

WAREHOUSE DISTRIBUTION SYSTEM



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BY

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APPROVAL

This dissertation entitled Warehouse Distribution Management System by **Tafadzwa L. Mawoyo** meets the regulations governing the award of the Bachelor of Science Information Systems Honors Degree of the Midlands State University, and its contribution to knowledge and literal presentation.

Supervisor.....

Date...../...../.....

DECLARATION

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

Signature.....

Date...../...../.....

ABSTRACT

This documentation gives in detail how the designer introduced, planned, analyzed, designed and implemented the warehouse distribution management system at TMPnP (Thomas Miekles, Pick and Pay) supermarkets. The designer clearly explained the problem which the organization had that is of using the traditional system in managing their warehouse department. By using the traditional system it gave them disadvantages in recording goods and services received and also monitoring the movements of warehouse trucks. The objective of the designer was to enable the company to monitor their warehouse trucks, be able to record details about suppliers, allow the management to check status of the trucks and also to be able to record departments and employee names that would have been issued the assets. The researcher used MySQL(Sequential querying language) database, PHP and Microsoft Visio 2007 for hypothesis. In this document the researcher explains also how she implements the system and if the company is able to carry out the project financially and also if the project meets the requirements of the employees.

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First and foremost I would like to thank God for leading and guiding me throughout this project and the duration of this course. Without Him, none of this would have been possible. My deepest gratitude goes to my supervisor Ms Mugoniwa for providing guidance for the period of my dissertation compilation. And to my mum, sisters and Miss Y. Guruva, thank you for the abundant love and support they have given me, financially and morally.

DEDICATION

To the almighty God, my mum and sisters.

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LIST OF ACRONYMS

- CASE Computer Aided Software Engineering;
Computer Aided Systems Engineering (ITS)
- FS Feasibility Study
- RAM Random access memory
- IT Information technology
- TMSM Thomas Meikles super markets
- PnP Pick and Pay
- PHP Pre-hypertext processor
- MySQL Sequential querying language
- Hp Hewlett Packard
- H/W Hardware
- S/W Software
- ROI Return on investment
- NPV Net Present Value
- DFD Data flow diagram
- P2 Process 2
- SDLC System Development Life Cycle
- CPU Central Processing Unit
- EER Entity relationship diagram

- EERD Extended entity relationship diagram
- UML Unified Modeling Language
- SQA Software Quality Assurance

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CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

A warehouse management system is the art of operating warehouse and distribution system (Hompele et al, 2007). A warehouse distribution management is a computer program that assists the organization or company to perform warehouse tasks in a short space of time and consistently with fewer errors. It also builds a connection between the manufacturer and the buyer. Warehouse distribution management system is responsible for fulfilling the following use cases:

- Zero profits due to warehouse errors.
- Elimination of checking operations.
- Order shipment completion is improved by the use of warehouse distribution management system.
- Lead time for ordering is shortened and improved on-time delivery performance.
- Verification of shipping is carried out.
- Replenishment.

1.2 BACKGROUND

1.2.1 Background of organization

TM Supermarkets is part of the Thomas Miekles Africa Limited; it is a multi-million dollar organization with a wide range of interests in different firms or companies. Each of these companies has its own Chief Executive or Managing Director and its own organizational structure.

According to independent market research TM supermarkets is considered most foremost retail supermarket in the whole of Zimbabwe. TM Supermarkets has grown since March 1978 and is currently made up of 50 stores country wide that is branches in different locations. The stores they range from well-located retail segments to hyper supermarkets, the largest branches are in Harare the Borrowdale branch and Hyper in Bulawayo correspondingly. Pick n Pay of South Africa is also a 25% shareholder.

TM supermarkets has improved after merging with the PnP South Africa to for they were now sharing technical expertise and the provision of different products that are required from South Africa to tribute the country's range so as to meet the demands of the customers. Pick n pay shareholding has increased in TM Supermarkets to 49%.there are now Pick n Pay stores that were opened in Harare and they include the liquor, supermarket and clothing department. It adds up to an extensive in-house production of money from incomes that would be increasing, which will enable the re-building of other TM branches that already in existence and accumulation of new chances. Pre-tax profits of 2012 were lower than that of 2013 in the month of December by six fold.

TM supermarkets is now confident or optimistic due to the amazing presentation of the Chinhoyi, Kamfinsa and Westgate Pick n Pay which were re-built, which also led to the opening of the Masvingo Pick n Pay in 2014. These programs will accelerate substantially in 2014.

“Real Value Always”, this remains true for large organizations like the TM supermarkets, consumers are presented a familiarity in supplies that they can access a variety or collection of foodstuffs or provisions at viable prices. TM forever meets the customers' needs and expectations that is why most people or customers prefer TM supermarkets Zimbabwe.

1.2.2 Organizational structure

BRANCH LEVEL

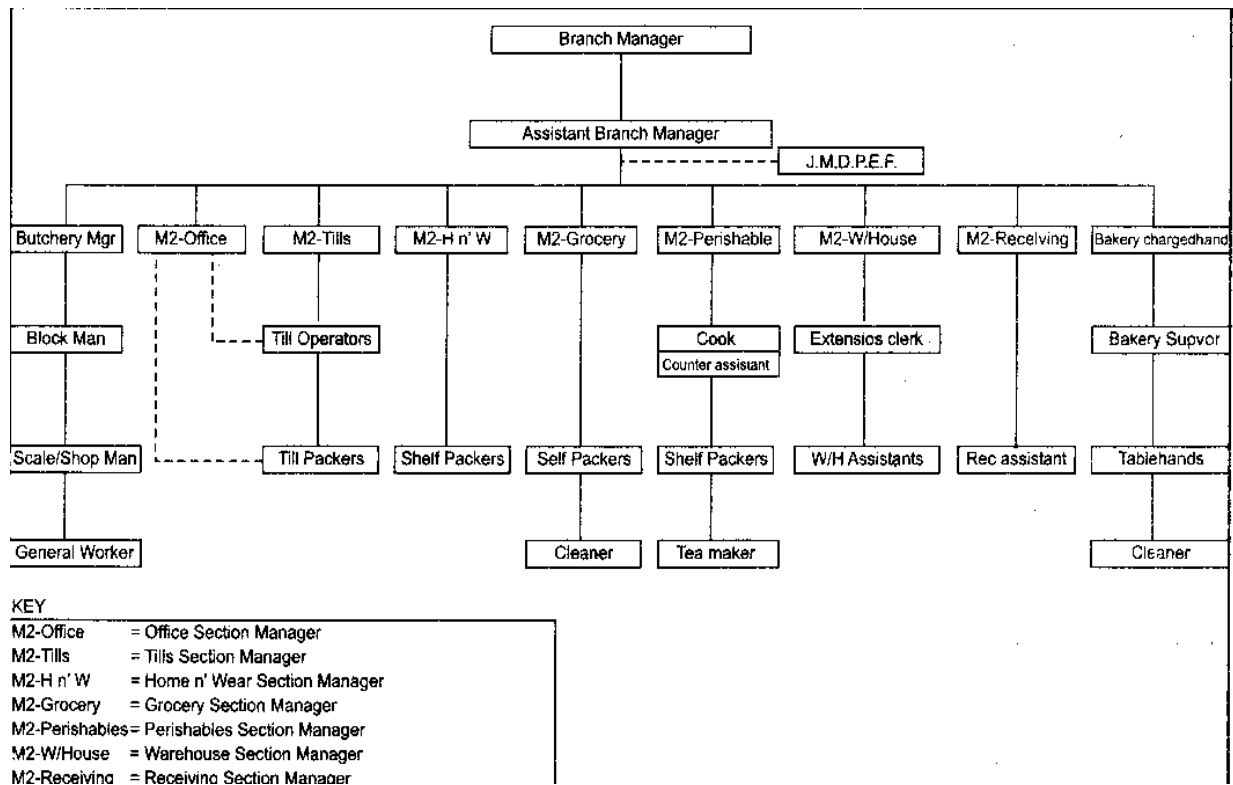


Fig 1.1 Organizational structure at branch level

Organizational level

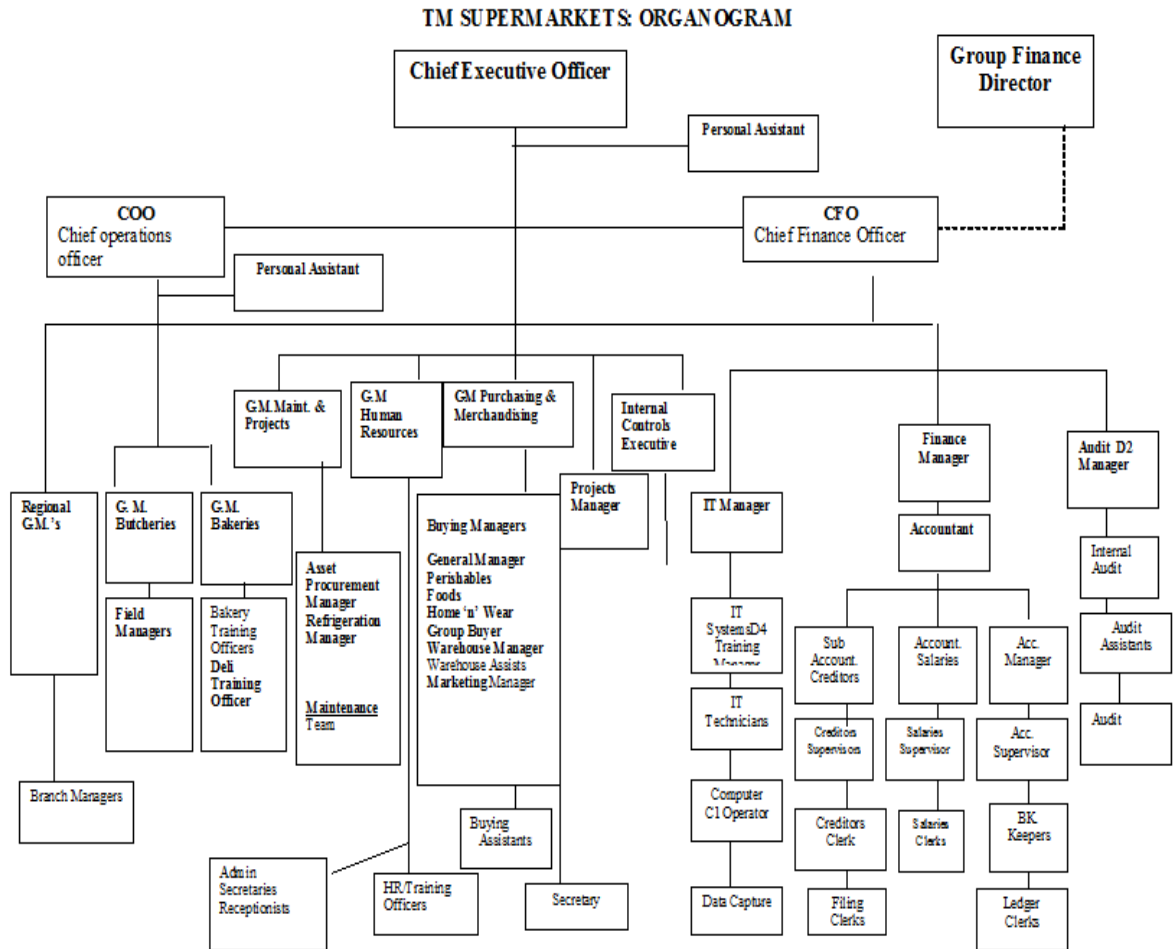


Fig 1.2 Organizational structure at organizational level

1.2.3 Vision

Being a retail of choice in Zimbabwe.

1.2.4 Mission statement

To optimize profit by selling the optimum amount of food and allied products including a range of Home and Wear in a controlled environment at competitive prices whilst creating a high degree of customer satisfaction by providing effective and friendly services in clean surroundings taking positive cognizance of the need to ensure that employee needs are satisfied.

The fundamental basis on which this Core Statement rest on is explained in the company's group declaration which outlines the company's commitment to its customers, its suppliers, its employees, its shareholders and the country at large.

Group declaration

i. To Customers

The most important asset in a group is its people. The group believes that the first task is fulfilling the needs of clients who utilize its products and services. In having fulfilled customer satisfaction all things has to be done of high value: prompt and efficiency of services; courtesy; accuracy full range availability and high standards of hygiene and housekeeping.

ii. To Suppliers

TM Supermarkets believes that suppliers must enjoy the same quality treatment and have the opportunity to make optimum profits.

iii. To the Employees

TM Supermarkets is liable to all employees; men and women who toil with the organization all over Zimbabwe. Whilst everyone is to be considered an individual each must feel part of the TMSM team.

1.3 PROBLEM DEFINITION

At TMPnP Supermarkets they do not use a distribution management system they only have the system that only records and keep track of stock that already exists and those that would have been bought. Without the warehouse distribution management system the company will waste time and resources having to travel in order to monitor their employees to see if there are any goods being stolen or goods that will not be having a high demand. With the warehouse distribution management system, it will provide a solid foundation for the operational system necessary to keep all employees connected to each other remotely and efficiently and also to keep track of products or services available and those not available.

1.4 AIM

The introduction of the proposed system to TMPnP Supermarkets so as to enhance competitive advantage over other companies in the IT industry. Reducing risks of theft, reducing a lot of paper work and it also helps the management to keep track of their branches' performance and also increase order fulfillment speed. The proposed system would make TMPnP gain market share and guarantee the correctness of each order that would have been made and diminish material costs by determining the right sized distribution pack.

1.5 OBJECTIVES

- The system should be able to capture items or goods into the warehouse and also make a register of the assets as allocated to relevant departments.
- The system should make a closer monitoring of the warehouse trucks in terms of recording their movements and also allowing use of them only when there is an order to transport.
- The system should produce adhoc and monthly reports for management, cost and marketing departments.
- The system will maintain an accurate update of movements of warehouse distribution trucks.
- Allow the checking of status of orders in real-time online.
- Having a view of shipment delivered and not yet at the impact of out-of-stock and insufficient fulfillment process.

1.6 HYPOTHESIS

- SQL server
- PHP Maker 5

- Microsoft Visio 2007
- MySQL database- a flexible and simple Rapid Application Development tool that is fast, easy and reliable to use.
- Microsoft Access 2008: A scalable and robust relational database system.
- Microsoft Access 2008 reports: these will be used for posting relevant depreciation and sock values to the costing and marketing departments.

1.7 JUSTIFICATION

The proposed system is to benefit the organization in the following ways that is if all objectives of the proposed system are all met:

- Expenditures of the company will be cut down due to the reduction of the use of paper and other traditional means.
- The system will enhance the time goods and services will be delivered to all the branches or from suppliers.
- The quality of information that would be delivered to the management and other personnel will be improved.
- The proposed system will be able to provide up-to date information about orders made and their status whether pending transportation or revoked.
- The improvement of security of the system therefore less fraud.
- The tools mentioned above which will be used in the development of the computerized system produce a user friendly interface thus simplifying and instilling happiness in users of the system.
- The proposed system will improve data consistence.

1.8 CONCLUSION

In the introduction phase the researcher clearly acknowledged and listed all the problems and objectives. The stage or phase that follows after the introduction is known as the planning phase which will further on show if the project is feasible and also to have a work plan.

CHAPTER 2: PLANNING PHASE

2.1 INTRODUCTION

Planning phase is when a company or organization as a whole is involved in defining the solution in detail how to build, what to build and who will be building the system (Rosenblatt,2003). The planning phase chapter gives an insight to aspects of the proposed system, these aspects include: the investment appraisal techniques, estimated time for carrying out activities and the system's feasibility study of the which will be carried out including economic feasibility study of the system that will be carried out which includes: economic, technical, operational and social feasibility. The chapter will also look at the business value of the planned system which will then justify the reason system would have been implemented. The chapter will also analyze whether it is worthwhile for the organization to proceed with the project or not and this should be understood well before proceeding with the project which is to enable the organization to be able to manage cost, time, change and risks.

2.2 WHY BUILD THE SYSTEM

The main reason why the system is being built is because there is too much work for the TMPnP branches. Those that work in the warehouse departments had to use a lot of paper work and also the management had to visit all the branches to ensure that all the goods and services are being utilized as agreed and delivered in time. With the implementation of the proposed system there will be reduction in costs of travelling country wide in order to monitor all warehouses of different branches in Zimbabwe. The management will have a clear picture of how the goods and services are being distributed and if they are being distributed in time. The introduction of the system will also limit frauds and theft from employees, the lead time will be reduced too, that is goods will be delivered in time and will reduce time for the warehouse employees as there will be limited paper work.

2.3 BUSINESS VALUE

“Business is one output of the collection of processes through which business today try to maximize the age-old equation of profit equals revenue minus expenses” (Harris et al, 2008).

When looking at the business value, this relates to the gains that contribute to the overall functionality of the system to the organization. In researching to assess the business value to be gained by the organization from using the proposed system that the researcher came up with the following business value benefits:

- The organization will reduce costs due to minimizing of movements to branches in order to monitor them closely.
- Customer satisfaction as all products and services will be provided and distributed in time before branches run out of stock.
- The employees will be motivated and more active for there will be less paper work and the warehouse’ system will be more secure.
- There will be a reduction in the abuse of or unauthorized use of distribution vehicles for the system will be monitoring by recording if the trucks or vehicle is distributing goods or not.
- There will be reduction of goods not distributed or unrecovered stocks not accounted for.
- There will be also timely and dependable reports that will enhance the decision making process.

2.4 FEASIBILITY STUDY

Feasibility is preliminary investigations into the potential benefits that are associated with taking a project or a certain activity (Jones, 1998). The procedures for preparing a feasibility study are fundamental in character which can also be useful to any project whether it is for software or systems improvement (Bryce, 2008).

At this stage it ascertains whether the organization has the capacity to support the project in terms of technical requirements, economic requirement, stakeholders support. (Banks, 2007) indicate that the feasibility stage includes the organizational system that is current, including policies, users and functions.

2.4.1 Technical feasibility

Investor should have the requisite of technically competent people as well as technology required to set and run the plant (El-sharkawy, 2005). The technical feasibility study identifies whether the organization has the required expertise in terms of computer literacy, appreciation of the use of technology on the part of the end users of the system (William et al, 2006). And also if there are developers that will be able to develop the proposed system. Also technical feasibility looks at whether the organization has the required software and hardware of the project and if they have the required infrastructure for the project to be carried out.

Technical Feasibility depends on the following:

- The availability of technical skills within the organization.
- Performance that is adequate to meet the specifications.
- Availability of hardware and software required.

Technical expertise

- **Users (TMPnP):** most of the TMPnP system users are computer literate making it easier for them to execute their tasks without complications.
- **Maintenance:** The organization has young and vibrant maintenance team which will be able to maintain the system therefore reducing costs.
- **Developers:** the organization's developers have adequate qualifications and are more familiar with most of the design tools.

2.4.1.1 Hardware and infrastructure requirements

In order for the project to succeed there will be need for upgrade and addition of hardware and software. The requirements are as follows:

Hardware requirements:

Quantity	Item	Specification
1	Hub	16 port
6	Ports	12 USB Ports
2	Hp Backup Server	2GB RAM Pentium 4 Processor 250GB Hard Drive (Swappable)
2	Hp Client Server	3GB DDR RAM 3.2 GHz Speed 40 GB Hard Drive(Swappable)
2	Display	17 inch monitor
2	Color Printer	Hewlett Packard

Table 2.1 Hardware requirements

Software Requirements

Software	Version required	Software available
Apache		None
Office Visio	2007	None
Dreamweaver	2008	None
Nod32 anti-virus	2013	Available
MySQL	2005	Available

Table 2.2 Software requirement

2.4.2 Economic Feasibility

According to (Tylor, 2008) when a system is economic feasible if the benefits of the system outweigh the estimated costs involved in the development, operating and installing. Economic feasibility is defined as the determination whether the project's predicted benefits outweigh the expenses and duration needed to obtain the benefits. The economic feasibility stage is when the proposed costs of the new system are compared with the available budget which the organization would have set aside for the project. It tries to show if the project can be successfully completed within the budget.

In accounting (Lucey, 2000) defines a cost as the expenditure incurred on a specified activity for example in the development of the proposed system. There are different types of costs; generally costs are a sacrifice of resources they include fixed costs, indirect costs, direct costs and variable costs.

Fig 2.3 Income and expenditure

YEAR	2012	2013	2014
Benefits	US\$	US\$	US\$
Goodwill	300	100	400
Estimated services in figures	100	350	400
Reduced paperwork	50	50	200
Total Benefits	450	500	1000
Development Costs			
Technical Labor	40	0	0
Supplementary hardware	50	0	0
Software licenses	50	0	0
User teaching	10	0	0
Total Development Costs	150	0	0
Operational Costs			
H/W Maintenance	300	40	60
S/W Maintenance	400	70	90
Stationery	150	40	55
Other Costs	150	70	100
Total	950	210	265
Total Costs	750	210	265
Total Benefits	450	500	1000
Profit/Loss	(50)	290	735

Year	Project (\$m)
0	-750
1	450
2	500
3	1000

Table 2.3 Calculations for Payback period

a.) Net Profit= Total Benefit – Total Costs

$$= (450 + 500 + 100) - 750$$

$$= \text{US\$ } 1200$$

b.) Pay Back Period

It is one of the capital expenditure methods which outlay that the sooner the project is covered by the cash inflow the better (Randall, 2003).

Year	Cash flow	Cash flows
1	(750)	(750)
2	450	(300)
3	500	-

Table 2.4 payback period

$$300/500 * 12 = 7.2$$

Therefore to recover the initial investment US\$750, it will require the whole cashflow of year 1 that is US\$450 + 8/12 = \$780.3 it will take 1 year and 7 months.

c.) Return on Investment = (Average Annual Profit / Total Investment) x 100%

The Return on Investment also known as the Accounting rate of return cost is compared with the monetary worth of the outcome for the course, articulated as a percentage (Phillips, 2003). The formula is:

$$\text{ROI} = (\text{Average annual Profit} / \text{Total Investment}) \times 100\%$$

$$\text{Total Annual Profit} = \text{US\$1950} - \$750$$

$$= \text{US \$1200}$$

$$\text{Total Average Annual Profit} = \text{US\$1200} / 3$$

$$= \text{US\$400}$$

$$\text{Therefore Return On Investment} = 400 / 750 \times 100\%$$

$$= 53.3\%$$

d.) Net Present Value based on a discount factor of 50%:

It states that the time value of money recognizes that a 10 dollars received today is worth more than the 10 dollars received in a year's time (Randall, 1996).

$$\text{Discount Factor} = 1 / (1+r)^t; \text{ where } r = \text{Discount rate and } t = \text{time}$$

$$\text{Present Value} = \text{Value in Year} \times \text{Discount Factor}$$

$$\text{Net Present Value} = \text{Total of Present Values}$$

Year	Value in Year (US\$)	Discount Factor	Present Value (US\$)
0	-750	1	-750
1	450	0.6667	30.0015
2	500	0.4444	220.220
3	1000	0.2963	290.630
Net Present Value			60.852

Table 2.5 Net present value

Overview of Economic Feasibility

The project is economically feasible for after working with the budgetary allocations, and the project being able to fund itself back within the anticipated time frame.

2.4.2.1 Risk Analysis

“Risk is the variation of future expectations around an expected value” (El-sharkawy, 2005). In this section the researcher is going to outline the risks that are involved or that are likely to occur, assess the risks and then coming up with a solution on how to avoid them while monitoring situation that may lead to the risks. Management of risks is crucial for the developer for they can interrupt the development, raise project expenditure and may cause the neglecting of the project.

a. Economic risks

The project might face risks in that maybe the company might face or incur losses during the period of the development of the system, this may cause delays in the designing of the system. Software and hardware prices change with time, the prices may increase rapidly making the project difficult to undertake.

b. Technical risks

The end users of the warehouse distribution management system should be at least computer literate, and looking at the current system some employees has an idea of how to use some of the hardware and software. The developer tends to face some risks for the employees with little knowledge about using the system would need a lot of training.

c. Other risks

Users are not willing to contribute towards the new system; this is mainly caused by resistance to change. However the researcher had to inform the users to cooperate in the contribution of ideas about the system and clearly explaining how the implementation of the system can be of an advantage to their organization.

2.4.3 Social Feasibility

TMPnP has been environment conscious and friendly in order to meet the demands of the customers. The social feasibility involves interviewing employees, management, customers and the warehouse and main gate staff. The main aim of the social feasibility is to evaluate how the project is likely to impact on the organization's stakeholders.

IT Personnel – the IT tem are very vibrant and would want to prove that they can be of great benefit to the organization and thereby controlling the financial situation in the organization.

Employees - the successful deployment of the proposed system is going to increase morale among the employees. The upgrading of the system was seen as long overdue for the employees. The current system led to low morale on the employees because of the existing pressure.

Finance department- the project's objective is to convert the current system into a fully computerized system. The system that can be stored modified and backed up, the warehouse and main gate staff had to work extra hours so as to reconcile month end cost figures.

2.4.4 Operational Feasibility

Operational feasibility is a process where the developer observes if there will be any human resources existing for the project and it involves the decision whether the system will be used and operate once it has been installed (Kendall, 2006). If the end users or employees of the TMPnP are rooted to the current system, making them adapt to the new system will be difficult and also making effective change in order for the system to operate will not be impossible. At TMPnP the technical staff that is the project manager up to end users are available and they meet the project requirements. On the other hand, if the end users are in need of the system then the developer will have a high possibility of making the system operational.

2.5 WORK PLAN

Activity	Duration(<i>weeks</i>)	From	To
Project Proposal	1	06/02/14	12/02/14
Planning	1	13/02/14	19/02/14
Analysis	2	20/02/14	06/03/14
Design	2	07/03/14	20/04/14
Coding	1	21/04/14	27/04/14
Testing	1	28/04/14	04/05/14
Implementation	2	05/05/14	19/05/14
Maintenance	1	20/05/14	27/05/14

**Table 2.6 Work Plan
Gantt Chart**

The chart in fig 2.1 below shows the activities and their duration.

Activity/Period	1	2	3	4	5	6	7	8	9	10
Proposal										
Planning										
Analysis										
Design										
Implementation										
Evaluation										
Documentation										

Fig 2.1 Gantt Chart

2.6 CONCLUSION

Planning phase gave an insight on knowing what is required from the system and how the project has to be achieved. Financial and technical resources were discussed on how to allocate to the project or proposed system. If any other issues or things come up which will be beyond the project's scope, the same planning procedures will be taken. According to the results the project is quite feasible as well as the time frame.

CHAPTER 3: ANALYSIS PHASE

3.1 INTRODUCTION

The main aim of the analysis phase is to offer a clear insight of how the current system operates, and also how it is to be incorporated into the proposed solution. Its purpose is to establish what the analyst must do or know on the work and to ascertain training needs. The analysis phase is achieved by identifying system requirement and, by conducting a requirements analysis. When doing systems analysis there are steps that are carried out in order for the researcher to be able to develop a high quality information system. Also to achieve a satisfactory level of understanding, one has to do some fact-finding activities that would help in determining the requirements, eventually leading to requirements analysis.

3.2 INFORMATION GATHERING METHODOLOGIES

Data collection is whereby a researcher captures and gathers all data necessary to complete the processing of transaction (Stair and Reynolds, 2012). It is a systematic gathering of data for a particular purpose and in this research the researcher is gathering for a purpose so that she has a clear understanding of the current system so as to be able to proceed with the designing of the proposed system. The information is gathered from various sources including interviews, existing records, observations and questionnaires. Information is raw information that would be transformed in to output that is valuable to users (Resenblatt, 2006). Information gathering is essential so as to have understanding of the current system which leads to system determination. In order for the researcher to gather or compile useful information, the following fact-finding techniques were employed:

(i) **Questionnaire**

A questionnaire is an arrangement of the uniqueness of the system mechanism required to set the logical design into accomplishment (Pawar, 2004). The personnel were given questionnaires at TMPnP warehouse, the intention was to get some sample into the current system from the users' judgment and a period or time was placed by the researcher for the surrender of questionnaires.

Advantages

- It was easier to coordinate and accomplish as there was no personal monitoring.
- Questionnaires were distributed to many respondents con-currently thereby saving time.
- The improvement of possible authentic responses, by maintenance of secrecy and this left no chance for intimidation by the remaining staff or worker.
- Respondents concluded their questionnaires at their ease for they had time to study, revisit and understand the questions before they could answer and this enabled them to provide all-inclusive answers.
- Questionnaires are inexpensive to carry out.
- Responses can be analyzed swiftly.

Drawbacks

- The researcher cannot be certain of the employees given the questionnaires if they would attend all asked questions for some can come back unanswered.
- Responses of questionnaires were not instant thereby making them time consuming.
- Some people may answer some questions unwillingly as they will be reluctant to be assigned tasks.

(ii) **Interviews**

Interviews were done in order for the researcher to be able to gather information about the organization and on what the employees or management thinks about the changing or introduction of another system. The researcher had to interview some of the employees even the shop floor workers in order to hear their views on what they think about the existing system or the changes they might want on the existing system. Interviews helped to give an insight on how the warehouse system functions and also to identify the weakness of the existing system. By carrying out the interviews it helped the researcher to quickly get information from the employees.

Advantages

- With interviews the researcher will have an advantage of getting immediate response.
- The interviewee might not talk or answer a lot but his or her actions can answer some questions that is non-verbal communication.
- The interviewer will have a clear view of what the interviewee is trying to explain or point out.
- Interviews guarantee greater accuracy of information that would have been acquired.
- The interviews also motivate the general people or employees in that they will be able to air their views.
- It is also flexible since the interviewer can adjust or change the way of asking questions.

Disadvantages

- Interviews can be time consuming.
- Some interviewees can be hesitant to provide information.
- Data that is obtained can be subjective towards views of the interviewee.

(iii) **Observations**

This data collection method helped the researcher to examine the duties or operations that take place at the organization's warehouse department and how they carry out the activities.

Advantages

- Information gathering for the observer is easy to deduce.
- Gives a better picture and understanding on how the system works or operates.
- Reduces bias on the view of how the system works for there will be a personal view on how the system works.

- Observation improves the accuracy of research results.
- They are also matching with other approaches.

Disadvantages

- In observation people tend to be extremely careful of how they act for they will know they are being observed which also leads to the employees being observed not portraying the real situation.

3.3 ANALYSIS OF EXISTING SYSTEM

This is when the researcher investigates how the existing system functions and operates. The researcher will explain how or describe how the organization's warehouse system which is currently in place works.

Inputs

- All delivery information are in the marketing department.
- Employee details.
- The delivery information that is obtained from the marketing and buying department.
- Customer's information which is also obtained from the buying and marketing department.

Processes

- Delivering goods to customers.
- Trucks reception.
- The capturing of details that include verification.
- The checking of quality of goods and services received.

Outputs

- Consumer list report.
- Statement for trucks.
- Delivered and undelivered stock reports.
- Consumer details reports.

3.3.1 Description of current system

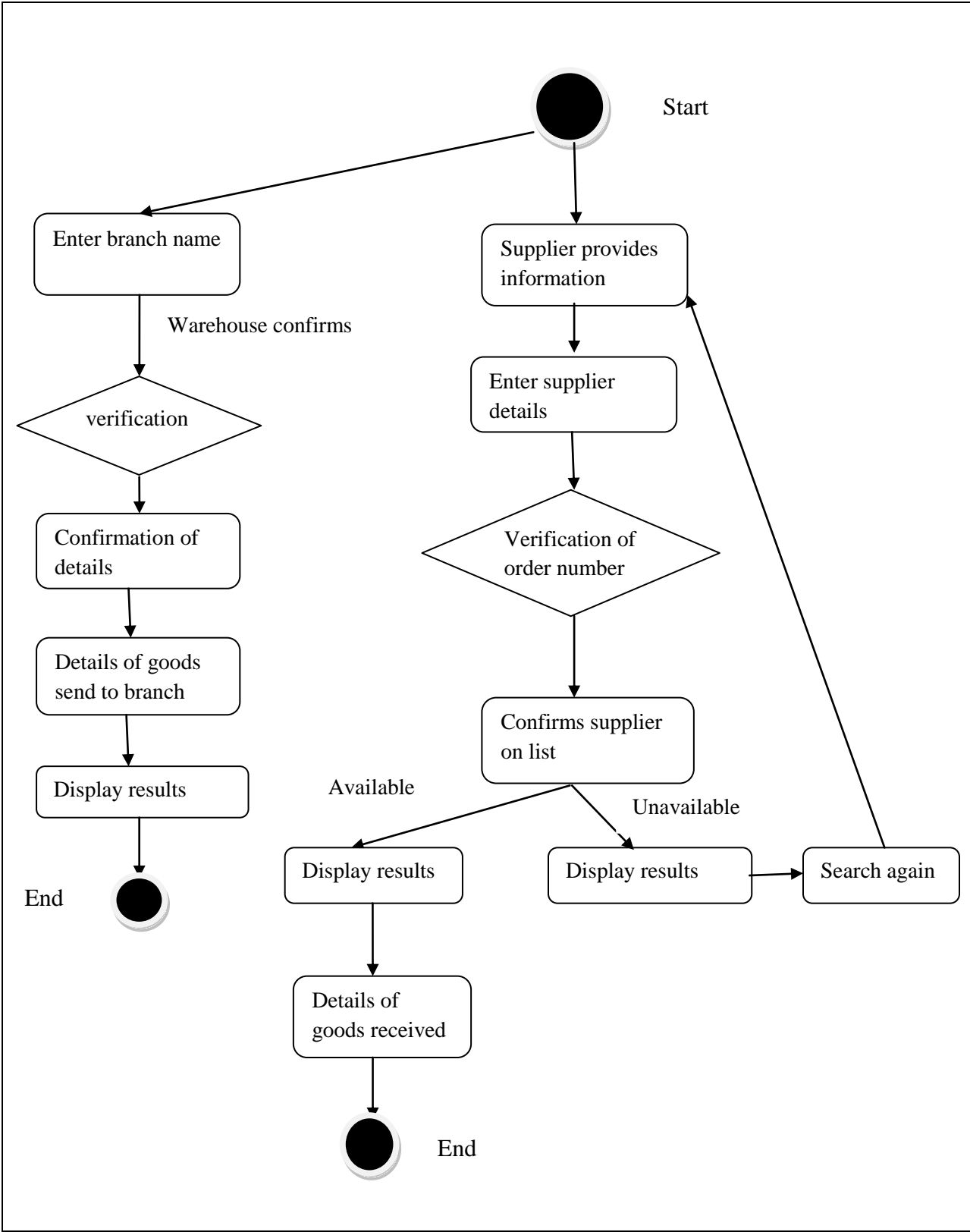
Currently the organization is using the manual system and does not yet have the warehouse distribution management system which is computerized. They only keep track of stock available and it does not keep track of the goods being sent to branches or customers and those that will still be in transit. The company or organization's suppliers are those that are only known by the buying department and marketing department. When a supplier delivers goods and services to the organization's warehouse they only record what the supplier would have brought in and sometimes the suppliers would not meet deadlines as agreed between the supplier and the marketing and buying department. Also, the warehouse provides some transportation of goods for customer at a certain fee, which leads to the trucks depreciating. When the head office warehouse wants to distribute goods and services to branches they will have to confirm with the branch if they still have the products or goods in stock. All the information about the trucks that would have entered and those in use for customers are recorded in the warehouse books.

3.4 PROCESS ANALYSIS

A process is defined as related tasks that are logically performed in order to achieve a defined outcome (Stair and Raynolds, 2012). With process analysis they are phases that take place in order to convey inputs, processes and outputs. It brings an understanding to the users even developers on how the processes operate and to also determine improvements in processes.

3.4.1 Activity Diagram of current system

An activity diagram has some similarities with the data flow diagram in its features, activities, flows and data stores. An activity in the activity diagram is represented by a cornered rectangle, flows of action between different activities are represented with arrows and if they branch they are shown by a horizontal line with details on it, objects are represented with cornered boxes and the data flow shown by dashed arrows. There is also the black circle represents the final state of the diagram and the diamond that represents a result that proceeds in one way or another (Sarknas, 2006).



Key:



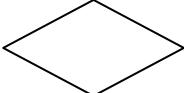

	Activity
	Beginning or end state
	Decision
	Flows

Fig. 3.1 Activity Diagram

3.5 DATA ANALYSIS

Data can be raw facts or are the system' raw materials (Singh, 2007). Data analysis is the processing of data that is the procedure of creating different shortened and extracted worth from collected data (Berthold et al, 2003). In data analysis the researcher will be manipulating the data that she would have collected which will then later help the development team which will be participating in the analysis of the system so that they can use the data.

3.5.1 Context Diagram

The context diagram shows the interaction between the system concern and its environment, it usually is presented in layered view showing which layer is within the project scope and which are not in the project scope (Clements et al, 2003). A context diagram does not show the architectural details of an entity and it also does not show temporal information such as dataflow.

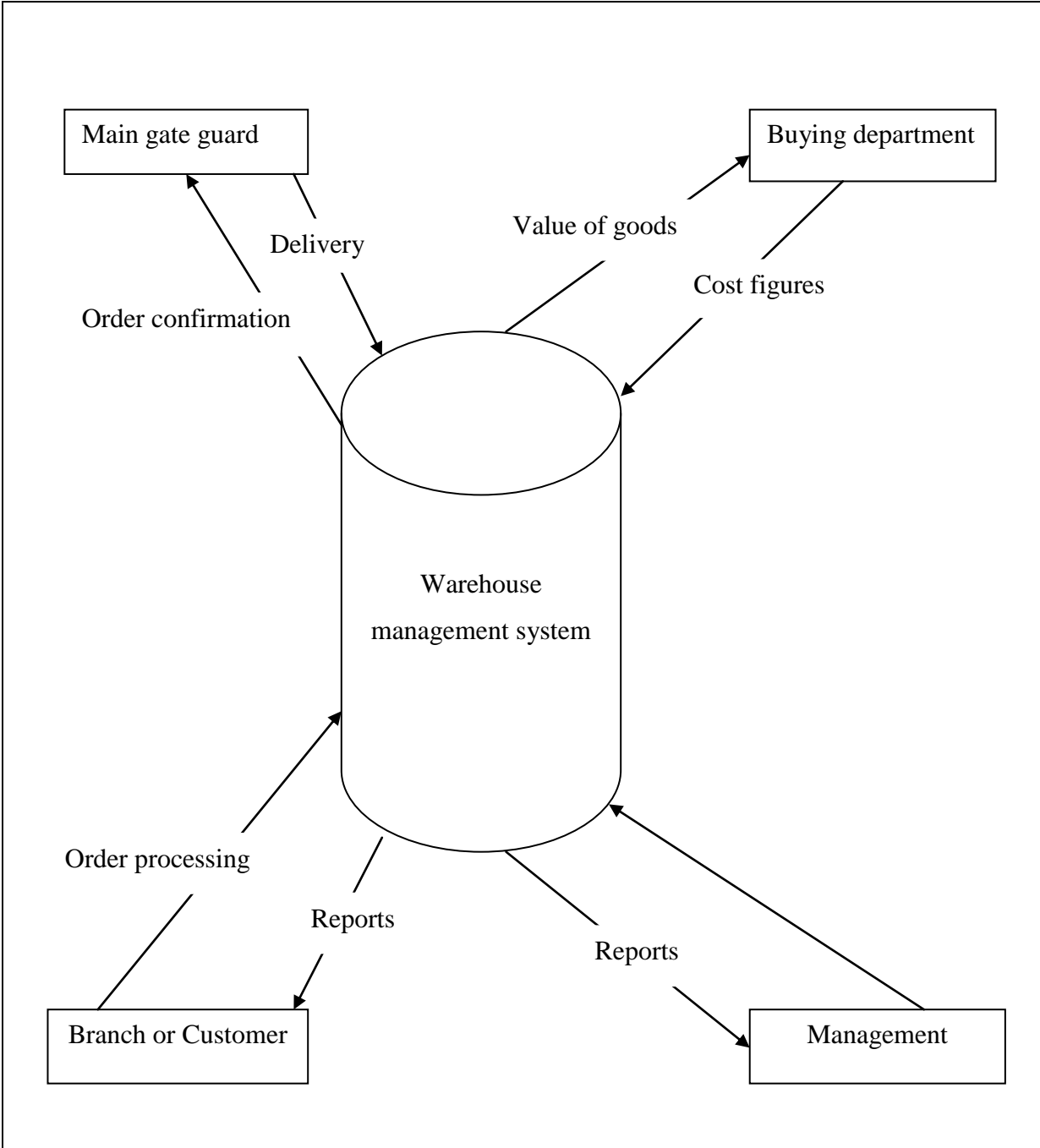


Fig 3.2 Context diagram of existing system

3.5.2 (DFD) Data Flow Diagram

A data flow diagram accomplishes the activity model, model object, associations and activities by describing how data can flow between and around various objects (Stair and Reynolds, 2012). (Berthold et al, 2003) defines a data flow diagram as a pictorial representation of system with a view to display the flow of data within a system and is used in structured systems analysis and design methodology. A data flow diagram describes activities to be done or accomplished by a business task and it shows logical sequences of activities, associations, external entities, data stores, processes and data flow. It has symbols that are primarily used which are:

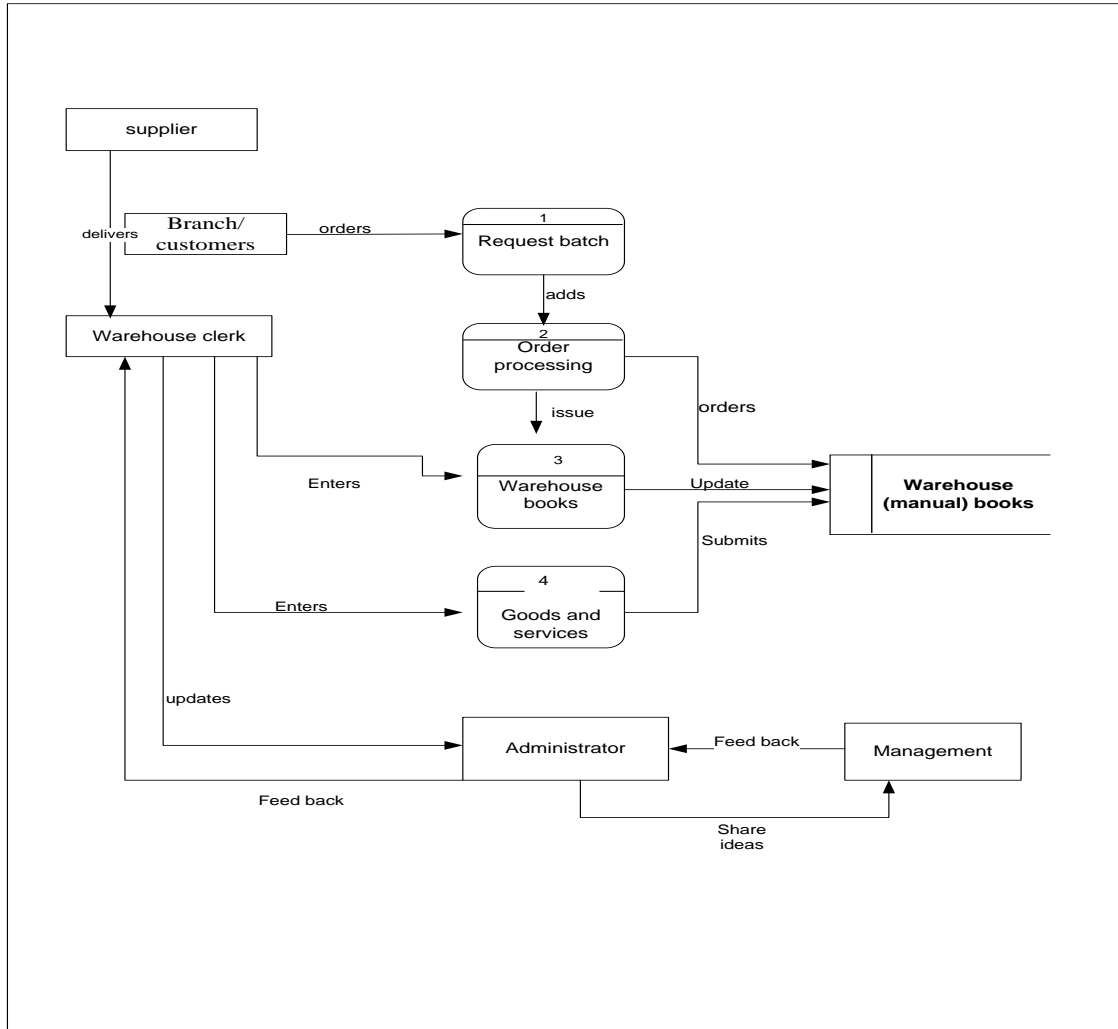
Data store- it represents the storage location of data it can be manual or computerized.

Entity- the symbol shows the source or destination of the data.

Data flow- these are represented by arrows, they show the direction of data element movement.

Process- it shows the function performed for example printing a report.

The table below shows the symbols that are used in the data flow diagram:



Key:



Process



Data store



Entity



Data Flow

Fig 3.3 Data flow diagram

3.6 WEAKNESSES OF CURRENT SYSTEM

By using a manual system the employees in the warehouse department will have a lot of paper work and work load. The organization's trucks tend to depreciate because of misuse for there will be no close monitoring on what time and how long a warehouse truck should take in distributing goods and services. The current system gives room for theft and fraud, as there will be no close monitoring of trucks employees may steal. The main gate guards may be bribed in order for them to do certain tasks for the suppliers or even customers from outside the organization or within the organization. This will also lead in the organization having expenses, and having to purchase goods that are not on demand. Current system also lacks efficiency since information required cannot always be available.

3.7 EVALUATE ALTERNATIVES

The researcher weighed the alternatives that were available for the development of the proposed system and the process assists the organization to choose the best alternative. When choosing the best alternative the organization should minimize development costs. Below are alternatives that exist:

3.7.1 Outsourcing

Outsourcing refers to the contracting out or hiring professionals from outside the organization in order to meet the in-house needs of the company by transferring their activities to a third party (Singh, 2007). In this alternatives there will be the use of external agencies to generate, develop, control and sustain the system and also they will provide the company with information related services.

Reasons why the organization might outsource:

- Strategic focus.
- Market forces.
- Economies of scale.
- Technical considerations.

Advantages of outsourcing:

- Outsourcing enables the organization to concentrate more on important business activities of the company.
- The delivering and developing of the system is on the vendor not the organization.
- Helps the organization to have a competitive advantage if they use reputable outsourcing vendors that may provide state of art technologies.

Disadvantages of outsourcing:

- Training costs will be increased for the users will need training by the developers.
- Also the preservation of the proposed system will not be easy for the IT personnel is unfamiliar with the tool used by the outsourcing vendor.

3.7.2 Improvement

This is when the problems that are being currently faced by the organization are explored and also then finding ways or means in how to improve the system. There can be minimal conflict to change because the employees will be familiar with the system. The alternative also however has its drawbacks which are:

- Its time consuming for it takes time to implement such a program and also redesigning will involve a lot of interviews with the stakeholders.
- The current system is slow.
- Operating costs will increase as there will be the redesigning of the system.

Therefore basing on the results the researcher concluded that it is not the recommended option.

3.7.3 In-house Development

TMPnP can create its own system which will be able to answer problems they will be facing with the in their organization rather than to buy already made software which might in turn not meet the company's needs. The reasons why the system should use the in-house development alternative is:

- There will be no possible transfer of assets.
- The system which would have been developed will have room for expansion as there will be changes in technology.
- Implementation costs are less.
- The organization's long term goals will be met.
- Reduction in man power due to smaller tasks that could possibly be integrated into the system.
- Reports will be easier to produce making delivery more efficient.
- The use of resources will be maximized.
- The organization can assume ownership of the system for the system will be meeting their requirements that would have been built-in during the system development.

3.8 REQUIREMENTS ANALYSIS

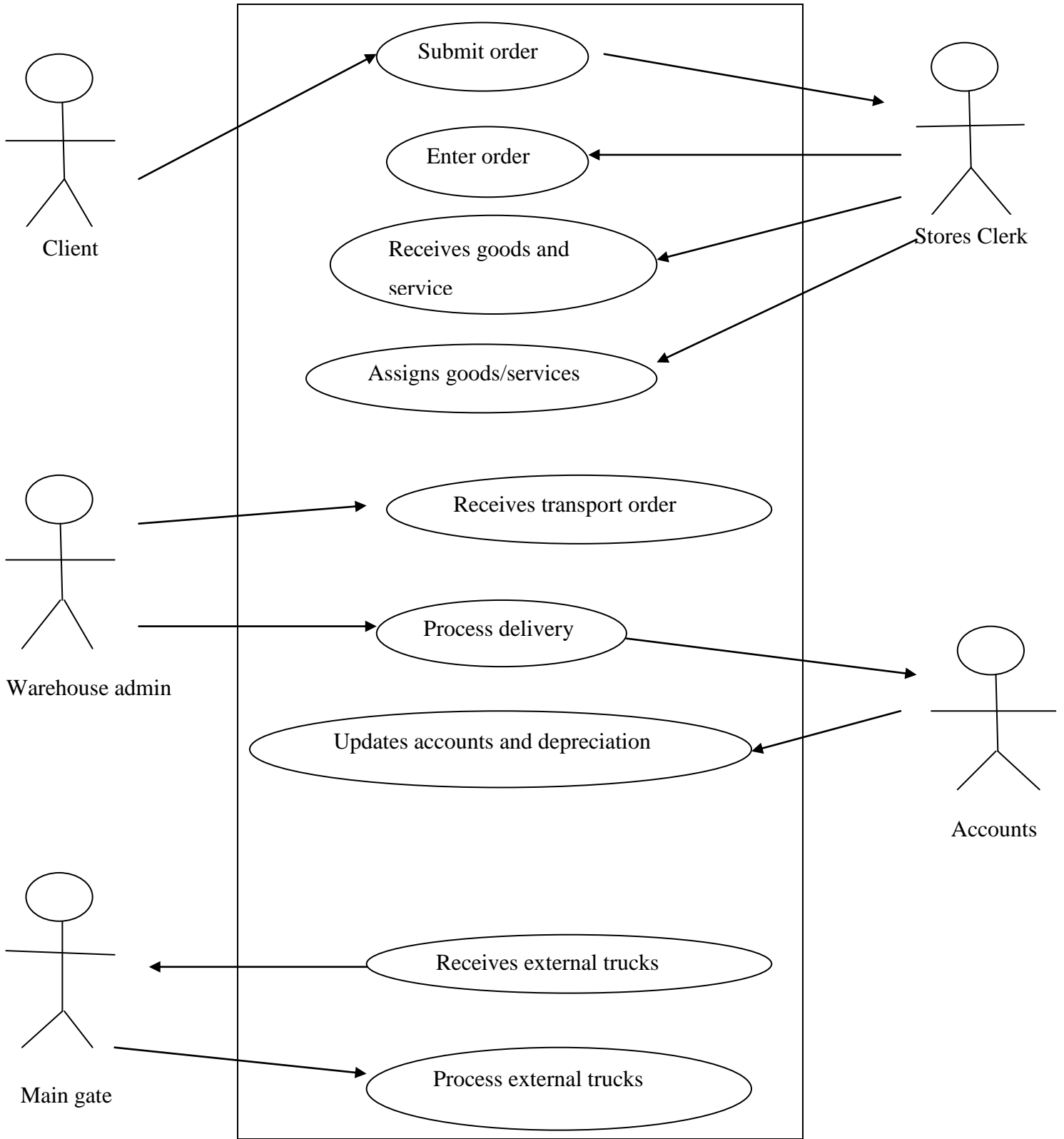
The requirements analysis is very important stage because client's requirements are noted and dealt with. If the analysis is not done well the software solution would need to be corrected in future. The requirements analysis has two types which are functional requirements and non-functional requirements.

3.8.1 Functional Requirements

Functional requirements are the capabilities that the system can perform. And they are as follows:

- Allowing verification of data before being entered into the system that is verification and validation
- There will be use of passwords for the users who would want to use the system.
- There will be the use of query processing to enable order status.
- There is real time data capturing.
- For faster transaction processing the use of a client server is there to meet demand.
- The use of transaction history in order to have up-to-date and correct monthly reports.
- Reports generation modules for production of timely reports on status of vehicles or trucks, stocks on hand and that which will not be in stock that may need to be purchased.

Use Case diagram



Key

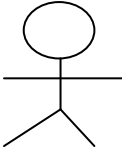

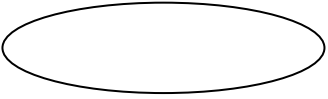
	Actor
	Communication of actor and use case
	Description of how user interact with the system

Fig 3.4 Use case diagram

3.8.4 Non-functional requirements

These are requirements which have not been covered by functional requirements specifying their criteria. The non-functional requirements are as follows:

- Users who would want to log into the system there should an authentication.
- The system should also give a solution that is understood by the end users.
- Error recovery should be allowed.
- The system should be easier to work with, user friendly and the interface should be self explanatory.
- The system should always be up-to-date leaving room for other solutions that would have been introduced.

3.9 CONCLUSION

The chapter clearly explained the functional and non-functional requirements of the system and description of the system. All alternatives were considered and the use of an in-house alternative was the best for the TMPnP organization. Therefore the researcher can now proceed to the next phase which is the design phase of the system.

CHAPTER 4: DESIGN PHASE

4.1 INTRODUCTION

The design phase follows after the analysis phase, in this stage the researcher or developer will be giving explanations on how the proposed system will be working or functioning. It gives an overview of the physical design, database design, program design and the architecture design. In the design phase the developer or designer will construct Data flow diagram, Entity relationship diagrams and context diagram of the proposed system. The designing of the system will be based on the outcomes of the analysis phase.

4.2 SYSTEM DESIGN

A system is a structured association among operating units or components and its intended to achieved one or more objectives for example interaction, organization or interdependence (Gupta, 2012). TMPnP's management agreed in using the in-house development alternative then the transition to the system phase as design begins. The goal of system design is to build a system that is effective, reliable that is handling errors for example input and processing errors and maintainable- meaning that the system should be well developed, flexible and should be developed in order to allow future modifications(Rosenblatt et al, 2009). The system design is made effective if the system meets the defined requirements and constraints that would have been addressed in the analysis phase.

Description of the system

The proposed system is there to meet the user requirements and specifications. TMPnP's current system is exposed to a lot of threats due to the manual system and lot of paper work. The proposed system to be designed is to enable the warehouse department and other department linked to the warehouse department to record their supplier's data and also to enable to keep track of trucks that distribute goods and services to customers and its own

branches. TMPnP will be able to monitor the goods issued to branches and goods received from suppliers. The warehouse distribution management system will allow managers to view reports on what the suppliers would have delivered and the movement of stock in branches and the warehouse. The organization will also be able to gain insights on which products need to be ordered or those which are out of stock.

Below are the systems' inputs, processes and outputs of the proposed system:

System inputs

- All new users are created by the administrator, and all the users have different view.
- Suppliers' details are entered by the clerk.
- New assets, new products, registering of trucks details are also entered by the clerk.
- The cost, depreciation and price figures are fed into the system by the management to price the products, have a financial credit for depreciation and the rate of delivering the goods.

System processes

Processing is converting or transforming or changing raw data into meaningful information that humans can understand. Processes involve calculations, comparing data, storing data for future use and taking alternative actions (Stair et al, 2012).

- Registering assets.
- Transportation of goods and services, the clerk will have to check if the trucks are available and also if there are any drivers available to transport the goods.
- If a truck is registered then it immediately is put on the waiting list as available.
- All products, services and assets when purchased or received they are recorded as warehouse stocks and when products are dispatched then an update is done in the system.

System Outputs

This is when a system produces meaningful processed data in the form of reports and documents for example reports for managers (Raynolds et al, 2012). As expected in most systems outputs are used with different people in the organization or stakeholders and the outputs of the proposed system are listed as follows:

- Reports for management, the proposed system is supposed to produce monthly reports on the transactions made that is trucks' use for transportation of goods, goods received by the warehouse department and also goods or services distributed to branches by the warehouse.

4.2.1 Context Diagram and DFD of the proposed System

A context diagram is constructed first before constructing a data flow diagram. A context diagram is defined as the most abstract data flow representation of a system, it represents the entire system as a bubble (Mall, 2009). It captures and establishes the context of the system that is who are the users of the system, what data do they input to the system and the data they received by the system.

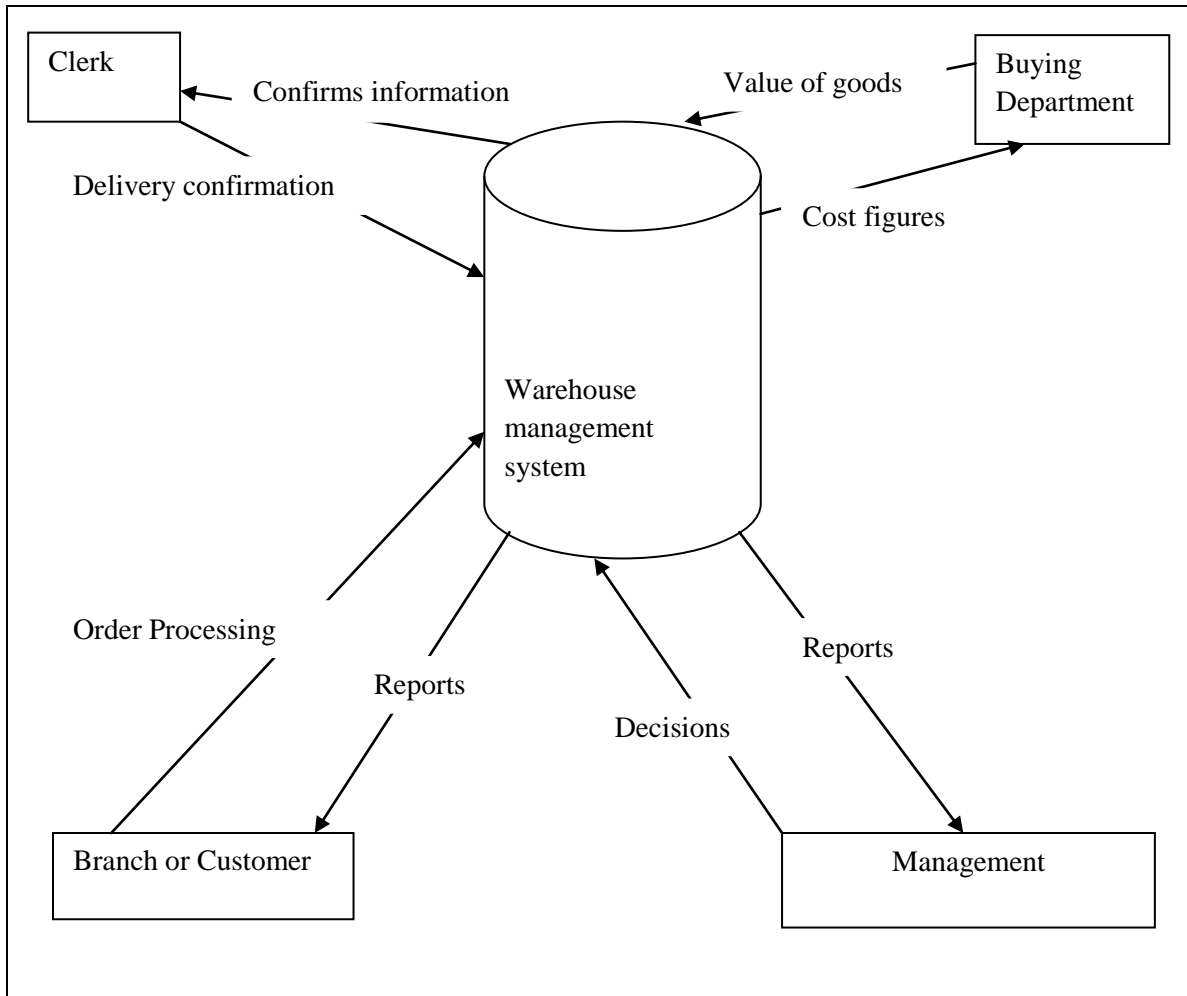


Fig4.1 – Context diagram of the proposed system

Data Flow Diagram of the proposed system

A DFD is a tool used to illustrate the movement of raw facts through the system and the processes carried out by the system (Gupta, 2012). A data flow diagram consists of data stores, entities, processes and data flows which are symbolized as illustrated in the key below:

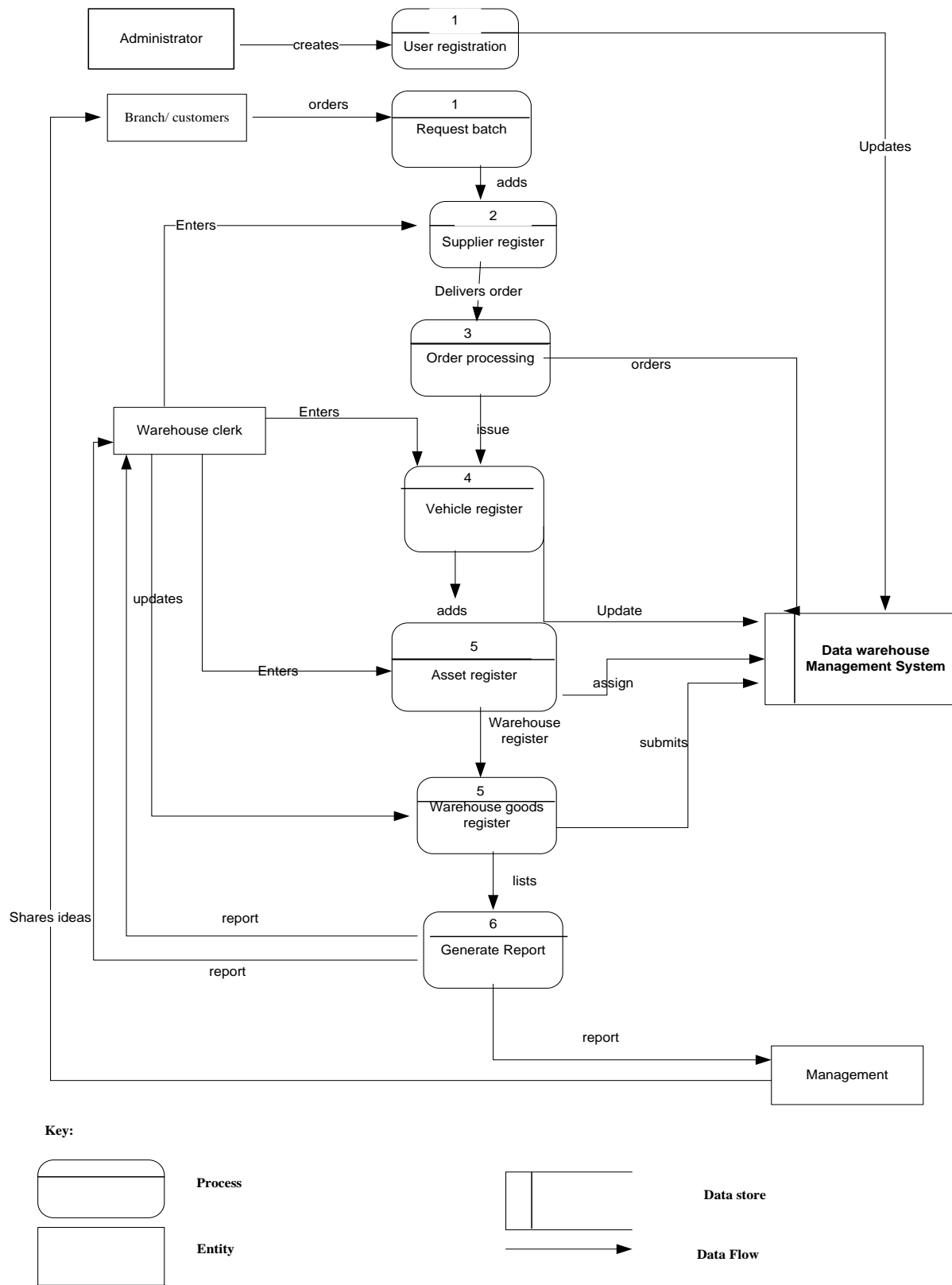


Fig 4.2 Data Flow Diagram of proposed system

4.3 ARCHITECTURAL DESIGN

Architectural design gives an explanation of the technical environment on which the proposed system will run. The logical and physical design of the proposed system are shown including the provision of hardware, software, data, procedures, and the people that will be involved in the designing of the system.

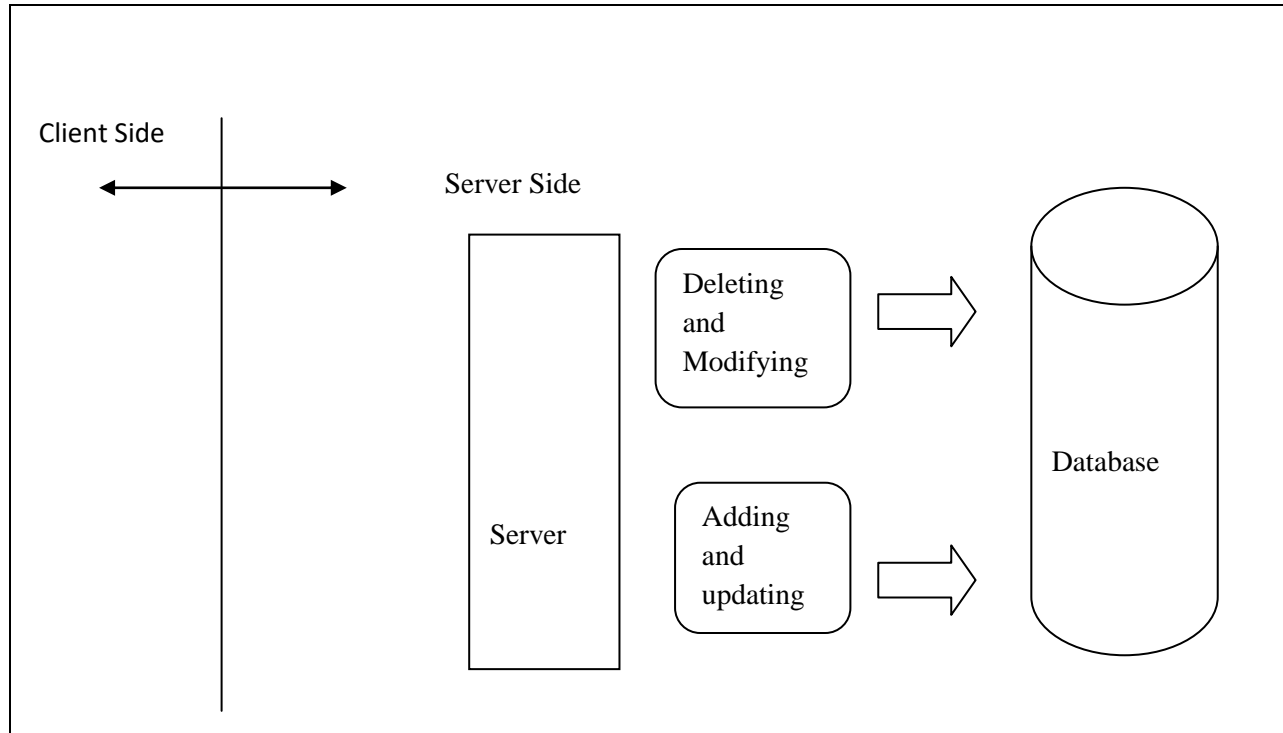


Fig4.3 Architectural design

The user has to enter his or her username and password in order to have right of entry in order to penetrate through the wall between the Client side and the Server side using the accurate information. After the verification and validation has been done of the username and password and are regarded as correct the user will be able to make use of a series of functions depending on the duty for instance using the searching option so as to gain access of required information and the registration of vehicles function in order for the user to list new details into the database.

4.4 PHYSICAL DESIGN

Process of design begins at the logical design then proceeds to the physical design, logical design focuses on the system specifications and then translated to a detailed physical design which is used to actually produce the system by programmers (Gupta, 2005). The physical design is the plan for the implementation of the actual system, and is developed during the system design phase of the SDLC (System Development Life Cycle) (Rosenblatt, 2009). It defines the actual process of entering, verifying, and storing data, the physical layout, sorting procedures, the exact formats of reports and many others.

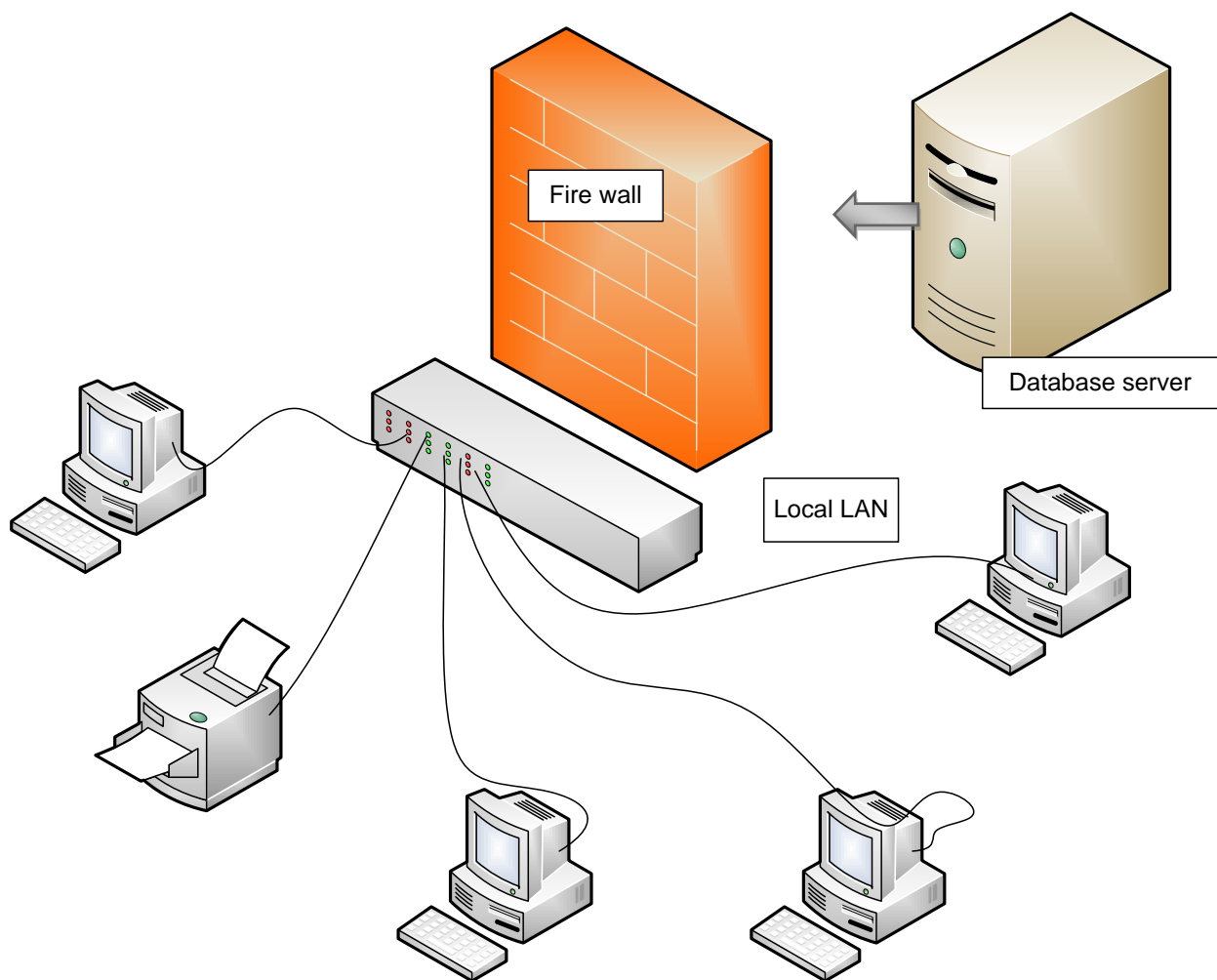


Fig 4.4 Physical architectural design

As shown in the above diagram the set up will be sub-divided into sections which are: the warehouse, IT, Buying, Management and every branch.

4.4.1 Software Architectural Design

- **Client machines**

This where the Graphic User Interfaced Applications sits, the other name for a client machine is a workstations. These machines are to be assigned to the warehouse department, branches, buying department and for management.

- **Database Server**

The database server will be operating in Microsoft Access 2008 which is suitable for medium project as this one. The designer proposed this because of its cost value and effectiveness. Microsoft Access is a competent instrument in running databases as it makes use of features like concurrence control and admission rights. The processing of the warehouse distribution management system's raw facts will be dealt with also, the maintenance of uniformity and reliability.

4.5 DATABASE DESIGN

Database is the collection of data and contains information about one particular enterprise (Kedar, 2009). Database is the compilation of logically related data that can be recorded (Gill, 2008). A database has a structure with different levels called schemas. A schema is the overall structure of a database and the schemas are partitioned according to the levels of its abstraction (Gill, 2008). It has the first level which is the physical level followed by the logical level and lastly the view level as shown in the diagram below:

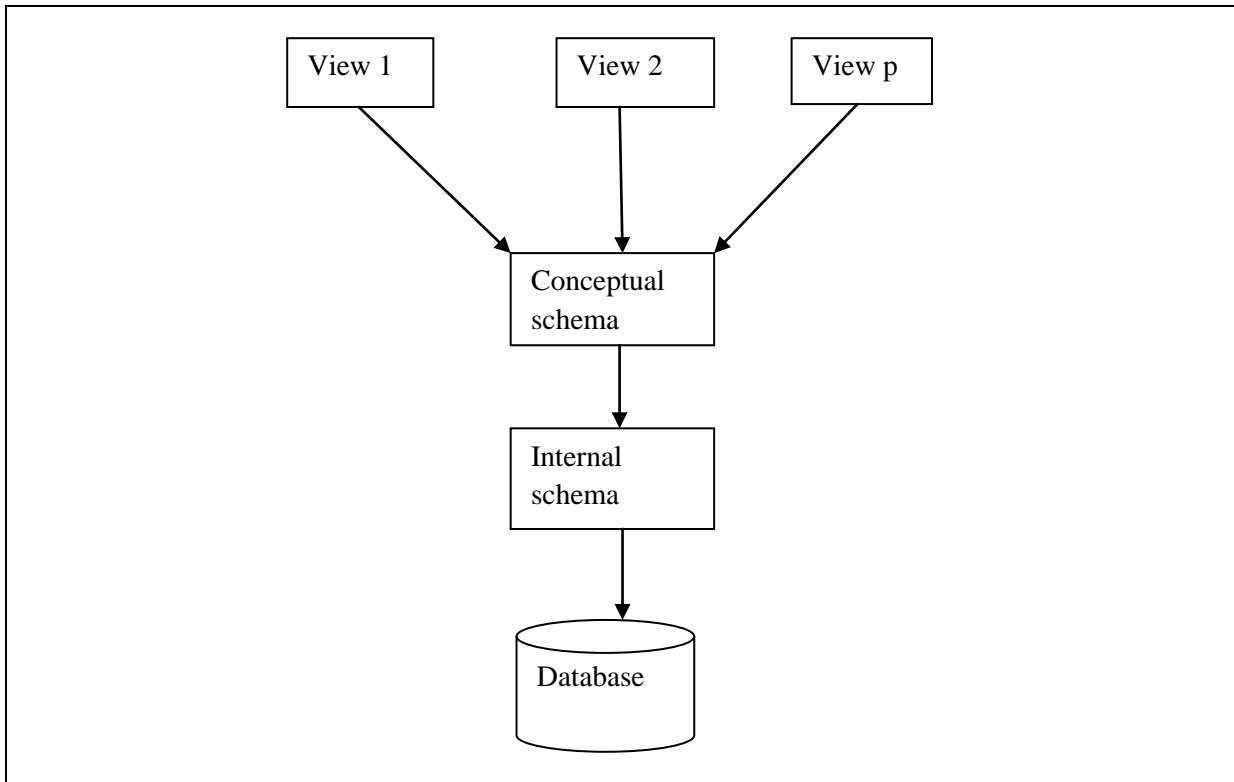


Fig 4.5 Database design

Physical level

It explains how the raw facts or data is stored also; it might describe the complex structures used to store data and is the lowest level of construct (Gill, 2008).

Logical level

This level is also known as the conceptual level which is the intermediate level of abstraction. This level is usually used by the database administrators to decide what information to store in the database; it describes what data is stored in the database and their relationships (Kedar, 2009).

View level

A view it describes the part of the database that a certain group is allowed to access or is to be allowed to be made visible to them (Gill, 2008). The view level is the highest level of abstraction which provides different views for different users, and they are tailored in order to meet the specific needs of the users.

4.5.1 Database tables

Access table

Field	Type	Collation	Attribute s	Null	Default	Extra	Action
id	Bigint(20)						
access	Varchar(30)						

Table 4.1 Access table

Asset table

Field	Type	Collation	Attributes	Null	Default	Extra	Action
Id	Bigint(20)						
Asset_name	Varchar(100)						
Serial number	Varchar(20)						
Type	Varchar(20)						
Userid	Int(11)						
date	Varchar(10)						

Table 4.2 Asset table

Asset-type table

Field	Type	Collation	Attributes	Null	Default	Extra	Action
id	Bigint(20)						
Asset_type	Varchar(30)						

Table 4.3 Asset-type table

Car-type table

Field	Type	Collation	Attributes	Null	Default	Extra	Action
Id	bigint(20)						
Car_type	Varchar(300)						

Table 4.4 Car-type table

Category table

Field	Type	Collation	Attributes	Null	Default	Extra	Action
id	Bigint(20)						
category	Varchar(50)						

Table 4.5 Category table

Department table

Field	Type	Collation	Attributes	Null	Default	Extra	Action
id	Bigint(20)						
department	Varchar(50)						

Table 4.6 Department table

Item table

Field	Type	Collation	Attributes	Null	Default	Extra	Action
id	bigint(20)						
item	Varchar(50)						
date	Datetime						
supplier	Varchar(30)						
Quantity	Int(30)						

Table 4.7 Item table

Products table

Field	Type	Collation	Attributes	Null	Default	Extra	Action
Id	Bigint(20)						
Item	Varchar(50)						
Description	Varchar(1000)						
Categoryid	Bigint(30)						

Table 4.8 Products table

Supplier table

Field	Type	Collation	Attributes	Null	Default	Extra	Action
Id	Bigint(20)						
Supplier	Vachar(50)						
Phone	Int(50)						
Address	Varchar(50)						
Date	Varchar(50)						
Email	Varchar(30)						

Table 4.9 Supplier table

Truck-issue table

Field	Type	Collation	Attributes	Null	Default	Extra	Action
Id	Bigint(20)						
Vehicleid	Bigint(20)						
Driver	Bigint(20)						
Dateback	Varchar(20)						
Date	Varchar(20)						
Return	Varchar(20)						

Table 4.10 Truck-issue table

Truck-item table

Field	Type	Collation	Attributes	Null	Default	Extra	Action
Id	Bigint(20)						
Destination	Vachar(100)						
ItemId	Bigint(20)						
Quantity	Int(11)						

Table 4.11 Truck-item table

User table

Field	Type	Collation	Attributes	Null	Default	Extra	Action
Id	Bigint(20)						
Firstname	Varchar(50)						
Surname	Varchar(50)						
Username	Varchar(50)						
Password	Varchar(50)						
Phone	Int(50)						
Address	Varchar(50)						
Date	Varchar(50)						
Department	Varchar(50)						
Level	Varchar(30)						
Suspend	Int(11)						

Table 4.12 User table

Vehicles table

Field	Type	Collation	Attributes	Null	Default	Extra	Action
Id	Bigint(20)						
Name	Varchar(30)						
Car_type	Varchar(30)						
Status	Varchar(30)						
Year	Int(11)						
Chases	Varchar(30)						
Plate	Varchar(30)						
Date	Varchar(30)						

Table 4.13 Vehicles table

4.5.2 EER Diagram (EERD)

An EER diagram is a diagram that shows how system's primary data entities are related and the EER diagram it in-cooperates the extension of the original ER diagram. The EER diagram was developed to add more semantic constructs found in relationships, it also includes concepts of generalization and specification.

Entity is defined as an object or a concept from the real world for example, which is different from other objects and concepts. It is defined by a set of properties known as attributes for example id number, phone number and name (Gill, 2008).

A relationship is shown by drawing a line between two entities, thereby linking entities (Yen et al, 1998). It is also known as an association of entities.

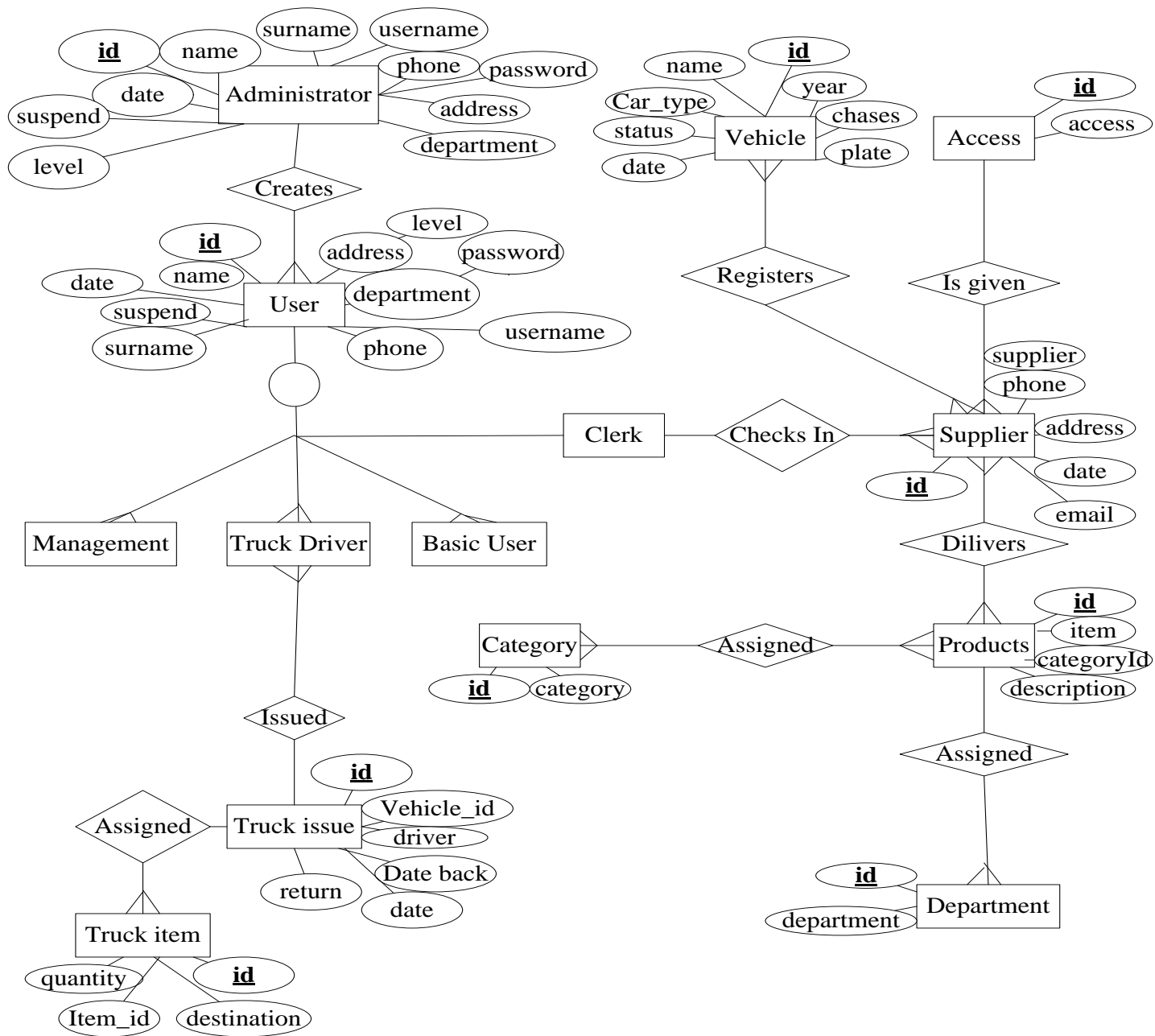


Fig 4.6 EER diagram of proposed system

4.6 PROGRAM DESIGN

When developing a system the output design is the starting point. This is because the designer must be aware of the user requirements by outputting from the system before proceeding to the development of the system. This also helps to determine the system inputs.

a.) Sequence diagram

A sequence diagram comprises of rectangles that denote objects and arrows that represent messages on a sequence diagram (Knoernschild, 2002). The directed arrows on the sequence diagram are allied with a method name that is triggered as a result of the object's communication and also, a sequence diagram can be used to show messages sent among objects as well as the order in which they are sent.

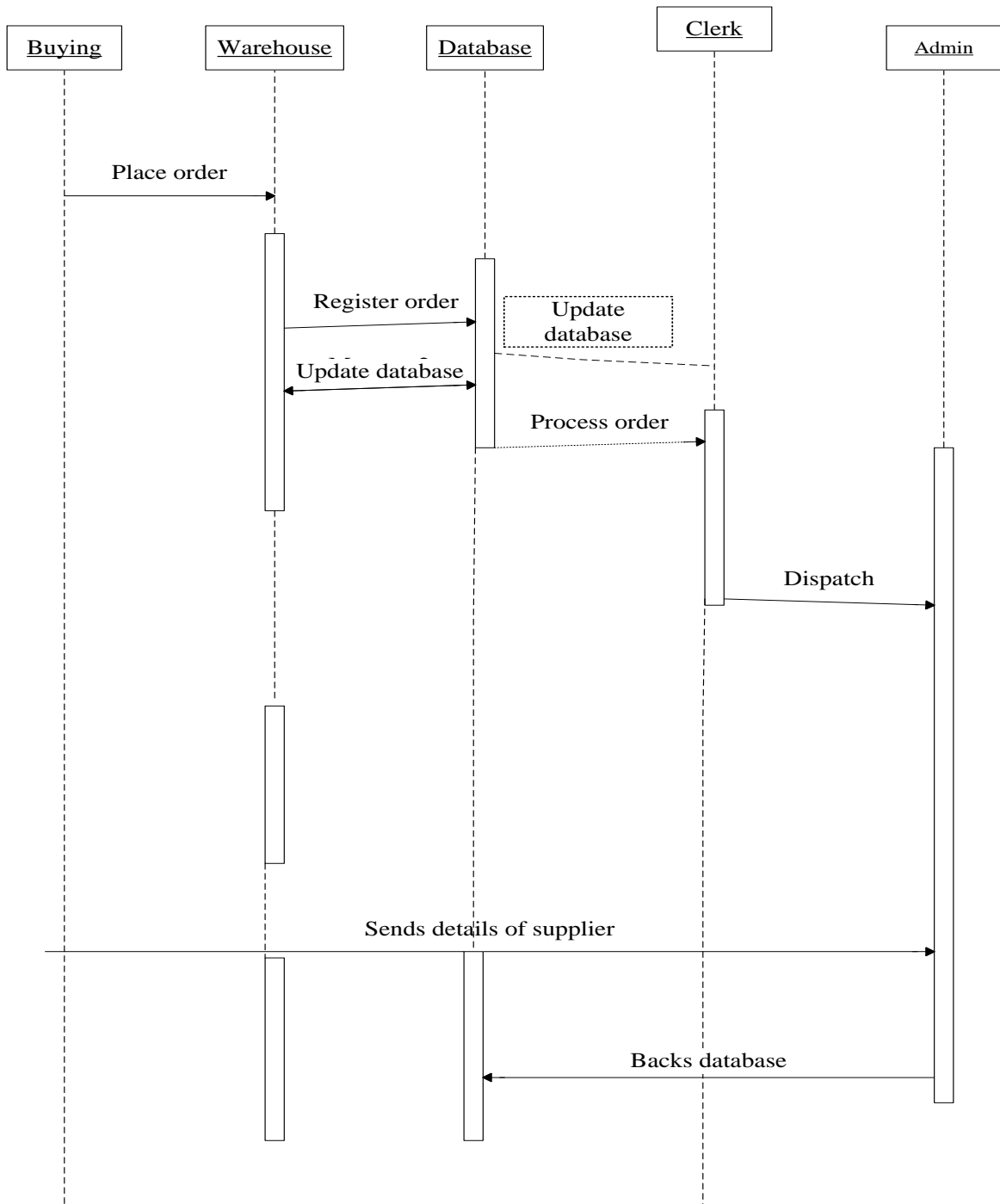


Fig 4.7 Sequence diagram

b.) Package diagram

A package is a UML (Unified Modeling Language) assemble that allows the analyst to arrange model fundamentals, such as cases or classes into groups (Ambler, 2005). Packages are represented as file folders and are functional on UML diagrams, and the diagram that simply depicts packages is a package diagram.

Reasons for the creation of a package diagram are:

- To depict a high level overview of the project's requirements.
- Modularizing a complex diagram logically.
- Organize source code.

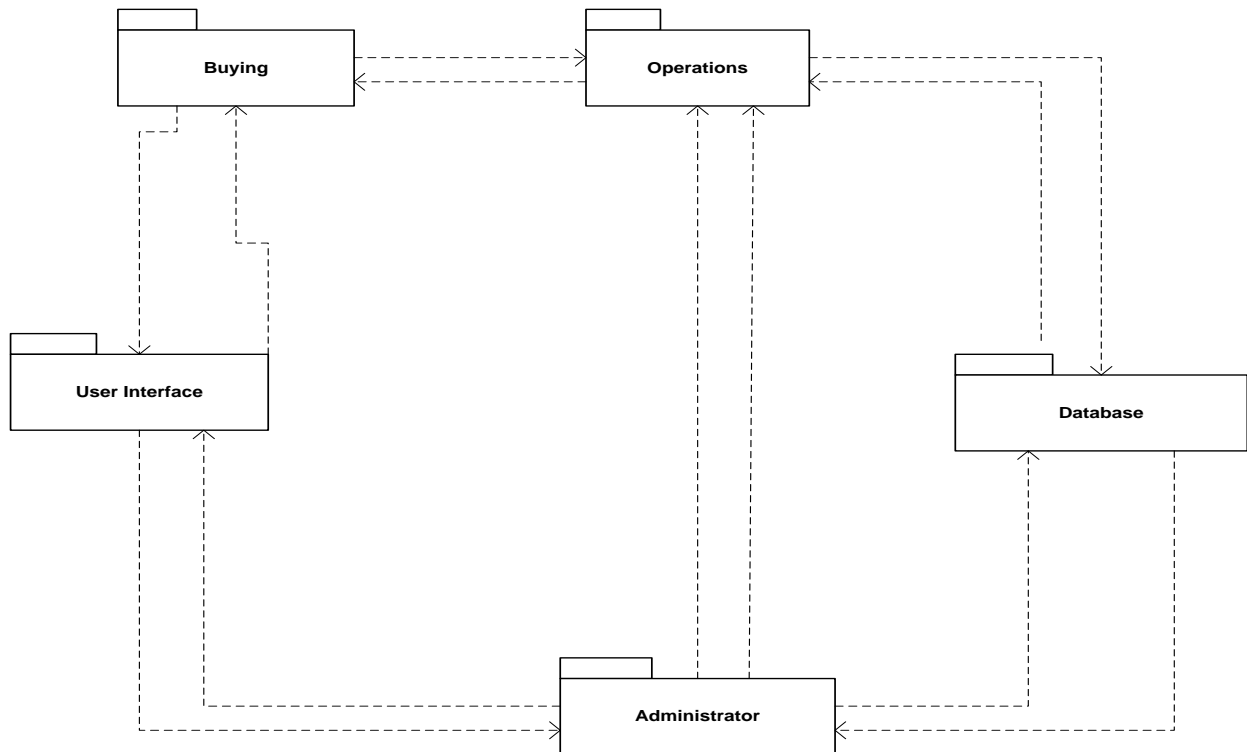


Fig 4.8 Package diagram

c.) Class diagram

A class diagram is a diagram that shows or depicts the link between classes and how they communicate (Knoernschild, 2002). It shows collection of classes, interfaces, and their associations, graphically it is a compilation of vertices and arcs. A class diagram can be different from other diagrams by classes, interfaces, dependencies, relationships and properties that are similar to other diagrams are it can include constraints and notes.

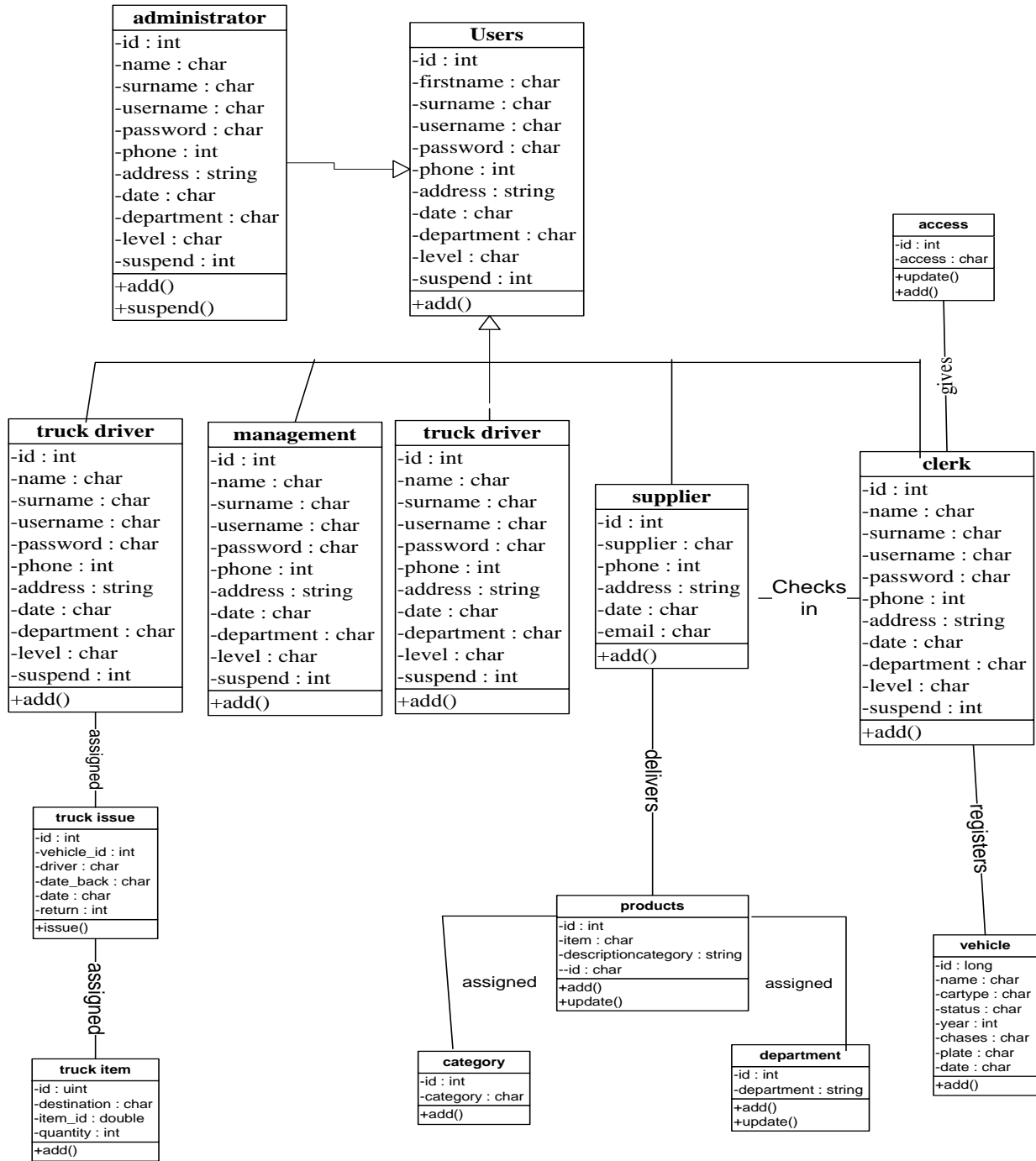


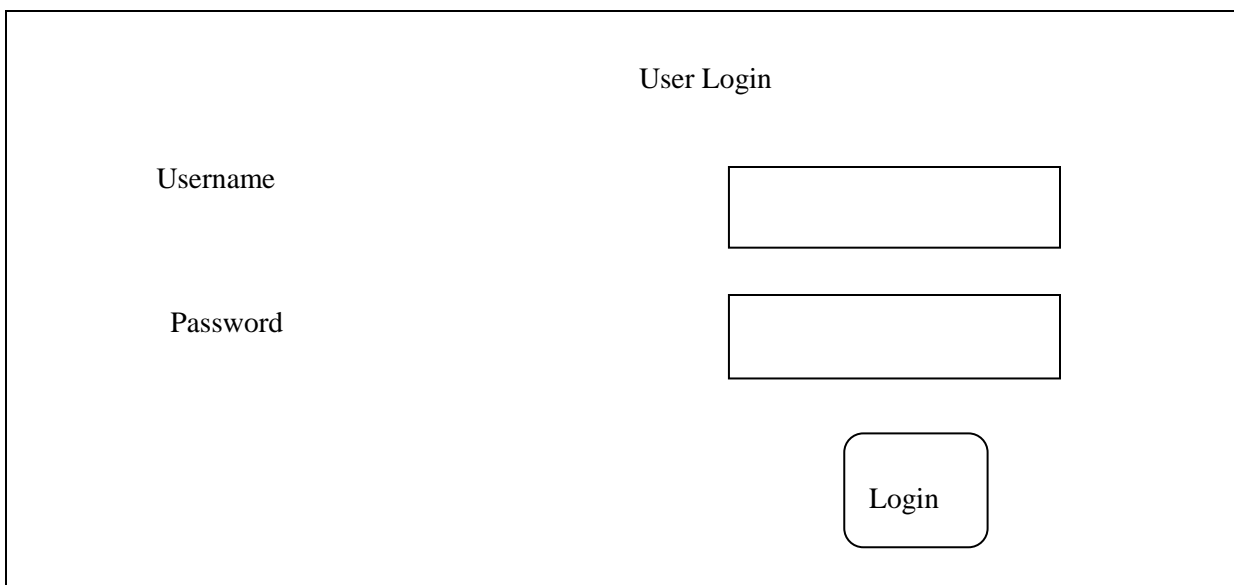
Fig 4.9 class diagram

4.7 INTERFACE DESIGN

With interface design it includes output media such as reports and it also outlines designs for reports, forms and menus screens

Login form

The figure below shows the login form that prompts a user to enter their login details that is the username and password that they would have been given by the administrator.



The diagram illustrates a 'User Login' form. It is enclosed in a rectangular border. At the top center, the text 'User Login' is displayed. Below this, on the left side, are the labels 'Username' and 'Password'. To the right of 'Username' is a rectangular input field. To the right of 'Password' is another rectangular input field. Below these two input fields, centered horizontally, is a rounded rectangular button labeled 'Login'.

Fig 4.10 Login form

New User

First Names	<input type="text"/>
Surname	<input type="text"/>
Contact Phone	<input type="text"/>
Contact Address	<input type="text"/>
Department	<input type="text" value="---Select Department-----"/>
Username	<input type="text"/>
Password	<input type="text"/>
Confirm Password	<input type="text"/>
Access Level	<input type="text" value="-----Select Access-----"/>
	<input type="button" value="Save record"/> <input type="button" value="Reset Data"/>

Fig 4.11 Create User Form

Administrator view

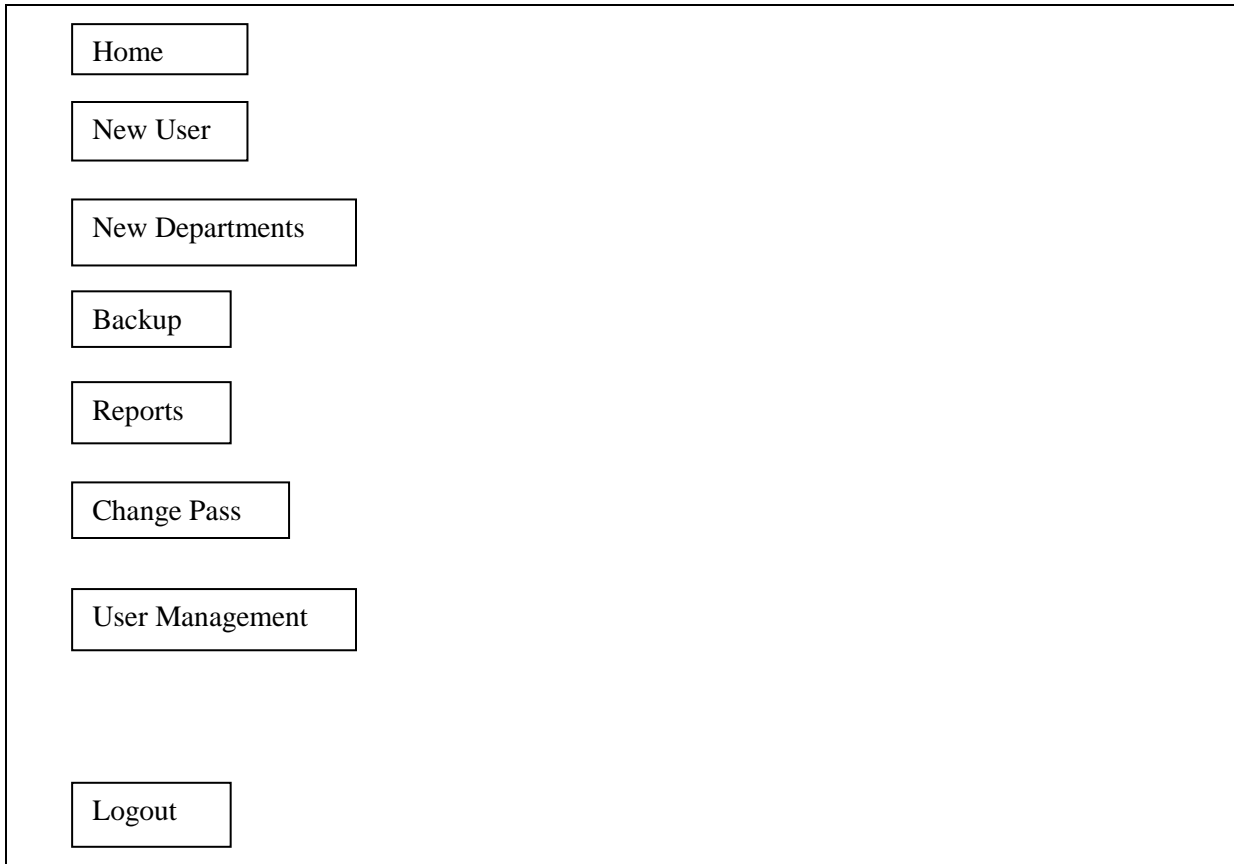


Fig 4.12 Admin View

Clerk's view

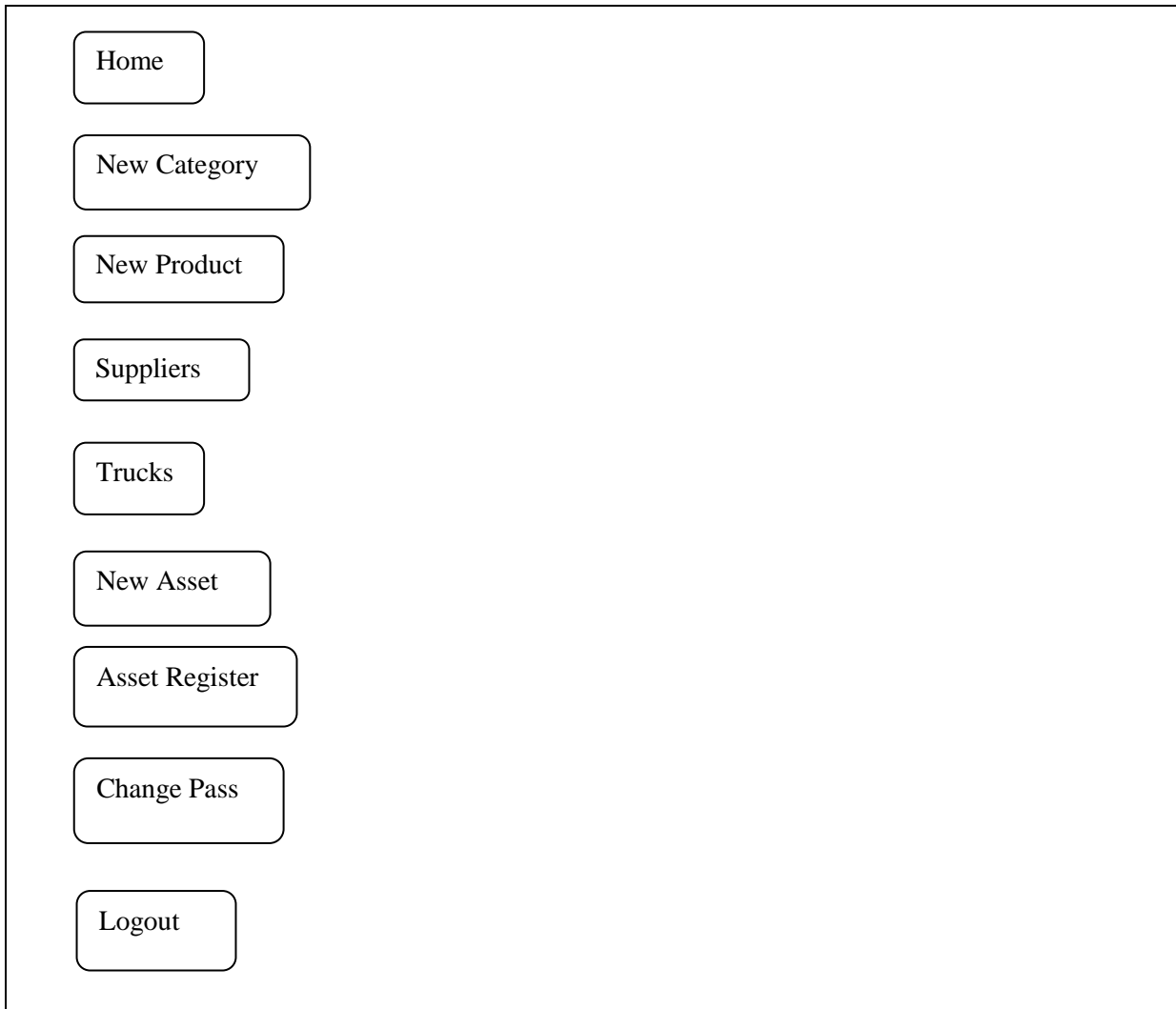


Fig 4.13 Clerk's view

Management View

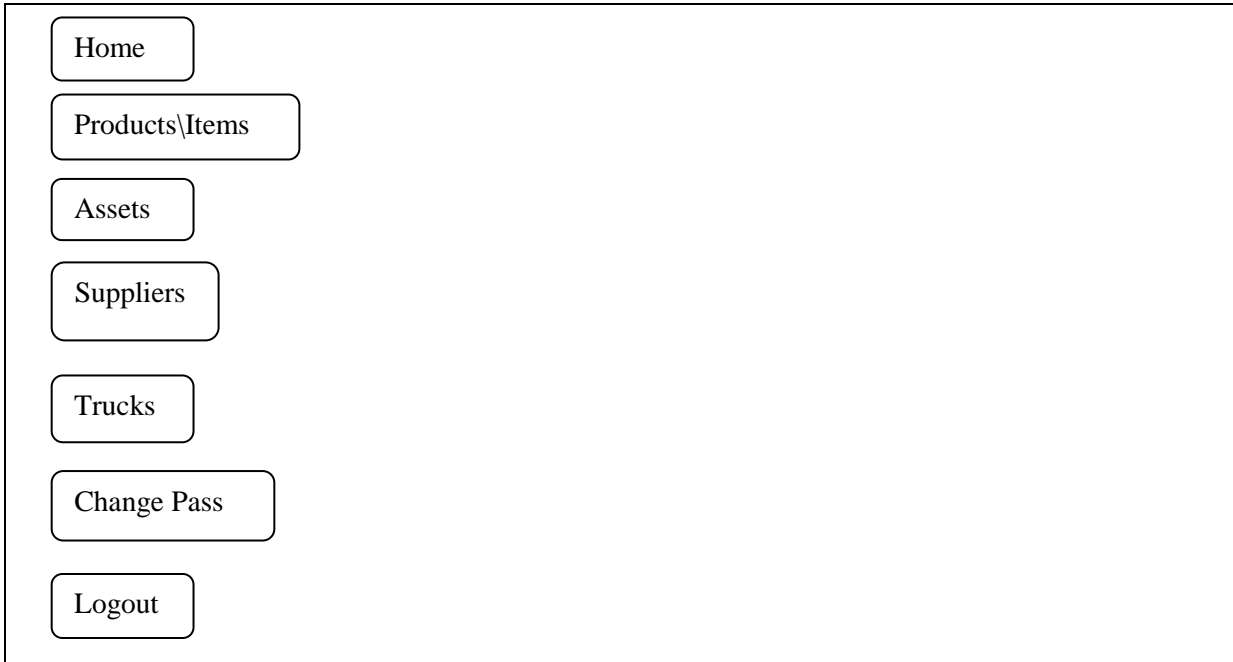


Fig 4.14 Management's View

4.8 CONCLUSION

In conclusion, the design phase helped the designer to come up with a system that is meeting the requirement of the organization or users. The designer was able to show how the data is supposed to be stored by constructing EER diagram, data flow diagram and also to design the inputs, processes and outputs of the system. The stage following the design phase is the implementation phase.

CHAPTER 5: IMPLEMENTATION PHASE

5.1 INTRODUCTION

After the design deliverables have been finalized and approved by different stakeholders, and then the implementation phase begins. Implementation phase it is when the designer reviews the project to the end users, in this stage the preparation of specifications for machinery and equipment, ordering of machinery, testing, checking and trial run take place during this phase(Choudhury, 2008). The implementation phase is completed fast if the design, supply and construction would have been out as a total package. It successful follows operation of the resolution in to the pilot phase, it includes exploitation of the result into live manufacturing environment of the entire organization to all suitable end users and other shareholders (Watt, 2007). The implementation stage occurs through staged development which ensures a convenient change to the proposed system without over utilizing presented possessions and negatively influencing the business stability. During the changeover issues there are followed up and presented prior the use of the key to other user groups.

5.2 CODING

5.2.1 Pseudo Code

A pseudo code is an English-like presentation of steps required to work out a problem, it is also written with a tranquil syntax that allows students to unravel problems while details are hidden as they concentrate on problem requirements (Gilberg and Forouzan, 2005). It is independent and represents data structures and code. A pseudo code is also defined as a combination of algorithm written in simple language and programming language statements. It is an effective building block for actual program (Puntambekar, 2007).

Start

Enter username and password

If the username and password are correct

View main menu

Choose an option on the main menu

If option create new login user then

Show page to enter details

Repeat option until you click another option on the main menu

End

Else

If option add basic user

Show page to enter details

Else

If option is incorrect details ten

Show warning message

re-enter details

End

End repeat

End

*{*end the program*}*

5.3 TESTING

A set of activities that can be planned in advance and conducted systematically, a template for testing software a group of stages which the researcher is able to set the exact test case design techniques and the definition of the testing methods of software process (Agarwal and Tayal, 2007). The creation or proposing of software testing strategies which provides the designer with a template for testing.

Software testing is the capability of the organization to describe and pursue documented processes (Sharma, 2004). Every team member has processes bound to their role and tasks so that teamwork is victorious and a well-organized one. It plays a pivotal role in determining success or failure of the entire effort of software engineering. There are two categories of testing which are: black box testing also known as functional testing and white box testing also known as structural testing. The developed modules are incorporated with external module systems and elements after the executable codes have been tested individually. After the testing the designer analyses and if there are any errors then they are dealt with accordingly.

5.3.1 Black box testing

The black box testing when the tester will be having no knowledge of internal workings for example he or she does not know the inputs or expected outcome (Sharma, 2004). Here the tester only needs the specification of the program, there will be no need for the tester to examine the programming code and have any further knowledge of the program. The black box test mainly points on the functional requirements of the software and the designer is able to obtain set of inputs that wholly train all the practical requirements of a program.

Benefits of using the black box testing

- The designer is not dependent to the tester thus limiting the test being biased.
- The test of the program is done basing on the user's opinion and not of the programmer.
- The person who will be testing the software does not require any familiarity of the programming language.
- After the specifications would have been completed then test cases can be designed.

Drawbacks of the black box testing

- The designing of test cases is difficult.
- The test can be redundant if the software designer would have already run a test case.

- It takes more time as there will be the testing of every possible input which is unrealistic thereby making many paths going untested.

5.3.2 White box testing

The routine details of the white box testing are closely examined, the software internals are tested so as to test if they operate according to the specifications and design (Puntambekar, 2007). It mainly concentrates on the internal structures, logic paths, conditions, control flows, data flows and data structures.

There are also other software testing strategies that are used namely: unit testing, validation testing, integration and system testing.

5.3.3 Unit testing

Techniques are applied for error detection from each individual component; there is the use of the white box and the black box technique.

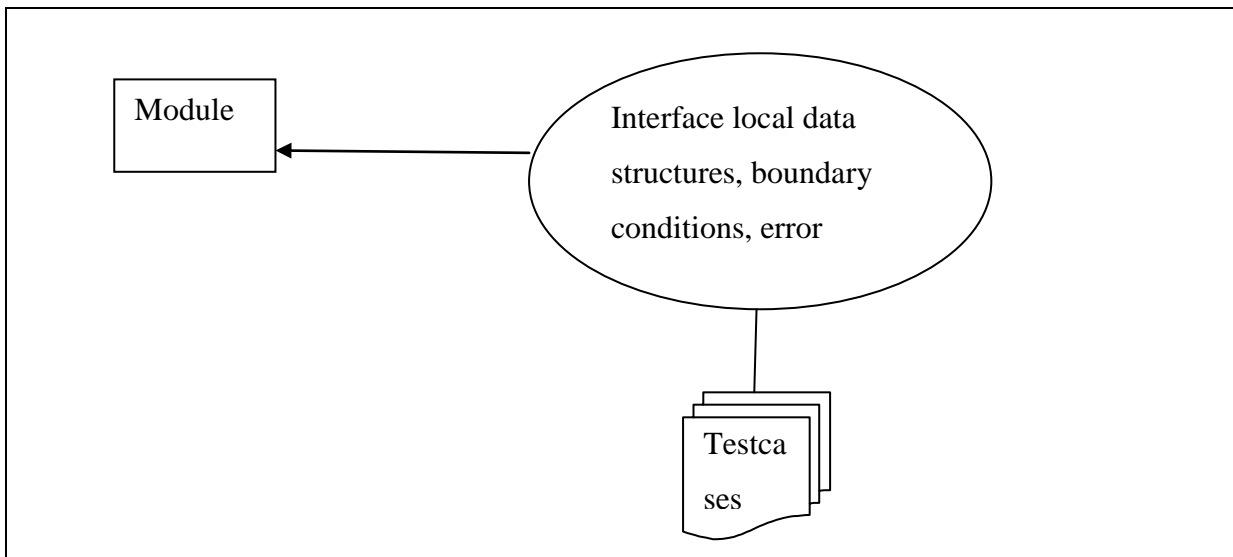


Fig5.1 Unit testing (Puntamberkar, 2007)

Unit testing the components are tested for quality and to also reveal errors in design and implementation. Below are the tests that are carried out in unit testing:

- Module interface
- The local data so as to maintain integrity.
- To make certain the component is functioning well at restrictions recognized boundary processing, the boundary conditions are tested.
- Error handling paths.

5.3.4 Validation testing

Provides the assurance that the software validation criteria that would have been established during the requirements analysis meet all behavioral, functional and performance requirements.

5.3.5 Acceptance testing

It is carried out to guarantee that the software functions as expected in the user work surroundings and it can be conducted in weeks or months. There are two types of acceptance testing which are:

a. Beta test

The version of software tested by the customers or clients in the absence of the developer and is performed at customer's site.

b. Alpha test

This is when the version of complete software is tested by the clients under the supervision of the developer and the test is done at the site of the developer.

5.3.6 Integration testing

It focuses on verification and program constructions as components begin interacting with each other. It uses black box techniques more and some of the white box techniques for its focus is on correction of interaction of components.

5.3.7 System testing

All system elements that would have formed the system will be tested as a whole, thus enabling the researcher to be able to identify any errors or requirements that would have not been met (Paley, 2009). The system testing uses the black box techniques for its scope is on the system as a whole, there are various types of system tests which are; recovery testing,

security testing, stress testing and performance testing. With these types of testing they focus on:

- System installation.
- System reliability and recoverability.
- Installation test.
- System functions and performance.
- System user operations using the acceptance test and/or alpha test.
- Integration and collaboration of the hardware and software.
- Integration of external software and the system.

5.3.8 Verification and validation

Verification is a group of actions that guarantee that the project appropriately puts in place a specific role and answers the query if the designer built the product right (Puntamberkar, 2007).

Validation is when a set of actions that make certain the software that the proposed system built is noticeable to the customer requirement which is the TMPnP supermarkets (Anderson and Schragenheim, 2004). Validation also answers the question did the designer built the right product.

Verification and validation involve some Software Quality Assurance(SQA) activities like:

- Database review.
- Feasibility study.
- Performance monitoring.
- Documentation review.
- Installation testing.

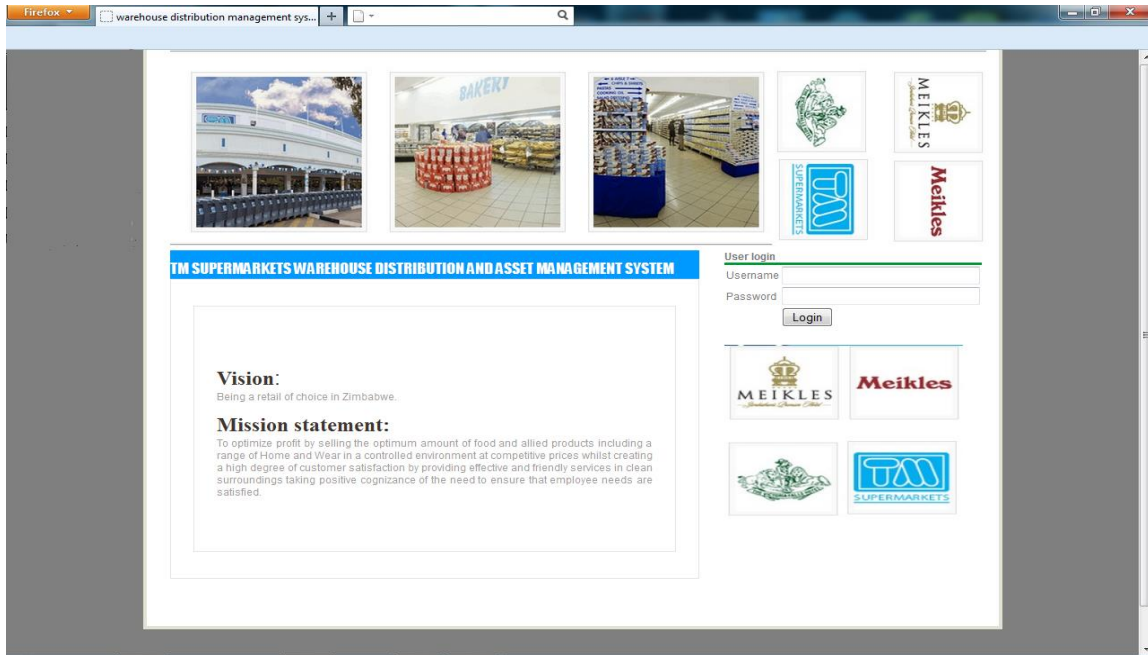


Fig 5.2 Login page

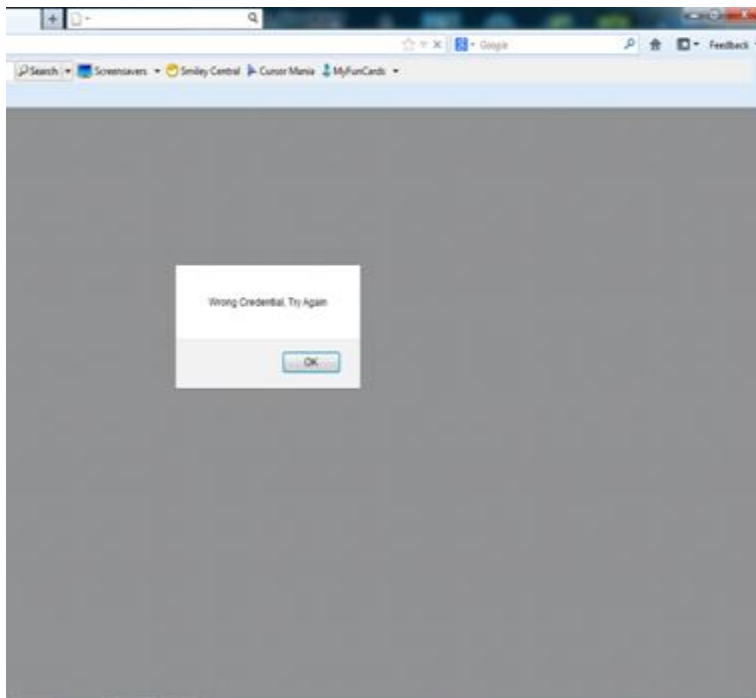


Fig 5.3 Wrong password pop-up window

5.4 INSTALLATION

After the software has been integrated it is then delivered to the client and installed according to the installation and development plan, the client then runs the acceptance test plan and ideally accept the software (Saleh, 2009). When installing a new software or system the designer can use various types of system change over methods which are: pilot operation, phased operation, parallel operation and direct cutover. System changeover is implementing the proposed system and making less use of the current system, and the substitution can be speedy or sluggish (Rosenblatt, 2013).

a. Pilot operation

The method involves implementing the entire proposed system at chosen site of an organization and is a mixture of the parallel changeover and direct changeover (Rosenblatt, 2013). A new warehouse distribution system for example can be installed in only one department of the TMPnP supermarkets, and the pilot site is the name of the group that will be using the novel system. In this type of changeover the old system will still be running in the entire organization including the pilot site. After the proposed system has worked well or met the client's requirements then the new system is implemented in the whole of the organization using the direct cutover method. The method reduces system failure for the system will be implemented only at a pilot site and not the entire organization. Pilot changeover for the whole organization is not as much costly than parallel operation.

b. Phased operation

The designer is permitted to use stages when implementing system. For example implementing the warehouse distribution management system the designer will first install the distribution of products management sub-system then the asset distribution management sub-system and so on. An advantage of the phased operation is that it reduces error or failure and it is also less expensive for by working with sub-systems the failure of one sub-system does not affect other subsystem.

c. Parallel operation

The parallel operate requires both systems running simultaneously for specific period, it is the slowest method (Rosenblatt, 2013). The parallel has disadvantages in that it is more expensive than all the other methods and there will be needing more employees for there will be extra workload due to the maintenance of both systems. Parallel also can have a disadvantage in that both the current system and proposed system may not be for the whole organization well-suited.

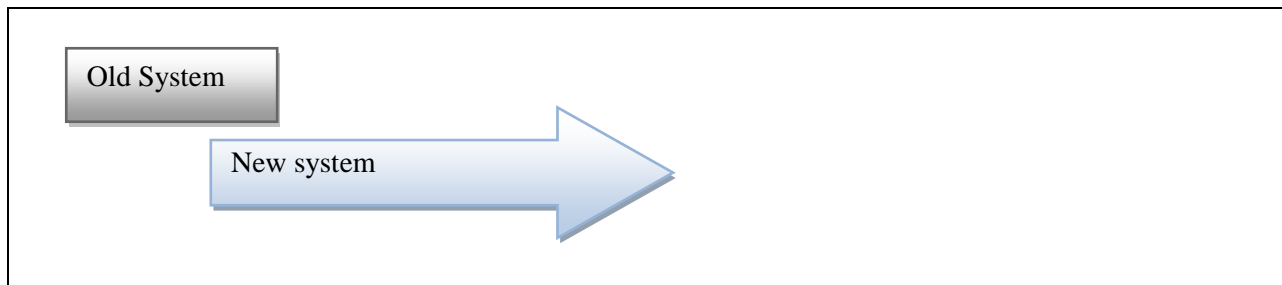


Fig 5.4 Parallel operation

d. Direct cutover

The method is different from all of the changeover methods the designer will instantly change from the old system to a new system.

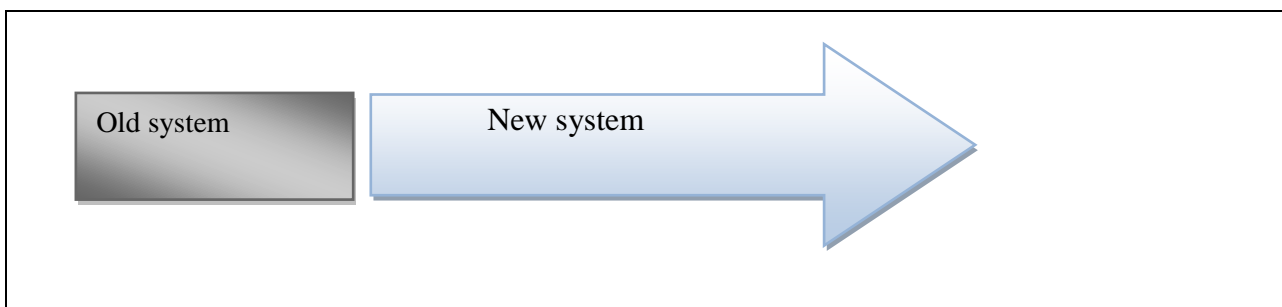


Fig 5.5 direct cutover

5.5 MAINTENANCE

Maintenance it is a system in which modifications are put in to action by changing the current system's architecture or adding new machinery to the system (Gilbery and Foroazan, 2005). When the installation process and acceptance has been done then the users will run the software

as they invoke its functions or service. Software maintenance is an action in which program is tailored after it has been put into exercise (Puntambekar, 2007). Software maintenance has the following activities:

- The reporting of software faults.
- Software improvement request management.
- Identification, categorization and prioritization of needed improvements.

There are four types of maintenance activities namely:

a. Corrective

Activities are triggered by software faults encountered during software use for example decorative changes to user interface or compound fixes like re-designing of component or re-introduction of omitted functionality (Saleh, 2009). In former case, code is re-visited and limited testing is required where as in latter case all phases are functional beginning with the requirements specifications which is in the analysis phase scheduled to proper integration or regression testing prior to the re-installation of the software.

b. Preventive

The development team identifies the weaknesses and vulnerabilities during and after deployment of the software and are dealt with even that which were not dealt with in the installed software.

c. Perfective

With perfective maintenance the request to improve efficiency of the algorithm, use interface interactions in the design and data structures are dealt with (Saleh, 2009).

d. Adaptive

This is when requirements from software stakeholders to familiarize the software to diverse working environment, user interface styles, new government policy and standards or social background.

5.6 RECOMMENDATIONS

The designer recommended using the white box testing for it tests the internal structures, logic paths, conditions, control flows, data flows and data structures. This ensures that the system is tested in all areas, it also has its advantage over the black box testing where the tester will be having no knowledge of the programming language.

In the installation of the system the designer recommends the company or organization to use the pilot operations where the system is only used in a specific department which is known as the pilot site. In using this installation or changeover method the organization will quickly study the system and if any changes are to be made they will be easily dealt with. For maintenance the designer recommends the preventive and adaptive methods for with these methods the designer is able to get responses from different people for example employees and stakeholders as well.

5.7 CONCLUSION

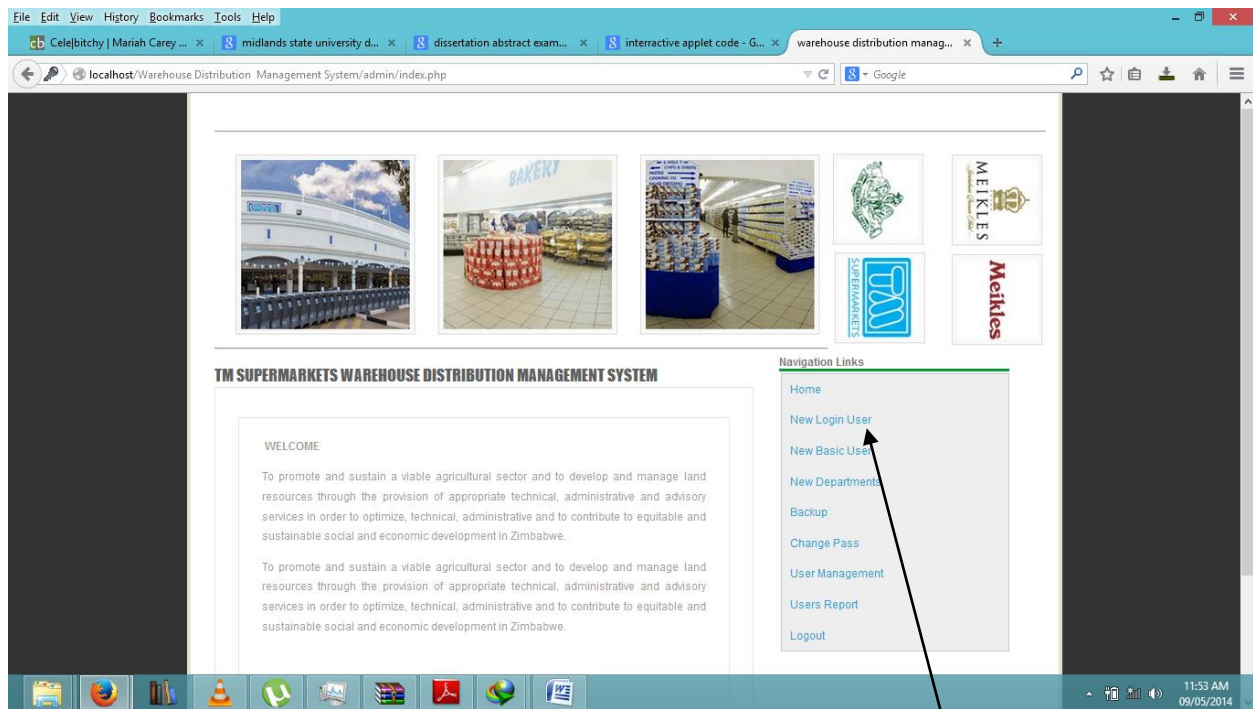
In conclusion after the implementation phase where coding, testing, installation and maintenance have been done, it is clear that the researcher met the minimum requirements of the organization. This will in future

APPENDIX A: USER MANUAL

The following is a user manual for the employees or even the stakeholders of the company who may need to have knowledge of the system that is the Warehouse distribution management system. The user manual is there to assist the end user or the users of the proposed or new system to be able to operate the system without any difficulties.

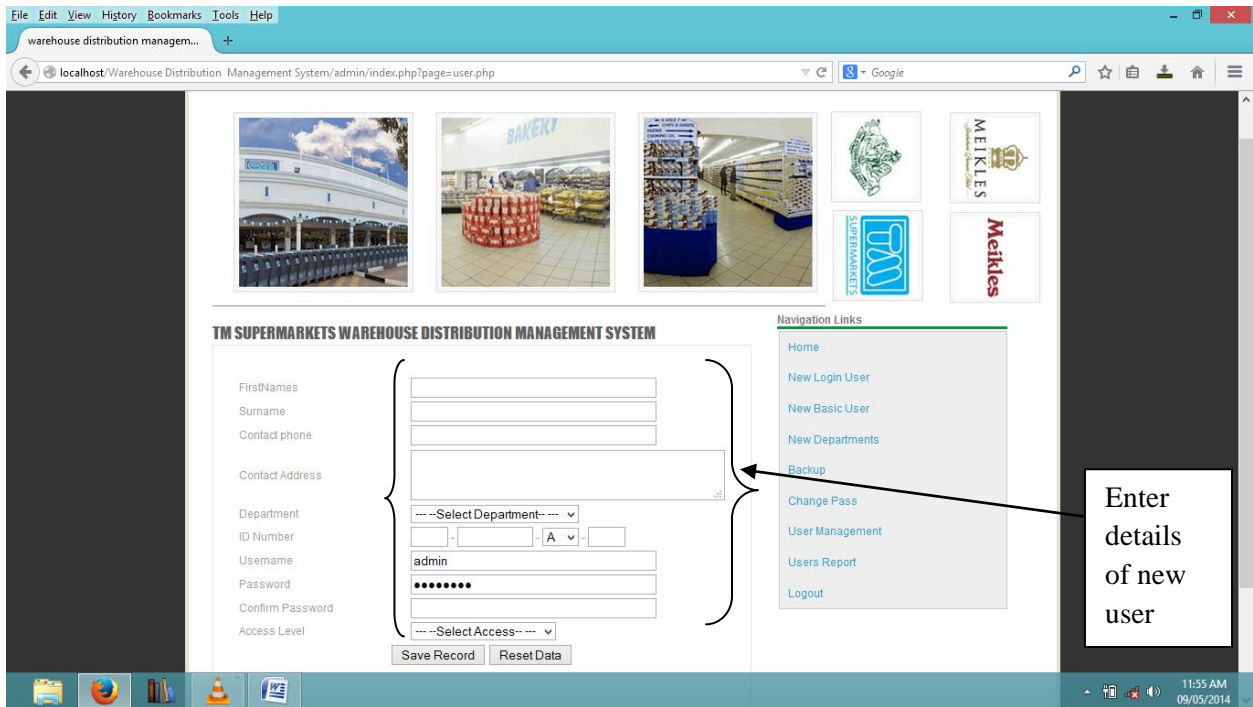
Administrator menu

Firstly the administrator view, which is used by the personnel who will be in charge of the system. The user will be able to login as the administrator and the menu will be as follows:



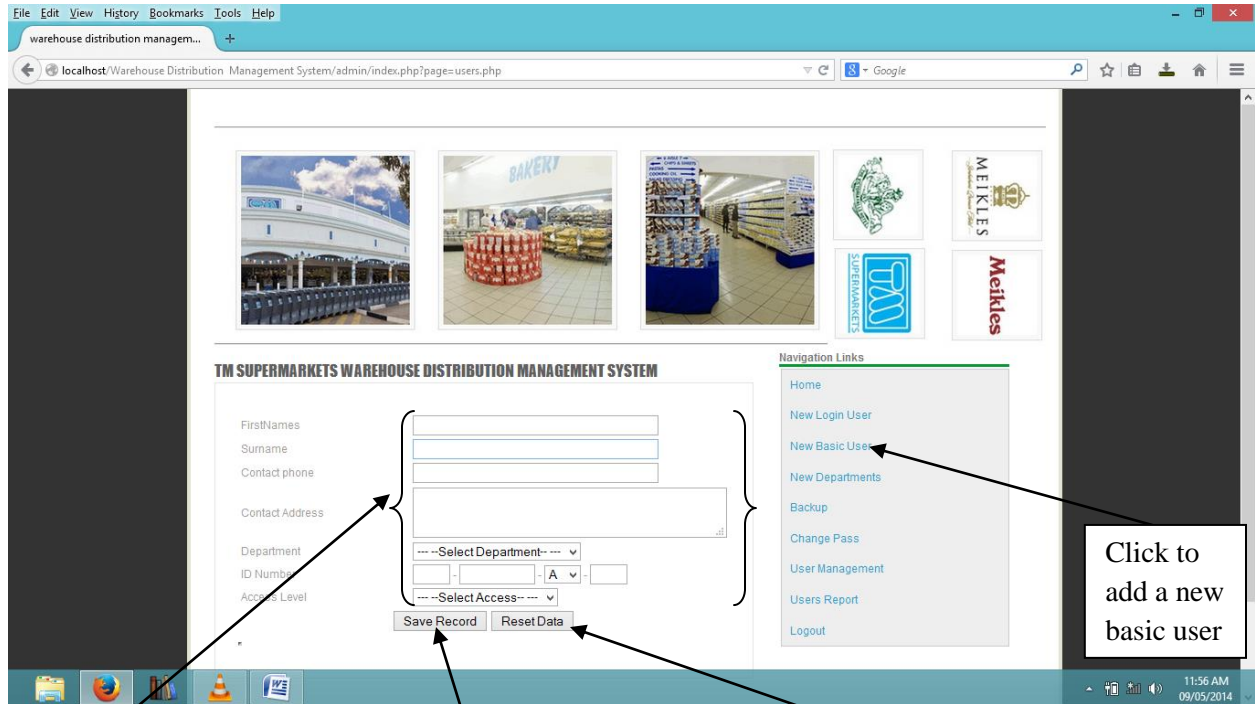
Click to
add new
login user

The administrator can click on the button create login user in order for him or her to create a user who will be able to login to the system. The user can be a clerk or management or other users from different departments.



Then administrator will fill in details of the user and then click the save record button so as to save that certain user in the company's database.

- Click the create basic user button so as to create a user who will be recorded in to the database but are not supposed to be logging in to the system for example, a truck driver or an employee who would want to be allocated an asset at a certain department.



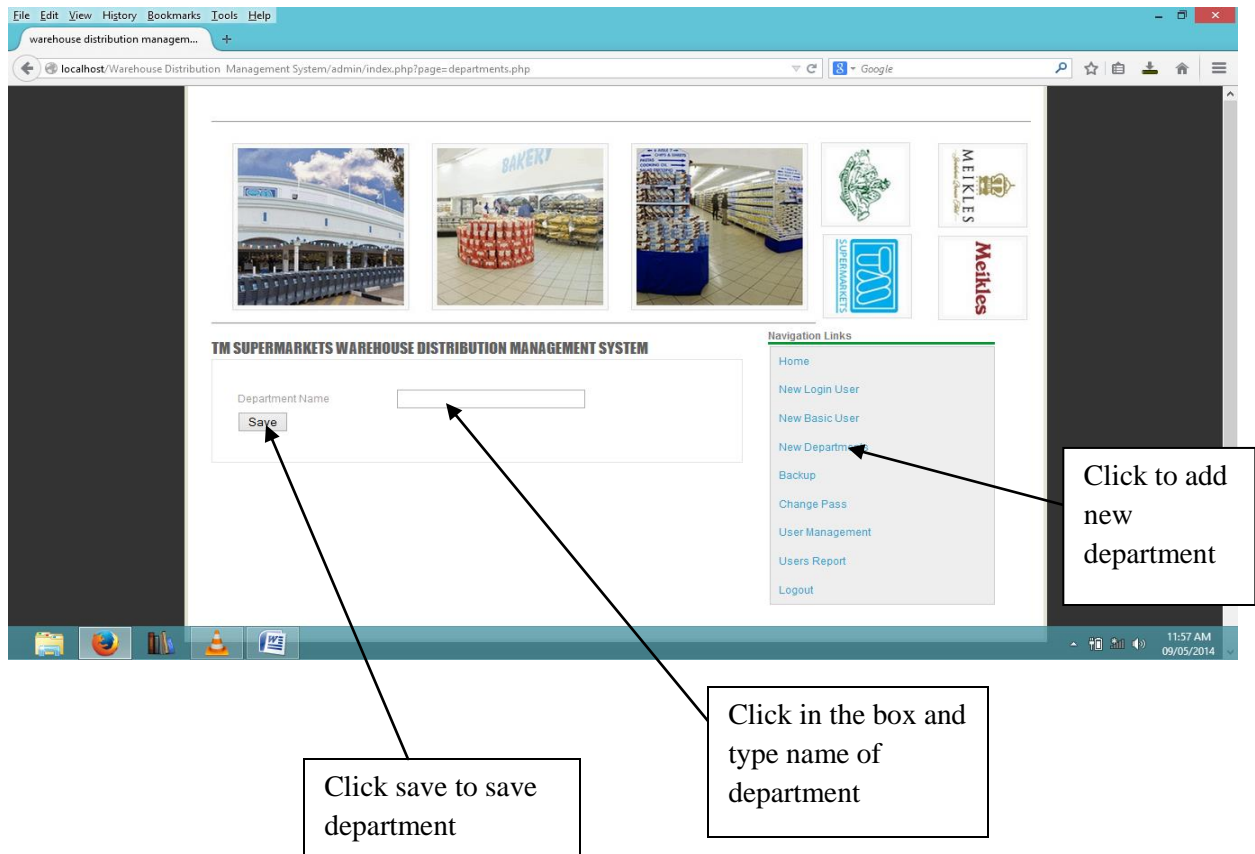
Enter details of the new user

Click save record after filling all details

Click reset data so to enable entering of different information of another user

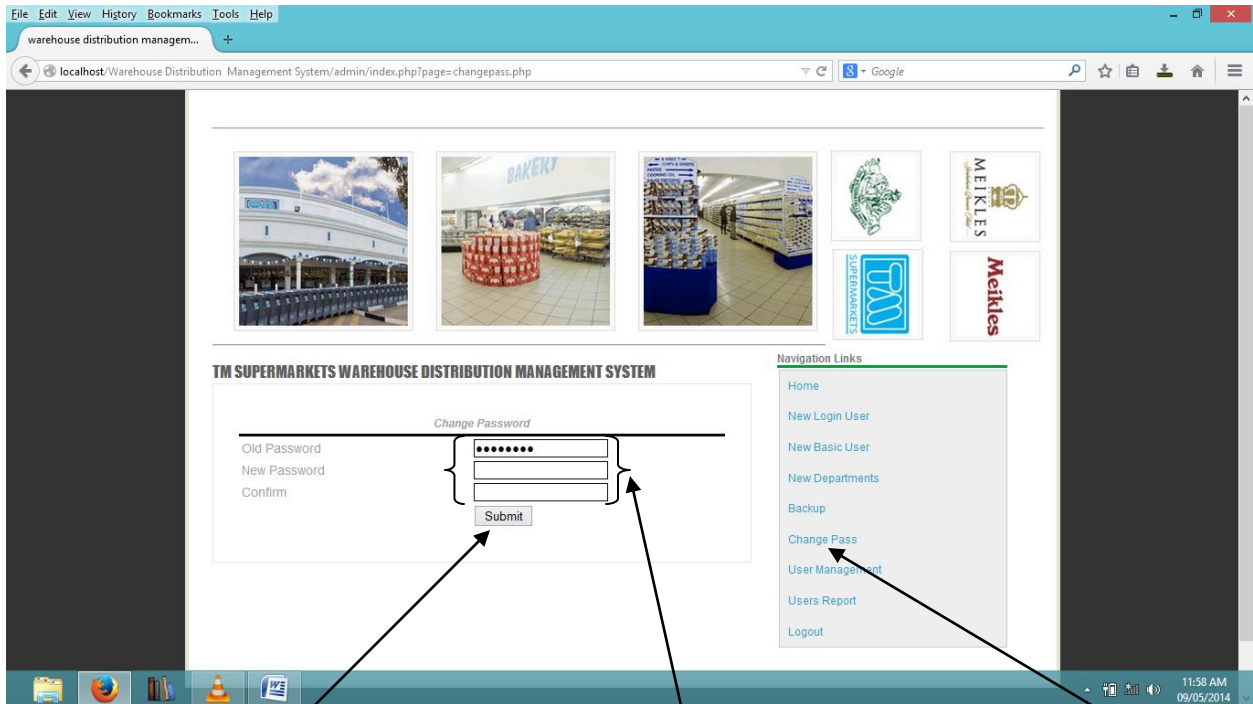
Click to add a new basic user

When the administrator clicks the new department's button, he or she will be able to add all departments of the company which will assist in the adding of a login user also mentioning their departments.



- The administrator is able to back up all the data that they would have entered and that which would have been entered by other system users. If the administrator clicks the button backup then a window will show which will prompt the user to click submit button in order to backup the data.

- The administrator is able to change his own password if he or she clicks the change pass button.



Click submit to save the new password

Enter old password first, then new password and confirm new password

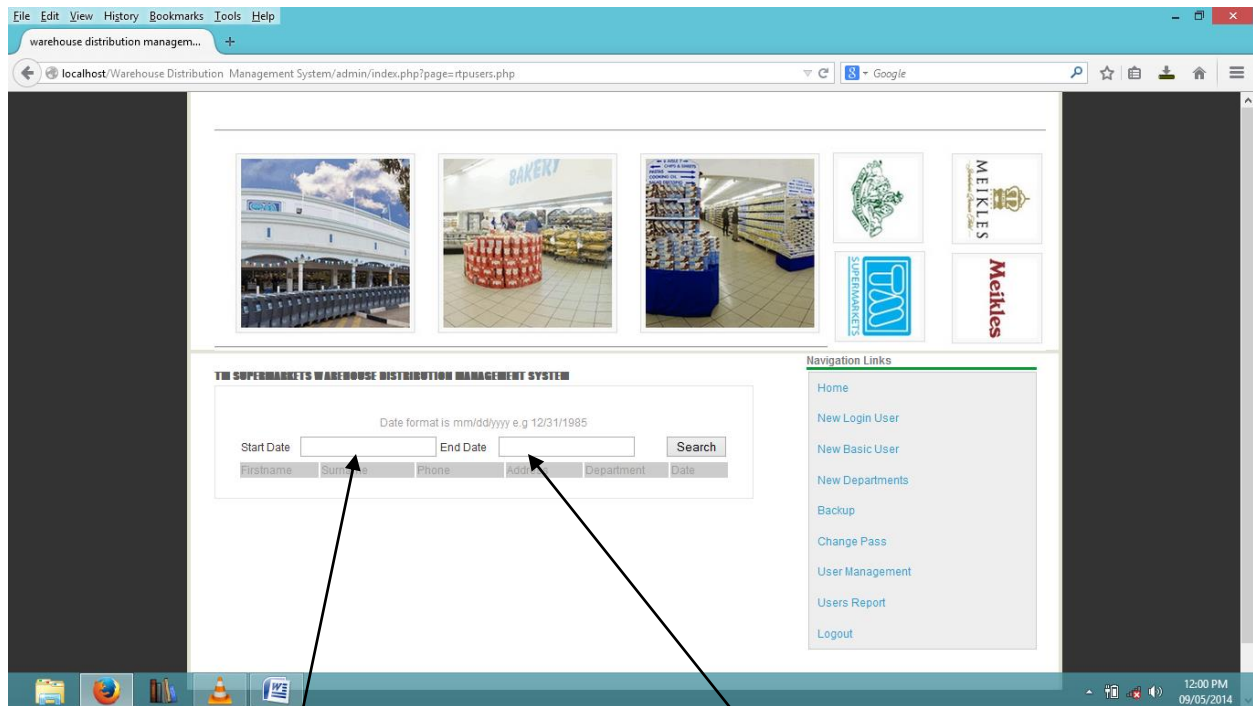
Click change pass

- On the click of the user management button the administrator is able to block a certain user or unblock existing users that will not be of use in the system.

The screenshot shows a web browser window displaying the 'warehouse distribution management' system. The page title is 'TM SUPERMARKETS WAREHOUSE DISTRIBUTION MANAGEMENT SYSTEM'. The main content area is divided into a 'USER MANAGEMENT SECTION' and a 'Navigation Links' sidebar. The 'USER MANAGEMENT SECTION' contains two buttons: 'Block User' and 'Unlock User'. The 'Navigation Links' sidebar includes links for Home, New Login User, New Basic User, New Departments, Backup, Change Pass, User Management, Users Report, and Logout. Three callout boxes with arrows provide instructions: 'Click user management button' points to the 'User Management' link in the sidebar; 'To unblock a blocked user click unblock user' points to the 'Unlock User' button; and 'To block existing user click block user' points to the 'Block User' button.

- After clicking the unblock user the administrator can then click inside the text box written search and type the username of the employee he or she wants to block.
- And when the administrator wants the user to be able to use the system gain, he or will click the unblock user and repeat the steps used in blocking a user.

The users report button is there for the administrator to be able to view all the users that would have been created or a certain period.



Click in the text box and select the start date from the calendar that shows after clicking.

After selecting the start date, click in the text box on the end date section and select the end date from the calendar that shows after clicking.

Clerk's menu

- Clerk's menu the new category button, it is when the clerk enters the categories for example goods being received like perishable foods or fruit and vegetables. So that delivered goods will be grouped according to their categories.

Click this section to add a new category

TM SUPERMARKETS WAREHOUSE DISTRIBUTION MANAGEMENT SYSTEM

[CLICK HERE TO SUBMIT A NEW CATEGORY]

ProductID	Category Name
1	Fresh Foods
4	Cains
5	
6	Bakery
7	5555

Navigation Links

- Home
- New Category
- New Product
- Suppliers
- Trucks
- New Asset
- Asset Register
- Change Pass
- Logout

Click new category

Table with details of already existing categories is shown.

TM SUPERMARKETS WAREHOUSE DISTRIBUTION MANAGEMENT SYSTEM

Category Name

Save

Navigation Links

- Home
- New Category
- New Product
- Suppliers
- Trucks
- New Asset
- Asset Register
- Change Pass
- Logout

Click save after typing the required category name

Click inside the box and type the name of the category you want to add.

- New product button is there to add the new products received by the warehouse department.

Browser address bar: x://localhost/TM...ge=productslist.php

TM SUPERMARKETS WAREHOUSE DISTRIBUTION MANAGEMENT SYSTEM

[\[CLICK HERE TO SUBMIT A NEW PRODUCT\]](#)

Product Name	Description	Category	Quantity
sadza	food to eat	Fresh Foods	89
Bakers Inn Bread	brown	Bakery	56

Navigation Links

- [Home](#)
- [New Category](#)
- [New Product](#)
- [Supplies](#)
- [Trucks](#)
- [New Asset](#)
- [Asset Register](#)
- [Change Pass](#)
- [Logout](#)

Click here to submit new product details

Table showing existing products

Click new product

p://localhost/T...?page=products.php

TM SUPERMARKETS WAREHOUSE DISTRIBUTION MANAGEMENT SYSTEM

Enter New Product

Item Name: beans

Description: green

Category: Fresh Foods

Submit Reset Data

Navigation Links

- Home
- New Category
- New Product
- Suppliers
- Trucks
- New Asset
- Asset Register
- Change Pass
- Logout

Click the boxes and then type in the product name and other product details

Click submit to add the record into the database

- Suppliers' button's function is to add suppliers that provide products or goods and services to the company, entering the supplier name, contact phone, address, email and the product they would have provided or they provide.

Click to add new supplier

TM SUPERMARKETS WAREHOUSE DISTRIBUTION MANAGEMENT SYSTEM

[\[CLICK HERE TO SUBMIT A NEW SUPPLIER\]](#)

Supplier Name	Contact Address	Contact Phone	Email	
Bakers Inn	harare	2147483647	bakersinn@bake.co.zw	[product]
delite	harare	0	delite@dpvttd.c.zw	[product]

Table showing existing suppliers

Navigation Links

- Home
- New Category
- New Product
- Suppliers
- Trucks
- New Asset
- Asset Register
- Change Pass
- Logout

After clicking to enter new supplier then enter details here in the boxes

TM SUPERMARKETS WAREHOUSE DISTRIBUTION MANAGEMENT SYSTEM

Supplier

Email

Contact phone

Contact Address

Submit Reset Data

After typing the supplier details then click submit to save the supplier's details.

Click reset data if you want to add another supplier details

Navigation Links

- Home
- New Category
- New Product
- Suppliers
- Trucks
- New Asset
- Asset Register
- Change Pass
- Logout

- Trucks' button the clerk will be able to add new trucks bought by the organization and even view those that already exist. And for the new truck the clerk will enter details of the truck and is also able to update status of existing or the created truck for purpose of monitoring if the truck will be available or not.

The screenshot displays the 'TM SUPERMARKETS WAREHOUSE DISTRIBUTION MANAGEMENT SYSTEM' interface. At the top, there are three images of supermarket interiors and logos for 'MEIKLES' and 'Meikles'. Below these is a navigation menu with links: Home, New Category, New Product, Suppliers, Trucks, New Asset, Asset Register, Change Pass, and Logout. The 'Trucks' link is highlighted with an arrow and the text 'Click trucks'. In the center, a table lists existing trucks:

Truck Name	Truck Type	Year	Chases	Plate	(status)
Truck 1	Toyota	2000	4555525	ADD-4525	(issue)
2344	Nissan	0	34-987%	ert-4555	

Annotations include: 'Adding a new truck click here' pointing to a link above the table; 'Table showing existing trucks' pointing to the table; and 'Click to view status or reassign a truck' pointing to the status and issue columns. Below the table is a form titled 'Please Enter the vehicle details below to create a new vehicle.' with a note: 'Note: All fields should be filled.' The form fields are: Name, Type (with a dropdown menu showing '--- Select Type ---'), Year, Chases Number, and Registration Plate #. A 'Save' button is at the bottom. Annotations include: 'After filling in details then click save' pointing to the 'Save' button; and 'After clicking the click to submit new truck then enter details of driver' pointing to the form fields.

//localhost/T...age=issue.php&id=2

TM SUPERMARKETS WAREHOUSE DISTRIBUTION MANAGEMENT SYSTEM

Navigation Links

- Home
- New Category
- New Product
- Suppliers
- Trucks
- New Asset
- Asset Register
- Change Pass
- Logout

Driver
Date of return

--- Select Driver ---

May							2014		
Su	Mo	Tu	We	Th	Fr	Sa	1	2	3
							4	5	6
							7	8	9
							10	11	12
							13	14	15
							16	17	18
							19	20	21
							22	23	24
							25	26	27
							28	29	30
							31		

Click next after selecting details to update the status of the truck

When the clerk wants to issue or re-assign a truck. Select name of driver then click in the box to choose date of return

- New asset button, the clerk will be able to view existing assets added into the database and also adding new assets by entering the details of the name of the asset, asset type and also the serial number.

Click here to add a new asset

TM SUPERMARKETS WAREHOUSE DISTRIBUTION MANAGEMENT SYSTEM

[\[CLICK HERE TO SUBMIT A NEW ASSET\]](#)

Asset Name	Serial Number	Asset Type
IPhones	4525656	Phone
8999	%%%%%%%%	Computer

Navigation Links

- Home
- New Category
- New Product
- Suppliers
- Trucks
- New Asset
- Asset Register
- Change Pass
- Logout

Click new asset to add and view assets

Table showing existing assets

Enter New Asset

Asset Name

Serial

Asset Type

Submit Reset Data

Navigation Links

- Home
- New Category
- New Product
- Suppliers
- Trucks
- New Asset
- Asset Register
- Change Pass
- Logout

Click submit to save the details

Enter details in the text boxes of the new asset to be added

- After adding assets in to the system then the asset register button after clicking will be able to display assets available and on the click of reassign then the clerk is able to assign asset to certain employees of certain departments for example a laptop being allocated to an employee Tapiwa Mawoyo in the IT department.

TM SUPERMARKETS WAREHOUSE DISTRIBUTION MANAGEMENT SYSTEM

Asset Name	Serial Number	Asset Type	Staff	
IPhones	4525656	Phone	Rentoman Taks Accounting and Finance	[re-assign]
8999	%%%%%%%%	Computer	barabra manyiyo ITS	[re-assign]

Navigation Links

- Home
- New Category
- New Product
- Suppliers
- Trucks
- New Asset
- Asset Register
- Change Pass
- Logout

Click to re-assign an asset to an employee

Table showing existing assets

Click asset register to register assets

TM SUPERMARKETS WAREHOUSE DISTRIBUTION MANAGEMENT SYSTEM

Assign Asset

Member of Staff

---Select Staff---

Submit Reset Data

Navigation Links

- Home
- New Category
- New Product
- Suppliers
- Trucks
- New Asset
- Asset Register
- Change Pass
- Logout

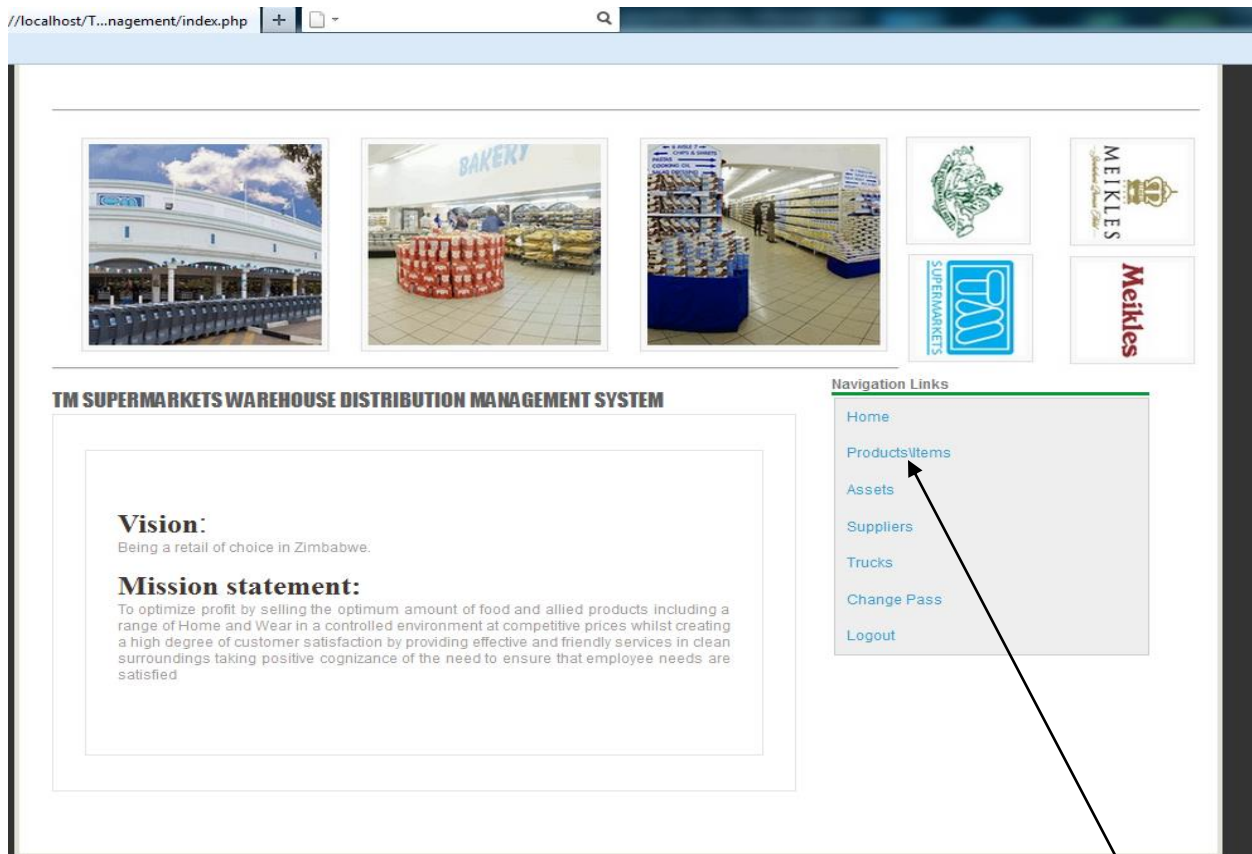
Click submit button after selecting the member of staff

Select member of staff to be assigned the asset

- And the change pass button the clerk is able to change his or her password after being created the administrator by typing in the old password and entering a new password then confirm it and click submit. The procedure is shown in the screen shot explained for change pass on administrator view

Management view

- For the management view the menu has the products/item button, assets, suppliers, and trucks, change pass and logout button.
- Products/ item button allows the management to view products available and those that would have been delivered from different suppliers.



Click products or services to view products brought in by suppliers

/localhost/TM...age=rtppproduct.php

THE SUPERMARKETS WAREHOUSE DISTRIBUTION MANAGEMENT SYSTEM

Date format is mm/dd/yyyy e.g 12/31/1985

Start Date End Date

Product Name Category Quantity

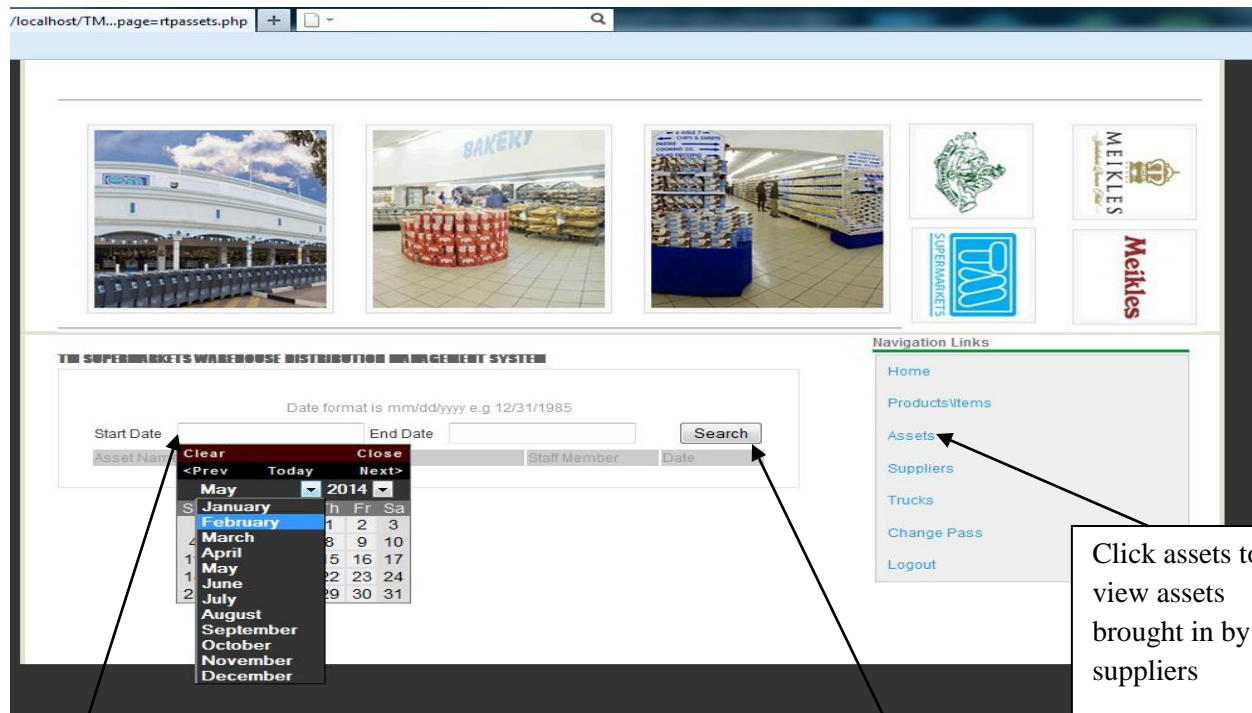
Navigation Links

- Home
- Products/Items
- Assets
- Suppliers
- Trucks
- Change Pass
- Logout

Click in the start date box and select a date from calendar from where the system should start showing you the information you require and do the same on the end date box

Click search after selection of dates then your required report will show

- The asset button is there to enable the management to view assets that would have been entered into the system and allocated to different departments.



Click in the start date box and select a date from calendar from where the system should start showing you the information you require and do the same on the end date box

Click search after selection of dates then your required report will show the assets and who they are assigned to

Click assets to view assets brought in by suppliers

- On the click the suppliers button the management is able to view all suppliers that would have been entered into the database and the date they were created.

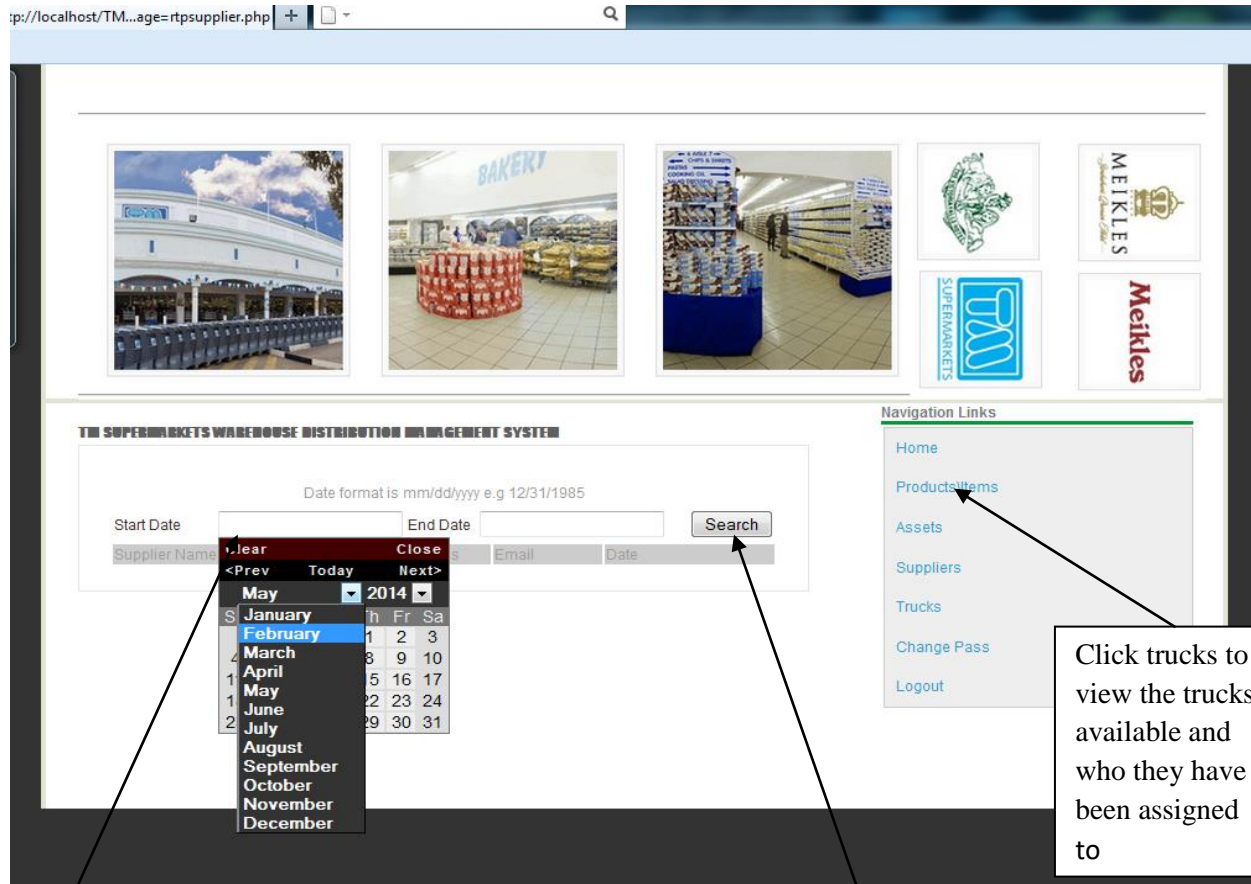
Click in the start date box and select a date from calendar from where the system should start showing you the information you require and do the same on the end date box

The screenshot shows the 'TM SUPERMARKETS WAREHOUSE DISTRIBUTION MANAGEMENT SYSTEM' interface. At the top, there are three images of supermarket interiors and two logos: 'MEIKLES' and 'PAM'. Below the images is a search form with fields for 'Start Date', 'End Date', and 'Supplier Name', and a 'Search' button. A calendar is open over the 'Start Date' field, showing the month of May 2014. To the right of the search form is a 'Navigation Links' sidebar with links for 'Home', 'Products/Items', 'Assets', 'Suppliers', 'Trucks', 'Change Pass', and 'Logout'. The 'Suppliers' link is highlighted. Three text boxes with arrows provide instructions: one points to the 'Start Date' field, another points to the 'Search' button, and a third points to the 'Suppliers' link.

Click search after selection of dates then your required report will show the suppliers and date they have been created

Click supplier to view existing suppliers

- Trucks button allows the management to view the trucks that will be available and the full details of the car or vehicle.



Click in the start date box and select a date from calendar from where the system should start showing you the information you require and do the same on the end date box

Click search after selection of dates then your required report will show the suppliers and date they have been created

Click trucks to view the trucks available and who they have been assigned to

- And the change pass button the management is able to change his or her password after being created by the administrator by typing in the old password and entering a new password then confirm it and click submit. And when done using the system he or she will click the logout button for security purposes. The process is shown under the administrator view menu page.

APPENDIX B: INTERVIEW CHECKLIST

1. In your own opinion is the current system meeting the needs of the staff.
2. What most important improvements you would like to change on the current system?
3. Do you feel like the introduction of a new system is the best thing to do?
4. Do you have any computer literacy skills, if so how much do you know?
5. On average how many suppliers deliver goods and services weekly?
6. Do you have any particular trend you follow when issuing your trucks?

APPENDIX C: QUESTIONNAIRE SAMPLE

Questionnaire presented to employees at the TMPnP Supermarkets as part of the information gathering process.

Please Answer ALL Questions.

a) How would you rate the current manual system in place? (Please tick in front of the suitable answer)

Good **Moderate** **Poor**

b) Did you encounter any difficulties with the current system? If yes please list them below.

.....
.....
.....
.....
.....
.....

c) In your own opinion how do you think the new warehouse distribution Management system will be acknowledged by you or any other workforce at this organization?

.....
.....
.....
.....

d) What benefits would be derived from the introduction of the proposed system?

.....
.....
.....
.....

e) What is your view on the customers' reaction to the introduction of the proposed system?

.....
.....
.....
.....

APPENDIX D: OBSERVATION SHEET

Observations

The researcher observed that the warehouse clerk receives a number of calls from branches or even suppliers because of late delivery and even goods not delivered at the expected date because they will not be having any information on the driver who would have been given warehouse truck. This leads to branches having insufficient stock in their branches thereby not meeting customer's needs. The details of the supplier were only recorded in a record book when the supplier delivers the goods. The warehouse clerk used the traditional method of capturing details of goods delivered, that being a disadvantage in keeping track of the number of goods delivered. Also the trucks take long in offloading for there will be no system to quickly enter all the details of goods received or just updating.

And for the warehouse supervisor he or she has a number of forwarded messages due to lot of complaints from the branches, customers or even the suppliers. If there is late delivery or goods would have not been delivered the management would not quickly recognize, they would recognize after the branch would have called to place a complaint. Delivered assets are not recorded they are given to the departments which would have requested the asset and not keeping record on the name of employee who would have been issued the asset or assets.

Recommendations

The researcher recommend the organization to have a computerized warehouse management system that will reduce call from customers and even suppliers complaining on the delivery problems and the company not meeting the customer's needs. To have a computerized system that keeps track of who and where the truck was issued to, thus reducing theft, fraud and lack of customer loyalty.

Conclusion

The organization needs a computerized system in order to keep records of the goods they will be receiving and issuing to branches and to also keep track of their warehouse trucks and assets received and issued to departments.

APPENDIX E: SNIPPET OF CODE

```
?>
<table width="100%" border="1">
<tr>
<td>Truck Name</td>
<td>Driver</td>
<td>Destination</td>
<td>Date of return</td>
<td>Items Delivered</td>
<td></td>
</tr>
<?php
while($row=mysql_fetch_array($rs))
{
?>
<tr>
<td><?php echo $row["name"]; ?></td>
<td><?php echo $row["firstname"]." ".$row["surname"]; ?></td>
<td><?php
    $rs2=mysql_query("select * from truck_item where id='$row[id]'");
    $row2=mysql_fetch_array($rs2);
    echo $row2["destination"];

?></td>
```

```
<td><?php echo $row["dateback"]; ?></td>
```

```
<td><?php
```

```
        if($_POST["product"] == 0)
```

```
        {
```

```
        ?>
```

```
<script language="javascript">
```

```
        alert("Please select product")
```

```
        location='index.php?page=product.php'
```

```
</script>
```

```
<?php
```

```
        exit;
```

```
    }
```

```
    if($_POST["quantinty"] < 1)
```

```
    {
```

```
    ?>
```

```
<script language="javascript">
```

```
        alert("Quantinty can not be less than zero")
```

```
        location='index.php?page=product.php'
```

```
</script>
```

```
<?php
```

```
        exit;
```

```
    }
```

```
        mysql_query("INSERT INTO item VALUES  
(NULL, $_POST[product], NOW(), $_GET[sid], $_POST[quantinty])") or die(mysql_error());
```

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