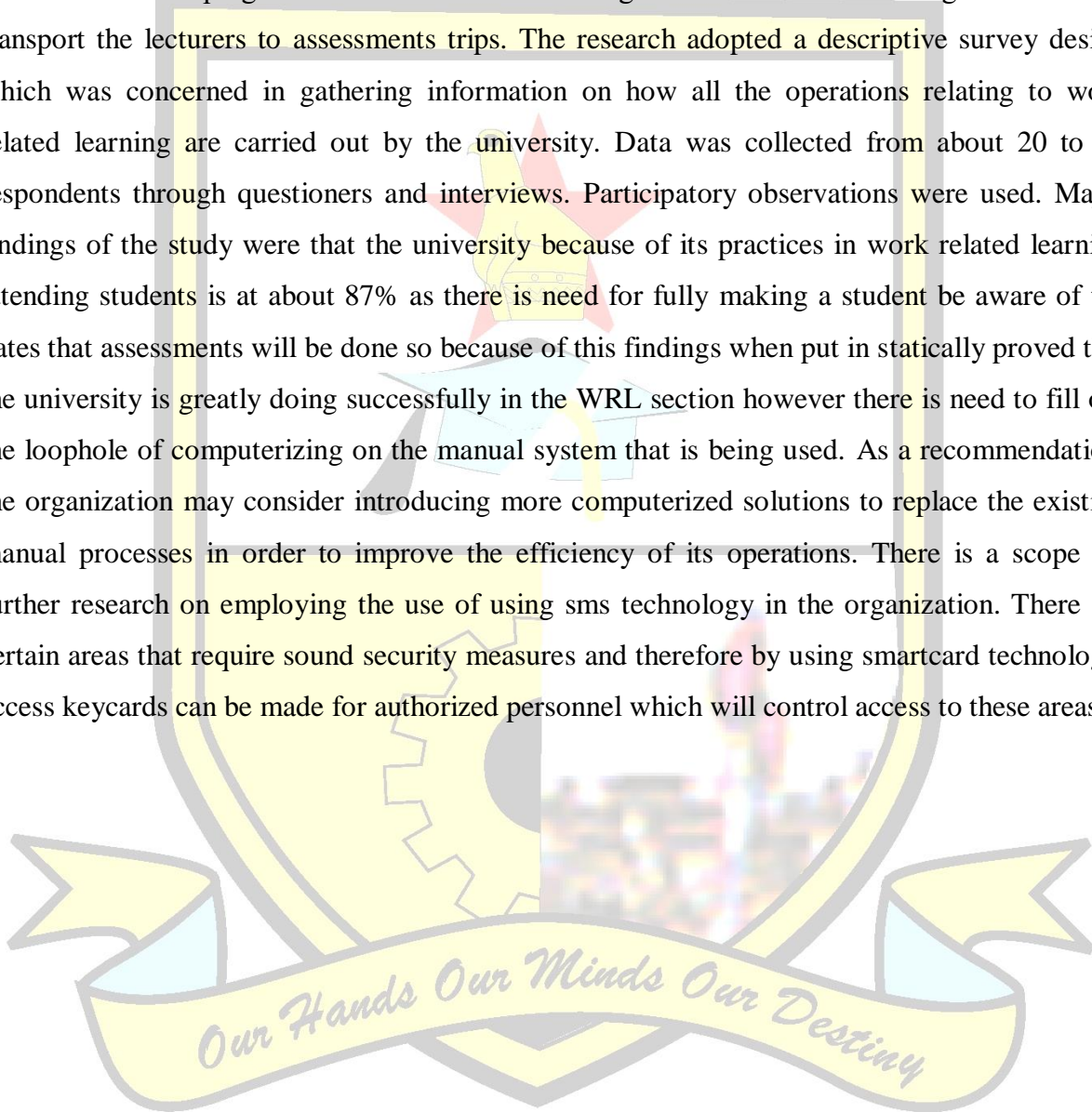


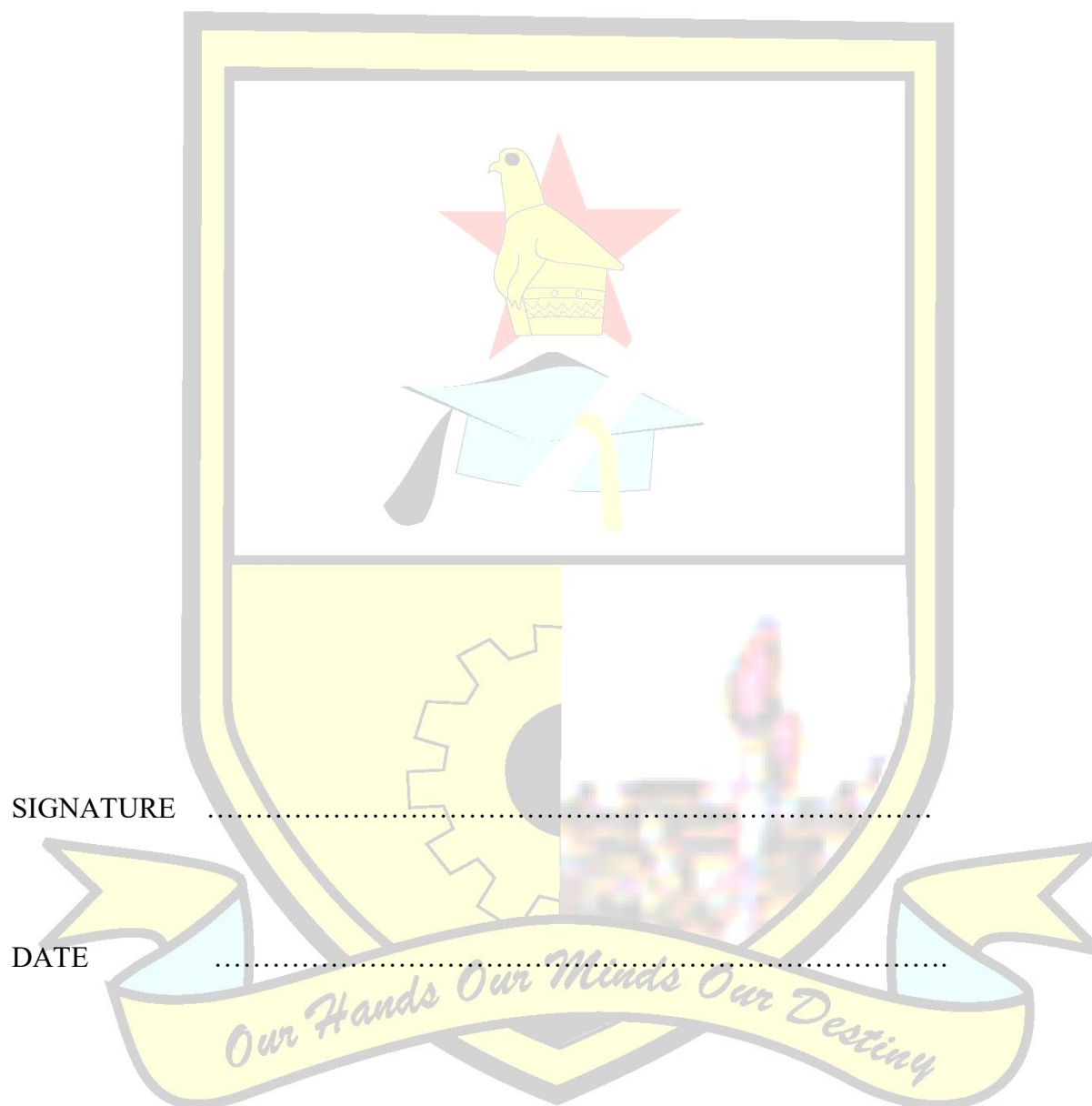
ABSTRACT

The main purpose of this study was to design an online system which helps operations done by the work related learning office by allowing students to send their placement forms online, departmental coordinators to allocate lecturers students for supervision fairly, decrease the use of flat files in keeping students' details and avoiding situations of overbooking of buses that transport the lecturers to assessments trips. The research adopted a descriptive survey design which was concerned in gathering information on how all the operations relating to work related learning are carried out by the university. Data was collected from about 20 to 30 respondents through questioners and interviews. Participatory observations were used. Major findings of the study were that the university because of its practices in work related learning attending students is at about 87% as there is need for fully making a student be aware of the dates that assessments will be done so because of this findings when put in statically proved that the university is greatly doing successfully in the WRL section however there is need to fill out the loophole of computerizing on the manual system that is being used. As a recommendation, the organization may consider introducing more computerized solutions to replace the existing manual processes in order to improve the efficiency of its operations. There is a scope for further research on employing the use of using sms technology in the organization. There are certain areas that require sound security measures and therefore by using smartcard technology, access keycards can be made for authorized personnel which will control access to these areas.



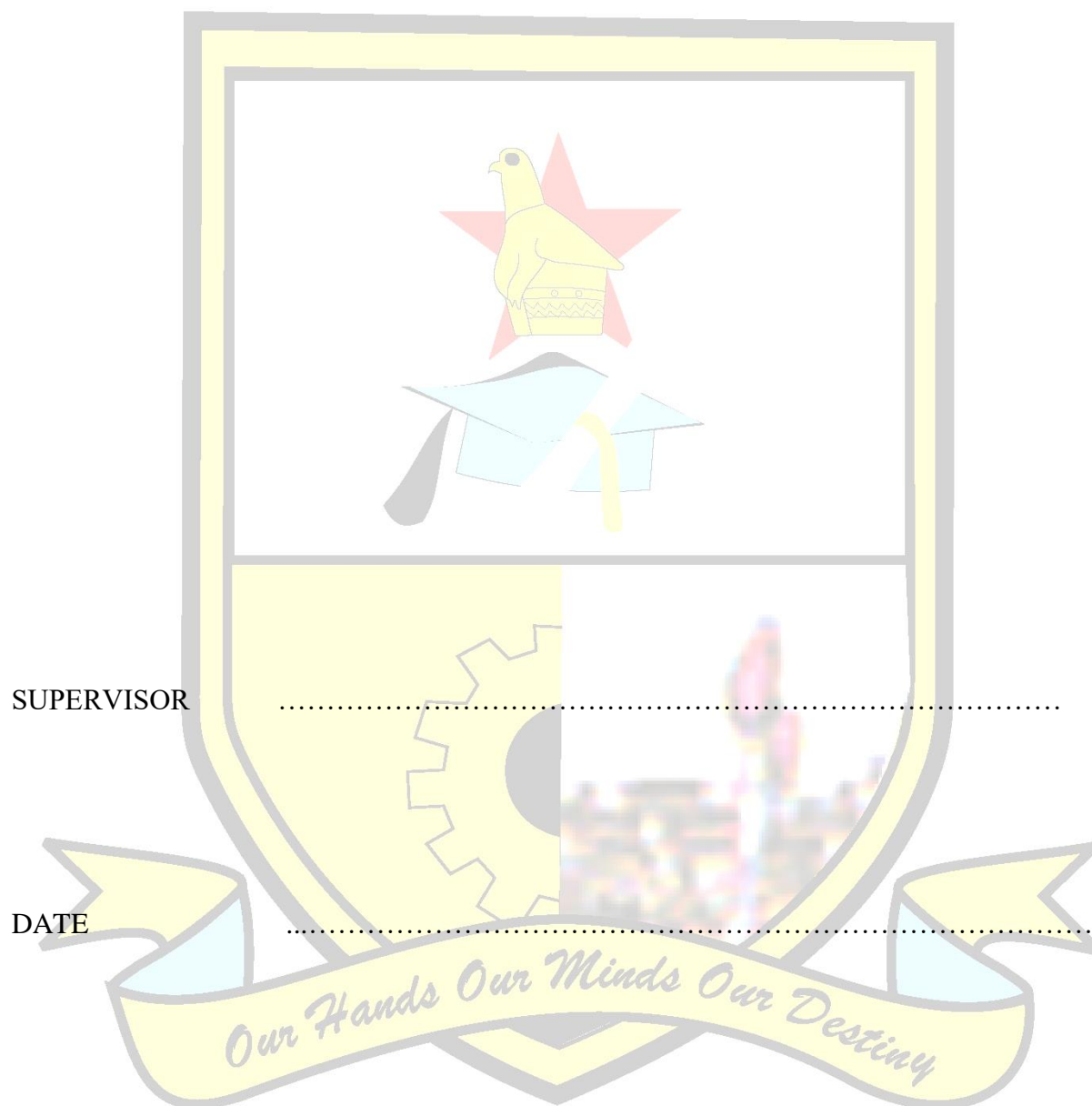
DECLARATION

I, **RUVIMBO MASANGO** declare that I am the author of this dissertation and I authorize the Midlands state University to lend this document to other institutions and students for supporting scholarly research



APPROVAL

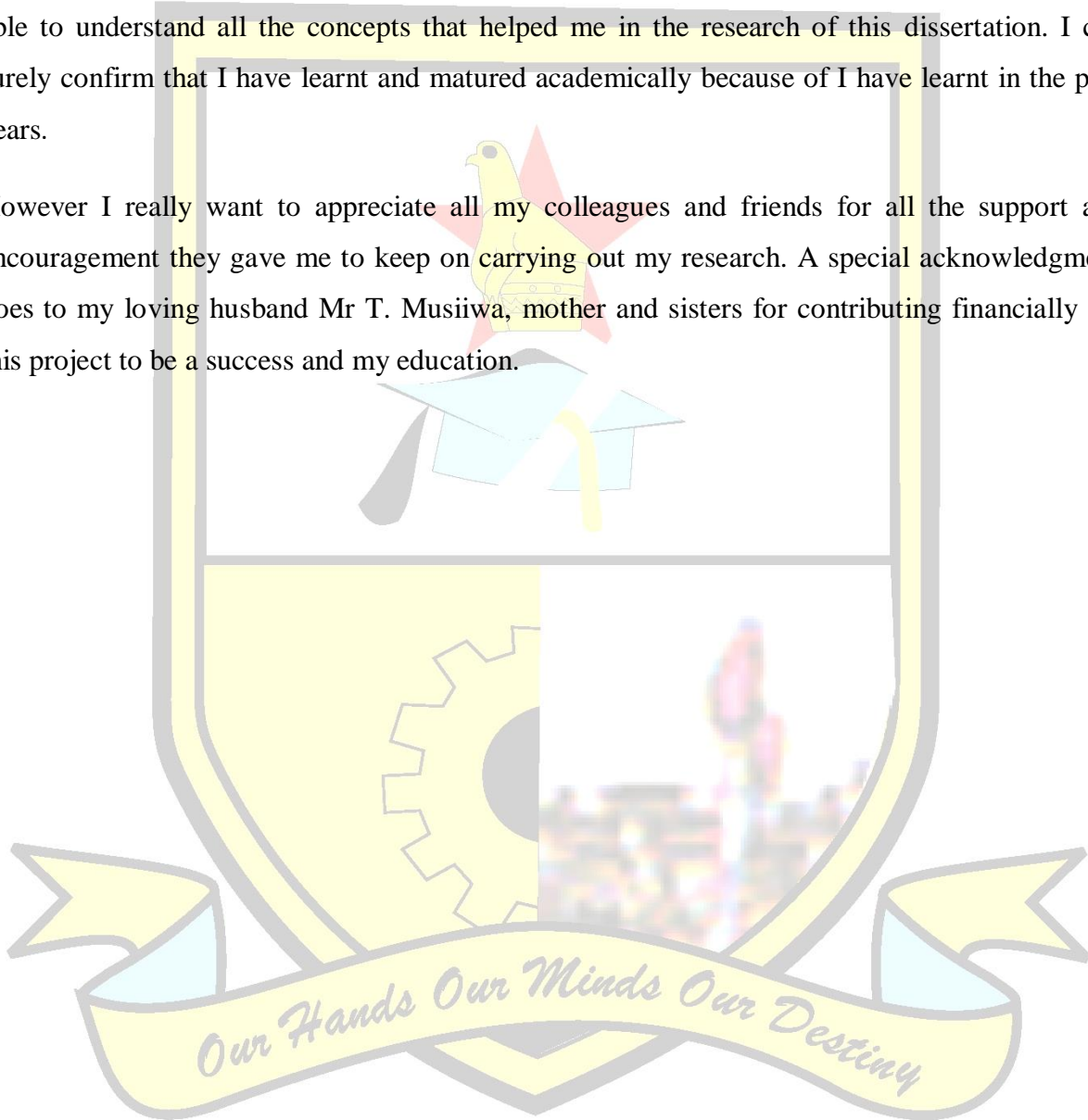
The dissertation “The Midlands State University Trip Scheduling System” done by **MASANGO RUVIMBO** meets the regulations governing the award of the Bsc HONOURS DEGREE IN INFORMATION SYSTEMS and approval is made because of its contribution to knowledge and literal presentation.



ACKNOWLEDGEMENTS

All the effort I have made would not have been a success without the help of the Midlands State University where I did my work related learning for allowing me to carry out this research and also my project supervisor Mr S. Musungwini who took all his time and effort to help me come up with the best dissertation. I also would like to thank all the Department of Computer Science and Information Systems lecturers for the knowledge they equipped me so that I can be able to understand all the concepts that helped me in the research of this dissertation. I can surely confirm that I have learnt and matured academically because of I have learnt in the past years.

However I really want to appreciate all my colleagues and friends for all the support and encouragement they gave me to keep on carrying out my research. A special acknowledgment goes to my loving husband Mr T. Musiiwa, mother and sisters for contributing financially for this project to be a success and my education.



DEDICATION

I dedicate my work to my parents, sisters for their support and not forgetting my one and only loving husband for being my source of inspiration and working tirelessly that I achieve the best in life. All this could not have been a success without the support and love from the Almighty God up above “It was all in the hands of the Lord”.



TABLE OF CONTENTS

Contents

ABSTRACT	i
DECLARATION	ii
APPROVAL	iii
ACKNOWLEDGEMENTS	iv
DEDICATION	v
CHAPTER 1 INTRODUCTION	1
1.1 INTRODUCTION	1
1.2. BACKGROUND OF ORGANISATION	1
1.2.2 Organizational Structure	1
1.2.3 Vision	3
1.2.4 Mission	3
1.2.5 Core Values	4
1.3 PROBLEM DEFINITION	4
1.4 AIM	5
1.5 OBJECTIVES	5
1.6 HYPOTHESIS	5
1.7 JUSTIFICATION	5
1.8 CONCLUSION	6
CHAPTER 2 PLANNING PHASE	7
2.1 INTRODUCTION	7
2.2 REASONS FOR BUILDING THE SYSTEM	7
2.3 BUSINESS VALUE	7
2.3.1 Employee Value	8
2.3.2 Stakeholder Value	8
2.3.4 Alignment of IT and Business Processes	8

2.4 FEASIBILITY STUDY	9
2.4.1 Operational Feasibility	9
2.4.2 Social feasibility	9
2.4.3 Technical Feasibility	10
2.4.4 Economic Feasibility.....	10
2.4.5 Cost- benefit analysis	11
2.4.4 Return on investment analysis	12
2.5 WORK PLAN	13
2.5.1 Gantt Chart	14
2.6 CONCLUSION	15
CHAPTER 3 ANALYSIS PHASE.....	16
3.1 INTRODUCTION.....	16
3.2 INFORMATION GATHERING METHODOLOGIES.....	16
3.2.1 Interviews	16
3.2.2 Questionnaires	17
3.2.3 Observations	17
3.3 ANALYSIS OF THE EXISTING SYSTEM.....	18
3.3.1 Description of the Current System.....	18
3.4 PROCESS ANALYSIS	18
3.5 DATA ANALYSIS	19
3.5.1 Current System Context Diagram.....	19
3.5.2 Current System Data Flow Diagram.....	20
3.6 WEAKNESSES OF THE CURRENT SYSTEM.....	21
3.7 ALTERNATIVES	21
3.7.1 Outsource.....	21
3.7.2 Improvement.....	22
3.7.3 Development Alternative	22

3.8 REQUIREMENTS ANALYSIS	23
3.8.1 Functional Requirements.....	23
3.8.2 Non-functional Requirements.....	24
3.9 CONCLUSION	25
CHAPTER4 DESIGN PHASE.....	26
4.1 INTRODUCTION.....	26
4.2 SYSTEM DESIGN.....	26
4.2.1 Context Diagram of the Proposed System	27
4.2.2Data Flow Diagram of the Current System.....	27
4.3 ARCHITECTURAL DESIGN.....	28
4.4 PHYSICAL DESIGN.....	29
4.5 DATABASE DESIGN	30
4.5.1 Physical level.....	31
4.5.2 Conceptual level	31
4.5.3 View level.....	32
4.5.4 Entity Relationship Diagram.....	32
4.5.5 Enhanced Entity Relationship Diagram.....	33
4.6 PROGRAM DESIGN.....	34
4.6.1 Package diagram.....	35
4.6.2 Class diagram	35
4.6.3 Sequence Diagram.....	37
4.6.4 INTERFACE DESIGN.....	38
4.7 CONCLUSION.....	40
CHAPTER 5 IMPLEMENTATION PHASE	41
5.1 INTRODUCTION.....	41
5.2 CODING (PSEUDO CODE).....	41
5.3 TESTING.....	42

5.3.1 Unit Testing	43
5.3.2 Black Box Tests	43
5.3.3 White Box Tests	43
5.3.4 Module Testing	44
5.3.5 System Testing	44
5.3.6 Acceptance Testing	44
5.3.7 Alpha Testing	44
5.3.8 Beta Testing	44
5.3.9 Validation	45
5.3.10 Verification	46
5.4 INSTALLATION	47
5.4.1 User training	47
5.4.2 Methods of conversion	47
5.5 MAINTENANCE	48
5.5.1 Adaptive Maintenance	48
5.5.2 Perfective Maintenance	49
5.5.3 Corrective Maintenance	49
5.5.4 Preventive Maintenance	49
5.6 CONCLUSION	49
REFERENCES	50



LIST OF ACRONYMS

DFD	Data Flow Diagram
ERD	Entity Relationship Diagram
EERD	Enhanced Entity Relationship Diagram
GUI	Graphic User Interface
HTML	Hyper Text Mark-up Language
ICT	Information Communication Technology
LAN	Local Area Network
MSU	Midlands State University
NUST	National University of Science and Technology
ROI	Return on Investment
SQL	Structured Query Language
WAN	Wide Area Network
Win	Windows



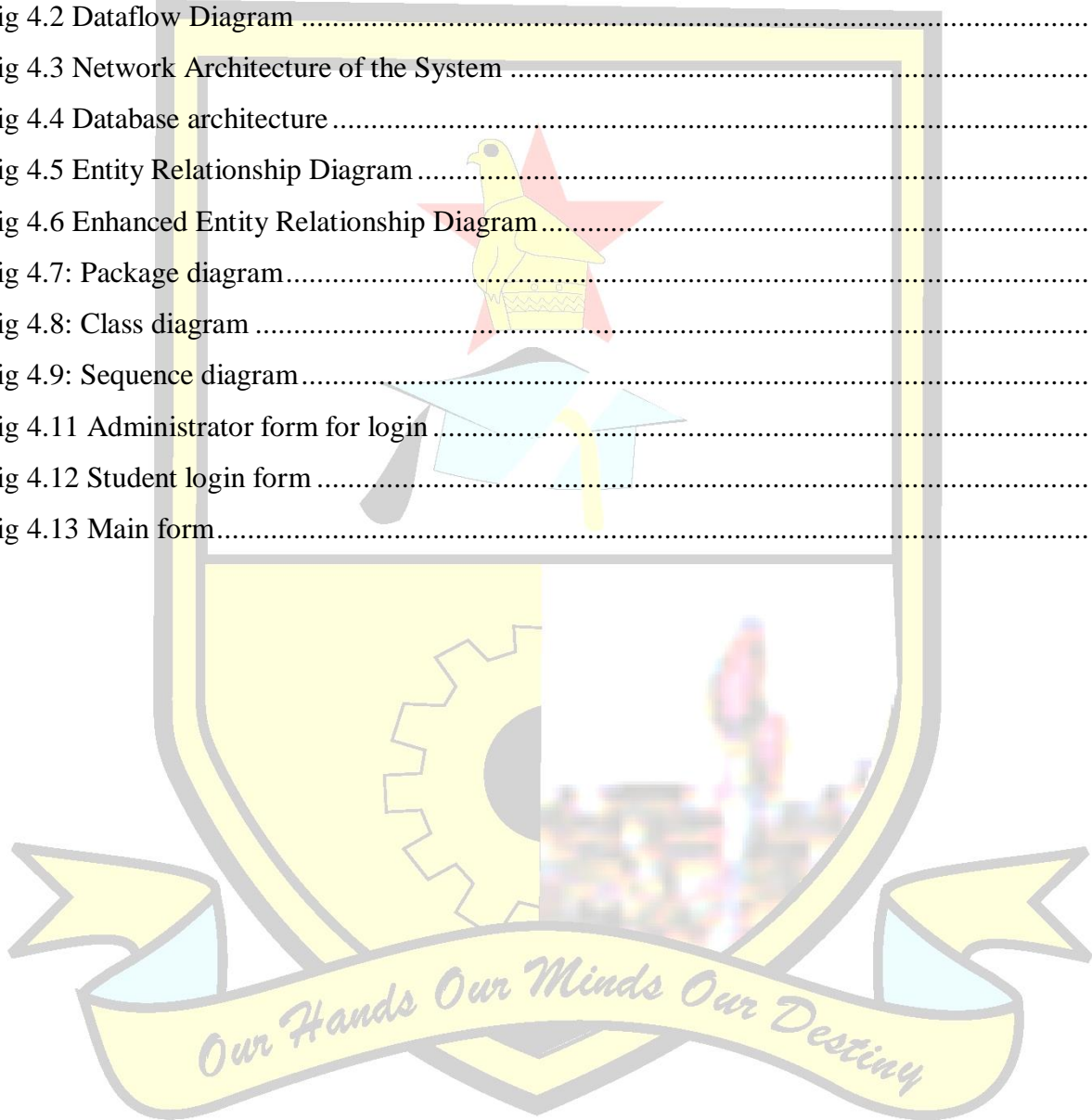
LIST OF TABLES

Table 2.1 Cost Benefit Analysis..... 12
Table 2.2 Work Plan 14



LIST OF FIGURES

Fig 1.1: Organogram of Midlands State University	3
Fig 2.1 Gantt chart	15
Fig 3.2 Context Diagram.....	19
Fig 3.3 Data Flow Diagram.....	20
Fig 3.4 Use Case Diagram	24
Fig 4.1 Context Diagram.....	27
Fig 4.2 Dataflow Diagram	28
Fig 4.3 Network Architecture of the System	29
Fig 4.4 Database architecture	31
Fig 4.5 Entity Relationship Diagram	32
Fig 4.6 Enhanced Entity Relationship Diagram.....	34
Fig 4.7: Package diagram.....	35
Fig 4.8: Class diagram	36
Fig 4.9: Sequence diagram.....	37
Fig 4.11 Administrator form for login	38
Fig 4.12 Student login form	39
Fig 4.13 Main form.....	39



LIST OF APPENDICES

APPENDICES.....	53
APPENDIX A USER MANUAL.....	53
APPENDIX B INTERVIEW CHECKLIST	62
APPENDIX C QUESTIONNAIRE CHECKLIST	64
APPENDIX D OBSERVATION SCORE SHEET	65
APPENDIX E SNIPPETS OF CODE	66



LIST OF FIGURES APPENDIXS

Fig A1: Homepage..... 53

Fig A2: User login 54

Fig A3: Student View 55

Fig A4: Successful capturing of details 56

Fig A5: Coordinator View 57

Fig A6: Adding lecturers..... 58

Fig A7: Allocating lecturers..... 59

Fig A8: Admin View 60

Fig A9: Adding departments..... 61



CHAPTER 1 INTRODUCTION

1.1 INTRODUCTION

The Midlands State University WRL management system is a system which uses an online platform to keep track of all work related learning records. Discussion on the chapter will be on the research done by the developer bringing out the background of the organization, problem definition of the current system and numerous possible ways to avoid them. It will also concentrate on the main aims that the proposed system possesses highlighting also the various methodologies or apparatus which will be used for the development process.

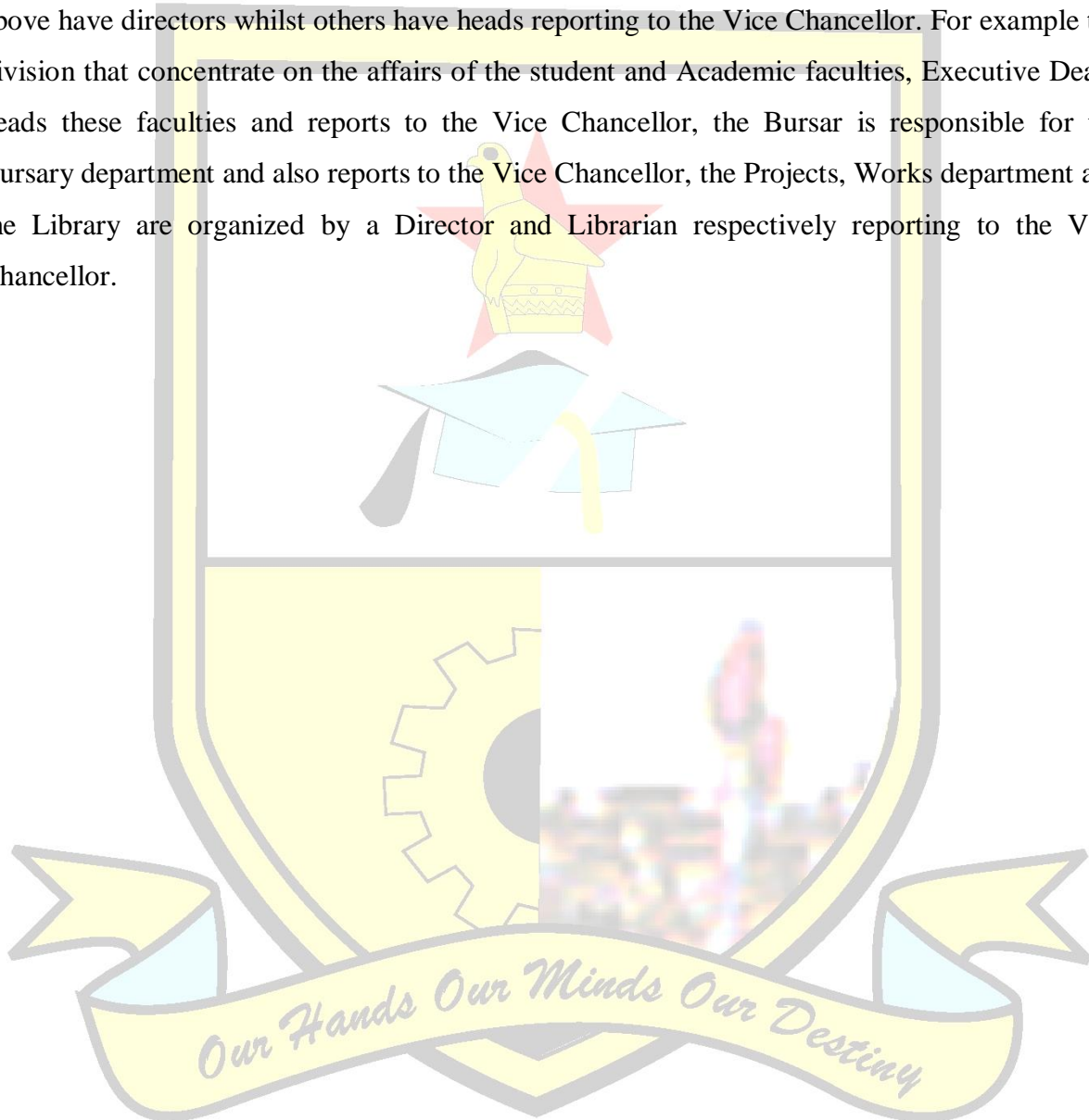
1.2. BACKGROUND OF ORGANISATION

As the university in Matabeleland Province that focuses on science and technology (NUST) was formed there came a suggestion to form an University in the Midlands Province which however was due to the failure of the Open University and the Catholic University to be placed in the province. This however led to the foundation of the Midlands State University, which was an idea that was accepted by His Excellency, the President R G Mugabe. However as the idea emerged various issues arose as the Ministry of Higher Education and Technology's devolution policy did not agree with the idea as the policy aims in escalating higher education access by changing teaching and technical colleges into institutions that help students acquire their degrees. Beginning 1998 considering the policy of devolution Gweru Teachers College began the enrollment of students to study the degrees of Bachelor of Commerce with Education and Bachelor of Science with Education which the University of Zimbabwe offered.

1.2.2 Organizational Structure

An organizational structure is defined by Dow G.K (1989) as a structure which takes into consideration two basic core features. These features include the breakdown of the whole objective into different secondary tasks and the combination of these secondary tasks to attain organizational performance. The organizational structure of the Midlands State University is designed in ways that ensure positive standards of business ethics, moral and integrity in conducting business affairs by its employees. The principal officer thus the Vice Chancellor who is currently Professor Ngwabi Bhebhe is the first one from the hierarchy who reports only to His Excellency Cde R .G Mugabe ,the Zimbabwean president known as the Chancellor of the university and other state universities in the country. Instantaneously after comes the Pro-

Vice Chancellor which is a vacant position formerly held by Professor R J Zvobgo. Underneath the two posts mentioned above comes different departments in operation. Also there is the department that focuses on the registration of students, payment of fees and other issues related in finance which is the bursary office, the Library, faculties that concern on the academic, Student affairs, Information Technology Services, the Work Related Learning, Works, the Information and Public relations department. In addition four of the departments mentioned above have directors whilst others have heads reporting to the Vice Chancellor. For example the division that concentrate on the affairs of the student and Academic faculties, Executive Deans heads these faculties and reports to the Vice Chancellor, the Bursar is responsible for the Bursary department and also reports to the Vice Chancellor, the Projects, Works department and the Library are organized by a Director and Librarian respectively reporting to the Vice Chancellor.



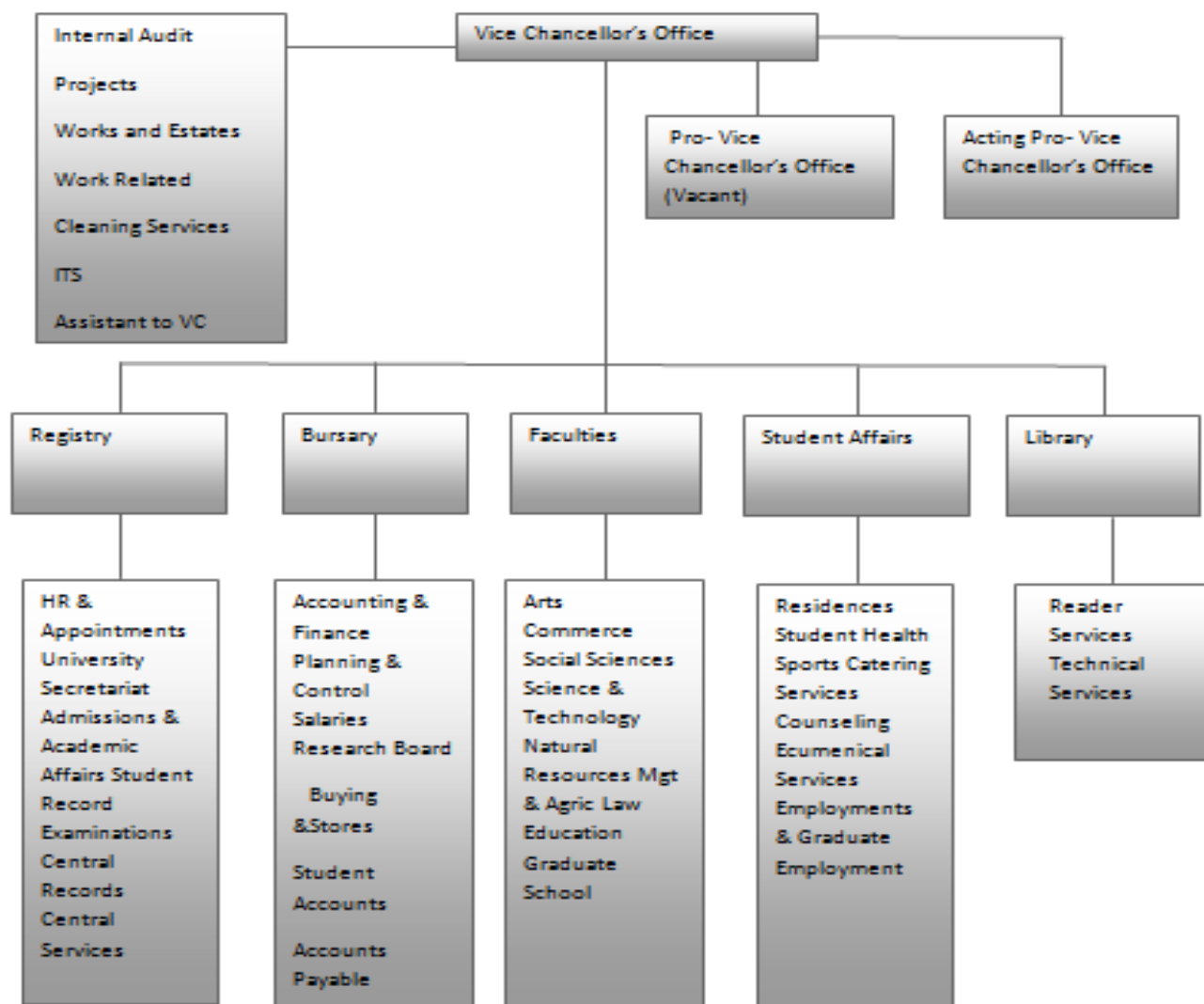


Fig 1.1: Organogram of Midlands State University

1.2.3 Vision

To be a unique, development oriented, pace-setting and stakeholder driven University that produces innovative and enterprising graduates.

1.2.4 Mission

- Commitment to a culture of problem solving through quality research, teaching and training by means of flexible packaging, work related learning and strategic partnerships with the University's stakeholders for the immediate and ultimate benefit of humanity;
- Commitment to improve the performance of the economy through the promotion of managerial skills and generation, dissemination and application of knowledge;

- Commitment to the recruitment, motivation and retention of staff in an environment of a caring institution;
- Commitment to the use of Information Communication Technology (ICT) 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 recruitment policies;

Commitment to enhance the quality of people's lives through new ideas and skills for sustainable utilization of resources; and

- Commitment to promotion of quality research through both taught and research post graduate studies as means of generating new knowledge.

1.2.5 Core Values

- Driven by honesty, integrity, hard work and passion for excellence tempered by self discipline and care for others;
- Driven by sensitivity to gender equality and equity, needs of the disadvantaged, African culture and devotion to self-sufficiency and professionalism.

1.3 PROBLEM DEFINITION

Weiss J.A (1989) cites that problem definition is a wrap up of ideas that are at least completely, an explanation of the causes and consequences of circumstances that are undesirable and a presumption on ways to improve them. Due to the rise in the number of students intake over the past few years, the Midlands State University has faced lot of administrative irregularities when it comes to managing work related issues like scheduling the trips to the lecturers and also compiling student records on whether they have found attachment or not. Work related learning as a paramount aspect of the students' learning period and as result of the large numbers of students this office has faced problems administratively in terms of managing assessment trips.

Noted below are problems in the current system;

- ❖ The system is manual making it possible for human error to occur.
- ❖ The departmental coordinators have to rely on excel sheets and flat files to compile student records.

- ❖ Lack of easily accessible student database making it is difficult to compile reports for reporting purposes for example in faculty board meetings.
- ❖ With the current system is very it is very difficult to manage WRL assessment trips resulting in some vehicles being over booked.

1.4 AIM

The research main aim is providing a system that properly keeps track of work related learning records, producing accurate statistics, improving communication and reporting within the organisation.

1.5 OBJECTIVES

- ❖ To provide a system that keeps track of WRL records.
- ❖ To have a system that enables students to upload their WRL placement details online hence reducing travelling costs.
- ❖ The system should enable the WRL administrator to upload all available trips so that departmental coordinators can make reservations.
- ❖ The system should make use of passwords and access levels to users through the use of passwords hence enhancing security.
- ❖ The system should also notify lectures on any changes in relation to trips through the use of an SMS platform.

1.6 HYPOTHESIS

The waterfall methodology will be used to develop the system because of its advantage of being less risky and allow easy tracking of the development process. PHP will be used to develop the system as it is a tool that enables a good graphic user interface, My SQL will also be used since it is known to be a strong relational database system and Dreamweaver CS6 which is simple to use.

1.7 JUSTIFICATION

With various operations taking place in the Work Related Learning office and problems highlighted in the chapter it calls for need to computerize these operations. The proposed system is essential to the University as it will be able to regularize activities within organization. However there is need for active user participation which will help by motivating users to accept the new system. Communication between students, coordinators and lecturers

will be improved particularly in the notification of students' placements in a particular company, planning and decision making.

1.8 CONCLUSION

Conclusively after identifying the problems presently facing the Midlands State University in terms of managing Work Related Learning records, the current system operations summary identified as problems being faced and few of the objectives of the proposed system are set. The planning phase is the next stage that follows.



CHAPTER 2 PLANNING PHASE

2.1 INTRODUCTION

The chapter is going to elaborate on the project development time, activities that are going to be implemented and the business value of the system indicating how beneficial the project would be to the university. The chapter will also focus on the analysis whether it is worthwhile for the organization to adopt to the system and also the feasibility of building the system and also the risk analysis to determine potential effects that might affect the project negatively. This chapter will also incite on feasibility study.

2.2 REASONS FOR BUILDING THE SYSTEM

Due to increase in the number of students intake over the past few years, the University is currently using a manual system to keep track of student records on whether they have found attachment or not and managing work related issues like scheduling the trips to the lecturers. The system is going to provide the following functionality:

- ❖ Enable departmental co-coordinators to keep track of students' Work Related Learning records.
- ❖ Enable students to upload their WRL placement details online hence reducing travelling costs.
- ❖ Enable the WRL administrator to upload all available trips so that departmental coordinators can make reservations.
- ❖ Provide security to confidential information through the use of passwords and users access levels.
- ❖ Notify lectures on any changes in relation to trips through the use of an SMS platform.

2.3 BUSINESS VALUE

Laudon, K.C (2004) defines business value as the use of information that is relevant in order for the organization to be a success with the aim of accomplishing its objectives strategically. Organization values can also be defined also as the advantages that an organization can attain in partaking projects that will improve organizational reputation. Business valuation is therefore one of the strategy that is used to evaluate the essential value of a business. The University will also benefit mostly on the implementation and development of the system as improvement will

be mainly focused on the effectiveness and efficiency of the Work Related Learning office services. Basically the system will be of value to the following strategic areas:

2.3.1 Employee Value

Employee Value is mainly concerned with the system helping employees perform their daily to daily duties easily and also increasing the staff morale. Lecturers are going to be of beneficial to the system especially work related learning co-coordinators in the sense that the system will help improve strategic decisions related with the work related assessment trips to avoid overbooking of the bus for the lecturers.

2.3.2 Stakeholder Value

A stakeholder is anyone who is interested in the affairs of business activities and on this aspect the developer identified the different stakeholders from the Midlands State University which include students, lecturers, and the government. The developer got their views and highlighted if the system will increase stakeholder value.

- ❖ **Students**- these are the main stakeholders, and the system is going to ensure that each and every student have access to fill in his or her placement form with the use of the request identification number, avoiding too many trips for students coming henceforth to leave their placement details rather than concentrating on the studies.
- ❖ **Lecturers**- these are also of paramount importance as system stakeholders. The system will see the lecturers benefiting through quick response time to any changes made concerning assessment trips, avoiding any disappointments and updating their assessment trips to the coordinator.
- ❖ **Government**- the development of the system will see the organization contributing towards the national objective of building towards a computerized learning environment for students.

2.3.4 Alignment of IT and Business Processes

Due to the University vision and mission statement the system will contribute greatly in supporting these two making sure that the obligation of a culture which involves solving problems, through inferiority investigations, educating and exercises through the work related learning programme and a premeditated partnership between with the people mainly interested with the business and operation of the University thus stakeholders will be supported.

2.4 FEASIBILITY STUDY

Feasibility study is defined by Lancaster G, (2001) as an activity done during the software development process after clearly outlining the system' requirements, the study will be carried out under four categories which include technical, social, operational and economical. Feasibility basically focuses on building the system practically with available resources and outlining guidelines to the organization whether the project is worthwhile or not.

2.4.1 Operational Feasibility

Lancaster G (2001) cites that the aim of operational feasibility is discovering whether the software will be of assistance to the management, employees and students. Acceptability of the system by the stakeholders will be taken into account and comparison of the current and proposed system will be determined. Operational feasibility reduces time take by departmental coordinators to compile students records using excel sheets and flat files to compile student records. Data security and integrity will also be noted with the use of passwords and usernames. The proposed system is going to be operational feasible in that:

- ❖ Manpower which is the developer is within the University making sure that the system will be easy to adjust.
- ❖ The system will not be too complicated making sure that departmental coordinators and lectures will be able to easily adjust to the various functions of the system.
- ❖ Users of the system will be trained.

2.4.2 Social feasibility

Analyzing how the project or system will affect the University' stakeholders is involved in this feasibility study, however the system will affect in a positive way to the lecturers to avoid the trouble of going to their pick area when they go for supervision not knowing if the bus is overbooked or not. With the use of excel sheets and flat files paper work will be reduced. The proposed system will help departmental coordinators as it will allow reduction of tasks that need advanced level of accuracy whenever a meeting is held since all the operations will be done electronically. On the other hand the system will also help students to cut travelling costs of submitting their work related reports and placement forms.

2.4.3 Technical Feasibility

Lancaster G (2001) argues that the purpose of technical feasibility lies on the developer to fully have enough knowledge of the hardware and software currently in use by the organization. Technical feasibility is furthermore defined as the study of limitations that are likely to affect the success of a system. It takes into consideration the ability to use recent and useful tools such as routers, switches, recent operating systems and recent application software. The following list comprises of the hardware and software items needed to build and implement the system.

Hardware Requirements and their Specifications:

- ❖ Desktops with Intel® Dual Core CPU L7500@ 2.60GHz, 2GRAM, 500G HDD, however the University has Acer desktops.
- ❖ Printer HP LaserJet which is already available.
- ❖ Server – with 4 GHz Intel® Core™ Quad Core Processor, 14G RAM, 2 Terabyte HDD.
- ❖ Switch –

Requirements for software needed:

- ❖ Operating systems which include Win 7, Win XP Professional, Win 8.
- ❖ MS Office 2010.
- ❖ Avast Antivirus
- ❖ Macromedia Dreamweaver which is the software which permits numeration of many locations.
- ❖ XAMPP 1.8.3.3 which can be downloaded on the internet.

2.4.4 Economic Feasibility

Bentley L.D and Whitten L (2007) highlights that in relation to costs not easy to approximate at the project's early stages, economic feasibility analysis associated with these costs, because of the user's requirements. Therefore success completion of the project relies mostly on the benefits and revenues which should be more than the costs. These costs will include costs obtained in the system' progress as well as set up costs that are incurred during implementation of the system and the risks associated with the system.

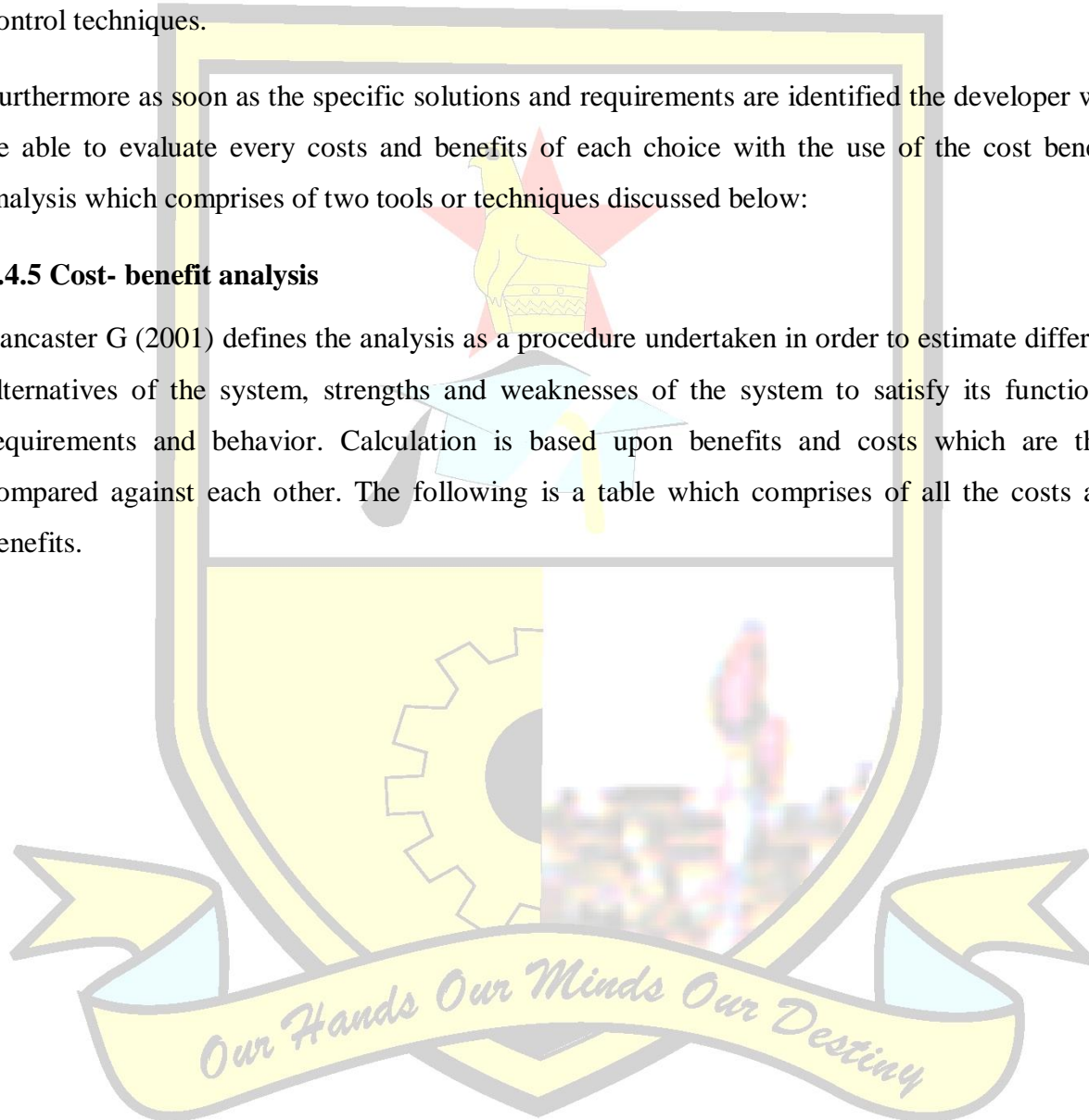
Risk Analysis – is defined by Kendal (2002) as consideration of a risk in particular and making analysis verifying the impact it has on the system to be implemented. Measures that prevent and

reduce these risks from occurring are also involved, which can be categorized accordingly to their threat. There are technical risks which particularly involves having problems to restore the system which includes crashing of the server which requires user involvement to the system, use of interfaces that are difficult to understand whereby there will be need for system analysts and designers to use easy and clear interfaces to reduce the risk of the project failing. However these risks can be reduced by use of passwords, back up, use of antivirus, and various error control techniques.

Furthermore as soon as the specific solutions and requirements are identified the developer will be able to evaluate every costs and benefits of each choice with the use of the cost benefit analysis which comprises of two tools or techniques discussed below:

2.4.5 Cost- benefit analysis

Lancaster G (2001) defines the analysis as a procedure undertaken in order to estimate different alternatives of the system, strengths and weaknesses of the system to satisfy its functional requirements and behavior. Calculation is based upon benefits and costs which are then compared against each other. The following is a table which comprises of all the costs and benefits.



BENEFITS AMOUNT	
1. Decrease in stationery	\$700
2. Goodwill	\$1950
3.Improved Accuracy	\$550
Total benefits	\$3200
COSTS	
1.Development costs	\$350
2. Training and installation	\$500
3.Software Licensing and travelling costs	\$100
4. Maintaining hardware and software	\$1000
TOTAL COSTS	\$1950
BENEFITS LESS COSTS(\$3200-\$1950)	\$ 1250

Table 2.1 Cost Benefit Analysis

The developer will use the following technique to see if the project is worthwhile which include the Return on Investment which Bentley L.D and Whitten L (2007) defines as a technique that makes comparison of the lifetime profitability of substitute solutions.

2.4.4 Return on investment analysis

The method is defined by Rachlin (2001) as a technique that is used by an organization to measure its performance and measure if the organization will make a profit or a loss from the investment relative accumulated to the amount of capital originally invested for a certain period. Calculation of the return on investment is as follows:

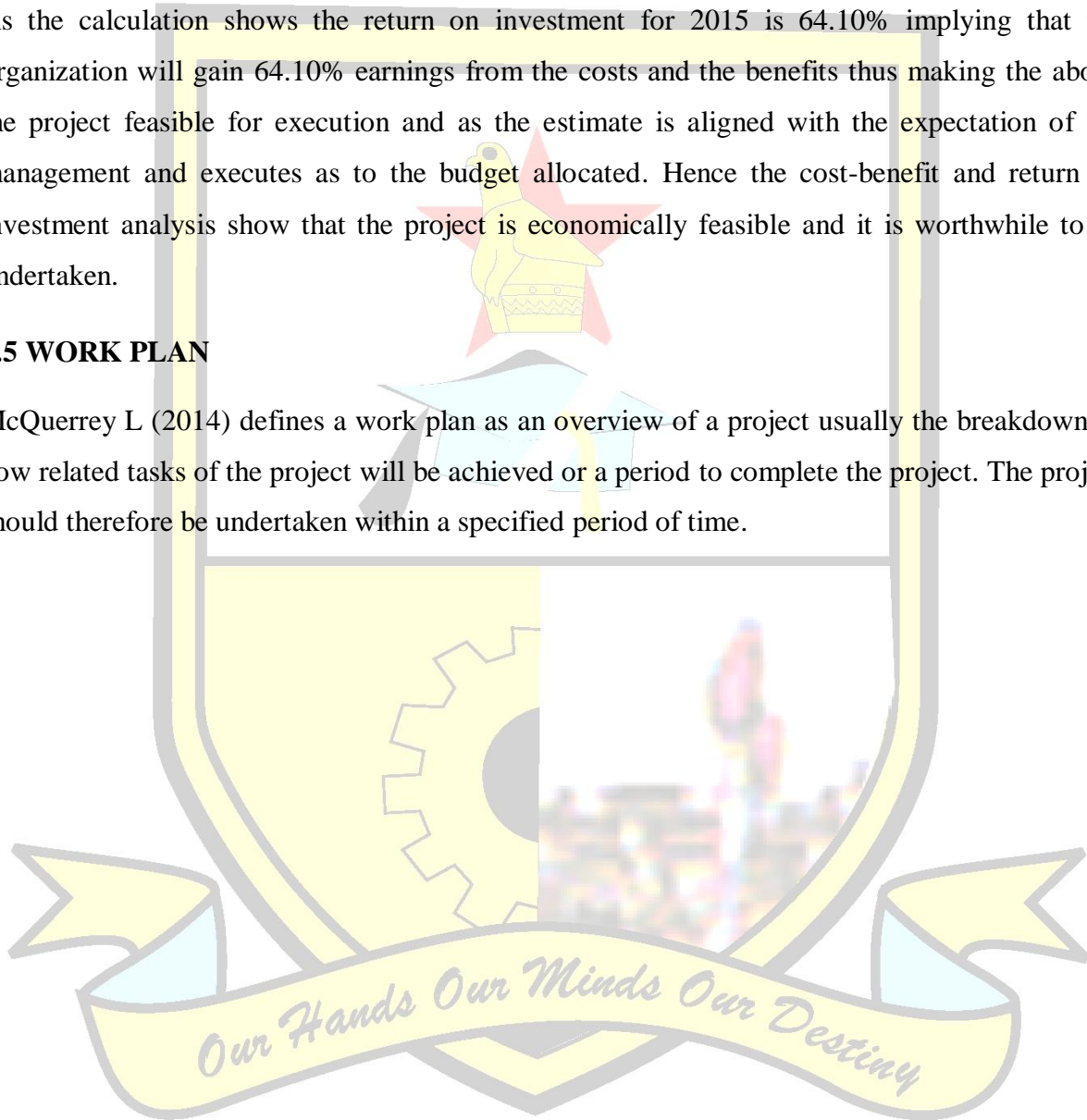
$$\text{Return on investment} = \frac{(\text{Total Benefits} - \text{Total Costs})}{\text{Total Costs}} * 100 \%$$

$$\begin{aligned} \text{ROI} &= \frac{\$1250}{\$1950} * 100 \% \\ &= 64.10 \% \end{aligned}$$

As the calculation shows the return on investment for 2015 is 64.10% implying that the organization will gain 64.10% earnings from the costs and the benefits thus making the above the project feasible for execution and as the estimate is aligned with the expectation of the management and executes as to the budget allocated. Hence the cost-benefit and return on investment analysis show that the project is economically feasible and it is worthwhile to be undertaken.

2.5 WORK PLAN

McQuerrey L (2014) defines a work plan as an overview of a project usually the breakdown of how related tasks of the project will be achieved or a period to complete the project. The project should therefore be undertaken within a specified period of time.

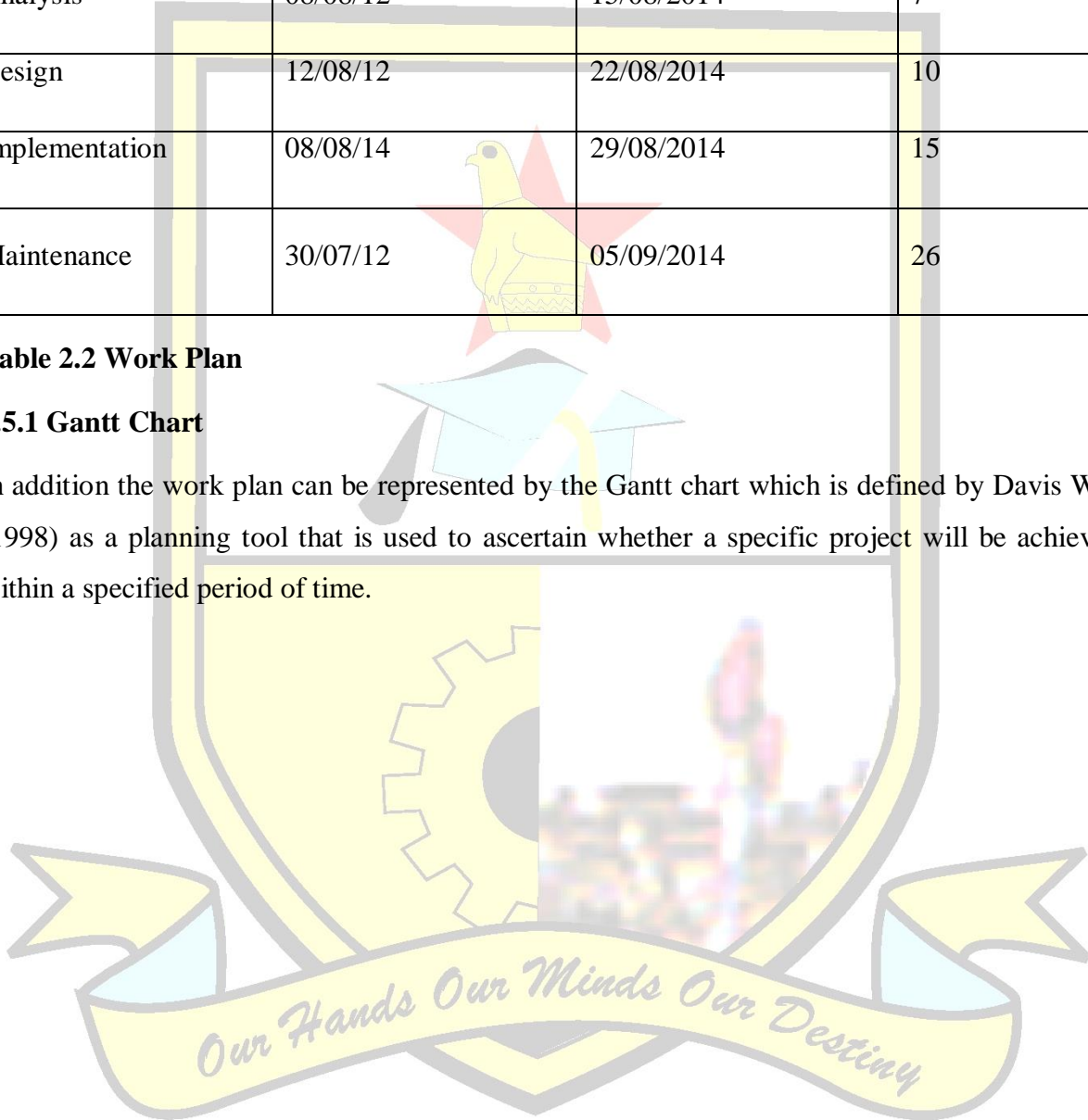


PHASES	START	FINISH	DURATION (weeks)
Proposal	20/07/14	29/07/2014	9
Planning	31/07/12	08/08/2014	7
Analysis	08/08/12	15/08/2014	7
Design	12/08/12	22/08/2014	10
Implementation	08/08/14	29/08/2014	15
Maintenance	30/07/12	05/09/2014	26

Table 2.2 Work Plan

2.5.1 Gantt Chart

In addition the work plan can be represented by the Gantt chart which is defined by Davis W.S (1998) as a planning tool that is used to ascertain whether a specific project will be achieved within a specified period of time.



Time (weeks)

PHASES	4	8	12	16	20	24	28	32	36	40
Proposal										
Planning Phase										
Analysis Phase										
Design phase										
Implementation										
Evaluation										
Documentation										

Fig 2.1 Gantt chart

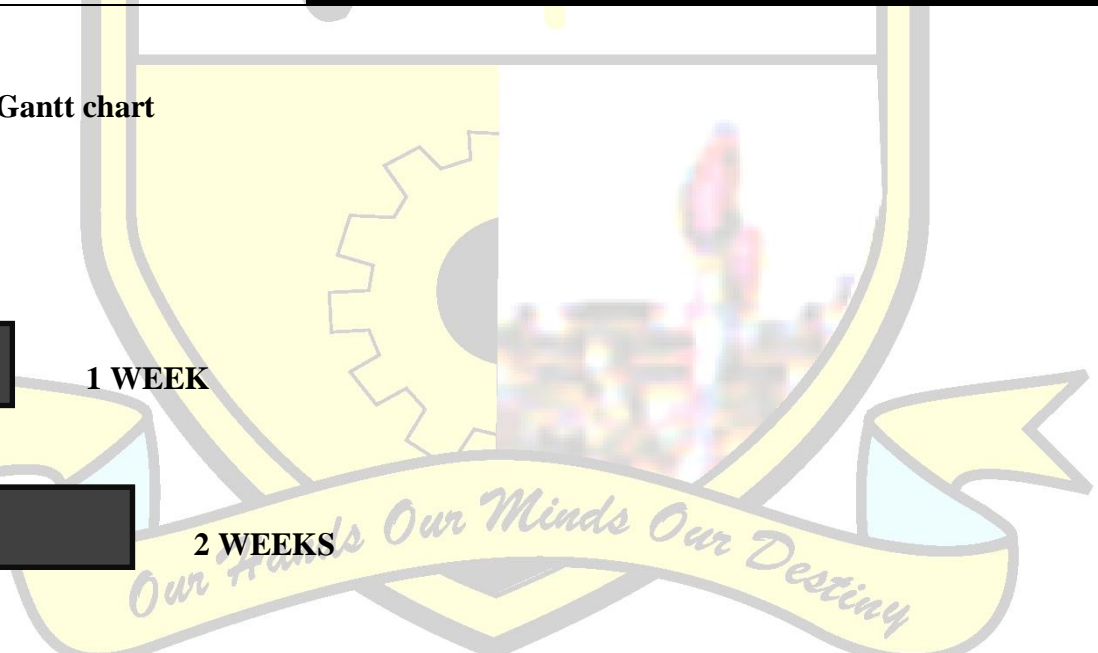
KEY



1 WEEK



2 WEEKS



2.6 CONCLUSION

In accordance with the feasibility study as well as time given, the project is worthwhile and the project typically proves to be economically feasible as the anticipated returns exceeded the total costs.

CHAPTER 3 ANALYSIS PHASE

3.1 INTRODUCTION

The analysis phase is a chapter which discusses various gathering methodologies that the developer used to come up with the system; these include interviews, questionnaires and observations. The system is then viewed as a whole making sure that processes, inputs and outputs for the system are identified. Concentration is also on the data flow diagram of the current system and the analysis of the system apprehensive with the awareness of the hitch, identification of applicable situations that help in decision making by making analysis on many factors and also concentration on finding an optimum solution that is satisfactory.

3.2 INFORMATION GATHERING METHODOLOGIES

There are a number of methods that the developer used to make a verdict or come up with a judgment about the current system, its associative hindrances, its expectations which will be adopted by a vast of stakeholders and the most appropriate ways to tackle the problems. Interviews, questionnaires, observations are some of the methods which the developer used and they all carry strengths and weaknesses when it comes to using data gathering methods.

3.2.1 Interviews

Bentley L.D and Whitten L (2007) cites that an interview is one of the most important fact finding technique that is used to achieve at least one goal from validating , clarifying and finding facts, and identifying requirements. The interviews were held on the 18th of July whereby the developer had to select the interviewees which where lecturers, chairperson and also departmental coordinators. The functionality of the current system was mainly of concern by the developer, and this made the interview's questions be designed. However the developer analyzed that the responses where quit a beneficial to the research and the system proposed. The following advantages were noted as the interviews were being conducted; the interviews allowed direct communication with the people who will uses the system in that the developer was able to collect information on how the system operates and the problems currently being faced by the system, the interviews allowed immediate responses enabling the developer to make quick decisions on the proposed system, and also the interview gave a clear insight to the developer on some of the key areas which were difficult to understand for instance employees relationships and lecturer to students relationships that where affecting the current system.

Furthermore the following disadvantages were noted; due to the current financial situation in Zimbabwe the developer was unable to conduct many interviews due to the fact that some of the lecturers were not always readily available for the interview and there was need for transport costs to travel to the designated areas they were, and another disadvantage was that some of the lecturers and even the students did not take the interviews seriously so it became difficult to rely on the results as some would give biased information.

3.2.2 Questionnaires

Bentley L.D and Whitten L (2007) argues that to carry out questionnaires, surveys need to be done and to give the developer possibility of gathering information from many people upholding consistent answers at the same time. These set of questions designed on paper were sent to lecturers and students on work related, distribution of about 15 questionnaires samples were given out. The following are some of the advantages which were noted through use of questionnaires which include respondents completed questions at their own space of time since enough time to comprehend the questions and giving answer them was available, questionnaires were however time saving helping the distribution process by distributing to people at the same time and maintenance of secrecy was supported which enhanced chances of genuine responses.

In addition during the research the developer experienced problems which are the disadvantages of questionnaires in which there was no guarantee that all the respondents would give feedback to all the questions posed because some questions came back unanswered or poorly answered. To a greater extent it was time consuming compared to in the case of interviews the response was not immediate, also the number of samples distributed did not match with the number of samples distributed as some respondents failed to provide the answers.

3.2.3 Observations

Bentley L.D and Whitten L (2007) cite that observations are vital as they allow work measurements to be done, providing the observer the ability to perceive the operation of the recent system in the real atmosphere. During implementation interacting directly and making observations on the system, the researcher used participant and non participant observations methods. During observations there were a number of advantages which were noted which included helping the developer to see exactly what was being done thus the methods used since in performing complex tasks it is difficult to explain how they are done. Due to the observer expectations reliable data was gathered, and the observation was less costly compared to other fact finding techniques.

On the other hand some disadvantages that were experienced by the developer required more information concerning the present system, which permitted a special analysis on ways of improving the system. Interruptions were experienced to tasks observed and some staff were not comfortable being watched and they ended up not doing their tasks as they are expected to do so by the organization.

3.3 ANALYSIS OF THE EXISTING SYSTEM

At this stage the developer managed to take into consideration the depth analysis of the current system, how it operates, its weaknesses and strengths. The concept behind the system was successfully evaluated through the methodologies used and the key to a program being a success requires adequate specification of requirements.

3.3.1 Description of the Current System

Presently all the activities carried out by the University Work Related Learning office departmentally are all manually that is using excel sheet and flat file to keep students' records about their attachment details done and verbally about lecturers designated cities they are to go and supervise. Another problem with the current system is that there is lack of easily accessible student database making it difficult to compile reports for reporting purposes for example in faculty board meetings. Over booking of vehicles leading to confusion amongst lecturers about when they will go for their supervision.

3.4 PROCESS ANALYSIS

Three components are basically taken into consideration namely inputs, processes and outputs which are listed below:

Inputs

Scheduling trips

- ❖ Student details
- ❖ Lecturers' details
- ❖ Placement details
- ❖ Verification details

Process

- ❖ Tracking records

- ❖ Scheduling trips
- ❖ Verifying details
- ❖ Making visits

Output

- ❖ Trips

3.5 DATA ANALYSIS

Longnecker M (2001) cites that the aim of data analysis is illustrating different activities as well as processes undertaken by the system in use as well as the flow of data. Diagrams concerned consist of the context diagram and data flow diagram.

3.5.1 Current System Context Diagram

Kendal, K.E (2002) defines a context diagram as a summary of the system boundaries which reflects the degree the system is related to the external environment and verifying that it is an open system.

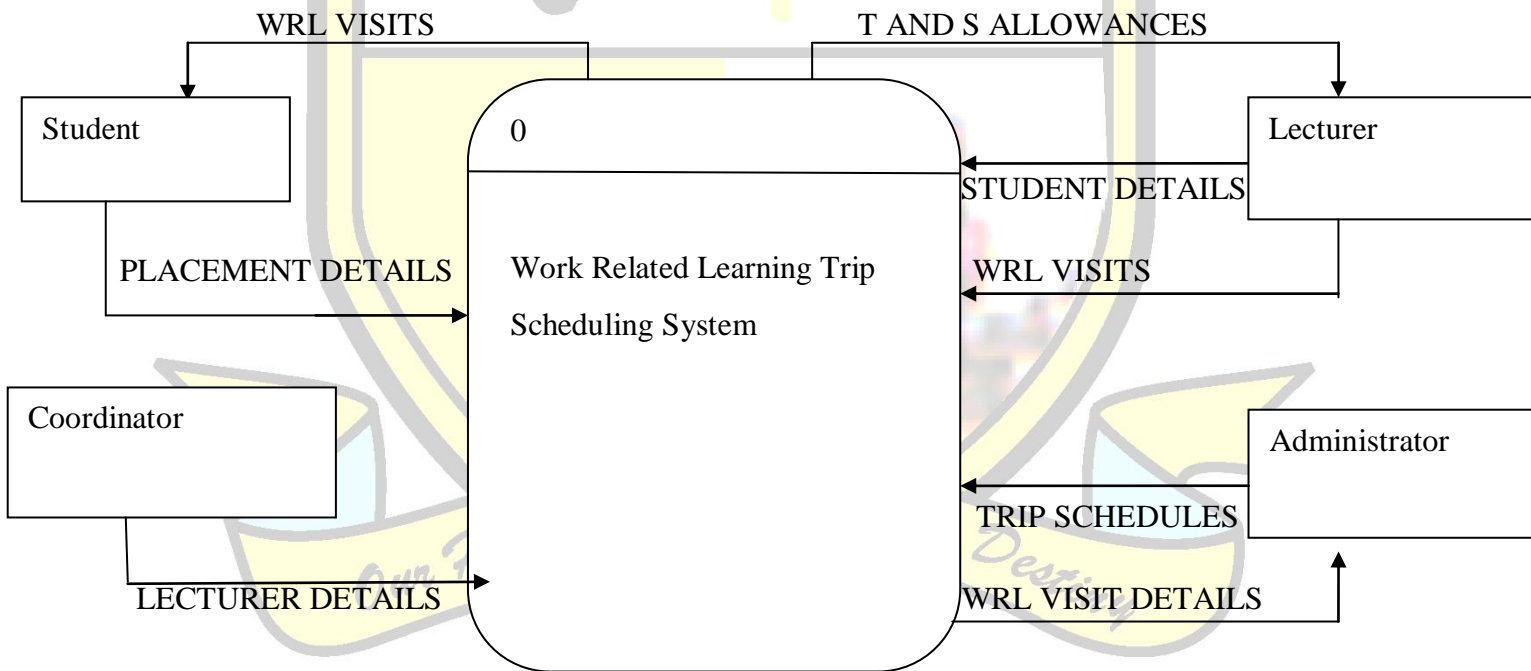
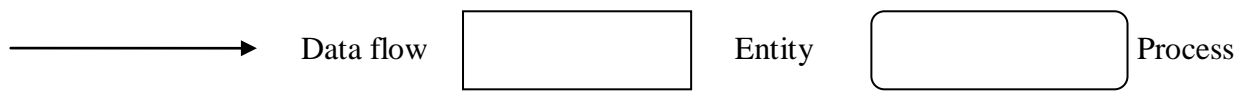


Fig 3.2 Context Diagram

KEY



3.5.2 Current System Data Flow Diagram

Bentley L.D and Whitten L (2007) define a DFD as a diagram which shows how data flows during the processing of the system under research or one that an organization has. A data flow diagram can also be known as a representation made graphically to the systems' processes done in small modular form and the data flow linking its processes which illustrate the way data flows within, at the beginning and towards a procedure of changing data.

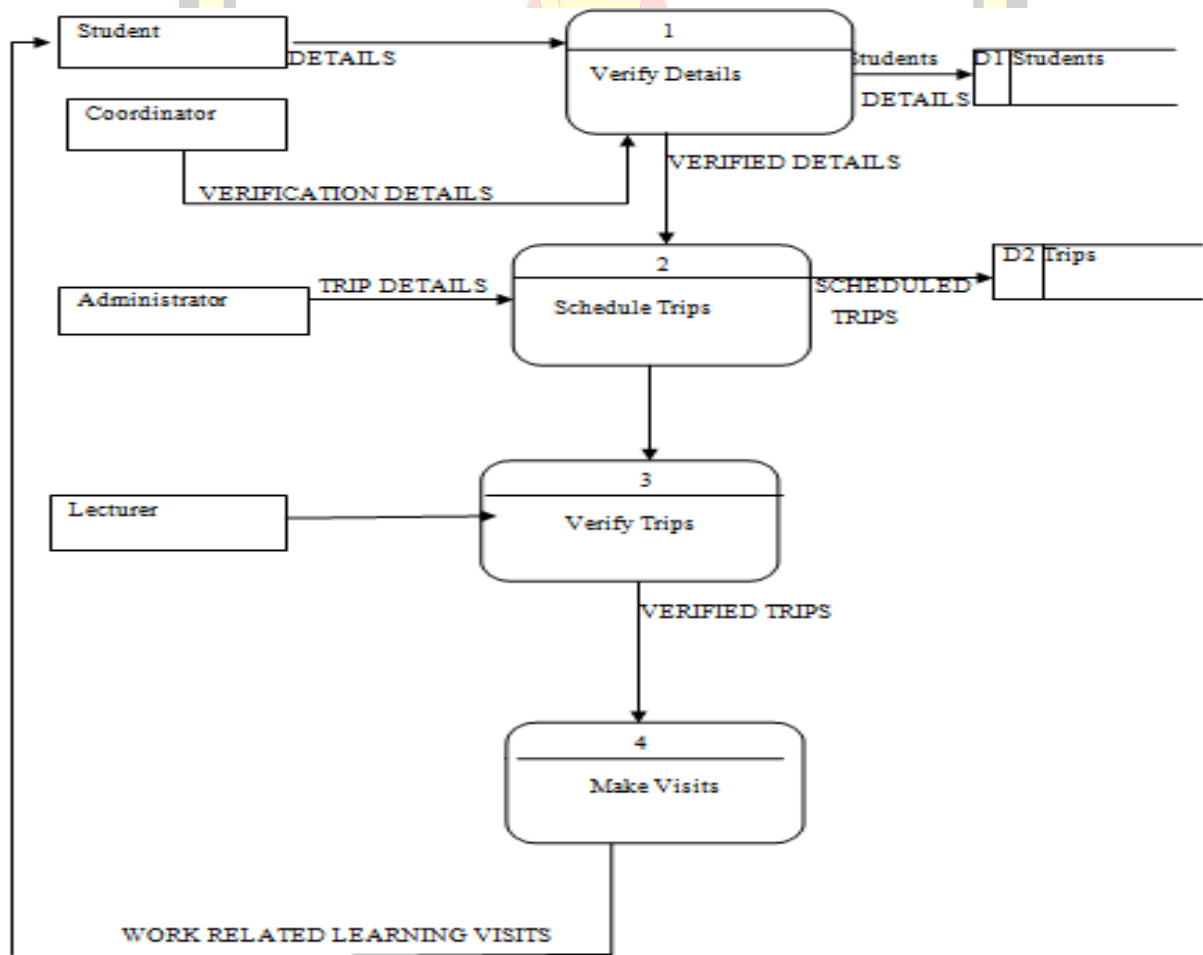
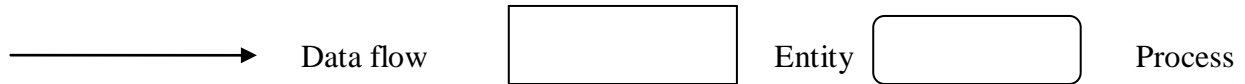


Figure 3.3 Data Flow Diagram

KEY



3.6 WEAKNESSES OF THE CURRENT SYSTEM

Currently a lot of weaknesses are being experienced by the system in use which the developer discovered and aimed to solve, these include:

- ❖ Back up for the current manual system is currently not in place in that if the files are stolen or a fire occurs all the information will be lost and there will be need for students to bring back their placement details and departmental coordinators to compile again students' information.
- ❖ Response time is slow about when a lecturer will go for his or her supervision cases whereby there will be overbooking of the bus, so there is need for an sms platform which notifies lecturers concerning their trips.
- ❖ The current system due to it being manual gives room for errors to occur.
- ❖ Economically the system does not provide cost effective service to the organization since excessive paperwork is costly in terms of stationary and storage expenses.

3.7 ALTERNATIVES

Pressman R (1994) highlights that there are basically three alternatives that are derived from the feasibility study which include outsourcing, improvement and development.

3.7.1 Outsource

Pressman R (1994) cites that outsourcing is the practice of procuring IT services from a source outside the organization. It can also be known as an alternative involving hiring an external company to be part of the development team, thus the University can hire specialists to develop the system which can be costly and will lead to reduction in the participation of its employees. However there are some advantages that this alternative brings in an organization which include new ideas are bound to emerge since specialists will be involved. People in practice with outsourcing have particular tools they use and skills in the technical field rather than those in an organization that practices outsourcing.

Disadvantages includes that a dealer outsourcing will be having more organizations which will be in need of the expertise creating a problem of in that the dealer will end up not having

focusing mainly in the tasks of the organization. Furthermore these services provided by outsourcing such as payroll processing services will lead the outsourcing provider to know an organizations' classified information hence creating security risk to security as privacy will be provoked. Other demerits include contract renewing, poor communication, contract misinterpretation and not standard quality. The cost of training increases since the developer will be referred to constantly. However outsourcing cannot be said to be a viable option to some extent because of disadvantages outlined above.

3.7.2 Improvement

Pressman R (1994) cites that computerizing and improving the present system can solve various problems experienced with the use of the system and in other cases some of the processes can be polished so that they are maintained to be manual even when implementing the system being proposed. Some advantages of this alternative includes that it is easy and simple for the users to use an improved system since fear of the unknown will be reduced, development time and costs are also reduced if the current system is upgraded. However disadvantages of these alternative are that the current system will be at times provide errors causing more problems to be faced. In addition during a period of time the present system weaknesses can continue to be noticed making it a solution which runs in a short period of time even though the existing system have potential of obliging to changes as well as upgrades

3.7.3 Development Alternative

This alternative has basically involves purchasing a software package which is known as the off-shelf package and the in house development methods that help in the choice of choosing the best method that will be less costly. Godfrey (1999) cites that purchasing a software package comprises of considering the sensibility of buying a system developed already buying the correct needed by the software bought and requirement of more expertise in the technical field will be needed to help in maintaining and installing the system. Advantages of the development alternative includes executing the system will be easy as companies already using the system will ascertain its performance and the system suppliers will always upgrade the software. However demerits will include training end users on the functionality of the system will be costly, the packaged system is costly causing the possibility of not relating soundly with different systems. Relating to costs from other alternatives the development alternative decrease dependency on the dealer as there will be the use of developers that are internal to the organization making it cost effective to build your own system.

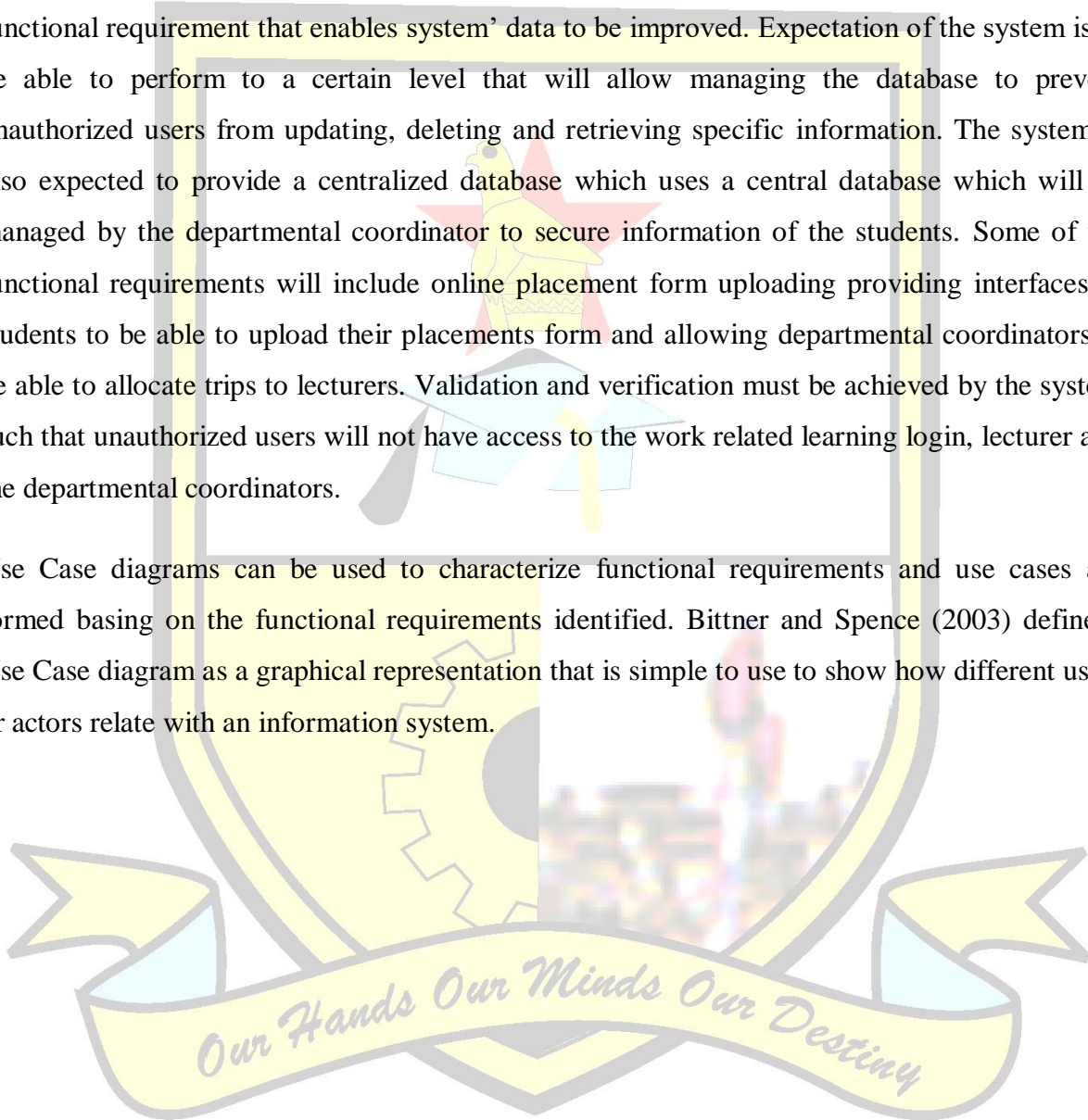
3.8 REQUIREMENTS ANALYSIS

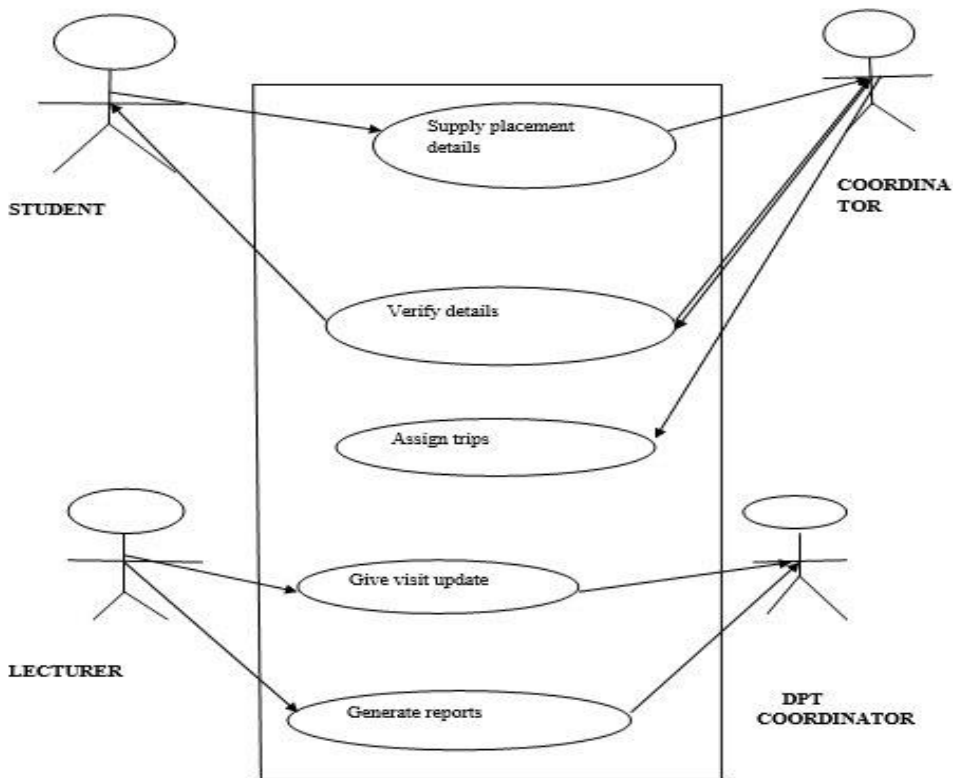
The requirements analysis stage involves two requirements which are grouped into two namely function and non- function.

3.8.1 Functional Requirements

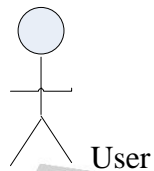
Bentley L.D and Whitten L (2007) cite that inputs, outputs, processes and stored data defines functional requirement that enables system' data to be improved. Expectation of the system is to be able to perform to a certain level that will allow managing the database to prevent unauthorized users from updating, deleting and retrieving specific information. The system is also expected to provide a centralized database which uses a central database which will be managed by the departmental coordinator to secure information of the students. Some of the functional requirements will include online placement form uploading providing interfaces to students to be able to upload their placements form and allowing departmental coordinators to be able to allocate trips to lecturers. Validation and verification must be achieved by the system such that unauthorized users will not have access to the work related learning login, lecturer and the departmental coordinators.

Use Case diagrams can be used to characterize functional requirements and use cases are formed basing on the functional requirements identified. Bittner and Spence (2003) define a Use Case diagram as a graphical representation that is simple to use to show how different users or actors relate with an information system.





KEY:



Communication between user and system

Figure 3.4 Use Case Diagram

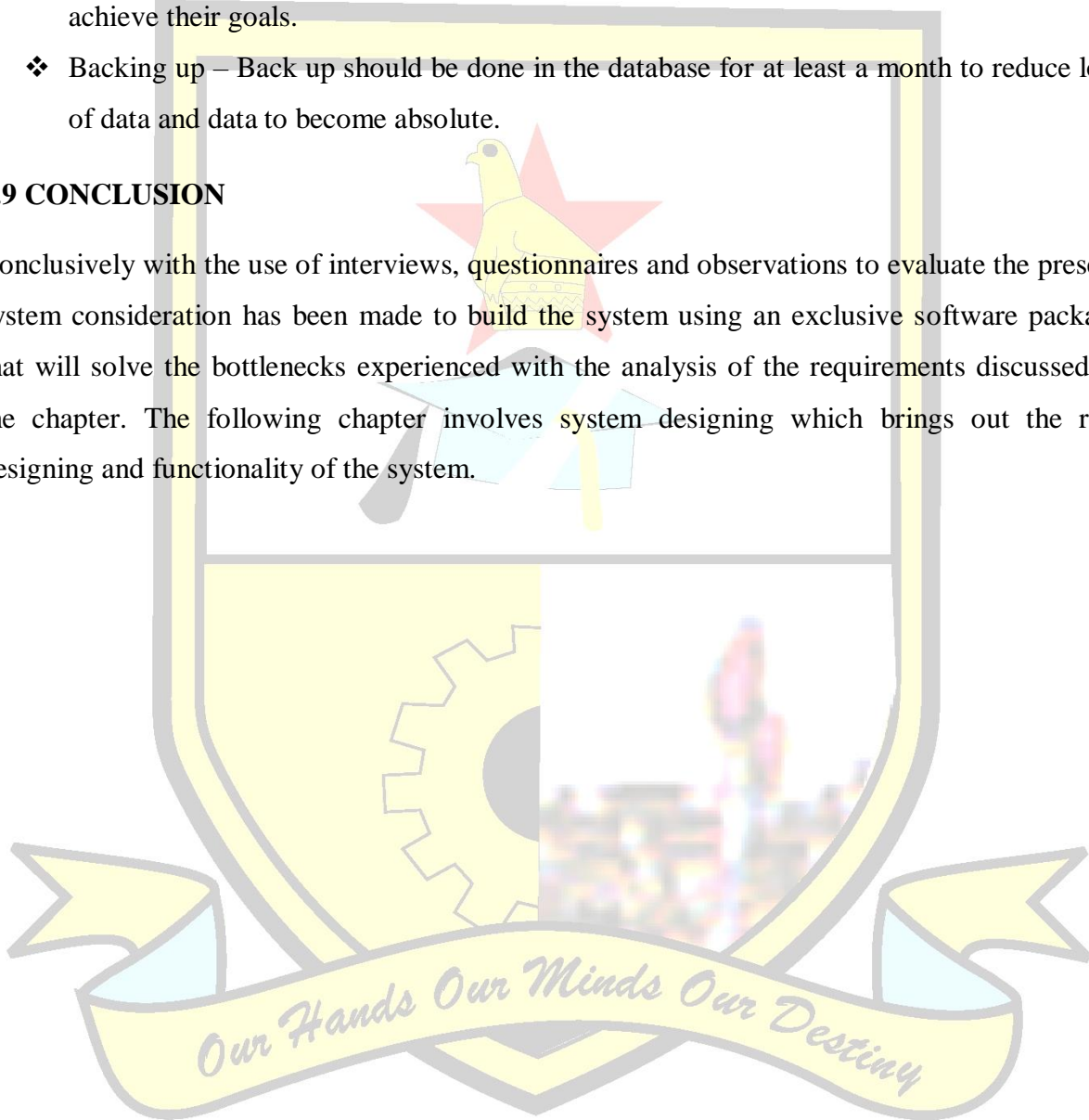
3.8.2 Non-functional Requirements

These non-functional requirements are mainly concerned with the new system, taking a look at the limitations of the system. These non functional requirements are explained by Bentley L.D and Whitten L (2007) as throughput and response time that ensures ease of learning and documentation of the deadline. The proposed system must be more secure through:

- ❖ Security – This will involve the user using passwords and usernames to gain access to the system and avoid unauthorized users accessing specific data.
- ❖ Hardware Consideration – Departmental coordinators should have desktop computers connected to the internet to facilitate fast communication and sharing of information.
- ❖ System Interfacing – Proposed system must be supposed to interact with its users and have interfaces that will allow users to understand it so that the users will be able to achieve their goals.
- ❖ Backing up – Back up should be done in the database for at least a month to reduce loss of data and data to become absolute.

3.9 CONCLUSION

Conclusively with the use of interviews, questionnaires and observations to evaluate the present system consideration has been made to build the system using an exclusive software package that will solve the bottlenecks experienced with the analysis of the requirements discussed in the chapter. The following chapter involves system designing which brings out the real designing and functionality of the system.



CHAPTER4 DESIGN PHASE

4.1 INTRODUCTION

The phase involves taking a look at ways on how to build the system, that is some diagrams in the analysis phase whereby logical diagrams are changed into physical diagrams, it will also give an overview of the system's design like the physical design, interface design, database ,program so as the architectural design. Despite defining the system' requirements and specifying the activities that will be done with the system the developer will also analyze the logical design requirements.

4.2 SYSTEM DESIGN

Kendal (2005) defines the design of the system as the method involving outlining the system' structural design, mechanisms, interfaces, modules, as well as the system' data satisfying requirements that are particular. Designing of a successful, consistent and system that will be easy to maintain will be required because of the characteristics below:

- ❖ Satisfying requirements set by the user or customer– The system should be able to bring satisfactory results to users when it comes to its specifications, which must meet user requirements since the different developments were implemented after the analysis of the current system. These users will be the departmental coordinators in that the system must be able to bring accurate statistics which will be able to match the number of students' that provide their placement sheets with the number of students filed to have found attachment.
- ❖ Security – The proposed system must be able to deny access to unauthorized users, that is only lecturers responsible for the work related issues must be the only ones that will have access to the record of the students' to avoid any distortion of each and every student details regarding the dates a student was placed in an organization and if the student will meet the required months outlined by the university.
- ❖ Efficiency – Within a specified period of time with the use of minimum available resources the proposed system must meet the user requirements. With the use of an sms the system is supposed to send an sms to lecturers and the sms must be able to arrive as soon as the sms is sent, to be a beneficial to the lecturers. Students should be able to upload their WRL placement details online anytime.
- ❖ Easy to use –With minimum help and consultation the system is expected to be simple, therefore the developer should build it in a way allowing the user to

accept it when it is executed. Thus the WRL administrator must be able to upload all available trips without experiencing any technical problems or wanting help anytime.

- ❖ Reliability and maintainability – the proposed system must be able to interact with various hardware inputs and must avoid any errors from occurring. In addition the system must also show flexibility, easy to maintain such that all the information for maintenance must be available.

4.2.1 Context Diagram of the Proposed System

As cited in the third chapter Kendal, K.E (2005) defines a context diagram as a summary of the system boundaries which reflects the degree the system is related to the external environment and verifying that it is an open system. Below is the context diagram of the proposed system which will show the relationship of the processes and their entities.

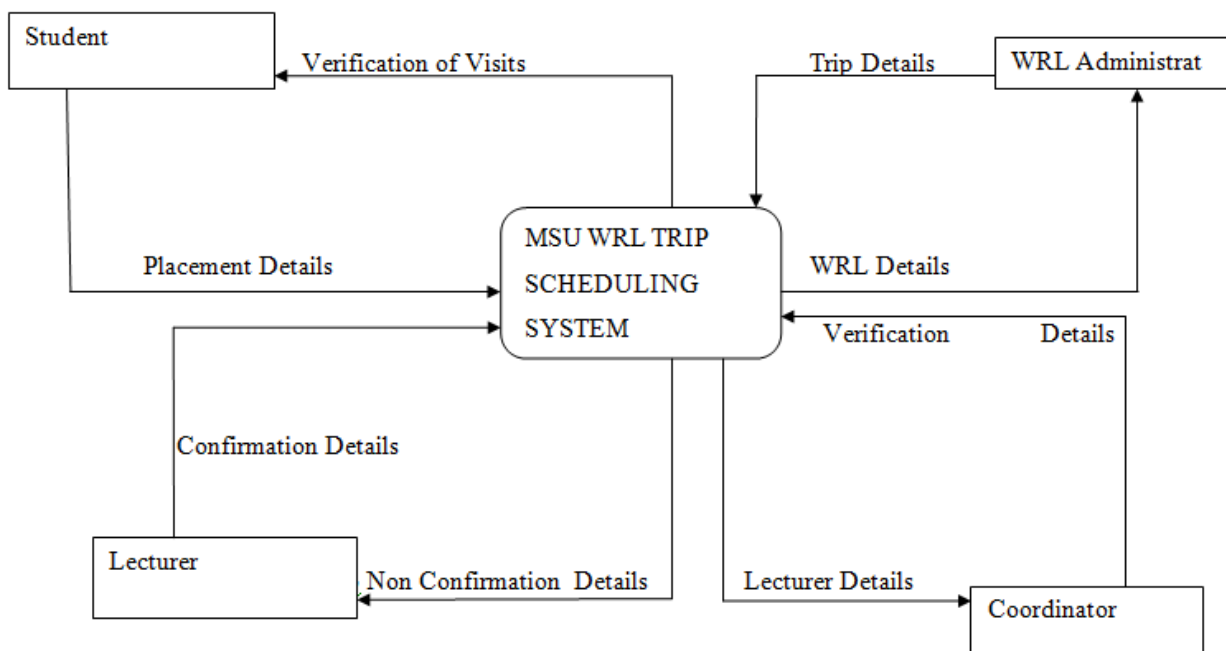
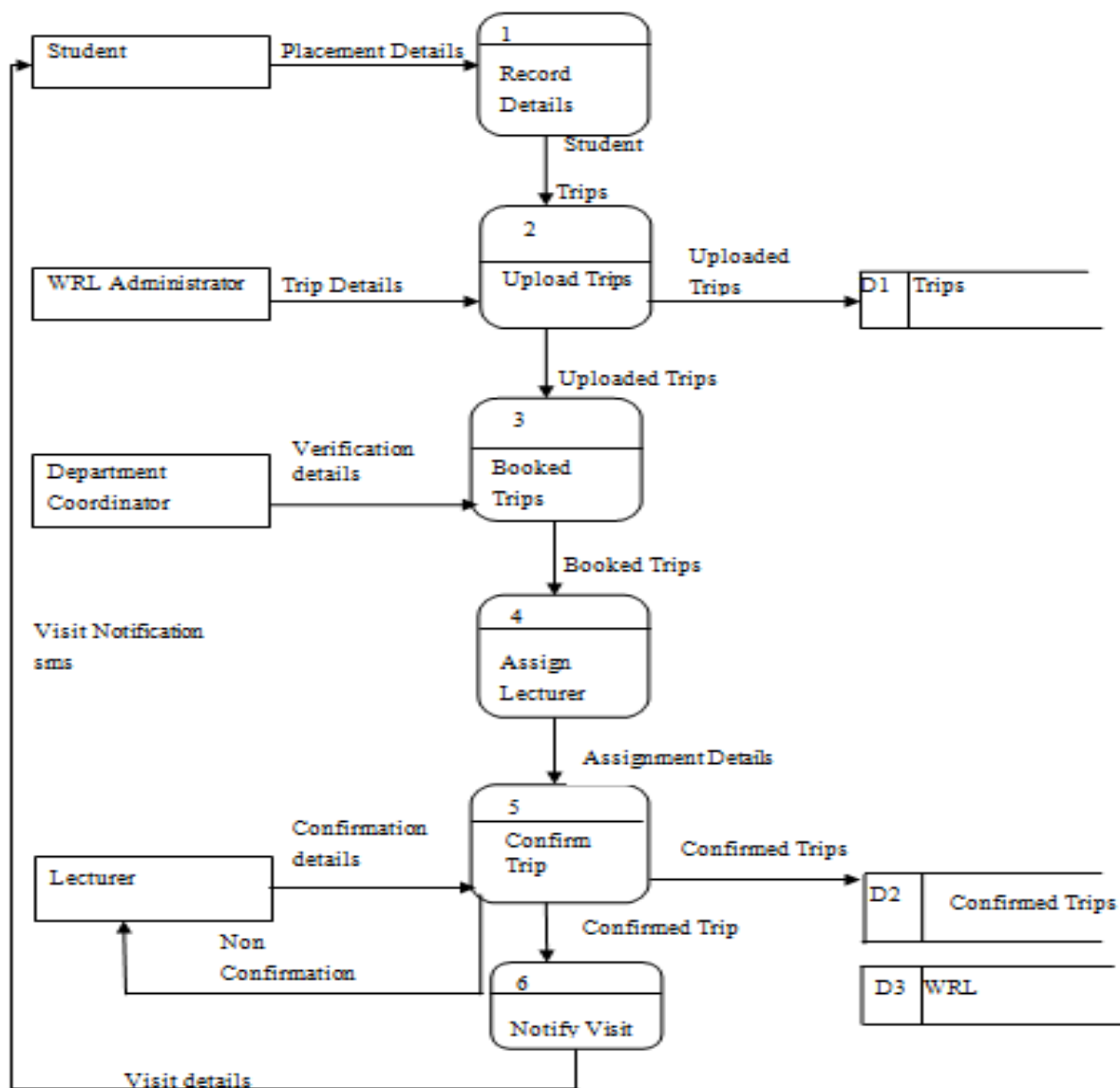


Fig 4.1 Context Diagram

4.2.2 Data Flow Diagram of the Current System

Bentley L.D and Whitten L (2007) define a DFD as a diagram which shows how data flows during the processing of the system under research or one that an organization has. A data flow diagram can also be known as a representation made graphically to the systems' processes done in small modular form and the data flow linking its processes which illustrate the way data flows within, at the beginning and towards a procedure of changing data



KEY:



Fig 4.2 Dataflow Diagram

4.3 ARCHITECTURAL DESIGN

Somerville (2007) highlights that an architectural design is a design that is concerned with the technical environment taking into consideration the hardware, software, the procedures and the user. The design helps to reduce bottlenecks which can be caused some of the technical environment mentioned above and also various factors concerned with the architecture. Another

cause of concern to the design is the performance of the system that is the proposed system should be executed on the hardware that is reliable and also the hardware should be maintained to reduce threats that may be a danger to the hardware so as the software. The issue of back up should be implemented regularly in cases of data loss, hard drive crashing and also corruption of the system. Below is the architectural design showing what it will comprise of and the diagram that involves the network architecture:

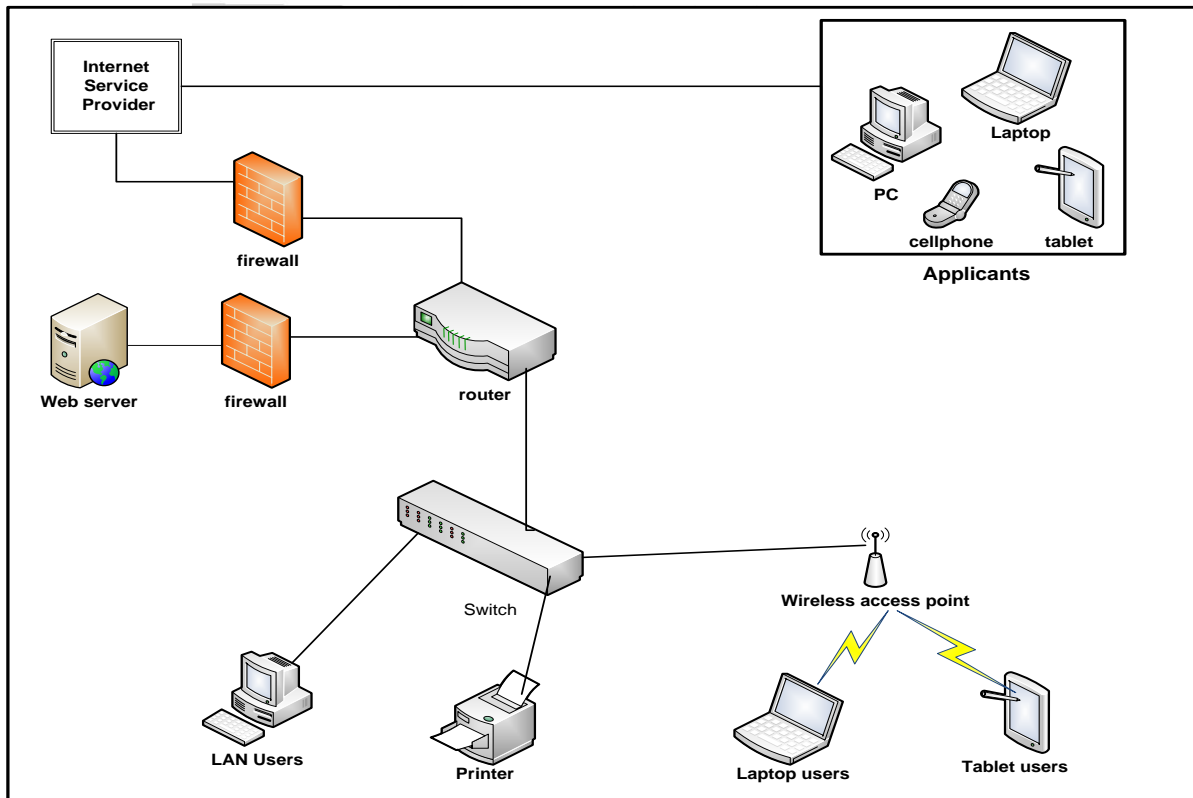


Fig 4.3 Network Architecture of the System

4.4 PHYSICAL DESIGN

A change in the abstract logical model to form a technical design specific is the physical design as defined by Coronel and Crockett, (2008). The design allows the developer to design the software that the proposed system is going to use and a web server that is centralized with a database secured by firewall and cookies enabled will be used for security purposes of the system as a whole to avoid copying of data when the system will be used.

4.4.1 System hardware requirements

The system will be used on machines linked via the LAN to allow one to have right of entry in the server on all machines, however this has been fortunate as the University already has

machines connected via the Local Area Network. The following lists show the interaction of the hardware and the software.

- ❖ Desktops with Dual Core of Intel® type, CPU L7500@ 2.60GHz, 4G RAM, 500G HDD, and University have Acer desktops.
- ❖ Printer HP LaserJet which is already available.
- ❖ Server – with 4 GHz Intel® Core™ Quad Core Processor, 14G RAM, 2 Terabyte HDD.
- ❖ Switch

Requirements for software:

- ❖ Win 7 OS, Win XP Professional or Win XP Home Edition.
- ❖ MS Office 2010.
- ❖ Avast Antivirus
- ❖ Macromedia Dreamweaver which is the software which permits numeration of many locations.
- ❖ XAMPP 1.8.3.3 which can be downloaded on the internet.

Requirements for backing up:

- ❖ External hard drive

4.5 DATABASE DESIGN

The design of the database is defined by Coronel and Crockett (2008) as a method of producing a comprehensive data and database representation. The developer focused on the database architecture on this part making illustration of the database schema and the concept in form of tables. Due to the following benefits of the database over the file based system, the developer decided on the database approach because of the reasons which include:

- ❖ The file based system is time consuming in terms of situations whereby the departmental coordinators have to rely on excel sheets and flat files to compile student records leading to lack of readily accessible student database for reporting purposes for example in faculty board meetings.
- ❖ Compared to file based system, systems in the database allow one to gain privileges to the information subsequently saved in different files.

❖ Elimination of redundancy is not fully completed but however minimized.
However schemas are used to design the database with their viewpoints discussed below with the database architecture below.

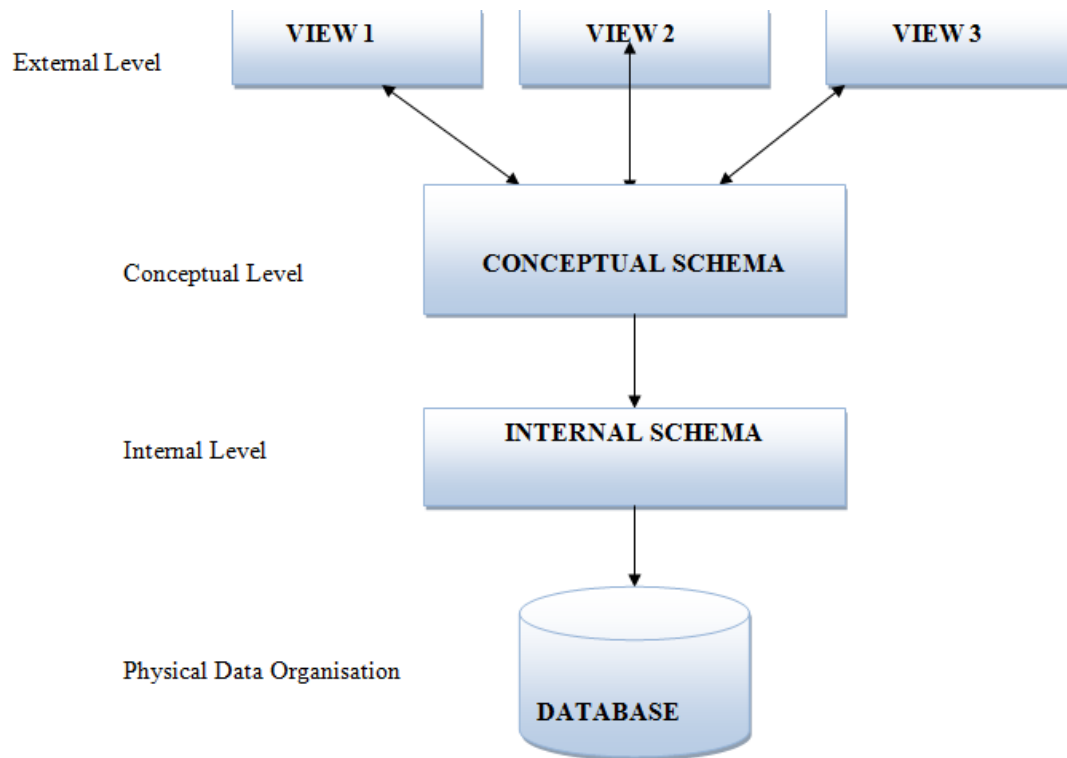


Fig 4.4 Database architecture

4.5.1 Physical level

The physical level is defined by Bosch J, (2000) as the lowest level of abstraction and he also cited that the physical level defines how data is actually stored.

4.5.2 Conceptual level

Coronel and Crockett,(2008) highlights the conceptual level as a level that shows the kind of data actually stored in the database, thus what data is stored and different relationships existing on the data. Tables are said to be where the data is stored and a table's design is the one that describes the tables' attributes' and their specific feature's for example integers, strings also the exact size and format. This leads to the table's field names, data types and queries to be defined showing the link that exists between them.

4.5.3 View level

This level shows the highest level of abstraction and as highlighted by Coronel and Crockett (2008) the main reason for having the level in the architecture is to make the user's interaction with the database simple with the use of simplified interfaces that are easy to interpret. The databases records can be viewed using Forms, reports and tables are used to view database records with the use of Structured Query Language (SQL) used for database manipulation.

4.5.4 Entity Relationship Diagram

During the preparation of the database design an entity relationship diagram is drawn first which Kendal (1996) defined as a diagram that defines a representation of entities and their relationships graphically. It also attempts to depict whom, which and what (entity or component) interacts with (logical relationship) who, which and what (another entity or component).

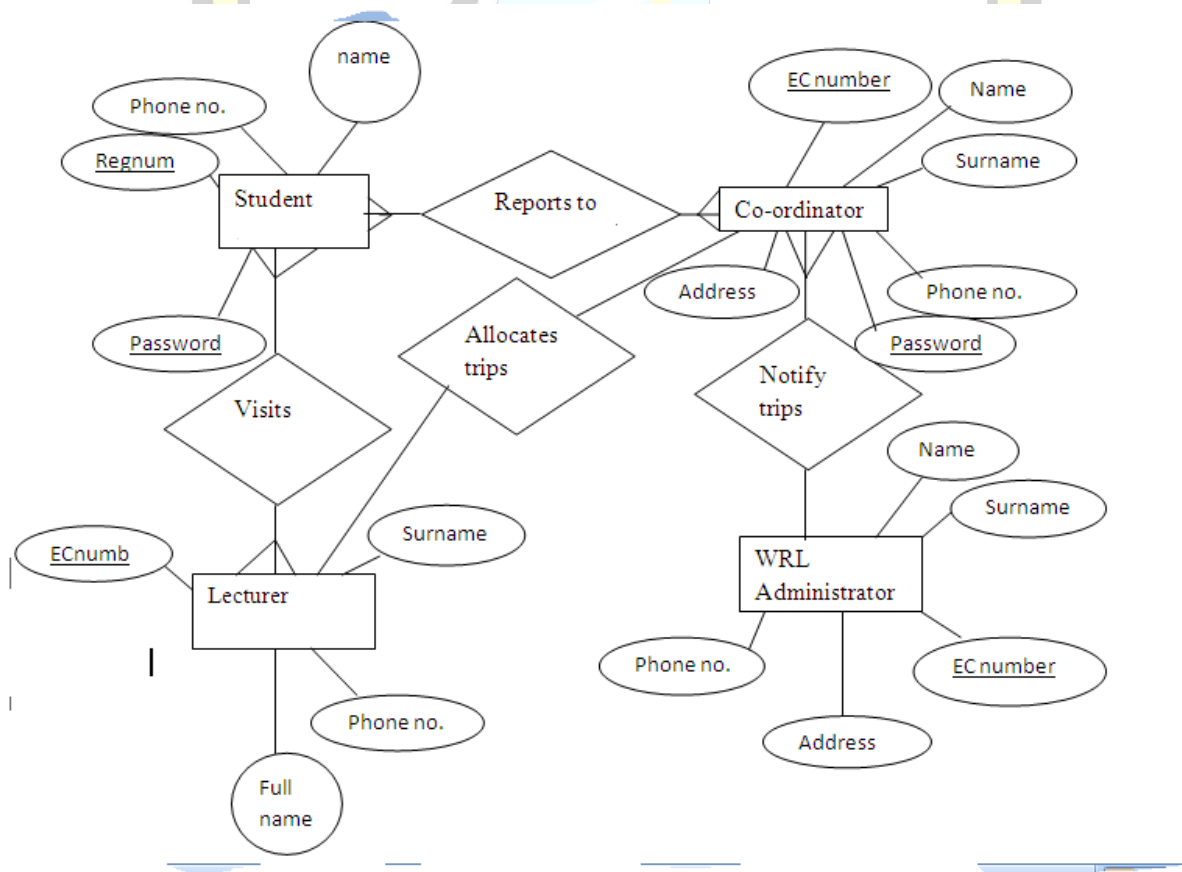
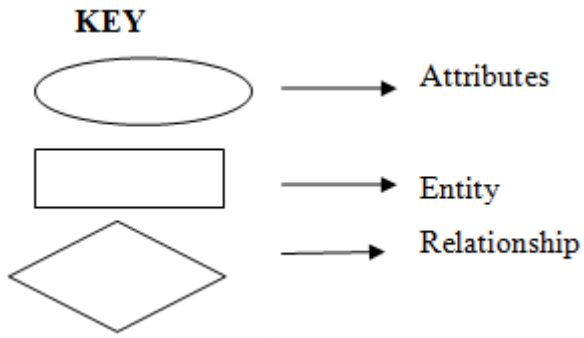
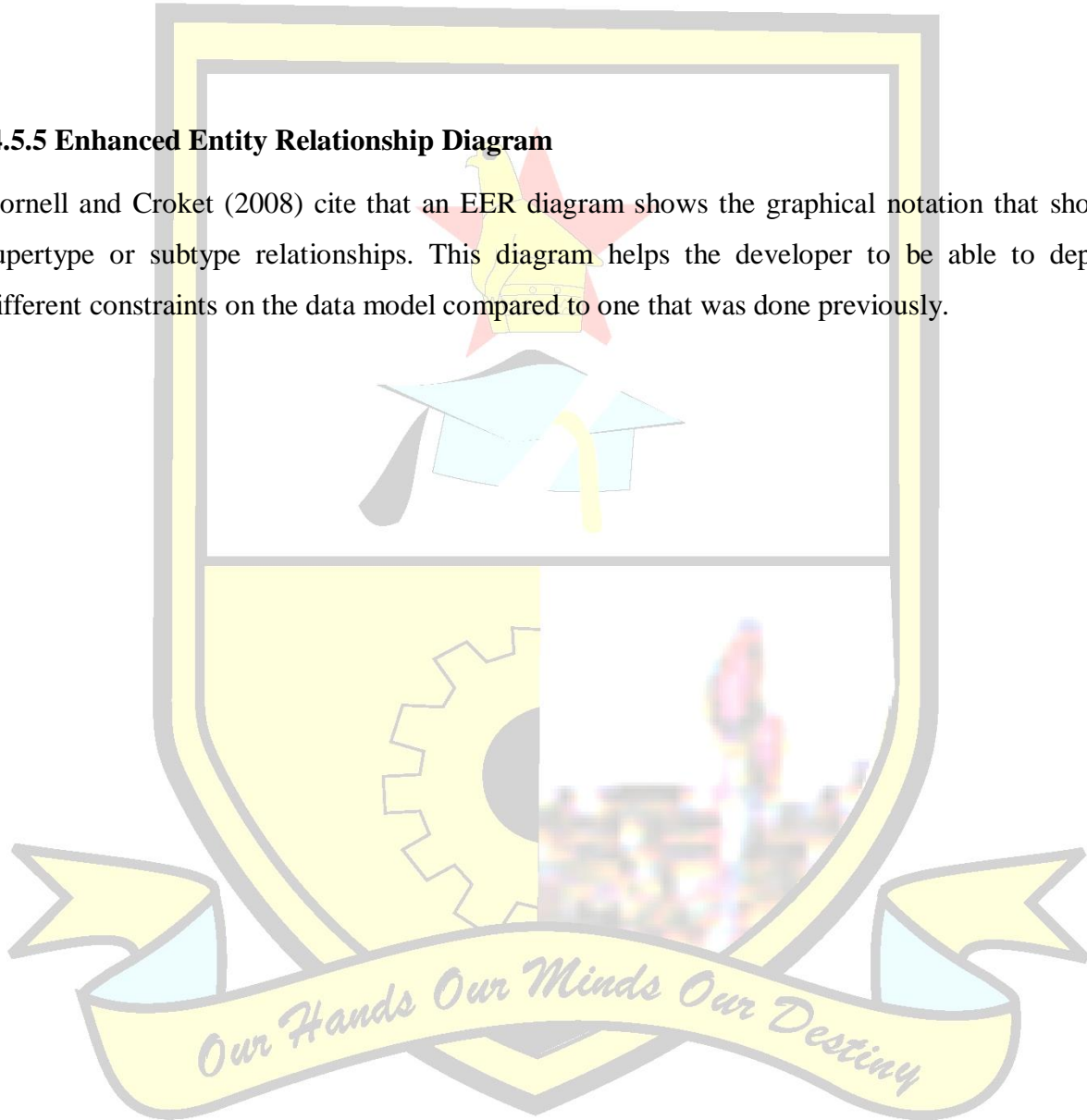


Fig 4.5 Entity Relationship Diagram



4.5.5 Enhanced Entity Relationship Diagram

Cornell and Croket (2008) cite that an EER diagram shows the graphical notation that shows supertype or subtype relationships. This diagram helps the developer to be able to depict different constraints on the data model compared to one that was done previously.



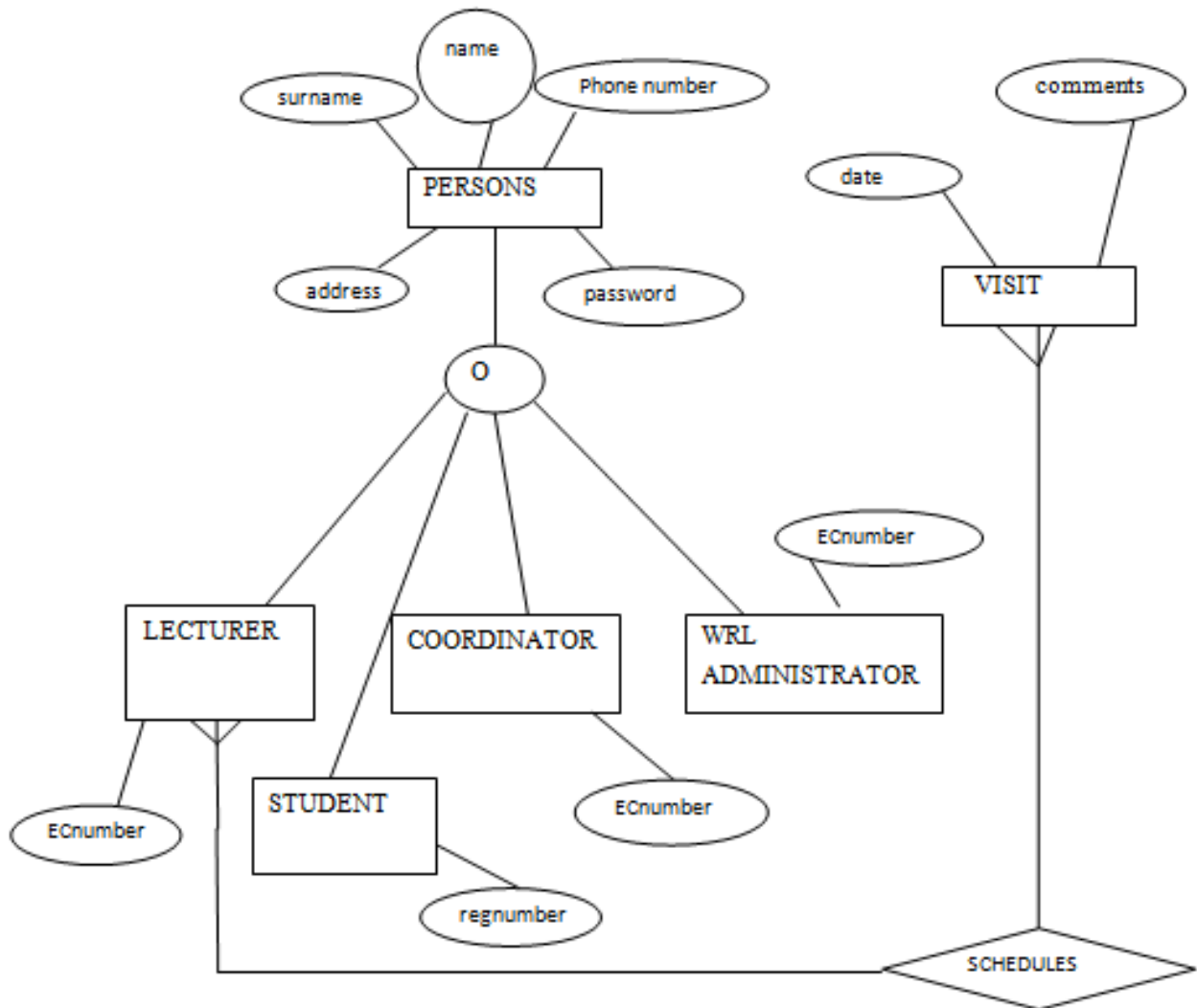
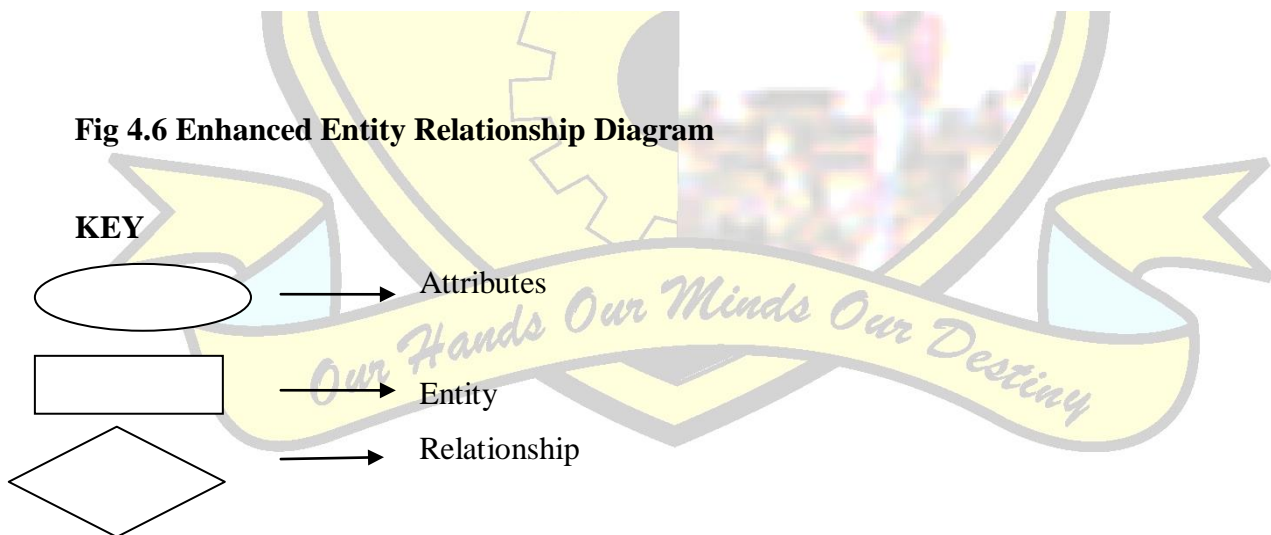


Fig 4.6 Enhanced Entity Relationship Diagram



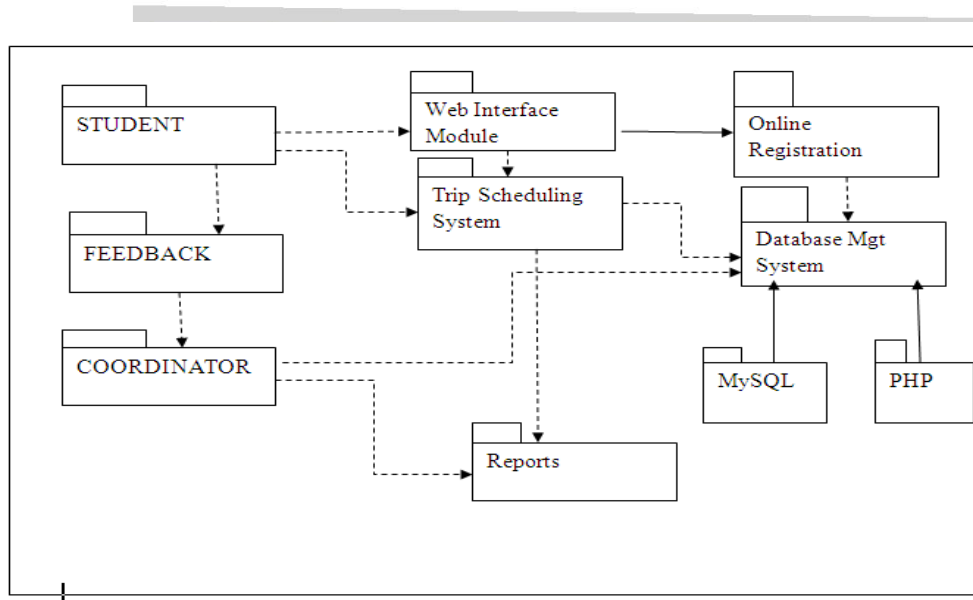
4.6 PROGRAM DESIGN

The process of designing and defining the system’ functions, modules and classes is called program designed as highlighted by Mala and Geetha (2013). The proposed system is broken

down into sub systems and package diagrams, class diagrams are used to elaborate more on program design.

4.6.1 Package diagram

A package diagram is defined by Mala and Geetha (2013) as a diagram that shows the breaking down, structure, dependencies and interaction between the sub systems.



KEY:

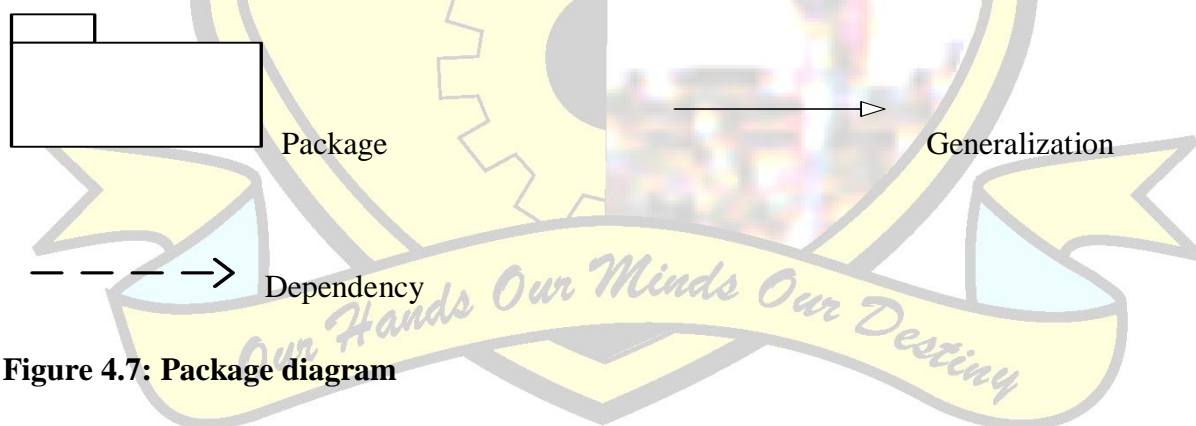
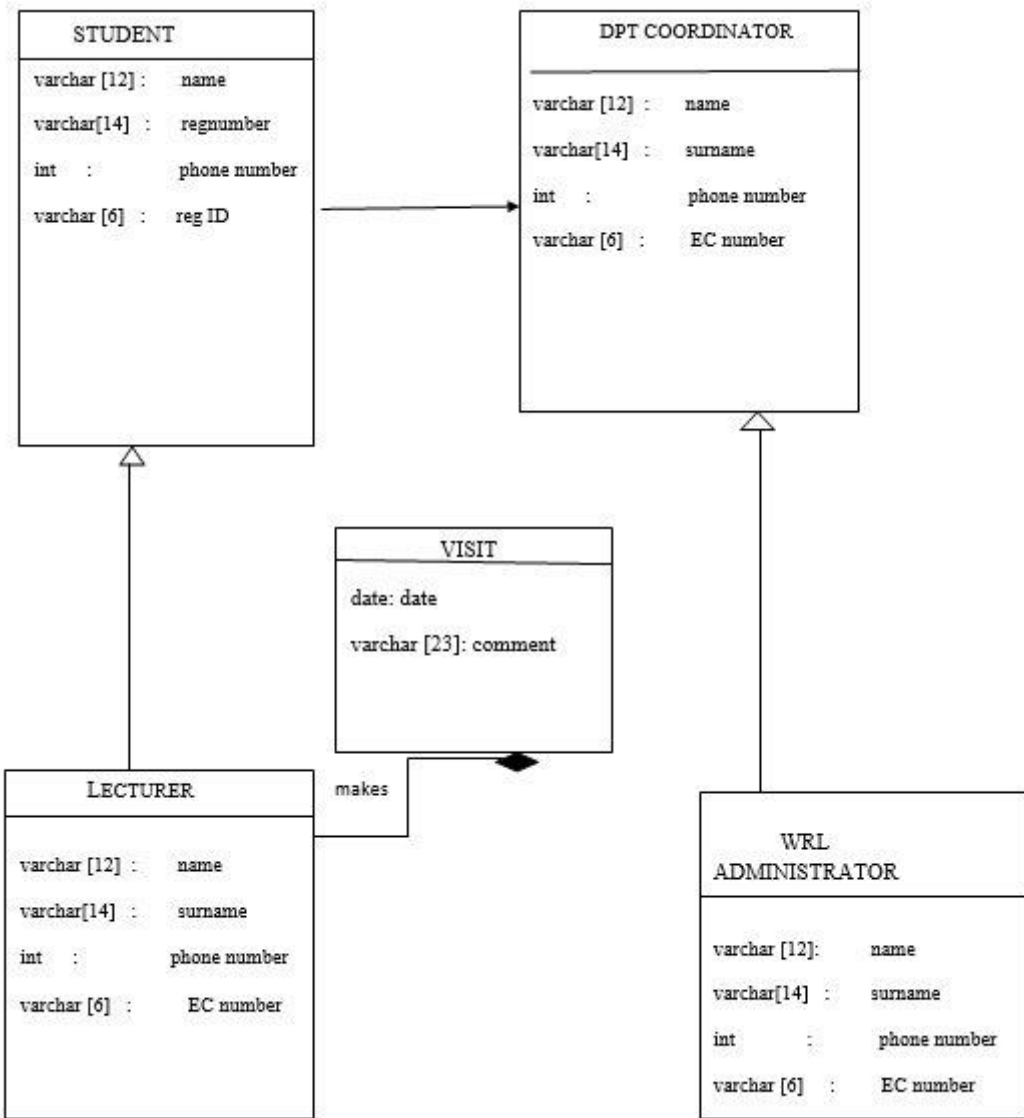


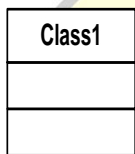
Figure 4.7: Package diagram

4.6.2 Class diagram

According to Mala and Geetha (2013) a graphical illustration that shows sub classes attributes, their relationships towards and operations is called class diagram.



KEY:



Class

-End4

-End3

Composition



Generalization

Figure 4.8: Class diagram

4.6.3 Sequence Diagram

According to Tidwell (2011) a diagram that represents the relationship associating objects and defining the sequences of the events between the objects with the aim of achieving a desirable outcome is a sequence diagram. Processes relating to system design, analysis and documentation are also linked to the diagram. On the diagram connections among the objects begin at the top and stops at the bottom.

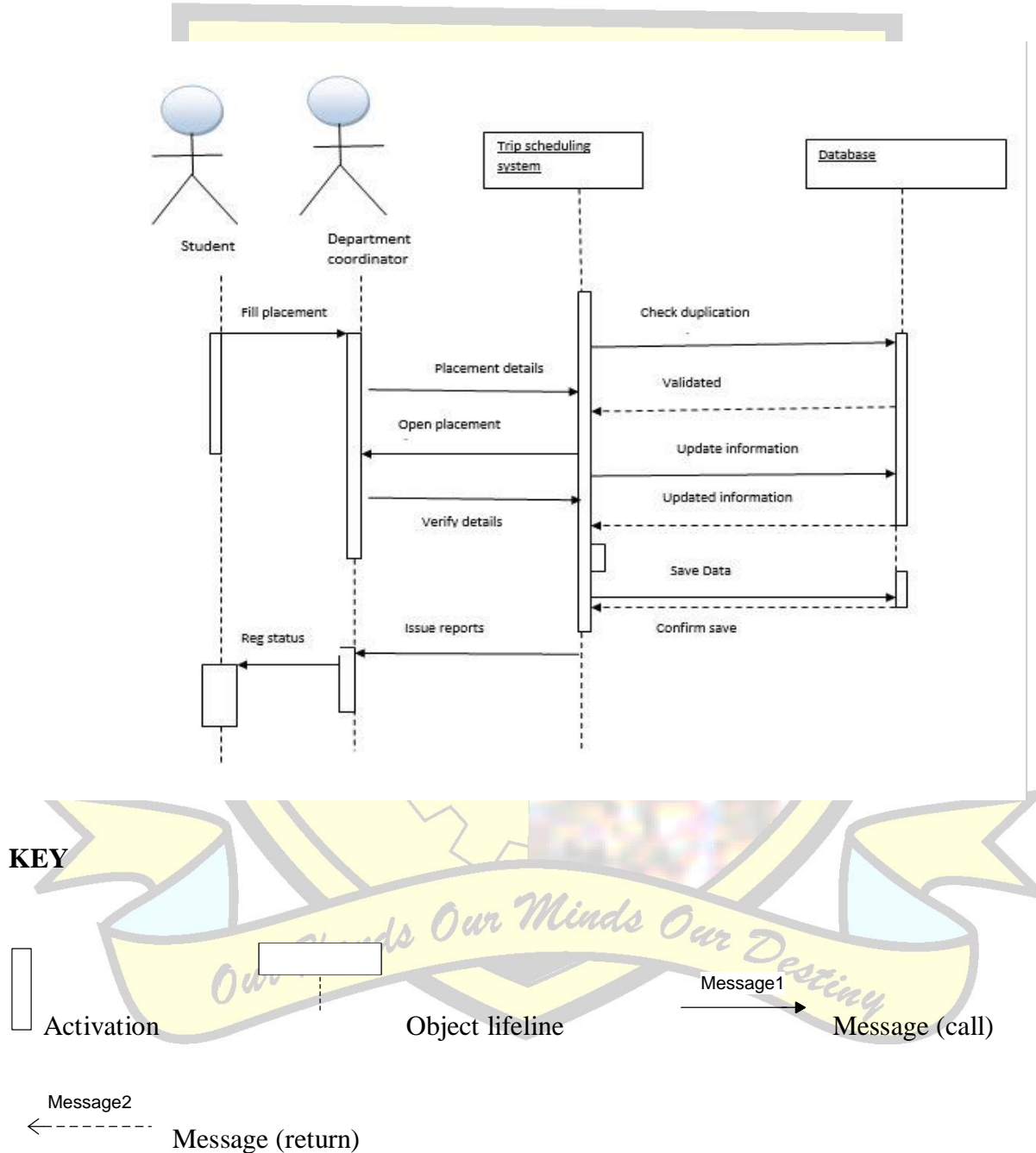


Figure 4.9: Sequence diagram

4.6.4 INTERFACE DESIGN

The proposed system will make use of graphical user interfaces which will be designed to allow the whole system to be simply navigated. The design will encompass the interfaces for the homepage, forms for login for different users for example students, WRL coordinators, lecturers and WRL administrator. Interface design focuses in supporting interactions between different users and applications that are found and can be executed by the computer. There are two alternatives for the interface design that is the command input for line mainly associated with commands typing invoking events and activities, guaranteeing that the use of a mouse is minimized and eliminated completely. Bosch J. (2000) defines this design as one which involves designing forms taking from the environment of the graphical user interface where using the mouse is mostly done. The following are the different samples showing the forms:

Administrator Login form

<i>LOGO</i>	<i>MSU WORK RELATED LEARNIND ADMIN LOGIN</i>	
	<i>USERNAME</i>	<input type="text"/>
	<i>PASSWORD</i>	<input type="text"/>
	<input type="button" value="LOGIN"/>	

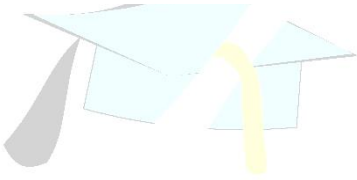
Fig 4.11 Administrator form for login

Student Login Form

Request Id	<input type="text"/>
Registration number	<input type="text"/>
Name	<input type="text"/>
Surname	<input type="text"/>
Phone number	<input type="text"/>
Programme	<input type="text"/>
Company attached	<input type="text"/>
Address of company	<input type="text"/>
<input type="button" value="SUBMIT"/>	

Fig 4.12 Student login form

Main form



MIDLANDS STATE UNIVERSITY						
WORK RELATED LEARNING TRIP SCHEDULING SYSTEM						
Home	About us	WRL Admin	Dptmental Coord	Lecturer	Student	Contact Us

Fig 4.13 Main form



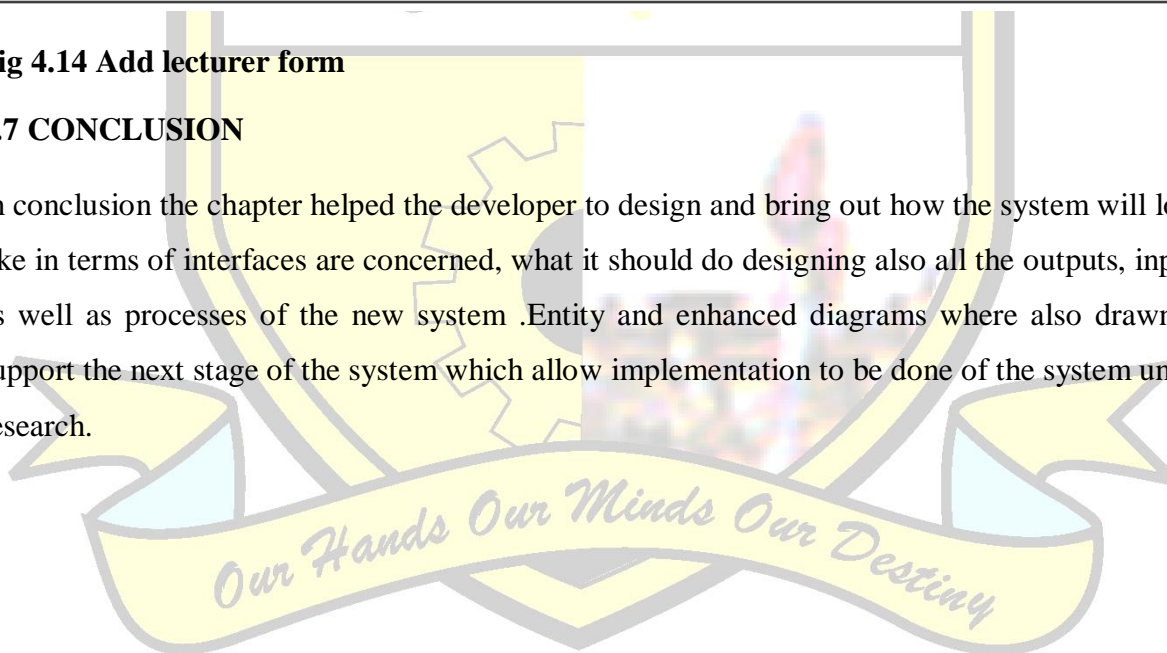
Add Lecturer

MIDLANDS STATE UNIVERSITY				
WORK RELATED LEARNING TRIP SCHEDULING SYSTEM				
Home	Users	WRL Trips Allocations	WRL Assessments	Security
Name			<input type="text"/>	
Surname			<input type="text"/>	
Cell			<input type="text"/>	
Department			<input type="text"/>	
Login Details				
Username			<input type="text"/>	
Password			<input type="text"/>	
Confirm			<input type="text"/>	
			<input type="button" value="SUBMIT"/>	

Fig 4.14 Add lecturer form

4.7 CONCLUSION

In conclusion the chapter helped the developer to design and bring out how the system will look like in terms of interfaces are concerned, what it should do designing also all the outputs, inputs as well as processes of the new system .Entity and enhanced diagrams where also drawn to support the next stage of the system which allow implementation to be done of the system under research.



CHAPTER 5 IMPLEMENTATION PHASE

5.1 INTRODUCTION

The chapter will identify issues relating on the execution of the project whereby implementation phase will be a process which involves delivery of the project to the intended user in this case the Midlands State University. In addition the system before it reaches the end user it goes through a number of tests ensuring and verifying that it meets the user's requirements and performs according to its specifications. The chapter will also take into account activities like coding, testing, installation, maintenance and also training.

5.2 CODING (PSEUDO CODE)

In describing algorithms, structured English known as pseudo code is used which permit the algorithm logic focus done by the designer not to be distracted by the information of the syntax language. The pseudo code allows implementation to develop into an automatic task where translation of each line one after another line is turned into a source code which will be used by computers. For the development of package for the software there was the use of CS6 Dreamweaver and MySQL and the following codes are samples found in the system:

❖ **Connection to the database**

Check for database connection establishment

 If no connection is available

 Set the connection

Else

 Report an error

❖ **User login**

Enter credentials information (username and password)

 If correct carry on to preferred module

Else

 Report error and try again

❖ **Creation of new record**

Enter required information

If invalid data is entered

Report error

Else

Save the data (using the established database connection)

❖ **Record searching**

Get ID for record

Recover necessary information (using established connection to the database)

If data is not found

Report error

Else

Show all the requested data.

5.3 TESTING

Software testing is defined by Kugler J (1996) as a process that involves validation and verification of the software program, its application and the end product to see if it meets the user requirements and has the functionality that it is expected. During this phase the developer made intensive testing to make sure that the database components were also functioning as per expected. However many testing methods were performed as Godfrey (1999) characterize testing procedures in **Fig 5.1 below**. Software testing has no specific stage it can be undertaken during the process of development.

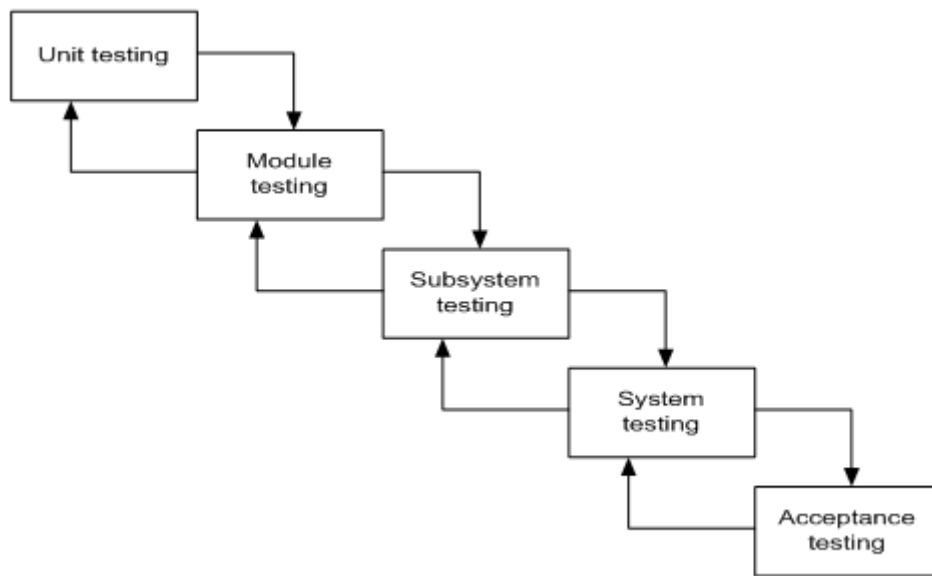


Fig 5.1 Stages in the testing process of the system

5.3.1 Unit Testing

Hoffer. J (2002) , cites that testing is done on each and every module independently with an aim find any problems or bugs in the code. This procedure makes sure that source code units, procedures associated with operations are tested to see if they are worthy to be used. Blackbox tests and white box tests are used to perform unit tests.

5.3.2 Black Box Tests

Black box test is mainly concerned with a unit inputs and outputs as the tester is the only one who knows the workings inside the item to be tested. Godfrey (1999) argues that the tester does not really have the knowledge of the code but rather focuses mainly on the inputs and the expected outcomes. During testing the developer tested the system recoding appropriate data testing the accuracy of data input, accuracy of output and accuracy of the validation rules of the system.

5.3.3 White Box Tests

White box tests are defined by Schwalbe J, (2009) as a testing technique which gives focus on the internal operational of a unit by helping the tester to discover bugs not found by making a unit black box. As the testing procedure commenced using white box running of the system was done in steps whereby the system was validated and verified at a particular segment of the code.

5.3.4 Module Testing

Godfrey (1999) cites that module testing is a strategy which encompasses testing of each module with the intention of finding out whether the system will be accepted by the user. The strategy makes use of the system's objectives measuring the modules functionality.

5.3.5 System Testing

System testing encompasses testing the information system as a whole. Godfrey (1999) states that when implementing system testing secondary or sub-modules are combined and tested to find any bugs that will affect the system's performance.

5.3.6 Acceptance Testing

Sommerville, (2004) cites that acceptance testing is a stage where errors are discovered in the system requirements specification. Testing is usually done by the intended user to verify if the system is working accordingly to the user's specification and requirements and the user will be allowed to comment on the system. Alpha and beta testing are some of the testing methods that are implemented.

5.3.7 Alpha Testing

According to Sommerville, (2004) alpha testing is a method used to produce results of the software being developed and the testing method provide all the activities responsible for making sure that the software will perform as required. The alpha test permits an organization that will use the system to have their system on time and be able to submit any errors for correction.

5.3.8 Beta Testing

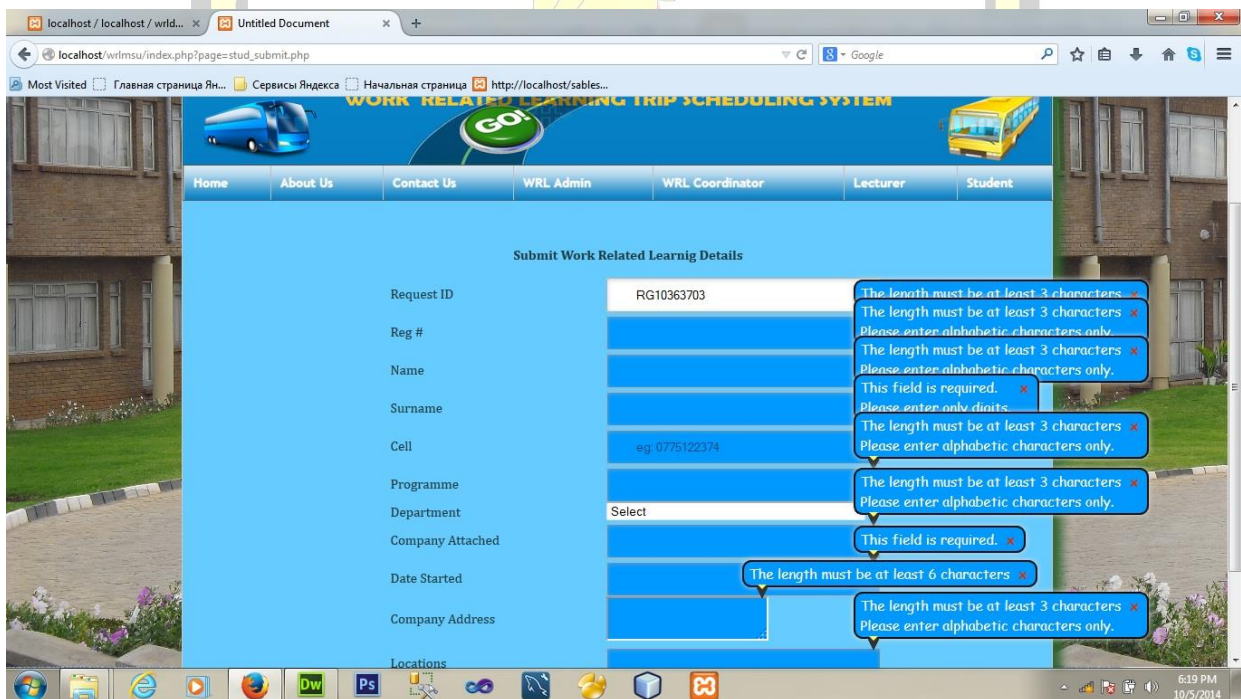
According to Sommerville, (2004) this method is used to ascertain that correct and valid data is entered into the system as the method make use of real data using sector of people who will use the system. With the use of a sample of people who will use the system errors are noted and the process of correcting these errors is done repeatedly until there are no errors found. Beta testing will be implemented by the system specially when it will use information provided by the departmental coordinators and the work related administrator.

5.3.9 Validation

Hass (2008) cites that validation is a testing strategy that involves illustrating that the desired outcome of the system is reached and satisfied meeting user requirements with the use of the objective given for the system. For example entering a numeric text whereby an alphabetic text is required will cause an error to occur.

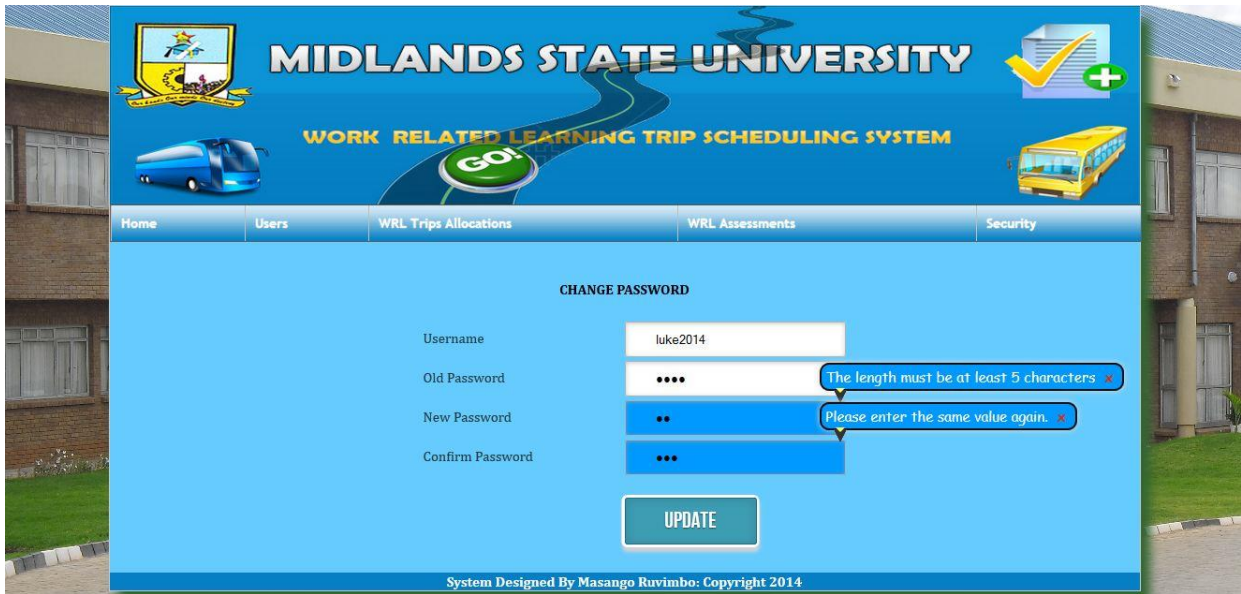
❖ Validation of null fields

This part of validation highlights the user to fill all the fields and shows if there is any field which was not filled. The system will automatically depicts the fields not entered and will not allow the user to enter parameters whilst some fields are missing.



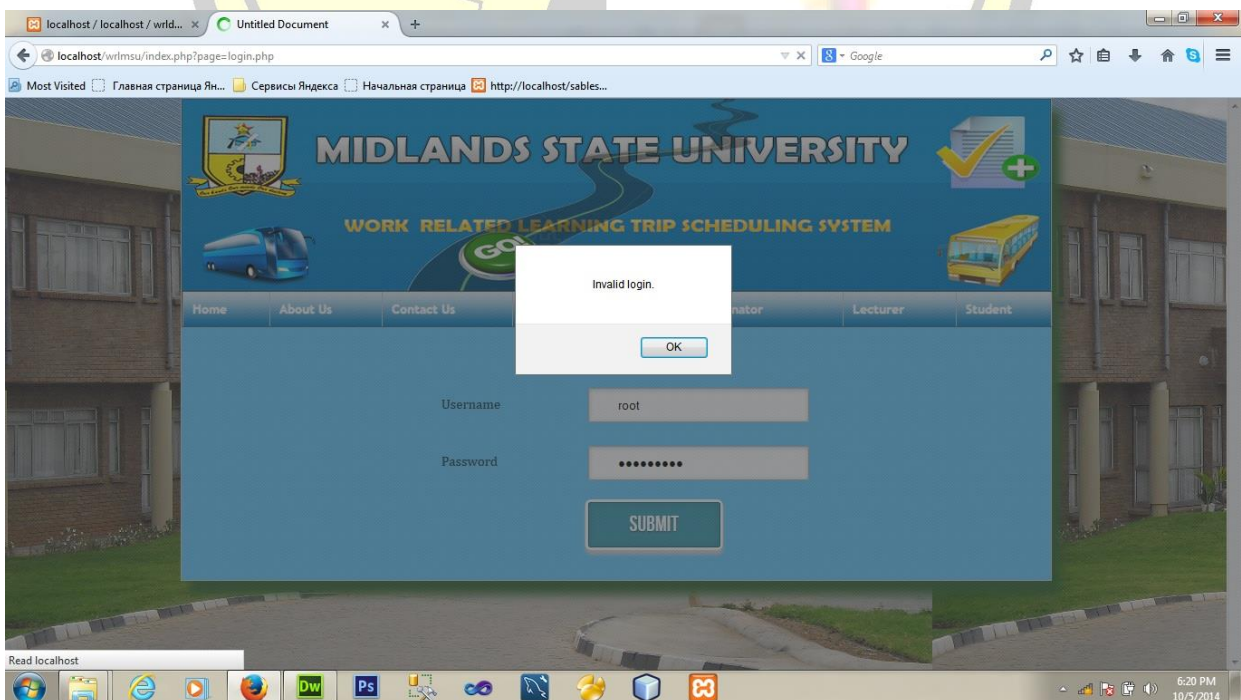
❖ Change password validation

If the lecture wants to change his or her password assigned to him by the departmental coordinator the system will accept a certain number of characters for the password and the system will allow confirmation of the desired password entered by the lecturer to update the system.



5.3.10 Verification

A process that involves verification of the code and design seeing if the system was built correctly is called verification as cited by Hass (2008). During testing the system's authentic data so as the results was used and compared with the results existing. To make the process be a success there was use of white box tests as these tests ensures that the system' internal operations performs.



5.4 INSTALLATION

Parallel conversion will be used for installation of the system whereby Crocket, (2008) defines it as the use of both the new and old systems to ensure that if the new system fails the organization will make use of the old system reducing risks aligned with system failure. Training, file conversion, system changeover methodologies are some of the activities that are going to be implemented at this stage. The CD ROM will be used to install the system from and the server will be used to store the system so that the system will be made available to other users since the organization has a Local Area Network. Installation steps to be followed include:

- ❖ On the web server install software called XAMPP.
- ❖ MySQL Manager should be installed on the server for easy management of the database.
- ❖ Send the files for the system in the htdocs folder found on the server.
- ❖ Type the url <http://localhost/wrlmsu>.
- ❖ Run the program and log in.

It's ready to use the system when the login is successful.

5.4.1 User training

Training of the user involves teaching all the people who will be using the system how the system works and how the results can be achieved. Mall J (2007) cites that the main objective for the training is allowing users to be familiar with the system, this training can be sub divided into two classes that is system level and module level training.

- ❖ **Module level** is that part of training that focus is mainly upon specific modules that are used by specific users. For example work related learning administrators use particular modules that can be accessed only by them for administration purposes.
- ❖ **System level** involves training users on the functionality of the system and its uses. Users with access to all modules will be the ones who will have this special training.

5.4.2 Methods of conversion

To change the system installing the proposed system requires implementation of several methods in which the organization will decide the best amongst the rest. These methods include direct conversion, pilot conversion parallel conversion and phased conversion.

Pilot conversion is a method defined by Eppingner, E (2008) as which involves installation of the system to the department it will be of use. Advantages of pilot conversion will include that

in terms of costs and risks there is reduction of these costs as both systems will be run on one location. In addition risks are fairly reasonable as there is reduction of risk failure to the pilot site.

Eppingner, E (2008) also cites that direct conversion involves replacement of the old system to the new system completely thus all the departments will carry out their daily routine of activities using the new system. One advantage of this conversion method is that with the use of one system there is reduction of costs. On the other hand this conversion method does not provide an option for back up increasing risks so careful planning and special intention is required to operational detail.

Eppingner, E (2008) defines phased conversion as an approach whereby implementation of the latest system is done in stages thus phasing the old slowly. There are low costs experienced because of the system being executed in stages or phases and lowering risks which restricted or limited into a distinct phase.

Parallel conversion involves using the old and the new system concurrently giving users the ability to report to any errors that the system might provide. The conversion method is done to ensure that the users become familiar with the system, advantages include backing up of data is implemented and the method provides time for the users to validate efficiency of the new system. One disadvantage include that costs are made high with the use of both systems. For this method recommendation is done on this method because of the advantages it possess

5.5 MAINTENANCE

According to Mall J, (2009) maintenance is a process of maintaining the system making improvements and fixing the problems. Maintenance is a continuous process which will involve the upgrading, modifying, updating the system to successfully achieve the organization objectives. Correcting errors like coding and design errors as well as emerging new requirements will allow changes to be done. As soon as the system is put forth there is greatly need to revisit it and see if its working according to its specifications at least once every six months of the year. There are four maintenance methods which are done thus corrective, perfective, adaptive and preventive.

5.5.1 Adaptive Maintenance

Mall J, (2009) defines adaptive maintenance as a type of maintenance that requires one to have knowledge on how the method can be applied into the system without any problems. Due to

the changing world in terms of technology and internal operations within the organization it is important to maintain the system so that it suits to the environment changes ensuring compatibility of the system to the external and internal environment.

5.5.2 Perfective Maintenance

According to Mall J ,(2009) perfective maintenance allows one to ensure that implementation of a good software solution results in a quality product to be produced .Perfect maintenance also plays a role in evaluating the worthwhile of implementing the effort to make changes so as to carry out the development process and activities of the system.

5.5.3 Corrective Maintenance

Mall J (2009) ,cites that corrective maintenance is a method whereby if an error is found in the system the initial cause of that error is traced and corrected. Corrective maintenance also requires steps to be undertaken so as to execute the changes and it is also executed when changes made during maintenance causes new errors.

5.5.4 Preventive Maintenance

Preventive maintenance as defined by Mall J, (2009) is said to be in line with perfective maintenance whereby it is performed by the system developers ‘system administrators and also the department of ITS. Mall (2009) also argues that the maintenance method evade problems that are likely to transpire using the system. Advantages are that user satisfaction is increased and downtime is reduced.

5.6 CONCLUSION

Conclusively with this chapter the system was implemented with all objectives being met and verification and validation of the system was achieved. Through testing the system was tested using various methods to prove how functional and also the flexibility of the system to the external environment was noted .Documentation was also carried out for all the phases.

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APPENDIXS

APPENDIX A USER MANUAL

Blake and Bly (1993) define a user manual as a guide for users which supports technical communication document which aims to assist users of a particular system. It contains different screenshots and human –machine interfaces of the system which are usually images.

Homepage

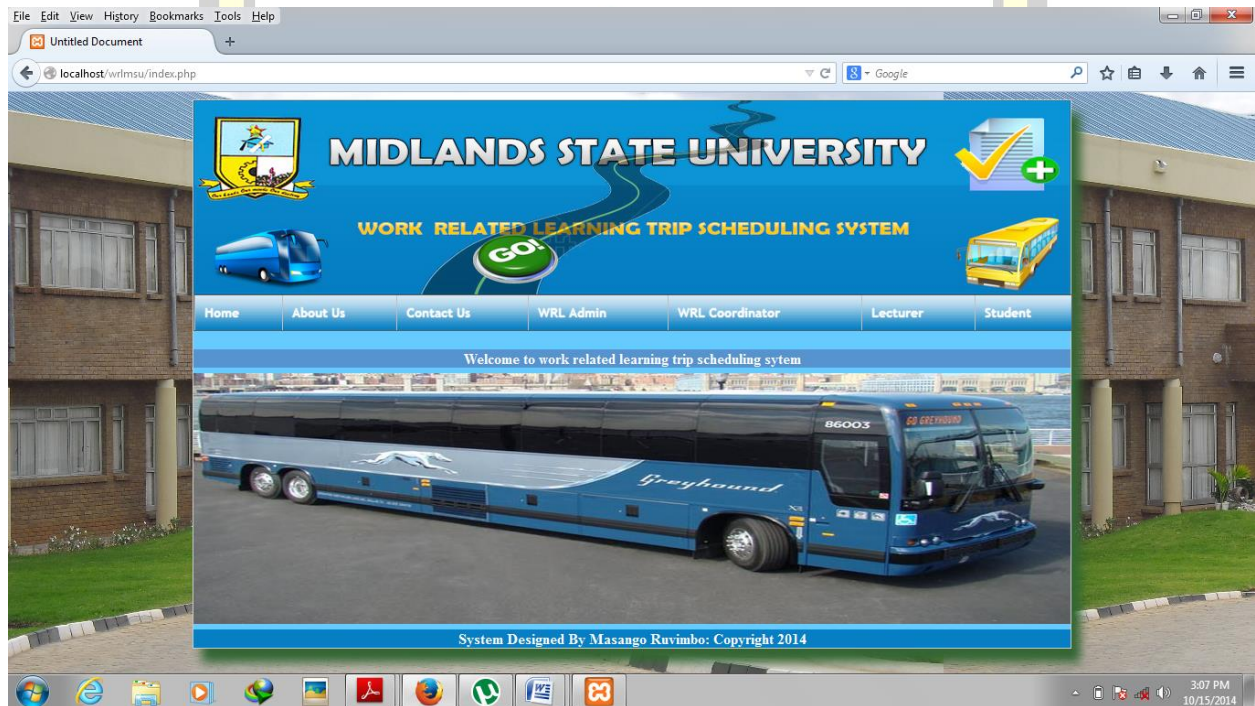


Fig A1: Homepage

The homepage allows users to view the welcome message about the system and be able to login according to who they are thus students, lecturer, work related coordinator and work related learning administration. The homepage will also allow users to find information about the university and its history. To access the system resources the user needs to click log in or submit and supply valid credentials for security measures using a user name and a password.

User login

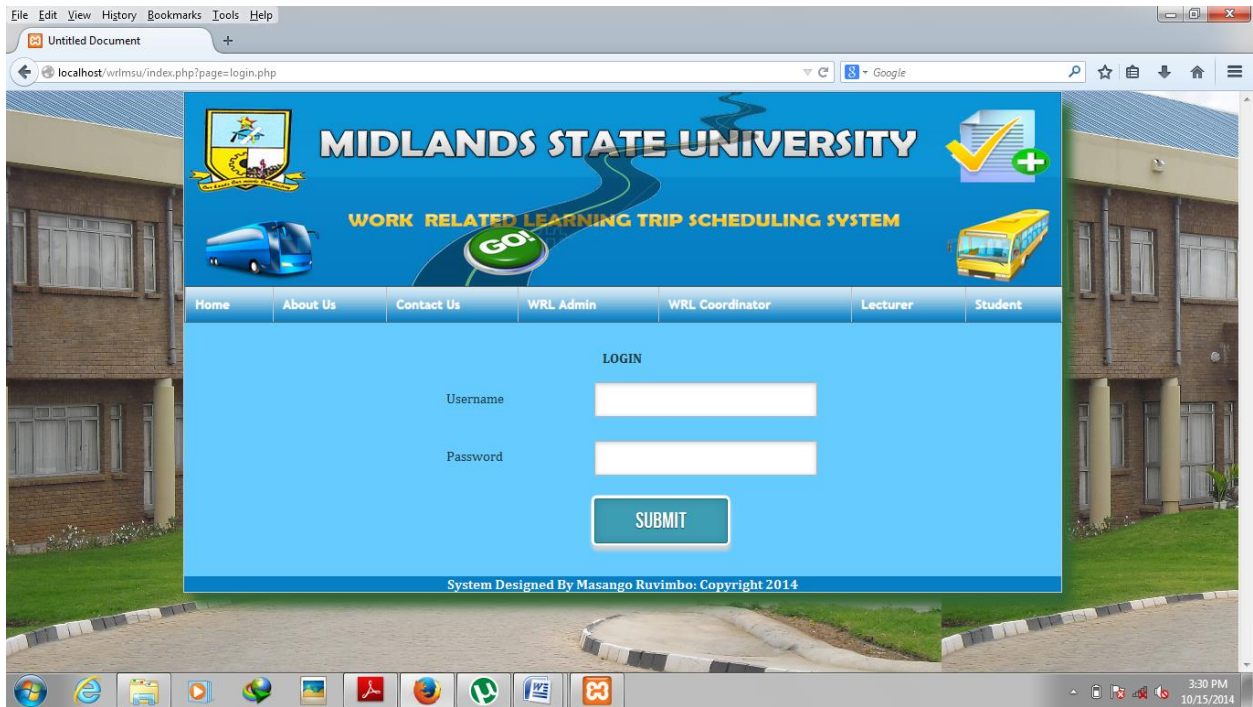
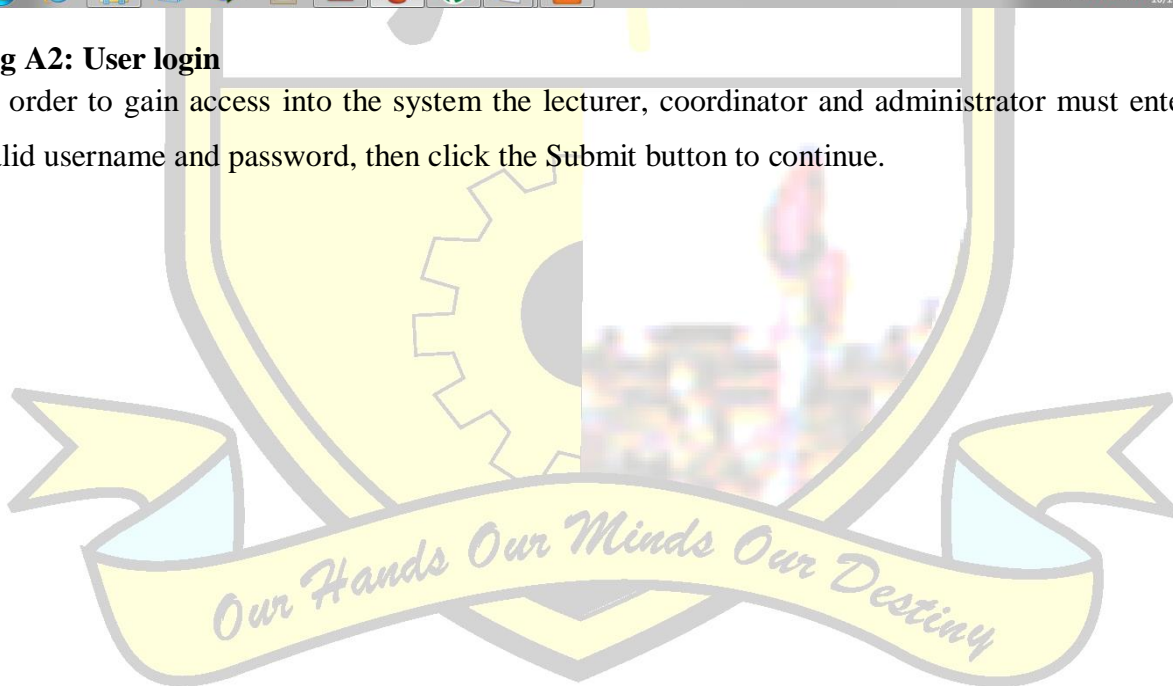


Fig A2: User login

In order to gain access into the system the lecturer, coordinator and administrator must enter a valid username and password, then click the Submit button to continue.



Student view

The screenshot shows a web browser window displaying the 'Student View' page of the 'MIDLANDS STATE UNIVERSITY WORK RELATED LEARNING TRIP SCHEDULING SYSTEM'. The page has a blue header with the university logo and navigation links: Home, About us, Contact Us, WRL Admin, WRL Coordinator, Lecturer, and Student. The main content area is a form titled 'Submit Work Related Learning Details' with the following fields:

Request ID	RQ22426103
Reg #	
Name	
Surname	
Cell	eg: 0775122374
Programme	
Department	Select
Company Attached	
Date Started (Y-m-d) eg (2014-09-09)	Y m d
Company Address	
Locations	

A 'SUBMIT' button is located at the bottom of the form. Below the form, there is a link 'Always on Submitted (Click Here)' and a footer note 'System Designed By Masango Ruvimbo: Copyright 2014'. The browser's taskbar at the bottom shows various application icons and the system clock indicating 3:39 PM on 10/15/2014.

Fig A3: Student View

On the student view section the student will enter his or her details including the company he is attached to and also his or her phone number, then submit the details which will be viewed by the coordinator. The student will also be able to check his or her details if he already submitted using the request identification number and a form which will show that an sms will be sent which will inform him about the details of the lecturer visit. The form is as follows:

Our Hands Our Minds Our Destiny

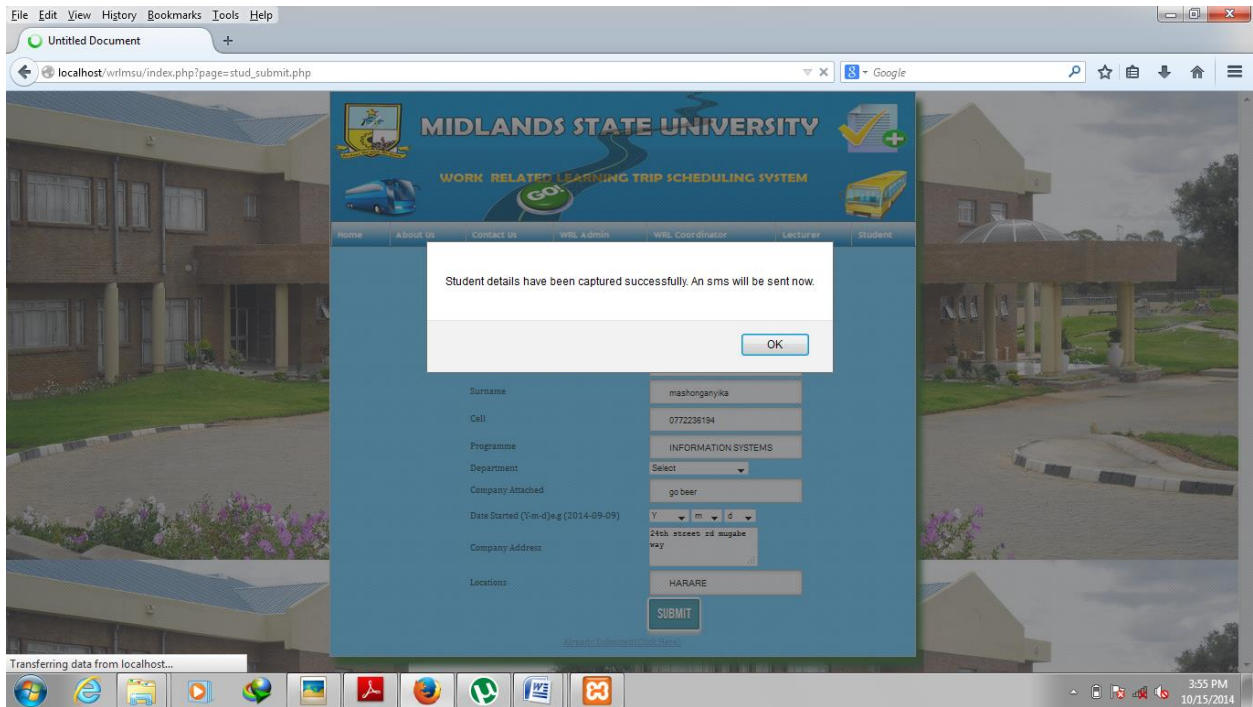
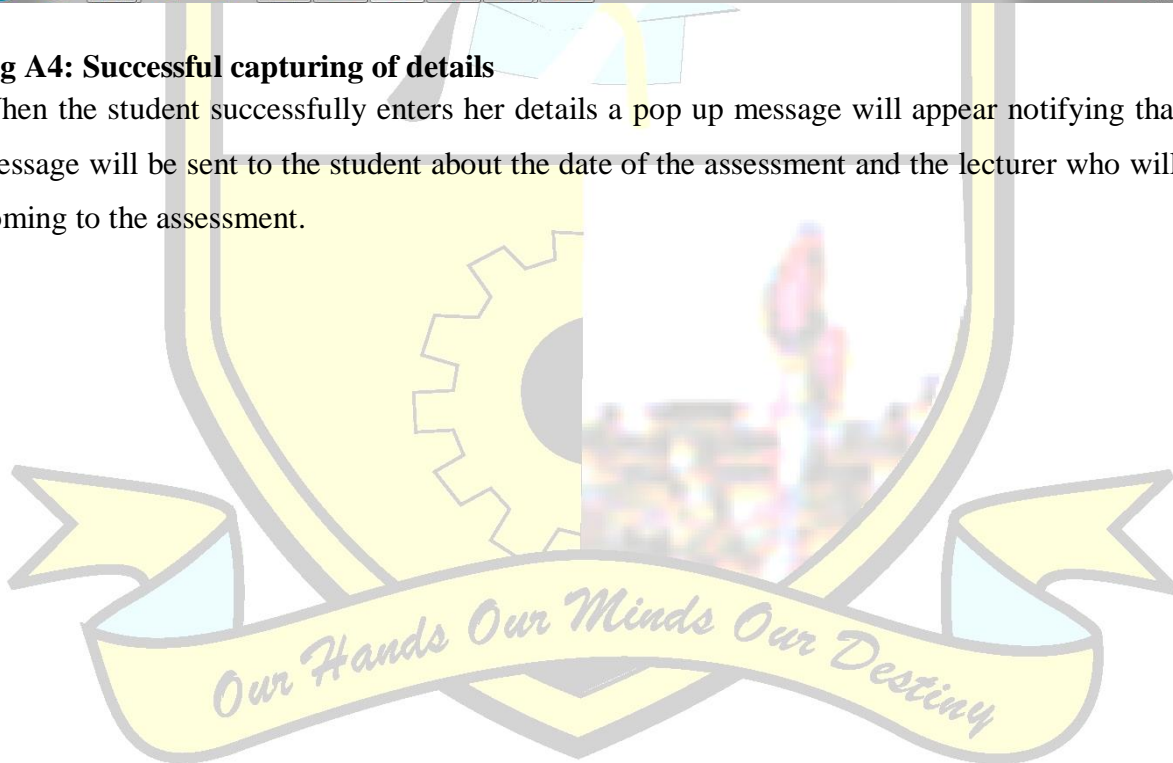


Fig A4: Successful capturing of details

When the student successfully enters her details a pop up message will appear notifying that a message will be sent to the student about the date of the assessment and the lecturer who will be coming to the assessment.



WRL Coordinator View

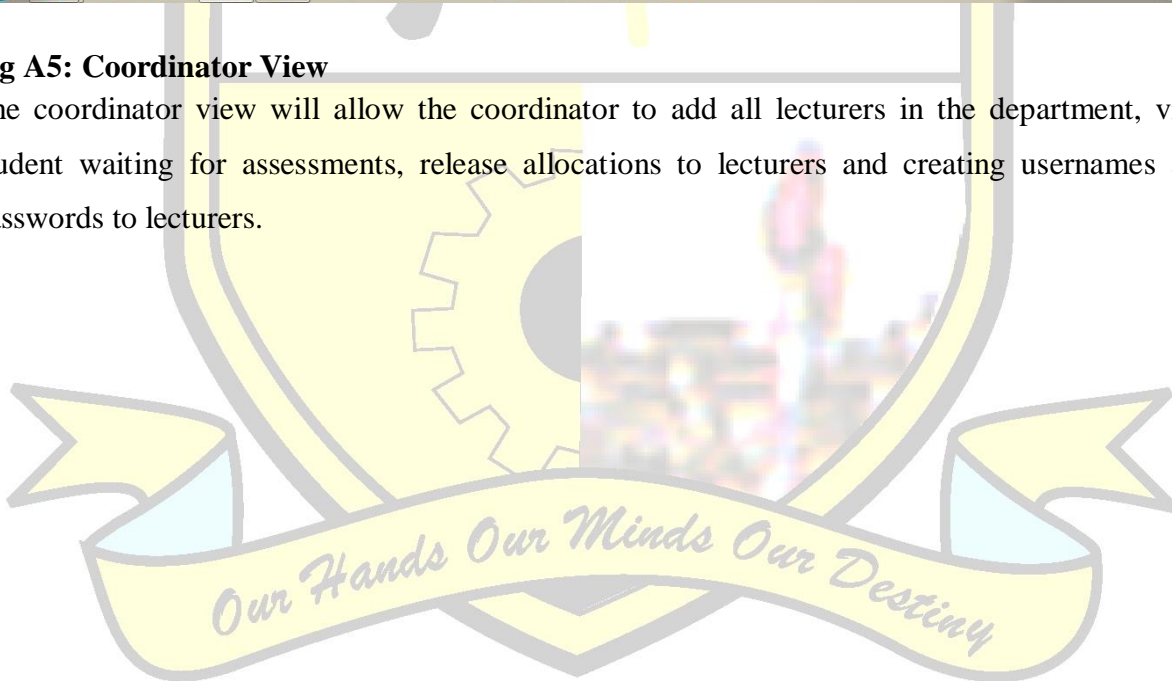
The screenshot shows a web browser displaying the 'MIDLANDS STATE UNIVERSITY WORK RELATED LEARNING TRIP SCHEDULING SYSTEM'. The interface includes a navigation menu with options like 'Home', 'Users', 'WRL Trips Allocations', 'WRL Assessments', and 'Security'. A dropdown menu is open under 'WRL Trips Allocations', listing actions such as 'Students Waiting 1st Assessment', 'Students Waiting 2nd Assessment', 'Students Allocated 1st Assessment', 'Students Allocated 2nd Assessment', 'All Allocated Students', 'Search Allocated Students', and 'Release Allocations'. A table on the right shows assessment details for the 'Physics) department: 1st Assesement'.

Company Address	Location	Date Started	Action
37 Westend Hre	Harare	2014-09-18	Allocate
10 Industry Road Gweru	Gweru	2014-09-23	Allocate

System Designed By Masango Ruvimbo: Copyright 2014

Fig A5: Coordinator View

The coordinator view will allow the coordinator to add all lecturers in the department, view student waiting for assessments, release allocations to lecturers and creating usernames and passwords to lecturers.



Adding lecturers

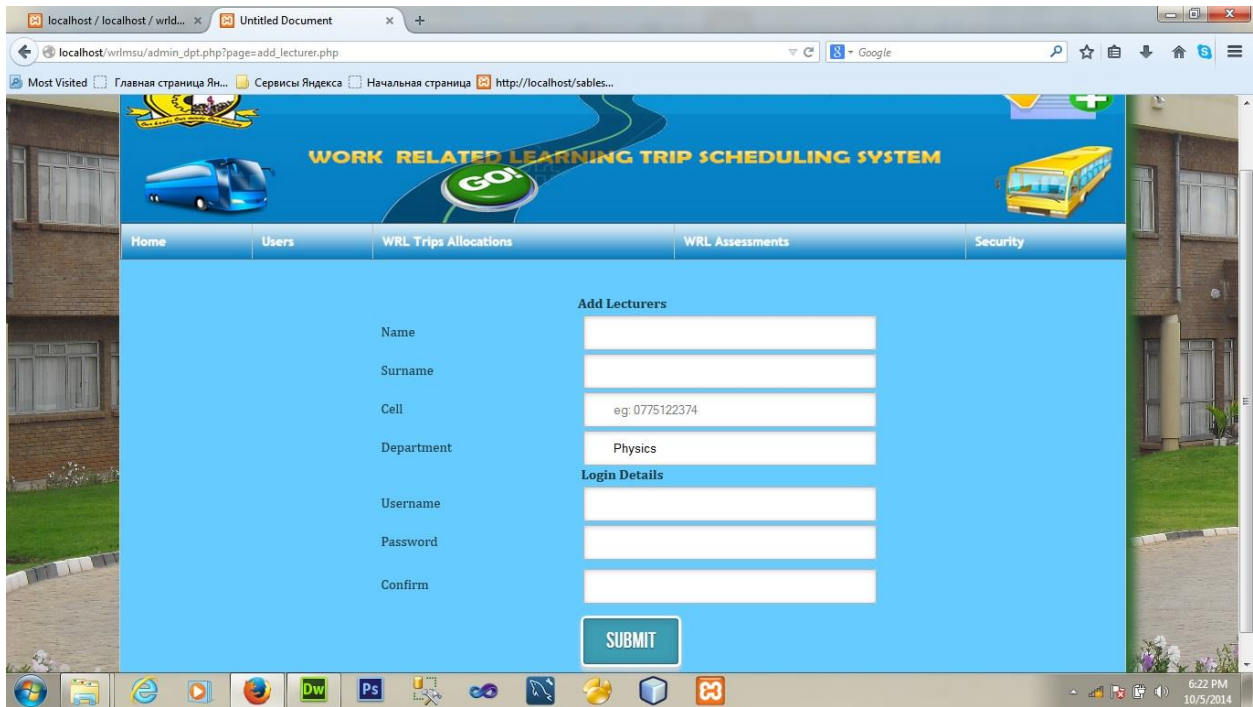
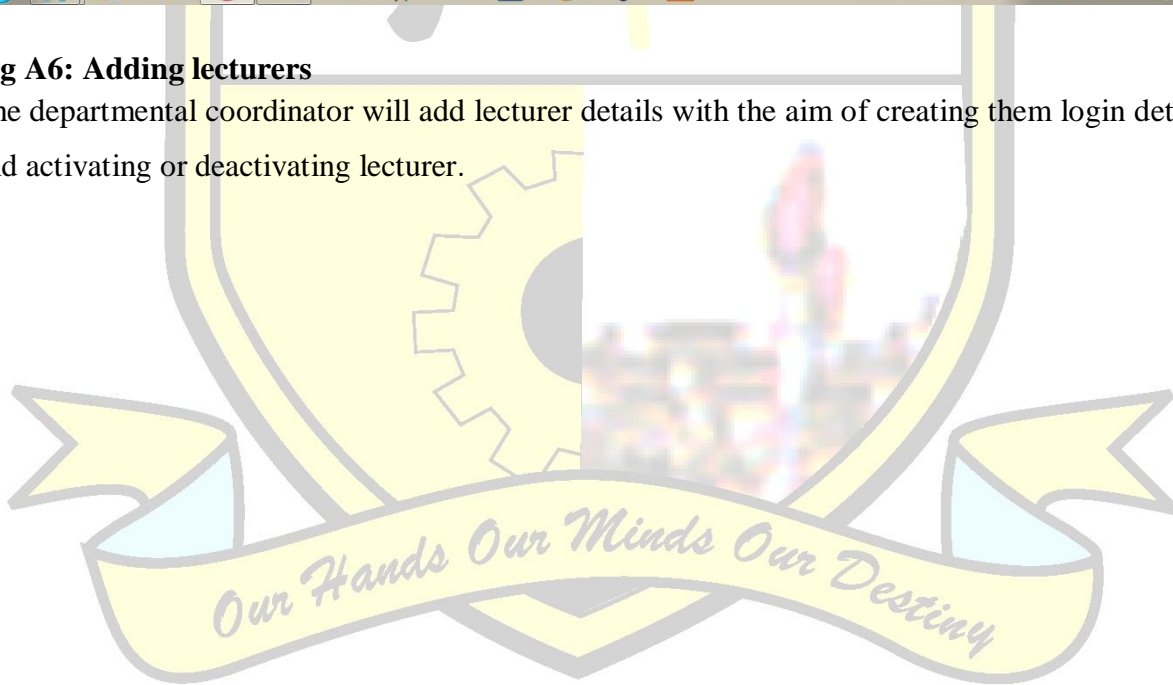


Fig A6: Adding lecturers

The departmental coordinator will add lecturer details with the aim of creating them login details and activating or deactivating lecturer.



Allocation of lecturers

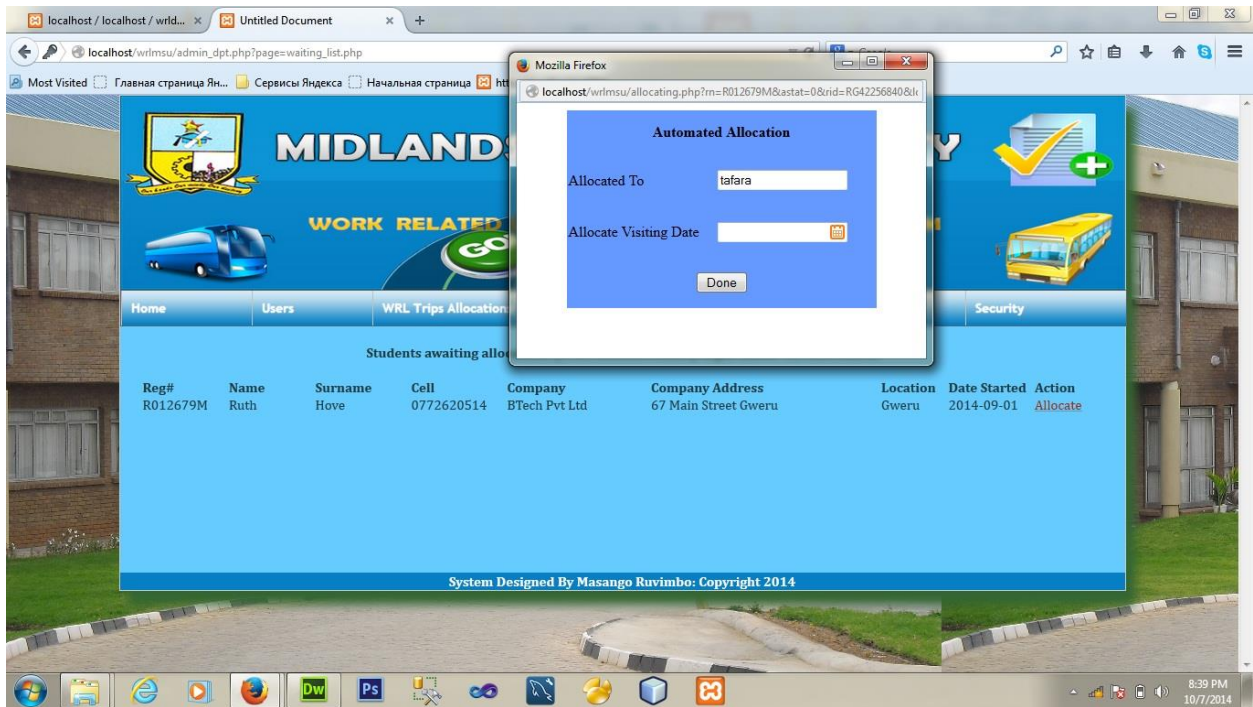
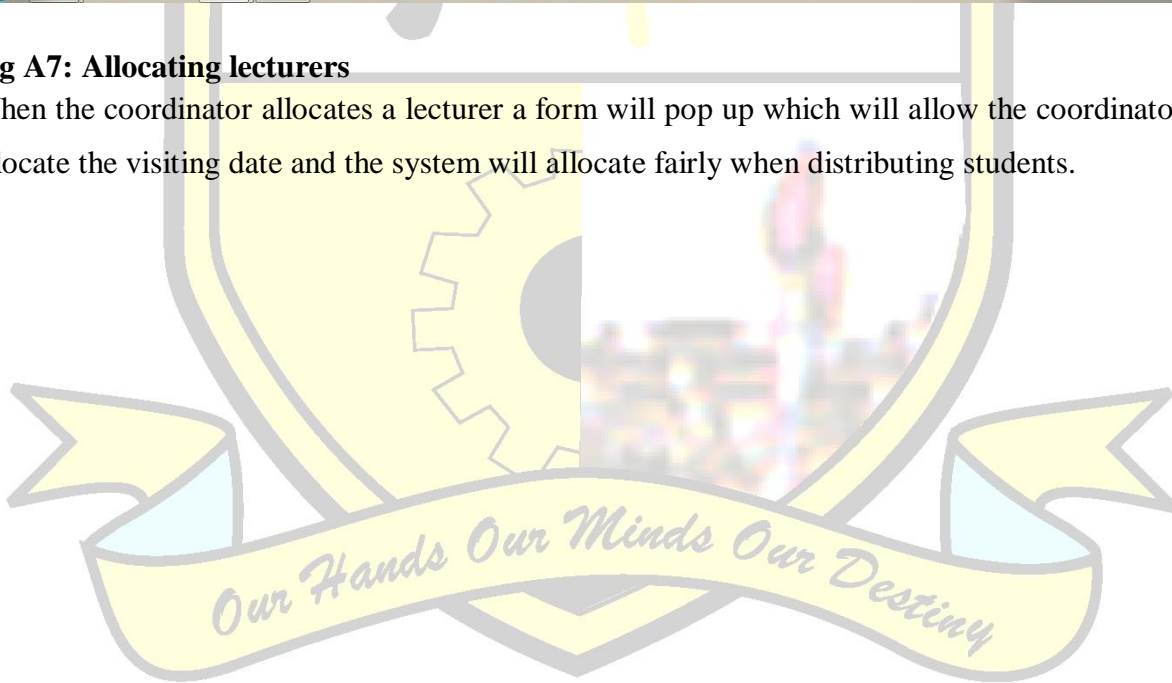


Fig A7: Allocating lecturers

When the coordinator allocates a lecturer a form will pop up which will allow the coordinator to allocate the visiting date and the system will allocate fairly when distributing students.



WRL Administrator View

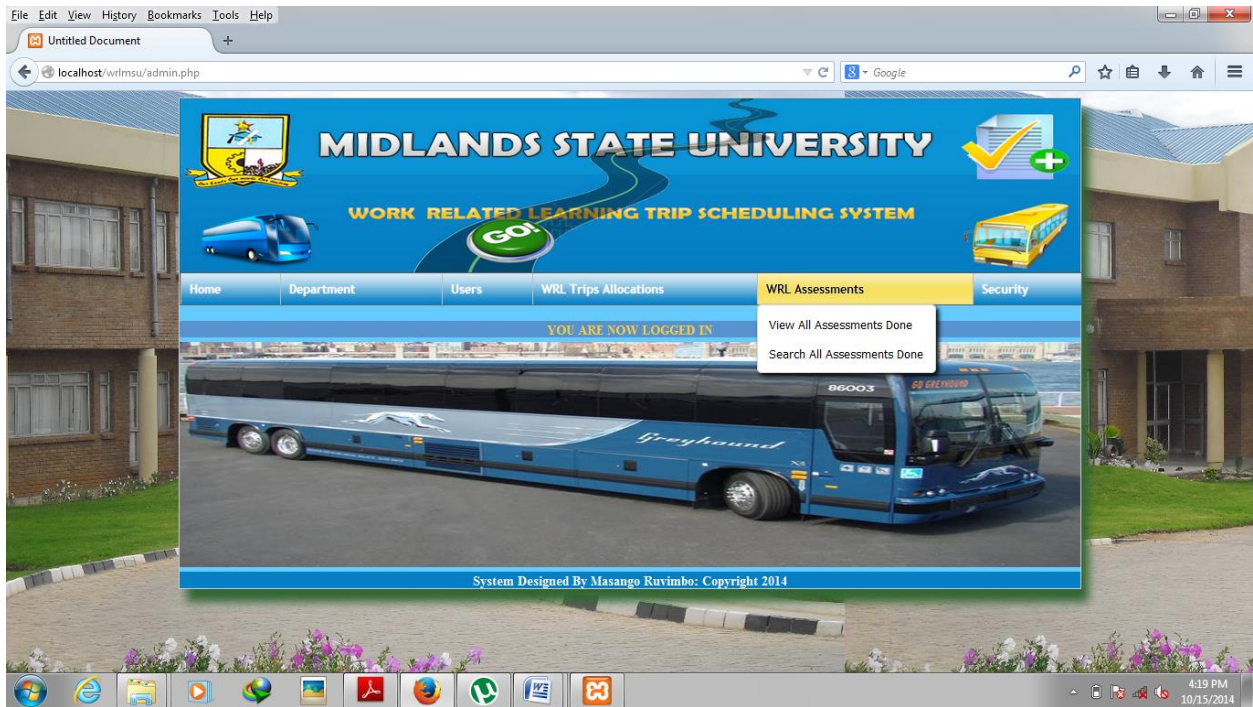
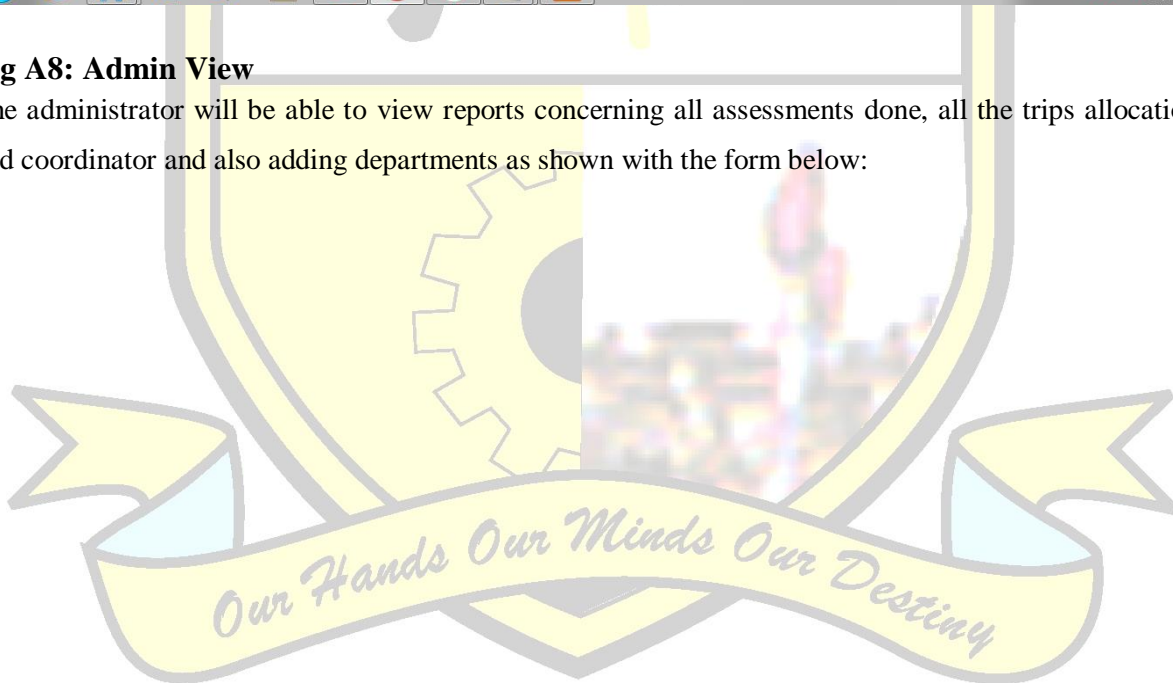


Fig A8: Admin View

The administrator will be able to view reports concerning all assessments done, all the trips allocations, add coordinator and also adding departments as shown with the form below:



Adding departments

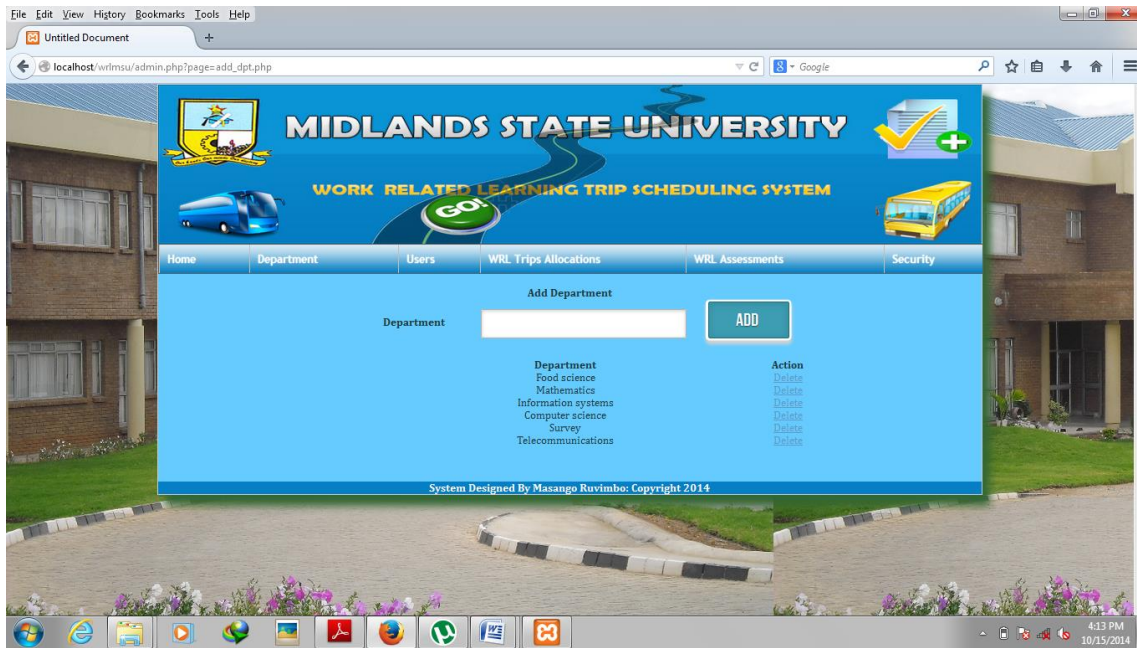
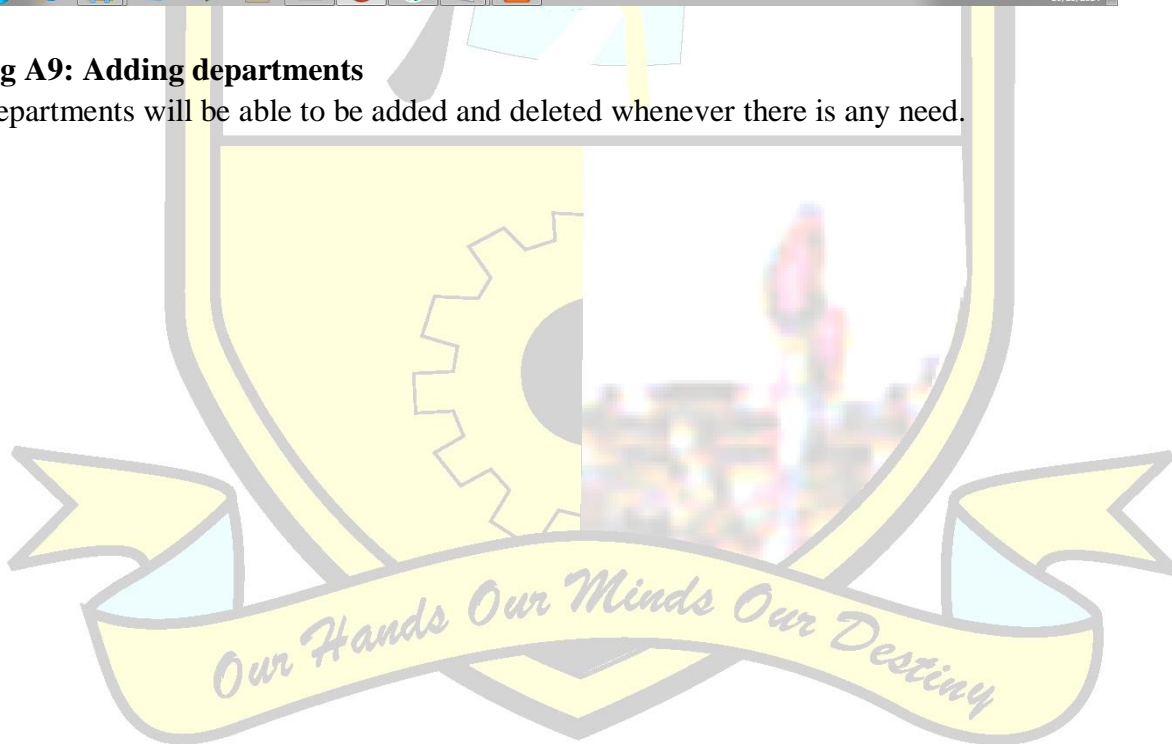


Fig A9: Adding departments

Departments will be able to be added and deleted whenever there is any need.



APPENDIX B INTERVIEW CHECKLIST

Work Related Learning department

1. How does your system work and what are the processes of application, acceptance admission of students, capturing attachment details of students?

2. How are you coping with the current system? Are you encountering any problems using the system?

3. How do rate the system performance?

4. What data about each student do you capture and record?

5. Are there any precautions in place to safeguard against unauthorized access to data?

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

7. Are there any complaints or drawbacks of the existing system currently available?

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

Users

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/ opinion about migrating from the current manual system to a fully computerized system do you have?

APPENDIX C QUESTIONNAIRE CHECKLIST

Work Related Learning department

1. How do you rate the current system?

Excellent Good Poor

2. Do you vote for computerization if it is considered a candidate for migrating from the current manual loan management system?

Yes No

If No, what may be the reason _____

3. Have some of employees complained about the current system's performance?

Yes No

If YES what were the complaints?

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



APPENDIX D OBSERVATION SCORE SHEET

Name of observant:

Name of observer:

Date: Time:

Focus of observation:
Brief Description of the system:
Areas of strength
Areas for development:

Signed- Observant: Date

Signed - Observer: Date



APPENDIX E SNIPPETS OF CODE

❖ Login into the system (Admin)

```
<meta name="viewport" content="width=device-width, initial-scale=1.0">
  <meta name="description" content="Login and Registration Form with HTML5 and
  CSS3" />
  <meta name="keywords" content="html5, css3, form, switch, animation, :target,
  pseudo-class" />
  <meta name="author" content="Codrops" />
  <link rel="shortcut icon" href="../favicon.ico">
  <link rel="stylesheet" type="text/css" href="css/demo.css" />
  <link rel="stylesheet" type="text/css" href="css/style2.css" />
  <link rel="stylesheet" type="text/css" href="css/animate-custom.css" />
  <div id="wrapper">
<form name="form1" method="post" action="">
  <table width="77%" border="0" align="center" cellspacing="0">
  <tr>
  <td height="43" colspan="2" align="center"><strong> LOGIN</strong></td>
  </tr>
  <tr>
  <td width="42%" height="44">Username</td>
  <td width="58%" align="center"><label for="textfield"></label>
  <input type="text" name="username" id="textfield"></td>
  </tr>
  <tr>
  <td height="83">Password</td>
  <td align="center"><label for="textfield2"></label>
  <input type="password" name="password" id="textfield2"></td>
  </tr>
```



```

<tr>
  <td height="64"><center></center></td>
  <td><p class="button"><input type="submit" name="login" id="button"
value="Submit" /></p></td>
</tr>
</table>
<?php
include("connection/db_con.php");
include("functions.php");
$usr=$_POST['username'];
$pass=$_POST['password'];
if(isset($_POST['login'])){
$query=mysql_query("SELECT * FROM dpt_users WHERE usr='$usr' and
pass='$pass'") or die(mysql_error());
$count= mysql_num_rows($query);
if($count==0){
message_goto("Invalid login. ","index.php");
}
while($fetch=mysql_fetch_array($query)){
$pos=$fetch['pos'];
$usr=$fetch['usr'];
$stat=$fetch['stat'];
$dpt=$fetch['dpt'];

if($stat==0){
message("Sorry your account has been deactivated.");
}

if($fetch['pos']=='Coordinator'){
$tm=time();
$_SESSION['usr']=$usr;
$_SESSION['dpt']=$dpt;

```

```

$_SESSION['p']="Lecturer";
$_SESSION['logged']='admin_dpt.php';
$_SESSION['allc']=$tm;
message_goto("You are logged in as WRL Departmental
Coordinator","admin_dpt.php");
}

if($fetch['pos']=='Lecturer'){
$_SESSION['usr']=$usr;
$_SESSION['logged']='lecturer.php';
$_SESSION['dpt']=$dpt;

message_goto("You are logged in as Lecturer","lecturer.php");
}
if($fetch['pos']=='Administrator'){
$_SESSION['usr']=$usr;
$_SESSION['logged']='admin.php';
$_SESSION['dpt']=$dpt;
$_SESSION['p']="Coordinator";
message_goto("You are logged in as WRL Administrator","admin.php");
}
else
redirectto("index.php");
}
?>
 
</form>
</div>

```

❖ Adding lecturer

```
<script language="javascript" src="jquery-1.9.1.min.js"></script>
<script language="javascript" src="jquery.bvalidator.js"></script>
<link href="bvalidator.css" rel="stylesheet" type="text/css" />
<link href="themes/bvalidator.theme.orange.css" rel="stylesheet" type="text/css" />
<link href="themes/bvalidator.theme.red.css" rel="stylesheet" type="text/css" />
<link href="themes/bvalidator.theme.gray2.css" rel="stylesheet" type="text/css" />
<link href="themes/bvalidator.theme.postit.css" rel="stylesheet" type="text/css" />
<link href="themes/bvalidator.theme.bootstrap.css" rel="stylesheet" type="text/css" />

<script type="text/javascript">
    var options = {
        singleError: true,
        showCloseIcon: false
    };
    $('#form1').bValidator(options);
</script>
<script type="text/javascript">
    var optionsPostIt = {
        classNamePrefix: 'bvalidator_postit_',
        offset: {x:-29, y:-10},
        template: '<div class="{errMsgClass}">{message}<div
class="bvalidator_postit_pointer"><div
class="bvalidator_postit_inner_pointer"></div></div></div>'
    };

    $(document).ready(function () {
        $('#form1').bValidator(optionsPostIt);
    });
</script>
```

```

});
</script>
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<meta name="description" content="Login and Registration Form with HTML5 and
CSS3" />
<meta name="keywords" content="html5, css3, form, switch, animation, :target,
pseudo-class" />
<meta name="author" content="Codrops" />
<link rel="shortcut icon" href="../favicon.ico">
<link rel="stylesheet" type="text/css" href="css/demo.css" />
<link rel="stylesheet" type="text/css" href="css/style3.css" />
<link rel="stylesheet" type="text/css" href="css/animate-custom.css" />
<div id="wrapper">
<form action="" method="post" name="form1" id="form1">
&nbsp;
<table width="89%" border="0" align="center">
<tr>
<td colspan="2"><strong><center>
Add Department Lecturer
</center></strong></td>
</tr>
<tr>
<td width="42%">Name</td>
<td width="58%"><label for="textfield"></label>
<input type="text" name="name" id="name" data-
validator="minlength[3],alpha,required" value="<?php echo $_POST['name'];
?>"></td>
</tr>
<tr>
<td>Surname</td>

```

```

        <td><input type="text" name="surname" id="surname" data-
bvalidator="minlength[3],alpha,required" value="<?php echo $_POST['surname'];
?>"></td>
    </tr>
    <tr>
        <td height="34">Cell</td>
        <td><input type="text" name="cell" id="cell" placeholder="eg: 0775122374" data-
bvalidator="required,digit" value="<?php echo $_POST['cell']; ?>"></td>
    </tr>
    <tr>
        <td height="36">Department</td>
        <td><p class="rollOut">&nbsp;</p></td>
    </tr>
    <tr>
        <td colspan="2"><strong><center>Login Details</center></strong></td>
    </tr>
    <tr>
        <td>Username</td>
        <td><input type="text" name="username" id="username" data-
bvalidator="minlength[3],required" value="<?php echo $_POST['username']; ?>"></td>
    </tr>
    <tr>
        <td>Password</td>
        <td><input type="password" name="password" id="password" data-
bvalidator="minlength[6],required" value="<?php echo $_POST['password']; ?>"></td>
    </tr>
    <tr>
        <td height="41">Confirm</td>
        <td><input type="password" name="password2" id="password2" data-
bvalidator="equalTo[password],required" value="<?php echo $_POST['password2'];
?>"></td>

```



```

</tr>
<tr>
  <td height="79"><center></center></td>
  <td><p class="button"><input type="submit" name="add_emp" id="button"
value="Submit" /></p></td>

```

```

</tr>
</table>
<?php
if(isset($_POST['add_emp'])){
include("connection/db_con.php");
include("functions.php");
$nam=$_POST['name'];
$sur=$_POST['surname'];
$usr=$_POST['username'];
$pass=$_POST['password'];
$dat=date('Y-m-d');
$cell=$_POST['cell'];
$dpt=$_POST['dpt'];
$pos="Lecturer";
$cel=trim(str_replace(" ","",$cell));
$stat=1;

```

```

if($dpt=="Select"){
message("Select department please");
}

```

```

validate_cell($cel);

```

```

$find=mysql_query("select * from dpt_users where usr='$usr'") or die(mysql_error());
$cnt=mysql_num_rows($find);
if($cnt==1){

```



```

message("Username already exists");
}
////
$find2=mysql_query("SELECT MIN(tot) FROM dpt_users WHERE pos='Lecturer' &&
stat=1 && dpt='$_SESSION[dpt]'" ) or die(mysql_error());
$stake2=mysql_fetch_array($find2);
$min=$stake2['MIN(tot)'];
////
$status="send";
$msg="Hie, ".$nam. " your username for WRL Trip scheduling system is: [ ".$usr."] and
your password is : [ ".$pass." ]";
mysql_query("insert into sms(msg,cell,status,fro) values('$msg','$cel','$status','$fro')")
or die(mysql_error());
mysql_query("insert into dpt_users(nam,sur,cell,pos,usr,pass,stat,dpt,tot)
values('$nam','$sur','$cel','$pos','$usr','$pass','$stat','$_SESSION[dpt]','$min')") or
die(mysql_error());
message("User details have been captured successfully. SMS Sent", );
}
?>
</form>
</div>

```

❖ Connecting to the database

```

<?php
$con=mysql_connect("localhost","root","") or die(mysql_error());
$db=mysql_select_db("wrldb") or die(mysql_error());
?>

```

❖ Student submitting details

```
<link rel="stylesheet" href="public/css/zebra_datepicker.css" type="text/css">
<script type="text/javascript" src="examples/public/javascript/jquery-1.9.0.js"></script>
<script type="text/javascript" src="public/javascript/zebra_datepicker.js"></script>
<script type="text/javascript" src="examples/public/javascript/functions.js"></script>
<script language="javascript" src="jquery-1.9.1.min.js"></script>
<script language="javascript" src="jquery.bvalidator.js"></script>
<link href="bvalidator.css" rel="stylesheet" type="text/css" />
<link href="themes/bvalidator.theme.orange.css" rel="stylesheet" type="text/css" />
<link href="themes/bvalidator.theme.red.css" rel="stylesheet" type="text/css" />
<link href="themes/bvalidator.theme.gray2.css" rel="stylesheet" type="text/css" />
<link href="themes/bvalidator.theme.postit.css" rel="stylesheet" type="text/css" />
<link href="themes/bvalidator.theme.bootstrap.css" rel="stylesheet" type="text/css" />

<script type="text/javascript">
    var options = {
        singleError: true,
        showCloseIcon: false
    };
    $('#form1').bValidator(options);
</script>
<script type="text/javascript">
    var optionsPostIt = {
        classNamePrefix: 'bvalidator_postit_',
        offset:          {x:-29, y:-10},
        template:        '<div class="{errMsgClass}">{message}<div
class="bvalidator_postit_pointer"><div
class="bvalidator_postit_inner_pointer"></div></div></div>'
    };
</script>
```

```

};

$(document).ready(function () {
    $('#form1').bValidator(optionsPostIt);
});
</script>

<meta name="viewport" content="width=device-width, initial-scale=1.0">
    <meta name="description" content="Login and Registration Form with HTML5 and
CSS3" />
    <meta name="keywords" content="html5, css3, form, switch, animation, :target,
pseudo-class" />
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    <link rel="stylesheet" type="text/css" href="css/demo.css" />
    <link rel="stylesheet" type="text/css" href="css/style.css" />
        <link rel="stylesheet" type="text/css" href="css/animate-custom.css" />
    <div id="wrapper">
<form action="" method="post" name="form1" id="form1">
&nbsp;
    <table width="105%" border="0" align="center">
    <tr>
        <td height="43" colspan="4"><strong><center>
Submit Work Related Learnig Details
</center></strong></td>
    </tr>
    <tr>
        <td colspan="3">Request ID</td>
        <td width="44%"><input type="text" name="rid" id="rid" value="<?php echo
"RG".substr(number_format(time() * rand(),0,","),0,8);?>" readonly="readonly"/></td>
    </tr>

```

```

<tr>
  <td colspan="3">Reg #</td>
  <td><input type="text" name="rn" id="rn" data-bvalidator="minlength[3],required"
value="<?php echo $_POST['rn'];?>" /></td>
</tr>
<tr>
  <td colspan="3">Name</td>
  <td><label for="textfield"></label>
  <input type="text" name="nam" id="nam" data-
bvalidator="minlength[3],alpha,required" value="<?php echo $_POST['nam'];?>"></td>
</tr>
<tr>
  <td colspan="3">Surname</td>
  <td><input type="text" name="sur" id="sur" data-
bvalidator="minlength[3],alpha,required" value="<?php echo $_POST['sur'];?>"></td>
</tr>
<tr>
  <td colspan="3">Cell</td>
  <td><input type="text" name="cell" id="cell" placeholder="eg: 0775122374" data-
bvalidator="required,digit" value="<?php echo $_POST['cell'];?>"></td>
</tr>
<tr>
  <td colspan="3">Programme</td>
  <td><label for="select"></label>
  <input type="text" name="prog" id="prog" data-
bvalidator="minlength[3],alpha,required" value="<?php echo $_POST['prog'];?>"
/></td>
</tr>
<tr>
  <td colspan="3">Department</td>
  <td><select name="dpt" id="dpt">

```



```

<option>Select</option>
<?php include("connection/db_con.php"); $query=mysql_query("select dpt from
departments") or die(mysql_error()); while($fetch=mysql_fetch_array($query)){?>
  <option><?php echo $fetch['dpt']; ?></option>
<?php } ?>
</select></td>
</tr>
<tr>
  <td colspan="3" align="left">
    Company Attached</td>
  <td><input
    type="text" name="co" id="co" data-
    validator="minlength[3],alpha,required" value="<?php echo $_POST['co'];?>" /></td>
</tr>
<tr>
  <td height="39" colspan="3" align="left">Date Started (Y-m-d)e.g (2014-09-
09)</td>
  <td><label>
    <select name="y">
      <option>Y</option>
      <option><?php echo date('Y'); ?></option>
    </select>
  </label>
  <select name="m">
    <option>m</option>
    <option>01</option>
    <option>02</option>
    <option>03</option>
    <option>04</option>
    <option>05</option>

```

<option>06</option>

<option>07</option>

<option>08</option>

<option>09</option>

<option>10</option>

<option>11</option>

<option>12</option>

</select>

<select name="d">

<option>d</option>

<option>01</option>

<option>02</option>

<option>03</option>

<option>04</option>

<option>05</option>

<option>06</option>

<option>07</option>

<option>08</option>

<option>09</option>

<option>10</option>

<option>11</option>

<option>12</option>

<option>13</option>

<option>14</option>

<option>15</option>

<option>16</option>

<option>17</option>

<option>18</option>

<option>19</option>

<option>20</option>

<option>21</option>



```

<option>22</option>
<option>23</option>
<option>24</option>
<option>25</option>
<option>26</option>
<option>27</option>
<option>28</option>
<option>29</option>
<option>30</option>
<option>31</option>
</select></td>
</tr>
<tr>
<td colspan="3" align="left">Company Address</td>
<td><textarea name="adr" id="adr" data-bvalidator="minlength[6],required" ><?php
echo $_POST['adr'];?></textarea></td>
</tr>
<tr>
<td height="49" colspan="3" align="left">Locations</td>
<td><input type="text" name="location" id="location" data-
bvalidator="minlength[3],alpha,required" value="<?php echo $_POST['location'];?>"
/></td>
</tr>
<tr>
<td width="20%" height="50" align="center">&nbsp;</td>
<td width="5%" align="center">&nbsp;</td>
<td width="31%" align="center">&nbsp;</td>
<td align="left"><p class="button"><input type="submit" name="add_emp"
id="button" value="Submit" /></p></td>
</tr>
</table>

```

<p align="center">Already Submitted[Click Here]</p>

```
<?php
include("connection/db_con.php");
include("functions.php");
$nam=$_POST['nam'];
$sur=$_POST['sur'];
$pos=$_POST['pos'];
$rn=$_POST['rn'];
$rid=$_POST['rid'];
$dat=date('Y-m-d');
$cell=$_POST['cell'];
$dpt=$_POST['dpt'];
$prog=$_POST['prog'];
$co=$_POST['co'];
$y=$_POST['y'];
$d=$_POST['d'];
$m=$_POST['m'];
$sdatt=$y."-".$m."-".$d;
$adr=$_POST['adr'];
$loc=$_POST['location'];

$cel=trim(str_replace(" ","", $cell));
if(isset($_POST['add_emp'])){
////
if($y=="Y"){
message("Select year please");
}
if($m=="m"){
message("Select month please");
}
}
```



```

if($d=="d"){
    message("Select day please");
}
if($m=="02" && $d>29){
    message("Invalid day selected for the month of February");
}
if($m=="04" && $d>30){
    message("Invalid day selected for the month of April");
}
if($m=="06" && $d>30){
    message("Invalid day selected for the month of June");
}
if($m=="09" && $d>30){
    message("Invalid day selected for the month of September");
}
if($m=="11" && $d>30){
    message("Invalid day selected for the month of November");
}
if($sdat>$dat){
    message("Start dat cannot be a future date");
}
///
if(!preg_match("^[R]{1}[0-9]{4,6}[A-Z]{1}^", $m))
{
    message("Please enter valid Reg#,in the correct format e.g,R08621V");
}
if($dpt=="Select"){
    message("Select department please");
}
if(is_numeric($adr)){
    message("Address can not be numbers only");
}

```



```
}
```

```
validate_cell($cel);  
$find=mysql_query("select * from stud_req where rn='$rn'") or die(mysql_error());  
$snt=mysql_num_rows($find);  
if($snt==1){  
message("Student has already submitted details");  
}  
$status="send";  
$msg="Hie, ".$nam. " your request id for WRL Trip scheduling system is: [ ".$rid. "]  
keep it for future reference";  
mysql_query("insert into sms(msg,cell,status,fro) values('$msg','$cell','$status','$fro')")  
or die(mysql_error());  
mysql_query("insert into stud_req(nam,sur,cell,rn,rid,prog,co,adr,da,dpt,loc,sdat)  
values('$nam','$sur','$cel','$rn','$rid','$prog','$co','$adr','$dat','$dpt','$loc','$sdat')") or  
die(mysql_error());  
message("Student details have been captured successfully. An sms will be sent now.");  
}  
?>  
</form>  
</div>
```

❖ Logout

```
<? php
```

```
session_start();
```

```
include("functions.php");
```

```
session_destroy();
```

```
redirectto("index.php");
```

```
?>
```

