

AUTO MOBILE INVENTORY MODEL AND TRANSACTION MANAGEMENT

A CASE STUDY: JACAR LTD NDEEBA

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DECLARATION

We, the undersigned, do hereby declare, that this project Report is an original paper of our research findings and has been compiled by me to the best of my knowledge and that any credit, mistakes and or shortcomings about the paper are duly accountable to us.

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This Project Report entitled: **Auto mobile inventory model and transaction management: A case study: JACAR ltd Ndeeba** was written and constructed under the supervision and approval of;

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20th Sept 2012

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“May the lord our God bless them so much”

ABSTRACT

JACAR ltd ___James Car dealers limited is a Company which is under private Companies dealing in transaction of car, spare parts and Motor cycles.

At the district level, JACAR ltd is under Kampala district which is under the private sector.

The Company is headed by the Company Manager, His major role is to ensure that the Company is mainstreamed in all development plans.

The Company is comprised of four departments namely;

- Managing Dept.
- Sales Dept.
- Purchasing Dept.
- Advertising Dept.

ACRONYMS

JACAR:	James car dealers'
Dept:	Department
ISF:	Information System Fictionalization
SDLC:	System Development Life Cycle
Ltd:	Limited
DBMS	Database Management System
LAN	Local Area Network
IT	Information Technology
E-R	Entity Relationship
M	Many
HCI	Human Computer Interface

DEDICATION

we dedicate this piece of work to our dear parents, Brothers, Sisters and Relatives for their moral, emotional and material support they have rendered to me all in life.

To my dear friends, Remmy, Barbra, Tina, Lydia, Paul for their support to words this achievement.

Special thanks to beloved dad and mum

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CHAPTER ONE

1.0 Introduction

This chapter contains the background of the study, statement of the problem, main objective, specific objectives, scope of the study, and conceptual model.

1.1 BACK GROUND

James car dealers' ltd is located in Ndeeba, Kampala - Masaka Road (Kampala). It started as a small washing bay by Mr. James in 1999 with a very little capital and now it is a very big business dealing in a variety of items such as motor cars, motor cycles and spare parts. They provide mechanical services such as motor cars, motor cycle repair and maintenance. Constantly the washing bay developed and turned out to be a dealers company. It now sales a variety of items, both locally made and imported items, importing them from Japan. These include motor cycle spare parts, motor car spare parts, lubrication oil, and Mechanical items, among others. The company as big as it is, carries out most of its operations manually. The inventory and stock is controlled by counting the items on shelves (stock-taking). They over stock and as a result, some commodities get spoilt, and others become expired before they are sold. There is need to put a computerized system in place that controls the inventory of thousands of Items some of which are replenished several times a day, keep track of all the required information about all the items in the stock, and inventory level. Computerized inventory control systems run on similar principles to manual ones, but are more flexible and information is easier to retrieve. You can quickly get the inventory valuation or find out how well a particular item of stock is moving. A computerized system is a good option for a JACAR dealing in different types of items.

This project involves the design, development and implementation of a computerized information system which will have a database to store the information on product specification such as item description, availability, inventory level, sales, and purchases among others.

1.2 Statement of the Problem

In James car dealers' ltd, they are using a manual system in caring out the stock control operations, which is difficult to update as a result thus overstocking, under stocking of items in the company.

The information kept on paper is insecure and inconsistent, this results in unnecessary expenses to look for misplaced information which can be avoided.

There is need for a computerized information system with a database which can keep track of all the information on every item in the business, information about the employees, customers and suppliers/manufacturers of the items.

1.3. Objectives of the study

1.3.1 Main objectives

1. To design an information system and an inventory model and transaction management this can monitor and track of information about the products, customers' information and suppliers' details. This can monitor the stock levels and automatic updating of the database in James car dealers.

1.3.2 Specific Objective:

- ◆ To study the auto mobile inventory methods
- ◆ To build and test the system to ensure that the system architecture meet the original requirement and work properly
- ◆ To analyze requirements for developing a information system

1.4 The Scope of the Study;

This project was confined only on **James car dealers Ltd** that sells through word-of-mouth. The authority of James car dealers realized and analyzed Information System Functionalities (ISF), Information System business controls and how the company could prosper with computerized control system. Putting such a system in place was limited to analysis, planning Design and Implementation of an Inventory control system in a company that was to keep track of information about the Stock level and information integrity. This is a medium size system with back-end capabilities and meant to offer a controlled Inventory and a proper solution to the stock.

However a prototype of the system will be produced with an implementation plan, but the detailed implementation of the system such as changeover, change management, system support, was not taken care of in the company however; they were discussed completely in the context

of their implementation. The project was also not to cover development costs, running costs and benefits the new system quantified in financial terms.

1.5 Significance of the project:

The study will create awareness on automatic Stock and inventory monitoring, triggering orders when the least level is reached.

With the project in place, efficiency was increased.

The project ensures provision of better services to the customers by ensuring that it produces a receipt to the customers showing the products bought, their prices and balance. The project will also cater for products which have been returned by customers by ensuring that they are properly recorded in the database.

Hopefully this project will increase the security of the company's information from unauthorized persons.

This system ensures that Maximum stock levels are also computerized hence investment on inventory is kept at minimum so that funds are made available for more productive uses thereby avoiding borrowing and consequent loss on interest. Losses are minimized on account of obsolescence due to overstocking. Minimum stock levels will be maintained automatically making sure that items are available in the store where and when needed.

When the system runs on a networked environment, information will probably be shared efficiently hence reducing on the time wasted by moving from one place to another. Since the system will run on a networked environment a database will be used. This will probably increase the privacy of customer's information since the database will be accessed by the authorized personnel only.

1.7 Conclusion

This chapter basically entails what one expects with the current and the new proposed Inventory model and transaction management. The chapter shows the disadvantages of the current system and how the proposed system will solve the problems with the old system.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter provides a critical review of the issues that have been explored and studies both theoretically and empirically in the existing literature made by other scholars and academicians on inventory model and transaction management systems. Literature review covers different knowledge of various authors about the proposed system.

2.1 The importance of an Inventory model and transaction management System

An inventory is a list for goods and materials, or those goods and materials themselves, held available in stock by a business. Inventories are held in order to manage and hide from the customer the fact that supply delay is longer than delivery delay, and also to ease the effect of imperfections in the supply process that lower delivery efficiencies if supply capacity stands idle for lack of commodities.

A company's inventory of goods for sale consists of all the products on its shelves that it has purchased from manufacturers or wholesalers. The company attempts to sell its inventory to consumers.

An inventory information system is a resource that enables the collection, management, control and dissemination of information throughout an organization (Connolly and Begg, 2002).

An Inventory Information System provides for data storage and retrieval in addition to the transformation of data into information and the management of both and data information (Coronel, 2000).

An inventory model system is an integrated package of software and hardware, including people involved in the monitoring of the quantity, location and status of inventory as well as the related re-ordering for stock when a certain level of inventory is reached.

This system is also vital for capturing as well as processing and disseminating information to end-users and composed of People, hardware, software, Databases, application programs and procedures.

The whole process of creating an Inventory model and transaction management system is Known as Control system development (CSD) Based on their use, inventory model and transaction management systems contribute greatly to the creation and maintenance of a competitive advantage. Highly efficient and dependable system of processing, storing, reporting and transmitting data are often essential for a company to be competitive.

Within the framework of system development, application transforms data and information (input) into information (output) that forms the bases of decision making.

Application usually produces formal reports, tabulation and graphic displays designed to produce insight.

Applications are divided into tow parts, data and code. (Hoffer, J.A, Geoge, JF and Valanith, 2005)

2.2 Information Technology

Information technology is a contemporary term that describes the combination of computer technology with telecommunications technology.

All maters concerned with the furtherance of computer science and Technology and with the design, development, installation and implementation of information systems and application.

Also all forms of technology applied to processing, storing, retrieval and transmitting information in electronic form are referred to as information Technology.(Peter Wright's 2001)

The performance of an information system, depend on a triad of factors: System design. Implementation and administrative procedures

It is worth noting that creating a sound inventory control system is hard. System analysis and design require much planning to ensure that all activities will interface with each other that they will complement each other and they will complete on time.

Information Technology architecture is an integrated framework for acquiring knowledge evolving IT to achieve strategic goals, it has both logical and technical components.

Logical components include mission, functional and information requirement and system configuration. Technical components include IT standards and rules that will be used to implement the logical architecture.

In a broad sense, the term database development describes the process of database design and implementation; and the performance of an inventory control system depends on the System Development Life Cycle. (SDLC) whose concept is described below:

2.3 The concept of a System Development Life Cycle (SDLC)

SDLC refers to a logical process by which system analysts, software engineers, programmers and end users build information system and computer applications to solve problems and needs. The SDLC traces the history of the Information System (IS) and provides the “big picture” with in which the design and applications development can be mapped out and evaluated (Coronel 2000)

The SDLC has five functional phases: Planning, Analysis, Design Implementation and Maintenance. The SDLC is an interactive rather than a sequential process. (Hoffer, 2005)

The different phases of the SDLC are illustrated in the figure 01 bellow

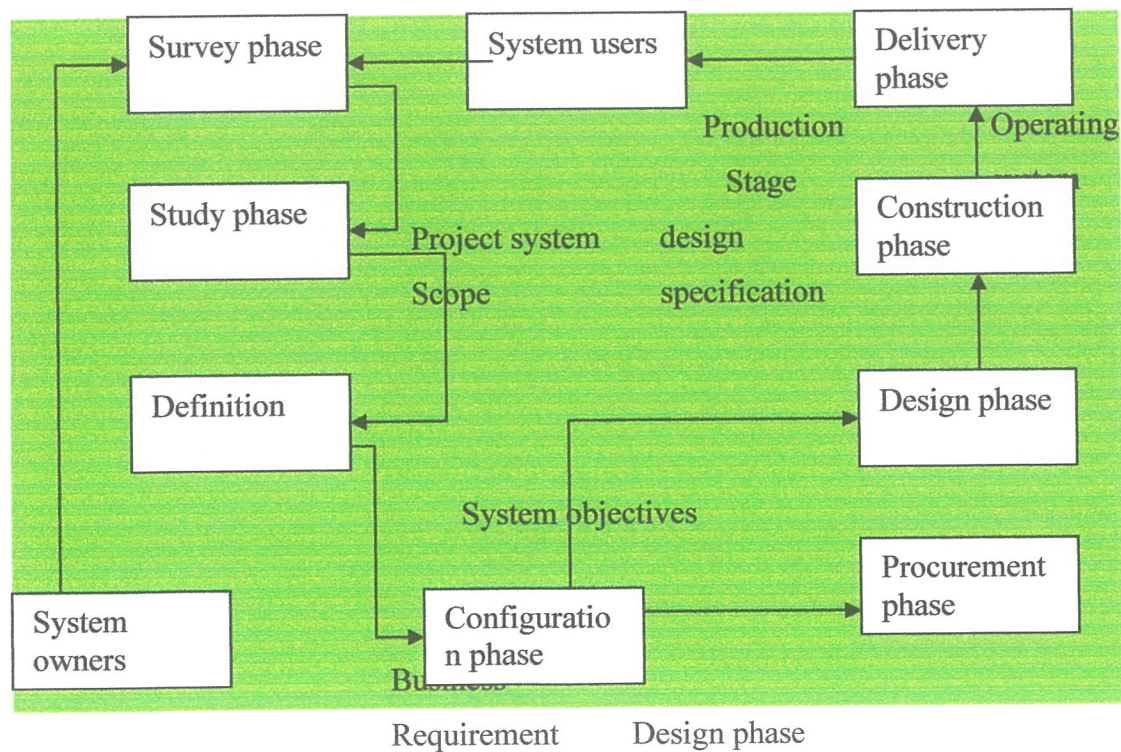


Figure 1: *Illustration of the system development life cycle (SDLC) source*
(shelly etal 2001)

2.4 Prototyping

Prototyping which is also known as iterative design or evolutionary development aims at building a system in a series of short steps with immediate feedback from the users, to ensure that development is proceeding correctly. Prototyping is a process of building a quick and dirty version of the system (Turban, 2001). Prototyping is a technique for quickly building a functioning but incomplete model of information system using Rapid (Whitten, 2000)

2.5 Data as a Corporate Asset

Data is one of the most misunderstood and underestimated asset in the public and private companies. Data are better understood as a source to be translated into information. Whitten et al, (1996) also adds that data is raw facts in isolation. If the information is accurate and timely, its use is likely to be trigger actions that enhance the company's competitive position and generate wealth. As a result, a company is subjected to a data information-decision cycle: The data user applies intelligence to data so as to produce information that is the basis of the knowledge used in decision making by the user (coronel, 2000)

2.6 The concept of database system environment

A database refers to a shared collection of logically related data, and a description of this data, assigned to meet the information needs of an organization. (Coronnolly, Begg, 2002)

A database is information set with a regular structure. Its front-end allows data access, searching and sorting routines. Its back-end affords data inputting and updating. A database is usually but not necessarily stored in some machine-readable format accessed by a computer. There are a wide variety of databases, from simple tables stored in a single file to very large databases with millions of records, stored in rooms full of disk drives or other peripheral electronic storage devices.

2.7 Previous studies

2.7.1 DBMS:

Database today represent the most popular way of organizing information. Database contains two distinct parts, the information itself and the logical structure of information, which is called a data dictionary. A database management system (DBMS) is the software used to specify the logical organization for a database and accesses it. DBMS contains software components for providing the physical bridge (DBMS engine). Defining the logical structure of a database (data manipulation sub system) developing transaction, intensive application (Application general subsystem)

The basic concept and most popular is the relation database model. The relation database model uses two series of dimension at tables or files to store information. The term relation describes each two dimension tables in a relational model.

Examples of DBMS include;

- Ms Access
- Oracle
- SQL sever
- SyBase
- MySQL
- PostgreSQL

2.7.2The advantages of DBMS are as follows:

- 1) Controlling redundancy Data redundancy is controlled by integrating the files so that multiple copies of the same data are not stored.
- 2) Providing storage structure for efficient query processing.
- 3) Restricting unauthorized users. Without suitable security measures, integration makes the data more vulnerable than file based systems. However, integration allows the DBA to define, and the DBMS to enforce database security which may take the form of user name and passwords. The access that un authorized user is allowed on the data may be restricted by the operation type (retrieval, insert, delete, update)

- 4) Providing concurrency by eliminating or controlling redundancy, we are reducing the risks of inconsistencies occurring. If a data item is stored only once in a database, any update to its value has to be performed only once and the new value is available immediately to all users.
- 5) Enforcing integrity constraints, Database integrity refers to the validity and consistence of stored data, this is normally expressed in terms of constraints which are consistence rules that the database is not permitted to violet
- 6) Increased concurrence. DBMS manage concurrence database access.
- 7) Sharing of data. A database belongs to entire organization and can be shared by all authorized users. In this way more users share more of the data.
- 8) Economy of scales. Combining all the organization's operational data into one database and creating e set of applications that work on this one source of data can result in cost savings.

2.7.3 Disadvantages of DBMS

- ❖ Complexity
- ❖ Cost of DBMS
- ❖ Cost of conversion
- ❖ Performance
- ❖ Higher impact of a failure

2.8 Structured Query Language (SQL)

This stands for Structured Query Language. It was formally known as SEQUEL.

2.8.1 It has the following advantages:

SQL is not a complicated programming language and is usually used in conjunction with a host language.

It has English like statements which are easily programmed.

2.8.2 However, SQL has the following limitations

SQL commands are very difficult to remember.

SQL is basically used to do the following:

Data definition language (DDL): It defines the contents of the data stored in the database.

Data Manipulation Language (DML): This is used to insert update and delete data from the database.

2.9 DATABASE SECURITY

2.9.1 Countermeasures – computer-based controls

Authorization

The granting of a right or privilege that enables a subject to have legitimate access to a database system or a database system's object

While conditions control the rendering and processing of specific controls or components on a page, authorization schemes control user access. Authorization is a broad term for controlling access to resources based on user privileges.

Authorization schemes extend the security of your application's authentication scheme. You can specify an authorization scheme for an entire application, a page, or specific page control such as a region, item, or button. For example, you could use an authorization scheme to selectively determine which tabs, regions, or navigation bar entries a user sees.

How authorization works

An authorization scheme either succeeds or fails. If a component or control level authorization scheme succeeds, the user can view the component or control. If it fails, the user cannot view the component or control. If an application or page level authorization scheme fails, then Oracle Application Express displays a previously defined message.

When you define an authorization scheme you give it a unique name. Once defined, you can attach it to any component or control in your application. To attach an authorization scheme to a component or control in your application, simply navigate to the appropriate attributes page and select an authorization scheme from the Authorization Scheme list.

View

A view is a virtual table that does not necessarily exist in the database but can be produced upon request by a particular user, at the time of request.

Backup

Process of periodically taking a copy of the database and log file (and possibly programs) onto offline storage media

Journaling

Process of keeping and maintaining a log file (or journal) of all changes made to database to enable recovery to be undertaken effectively in the event of failure

Integrity

Prevents data from becoming invalid, and hence giving misleading or incorrect results

Encryption

Encoding the data by a special algorithm that renders the data unreadable by any program without the decryption key

2.9.2 Redundant array of independent disks (RAID)

Hardware that the DBMS runs on must be *fault-tolerant*, meaning that the DBMS should continue to operate even if one of the hardware components fails.

Suggests having redundant components that can be seamlessly integrated into the working system whenever there are failures

One solution is to provide a large disk array comprising an arrangement of several independent disks that are organized to improve reliability and at the same time increase performance.

2.10 Visual Basic:

Visual basic is a high level programming language evolved from the early DOS version called BASIC. Basic means 'Beginners All-purpose Symbolic Instruction Code'. It is a fairly easy programming language to learn. The code looks a bit like English language. Different software companies produced different versions of BASIC such as Microsoft QBASIC, QUICK BASIC, GWBASIC, and IBM BASIC and so on.

The Inventory control system will use visual Basic programming language to build the user interface. Visual Basic is a programming environment that is, a program specifically designed to facilitate the creation of new programs .Visual Basic runs on windows operating system and it is mostly used to create business applications (Burrows and Langford, 2000).

2.11 BARCODE

A barcode (also bar code) is a machine-readable representation of information (usually dark ink on a light background to create high and low reflectance which is converted to 1s and 0s). Originally, barcodes stored data in the widths and spacing of printed parallel lines, but today they also come in patterns of dots, concentric circles, and text codes hidden within images. Barcodes can be read by optical scanners called barcode readers or scanned from an image by special software. Barcodes are widely used to implement Auto ID Data Capture (AIDC) systems that improve the speed and accuracy of computer data entry. An advantage over other methods of AIDC is that it is less expensive to implement.

2.11.1 Benefits/ reasons of using barcodes

In point-of-sale management, the use of barcodes can provide very detailed up-to-date information on key aspects of the business, enabling decisions to be made much more quickly and with more confidence. For example:

- Fast-selling items can be identified quickly and automatically reordered to meet consumer demand,
- Slow-selling items can be identified, preventing a build-up of unwanted stock,
- The effects of repositioning a given product within a store can be monitored, allowing fast-moving more profitable items to occupy the best space,
- Historical data can be used to predict seasonal fluctuations very accurately.
- Items may be re-priced on the shelf to reflect both sale prices and price increases.
- When a manufacturer packs a box with any given item, a Unique Identifying Number (UID) can be assigned to the box.
- A relational database can be created to relate the UID to relevant information about the box; such as order number, items packed, quantity packed, final destination, etc...
- The information can be transmitted through a communication system such as Electronic Data Interchange (EDI) so the retailer has the information about a shipment before it arrives.

The reason bar codes are business friendly is that bar code scanners are relatively low cost and extremely accurate.

2.12 BARCODE READER

2.12.0 A barcode reader

(or barcode scanner) is an electronic device for reading printed barcodes. Like a flatbed scanner, it consists of a light source, a lens and a photo conductor translating optical impulses into electrical ones. Additionally, nearly all barcode readers contain *decoder* circuitry analyzing the barcode's image data provided by the photo conductor and sending the barcode's content to the scanner's output port

2.12.1 Methods

Barcode Readers are usually offered from three lines of heritage:

- Handheld readers for semi-automatic reading: The operator need not write, but must at least position the Reader near the label
- Fix-mount readers for automatic reading: The reading is performed laterally passing the label over the reader. No operator is required, but the position of the code target must coincide with the imaging capability of the reader
- Reader gates for automatic scanning: The position of the code must be just under the gate for short time, enabling the scanner sweep to capture the code target successfully.

This leads to the segregation of in-line reading, semi-automatic reading, and automatic scanning.

The reader types can be distinguished as follows:

- **Pen type readers**

Pen type readers consist of a light source and a photodiode that are placed next to each other in the tip of a pen or wand. To read a bar code, the tip of the pen moves across the bars in a steady motion. The photodiode measures the intensity of the light reflected back from the light source and generates a waveform that is used to measure the widths of the bars and spaces in the bar code. Dark bars in the bar code absorb light and white spaces reflect light so that the voltage waveform generated by the photo diode is a representation of the bar and space pattern in the bar code. This waveform is decoded by the scanner in a manner similar to the way Morse code dots and dashes are decoded.

- **Laser scanners**

Laser scanners work the same way as pen type readers except that they use a laser beam as the light source and typically employ either a reciprocating mirror or a rotating prism to scan the laser beam back and forth across the bar code. As with the pen type reader, a photodiode is used to measure the intensity of the light reflected back from the bar code. In both pen readers and laser scanners, the light emitted by the reader is tuned to a specific frequency and the photodiode is designed to detect only this modulated light of the same frequency.

- **CCD Readers**

CCD readers (also referred to as **LED scanner**) use an array of hundreds of tiny light sensors lined up in a row in the head of the reader. Each sensor can be thought of as a single photodiode that measures the intensity of the light immediately in front of it. Each individual light sensor in the CCD reader is extremely small and because there are hundreds of sensors lined up in a row, a voltage pattern identical to the pattern in a bar code is generated in the reader by sequentially measuring the voltages across each sensor in the row. The important difference between a CCD reader and a pen or laser scanner is that the CCD reader is measuring emitted ambient light from the bar code whereas pen or laser scanners are measuring reflected light of a specific frequency originating from the scanner itself.

2.12.2 D imaging scanners

These are the fourth and newest type of bar code reader currently available. They use a small video camera to capture an image of a bar code. The reader then uses sophisticated digital image processing techniques to decode the bar code. Video cameras use the same CCD technology as in a CCD bar code reader except that instead of having a single row of sensors, a video camera has hundreds of rows of sensors arranged in a two dimensional array so that they can generate an image.

The **POS terminal** only needs to pass the **bar code** on each item past a **laser scanner**. The scanner reads the code number stored in the bar code and sends it directly to a computer. The computer checks the code and, if it is valid, looks up the product's name and price in data files

held on disc. The name and price are sent back to the POS terminal. In this way the POS terminal can print out an itemized receipt.

2.13 Conclusion

According to the studies carried out, the company found out that the existing system must be changed.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter includes items such as research procedure, target population, sample population, data collection, fact finding techniques, development methodology, information system plan, feasibility analysis, project plan, and risk assessment.

3.1 Research Methodology

3.1.1 Target Population

In this section, data collection techniques targeted senior manager and operational managers of the company selling products from traditional retail way. This was because; these categories of managers can give complete and correct information that can be used to determine the requirements for the system under investigation. Research targeted customers that purchase from the company. All this information would be enough to meet the requirements of the system.

3.1.2 Sample selection

The researcher used purposeful sampling technique to choose respondent who were able to give reliable and accurate information due to their position of authority and expertise. Therefore, senior manager of the company were expected to give information concerning strategic objectives, politics organizational structure and human resource.

Operational managers were to give information about the business procedure, problems encountered with customers, customer care and motivation.

3.1.3 Research procedure

Before starting the research project, a letter of introduction was secured from the relevant authorities. Thereafter the researcher went to the areas of consideration to meet the top manager of the business and to secure a letter of acceptance to carry out research there.

Prior to commence with the data collection, the researcher reviewed and studied other leading Car dealers' company in order to know what factors enable inventory model and transaction manager to work properly and efficiently.

Then time for collecting data from the company under consideration came, schedules were drawn with the manager so as not to disrupt normal flow of activities of the business.

The researcher also analyzed products in the company and the customers.

This was intended to discover issues with the tradition retail stores and needs for the future. The researcher expected to gather facts, opinions and speculations.

3.1.4 Data collection

Data collection involved reviewing primary and secondary data sources. For example: text books, reports, and the Internet in order to determine the requirements of the intended system. This included reviewing, understanding as much relevant information regarding the company's strategic objectives, processes and information systems, product requirements organization structure, system requirements and customer perspectives. Therefore, the information was collected from the strategic manager, operational managers and the customers of the company in question, in order to capture well the appropriate requirements, various technique in data collection were used based on the traditional i.e. Interviews, Questionnaires, Observation, document analysis and secondary data sources.

3.1.5 Data collection tools

The research instruments included Questionnaires and interview schedules composed of open-ended and close-ended questions, structured and semi-structured questions, multiple choice questions, which allowed respondents to give views and opinions, and also specific reasons, were provided.

The instruments were designed to capture as much relevant information as possible in a shortest time possible.

Observation was also used to complement interviews and questionnaires

3.1.5.1 Questionnaire

This is a written document that was used to gather data from a large number of people in the same region. The users were sometimes remote from the analysis, making them inaccessible due

to work related conditions. In these circumstances were used to gather facts, attitudes and some suggestions about the system.

Below are the reasons as to why questionnaires are used;

- i. The questionnaire was answered quickly. People finished quickly and returned them at their convenience.
- ii. Questionnaire proved to be relatively cheap in gathering the information.
- iii. Response came very fast.
- iv. The researcher found out that questionnaire allowed individuals to maintain anonymity, therefore individuals provided real facts rather than what their bosses wanted them to tell us.

3.1.5.2 Interviewing:

These are formal meetings where the analyst attempts to obtain information by asking questions. Interviews were used to get data on processes and operations, verify understanding of the system and to build user confidence in the new system.

Below are the reasons as to why interviews were used

- a) First hand information access was possible.
- b) Interviews made me feel as though I was part of the system.
- c) Interviews eliminated the fear that the interview might have had.

3.1.5.3 Observation:

This is the gathering of data by observation methods. Observation enables the analyst to have an inside of the operation rather than the outside of the system.

It was established that through observation, vital data could be gathered by a technique known as participatory observation.

Observation was done through attending the company's workshops and making inspections in different departments of the company.

3.1.5.4 Documentation:

Documentation and literature on available control data management or related systems were studied. This was done by reading of relevant Journals; some relevant software also had

documentation which was studied, for example Visual Basic, MYSQL and Oracle on the JACAR ltd.

This is important for the establishment of the control data management system.

3.2 Data Analysis and Development of a prototype

Data analysis involved analyzing the questionnaires and interviews schedules, documents, reports and forms and by interpreting the results. Also results from the questionnaires and interviews were rechecked for accuracy.

Document analysis was carried out with an aim of discovering the problems within James car dealers' ltd, opportunities to meet new needs, company directives and rules and information processing. . The existing system was analyzed by collecting facts from the existing documentation so that the researcher can know the problem with the current system and be able to come up with solutions.

The requirements of the new system were determined and structured depending on Data, Process and Logic.

The goal of requirement analysis is to discover and resolve the problems with the requirement and reach agreement on any modifications in order to satisfy the user. Designing the new system was done after the requirements analysis phase had been done. A network and database architecture design was made to show how the database and the network system were interconnected. The prototype was developed after the design of the system was complete. The prototype was implemented only to the point that the users were given the opportunity to experience working with the prototype and the system was then tested to ensure that it functioned as expected.

3.3 Kind of information to be stored

The database of this company mainly stores information about the following:

- i. Back ground of the company
- ii. Information Staff members
- iii. Information Assets of the company
- iv. Information of all Items sold in the company

- v. Information about the suppliers
- vi. Information about the customers of the company
- vii. Future prospects of the company

3.4 Development Methodology and Tools

The system was developed using the system development life cycle. During the planning step, the researcher identified the scope and the boundary of the system and planned the development strategy and goals. In the analysis stage, the researcher studied and analyzed the problem, causes and effects of the new system and also analyzed the requirements that had to be fulfilled for the new system to be successful. The researcher then designed the new system and developed a prototype.

3.5 System testing

3.5.1 Unit testing

This was done for validation of the system

3.5.2 System testing

The system was integrated and tested before the implementation

3.6 Tools

Visual basic programming language was used to develop the user interface. This is because visual basic offers a strong Graphical User interface (Aronson, 2001). Oracle was used to develop the database which will store the information and handle the large number of clients. This is because Oracle can be used in distributed computing, that is it can be used in a networked environment. The application operates on Windows operating systems this is because windows operating system is widely used in many organizations.

3.7 System Design

System design can be described as a process of defining the hardware and soft ware architecture, components, modules, interfaces and data for a system to satisfy specified requirement. The preparation of an assembly of methods, procedures, or techniques united by regulated interaction

to form an organized whole. In other words the researcher described the hardware and the software which was used to develop the system.

This phase follows the analysis phase. After the analysis phase has been completed successfully, this phase uses the information already obtained in system analysis and it produces a design specification for the new system by building a representation of the new system. It normally involves two broad stages i.e. logical and physical design. At this period the interaction between the users and the developers is the key to successful system which will meet the required information requirements determined by the system analysis process.

3.6.1 Logical design

This is concerned with the conversion of logical record structures to a data model supported by a DBMS identifying the entities, attribute and the relationship type determining the attribute's domain.

3.6.1.1 Entity Relationship Diagram

An entity relationship model is part of system development methodology that provides an understanding of the logical data requirement of a system independently of the systems' organization and process. It also reflects a static view of the relationship between different entities

3.6.1.2 Basic concepts about entity relationship model (E-R model)

The ER model employs three basic sets of components; Entity set, Relationship set and Attributes.

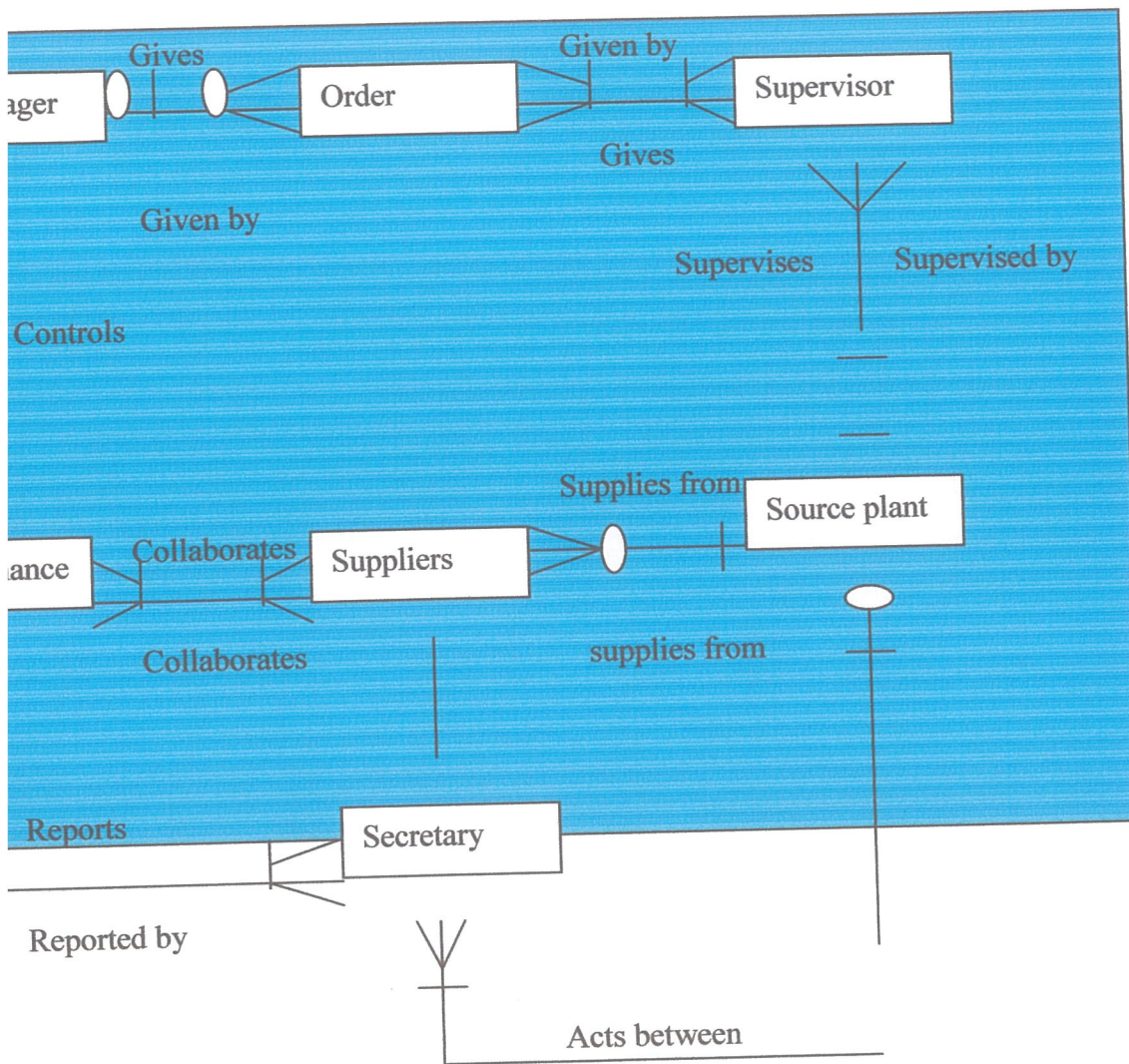


Figure 2: E-R diagram for an inventory model system

The above diagram is an E-R diagram from which one can note that a supplier can supply many items, which is a one-to-many (1 or M) relationship. Also a department can have many assets, indicating a one-to-many relationships.

It is also possible that many suppliers can supply many items, which is a many to many relationship (M or M)

It can also be seen that one staff member can attend to many suppliers, which is a one to many relation (1 or M)

3.6.2 Physical Design

Design shows not only what a system does, but also how the system is physically and technically implemented. It transforms the logical design material into real computer work and describes how the logical structure is to be physically implemented in the target database management system

Column Name	Data Type	Null able	Default	Primary Key
ITEM_ID	VARCHAR2(10)	No	-	1
ITEM_NAME	VARCHAR2(30)	Yes	-	-
ITEM_TYPE	VARCHAR2(20)	Yes	-	-
DESCRIPTION	VARCHAR2(60)	Yes	-	-
COST_PRICE	NUMBER	Yes	-	-
QUANTITY	NUMBER	Yes	-	-
SUPPLIER	VARCHAR2(30)	Yes	-	-
MANUFACTURE_DATE	DATE	Yes	-	-
EXPIRY_DATE	DATE	Yes	-	-
PURCHASE_DATE	DATE	Yes	-	-
DEPARTMENT	VARCHAR2(30)	Yes	-	-
STAFF_ID	VARCHAR2(10)	Yes	-	-

Figure 3: A table for item

Column Name	Data Type	Null able	Default	Primary Key
STAFF_ID	VARCHAR2(10)	No	-	1
FIRST_NAME	VARCHAR2(20)	Yes	-	-
LAST_NAME	VARCHAR2(20)	Yes	-	-
OTHER_NAME	VARCHAR2(20)	Yes	-	-
SEX	VARCHAR2(20)	Yes	-	-
STATUS	VARCHAR2(20)	Yes	-	-
ADDRESS	VARCHAR2(50)	Yes	-	-
DATE_OF_BIRTH	DATE	Yes	-	-
POSITION	VARCHAR2(50)	Yes	-	-
RESPONSIBILITY	VARCHAR2(50)	Yes	-	-
				1 - 10

Figure 4: A table for staff

Column Name	Data Type	Null able	Default	Primary Key
SUPPLIER_ID	VARCHAR2(10)	No	-	1
FIRST_NAME	VARCHAR2(20)	Yes	-	-
LAST_NAME	VARCHAR2(20)	Yes	-	-
SEX	VARCHAR2(20)	Yes	-	-
ITEM	VARCHAR2(20)	Yes	-	-
ADDRESS	VARCHAR2(50)	Yes	-	-
PHONE_NUMBER	NUMBER	Yes	-	-
EMAIL_ADDRESS	VARCHAR2(30)	Yes	-	-
STAFF_ID	VARCHAR2(10)	Yes	-	-
				1 - 9

Figure 5: A table for supplier

Column Name	Data Type	Null able	Default	Primary Key
CUSTOMER_ID	VARCHAR2(10)	No	-	1
FIRST_NAME	VARCHAR2(20)	Yes	-	-
LAST_NAME	VARCHAR2(20)	Yes	-	-
ADDRESS	VARCHAR2(60)	Yes	-	-
SUBSCRIPTION_FEE	NUMBER	Yes	-	-
DEPARTMENT	VARCHAR2(20)	Yes	-	-
STAFF_ID	VARCHAR2(10)	Yes	-	-
				1 - 7

Figure 6: A table for customer

3.7.1 System Request

System request report is a document which tries to solve the problem of the organization. It shows the value of the system to the organization.

3.7.2 Name of the project

Auto Mobile Inventory Model and Transaction Management using Oracle, Demo, and Visual Basic (V.B)

3.7.3 Name of the organization

James Car Dealers' ltd

3.7.4 Business needs of the organization

The business needs of the company includes placing and processing of orders, maintaining Inventory levels and also keeping customers' information privacy.

The company deals in a variety of items such as motor cars, motor cycles, and spare parts. They also provide mechanical services such as motor cars and motor cycles repair and maintenance.

3.7.5 Expected functionality of the system

The system is expected to automate the business process of the company. The system will also run on a networked environment (LAN) share the resources i.e. the database. The system will enable the users to know the quantities of Inventory levels i.e. reorder levels, minimum and maximum Inventory levels.

3.7.6 Expected value of the system

The system is expected to improve efficiency in conducting the business processes, hence saving time and money. The system will also increase the security of the customer's information from unauthorized persons. Sensitive information will also be protected from access by unauthorized people by using views and granting of privileges in the database.

3.8 Feasibility Analysis

The users were not experienced with the new system hence they needed to be trained but it did not take a lot of time. The programmer was also well experienced with the development tools. For instance the programmer was knowledgeable with visual basic programming language which was used to develop the user interface. The development tools were also available that is, the DBMS and other software like the visual basic were readily available.

3.8.1 Economic feasibility

The expected benefits of building the system will be (tangible benefits) Fewer processing errors because all processes will be automated and decreased response time between when a query is sent and when the feedback is received will be expected, also elimination of job steps i.e. keeping the inventory levels can be done by one individual. Also the overall expenses of the company will be reduced because of reduced number of employees.

3.8.2 Intangible benefits

Improved customer goodwill will be expected because the system will ensure that time is saved and this increases efficiency. The employee moral will be improved because it will be less tedious to use the new system than using the manual system. The system will likely enhance better decision making, that is, through reviewing the computerized summaries the managers will be able to make quick decisions based on accurate information because computers rarely make errors. The cost of developing the system will be estimated from the outset of the project and it will be reviewed after the end of each project phase.

3.8.3 Organization feasibility

The management and the end users are likely to have a positive attitude towards the system because it has been tedious conducting business processes manually. Although some end-users may resist the new system, for the fear of losing jobs, this problem can be avoided by retraining the employees and motivating them. It is also expected to be difficult getting information from the owners because of their tight schedule. Training users is expected to be easy because the system will have an easy to use graphical user interface.

3.9 Risk assessment

Every business decision has a degree of risk and uncertainty; this also includes building a new system. For instance lack familiarity of development tools may delay the project completion making it lag behind schedule. However this risk was avoided by training and acquiring expertise on the unfamiliar tools. Also managing the four phases of the system development life cycle was not easy. It is not easy to manage the implementation phase and complete it in time. This can be controlled by acquiring professional guidance whenever possible.

3.10 Conclusion

This chapter explains all the possible methods that will enhance the effectiveness of the proposed system. This will be in line with the use of the methodologies described in its various stages of which range from feasibility study of the current system definition of requirements and solution of technical system.

CHAPTER FOUR

REPRESENTATION OF THE FINDINGS AND SYSTEM DESIGN

4.0 Introduction

This chapter explains the logical design, physical design developed by the researcher, entity relationship diagram, data flow diagram, the new design system, data input and findings from questionnaires and observation. The new system is designed to meet the needs of James car dealers' ltd as far as Inventory model is concerned. It is also designed to ensure accurate record keeping and provide better services to customers. It will be expected to overcome the shortfalls associated with the current system.

4.1 Analysis

The information was gathered from the users of the system and could be function system requirement and user system requirements.

Function system requirements include; the system which is not slow.

User system requirements include; the system which can update itself automatically.

4.2 User Interface

The goal of the interface design is to provide the best way for people to interact with the computers, or what is commonly known as human computer Interface (HCI). Provision of good interface is becoming more important because of its impact on the organizations. This impact is increasing, because most people in organizations are spending more time with computers as part of their normal work they enter transactions retrieve data, design artifact, and do other myriad things that to be done in the organizations.

Some of the interfaces designed for JACAR dealers' ltd are shown below

Startup Form

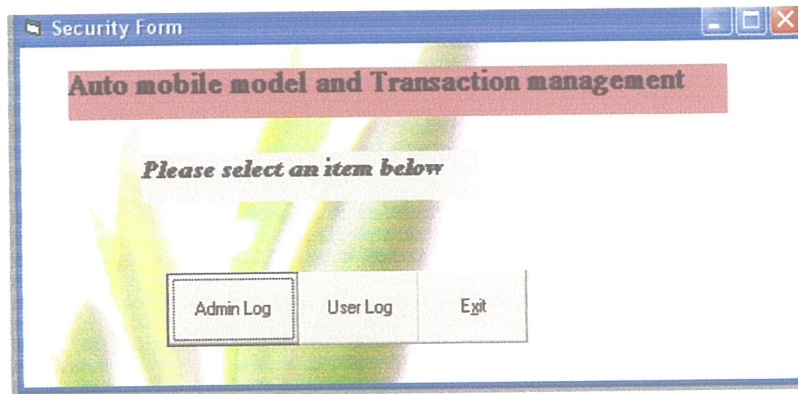


Figure 7: Startup form

The above is the interface through which one can access the login form.

It allows the user to access either the Admin Login or User Login.

The Exit button allows the user of the application to unload the application

Login Form

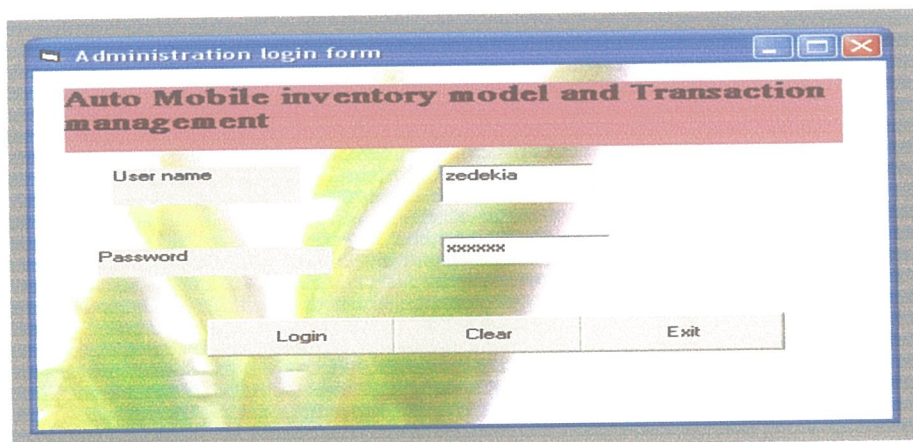


Figure 8: Login form

Figure above illustrates the administrator's login form. This form allows an authorized user to login with the correct password to access all the information stored in the database.

After logging in the correct names and passwords, the company's information is accessed like customers' form, suppliers' form and others.

Staff Form

Staff_ID	S4002	First_Name	Ebiringire
Last_Name	Johnson	Status	Married
Sex	male	DOB	4/14/1679

Add New Delete Next Record Previous Record Last REcord First Record Exit

Figure 9: A Form for Staff.

The figure above shows a staff form. This form displays information about staff members. It gives information like Staff identification number, staff first name, second name, sex, status, address, date of birth, position.

Using this form an administrator can either add or delete a record from the database.

The Next, Previous, Last, First buttons prompts the user to select a record of the choice and the Exit button terminates the application

Suppliers' Form

Suppliers'_ID	C090	First_name	Adams
Last Name	Brown	Items	Colora
Sex	Male	Address	Japan
Email Address	admsbrown@hotmail.org		

Add New Delete Next Record Previous Record Last REcord First Record Exit

Figure 10: A Form for Suppliers

The figure above shows the suppliers' form. It contains all the information about every supplier of all categories of items sold in the company. It displays the supplier's identification number,

first name, last name, sex, the item supplied, address, E-mail address. Here also an Administrator can add or Delete records in the Database. The Next, Previous, Last, First buttons prompts the user to select a record of the choice and the Exit button terminates the application

Items' form

The screenshot shows a window titled "Items Form" with a red header bar that reads "Auto mobile inventory model & transaction management". The form contains the following fields and values:

Field	Value
Item's_ID	Mer090
Item Name	Landcruzer
Item type	Mercedes_benz
Item Description	Motor_cars
Cost_Price	\$1500
Manufacturing Date	12/5/1990

At the bottom of the form, there is a row of buttons: "Add New", "Delete", "Next Record", "Previous Record", "Last Record", "First Record", and "Exit".

Figure 11: the form for Items

From the above figure, shows all items sold in company. The form includes all the information concerning every item such as item's identification number, item's name, type, its description, its cost price, manufacturing data. The Next, Previous, Last, First buttons prompts the user to select a record of the choice and the Exit button terminates the application

4.3 The new computerized system:

A new computerized system has been developed with the capability for storing a vast piece of information. The main difference between the old system and the new computerized system is that, data capturing and processing is computerized and that computers are used instead of papers or books. It requires less storage space. It is also much more efficient since it can generate reports with in minimum time and with minimal errors. In this section each process is explained precisely including inputs, condition/logic, outputs and data storage associated with each process.

Below is the illustration

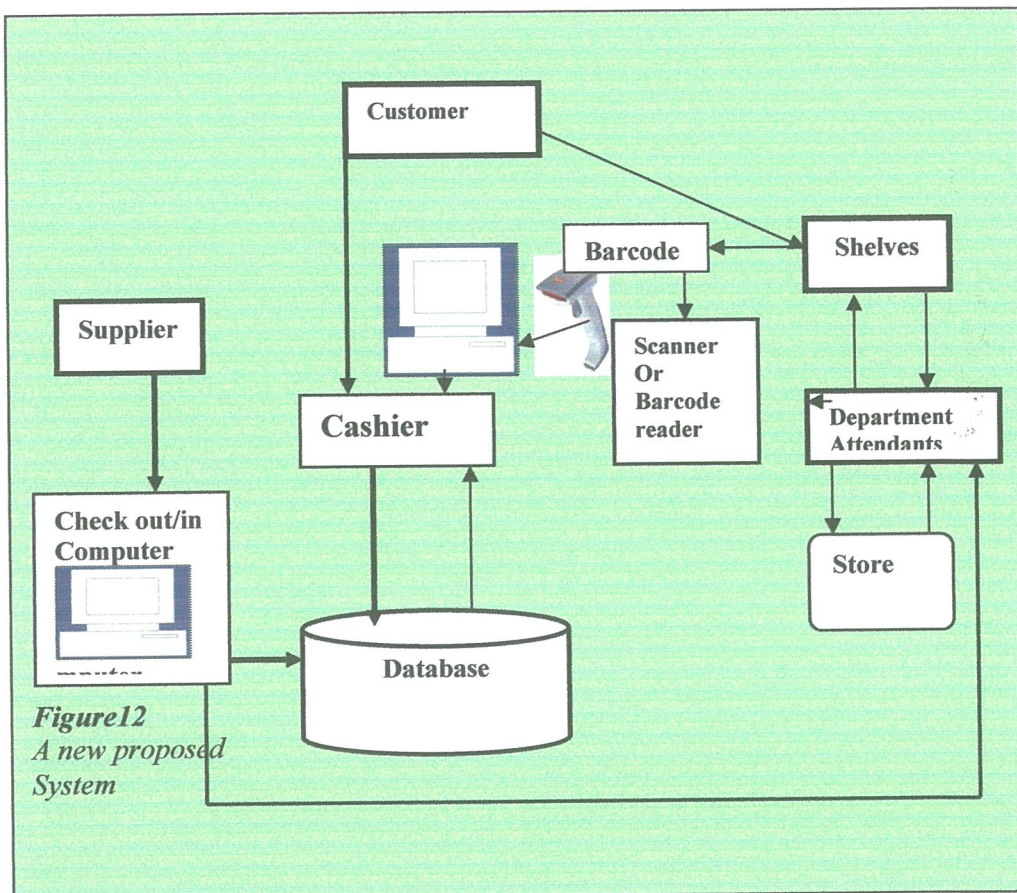


Figure12
A new proposed
System

4.3.1 THE DATA FLOW MDIAGRAM

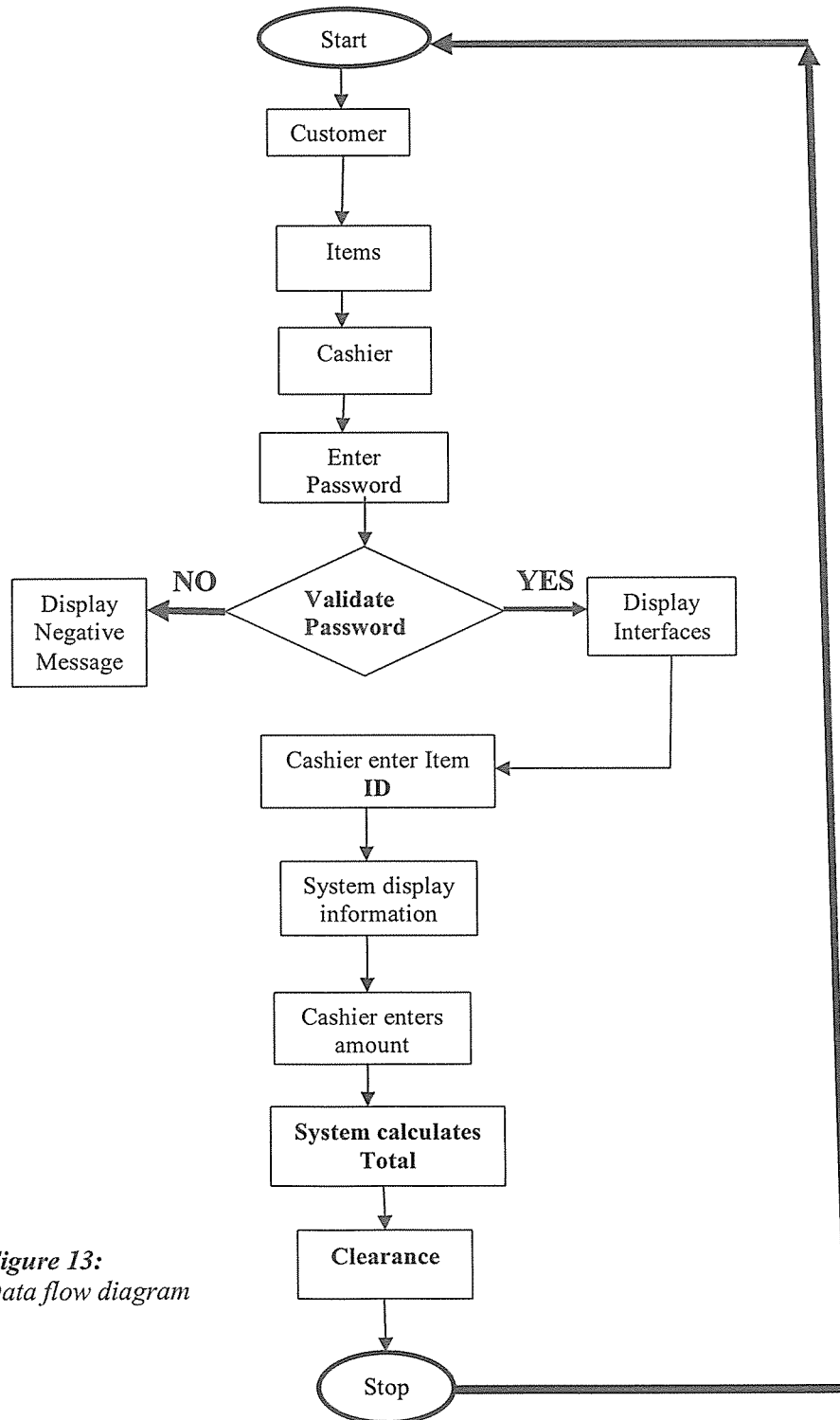


Figure 13:
Data flow diagram

CHAPTER FIVE

SYSTEM IMPLEMENTATION

5.1 Introduction

This chapter contains program testing, project implementation, user interfaces and system conversion. System implementation entails the construction of the new system and delivery of that system into production (day to day operation.) Prior to system implementation, it's necessary to carry out training since it enables users to gain maximum benefits from the new system. Managers should learn that the system is capable of functioning to the benefits of the organization. Operators need training in data entry and how to retrieve data stored in files. The goals are to convert the system models, specified as a structure chart, into a set of program modules.

5.2 Unit Testing

Unit testing is recognized as an important part of quality assurance. Testing as shown below proceeds in parallel with system development, here a test plan is developed in parallel with system design. The test plan is then used in system testing. Testing proceeds through a number of steps.

First individual programs modules are tested by their developers. Once Individual modules are tested, the next step is to test whether they can be combined. This is known as **integral testing**; groups of modules are combined into test modules and tested together. The goal is to determine whether the interfaces between modules work properly. Then the entire system is tested.

Below are Reports after unit testing of different designed Tables

Staff_table

Staff_ID	Fname	Lname	Sex	Status	DOB	Address	Position
S4011	Dr Margie	Kakas	F	Married	12/9/1988	Kampala	Finance
S4023	Akankwasa	John Jude	M	Married	2/7/1890	Kobale	Supervisor
S4021	Magoole	Wilson	M	Married	2/3/1897	Jinja	Sales Manager
S4002	Ebiringire	Johnson	M	Married	4/14/1679	Kyebanda	Managing Director
S4030	Mirembe	Deborah	F	Single	2/6/1989	Kireka	Secretary

Edit

Figure 14 A report from staff table (Staff Entity)

Items' Table					
Item_ID	Item_Nam	Item_Type	Item_Description	Cost_p_rice	Manufacturing_Date
Mea090	Landcruizer	Mercedee benz	Motor Cars	\$1,300.00	12/5/1998
Mea678	Range_Rove	Mercedee benz	Motor Cars	\$4,570.00	12/7/2005
Co004	Posh	Corona	Motor Cars	\$230.00	7/9/1999
Bo9898	Boner	Senke	Motor Cycle	\$300.00	3/4/2007
Ba6783	Bajaji	bajaji	Motor Cycle	\$250.00	4/6/2008
Se098	Senke	Senke	Spare parts	\$450.00	6/15/2006
Ta679	Track	Mercedee benz	Motor Cars	\$23,460.00	8/17/1989

A figure: 15 Item report

Suppliers' Table

Suppliers'	Fname	Lname	Sex	E-Mail Addresss	Addres	Item
C090	Adams	Brown	Male	admsbrown@hotmail	Japan	Colora
C053	Cris	Donavan	Male	Cris@gmail.org	Netherland	Jeep
C075	Barban	Willis	Female	Willis@yahoo.com	England	Mercedece_be
C098	Marka	Bobson	Male	bobson@mail.org	Japan	Bajaji
C078	Budul_bin	Hassan	Male	hassan@mail.org	Dubai	Trucks

A figure: 16 Supplier report

Customers' Table

Custo	Fname	Lname	Address	Tel	scription	fee	Gender	Status
J001	Kayanga	Dan	Mbale	8E+08	400,000	M		single
J002	Kagoya	Asha	Ndeeba	3457	400,000	F		married
J003	Muwonge	Fred	Nabutiti	9E+06	400,000	M		widow
J004	Semwogere	Andrew	Kawempe	3E+06	400,000	M		married
J005	kukunda	Annita	Muyenga	8E+08	400,000	F		single
J006	Katoora	Rose	Gaaba	8E+08	400,000	F		single
J007	Edema	Jose	Netote	8E+08	400,000	M		married
J008	Igwe	Molline	Makindye	1E+09	400,000	F		single
J009	Musa	Denis	Nkuruma Rd	3E+08	400,000	M		married
J010	Mutesi	Hajjira	Byeyogerere		400,000	F		married

A figure: 17 Customers' report

5.3 System Conversion:

System conversion, which is also called system change over, takes place upon the approval of the system testing. The parallel method of conversion from the current system to the new system was selected as the most appropriate for the current Operation.

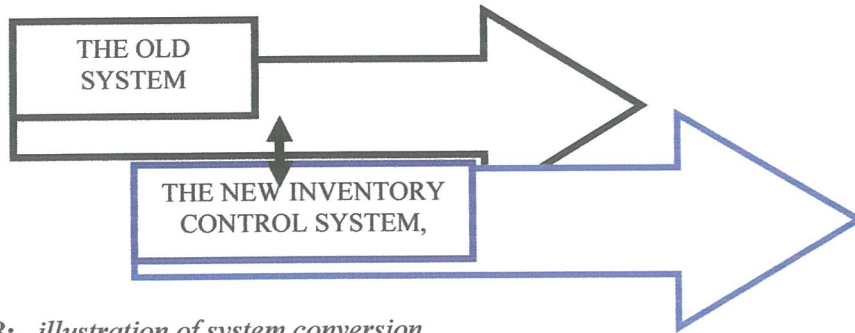


Figure 18: illustration of system conversion.

Parallel conversion

The above figure shows how the system's change over takes place. Both the new and old systems are used concurrently.

The reason of system conversion is to allow the users to learn how to use the new system.

5.4 User training

The trainees, to work with the new system were selected and trained. These are system users and Training involved teaching and guiding the users on how to operate and manage the system program plus interfaces.

5.5 Conclusion

This chapter is mainly for implementation of the system. Implementation defines the system, the working methods produced and standards to be followed. This is done through testing and reviewing. This gives out a system that meets client's needs at a time of system delivery.

CHAPTER SIX

EVALUATION, RECOMMENDATIONS AND CONCLUSION

6.1 Introduction

This chapter explains the evaluation, recommendation and conclusion arrived at by the researchers.

6.2 Evaluation of the new system.

The new Inventory model and transaction management system if implemented will achieve a lot of things which include the following:

The company will increase efficiency and effectiveness in its operations, making it stand the competitive environment. The system will permit only valid entries into the database. To make sure that this is accomplished; the system will validate the user's entries.

The information system will control data redundancy in the company thus improving performance. Also the system will ensure data integrity within the organization since there will be only one single storage area of data.

The Inventory control system will permit only authorized users to update the data in the database whenever it's necessary. This will be achieved by use of an administrator passwords and usernames also the system will permit instant data storage, fast retrieval, tracking of Inventory movement and better financial management.

However, despite the fact that the new system achieved the above performances it has some Limitation.

The new system cannot notify the suppliers when levels of stock reach its critical levels. For this to be possible there should be a network between the supermarket's system and the suppliers system.

6.3 Limitations of the study

- Identification of people to be considered affected directly or indirectly by the system was so hard.
- Identification of the questions to be answered by the respondents was hard.

- Little time due to busy schedule for both researchers and respondents
- Some members of the staff were worried about their future with the company if the system was to be implemented.
- Convincing the top personals of the company to allow me carry out the research as difficult.

The cost of transport to the areas of research and the materials used in the research were difficult.

6.4 Recommendation

After understanding all the benefits of the new system, James car dealers' ltd should adopt the database system in order to store all the information about all the Items sold in the company, information about the customers' and also stock details. This enables easy retrieval of customer records, immediate sales summary retrieval and suppliers' records can also be stored in the database.

James car dealers' should also test the Inventory model system in order to ensure that it meets the expected quality. Testing the system avoids unexpected failure or break down which may lead to lose profits customer loyalty. Testing the system ensures that bugs are identified and taken care of before full system implementation takes place.

Also module that keeps track of stock and be able to notify the company staff when the company is out of stock should also be developed and implemented so that the system will ensure better provision of services to the customers. This will increase the customer loyalty hence more profits to the company.

James car dealers' ltd should also use the user-interactive Inventory model system because it is easy for the users to learn how it is used. Interactive user systems have a short learning curve which is cost effective and also saves time.

6.5 Conclusion:

The database design was built

The system was developed, in the development; the system allows the authorized users to either Add or Clear records, to search for last, Next, first, previous records.

Hence the project is a success to the Researcher.

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APPENDIX A

A sample questionnaire

Dear respondent,

. I kindly request you to fill this questionnaire below to facilitate the research study to a success and helpful to the company.

- PLEASE feel free and give the important information as required to make the project feasible.
- Your information will be treated and kept with a lot of confidentiality, great care and will be highly appreciated.

Much regards:

1) When was this company started?

.....

2) How did JACAR begin? *(Please tick where appropriate)*

- Started as a company. ☐
- Started as a washing bay ☐

3) Which system do you use for controlling the stock and inventory? *(please tick where appropriate)*

Manual System ☐

Computerized System ☐

Both Systems ☐

- If manual, what problems do you encounter? *(Please out line)*

.....

.....

.....

- If computerized, which System?
- And what problems do you experience? *(Please out line)*

.....

.....

.....

4) How do you keep your records? *(Please tick where appropriate)*

File bases System ☐

Database system ☐

I don't know ☐

If database, choose the application. *(Please tick where appropriate)*

Microsoft Access ☐

Mysql ☐

Oracle ☐

5) Is there any step that has been taken to meet the challenges? *(please tick where appropriate)*

Yes ☐

No ☐

- If yes please state it (them)

.....

.....

6) What is the hierarchy of the Company? E.g. [Manager, Ass-Manager...].

.....

.....

7) What is the conduct of the customers? (please tick where appropriate)

Good ☐

Bad ☐

Excellent ☐

8) What problems do you face with customers?

.....

.....

.....

.....

9) Do you have back up copies for your information? (please tick where appropriate)

Yes ☐ NO ☐

- If yes state the kind of the information you back up, and where it is stored.

.....

.....

.....

10) What kind of products do you sell? (please tick where appropriate)

Locally produced items ☐

Imported Items ☐

Both local and imported items ☐

11) Please out line some of the products sold in this company.

.....

.....

.....

12) How do you market your products?

.....

.....

Your support is highly appreciated.

Thanks

APPENDIX B

Source code for the MDI form

```
Private Sub mnuaboutus_Click()  
frmAbout.Show vbModal, Me  
End Sub
```

```
Private Sub mnuarrangeIc_Click()  
Me.Arrange vbArrangeIcons  
End Sub
```

```
Private Sub mnucascade_Click()  
Me.Arrange vbCascade  
End Sub
```

```
Private Sub mnucontents_Click()  
MsgBox "Unable to display Help Contents. There is no Help associated with this project.",  
vbInformation, Me.Caption  
End Sub
```

```
Private Sub mnucustomer_Click()  
frmcustomer.Show  
  
End Sub
```

```
Private Sub mnuexit_Click()  
End  
End Sub
```

```
Private Sub mnuitems_Click()
```

frmitems.Show

End Sub

Private Sub mnurptcustomer_Click()

drcustomer.Show

End Sub

Private Sub mnurptitems_Click()

dritems.Show

End Sub

Private Sub mnurptstaff_Click()

drstaff.Show

End Sub

Private Sub mnurptsupplier_Click()

drsupplier.Show

End Sub

Private Sub mnustaff_Click()

frmstaff.Show

End Sub

Private Sub mnusupplier_Click()

frmsupplier.Show

End Sub

```
Private Sub mnutileH_Click()  
Me.Arrange vbTileHorizontal  
End Sub
```

```
Private Sub mnutileV_Click()  
Me.Arrange vbTileVertical  
End Sub
```

Source code for the Administrator form

```
Private Sub cmdAdmin_Click()  
Me.Hide  
frmLogin.Show
```

```
End Sub  
Private Sub cmdexit_Click()  
Unload Me  
End Sub
```

```
Private Sub cmdUser_Click()  
Me.Hide  
frmLogin.Show  
End Sub
```

```
Private Sub cmdclear_Click()  
txtuser_name1.Text = ""  
txtpassword1.Text = ""  
End Sub
```

Source code for the Staff form

```
Private Sub cmdadd_Click()  
On Error Resume Next  
Adodc1.Recordset.AddNew  
End Sub
```

```
Private Sub cmdCancel_Click()  
Unload Me  
End Sub
```

```
Private Sub cmddelete_Click()  
On Error Resume Next  
confirm = MsgBox("Are sure you want to delete this record?", vbYesNo + vbExclamation,  
"Deletion confirmation")  
If confirm = vbYes Then  
Adodc1.Recordset.Delete  
MsgBox "Record deleted!", , "Message"  
Else  
MsgBox "Record not deleted!", , "message"  
End If  
End Sub
```

```
Private Sub cmdexit_Click()  
Unload Me  
End Sub
```

```
Private Sub cmdfirst_Click()  
On Error Resume Next  
Adodc1.Recordset.MoveFirst  
End Sub
```

```
Private Sub cmdlast_Click()  
On Error Resume Next  
Adodc1.Recordset.MoveLast  
End Sub
```

```
Private Sub cmdnext_Click()  
On Error Resume Next  
Adodc1.Recordset.MoveNext  
End Sub
```

```
Private Sub cmdprevious_Click()  
On Error Resume Next  
Adodc1.Recordset.MovePrevious  
End Sub
```

```
Private Sub cmdsave_Click()  
On Error Resume Next  
Adodc1.Recordset.Save  
End Sub
```

```
Private Sub cmdsearch_Click()  
On Error Resume Next  
Dim strsearch As String  
strsearch = InputBox("Enter the Class you are in.")  
Adodc1.Recordset.MoveFirst  
While Not Adodc1.Recordset.EOF  
If UCase(strsearch) = UCase(Adodc1.Recordset.Fields(0)) Then  
MsgBox ("search successful")  
Exit Sub  
Else  
Adodc1.Recordset.MoveNext
```

```
End If
Wend
MsgBox ("Record not found")
End Sub
```

Source code for the Customer form

```
Private Sub cmdadd_Click()
On Error Resume Next
Adodc1.Recordset.AddNew
End Sub
```

```
Private Sub cmdCancel_Click()
Unload Me
End Sub
```

```
Private Sub cmddelete_Click()
On Error Resume Next
confirm = MsgBox("Are sure you want to delete this record?", vbYesNo + vbExclamation,
"Deletion confirmation")
If confirm = vbYes Then
Adodc1.Recordset.Delete
MsgBox "Record deleted!", , "Message"
Else
MsgBox "Record not deleted!", , "message"
End If
End Sub
```

```
Private Sub cmdexit_Click()
Unload Me
End Sub
```

```
Private Sub cmdfirst_Click()  
On Error Resume Next  
Adodc1.Recordset.MoveFirst  
End Sub
```

```
Private Sub cmdlast_Click()  
On Error Resume Next  
Adodc1.Recordset.MoveLast  
End Sub
```

```
Private Sub cmdnext_Click()  
On Error Resume Next  
Adodc1.Recordset.MoveNext  
End Sub
```

```
Private Sub cmdprevious_Click()  
On Error Resume Next  
Adodc1.Recordset.MovePrevious  
End Sub
```

```
Private Sub cmdsave_Click()  
On Error Resume Next  
Adodc1.Recordset.Save  
End Sub
```

```
Private Sub cmdsearch_Click()  
On Error Resume Next  
Dim strsearch As String  
strsearch = InputBox("Enter the Class you are in.")
```

```

Adodc1.Recordset.MoveFirst
While Not Adodc1.Recordset.EOF
If UCase(strsearch) = UCase(Adodc1.Recordset.Fields(0)) Then
MsgBox ("search successful")
Exit Sub
Else
Adodc1.Recordset.MoveNext
End If
Wend
MsgBox ("Record not found")
End Sub

```

Source code for the Items form

```

Private Sub cmdadd_Click()
On Error Resume Next
Adodc1.Recordset.AddNew
End Sub

```

```

Private Sub cmdCancel_Click()
Unload Me
End Sub

```

```

Private Sub cmddelete_Click()
On Error Resume Next
confirm = MsgBox("Are sure you want to delete this record?", vbYesNo + vbExclamation,
"Deletion confirmation")
If confirm = vbYes Then
Adodc1.Recordset.Delete
MsgBox "Record deleted!", , "Message"
Else
MsgBox "Record not deleted!", , "message"

```


End If

End Sub

Private Sub cmdexit_Click()

Unload Me

End Sub

Private Sub cmdfirst_Click()

On Error Resume Next

Adodc1.Recordset.MoveFirst

End Sub

Private Sub cmdlast_Click()

On Error Resume Next

Adodc1.Recordset.MoveLast

End Sub

Private Sub cmdnext_Click()

On Error Resume Next

Adodc1.Recordset.MoveNext

End Sub

Private Sub cmdprevious_Click()

On Error Resume Next

Adodc1.Recordset.MovePrevious

End Sub

Private Sub cmdsave_Click()

On Error Resume Next

Adodc1.Recordset.Save

End Sub

```

Private Sub cmdsearch_Click()
On Error Resume Next
Dim strsearch As String
strsearch = InputBox("Enter the Item's Id please.")
Adodc1.Recordset.MoveFirst
While Not Adodc1.Recordset.EOF
If strsearch = Adodc1.Recordset.Fields(0) Then
MsgBox ("search successful")
Exit Sub
Else
Adodc1.Recordset.MoveNext
End If
Wend
MsgBox ("Record not found")
End Sub

```

Source code for the Suppliers' form

```

Private Sub cmdadd_Click()
On Error Resume Next
Adodc1.Recordset.AddNew
End Sub

```

```

Private Sub cmdCancel_Click()
Unload Me
End Sub

```

```

Private Sub cmddelete_Click()
On Error Resume Next
confirm = MsgBox("Are sure you want to delete this record?", vbYesNo + vbExclamation,
"Deletion confirmation")

```

```
If confirm = vbYes Then
Adodc1.Recordset.Delete
MsgBox "Record deleted!", , "Message"
Else
MsgBox "Record not deleted!", , "message"
End If
End Sub
```

```
Private Sub cmdexit_Click()
Unload Me
End Sub
```

```
Private Sub cmdfirst_Click()
On Error Resume Next
Adodc1.Recordset.MoveFirst
End Sub
```

```
Private Sub cmdlast_Click()
On Error Resume Next
Adodc1.Recordset.MoveLast
End Sub
```

```
Private Sub cmdnext_Click()
On Error Resume Next
Adodc1.Recordset.MoveNext
End Sub
```

```
Private Sub cmdprevious_Click()
On Error Resume Next
Adodc1.Recordset.MovePrevious
End Sub
```

```
Private Sub cmdsave_Click()  
On Error Resume Next  
Adodc1.Recordset.Save  
End Sub
```

```
Private Sub cmdsearch_Click()  
On Error Resume Next  
Dim strsearch As String  
strsearch = InputBox("Enter the Class you are in.")  
Adodc1.Recordset.MoveFirst  
While Not Adodc1.Recordset.EOF  
If UCase(strsearch) = UCase(Adodc1.Recordset.Fields(0)) Then  
MsgBox ("search successful")  
Exit Sub  
Else  
Adodc1.Recordset.MoveNext  
End If  
Wend  
MsgBox ("Record not found")  
End Sub
```

Source code for user form

Option Explicit

Public LoginSucceeded As Boolean

```
Private Sub cmdCancel_Click()  
    'set the global var to false  
    'to denote a failed login
```

```
LoginSucceeded = False
Me.Hide
End Sub
```

```
Private Sub cmdOK_Click()
    'check for correct password
    If txtPassword = "pass" Then
        'place code to here to pass the
        'success to the calling sub
        'setting a global var is the easiest
        LoginSucceeded = True
        Me.Hide
        MDIForm1.Show
    Else
        MsgBox "Invalid Password, try again!", , "Login"
        txtPassword.SetFocus
        SendKeys "{Home}+{End}"
    End If
End Sub
```

```
Private Sub cmdReset_Click()
txtUserName.Text = ""
txtPassword.Text = ""
End Sub
```

APPENDIX C

Definition of some terms

Information Technology is a contemporary term that describes the combination of computer technology with telecommunication technology.

Computer software is a general term used to describe a collection of computer programs, procedures and documentation that perform some task on a computer system.

System software helps run the computer hardware and computer system. It includes operating systems, device drivers, diagnostic tools, servers, windowing systems, utilities and more.

Programming software usually provides tools to assist a programmer in writing computer programs and software using different programming languages in a more convenient way. The tools include text editors, compilers, interpreters, linkers, debuggers, and so on. An Integrated development environment (IDE)

A **DBMS** is a complex set of software programs that controls the organization, storage, management, and retrieval of data in a database. A DBMS includes:

Computation: There are common computations requested on attributes such as counting, summing, averaging, sorting, grouping, cross-referencing, etc. Rather than have each computer application implement these from scratch, they can rely on the DBMS to supply such.

An Inventory is a list for goods and materials, or those goods and materials themselves, held available in stock by a business.

An inventory information system is a resource that enables the collection, management, control and dissemination of information throughout an organization (Connolly and Begg, 2002).

Integrity: Prevents data from becoming invalid, and hence giving misleading or incorrect results

Encryption: Encoding the data by a special algorithm that renders the data unreadable by any program without the decryption key

A **barcode** (also **bar code**) is a machine-readable representation of information (usually dark ink on a light background to create high and low reflectance which is converted to 1s and 0s).

Barcode reader: (or barcode scanner) is an electronic device for reading printed barcodes. Like a flatbed scanner, it consists of a light source, a lens and a photo conductor translating optical impulses into electrical ones