DESIGN AND IMPLEMENTATION OF A VIDEO LIBRARY MANAGEMENT INFORMATION SYSTEM USING VISUAL BASIC, ORACLE 10g AND MICROSOFT WINDOWS XP

CASE STUDY: MEI VIDEO LIBRARY, NAMWONGO

BY

OROM ACIRE MACKMOT
BIT/9661/52/DF

AND

SENKUNGU JACOB
BIT/9576/52/DU

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Bachelors of Information Technology

Of

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DECLARATION

We, Orom Acire Mackmot and Jacob Senkungu do hereby declare to the best of our knowledge that this graduation project was our original work and that it has never been submitted to any University or any institution before.

The literature and citation from other people's work have been duly referenced.

Date..26th / Aug / 2009.....

Signed.....

NAME: OROM ACIRE MACKMOT

STUDENT

Date..26th / Aug. / 2009.....

Signed.....

NAME: JACOB SENKUNGU

STUDENT

APPROVAL

This Project Report "A Video Library Management Information System" has been submitted for examination with my approval.

Date 26th/08/09

Signed .....

NAME: MR. AHMED MUTAASA
SUPERVISOR

DEDICATION

We dedicate this project to our dear parents for their moral and financial support, brothers, sisters, friends, course mates, lecturers, Mei Video Library staff and above all to our supervisor, Mr. Ahmed Mutaasa for their helpful guidance, suggestions and comments which helped a great deal to accomplish this task. And to the Almighty God in Heaven, glory be unto you forever and ever.

ACKNOWLEDGEMENT

We would like to thank the Almighty God for his continuing guidance, love and affection for our lives. Without you Lord we couldn't have made it.

We thank everyone at Mei Video Library for allowing us to use the organization as a case study. Our appreciation also goes to our parents for their financial and moral support. Special regards goes to our supervisor Mr. Ahamed Mutassa for his support during this research.

ABSTRACT

This project was aimed at designing a Video Library Management Information System; a system to aid in the management and operation of the video library.

Methods that were used to gather information about the current system include; interviews, document review and questionnaires. From that information, requirements for the new system were obtained. The new system was designed and implemented using Visual Basic and Oracle 10g. The system generates reports that are vital for the video library administration.

ABBREVIATIONS

CD	-	Compact Disc
DBMS	-	Database Management System
GB	-	Giga Byte
GHZ	-	Giga Hertz
LAN	-	Local Area Network
M.I.S	-	Management Information Systems
MySQL	-	My structured Query language
RAM	-	Random Access Memory

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Chapter One: Project Overview

1.0 Introduction

This chapter presents an overview of the project. This will include the aim, objectives, plan and the methodology of the project. Information Systems play a vital role in the growth and development of organizations. In this era of explosion of computer and information technology, information systems are turning out to be the driving force behind businesses thus offering a competitive edge.

This project will involve the design and implementation of a Video Library Management Information System. It will be designed to collect (or retrieve), process, store, and distribute information to support decision making, coordination, and control in the organization (Video Library). The users of this system will be able to access this information through an interface designed in Visual Basic linked to a database on a standalone computer.

Currently, Mei Video Library is running a manual system. This involves recording information in books and on papers, stored in a physical file cabinet. The records involve, customer membership, movies, music, and staff details.

The Video Library is facing a problem of record keeping such as tracking Video stocks, customer details and producing reports on the various activities carried out (movies and music hiring). The proposed Video Library Management Information System will help to solve these problems.
The scope of this project will be limited to planning, analysis, design and implementation of a Video Library Management Information System. Specific areas of data collection will include; business processes in the organization and the current manual system.

Details of implementation such as user training, data migration and changeover, change management, ethical issues, and system support, will not be taken care of in this project but will be dully discussed in the context of their implementability.

1.2 Aim of the project

The aim of the project is to design and implement a Video Library Management Information System and also produce a project report.

1.3 Objectives

The objectives of this project are:-

i. To review literature related to the project.
ii. To analyze the current system and collect requirements for the new system.
iii. To design prototypes for the new system.
iv. To implement a new computerized system based on the designed prototypes.
v. To carry out an evaluation of the implemented system.

1.4 Project Plan

A project plan is a document used during the implementation of the project for management purposes that gives the basics of a project in terms of its objectives and how the objectives are to be achieved. This document is used as a record of decisions and a means of communication among stakeholders [1].

In this project, a Gantt chart will be used to identify and schedule the different activities that will be undertaken. A Gantt chart is a representation of a schedule of activities or milestones over time [2]. The Gantt chart below (Figure 1), illustrates the different project objectives and the timeframe for completion of these tasks.

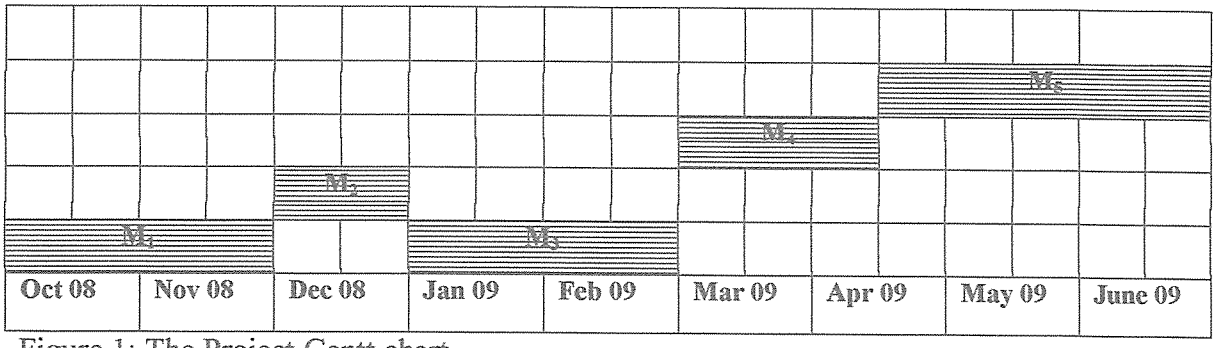

Figure 1: The Project Gantt chart

M_1 - To review literature related to the project

M_2 - To analyze the current system and collect requirements for the new system

M_3 - To design prototypes for the new system

M_4 - To implement a new computerized system based on the designed prototypes

M_5 - To carry out an evaluation of the implemented system

In case of failure to meet the stated timeframe, a revised project plan will be put in place at the end of the project.

1.5 Project Methodology

To carry-out the project, requirements will be collected from the staff and management of Mei Video library using a questionnaire. Research about similar topics (objectives) will be carried out using the internet, text books and past graduation projects in order to gain a wider understanding about the project objectives. The gained knowledge will be put to use to design and implement a new system for Mei Video Library.

1.6 Conclusion

In this chapter, we have given an overview of the project, stated the problem of the current system, the aim and objectives of the project, the project plan (Gantt chart), and the project methodology.

In the next chapter, we will review literature related to the project and also discuss its significance to this project.

Chapter Two: Literature Review

2.0 Introduction

This chapter presents a review of information management systems. It focuses on the functional architecture of information systems, system development, and system methodologies, and also discusses the role of databases in information systems. In this chapter, the definition of a library is also discussed.

2.1 What is an Information System?

An information system can be defined as a set of interrelated components working - together to collect, retrieve, process, store, and disseminate information. [3]

An information system (IS) is also defined as the group of components including hardware, software, people, and procedures that work together to produce meaningful information for individuals and organizations.

Hassen W. Gary [4] defines an information system as an automated system, which organizes data to produce information.

According to Laudon C. Kenneth [3], an information System can be technically defined as a set of interrelated components that collect, retrieve, process, store and distribute information to support decision making and control in an organization.

In addition to coordination and control, Information System may also help managers and workers to analyze problems and visualize complex subjects. An Information System contains information about significant people, places and things in the organization or the environment around.

Information systems may not involve computer systems at all. For example, some employees maintain calendar information on bulletin boards in their office using paper and pens. The purpose of this manually operated information system is to capture, organize, and communicate scheduling information. However, more and more information tasks are being automated using computerized information system. [5]

All businesses, small and large, must manage the company data in a manner that allows the business to run smoothly. Some businesses might use filing cabinets to manage their data but most companies use computerized database management systems that effectively store, retrieve, and manage large amounts of data.

2.2 Library

A library is a repository for various forms of recorded information according to Microsoft Encarta encyclopedia [5]. Although the word *library* is derived from the Latin *liber*, meaning "book", the term now refers to collections of data in many other formats: microfilms, magazines, phono-recordings, films, magnetic tapes, slides, video tapes and electronic media.

Ramachandran J.M defines a library as a collection of books, periodicals, gramophone records, magnetic tapes, audiocassettes and the room which contains them [6].

2.3 Functional Architecture

2.3.1 What Is Functional Architecture?

Functional architecture deals with the architecture of the information system as viewed by the business. It deals with understanding, modeling and improving on the way information is captured, analyzed and presented to the users. As functional architecture depends on the nature of the business, different types of business would have different

architectures. For example, architecture developed for a department store system might be very different from that for a travel and touring system [7].

As mentioned earlier, functional architecture is considered as an abstract view of the organization in terms of business processes. It could be interpreted as the senior executive's vision of the business in the context of information systems [7].
To distinguish it from other architectures, two important architectures in the information system environment are considered these being the network and software architectures [7].

2.3.2 Network Architecture

Network architecture deals with the communication components of the information system. It provides the means that enable communication between these components [7].

The two essential components of the network architecture are firstly compatible hardware, and secondly, compatible software. By analogy to the telephone system, for two households to communicate, they both must use telephone receivers that operate on the same electrical principles, connected to the same cabling system (hardware); and they both must use the same language when speaking (software) [7].

2.3.3 Software Architecture

Software architecture involves the description of components from which systems are built, interactions among those components, patterns that guide their composition, and constraints on these patterns. Components include things such as clients/servers software, databases, filters, and layers in a hierarchical system. Ideally, each component is defined and designed independently, thus the component can be reused within different contexts [11].
It is very important to have a general functional architecture in the development of information systems. The reason is that as the business refines and evolves its strategic vision and business operations, the information system will need to evolve as well.

The core idea of functional architecture is to develop the appropriate and flexible information systems that can be unreservedly operated within and across the organization.

2.4.1 Technical Foundations of Information Systems

The foundation of information systems came as a result of the need to integrate hardware, software, storage and telecommunication technologies. In today's new information architecture the computer itself is considered as one of the many information technologies that permit modern information systems to function. Therefore, to build effective information systems, one must understand how all these technologies can work together.

A computer system consists of a central processing unit, primary storage, secondary storage, input devices, output devices and communication devices.

- The central processing unit manipulates raw data into more useful information and control other parts of the computer system.
- Primary storage temporarily stores data and program instructions during processing whereas secondary storage store devices (magnetic and optical disks, magnetic tapes) store data and programs when they are not being used in processing.
- Input devices such as keyboards and mice convert data and instructions into electronic form for input into the computer whereas, output devices such as printers and video display unit convert it into a form that people can understand.
- Communication devices provide connections between the computer and other communication devices like servers, printers, IP Telephony on the networks.

2.4.2 Benefits of Information Systems

Information Systems play a vital role in day to day running of business. There are several benefits realized with the introduction of information systems into a business as noted below;

i. Ensures that information from user files is managed in legible, complete and punctual way.
ii. Improve procedures for information accessibility.
iii. Create an agreed time table for all input to the system.
iv. Allows for strict privacy / security system.
v. Provides means of accessing, analyzing, formatting and displaying information from the user file in response to both regular and ad hoc requests.
vi. Improves user file accessibility environment.

2.4.3 Functions of Information Systems

Information systems process data using a set of interrelated functions. In the most basic sense, information systems accept, store, and process data, and finally produce results in the form of information.

Information systems carry out four well defined primary functions, these include; input, processing, storing, and output functions.

These set of functions apply to information systems which may be composed of multiple computers in a network or a single computer. [8]

The data fed into the system is accepted by the input function and is immediately processed by the processing function or stored by the storage function as stored data for processing later on. The output function produces the results of the processing function and sends it out of the system as output information.

2.5 System Development

2.5.1 System Development Life Cycle

The system development life cycle is an approach used by system developers to design and develop information systems. It is a step by step approach of defining a problem, analyzing/studying the problem, designing alternative solutions and then implementing the most appropriate solution to that problem. [9]

Introduction to information systems a book by James A. O'Brien defines a system development life cycle as a system approach to problem solving which involves the following interrelated actives; investigating the problem, analyzing the requirements, designing the system, implementing the system, and maintaining the system. [10]

The City and Guilds of London Institute Information Systems Handbook (1999) defines a system development lifecycle as the stages in the life of an information system beginning with selection for development and including detailed analysis of requirements, design of the system, and its implementation and ending with systems maintenance to ensure its continued usefulness. [11]

According to the Association of Certified Chartered Accountants (ACCA) Information Systems Study Text (2001), the term systems development life cycle describes the stages a system moves through from inception until it is discarded or replaced. [12]

In the days of early computing, systems development was piecemeal, involving automation of existing procedures rather than forming part of a planned strategy. The development of systems was not properly planned. The consequences were often poorly designed systems, which cost too much to make and yet was not suited to user's needs.

This led to the systems development lifecycle model. Among the first models was that developed by the National Computing Centre in the 1960s. This disciplined approach to systems development identified several stages of development;

- **Identification of a problem or opportunity;** analysis of an organization's information requirements.
- **Feasibility study;** Involves a review of the existing system and identification of a range of possible alternative solutions. A feasibility (technical, operational, economic, social) solution will be selected or a decision not to proceed made.
- **System investigation;** A fact finding exercise which investigates the existing system of assess its problems and requirements and to obtain details of data volumes, response times and other key indicators.
- **Systems analysis;** This process examines why current methods are used, what alternatives might achieve the same or better results and what performance criteria are required from a system.
- **System design;** This is a technical phase, which considers both computerized and manual procedures, addressing in particular, inputs, program design, file design and security. A detailed specification for the system is produced.
- **System implementation;** It involves acquisition (or writing) of software, program, file conversion of setup, acquisition of the hardware and starting to use the system.
- **Review and maintenance;** This s an on-going process, which ensures that the system meets the objectives set during the feasibility study, that it is accepted by the users and that its performance is satisfactory.

In the early 1970's a similar system development model to that described by the National Computing Centre was published. It is called the Waterfall model. Like the earlier model it breaks the system lifecycle into sequential stages but the difference is that in this case each stage is divided into two parts; the actual work associated with the stage followed by a procedure to check what has been done. Both models are at times referred to as the 'Traditional Approach'.

When developing systems where requirements are difficult to specify it is unrealistic to follow a sequence process, which relies on getting things correct at each stage of development before starting subsequent activities. In these more complex situations, the 'Spiral Approach' is appropriate.

The spiral model represents an evolutionary approach to systems development. It involves carrying out the same activities over a number of cycles in order to clarify the requirements and solutions. Boehn developed the first spiral model.

2.5.2 System Development Methodologies

Laudon C. Kenneth et al (2002) defines a development methodology as a collection of methods, one or more for every activity within every phase of a development project. The primary function of a development methodology is to provide discipline to the entire development process. [3]

Structured methodologies have been used to document, analyze and design information systems since the 1970's. Structured refers to the fact that techniques are step by step with each step building on the previous one.
The ACCA Information systems study text outlines characteristics of methodologies as follows:

- **Separation of logical and physical;** The initial focus is on what the system will achieve (the logical design). Physical design and implementation are looked at later.
- **User involvement;** Users are involved throughout the development process.
- **Diagrammatic documentation;** Diagrams rather than text based documentation are used as much as possible to ensure the focus is on what the system is trying to achieve and to aid user understanding of the process.
- **Data driven;** Most structured methods focus on data items regardless of the processes they are related to.

- **Defined structure;** Most methodologies prescribe a consistent structure to ensure a consistent and complete approach to work.

The choice of methodology to use depends on the options available and developer preference. [12]

2.5.3 Data Flow in information Systems

Hansen W. Gary et al (2000), defines data as isolated facts. However, the City and Guilds of London Institute Information Systems (1999) refers to data as any facts, numbers, letters or characters.

A **data flow diagram** is a graphical representation of the movement of data within an information system and between the information system and the outside world.

Data flow diagrams also show the ways in which data is processed within an Information System. The production of a data flow diagram is often the first step in a structured systems analysis because it provides a basic understanding of how the system works. The following are some of the key terms used in data flow diagrams:

- A **data flow** represents the movement or transfer of data from one point in the system to another.
- A **data store** is a point, which receives a data flow and holds data.
- **Data processes** involve data being used. The process could be manual, mechanized or computerized.

2.5.4 Database in Information System

Computerized Information Systems have databases at the heart of their operations. Creating, storing and receiving data are important tasks. A variety of records such as personnel, inventory, and payroll information and so on are kept. These records must be arranged for quick access.

A Database describes a collection of data organized in a manner that allows access, retrieval and use of that data.

Thomas Connolly and Carolyn Begg (2002) describe a database as a shared collection of logically related data, and a description of this data, designed to meet the information needs of an organization. Further more, **Laudon C. Kenneth et al (2000)** defines a database as a collection of data organized to service many applications at the same time by storing and managing data so that they appear to be in one location. They identify some of the benefits of databases as follows:

- Data sharing; Data can be shared between functional units, between levels of management and between geographical units.
- Data can be controlled; Control is provided by a database Management System whose facilities are managed by personnel known as a Database Administrator.
- Data is integrated in logically sound fashion so redundancies are highly eliminated, ambiguities of definitions are resolved and internal consistence between data elements is maintained.

2.6 Conclusion

In this chapter, a review of information management systems was presented. It focused on the functional architecture of information systems, system development, and system methodologies, and also discussed the role of databases in information systems.
In the next chapter, the current system will be analyzed and the requirements specification presented.

Chapter Three: Current System Analysis and Requirements Collection

3.0 Introduction

In this chapter, we looked at the current system analysis and also requirements needed for the new system to be implemented. These included hardware, software, security and also the user requirements.

3.1 Current System Analysis

This process involved analyzing the manual system currently used at Mei Video Library. This enabled us to identify the data flow processes, data capture and output procedures, and also isolate the problems of this system.

Currently, Mei Video Library is running a manual system. This involves recording information in books and on papers, stored in a physical file cabinet. The records involve, customer membership, movies, music, and staff details.

The Video Library is facing a problem of record keeping such as tracking Video stocks, customer details and producing reports on the various activities carried out (movies and music hiring).

3.1.1 Data flow process in current system

In the current system, all information concerning members of the video library, staff, movies, and music is stored in file cabinets. Has time goes on; this has resulted in considerable amounts of physical storage space being used to store these documents.

Because of the poor data storage employed when using file cabinets, this has let to difficulty in getting specific information concerning a member, staff or a movie to be hired out. Figure1 describes the general flow of data during a movie hiring process.

3.1.2 Data Flow Diagram for the Movie Hiring Process

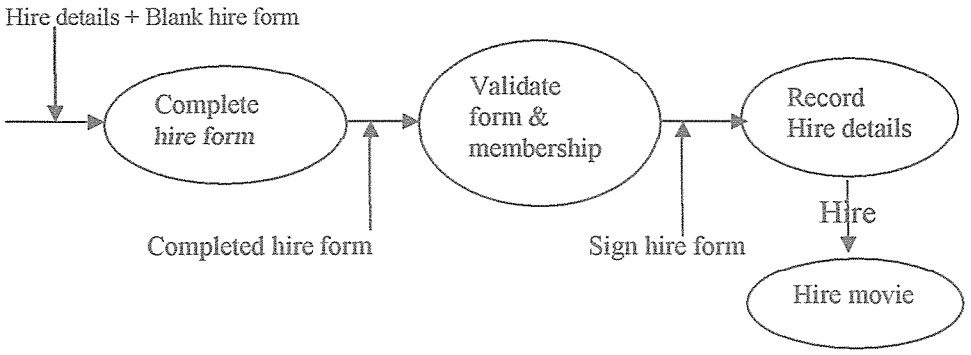

Figure 2: Data flow Diagram for the Movie hiring process

3.2 Requirement Collection and Analysis

This is a process of collecting and analyzing information about the part of the organization that is to be supported by the information system, and using this information to identify the users' requirements of the new system. [9]

This phase involved visiting the Video Library and interacting with the manager and staffs to try and come up with the system requirements and form a basis for the software development. The system functions and constraints were established and planning was done basing on the facts gathered. The requirements collected included; hardware and software requirements, user and security requirements, and finally, functional and non-functional requirements.

The information collected was converted into a more structured statement of the requirements. This was achieved by using a data flow diagram (DFD) requirements

specification technique. Below is a representation of the requirements specification using data flow diagrams.

Data Flow Diagram for Membership Registration Process

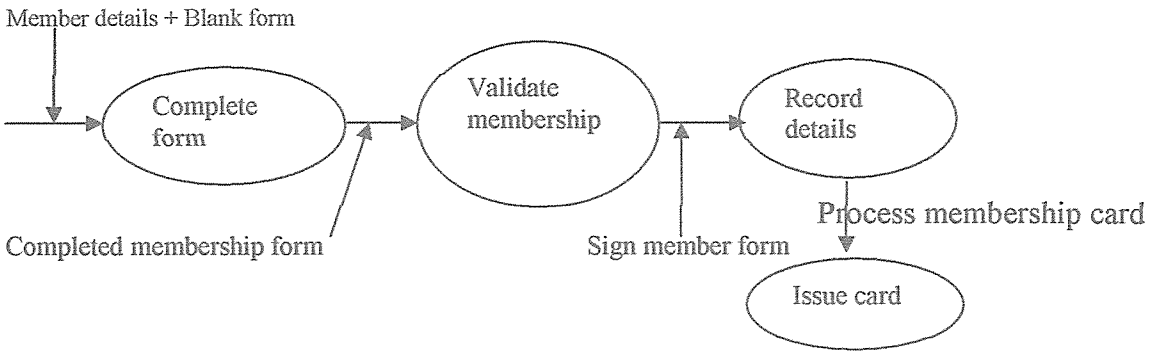

Figure 3: Data flow Diagram for membership registration process

Data Flow Diagram for a Music Hiring Process

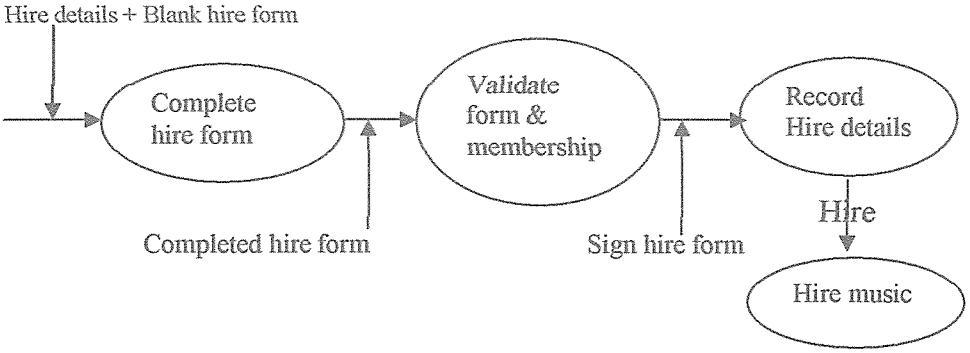

Figure 4: Data flow Diagram for the Music hiring process

Business Processes

- The business processes which form the requirements specification are listed below;
- Movie hiring process
- Music hiring process
- Member registration process
- Reporting processes (Price reports, Movies in/out reports, Music cds in/out reports, Supplier reports, Member hiring behavior reports)

3.2.1 Hardware and Software Requirements

Since the library has been running a manual file system, there is no computer hardware and software that was evaluated. However, due to the pitfalls of a manual file system, we suggested that the client adopts a computerized system to manage the library and therefore, the following hardware and software was recommended to be purchased and installed in the library:-

- Two computer sets (complete with keyboard, mouse and monitors) with the following specifications (Pentium IV processor with 2.4 GHZ processing speed, CD-Rom drives, 256-512 MB of RAM, 80-120 GB hard disks)
- One Printer
- One Uninterrupted Power Supply unit (UPS)
- One Straight Through Network Cable
- Software included installing (Windows Xp Operating System, Microsoft Suite, Oracle Database Management System)

The two computers and the printer were then networked to facilitate easy sharing of resources like the printer, files, disk drives and software resources.

3.2.2 User and Security Requirements

In the earlier system, data was kept secure by locking up the library. But once the library was open for business, apart from the watchful eye of the manager and library staffs, company data lay at risk to theft, vandalism and any other form of unauthorized access since it was kept in open cabinets.

In the new system, security passwords have been designed into the system to prevent unauthorized persons from accessing the system as well as installing antivirus programs to prevent viruses and worms.

Authorized users of the system have been supported to be able to log into the system and access data in the following ways;

- Insert new records in the system concerning members, staffs or movies.
- Update and delete records as required concerning members, staffs or movies.

- Generate reports to be used by the manager for management purposes.
- Query the system for member's and staff's current status whenever needed.

3.2.3 Functional and Non-functional Requirements

The system has been created to meet the following functional requirements:

- Produce reports of movies purchased and hired-out in a given period of time.
- Produce reports about suppliers and members details that do business with the video library.
- Monitor hiring transactions and movies stock levels.
- Search and query for data in the database

The system has also been designed to meet the following non-functional requirements:

- Validation rules have been designed to enable data integrity.
- User friendly interfaces have been created for efficient and ease usability.
- Security measures have been employed through username and password enforcement to control access to the system and determine who is responsible for which type of data.

3.3 Conclusion

In this chapter, the current system has been analyzed. Requirements needed for the new system to be implemented have been collected and presented. In the next chapter, designs for the new system will be presented.

Chapter Four: Design of the New System

4.0 Introduction

This chapter analyses the possible designs that can be developed from the system requirements looked at in chapter 3 (which will include; logical, conceptual and physical designs) Designs help designers and system clients to understand, observe, visualize, evaluate and implement a given specification (these designs shall include both structural and interface designs). Structural designs analyse the internal components relationships (for example, between the database and the user interfaces), while interface designs are aimed at analysing navigation and performance of the resultant system. The output of this stage will be an architectural model consisting of the specifications of the components which describe what each system aspect must do. Only the final prototypes will be included in this chapter.

4.1 Design Prototypes

A prototype is a working model of the information system application built to develop and test design ideas. They (prototypes) are a form of limited representation of designs and allow users and developers to interact and explore the suitability for implementation of a given specification [16, 17, 18, and 19]. It is a working model that does not normally have all the required features or provide all the functionality of the final system [11]. The main purpose of developing this prototype was to allow users to identify the features of the system that work well, or are inadequate, and if possible to suggest improvements or even new features to be added to the application [16].

Prototyping has several benefits that include; obtaining feedback from the users early in the project development sage (this helps users or client to verify that the software specifications or requirements match with the project objectives), encourage reflection as to whether the specified objectives are being met, facilitate choice for best

implementation alternatives, analyse technical feasibility of ideas (for example, clarifying vagueness in specified objectives), prototypes act as a way to work through your design solution, prototypes give you the ability to evaluate a few different options, tweak them, and come up with the best one, using the prototypes to sell your design solution to internal stake holders like senior management, other designers, or the engineering team, and to facilitate *user testing and evaluation* [18].

Two methods of prototyping can be used to design the system; *Low-fidelity (throwaway prototyping) and High-fidelity (Evolutionary prototypes)*. Low-fidelity is used in early stages of the design, using materials that are different from those to be used in developing the solution or final version (such as paper sketches) of the product and are therefore cheap and quick to modify, hence supporting exploration of alternative implementation methods. After preliminary requirements gathering is accomplished, a simple working model of the system is constructed to visually show the users what their requirements may look like when they are implemented into a finished system [16].

The most obvious reason for using Throwaway Prototyping is that it can be done quickly. If the users can get quick feedback on their requirements, they may be able to redefine them early in the development of the software. Making changes early in the development lifecycle is extremely cost effective since there is nothing at that point to redo (in terms of coding). If a project is changed after a considerable work has been done, then small changes could require large efforts to implement since software systems have many dependencies. Speed is crucial in implementing a throwaway prototype, because of the time and resources constraints. Examples of low fidelity methods include *Story telling and Sketching on paper to describe system components and interaction* [16, 17].

High-fidelity designs (evolutionary designs) produce prototypes that closely match the final outcome of the product. The prototypes display high level functional capabilities and are interactive (user initiated events are enabled). High-fidelity prototypes are time consuming and expensive to design [16]. In this research, low fidelity prototypes will be used.

4.1.1 Structural Design

A structural design is a graphical representation of both the external and internal operations of the prototype.

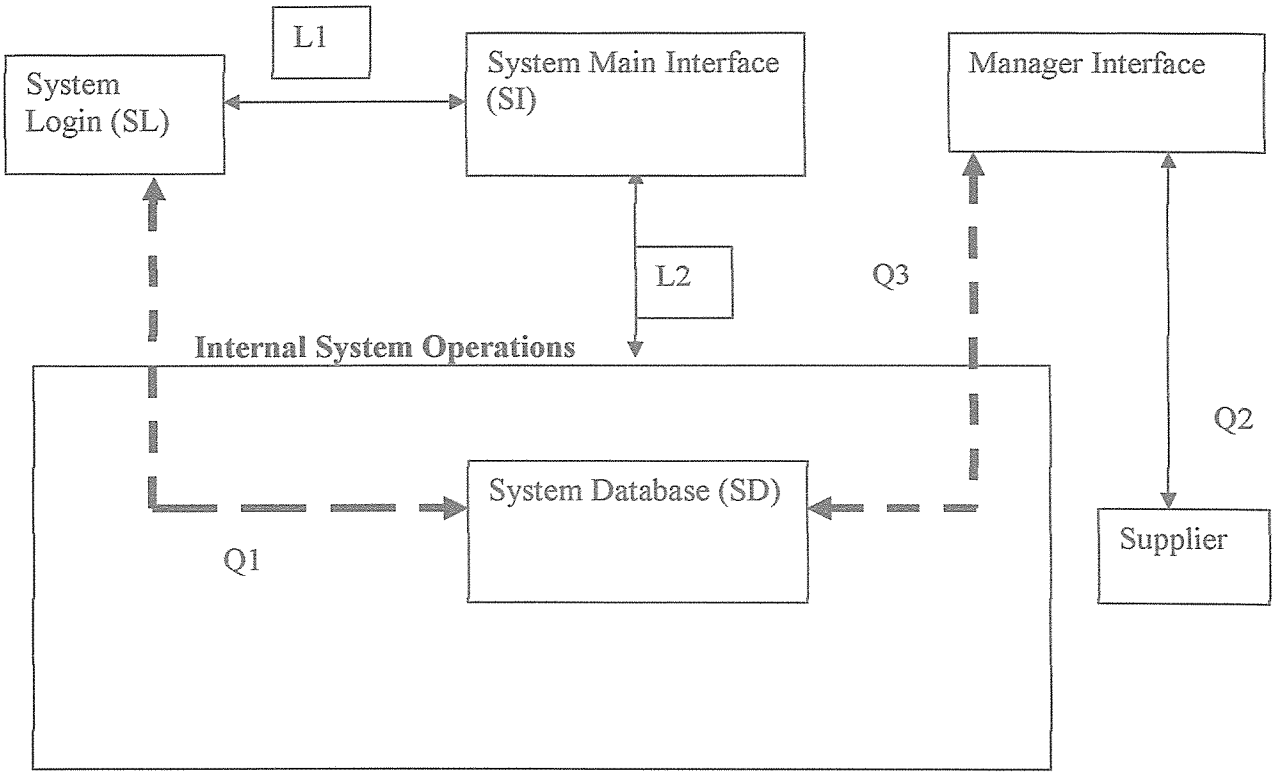

Figure 5: Structural Design of the system

Login Procedure

The Login procedure is illustrated by the **Q1** query. A query containing the user name and password are sent to the system database for verification. If the verification is successful, then Linkage **L1** is executed (and **SI**) is viewed, else **SL** is displayed. This is illustrated by the simple equation below;

If Q1 = true then view SI & execute L2 else view SL

Q2 (Manager-Supplier Relationship)

The supplier and the manager (as the main purchasing officer) are in constant contact. The manager places an order to the supplier and the supplier delivers this order to the manager **(Q2)**, who appends the system database accordingly **(Q3)**.

4.1.2 Interface Designs

This section discusses the different prototypes for the two user interfaces of the system. It will include low fidelity prototypes and will be associated with the system requirements made in chapter 3.

User interfaces simplify complex internal system specifications to a form easily understood by naïve users, encouraging easy, natural and engaging interaction between the two entities. Interface *usability* determines how well or bad it was designed. By definition, *interface usability* is, "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use". Bad user interface designs lead to user frustration and dissatisfaction, whereas good designs should help realise user experience goals (such as satisfaction, enjoyment, helpful, motivation and rewarding) [].

LOGIN INTERFACE

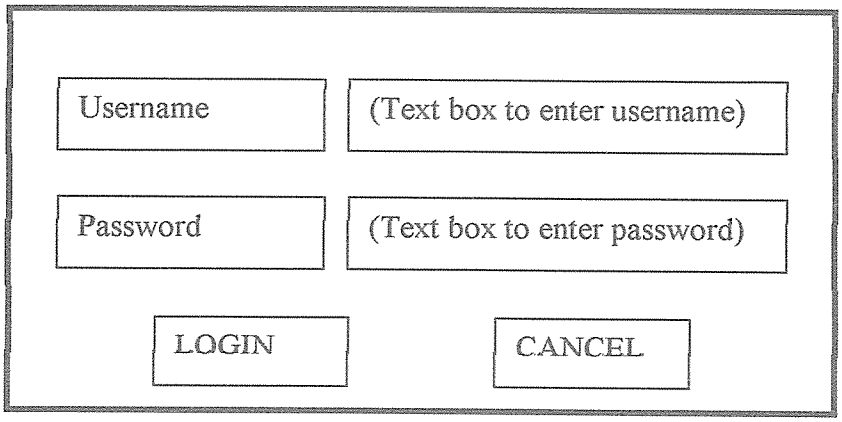

Figure 6: Prototype Login Interface

The prototype login interface describes the process a user goes through to be authenticated before being allowed to access information in the system.

Step 1: A user enters the administrator configured username

Step 2: A user enters the administrator configured password

Step 3: A user clicks on the Login button to complete the login process

Step 4 (optional): A user clicks on the CANCEL button if they want to abort the login process or if they have failed to login. Clicking on this button aborts the login process and closes the login window.

4.1.3 Prototype Design for the Main Interface

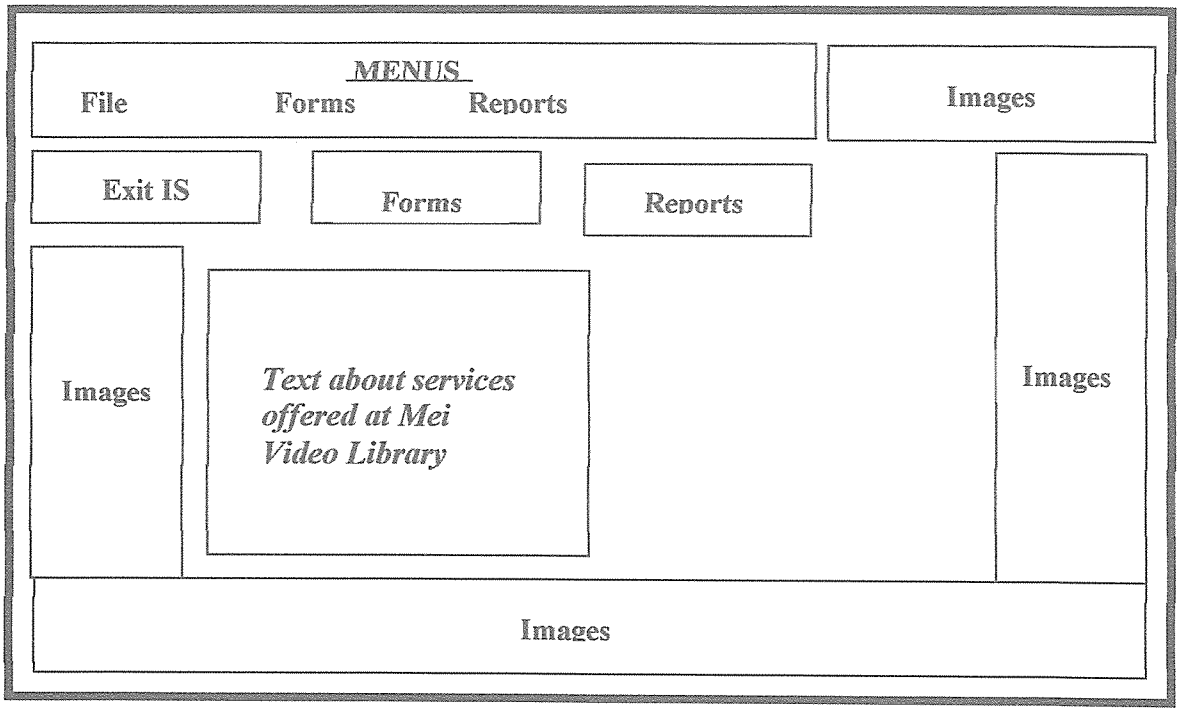

Figure 7: Main Interface prototype

The Main interface prototype describes the process a user goes through to access the information in the database using forms and reports. It also describes the process of exiting the information system.

Menus: The menu icon is used to describe the processes a user goes through to open a form/report and also exit the information system. Under the file menu, a user clicks on exit to close the system. The form and report menus on the bar are used to access the forms and reports in the system respectively.

Exit IS Button: The Exit IS icon is used to represent a button a user clicks to exit or close the information system.

Forms: The form icon is used to represent a button a user clicks to access the different forms in the system. The forms include; supplier, movies, music, staff and hire.

Reports: The report icon is used to represent a button a user clicks to access the different reports in the system. The reports include; price lists, bills, staff, movies, and hire.

Title Images: The image icon is used to represent place-holders for static images in the system.

4.1.4 Data Flow Diagram (DFD)

A data flow diagram (DFD) is a design tool to represent the flow of data through an information system [26]. The facts collected in the requirement analysis step (chapter 3), used in the conceptual and logical design model, are used to develop a high level description of the system. This also shows how data flows within the system.

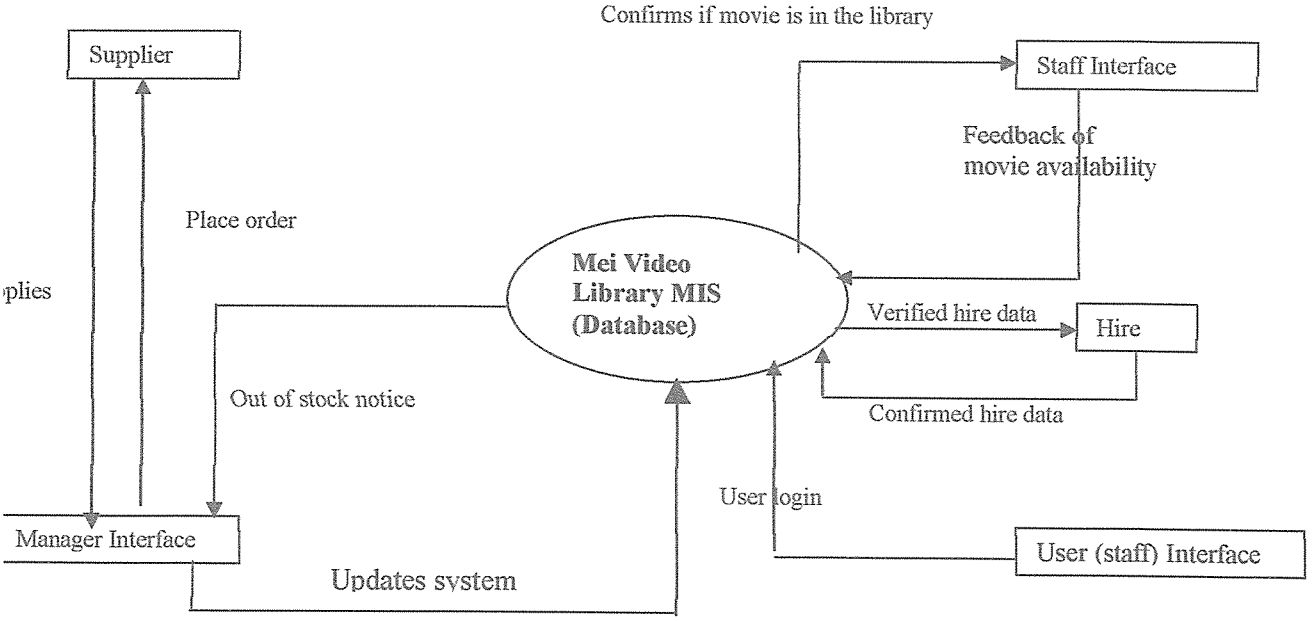

Figure 8: Data Flow Diagram

4.2 Conceptual System Design

At this level of design, a model of the information used in the video library was constructed independent of all physical considerations. The model was tested and validated against the user's requirements.

In building the conceptual data model for the system, the following activities were carried out:-

a. **Entity types were identified as:-**
   - Member
   - Staff
   - Suppliers
   - Movie
   - Hire

Relationship types were identified as:-

- Member **borrows** Movies
- Staff **hires-out** Movies
- Supplier **supplies** Movies
- Staff **manages** suppliers
- Staff **supervises** Member
- Staff **operates** Hire
- Hire **records** Movies

b. **Attributes, primary and foreign keys were determined as:-**
   - **Member**(MemberNo, fname, sname, sex, DOB, mobile, address)
   - **Staff**(StaffNo, fname, sname, sex, DOB, mobile, address, position, salary, MemberNo, SupplierNo, HireCode)
   - **Suppliers**(SupplierNo, CompanyName, ContactPerson, phone, address, MovieNo)
   - **Movies**(MovieNo, Title, Category, HireStatus, HireCode, MemberNo, StaffNo)

- **Hire**(HireCode, MovieNo, SupplierNo, StaffNo, MemberNo, HireDate, ReturnDate, HireFees)

c. The model was checked for redundancy

Using Entity-Relationship (ER) diagrams entities where represented showing how they relate to one another. Afterwards, all the entities where put together in a representative E-R diagram.

Then, the model was checked for redundancy. This was achieved by re-examining one-to-one relationships and removing redundant relationships. The following diagrams are the result of that process.

- Member borrows movies relationship

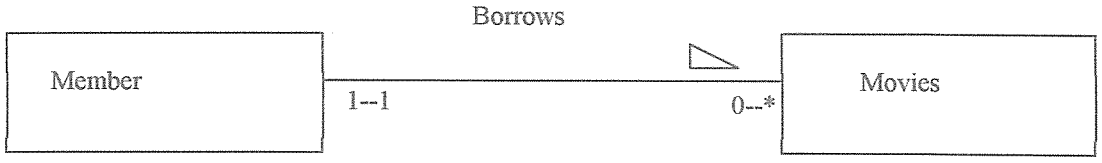

Figure 9: Member borrows movies relationship

- Staff hires-out a movie(s) relationship

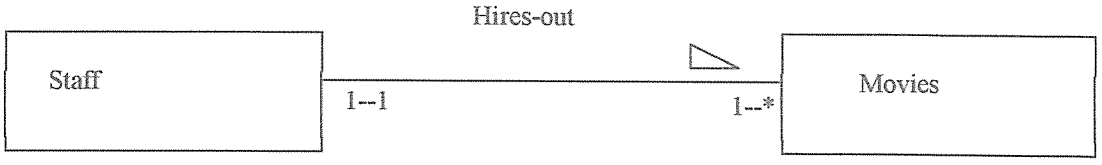

Figure 10: Staff hires-out a movie relationship

- Supplier supplies movie(s) relationship

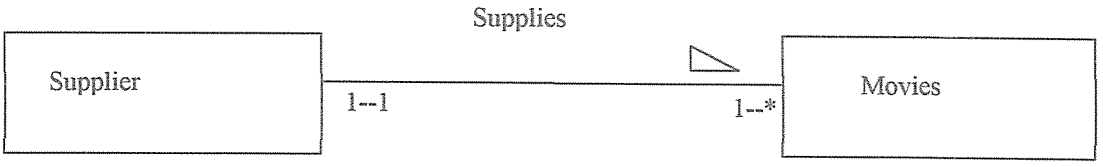

Figure 11: Supplier supplies movie relationship

- Staff manages supplier(s) relationship

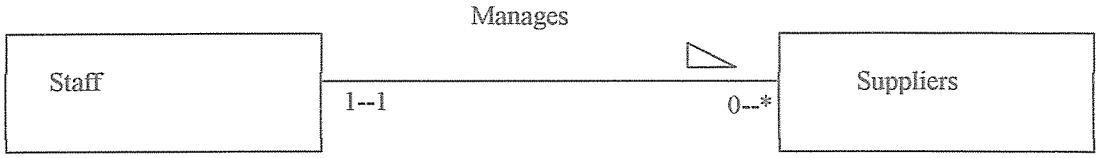

Figure 12: Staff manages supplier relationship

- Staff supervises member(s) relationship

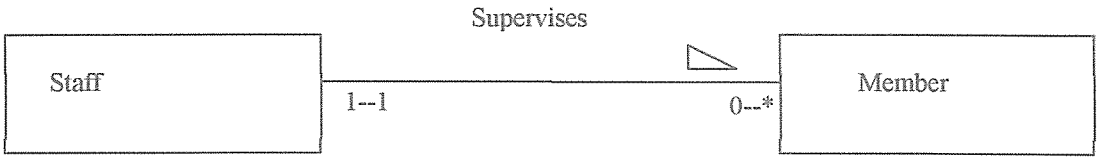

Figure 13: Staff supervises member relationship

- Staff operates hire relationship

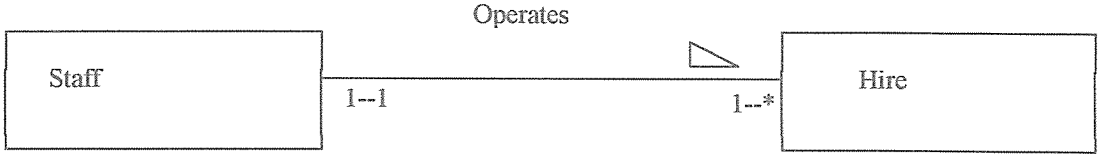

Figure 14: Staff operates hire relationship

- Hire records movie(s) relationship

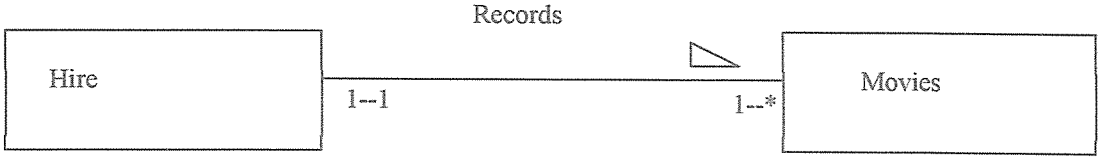

Figure 15: Hire records movie relationship

E-R diagram for the Video Library

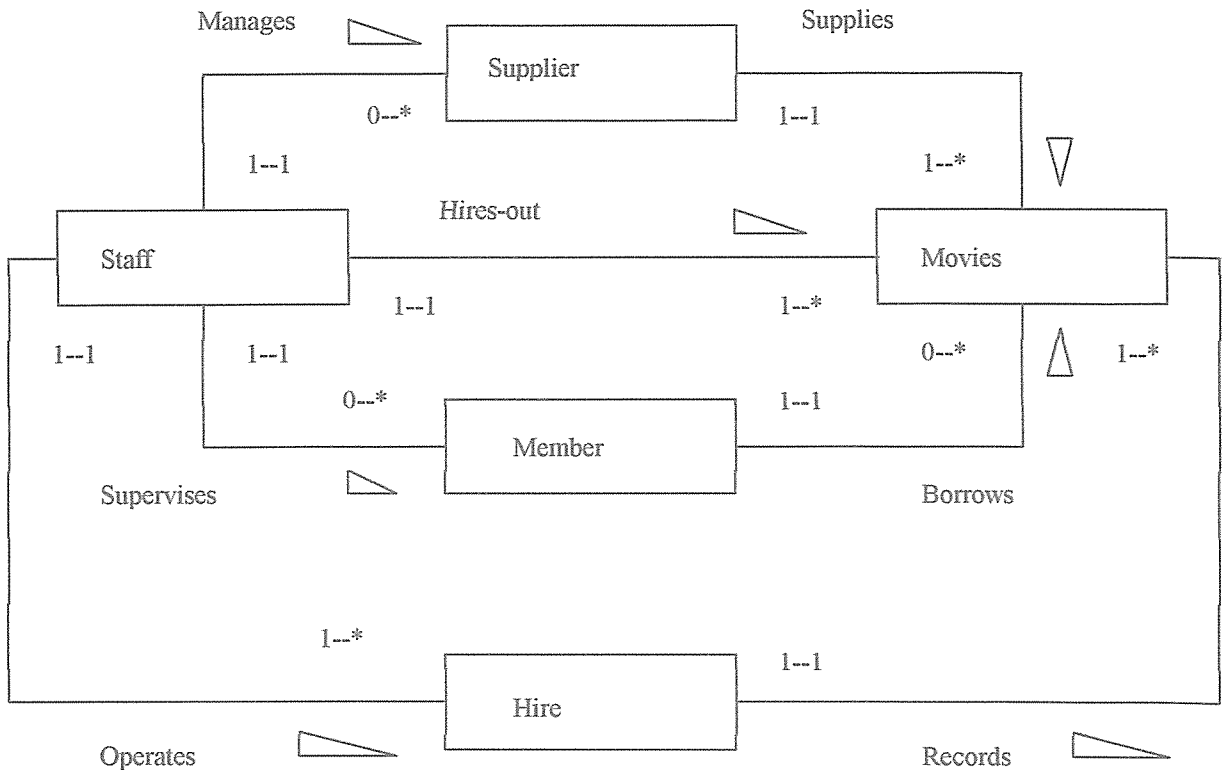

Figure 16: E-R diagram for the Video Library

4.3 Logical System Design

At this level of design, a model of the information used in the video library based on the entity relationship model but independent of a particular database management system and other physical considerations was developed. Throughout the process of developing this data model, it was tested and validated against the user's requirements using normalization to test its correctness.

In building the logical design for the system, the following activities where carried out;

- Features not compatible with the relational model where removed from the conceptual design.

- Relations for the logical data model where derived from the conceptual design.
- Relations where validated using normalization and against user transactions.
- Integrity constraints for the entities where defined.

After carrying out all the activities outlined above, the E-R diagram below resulted.

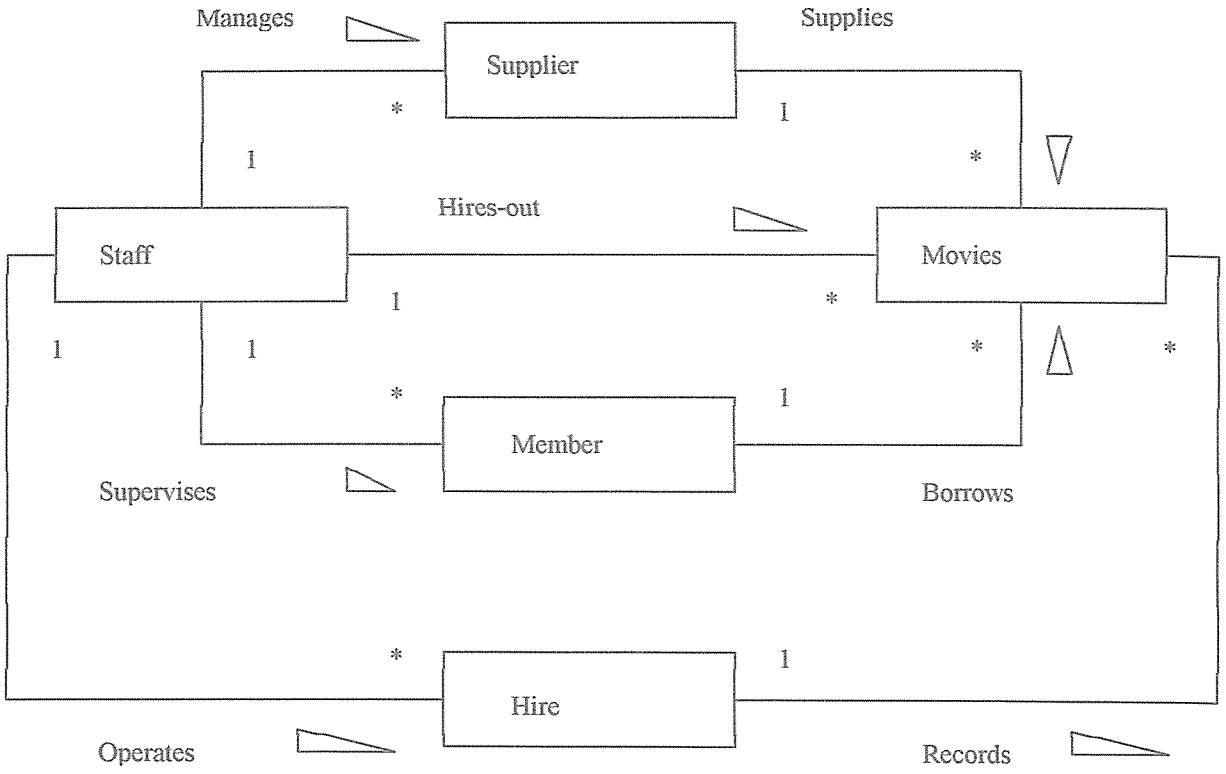

Figure 17: Edited E-R diagram for the Video Library

4.4 Physical System Design

At this level of design, activities where carried out that enabled the producing of a description of the database on secondary storage; base relations, file organizations, and indexes used to achieve efficient access to the data, and any associated integrity constraints and security measures where described. The database was designed tailored to MySQL Database Management System.

In building the physical design for the system, the following activities where carried out:-

Base relations, representation of derived data and enterprise constraints were designed, transactions were analyzed, file organizations and indexes chosen, and disk space requirements where estimated and User views and security mechanisms were designed. After carrying out the activities outlined above, the following diagrams resulted as a representation of the processes undertaken.

4.4.1 Member Table

Attribute Name	Description	Attribute Type	Attribute Size
MemberNo	Unique number identifying member borrowing movie	Varchar	5
fname	First name of member borrowing movie	Varchar	10
Sname	Surname of member borrowing movie	Varchar	15
Sex	Defines the gender of the member i.e. male or female	Char	1
DOB	Defines the date of birth of member	Date	8
Mobile	Defines the mobile phone contact for the member	Varchar	10
Address	Defines the physical and post office address of member	Varchar	20

Table 1: Member Table

4.4.2 Staff Table

Attribute Name	Description	Attribute Type	Attribute Size
StaffNo	Unique number identifying a staff	Varchar	5
Fname	Defines the first name of the staff	Varchar	10
Sname	Defines the surname of the staff	Varchar	15
Sex	Defines the gender of the staff i.e. male or female	Char	1
DOB	Defines the date of birth of the staff	Date	8
Mobile	Defines the mobile phone contact of the staff	Varchar	10
Address	Defines the physical and postal office address of staff	Varchar	20
Position	Defines the responsibility of the staff	Varchar	15
Salary	Defines the remuneration of the staff	Number	7,2
MemberNo	Unique number identifying member borrowing movie	Varchar	5
SupplierNo	Unique number identifying supplier of movies	Varchar	5
HireCode	Unique code identifying movie borrowed	Varchar	5

Table 2: Staff Table

4.4.3 Suppliers Table

Attribute Name	Description	Attribute Type	Attribute Size
SupplierNo	Unique number identifying supplier of movies	Varchar	5
CompanyName	Name of the company supplying the movies	Varchar	15
ContactPerson	Name of the person in the company to be contacted	Varchar	10
Phone	Defines the phone contact of the company	Varchar	10
Address	Defines the physical & postal office address of company	Varchar	20
MovieNo	Unique number defining the movie supplied	Varchar	5

Table 3: Suppliers Table

4.4.4 Movie

Attribute Name	Description	Attribute Type	Attribute Size
MovieNo	Unique number defining the movie	Varchar	5
Title	Defines the title of the movie	Varchar	15
Category	Defines the category of the movie i.e. action, drama etc	Varchar	15
HireStatus	Defines the hire status of the movie i.e. in or out	Varchar	3
HireCode	Defines the code given to a movie that is hired	Varchar	5
MemberNo	Unique number identifying member borrowing movie	Varchar	5
StaffNo	Unique number identifying a staff	Varchar	5

Table 4: Movie Table

4.4.5 Hire Table

Attribute Name	Description	Attribute Type	Attribute Size
HireCode	Defines the code given to a movie that is hired	Varchar	5
MovieNo	Unique number defining the movie	Varchar	5
SupplierNo	Unique number identifying supplier of movies	Varchar	5
StaffNo	Unique number identifying a staff	Varchar	5
MemberNo	Unique number identifying member borrowing movie	Varchar	5
HireDate	Defines the date the movie was hired out	Date	8
ReturnDate	Defines the date the hired movie was returned	Date	8
HireFees	Defines the fess paid to hire a movie	Number	7,2

Table 5: Hire Table

4.5 Conclusion

This chapter looked at the system design, where prototypes of the system were presented to describe system functionality. It also presented a high level description of the flow of data in the system and how the system interacts with the external entities. In the next chapter, the system will be implemented.

Chapter Five: Implementation of the New System

5.0 Introduction

This chapter describes the implementation of the new system. It includes implementation details with the process of converting the system specifications into executable programs. System specification involves processes of software design and programming.

5.1 System Implementation

This is the physical realization of the information system designs [11]. In this process, the logical, conceptual and physical designs of the system where implemented using Visual Basic 6.0, Oracle 10g and Ms Excel 2003 over Windows Xp operating system platform.

The database was implemented using Oracle database management system. The user forms and reports were implemented using Visual Basic 6.0 and Ms Excel 2003.

5.2 Database Table Implementations

This phase describes the physical implementation of the database tables of the various entities captured in the Video Library Management Information System. This was accomplished by the use of Oracle database management system as illustrated below;

```
CREATE TABLE "SUPPLIER" ("SUPPLIERNO" VARCHAR2(5),
"COMPANYNAME" VARCHAR2(15),
"CONTACTPERSON" VARCHAR2(10),
"PHONE" VARCHAR2(10),
"ADDRESS" VARCHAR2(20),
"MOVIENO" VARCHAR2(5),
CONSTRAINT "SUPPLIER_PK" PRIMARY KEY ("SUPPLIERNO") ENABLE,
CONSTRAINT "SUPPLIER_CON" FOREIGN KEY ("MOVIENO")
```

```
REFERENCES  "MOVIE" ("MOVIENO") ON DELETE CASCADE ENABLE)/
CREATE TABLE  "STAFF"
 ("STAFFNO" VARCHAR2(5) NOT NULL ENABLE,
"FNAME" VARCHAR2(10),
"SNAME" VARCHAR2(15),
"SEX" CHAR(1),
"DOB" DATE,
"MOBILE" VARCHAR2(10),
"ADDRESS" VARCHAR2(20),
"POSITION" VARCHAR2(15),
"SALARY" NUMBER(10,2),
"MEMBERNO" VARCHAR2(5),
"SUPPLIERNO" VARCHAR2(5),
"HIRECODE" VARCHAR2(5),
CONSTRAINT "STAFF_PK" PRIMARY KEY ("STAFFNO") ENABLE,
CONSTRAINT "STAFF_CON" FOREIGN KEY ("MEMBERNO")
REFERENCES   "MEMBERSHIP"  ("MEMBERNO")  ON  DELETE  CASCADE
ENABLE,
CONSTRAINT "STAFF_CON1" FOREIGN KEY ("SUPPLIERNO")
REFERENCES  "SUPPLIER" ("SUPPLIERNO") ON DELETE CASCADE ENABLE,
CONSTRAINT "STAFF_CON2" FOREIGN KEY ("HIRECODE")
REFERENCES  "HIRE" ("HIRECODE") ON DELETE CASCADE ENABLE)/

CREATE TABLE  "MOVIE"
("MOVIENO" VARCHAR2(5) NOT NULL ENABLE,
"TITLE" VARCHAR2(50) NOT NULL ENABLE,
"CATEGORY" VARCHAR2(15),
"HIRESTATUS" VARCHAR2(3),
"HIRECODE" VARCHAR2(5),
"MEMBERNO" VARCHAR2(5),
"STAFFNO" VARCHAR2(5),
```

```
CONSTRAINT "MOVIE_PK" PRIMARY KEY ("MOVIENO") ENABLE,
CONSTRAINT "MOVIE_CON" FOREIGN KEY ("MEMBERNO")
REFERENCES "MEMBERSHIP" ("MEMBERNO") ON DELETE CASCADE
ENABLE,
CONSTRAINT "MOVIE_CON1" FOREIGN KEY ("STAFFNO")
REFERENCES "STAFF" ("STAFFNO") ON DELETE CASCADE ENABLE,
CONSTRAINT "MOVIE_CON2" FOREIGN KEY ("HIRECODE")
REFERENCES "HIRE" ("HIRECODE") ON DELETE CASCADE ENABLE)/

CREATE TABLE "MEMBERSHIP"
("MEMBERNO" VARCHAR2(5) NOT NULL ENABLE,
"FNAME" VARCHAR2(10),
"SNAME" VARCHAR2(15),
"SEX" CHAR(1),
"DOB" DATE,
"MOBILE" VARCHAR2(10),
"ADDRESS" VARCHAR2(20),
CONSTRAINT "MEMBERSHIP_PK" PRIMARY KEY ("MEMBERNO") ENABLE)/

CREATE TABLE "LOGIN"
("USERNAME" VARCHAR2(25) NOT NULL ENABLE,
"PASSWORD" VARCHAR2(25) NOT NULL ENABLE,
CONSTRAINT "LOGIN_PK" PRIMARY KEY ("USERNAME", "PASSWORD")
ENABLE)/

CREATE TABLE "HIRE"
("HIRECODE" VARCHAR2(5) NOT NULL ENABLE,
"HIREDATE" DATE,
"RETURNDATE" DATE,
"HIREFEES" NUMBER(10,2),
"MOVIENO" VARCHAR2(5),
```

"SUPPLIERNO" VARCHAR2(5),
"STAFFNO" VARCHAR2(5),
"MEMBERNO" VARCHAR2(5),
CONSTRAINT "HIRE_PK" PRIMARY KEY ("HIRECODE") ENABLE,
CONSTRAINT "HIRE_CON" FOREIGN KEY ("MOVIENO")
REFERENCES "MOVIE" ("MOVIENO") ON DELETE CASCADE ENABLE,
CONSTRAINT "HIRE_CON1" FOREIGN KEY ("SUPPLIERNO")
REFERENCES "SUPPLIER" ("SUPPLIERNO") ON DELETE CASCADE ENABLE,
CONSTRAINT "HIRE_CON2" FOREIGN KEY ("STAFFNO")
REFERENCES "STAFF" ("STAFFNO") ON DELETE CASCADE ENABLE,
CONSTRAINT "HIRE_CON3" FOREIGN KEY ("MEMBERNO")
REFERENCES "MEMBERSHIP" ("MEMBERNO") ON DELETE CASCADE ENABLE)/

CREATE TABLE "ADDUSER"
("PASSWORD" VARCHAR2(25) NOT NULL ENABLE,
CONSTRAINT "ADDUSER_PK" PRIMARY KEY ("PASSWORD") ENABLE)/

5.3 System Login and Main Window prototype implementation

This phase describes the physical implementation of the system login and main window prototypes. This was accomplished by the use of Visual Basic 6.0 and Oracle 10g over Windows Xp operating system.

5.3.1 System Login implementation

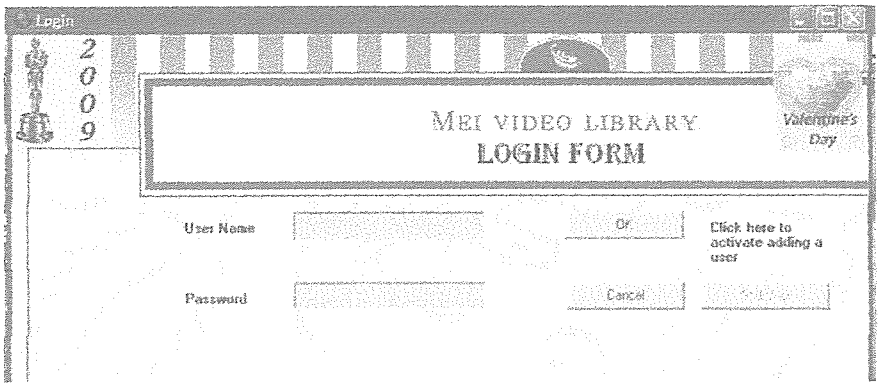

Figure 18: System login implementation

5.3.2 Main Window implementation

The main window implementation describes the process of accessing system forms, reports and how to exit the system. To access the forms, use the "Click To Access Forms" button. To access the reports, use the "Click To Access Reports" button. And to close the system, use the "Exit Mei Video Library" button.

Figure 19: Main window implementation

5.4 Conclusion

In this chapter, the implementation of the system was presented. This involved implementing the database tables using Oracle 10g DBMS, using Visual Basic 6.0 to implement the forms and reports and Ms Excel 2003 to implement interactive reports. In the next chapter, evaluation of the new system will be presented.

Chapter Six: Evaluation of the New System

6.0 Introduction

In this chapter, the new system was evaluated focusing on the following areas of concern; functionality, usability, standards, effect on the organization and finally, effect on the customers.

To carry-out the system evaluation, a questionnaire was designed highlighting the issues mentioned above. This was administered to the stake-holders (staff and management of Mei Video Library) together with the system.

The stake-holders were taken through a 5 to 10 minutes how-to-use session of the system and then allowed to navigate and explore the system on their own.

6.1 Functionality

In this phase of system evaluation, the system was tested to find out whether it is able to do what it is intended or needed.

Mei Video Library Management Information System has been designed to perform the *following functions;*

i. Data input
ii. Data analysis/processing
iii. Data output
iv. Data storage

Data Input This function of the system is concerned with capturing data using forms. These forms have been designed to capture all relevant information concerning staffs, suppliers, members, movies and music in Mei Video Library.

Data Analysis/Processing This function of the system is concerned with examining the inputted data so as to come up with significant information that will facilitate planning and decision making in Mei Video Library.

Data Output This function of the system is concerned with data output using reports. These reports have been designed to be both static and interactive.

The static forms can not be updated and will only output data stored in forms. However, the interactive reports can be updated and will be used to output data that needs real-time updates and is critical to the running of Mei Video library. This data includes price lists of movies and music videos/tapes, bills, expenses and information about members of the library.

Data Storage This function of the system is concerned with data storage. The data storage functionality of this system has been designed using tables in Oracle 10g DBMS. These tables have been linked to their respective forms and reports using Visual Basic 6.0 controls to store data that will be inputted through the forms and all updates done through the interactive reports.

6.2 Usability

In this phase of system evaluation, the system was tested to find out whether it is easy to use for its intended user population. This covered the following areas;

i. Simple and clear instructions to execute tasks (like data input, analysis, and output)
ii. How to find help incase of inability to execute a task
iii. Using both menus and short-cut tools to execute the same task
iv. Abstracting advanced procedures from novices yet clear on how expert/advanced users can find them.

6.3 Standards

In this phase of system evaluation, the system was tested to find out whether it fulfills the pertinent requirements of various standards-making bodies.

The system standards evaluation focused on examining whether user interface design principles where adhered to. These principles include consistency, explaining rules/abbreviations, supporting both novices and experts, using color appropriately, using non-destructive default buttons, alignment of fields, justifying data appropriately, grouping things appropriately, and not using pop-up menus as the only source of functionality.

6.3.1 Principles of User Interface Design

- **Consistency:** This is a harmonious uniformity or agreement among things or parts [15]. For example, if someone can click on a list icon and have something happen, if he/she goes to another interface and clicks on the same icon, they should get the same results.
- Explain rules/abbreviations: All rules and abbreviations used should be properly explained in clear complete messages. Tool-tip text should be used to define abbreviations.
- Support both novices and experts: In the past, research has shown that novices tend to like to use the mouse, while experts tend to like to use the keyboard short-cuts. So, both categories of users should be supported.
- User color appropriately: When color is used to reflect an action, then there must be a secondary indicator because some users maybe color blind.
- Use Non-destructive default buttons: A non-destructive default button is a button that does reversible actions like select-all, undo etc. A destructive default button is a button that does an irreversible action like save, delete, exit, submit etc

- Alignment of fields: Fields should be aligned in such a way that, when a screen has more than one editing fields, they should be visually appealing. Text fields should be left aligned and numbers right aligned by default.

6.4 Effect on the organization

In this phase of system evaluation, the following questions were answered about this system;

- Does the system make the organization more profitable?
- Does the system make the organization a nicer place to work?
- How does the organizational structure & culture change due to the system's implementation?

6.5 Effect on the customers

In this phase of system evaluation, the following questions were answered about this system;

- Does the implementation of the system affect the customers of the organization?
- If there are any changes due to the implementation of this system, are they positive or negative?

6.6 Conclusion

In this chapter, evaluation of the new system was presented focusing on functionality, usability, standards, effect of the system on the organization and its customers.

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APPENDIX Sample Questionnaire

1. What is the name of this video library? .....

2. When was the video library established?

.....

3. How many people work in the library?

.....

4. How do you record and store information?

☐ **Manual** ☐ **Computerized** ***(tick where appropriate)***

5. What are some of the challenges that you face while recording and storing the information?

.....

.....

.....

.....

.....

6. Have you tried to find solutions to the challenges faced?

☐ **Yes** ☐ **No** ***(tick where appropriate)***

If yes, please state it (them)

.....

.....

.....

.....

.....

7a. What information do you store about your staff?

.....

.....

.....

.....

7b. What information do you store about the movies and music?

.....

.....

.....

.....

7c. What information do you store about your customers?

.....

.....

.....

.....

7d. What information do you store about your suppliers?

.....

.....

.....

.....

7e. What information do you store about the hired movies and music?

.....

.....

8. Do you store your information else where for safe storage?

☐ **Yes** ☐ **No** ***(tick where appropriate)***

If yes, what kind of information do you keep for safe storage?

.....

.....

.....

.....

.....

9. How often do you have your records updated?

☐ Daily ☐ Weekly ☐ Never

☐ Monthly ☐ Once a year ***(tick where appropriate)***

10. Do you have a staff specifically employed to do record keeping?

☐ Yes ☐ No ***(tick where appropriate)***

If yes, what are some of the activities they perform?

.....

.....

.....

.....

.....

APPENDIX I I Evaluation Questionnaire

Preamble
This questionnaire is part of the graduation report about Mei Video Library and it will be used to evaluate Mei Video Library Information System.

Evaluating system functionality

1. While using the forms, are you able to capture data easily? Yes, No

2. Are the form interfaces easy to follow when entering data? Yes, No

3. Are the form interfaces visually appealing? Yes, No

4. Are you able to capture text data easily? Yes, No

5. Are you able to capture numerical data easily? Yes, No

6. Are you able to derive from the database all needed information about movies? Yes, No

7. Are you able to derive from the database all needed information about the music CD? Yes, No

8. Are you able to derive from the database all needed information about staff? Yes, No

9. Are you able to derive from the database all needed information about suppliers? Yes, No

10. Are you able to derive from the database all needed information about bills? Yes, No

11. Are you able to derive from the database all needed information about prices of movies and music? Yes, No

Evaluating system usability

12. Are the forms easy to use? Yes, No

13. Are the reports easy to use? Yes, No

14. Are the instructions clear and easy to use? Yes, No

15. Can you easily navigate through the system? Yes, No

16. Are you able to find the exit/close commands easily? Yes, No

Evaluating system standards

17. Does the system adhere to consistency standards? Yes, No

18. Does the system adhere to rules/abbreviation standards? Yes, No

19. Does the system adhere to color standards? Yes, No

20. Does the system clearly support novices and experts use? Yes, No

21. Does the system adhere to field alignment standards? Yes, No

Evaluating effect of the system on the organization

22. Does the system make the organization more profitable?

23. Does the system make the organization a nicer place to work?

24. How has the organization's structure & culture changed due to the system's implementation?

Evaluating effect of the system on customers

25. Does the implementation of the system affect the customers of the organization?

26. If there are any changes due to the implementation of this system, are they positive or negative?

APPENDIX III Budget

Item	Ugshs
Hiring PC	20,000/=
Printing and Photocopying	10,000/=
Binding (4 copies) 6,000/= each	30,000/=
Fare/transport	12,000/=
Phone calls	15,000/=
Miscellaneous	25,000/=
Total amount	**112,000/=**

APPENDIX IV Introductory Letter

KAMPALA INTERNATIONAL UNIVERSITY
P.O BOX 20,000
KAMPALA-UGANDA

10TH MARCH, 2009.

THE MANAGER
Mei Video Library
P.O BOX 2300
KAMPALA – UGANDA

Dear sir/Madam,

RE: REQUEST TO USE MEI VIDEO LIBRARY AS A CASE STUDY FOR OUR GRADUATION PROJECT

We hereby seek your consent to allow us use Mei Video Library as a Case Study for our Graduation Project.

We are students of Kampala International University, pursuing a Bachelor's degree in Information Technology.

A Graduation Project done through a research process is a requirement for one to graduate. We therefore chose Mei Video Library as our case study, so as to investigate the operations and challenges you face in your daily operations.

We look forward for your positive response.

Yours faithfully,

Jacob Senkungu

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