Table 4.1: Entity Relationship Table

4.5.3 Enhanced Entity Relationship Model

Date (2000) stated that enhanced entity relationship diagram is a data modeling technique which describes the entities graphically and the relationship between these entities within a system and also shows the structures of the proposed system database. So enhanced entity relationship model refers to the extension of the original entity relationship model. It includes all modeling concepts.
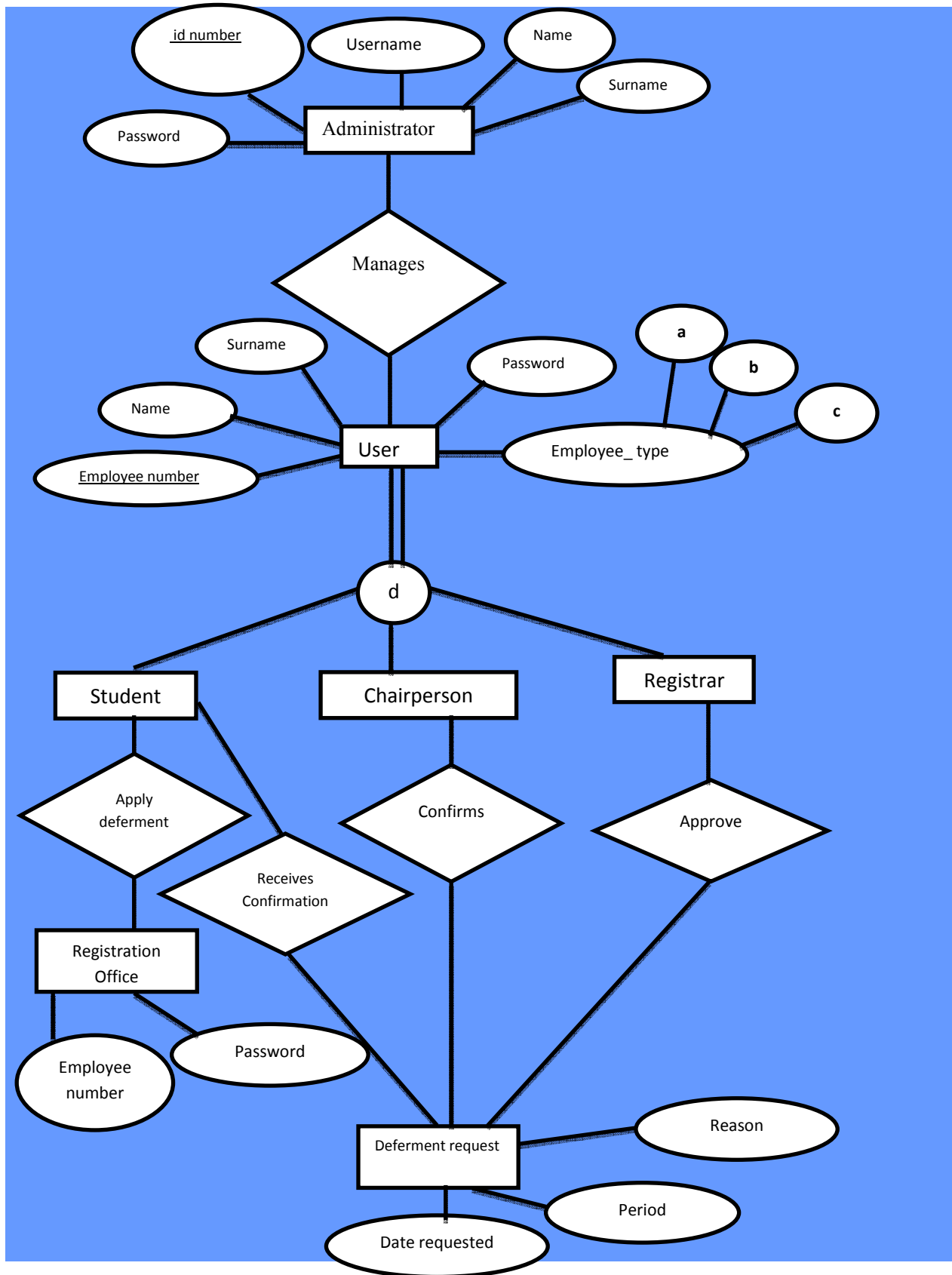
Fig 4.5: Enhance Entity Relationship

Key for entity-relationship diagram and the enhanced entity relationship diagram

| Entity | Attributes | Relationship | Sequence of relationship |
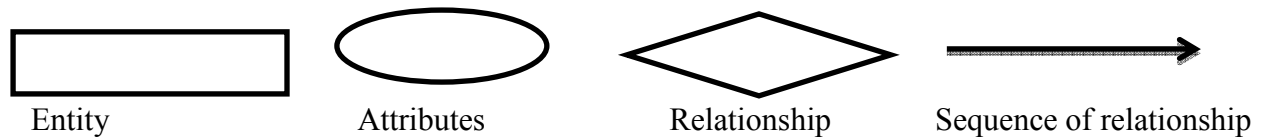
4.6 Program design

Marsic (2008) mentioned that designing the output of the proposed system is an essential point of developing a system and during the design of the system an object oriented programming concept is adopted. Program design will hence include the designing of modules, functions and classes of the system to be developed.

Program design is described in the following diagrams:

4.6.1 Class Diagram

According to Silberschatz (2002), class diagram refers to an illustration that provides an overview of the system, showing its classes, operation, attributed and their relationships, also the system constrains. Class diagram also shows the relationship in which they operate. Below is a class diagram which shows classes and their relationships, attributes and operations.

Class Diagram
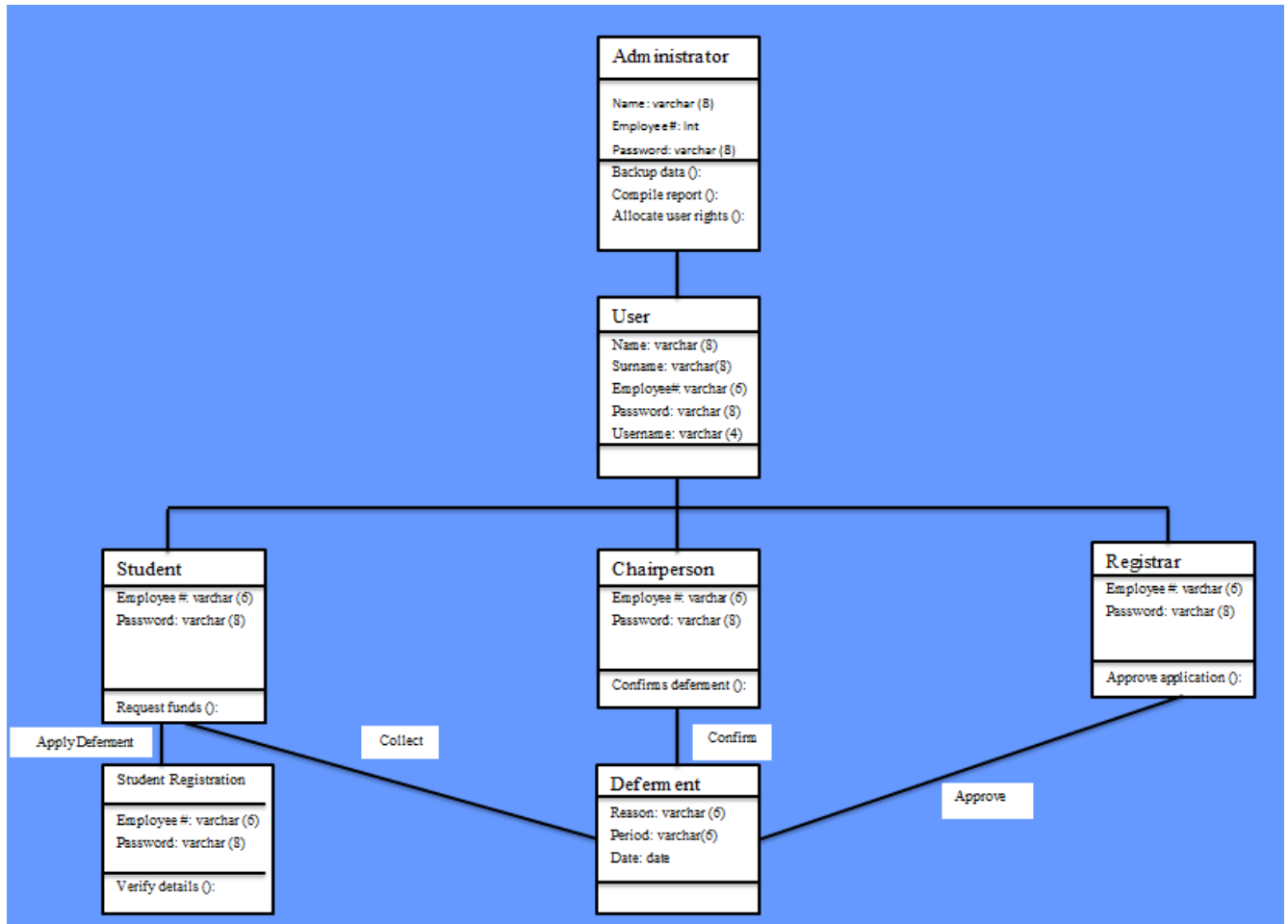
Fig 4.6: Class Diagram

4.6.2 Package Diagram

Silberschatz (2002) suggested that a package diagram is a structure that illustrates how the proposed system is broken down into different modules and also the way they interact.

Package Diagram
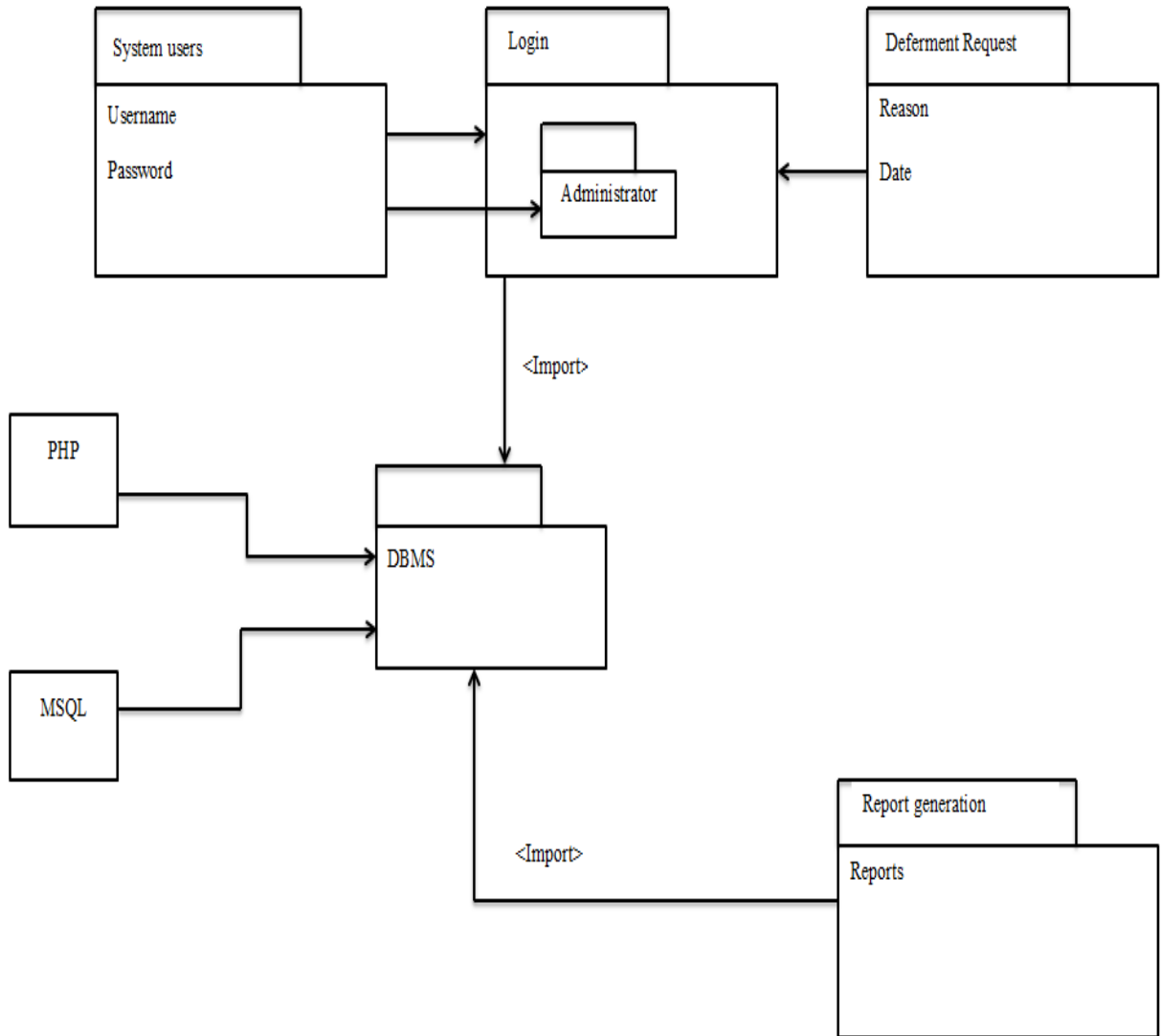
Fig 4.7: Package Diagram

4.6.3 Sequence Diagram

Manning (2004) mentioned that sequence diagram is a structure that shows classes and how they exchange messages over a period of time. In sequence diagram activation bars entails us the period when the entity is active and the rectangles represents the entities. Below is a diagram that shows sequence of activities that are done within the system and their time of occurrence.

Sequence Diagram for the proposed system
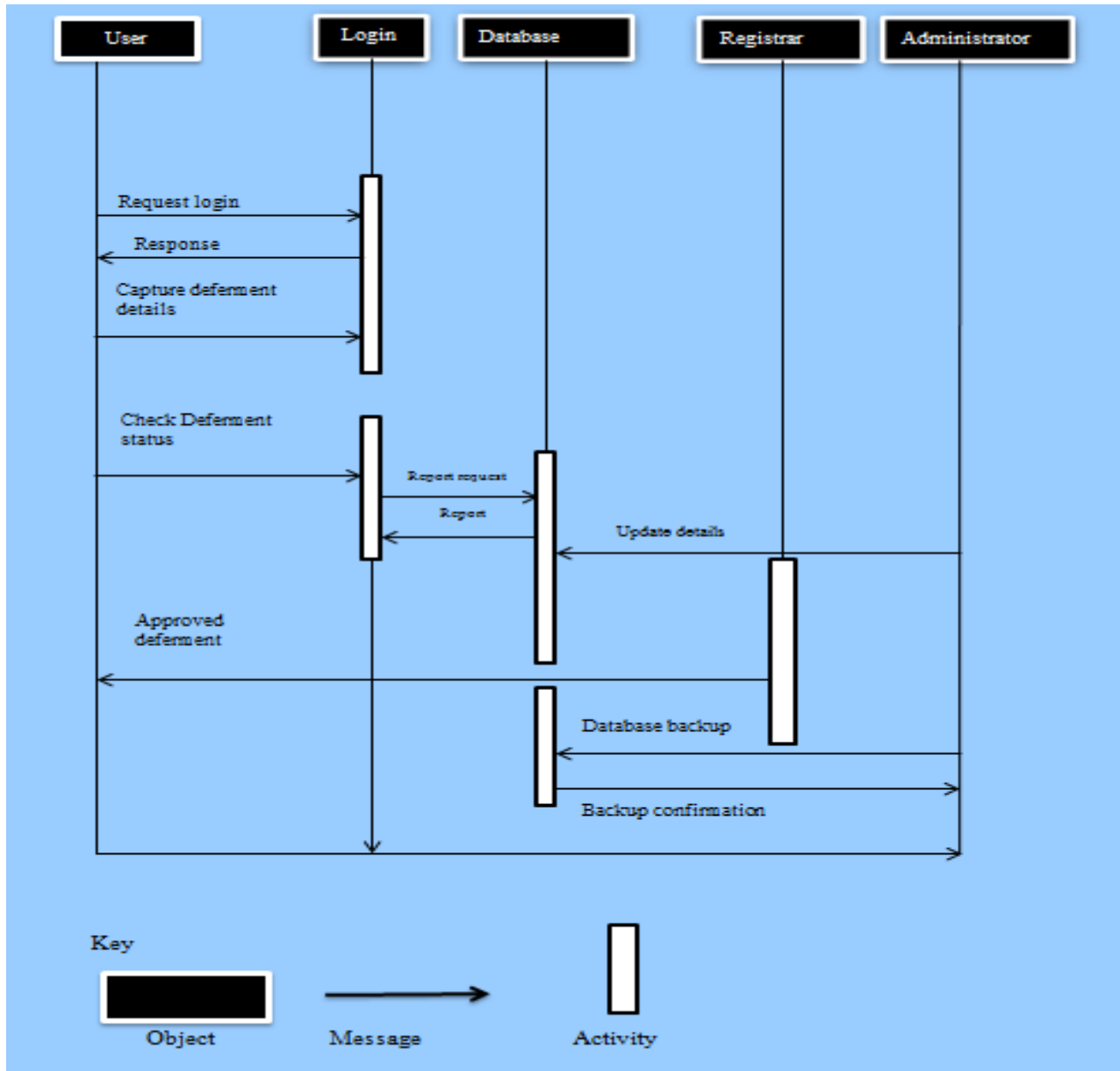
Fig 4.8: Sequence Diagram

4.7 Interface design

Pressman (2001) suggested that interface design is the graphical views of that the user will get to communicate with the system through. Interface design helps the proposed system to progress in a desired manner. This is where user get output from the system which include ideas from other as well reports from the system.

4.7.1 The User Interface

The proposed system is going to use Graphical User Interface. This reduces complexity to the end users and it enables them to navigate through the system with minimum assistance. The following are the forms that show how the system will be like:

User Login Page

User Login Page	
Username:	
Password:	
	Login

Fig 4.9: User Log in Form

Student Login Page

Student Login Page	
Reg Number:	
Password:	
	Login

Fig 4.9.1: Student Log in Form

The above two login form enables the student and the staff user to login in the system using their logging in credentials. If password, username and registration number is incorrect assess is denied

Student Deferment Application form

Deferment Reason	
Period of Deferment	
	Process

Fig 4.9.2: Student Deferment Application form

The deferment application is where the student enters the reason of deferment and also the period of deferment. When the student clicks process the system will automatically sends

New Staff registration form

New User	
Username:	
Password:	
Confirm Password:	
Access Level:	
Name	
Surname	
ID Number	
Email	
	Submit

Fig 4.9.3: New Staff registration form

With the above design the administrator will be able to register and add all staff users who are going to use the system.

Deferred Student Reports

Start Date		End Date		Search Button

Student Name	Reg Number	Faculty	Degree	Reason	Deferment Period	Date Approved

Fig 4.9.4: Deferred Student Reports

The design swill give out report of all students who have deferred their studies showing all attributed of the student.

Approval/disapproval of form

Student Name	Reg Number	Faculty	Degree	Reason	Deferment Period	Approved	Disapprove
						[Approve]	[Disapprove]

Fig 4.9.5: Approval/disapproval of form

The approval or disapproval form is where the Chairperson views the request from the student then by clicking the button to approve or disapprove the details are updated redirecting to the below form.

Comment Form

Comment	
	Approve/ Disapprove
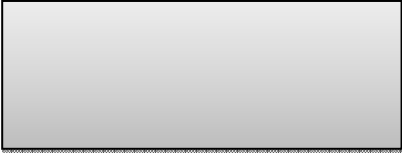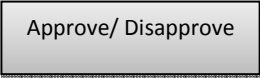
Fig 4.9.6: Comment Form

The chairperson will comment the decision that he \she has granted.

4.7.2 Operating Environment

The system to be developed is going to be able to operate on computers with Windows operating system or Mackintosh and MySQL database that is running on the current Windows server 2003

4.7.3 Interface design tools

Tools used in the implementation in coming up with an interface are HTML, CSS and Dreamweaver, these tools are used to come up with website pages. Using PHP as the programming language makes it simple to connect to the database and the database software to be used makes it quick in storing and retrieving data or knowledge shared. User interface design process which focuses on user interaction with the system. User interface design has two options which Graphical User Interface design and Line Command Interface design.

➢ Line Command Interface: The interface does not make use of a point to navigate through the system, but it makes use of commands for one to access activities or system processes. Hence the use of a mouse is limited.

➢ Graphical User Interface: The interface is designed in forms and the user makes use of pointer to navigate through the system. The interface is more interactive to the user and

hence the use of a mouse is high to access activities and system processes.

Looking at the two options, Graphical User Interface option is highly favorable to the end user because it is highly interactive to the users of the system and hence make it easy for one to access activities and enjoy systems processes.

4.8 Conclusion

The design phase has helped the developer to be able to come up with an organized way of how the system to be developed is going to look like. Entity relationships, database, inputs, processes and outputs as well and how data is going to flow in the proposed system were done in this phase. This was all done to ensure that the developer develops a system that is user oriented and a system that will fulfill the intended objectives. The next chapter is implementation which will focus on the newly developed system.

CHAPTER FIVE: IMPLEMENTATION PHASE

5.1 Introduction

This phase takes a look at the development, installation, testing and maintenance of the new proposed system. The implementation phase includes user training on the data flow and use of the system so as to make easy understanding. After the system is done, it is tested repeatedly for errors and errors are corrected up until the system reports no errors.

5.2 Coding

Coding is the writing a language which is understood by a computer. (Medard and Sprintson, 2012). This is achieved by using PHP programing language and MSQL for SQL statements that will query the database. Goel (2010) states that pseudo code as a short language used in explaining algorithms is an understandable manner.

5.2.1 Pseudo code

➢ Connecting to the database

Check if connection has been made

If not yet set then

Set the connection

Else

Ignore

➢ Login

Enter username and password

If correct then

Go to KMS main menu

Else

Try again

If login is failure then

Exit

End if

➢ Creating a new record

Validate all the information

If invalid input is entered

Report error

Else

Using the established connection, save details

> Updating data in the database

Get the key fields

Check if record does exist

If not then

Report error

Else

Validate all the information

If some of the input is invalid

Report error

 Else

Using the established connection, save record

> Searching for a record

Get the record ID

Using the established connection, retrieve data

If data has not been found then

Report error

Else

Display data

Allow the user to edit

End

5.3 Testing

Testing is a process of checking out if the software being built or developed has errors before implementing it on an organization (Rajani, 2009). Any duty and task is focused in assessing the ability of the system to ensure that it meet the user requirements. System testing is to done iteratively with qualified engineering team which will mainly focuses to prevent faults than to remove them (Kazmierczak, 2003). The following are the methods of testing which are going to be used.

5.3.1 Unit Testing

Williams (2006), states that testing is where distinct or units of code are tested to see their ability for a selected task. The code will be tested according to its work or functionality. The units have to be small for testing to commence and has to include one output and input. Black box and white box are the two categories which the unit testing will use, this is explained below. McFarlin (2012) stated that, this includes the close look on individuals units on the system to check if all functionality works well. Units might be functions and algorithms that do some actions and give back feedback.

5.3.2 Integration testing

As stated by Microsoft (2004), integration testing of software is actually an addition of unit testing and units are joined and tested to check out for interface errors (Microsoft, 2014). The core reason for this testing is to look for the defects that happen when components integrate. Integration testing was conducted using a bottom-up approach which involved testing smaller combined units followed by bigger combined units called modules. Black box and white box were used for integration testing. The methods that were used for integration testing were black-box testing and white-box testing. Black-box testing was mainly used to test and verify the performance of the interfaces that facilitate the interaction between components of the system. The two testing methods were equally important to employ from low level system components testing to the highest level system components testing.

5.3.3 Acceptance Testing

Powers (2012) states that acceptance testing is manly focusing on the system users requirements whereby testing will be done to check if it meets all systems users requiremnets found on the research findings. Before the operational use of the system can be done, acceptance testing is done and this is the final stage in testing the system. The testing is repeatedly done till both users agreement.

The diagram below shows the procedures for testing.
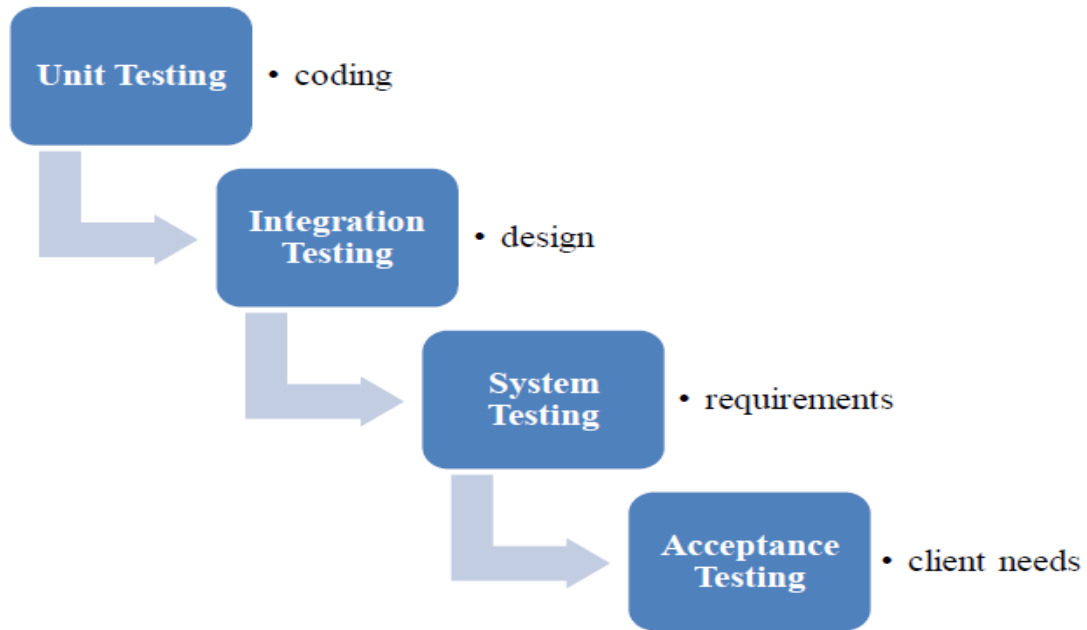
Source: (Sommerville, 2005)

Fig 5.1 Testing Process

5.3.1 Testing methods

There are three methods that the developer will use for testing namely white box, black box and defect testing (Beizer, 2002).

➢ **Black Box Testing**

Black box is a testing method whereby the process is done without the knowhow of the According to Beck (2000) black box testing is a technique of testing without having any knowledge of the internal working of the system. This is where the functionality of the system is completely tested. Black box testing involves an exercise of locating errors such as performance, initialization and interface as well as wrong functions in the system.

➢ **White Box Testing**

 White box testing is an examination of the system based on the structure of the code and the interior logic of the code also (Williams, 2006). It only examines the fundamental aspects of the system and has no or little relevance with the internal logical structure of the system (Nancy et al 2004).This involves thorough investigation of the internal structure and logic of the program. This was exercised by individuals who have the knowledge of the internal

working of the programs and was done with the aim of identifying snippets of code which misbehaving.

➢ **Defect Testing**

Discovering of defects inside the system is very important. The aim of defect testing is to ensure that the system is delivered to the final user perfect.

5.3.2 Verification and Validation

5.3.2.1 Verification

Verification is the action that is taken to see if the built computer programs or systems meet all user requirements noted before the developing of the system (Beizer, 2002). Verification and testing work together and it is much important for the system to bring out results expected meeting all objectives correctly. The IT Director is the one who did the process taking a look at the outcome comparing with expected user outputs. This also refers to the process of calculating the products of work done of the development stage to ensure that stated user requirements are meet for that particular stage (Tannenbaum, 1990)

5.3.2.2 Validation

The process of making sure that the developed product, program and system please the users needs is referred as validation (Kazmierczak, 2003). The reason for building a new system is to eliminate and remove all drawbacks been faced the system users, so as to build the correct system that will tackle down all the noted challenges. This can be also explained as assessing of a computer system during and at the end of the software during or at the end of the progress stage to ensure stated business requirements are accepted (Dixit, 2002).

Login Validation

If wrong login credentials are inserted in the username and password text field the system will give a warning error massage to give valid credentials. The below is the login form showing the username and password text fields
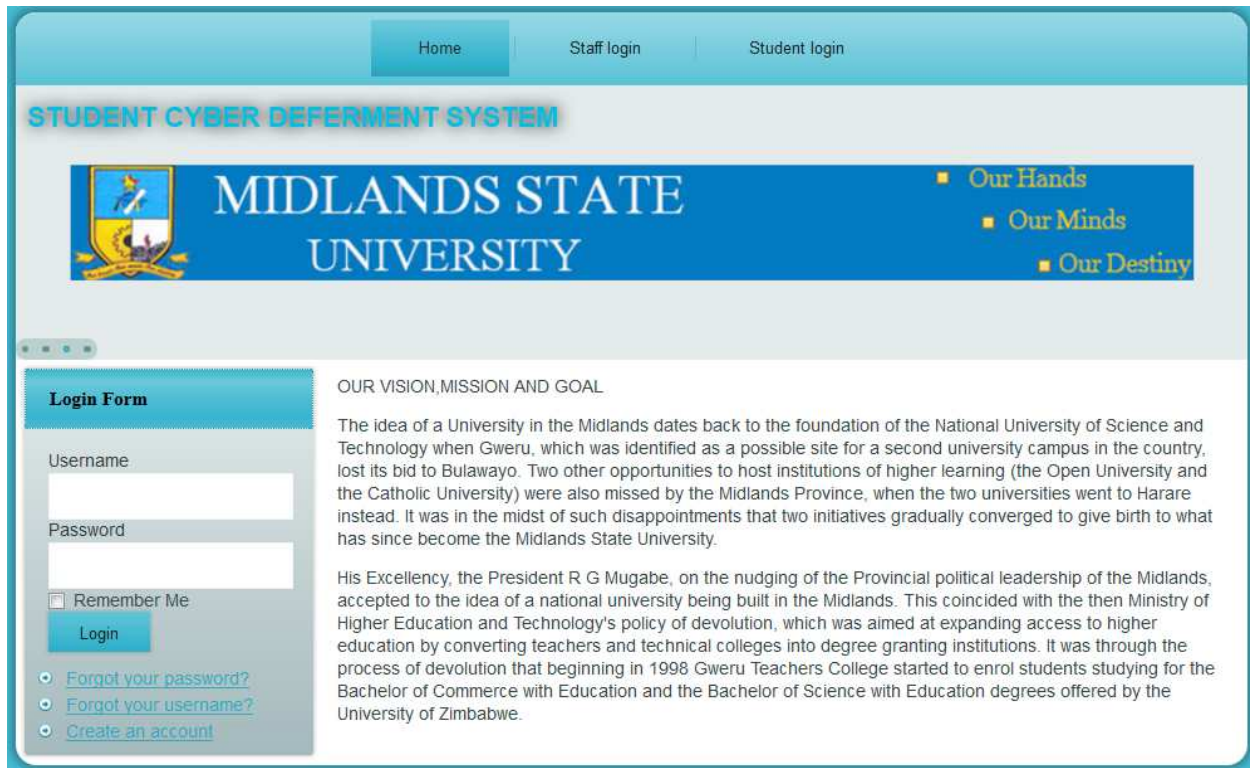
Fig 5.2 Login Form

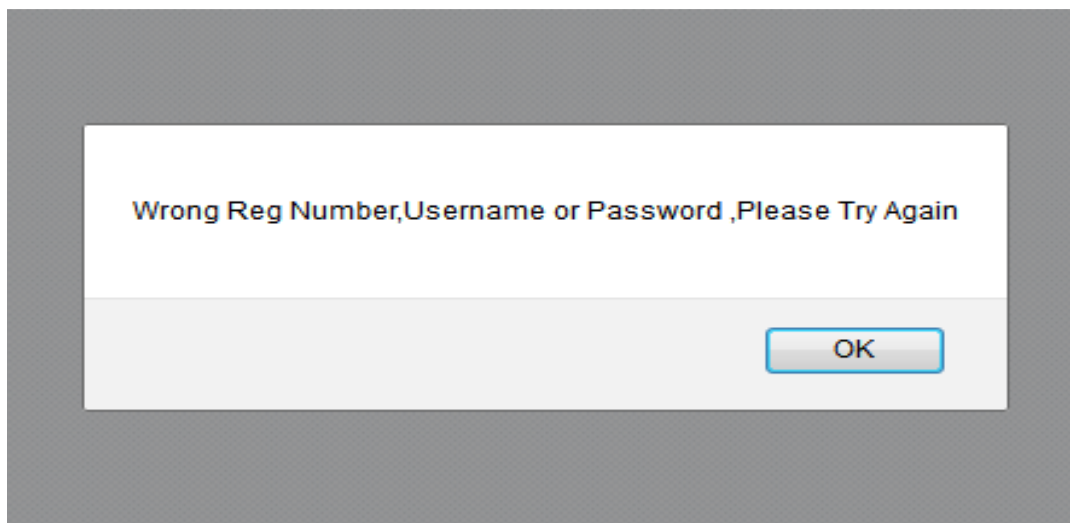When the Staff or Student enters wrong credentials the below error warning box pops out.

Wrong Reg Number,Username or Password ,Please Try Again

OK

Fig 5.3 Failed Login Shot.

User Input Validation.

The user input validation is where the system validate the inputs being entered by the user in the system for example the user has to enter numbers only on the field were the numbers are required also enter a valid email address were an email is required. The below shot points out an email input validation.
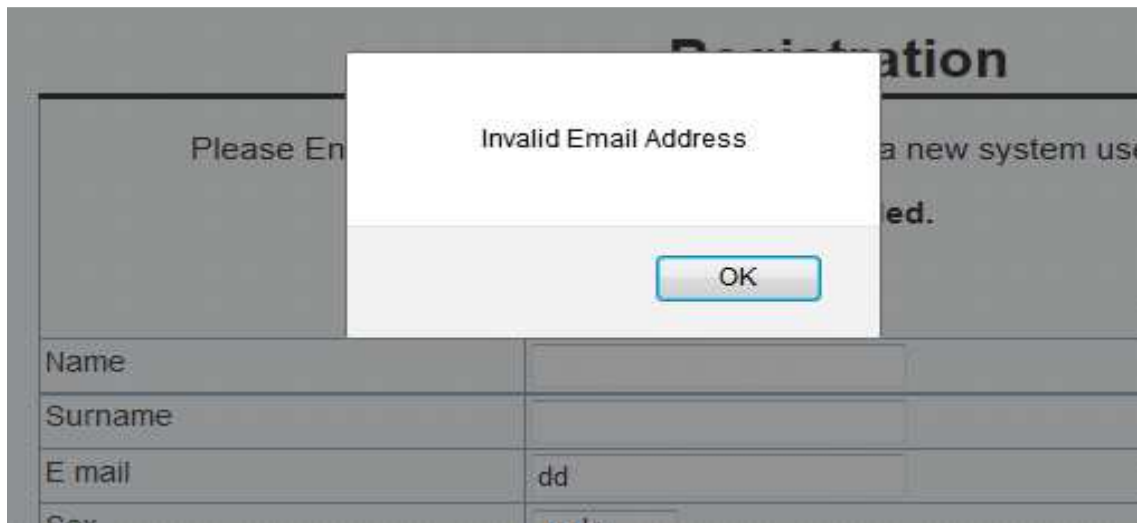
Fig 5.4 User Input Validation

5.4 Installation

Installations are events and action taken involved in the installation of a computer program or system (Grady, 1997). This takes a look at the user training and all methods which are going to be used to position the system according to it system servers. Installation also refers to a process of inserting the system onto a web server where the users will use it from (Myers 2003).

The installation was done on The Midlands State University Server as said before in the design stage.

- ➢ The WAMP Server with MYSQL database server was installed.
- ➢ Auto-creation of a root folder in wamp called www.
- ➢ Type the URL www.localhost/msu _cyber.
- ➢ The system will redirect the user to the homepage where there is the login page where all users logs in with their credentials.

5.4.1 User Training

The new cyber Deferment System has for users namely the student the departmental chairperson and the registrar. User training is going to be done in two different ways since it includes the staff and the students. Mass user training is going to be conducted to students and for the staff involved it's going to be done on individual bases. There are levels of training which are going to be used:

➢ **Module level:**The user must get well versed with each and every module of the system that the user will access or work with.

➢ **System level:**The management has to appreciate the construction of the system and all the work it is capable of doing. Only a few individuals who have full or complete access rights to the whole system must have knowledge of how all the modules within the system work that is its functionality.

5.4.2 Changeover

System changeover is the process of taking out the current system replacing with a new system (Huassain, 2007). The main reason is to make changes or shift from the old system without having any problems. It also takes a look on how the existing information can be incorporated with the one of the new system. The below are the types of changeover that can be used and one method will be selected.

Pilot Changeover

With pilot changeover the new system will be installed on a particular small department of the organization and few users will evaluate and see its functionality and performance before it is installed and implemented on the whole organization (Pual et al, 1993). Pilot changeover is said to have low risks since installed on a small part of the organization if risks occurs its cost will be low (Krugnman, 2009).

Direct Changeover

Direct changeover is completely ruling off the existing system replacing it with a new system (Krugnman, 2009). This change over process is time saving and there are minimized cost but this in accompanied with high risk of losing all data since there will be no back up of the current system.

Phased Changeover

This is where one part of the system is introduced at a time up until the old system is totally removed (Sommerville 2004). When the part selected is working properly the system is installed to the next up until the current system is overwritten. This encounters fewer risks since one area chosen is affected and its time consuming to affect the whole organization.

Parallel Changeover

Hutchens (2007) states that, parallel changeover is the process of running both the old system and the new system at one time parallel. If the user is satisfied with the performance of the new system the old one is eliminated and ruled off. This changeover process is safe since both systems is used to evaluate if the new system is usable over the old existing one. Parallel method is dare and time wasting since two systems will be running at the same time. Hence the researcher will recommend the parallel changeover to be used.

Reasons for choosing Parallel Changeover

➢ The changeover has less risks
➢ Low employees and student stress since they will be still using the old one.
➢ Gives more time of learning the new system while using the old one.

5.5 Maintenance

This is ways to make sure that the installed system keeps performing as expected (George, 2001).The main aim of this process is to ensure continues running of the system meeting its objectives and also improve the system where necessary. The system maintenance process is an endless practice whereby the system administrators have to keep the system updated and to do upgrade when needed. The Student Cyber Deferment System maintenance is going to be done with the next following stages

➢ **Interval System Review**

Review will be done quarterly in each and every year, this will be done by the ITS department of Software Analysts headed by the IT director. This will be done to ensure great performance of the system.

> ➢ **Disaster Recovery**

The system allows backing up of the database and all files of the system which will be done by the system administrator. External Hard Drives are going to be used for offline data backup. The backing up process is done after every semester for the administrator to capture all data for the whole semester.
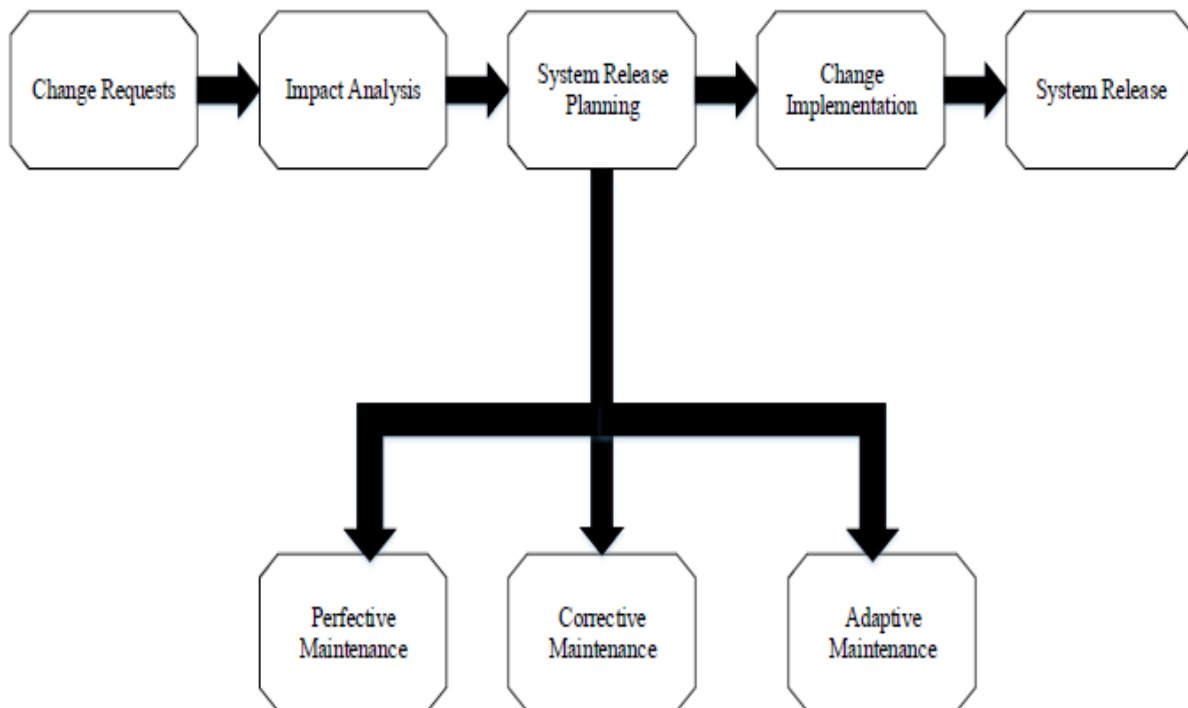
> ➢ **System Maintenance Activities**

The system maintenance activities includes error correction which may be detected during the running of the system and also adding new requirements or suggestions from the users of the system.

5.5.1 Maintenance activities

The system maintenance is an important process and it should be done properly so as to meet all functionality of the system.

The diagram below tries to elaborate how the system is going to be maintained.

Source: (Sommerville, 2005)

Fig 5.5 Software maintenance diagram

5.5.2 Perfective Maintenance

 Perfective maintenance refers to the process to make sure that user output, system activities of the computer program is improved (Sommerville, 2005). This is aimed to meet the perfect the efficiency, response time, effectiveness and reliability of the system. According to Edwards(2009) perfective maintenance is defined as the maintenances process to transform the functionality of the system to a better one. This has to be done so as to be able to handle the changes of requirements by the user involving the system. All changes and adjustments on the system have to be documented.

5.5.3 Corrective Maintenance

Corrective maintenance refers to the alternatives done when trying to solve the faults in the system design, code and system implementation (Sommerville, 2005). Most of the time problems start to rise soon after the installation of the system and this is where corrective maintenance is done. The errors are mostly caused by incorrect implementation of the system (Edwards and Bramante, 2009). The errors identified will be resolved so as to come out with a perfect system and documentation is done for all errors corrected.

5.5.4 Adaptive Maintenance

Adaptive maintenance is to make changes to the running system to transform how it works in order to meet the new environment of operation (Sommerville, 2005). When the hardware of the running system changes, adaptive maintenance is commenced so as to make the system compatible with the new system hardware (Edwards and Bramante, 2009). This type of maintenance is less important as compared to corrective maintenance.

5.5.5 Software backup services

George (2001) suggested that system backup must be done to reduce the loss of important information stored. The system developer is going to do the backup of the system files. They may be system related errors such as the code of the system, so the debugging and modifications of the system's code, the organization has to get in touch with the system programmer or other programmers who have an excellent knowledge of PHP or software systems technician who

knows how to fix problems that comes with software systems. Backup will involve the following:

- ➤ Hardware Backup Backing up of computer hardware is needed and this includes maintenance and repairing of the hardware.
- ➤ System Backup The system administrator is responsible for backing up all system activities so as to reduce or minimize loss of information shared by users of the system. This involves copying files into an external hard drive for backup purposes and this must be done every week.

5.6 Recommendations

The system is subject to review and updates and it can be upgraded to accommodate "WHAT IF ANALYSIS" that enhances the management to come up with an uncompromised decisions for future organization information sharing and how it is structured within the organization. The following is recommended for the system.

- ➤ The server must always be kept on and internet must not be disconnected and the database must be backed up on a regular basis, for example one a week.
- ➤ The system can be incorporated or integrated with the organizational website and be upgraded to allow other external researcher or writers to add more value to organizational work.

- ➤ In future, moving or migrating to Java is more recommended as a development language of systems because it is robust, secures portable and platform independent which makes it easy to reach not only the southern Africa region but the world at large despite the platform being used.

5.6 Conclusion

The system was installed and provided to the users, it was implemented and tested all errors was corrected and resolved hence it was ready for it to perform its operations. In order the system to be kept updated and keep on good performance in future maintenance measures were taken into consideration.

REFERENCE LIST.

- Agwaral,N.A et al .(2010) Software Development Techniques. New Delhi : India Press

- Bloch, M & Hoyos-Gomez,A (2009). How CIOs should think about business value. Available from: www.mickinsey.com/insights/business_technology/ how_cios_should_think_about_business_value (accessed 17 March 2014)

- Brent, R.J, (2006), Business and Economics, Edward Elgar Publishing

- Borrington K (2013). Cambridge IGCSE Business Studies. London: Hodder Education

- Cadle J and Yeates D,(2008),Project Management for Information Systems,5th edition ,Pearson Education Limited ,England.

- Capon C, (2000), Understanding Organizational Context, Pearson Educated limited, Britain.

- Capozzi, C. (2012), What is the difference between tangible & intangible benefits?. Available at:www.ehow.com/info_8094073_difference-between-tangible-intangible-benefits.html (Accessed 11 March 2014)

- Culley .S, Mileham .A, McIntosh .R, Owen .G, (2001), Improving changeover performance, Butterworth-Heinemann, United Kingdom.

- Dawn, T (2002) .Enhanced feasibilities 1st edition. LosAngeles: Dove Publications.

- Dorian .C, Heiberger .E.L, Karsten .K, (2003), the backup book: Disaster Recovery from Desktop to Data Center, Worcestershire, United Kingdom.

- George, M (2001).The Cost of Maintenance Managing System Maintenance. MacGraw-Hill, America. Available at:www.mis.uhcl.edu accessed 27 April 2014

- Hofstrand, D., and Holz-Clause, M., (2006) .What is a Feasibility Study? London: McGraw-Hill.

- Hussain, K. (2007). The System Changeover, CA Module. Pearson Education, America.

- Jefrey, A. H, Jeoy F.G, Joseph S. V. (2004) System, Analysis and Design 3rd Edition, PearsonEducation, Singapore

- Kendall (2005), Systems Analysis and Design, Prentice Hall, India.

- Katimuneetorn, P. (2008), Feasibility Study for Information System Projects. Available at:www.umsl.edu/~sauterv/analysis/F08papers/Katimuneetorn_Feasibility_Study.html (Accessed 6 March 2014)

- Rosenblatt.S, (2012), Systems analysis and Design, 9th edition, Course Technology Cengage learning, USA.

- Sommerville, I (2005). Software Engineering 9. Pearson Education, America.

- Smith, C (2013).www.smallbusiness.chron.com Hearst Newspapers, Texas America (accessed 10 March 2014)

- Swedberg, J., (2008) The Decision Point. California: Orchard Books Press.

- Stevens ,E and Sherwood ,P .(1982) How to prepare a feasibility study .Prentice-Hall

- Smith, C (2013).www.smallbusiness.chron.com Hearst Newspapers, Texas America (accessed 10 March 2014)

- Swedberg, J., (2008) The Decision Point. California: Orchard Books Press.

- Thompson, A (2003). Business Feasibility Studies: Dimensions of Business Viability. Perth, Best Entrepreneur.

- Sheldon .M and Moes .G, (2005). Beginning MySQL, John Wiley and Sons, United States.

- Tearle R (n.d.). Visions and Values. Available from: http://www.changedesigns.net/public/organisation/org_strategy/What-are-vision-and-values.html

- Manktelow J (no date). Mission statements and vision statements. Available from: http://www.mindtools.com/pages/article/newLDR_90.htm

- McQuain W (2012). Problem Solving in computer science. (s.l.): (s.n.).

- Medard, M and Sprintson, A (2012). Network Coding: Fundamentals and Applications.

Appendix A - User Manual

Introduction

The user manual is created to simplify the navigation or use of the system by users, so it was prepared to provide guidance to the user in the absence of the helpdesk on how to operate the system. This manual has been designed to assist you getting started with this amazing new era of technology. The goal being that you will find this user manual hopeful in operating the system.

About the system

The system was constructed using HTML, JavaScript and PHP as the programming language and MySQL being the system database from (Xampp Server) although importing to other database engines is possible. The system comprises of the following modules;

- ➢ Student module.

- ➢ System Administration module.

- ➢ Department Chairperson Module

- ➢ Registrar Module

Getting started

Midlands State University Student Cyber Deferment System is accessed by entering the website: www.localhost/msu_cyber on any web browser. The login page will be shown as below.

System User Login

User Login

The system comprises of four users who are the student ,the department chairperson, and the registrar.This is the entry point for a user to have access to the cyber deferment. The system comes with username and password in order for a user to get entry into the system. The user must enter valid details on the Login as User section, to get into the system.

Administrator Home Page
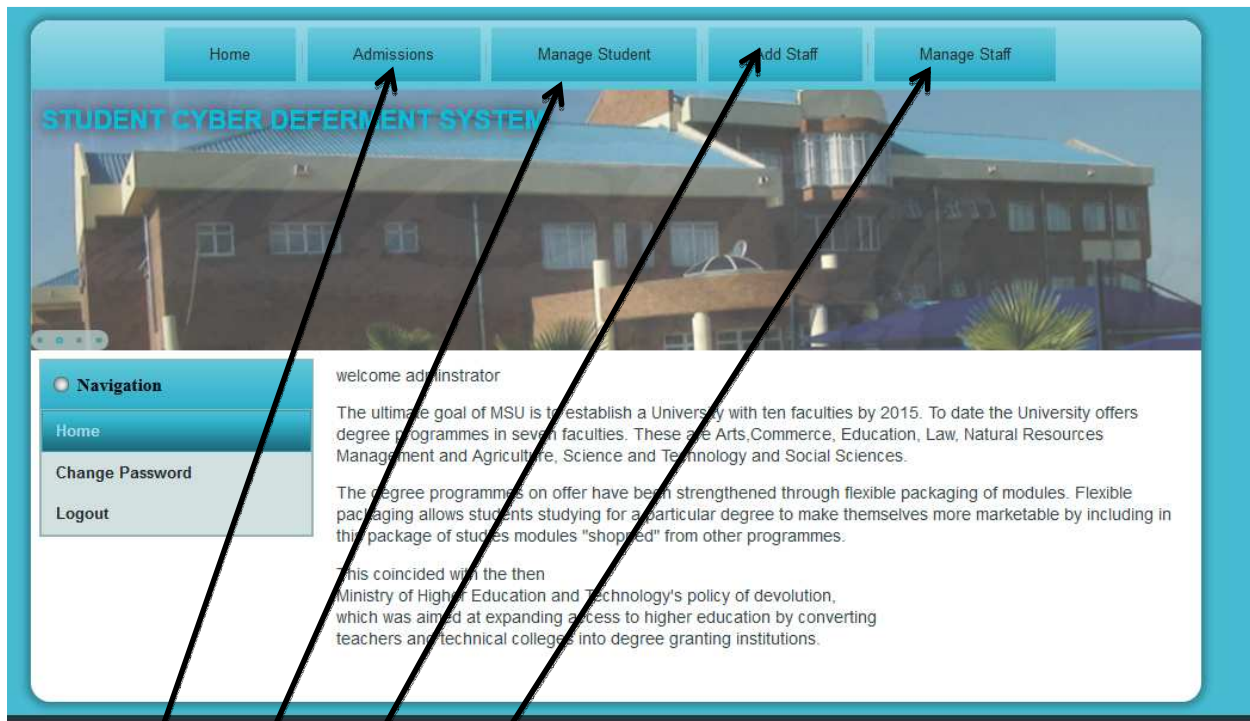
Click **Admissions** to add new student.

Click **Manage Students** To edit, update and delete the student.

Click **Add Staff to** add new staff.

Click **Manage Staff** To edit, update and delete the staff.

In this section the administrator has full authority over everything the system performs and he/she must take each action with caution knowing that he/she is accountable to every decision he/she makes in the system. There is a section for backing up the system's database to ensure information is secure and in case of system failure there is a contingence plain to restore the system.

Student Home page

After entering correct credentials the student is directed to this home page
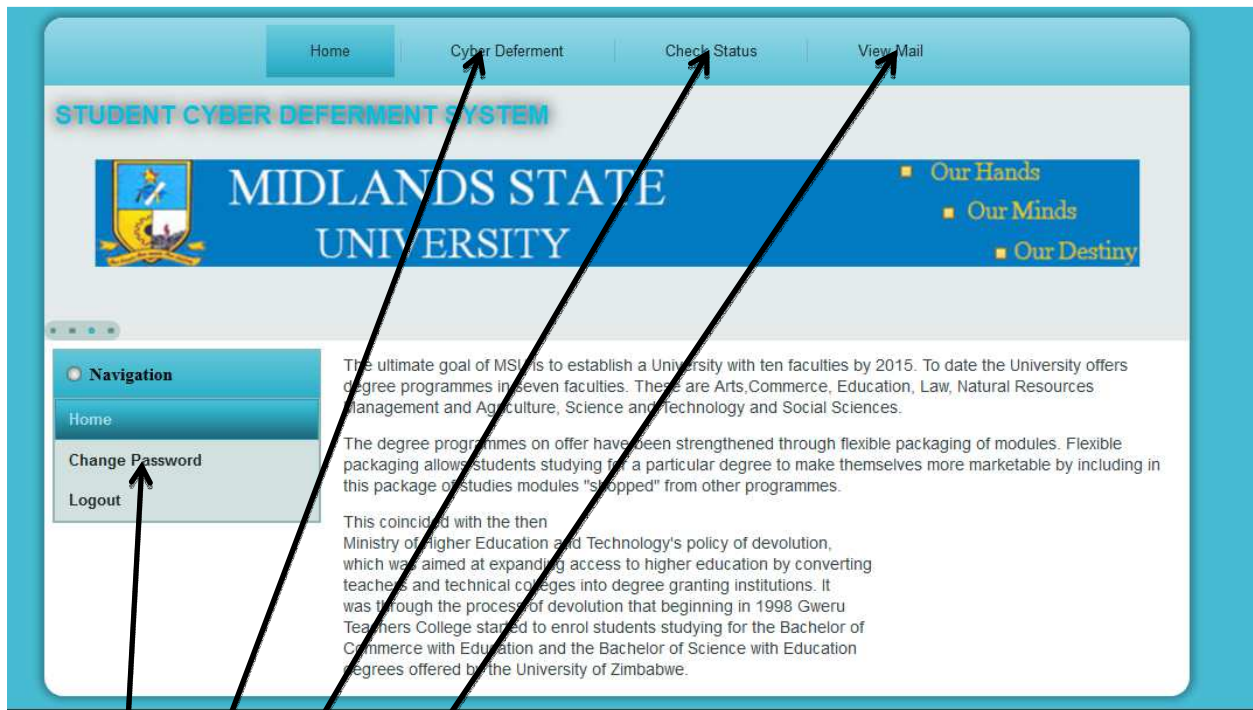
Click **Cyber deferment** to request or apply for deferment of study.
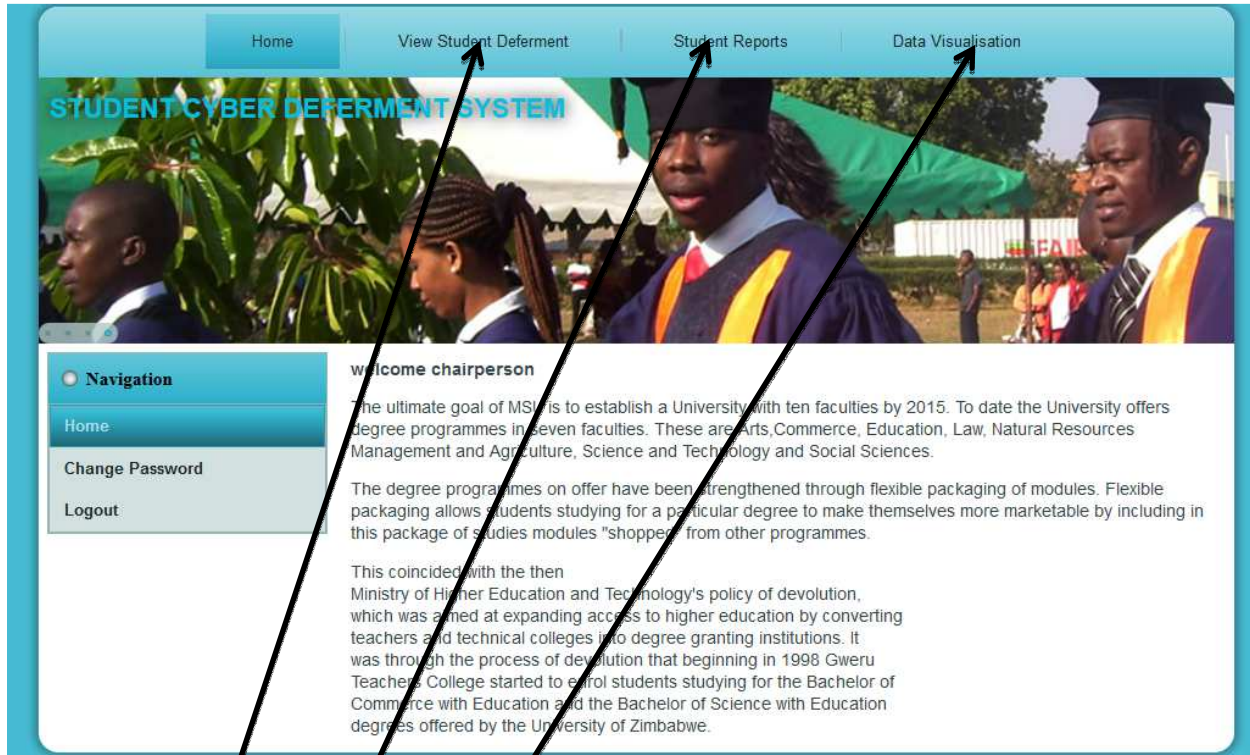
Click **Check status** to view and check for status from the department chairperson and the registrar.

Click **View mail** to be directed to the mailbox.

Click **Change password** to change your user password

Departmental Chairperson Home Page

After entering correct credentials the student is directed to this home page
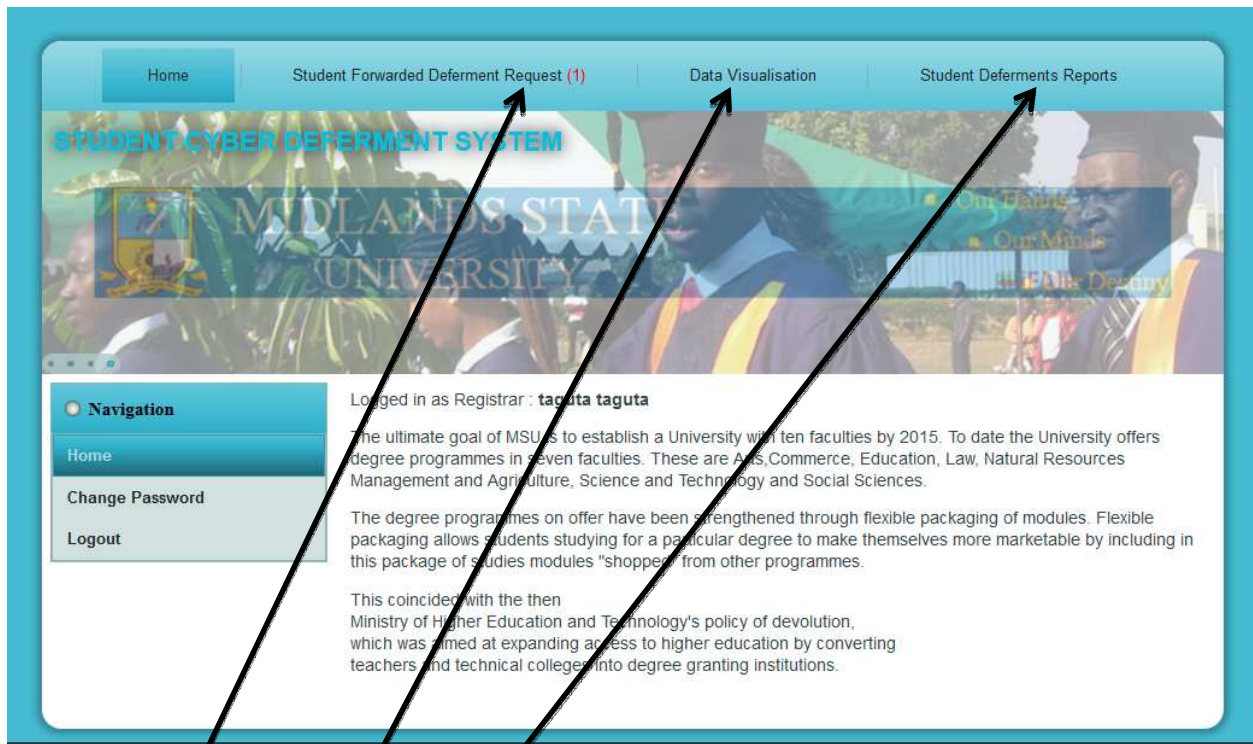

Click **View Student Deferment** Request to view all request by the students from your department.in this platform this is where the lecturer accepts of rejects the request by the student.

Click **Student reports** to view all reports of students who applied for the deferment of studies.

Click **Data Visualization** for the 3 D views of reports of students who deferred their studies.

Registrar Home Page

Click **View Student Deferment** Request to view all request by the students from your department.in this platform.this is where the lecturer accepts of rejects the request by the student.

Click **Student reports** to view all reports of students who applied for the deferment of studies.

Click **Data Visualization** for the 3 D views of reports of students who deferred their studies.

Appendix B: Interview Checklist

Interview Questions

STAFF SECTION

1. What data about each contributed do you capture/ record?

_____

_____

2. How do you generate reports and who can access reports?

STUDENT SECTION

1. Do you enjoy working with the current manual system and if so what are the strengths?

_____

_____

_____

2.   What   problems   are   you   facing   using   the   current   system?

_____

_____

_____

3. What view or opinion do you have about migrating from the current manual system to a fully computerized system do you have?

_____

_____

_____

4. What expectations of the proposed system do you suggest?

_____

_____

Appendix C: Questionnaires

09 February 2015

Dear Participant

My name is Tinashe Makiwa and I am a student at Midlands State University. For my final project, I am developing a system called Midlands State University Student Cyber Deferment System which is an online-computing solution system that allows the current students to defer and resume their studies online and receive the confirmation via email.

I am inviting you to participate in this research study by completing the attached surveys. The following questionnaire will require approximately two days completing. There is no compensation for responding nor is there any known risk. In order to ensure that all information will remain confidential, please do not include your name. If you choose to participate in this project, please answer all questions as honestly as possible and return the completed questionnaires promptly. Participation is strictly voluntary and you may refuse to participate at any time.

Thank you for taking the time to assist me in my educational endeavors. The information from this study will be used for academic purposes only

Sincerely,
Tinashe Makiwa
0775488798

NB: TICK ON THE PROVIDED TICK BOX

Checklist Section A: Staff

1. How do you rate the current system?

Excellent ☐ Good ☐ Fair ☐ Poor ☐

2. Given the choice to migrate from the current manual deferment system to a fully computerized system, do you choose to migrate?

Yes ☐ No ☐

If No, what may be the reason_____

_____

3. Do you often experience very busy days and huge workloads during your operations?

Very often ☐ Sometimes ☐ All the time ☐

4. Have some of employees complained about the current system?

Yes ☐ No ☐

If YES what were the complaints?

5. What problems are you facing with the current system?

_____

_____

Section B: Students

1. Are you satisfied with the current manual system that you have been using all along?

Yes ☐   Not at ☐

If YES, give the reason

_____

_____

2. How do you rate the current system?

Excellent ☐   Good ☐   Fair ☐   Poor ☐

3. Are you pleased with the processing speed of the current manual system?

Yes ☐   No ☐

If No what are the suggestions? _____

Appendix D: Snippet of code

```php
<?php

error_reporting(0);

?>

<?php

session_start();

include 'opendb.php';

if(isset($_POST['submit']))

{

$username = $_POST["username"];

$password = $_POST["password"];

//$balance = $_POST["balance"];

 $result ="";

$query = "SELECT * from users where username='$username' AND password = '$password'";

$result = mysql_query($query);

$rows=mysql_fetch_array($result);

$access=$rows['access'];

$_SESSION['username'] = $username;

if(!$result)
```

```php
{

        die( "\n\ncould'nt send the query because".mysql_error());

        exit;}

        $row = mysql_num_rows($result);

        if($row==1 && $access == '1')

{

        header("location: admin/index.php");exit;

}

elseif($row==1 && $access== '2')

{

header("location: extra/index.php");

        exit;

}

elseif($row==1 && $access== '3')

{

        header("location: student/index.php");

        exit;

}

 elseif($row==1 && $access== '4')

{

header("location: wrl/index.php");
```

```php
exit;

 }

 elseif($row==1 && $access== '5')

 {

        header("location: bursar/index.php");

        exit;

 }

 elseif($row==1 && $access== '6')

 {

        header("location: payables/index.php");

        exit; }

   else

 {

{

echo("<SCRIPT  LANGUAGE='JavaScript'>  window.alert('Your  Password  or  Username  is
Wrong,Please Try Again')

              javascript:history.go(-1)

                    </SCRIPT>"

 }

 }

?>
```