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LIBRARY MANAGEMENT INFORMATION SYSTEM

CASE: SAINT JOSEPH INTEGRATED TECHNICAL COLLEGE

A dissertation submitted to the Faculty of
Science and Technology in partial
fulfillment of the requirements for the
award of a Bachelor's Degree in Computer
Sciences

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Kigali, September 2013

DECLARATION

I, ***NDAHIMANA Gilbert***, hereby declare that this research work entitled “Library management information system” case of Saint Joseph Integrated technical College is my original work and has never been submitted anywhere else for any academic qualification. Where other people’s work has been used in this research work, it is indicated in the bibliography.

Date.....

Candidate’s signature.....

NDAHIMANA Gilbert

CERTIFICATION

This is to certify that the research entitled, ‘Library management information system’ case of Saint Joseph Integrated technical College, was done by **NDAHIMANA Gilbert** As a student in faculty of Science and Technology Department of Computer Science Under my guidance and supervision

Lecture TWAGIRIMANA Cyprien

Date

Signature.....

DEDICATION

To my late Parents;

To my sister;

To my families;

To my colleagues relatives and all friends

ACKNOWLEDGEMENT

Firstly I would like to thank the almighty God for his grace and love that protected me throughout my studies and my life.

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Lastly, I present my sincere appreciation to my colleagues and neighbors who have helped me.

Thanks to all those who prayed for me and all well wishers.

May God bless you .

ABSTRACT

The research study was conducted at Saint Joseph Integrated technical College the topic of this study is the “Library management information system”

The objectives of this study were to develop and update database books by using management information system, to implement automated system using library integrated software, to provide various search options to know the availability of books I the library, to generate the list of books in library due by particular software and to record the information of the members.

Management Information Systems are tools designed to improve of scholarly communication system. The present Study offers measures to library effectiveness & automation, offers tools for better reader services through integrated and collaborative working of St Joseph library.

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Conclusion of this study indicates that library management system will help the library of St Joseph to manage their books and all information. According the achievement of our system will allow St Joseph to manage its library. The system allows also borrowers to get books easily.

Recommendations that have been made by the researcher recommend that St Joseph to use this system to improve the quality of services we also recommend St Joseph allows people from outside to use its library to develop the spirit reading.

LIST OF ABBREVIATIONS

DBM	: Database Management
Dr	: Doctor
ERG	: Entity Relationship Diagram
MIS	: Management Information System
Prof	: Professor
RDBMS	: Rational Database Management System
SDLC	: Software Development Life Cycle
SDM	: System Development Method
SQL	: Structure Query Language
SSMSE	: Server Management Studio Express
ULK	: Université Libre de Kigali
UML	: Unified Modeling Language
OMG	:Object Management Group
SSMSE	:Server Management Studio Express
IBM	:Internationl Business Management
EMN	: Ecole des Métiers de Nyamirambo
SJITC	:Saint Joseph Integrated Technical College

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CHAPTER ONE GENERAL INTRODUCTION

1.1 Introduction

Almost every activity in the world today is controlled by computer software programs. However, as the life style become more and more complex, every area of human interaction was invalid various software systems, such as real time, business, simulation, embedded, web based, personal and more recently, artificial intelligence software, therefore

A management information system offers an institution the tool to manage itself properly. Computer systems are built to manage components such as individuals, technology, and data, effectively and efficiently. In information communication technology, management information systems help to store data and delete unnecessary information. As a result, effective computer based software through management information systems provides an institution with the appropriate technology to generate information in the most convenient means possible.

1.3 Problem statement

Saint Joseph Integrated Technical College has a library for students and teachers. However, the library lacks a system to enable staff to effectively manage different resources. Users have difficulties to locate books because the library is not equipped with the appropriate database to allow people to search for different books.

Currently if a student or teacher wants to locate a particular book, the person must browse manually through different bookshelves to identify the appropriate resource. However if a database were established in the library, users will be able to save time to locate particular books. The database will offer the library with an organize system to enable people to effectively borrow resources. In addition, the library will contain an organize collection of information resources.

Management Information Systems (MIS) have emerged as a solution to this capacity expansion requirement of Academic Libraries. Management information systems are tools designed to improve management decisions. The present study aims to focus on Library management information system for successful implementation of MIS.

1.4 Objectives of the study

1.4.1 General objective

This project will provide the library of Saint Joseph Integrated Technical College with an effective and useful database to manage different resources related to its library.

1.4.2 Specific objective

The specific objective are:

- To develop and update database books by using management information system
- To implement automated system using library integrated software
- To provide various search options to know the availability of books in the library
- To generate the list of books in library due by particular software
- To record the information of the members

1.4 Interest of the study

1.4.1 Personal interest

This study will help me to improve my knowledge on library management systems. As Rwanda takes the path of development, it has become crucial for the country to implement different libraries to provide the population with the knowledge to improve their skills. Currently, the country has many library facilities. However, many of these libraries lack an appropriate database for storing and retrieving records. This project will enable me to broaden my understating in database management, programming, and networking.

1.4.2 Social interest

This research will help to be able to come up with new application of library management information system. That the headmasters of school are contributing to improving the library management information system.

1.4.3 St Joseph interest

This project will provide the staff (librarians) from Saint Joseph Integrated Technical College with a system that can provide basic storage and retrieval technology. Thus, users will receive a good and fast service, as well as improve the overall performance of the library.

1.6 Scope of the study

The scientific regulations require to precisely defining the angle in which the topic has been treated. Based on the time and resources availed to the researcher; this project will be limited on the design and implementation of library information system in St Joseph will take as case study.

1.6 Research methodology

To achieve our objectives the following methods and research techniques will be used:

1.6.1 Data collection

Data collection techniques used includes interviews techniques, focused group discussions, observations, and documentary review.

A. Documentation technique

This type of techniques will help the research to collect data through library files, various research reports concerned on organizations and other resources like the internet websites. It will help me to use book at Saint Joseph, class notes, and other books related to the subject of this project.

B. Interview technique

Kenneth D. Bailey (1978) defined an interview as a conversation in which the researcher tries to get the information from the interviewee. The researcher was helped by a research guide or schedule to get information from the respondents. Here the researcher will directly ask questions, some of the authority of S^t Joseph especially the headmaster. The researcher will ask questions and record answers for further analysis.

C. Observation technique

Observation constitutes an important technique used in data collection in the scientific research. This technique will allow me to observe how daily activities are done at S^t Joseph in library

1.6.2 Methods

This methods used in this project is based upon the standard of analysis and design as well as software engineering process.

This includes the requirements capture, analysis design, implementation, coding, testing and integration.

The waterfall model will be followed during the development of this project.

1.7 Organization of the study

This project is composed by five chapters:

- Chapter one will focus on the general introduction;
- Chapter two will deal with the theoretical concepts on which I will base my development process;
- Chapter three will deal with the system analysis and design;
- Chapter four will deal with the system implementation;
- Chapter five will concern with the conclusion and recommendation;

CHAPTER TWO LITERATURE REVIEW

2.1 Definition of key concepts

2.1.1 Library

A library is an organized collection of information resources made accessible to a defined community for reference or borrowing. It provides physical or digital access to material, and may be a physical building or room, or a virtual space, or both (Casson, L 2002:48).

A library's collection can include books, periodicals, newspapers, manuscripts, films, maps, prints, documents, microform, CDs, cassettes, videotapes, DVDs, Blu-ray Discs, e-books, audio books, databases, and other formats (Phillips, H 2010:89)

2.1.2 Information system

Information system has been defined in terms of two perspectives: one relating to its function; the other relating to its structure. From a functional perspective; an information system is a technologically implemented medium for the purpose of recording, storing, and disseminating linguistic expressions as well as for the supporting of inference making. From a structural perspective; an information system consists of a collection of people, processes, data, models, technology and partly formalized language, forming a cohesive structure which serves some organizational purpose or function. (Kenneth, C 2002:5)

Information has been frequently defined as “interpreted data” and, as such, the same data might cause different interpretations. Different persons might associate different meanings to the same data. This kind of definition is frequently found in Information Systems especially those oriented to Information Systems Development and Managerial Information Systems (MIS) (Mingers, J 1997:73).

2.1.3 Management information system

A management information system (MIS) provides information that organizations require to manage themselves efficiently and effectively.

Management information systems are typically computer systems used for managing five primary components: Hardware, Software, Data, Procedures and People.

Management information systems are distinct from other information systems, in that they are used to analyze and facilitate strategic and operational activities.

Management information system is a system using formalized procedures to provide management at all levels in all functions with appropriate information based on data from both internal and external sources to enable them to make timely and effective decisions for planning, directing and controlling the activities for which they are responsible(Gumilar, D 1995:84).

In a management information system, modern, computerized systems continuously gather relevant data, both from inside and outside an organization. This data is then processed, integrated, and stored in a centralized database where it is constantly updated and made available to all who have the authority to access it, in a form that suits their purpose((Kuruppu, D.2002:14)

2.2. Theories on variables

2.2.1 Software

The software is the set of instructions that cause a computer to perform one or more tasks. Computers cannot do any useful work without instructions from software; thus a combination of software and hardware is necessary to do any computerized work. A program must tell the computer each of a set of tasks to perform, in a framework of logic, such that the computer knows exactly what to do and when to do it.

There are two major types of software: system software and application software. Each kind performs a different function.

A. The System Software

System software is a set of generalized programs that manage the computer's resources, such as the central processor, communications links, and peripheral devices.

B. The Application Software

Application software describes programs that are written for or by users to apply the computer to a specific task. Software for processing an order or generating a mailing list is application software. (LAUDON, K. and LAUDON, J.P 1999:127)

2.2.2 Data

Data must be distinguished from information (as defined before), and this distinction is clear and important for our purposes. Data are facts and figures that are not currently being used in a decision process and usually take the form of historical records that are recorded and filed without immediate intent to retrieve for decision making. An example would be any one of the supporting documents, ledgers, and so on that comprises the source material of profit and loss statements. Such material would only be of historical interest to an external auditor.

A. Database

The term «database» is perhaps one of the most overused and misunderstood terms in today's business environment. Many of people will tell you that they have a database, in fact, have only files. Others simply refer to a gathering of information as a file. In reality, many of these files are probably databases. Consider these definitions of a database:

Collection of data organized to serve many applications;

Collection of related files;

Integrated collection of computer data;

Collection of files;

Superset of related files;

This is why it is easy to misunderstand the database concept. Each definition refers to a database as a «collection,» but describes the collection differently. Let's adopt the following definition of a database.

A database is a collection of information that you organize and access according to logical structure of that information

2.3 Theory on library management system

The contemporary approach casts academic librarians as managers within the higher education system. What academic librarians need, before is the information which will allow them to plan properly, to know whether or not the library service is meeting the needs of the academic community. (Michael R, 2001:93)

Most librarians claim that they would now like to install decision support systems, even though they see the expense as a problem. Living in an age of such information explosion, Management Information Systems (MIS) have emerged as a solution to this capacity expansion requirement of Academic Libraries. The MIS's function is to provide library Staff and Readers with data, information, analysis and tools that enhance the effectiveness and efficiency of library services and assist in the decision-making process. (Adams, R, 1991:159)

2.3.1 Management Information Systems in Libraries

The contemporary approach casts academic librarians as managers within the higher education system. What academic librarians need, now much more than ever before, is the information which will allow them to plan properly, to know whether or not the library service is meeting the needs of the academic community. The introduction of computers into academic libraries was largely a response to the problem of dealing with increased workloads with fewer staff, and they are now able easily to handle most of the routine and repetitive work of the library staff. In addition, they have the capability to enhance the provision of management information, since automated data processing is able to present reports more accurately and much faster than manual systems. Nonetheless, most librarians claim that they would now like to install decision support systems, even though they see the expense as a problem. Living in an age of such information explosion, Management information system is shown only when the user of information. (Adams, R.1997:45).

2.3.2 The objective of management information systems in libraries

The objectives of an MIS are to assist staff with the daily decision making process, to maintain better accountability and control of resources, to monitor budget allocations, to improve overall library effectiveness by focusing on outcomes to generate internal and external reports to improve long-term planning and to facilitate performance measures activities. Further, the MIS intervention offers utility to Readers too by means of a wider bibliographic database through e-resources.

A management information system (MIS) is a subset of the overall internal controls covering the application of people, documents, technologies, and procedures.

According to McClure (2000:78), Management information systems are tools designed to improve management decisions.

The four main objectives for Management Information systems have been defined:

1. To facilitate the decision making process in the library by providing the managers with accurate, timely, and selective information that assists them in determining a specific course of action.
2. To provide for the objective performance measurement and assessment of selected relevant areas of the library. The areas are to be determined during strategic planning.
3. To provide pertinent information about the library's internal and external environment
4. To provide information on alternative strategies and contingency plans (Brophy, P. 1987:119).

2.4 DATABASE CONCEPT

I am going to define some database concepts which will be helpful on my work.

2.4.1 Data

Data must be distinguished from information (as defined before), and this distinction is clear and important for our purposes.

Data are facts and figures that are not currently being used in a decision process and usually take the form of historical records that are recorded and filed without immediate intent to retrieve for decision making. An example would be any one of the supporting documents, ledgers, and so on

that comprises the source material of profit and loss statements. Such material would only be of historical interest to an external auditor.

2.2.4.1 Database

The term «database» is perhaps one of the most overused and misunderstood terms in today's business environment. Many of people will tell you that they have a database, in fact, have only files. Others simply refer to a gathering of information as a file. In reality, many of these files are probably databases. Consider these definitions of a database:

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Collection of files;

Superset of related files;

This is why it's easy to misunderstand the database concept. Each definition refers to a database as a «collection,» but describes the collection differently. Let's adopt the following definition of a database:

A database is a collection of information that you organize and access according to logical structure of that information.

The components of a database are:

A. Table

A table is a set of data elements (values) that are organized using a model of vertical columns (which are identified by their name) and horizontal rows. A table has a specific number of column, but can have any number of rows. Each row is identified by the values appearing in a particular column subset which has been identified as a candidate key.

B. Field

Field is a space allocated for a particular item of information. A tax form, for example, contains a number of fields: one for your name, one for your social security number, one for your income .In database systems, fields are the smallest units of information you can access

C. Record

In database, a record (sometimes called a row) is a group of fields within a table that are relevant to a specific entity. For example, in a table called customer contact information, a row would likely contain fields such as: Id number, name, street address, city, telephone number ...)

In relational database management systems, records are called tuples.

D. Index

Index is a number used to select an element of a list, vector array or other sequence or an index can be a list of names, subjects and others with reference.

E. Foreign key

A foreign key is a field in a relational table that matches the primary key column of another table. The foreign key can be used to cross-reference tables. There are other types of database such as:

- Relational databases have much more logical structure in the way that it stores data. Tables can be used to present real world objects with each field acting like an attribute.
- Database Management (DBM) allows script programmers to store information as a pair of string a key which is used to find the associated value. Database management adds more functionality and better sortation during sortation.
- Object oriented database use SQL query language like notation to express the queries which is called as object query language.

2.4.4 DATABASE MANAGEMENT SYSTEM (DBMS)

A DBMS is a software package with computer programs that control the creation, maintenance, and the use of a database. There are many different types of DBMS ranging from small systems that run on personal computers to huge systems that run on mainframes. In fact, most of today's database systems are referred to as a relational database management system (RDBMS), because of their ability to store related data across multiple tables. Some of the more popular relational

database management systems include Microsoft Access, Microsoft SQL-Server, My Sql and Oracle.

2.5 DATA MODELING

It is a technique for organizing and documenting a system's data. Sometimes it is called database modeling because it is eventually implemented as a database. the actual model is frequently called Entity Relationship Diagram(ERG),where entity means class of persons, objects, events or concepts about which we need to capture and store data and relationship means association among the instance of one or more entity types.

2.5.1 Entity –Relationship Diagram

It is a pictorial representation of the entities and the relationships between them. it allows the participants in the meeting to easily see the information structure of the application.

2.5.2 Entity

The entity is a person, object, place or event for which data is collected. For example, if you consider the information system for a business, entities would include not only customers but the customer's address and orders as well. The entity is represented by a rectangle and labeled with a singular noun.

2.5.3 Attribute

In general, an attribute is a property or characteristic. color, for example, is an attribute of your hair. in database management system(DBMS),an attribute may describe a component of the database ,such as a table or a field, or may be used itself as another term for a field.

2.5.4 Relationships

Relationships are the glue that holds together the various components of an E-R model. Intuitively, a relationship is an association among the instances of one or more entity types that is of interest to the organization.

2.5.5 Primary key

Every database table should have one or more columns designated as the primary key. The value this key holds should be unique for each record in database. It can either be a normal attribute that is guaranteed to be unique (such as Social Security Number in a table with no more than one record person) or it can be generated by the DBMS. Primary keys may consist of a single attribute or multiple attributes in combination.

2.5.6 Cardinality

Cardinality specifies the minimum and maximum number of instances of one or more entity types.

2.6 Used tools and languages

2.6.1 My SQL Overview

MySQL is an open source relational database management system (RDBMS). It is commonly used for database services for other open source applications. It provides two methods to use MySQL for customer applications. In the first method, it fully manages the entire MySQL infrastructure so the customer does not have to. In the second method, the customers manage the infrastructure themselves and purchase access to the university's campus-wide MySQL Enterprise Platinum support contract.

MySQL is a relational database management system (RDBMS) that runs as a server providing multi-user access to a number of databases.

2.6.2 Microsoft SQL Server 2005

Microsoft Visual Studio includes native support for data programming with Microsoft SQL Server. It can be used to write and debug code to be executed by SQL CLR. It also includes a data designer that can be used to graphically create, view or edit database schemas. Queries can be created either visually or using code. SSMS 2008 onwards, provides intelligence for SQL queries as well.

SQL Server Management Studio is a GUI tool included with SQL Server 2005 and later for configuring, managing, and administering all components within Microsoft SQL Server. The tool

includes both script editors and graphical tools that work with objects and features of the server. SQL Server Management Studio replaces Enterprise Manager as the primary management interface for Microsoft SQL Server since SQL Server 2005. A version of SQL Server Management Studio is also available for SQL Server Express Edition, for which it is known as SQL Server Management Studio Express (SSMSE).

A central feature of SQL Server Management Studio is the Object Explorer, which allows the user to browse, select, and act upon any of the objects within the server. It can be used to visually observe and analyze query plans and optimize the database performance, among others. SQL Server Management Studio can also be used to create a new database, alter any existing database schema by adding or modifying tables and indexes, or analyze performance. It includes the query windows which provide a GUI based interface to write and execute queries.

The SQL phrase stands for Structured Query Language.

2.6.3 Structured Query Language

English –like set of commands used in accessing, editing or updating, information stored in a database. Invented by International Business Machines (IBM) Corp, in 1974, SQL continues to be enhanced and (having been adopted by both ANSI and ISO), is a de-facto worldwide standard.

2.6.4 Objectives of SQL

The objectives of SQL:

- Create the database and relation structures;
- -Perform basic data management tasks, such as the relation, modification, and deletion of data from the relations;
- -Perform both simple and complex queries to transform the raw data into information;

2.6.5 Query Languages

A query language is a language in which user requests information from the database. Query language can be categorized as their procedural or non procedural.

In a procedural, the user instructs the system to perform a sequence of operations on the database to computer desired result.

In a non procedural language, the user describes the desired information without giving a specific procedural for obtaining that information.

2.6.6 Microsoft Visual Studio

Microsoft Visual Studio is the Integrated Development Environment (IDE) in which developers work when creating programs in one of many languages, including Visual C#, for the .NET Framework. The .NET Framework is a development and execution environment that allows different programming languages and libraries to work together seamlessly to create Windows, Web, Mobile, and Office applications (Thomas,F 2007).

2.6.7 Microsoft Visual C# 2008

Microsoft Visual C# 2008 pronounced "C sharp") is a programming language that is designed for building a variety of applications that run on the .NET Framework. C# is simple, powerful, type-safe, and object-oriented. The many innovations in C# enable rapid application development while retaining the expressiveness and elegance of C-style languages.

Visual C# is an implementation of the C# language by Microsoft. Visual Studio supports Visual C# with a full-featured code editor, compiler, project templates, designers, code wizards, a powerful and easy-to-use debugger, and other tools. The .NET Framework class library provides access to many operating system services and other useful, well-designed classes that speed up the development cycle significantly (Vincent,L,2010)

2.6.8 Crystal Reports

Crystal Reports for Visual Studio is the custom version of Crystal Reports that is available as part of the default installation in most versions of Microsoft Visual Studio.

If you upgrade to Crystal Reports Developer, you have access to additional features and an updated reporting component within Visual Studio.

Crystal Reports for Visual Studio .NET 2002 or 2003 and Crystal Reports for Visual Studio 2008 include many of the features of Crystal Reports Developer. These include the ability to create reports, connect them to a Crystal Report Viewer control, and programmatically interact with these reports using the Crystal Reports SDK (Taylor,G,2008)

2.7 Features of Crystal Reports for Visual Studio

Crystal Reports for Visual Studio 2008 comes with powerful features. For a list of features that are new to Crystal Reports for Visual Studio 2008.

- A common standard file format allows for feature-rich reports that contain data retrieval criteria, grouping, summary, parameter, drill down, and sub report linking information.
- An embedded Crystal Reports designer, assisted by wizards and experts, builds complex report files easily.
- Data and .NET Dataset connections use the Database Expert to easily interact with a wide variety of database protocols, as well as proxy data in the form of ADO.NET Datasets.
- Dataset processing speed has been significantly improved in Crystal Reports 10 and Crystal Reports for Visual Studio 2008.
- Report viewers display Crystal reports on forms, in both Web and Windows applications.
- A Crystal Reports SDK interacts with and modifies reports programmatically. Use one of four different object models, each with increasing levels of complexity and power.
- An exporting feature exports data from the Crystal Report Viewer control to Word, Excel, PDF, and HTML, and Crystal Reports formats.
- The ability to print from the Crystal Report Viewer control enables page-based report printing from any Web or Windows application.
- Prompts for missing parameters and database logons from the Crystal Report Viewer control allow reports, which have missing parameters or database information, to be easily corrected and displayed.
- Multilingual client support allows you to configure the Crystal Report Viewer control so that other languages can be displayed in the Tool Tips, determined by the client browser, the ASPX page, or the environment settings for the machine.

- Report Web Services, from an ASP.NET Web Service project, allow you to create a project, add a Crystal Report, and publish it as a Web service.
- Crystal Services allows programmatic access to your reports through a web service.
- Merge module deployment ensures the correct Crystal Reports' components and assemblies are added to a Web or Windows application that is created in Crystal Reports for Visual Studio 2008.
- Scalability is offered through optimizations that are available within Crystal Reports for Visual Studio 2008, or by upgrading to another solution in the Crystal product family.
- Seamless migration is possible from previous versions of Crystal Reports for Visual Studio 2008.

Projects created in previous versions of Crystal Reports for Visual Studio .NET is supported at runtime without requiring design-time modifications (Taylor, G, 2008)

2.8 Methodology

Methodology is a formal development process that defines a set of activities, methods, practices deliverables and automated tools that are used by developers and projects managers to implement and maintain an information system.

The software development process focus on the activities directly related to production of the software, for example, design, coding, and testing.

A development process consists of various phrases, each phrase ending with a defined output. The phrases are performed in an order specified by the process model being followed. The main reason for having a phased process is that it decomposes the problem of developing software into a set of phases, each handling a different concern of software development. Furthermore, a phased process allows proper checking for quality and process at some defined point during the development.

There are many types of Software Development Methodologies such as:

- The Software Development Life Cycle(SDLC);
- The Prototyping Model;
- The spiral Model;

- The Object-Oriented Model;

2.9. The Software Development Life Cycle

The Software Life Cycle refers to the steps that one goes through to design, develop, implement, use and maintain a software system. Here, the developer of the system has some choices to make. In particular, the developer must decide which software development to use.

2.9.1. The Prototyping Model

The prototyping model is the process of building a system mock-up with minimal time, investment. Prototyping is actually more of a software development technique that can be used in conjunction with any software development process than a software development process in its own right. Prototyping, however, can serve as the focal point of a software development process.

2.9.2. The spiral Model

The Spiral Model is a software development combining elements of both design and prototyping in stages, in an effort to combine advantages of top-down and bottom-up concepts. the spiral model is a system development method (SDM) which combines the features of the prototyping model and the waterfall model. The spiral model is expensive and complicated projects.

2.9.3. The Object-Oriented Model

The Object-Oriented Model is based on a collection of objects, like Entity-relationship. Unlike the record-oriented models, these values are themselves objects. The object contains bodies of code that operate on the object and these bodies of code are called methods.

2.9.4. Waterfall Model

Waterfall Model consists of a number of dependent phases that are executed in a sequential order. The complete solution is not released until the final phase.

A phase starts only when the previous has completed; each phase is addressing a separate concern, there is no feedback.

The sequence of activities performed in a software project is:

- Requirement analysis;
- Design phase;
- Implementation;
- Testing code;
- Maintenance.

Diagram view of waterfall model

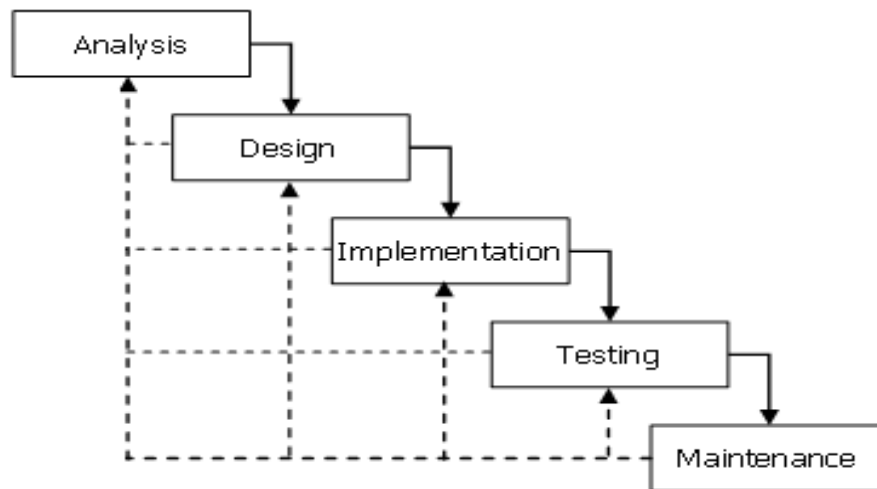


Figure 1.2: Waterfall model

Advantages of waterfall model are:

- .Conceptually simple to understand and use, cleanly divides the problem into distinct phases that can be performed independently
- . Natural approach for problem solving

Disadvantages of waterfall model are:

- Assumes that requirements can be specified and frozen early
- Operational problems discovered too late

2.9.4.1. Phases of Waterfall Model

The waterfall model derives its name due to the cascading effect from one phase to the other as is illustrated in Figure(1). In this model each phase well defined starting and ending point, with identifiable deliveries to the next phase.

A. Requirement analysis

The use of interview method is used to know the requirement .It is based on asking question to get opinions, ideas, explanations or specific information about the proposed statement of the problem.

B. Design phase

It includes translation of the requirements specified in the software requirement specification (SRC) into a logical structure that can be implemented in a programming language. The output of the design phase is a design document that acts as an input for all the subsequent SDLC phases.

C. Implementation

On receiving system design documents, the work is divided in modules, units and actual coding is started. The system is first developed in small programs called units, which are integrated in the next phase. Each unit is developed and tested for its functionality; this is referred to as Unit Testing. Unit testing mainly verifies if the modules/units meet their specification.

D. Coding phase

The goal of the coding or programming phase is to translate the design of the system produced into code in a given programming language, which can be executed by a computer and that performs the computation specified by the design.

E. Testing phase

It includes detection of errors in the software. The testing process starts with a test plan that recognizes test-related activities, such as test case generation, testing criteria and resource allocation for testing. The code is tested and mapped against the design document created in the design phase. The output of the testing phase is a test reports containing errors that occurred while the application.

F. Maintenance

This phase of the waterfall model is virtually never ending phase(very long).Generally, problems with the system developed(which are not found during the development life cycle)come up after its practical use starts, so the issues related to the system are solved after deployment of the system. Not all the problems come in picture directly but they arise time to time and needs to be solved; hence this process is referred as Maintenance.

The waterfall model is my choice of the development process model in my project.

2.10 Research methodology

2.10.1 The Unified Modeling Language

The Unified Modeling Language or UML is a mostly graphical modeling language that is used to express designs. It is a standardized language in which to specify the artifacts and components of a software system. It is important to understand that the UML describes a notation and not a process. It does not put forth a single method or process of design, but rather is a standardized tool that can be used in a design process.

2.10.2 Goals of UML

To understand UML, we need to first reference the organization that is responsible for bringing this language together and agreeing on a standard for laying out a way to visualize complex systems and their requirements.

The Object Management Group (OMG) defines the purpose of the UML as follows

- Provide users with a ready-to-use, expressive visual modeling language so they can develop and exchange meaningful models;
- Provide extensibility and specialization mechanisms to extend the core concepts;
- Be independent of particular programming languages and development processes;
- Provide a formal basis for understanding the modeling language;
- Encourage the growth of the Object Oriented tools market;
- Support higher –level development concepts such as collaborations, frameworks, patterns and components, integrate best practices.

2.10.3 Types of diagrams used in UML

Each UML diagram is designed to let developers and customers view a software system from a different perspective and in varying degrees of abstraction.

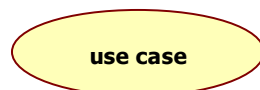
A. Use case diagram

A use case is a set of scenarios that describing an interaction between a use and a system. A use case diagram displays the relationship among actors and use cases. the two main components of a use case diagram are use cases and actors.

*Actor :is someone or something that interact with the system. it is who or what uses the system



*Use case: a use case represents functionality for an action.



They are three types of relationships between use cases:

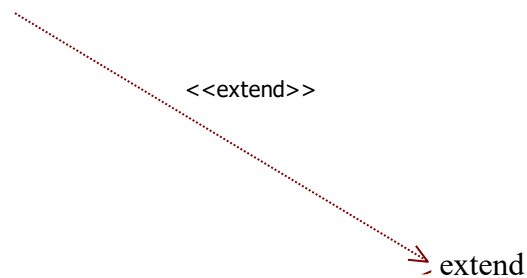
a. Generalization:

A use case generalization is a relationship from a child use case to a parent use case, specifying how a child can specialize all behavior and characteristics described for the parent, the symbol is



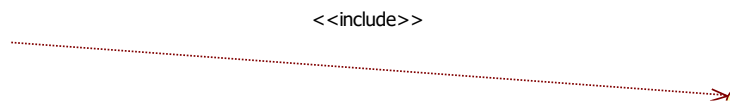
b. Extend

It is relationship and specifies that the behavior of a use case may be augmented by an additional use case. The arrow points from the child use case to the base use case, the symbol is



c. Include

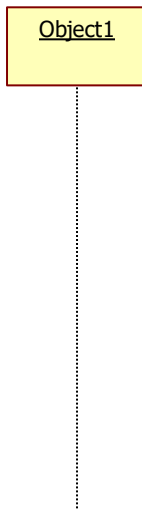
It indicates that a use case contains the behavior defined in another use case. the use case that is included is always required in other for the base case to execute, the symbol is



There exist another relationship called association between use case and actor.

B. Sequence diagram

Sequence diagrams are used to show how objects interact in a given situation. An important characteristic of a sequence diagram is that time passes from top to bottom: the interaction starts near the top of the diagram and ends at the bottom.

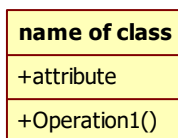


C. Class diagram

Class diagram are widely used to describe the types of objects in a system and their relationships. They model class structure and contents using design elements such as classes, packages and objects.

Class diagrams describe three different perspectives when designing a system: conceptual, Specification, and implementation.

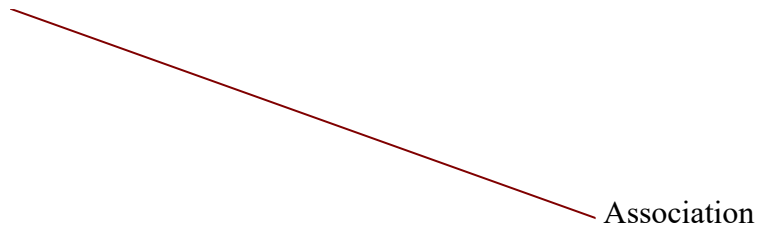
Classes are composed of three things: a Name, Attributes, and Operation



class

Relationship between classes

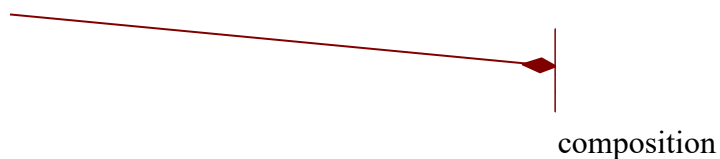
***Association** is defined as a relationship that describes a set of links, where a link is defined as a semantic connection among a triple of objects.



***Aggregation** is a special case of association the aggregate indicates that the relationship between the classes is some sort of “whole-part”



***Composition** is a strong aggregation. The composition is one with strong ownership, the parts “live” inside the whole, they will be destroyed together with its whole.



There are also other diagrams such as:

- Activity diagram
- Component diagram
- Deployment diagram
- Collaboration diagram:
- State chart diagram;
- Composite structure diagram

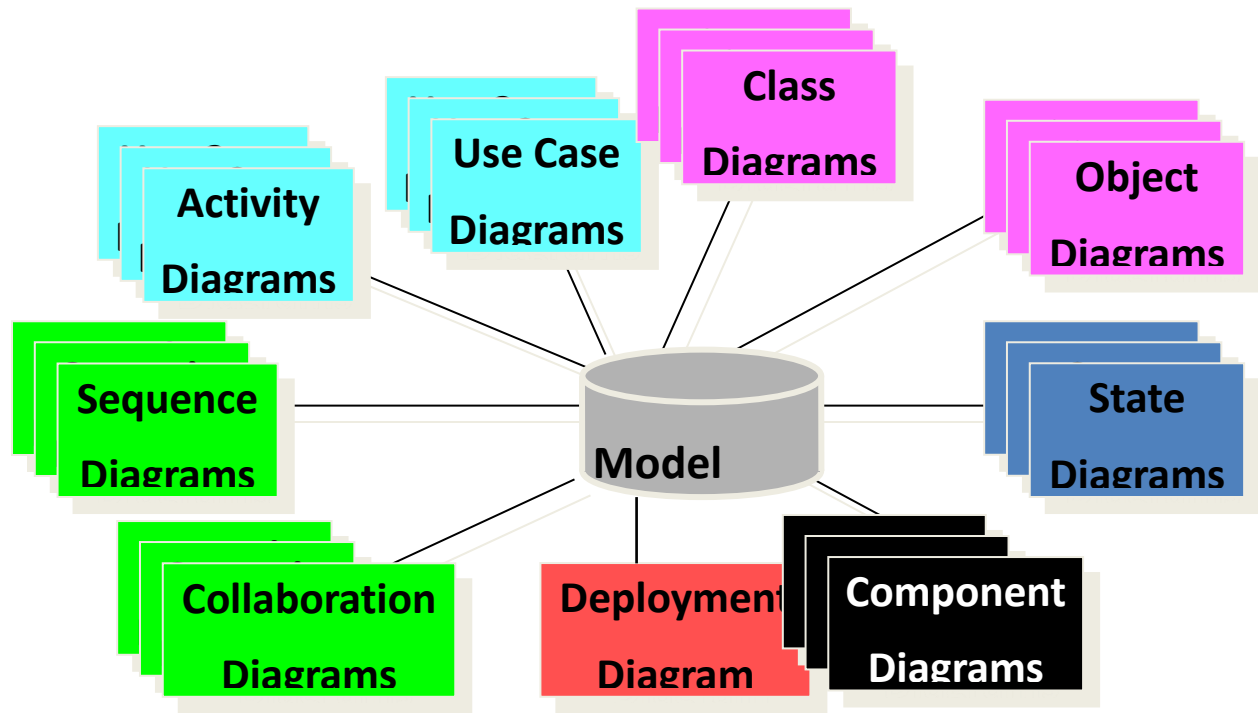


Figure 2.2: UML diagrams

CHAPTER THREE SYSTEM ANALYSIS AND DESIGN

3.1 INTRODUCTION

This chapter introduces techniques for the design of interfaces, menus, and databases, based on the requirement specification worked out during the analysis phase (functioning diagram, relationship diagram).

This phase is the first step in moving from the problem domain to the solution domain. In other words, starting with what is needed; design takes us towards satisfying the needs. The design of a system is the most critical factor affecting the quality of the software. It has impact on the late phases as well as testing and maintenance of the software.

3.2 HISTORICAL BACKGROUND OF SAINT JOSEPH

Saint–Joseph Integrated Technical College formerly known as Nyamirambo School of Crafts came into existence as a Training Centre in 1970 and started with 15 students.

Its establishment was made possible by the joint efforts of the Josephite Brothers Congregation whose objective was a practical training in order to respond to growing needs of both the capital and the countryside, as the country needed average but fast technical progress. It was urgent to train qualified workers according to modern technical method instead of following the traditional on-the-job training method.

In 1993, the School -then called Institut Léon Paul Classe- adopted the A3 level to its program. The 1994 Genocide left the School ransacked but it reopened on 27/06/1997. On 25/06/1999 it was officially inaugurated by the Minister of Education, Emmanuel MUDIDI and was recognized as a private School on 03/09/2000.

The Ninth General Chapter of the Josephite Brothers Congregation held in September 2001 decided that all Schools sponsored/managed by these Brothers must have Saint Joseph as patron saint; thus Nyamirambo School of Crafts (EMN) became Nyamirambo Saint–Joseph Technical School (ETSJ) since September 2002 and adopted A2 program in Public Works and Construction. The School was officially approved for A1 program in April 2010 and thereby became Saint

Joseph Integrated Technical College, SJITC. In April 2010, SJITC opened a department of Civil Engineering, whose first promotion will graduate in 2012.

Despite many challenges, Saint Joseph Integrated Technical College has made a significant progress and is today an essential partner of the Ministry of Education regarding technical options.

Saint Joseph Integrated Technical College VISION AND MISSION:

The vision and mission of Saint Joseph Integrated Technical College are:

- - To equip students with advanced skills with a view to increasing manpower and capacity for national development;
- To provide consultancy services to the Government, industry, private sector and the community at large.
- To collaborate with other academic, professional, technical, and research institutions in and outside of Rwanda for educational and technological development;
- To make provision for the advancement, transmission and preservation of knowledge and to sustain intellectual life in Rwanda;
- To contribute to the cultural, civic and moral training of its students and to participate actively in the economic and socio cultural development of the country;
- To develop and promote close collaboration with the private sector and the community.
To award diplomas of the categories of the courses it offers;
- To award certificates concluding short period courses;
- To conclude bilateral cooperation agreements with various institutions in charge of education as well as other high national and international institutions of learning.

Organizational Structure of Saint Joseph Integrated Technical College

The figure below illustrates the structure of SJITC

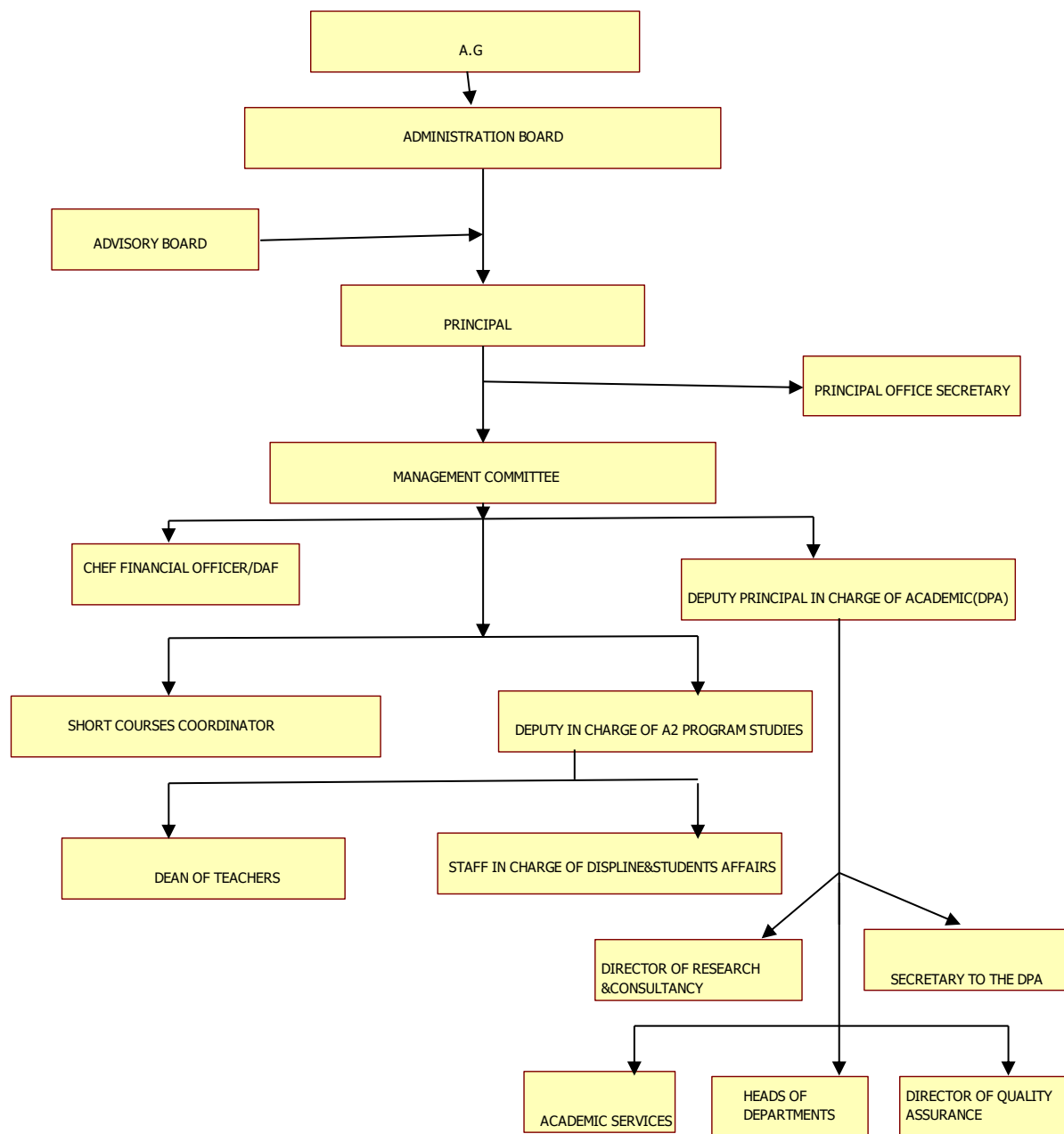


Figure 3.3 Structure of saint joseph integrated technical college

3.3 Problem presentation of the existing system

Normally, the process of managing and borrowing books is done manually where a student can come for choosing the needed book and borrowing it. The borrowing done in the registry where the librarian must save the books that have been borrowed by each student, and as you know it is so hard on the side of the librarian to check in the chaves all book and know how many book are available and those who have been borrowed.

They don't have an information technology for managing their Library; they use file, registry, books based system which has many inconvenient such as loss of data.

3.4 Requirement specification of the new system

3.4.1 Functional requirement

We proposed to Saint Joseph that we are going to develop an automated Saint Joseph Library Management Information System that used by the Librarian to record the books, record the members, save all information in library. The members borrow the books and get others information needed quickly.

The system use to solve these problems of books registration and borrowing books and reduce the time taken by the librarian for knowing all work in the Library. The system helps to do the report and save more information and data. The administrator and librarian is the only who can import, edit and view all information about the student or staff

3.5.2. NON FUNCTIONAL REQUIREMENT

The system will be doing, I need the people who have knowledge on the computer, during the development and running this system, I used a SQL Server for doing the database and programming language(Microsoft visual studio). I use waterfall model for developing the system and UML show how the system interact between the actors and the tables.

3.6 SYSTEM ANALYSIS

Any system designer will first analyze the existing system to point out the problem which is the system requirements creating need for a new one. It is a process of analyzing a system with a potential goal of improving it or modifying it. Based on the analysis better designing is done to get better output. During system analysis some factors of priority speed, cost, up gradation and convenience are given suitable priorities in designing.

After analyzing our system, we have recognized that the development of “Library Management Information System” program that is user friendly, timely, and benefiting to learn areas.

3.6.1 System requirement capture

The system requirements capture is modeled by UML (Unified Monitor Language)concept with the use of use case modeling, this is a process of modeling a system functions in terms of business event, who initiates the events and how the system responds to those events. The use case diagram of this system contains main use cases: Librarian use case and Student use case.

3.6.2 Main use cases view of the system

The following figure presents the main use cases view of the system..

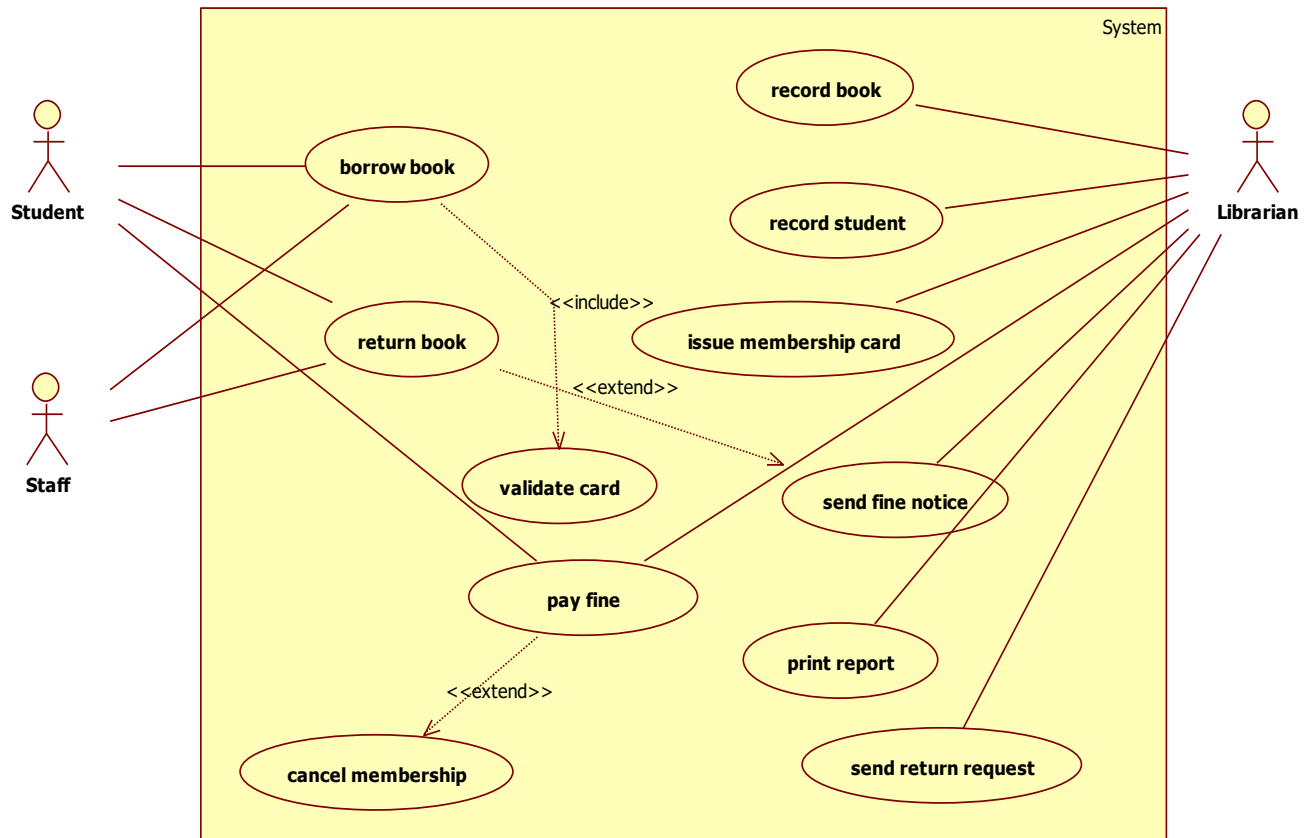


Figure 4.3 use case diagram

3.7.1 Conceptual class Diagram

The following figure shows the conceptual class diagram..

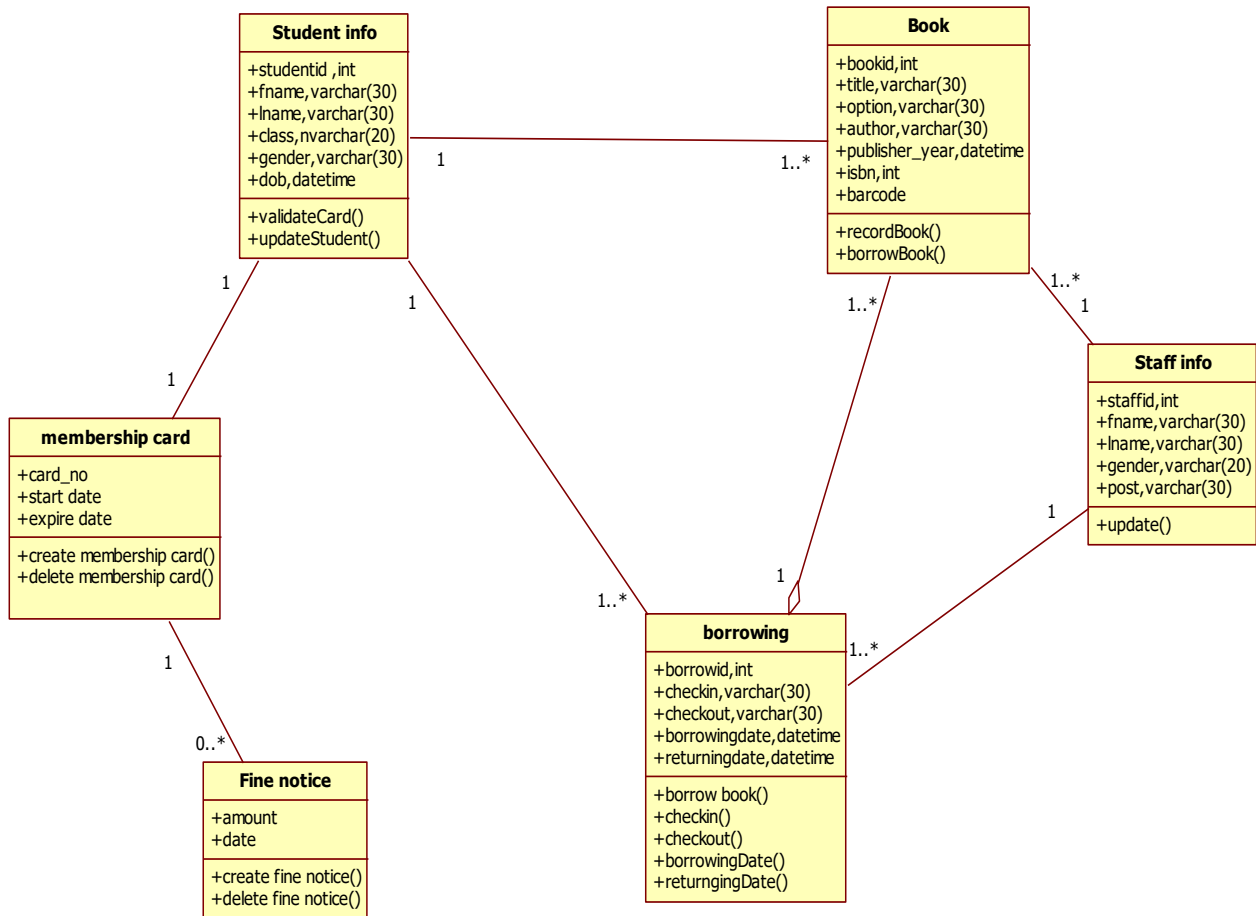


Figure 5.3: conceptual class diagram

3.8 Sequence Diagram

The sequence diagram shows how the system operate, the interaction between the actors and the tables.

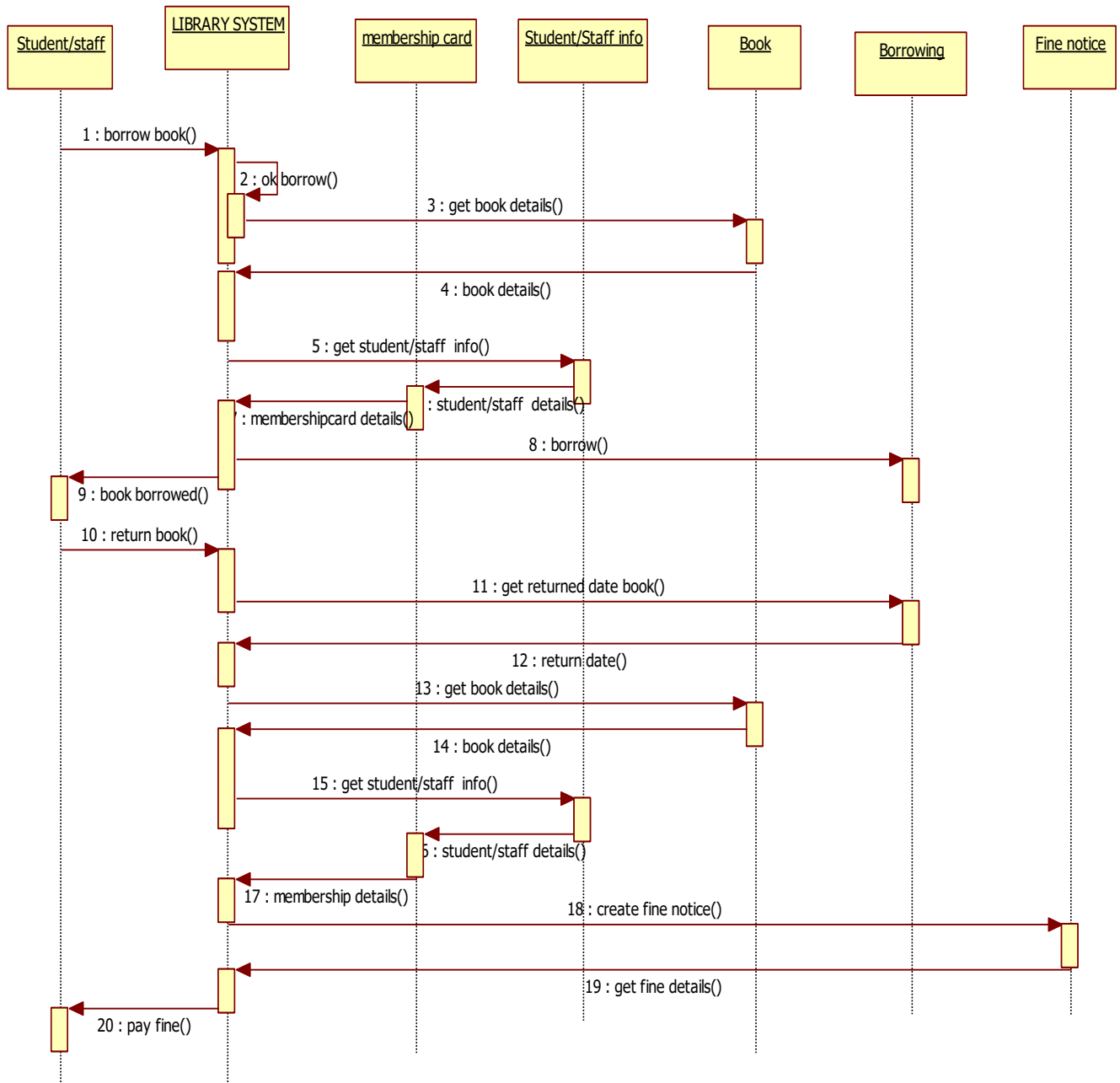


Figure 6.3:Sequence diagram

CHAPTER FOUR RESULTATS PRESENTATION AND IMPLEMENTATION

4.1 Introduction

This chapter includes the implementation of Library Management Information System where the student borrows the books, and the librarian controls well his/her library. The system helps to do record and report.

4.2 Home page

When a Librarian open the system and display this home page to access the login page, so that he/she can inter into the System.

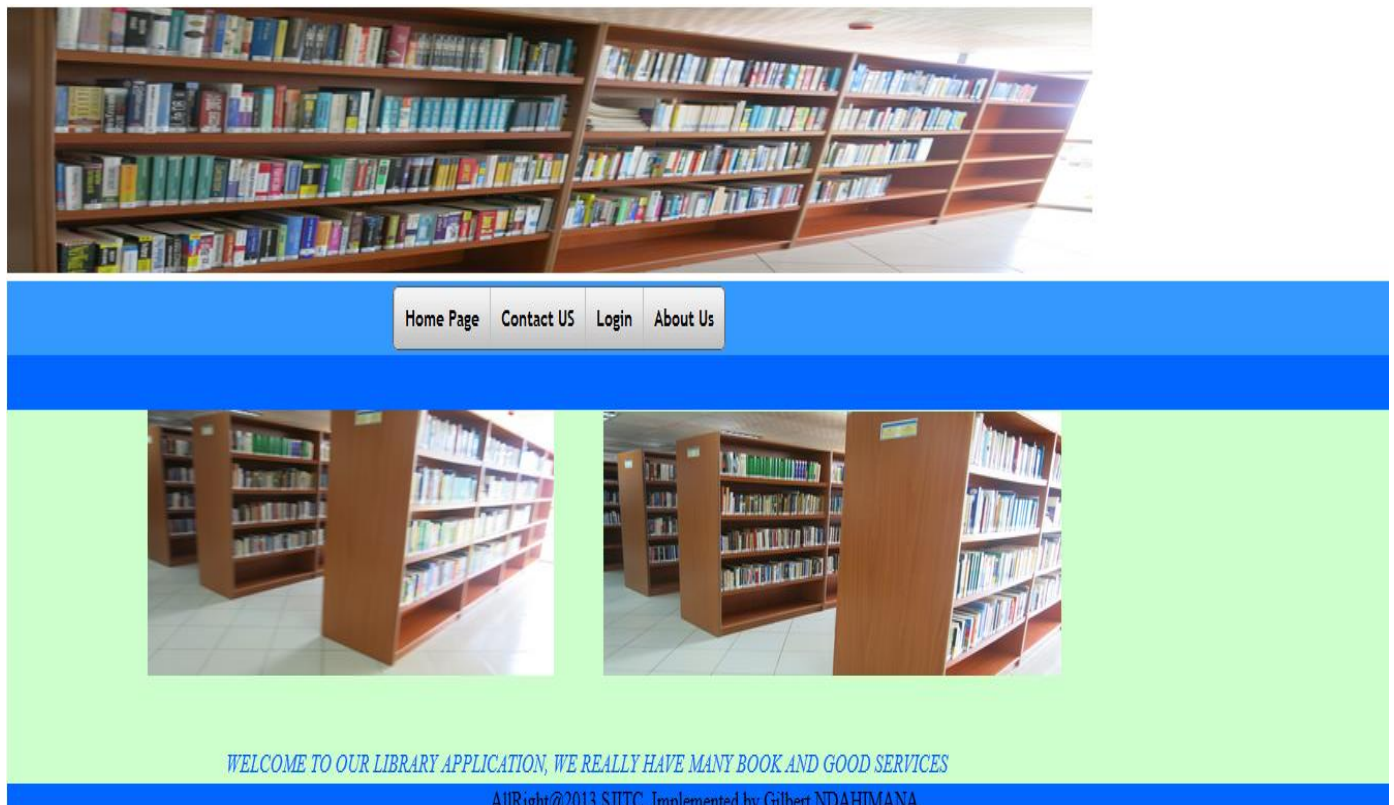


Figure 7.4: Home page

4.3 Login form

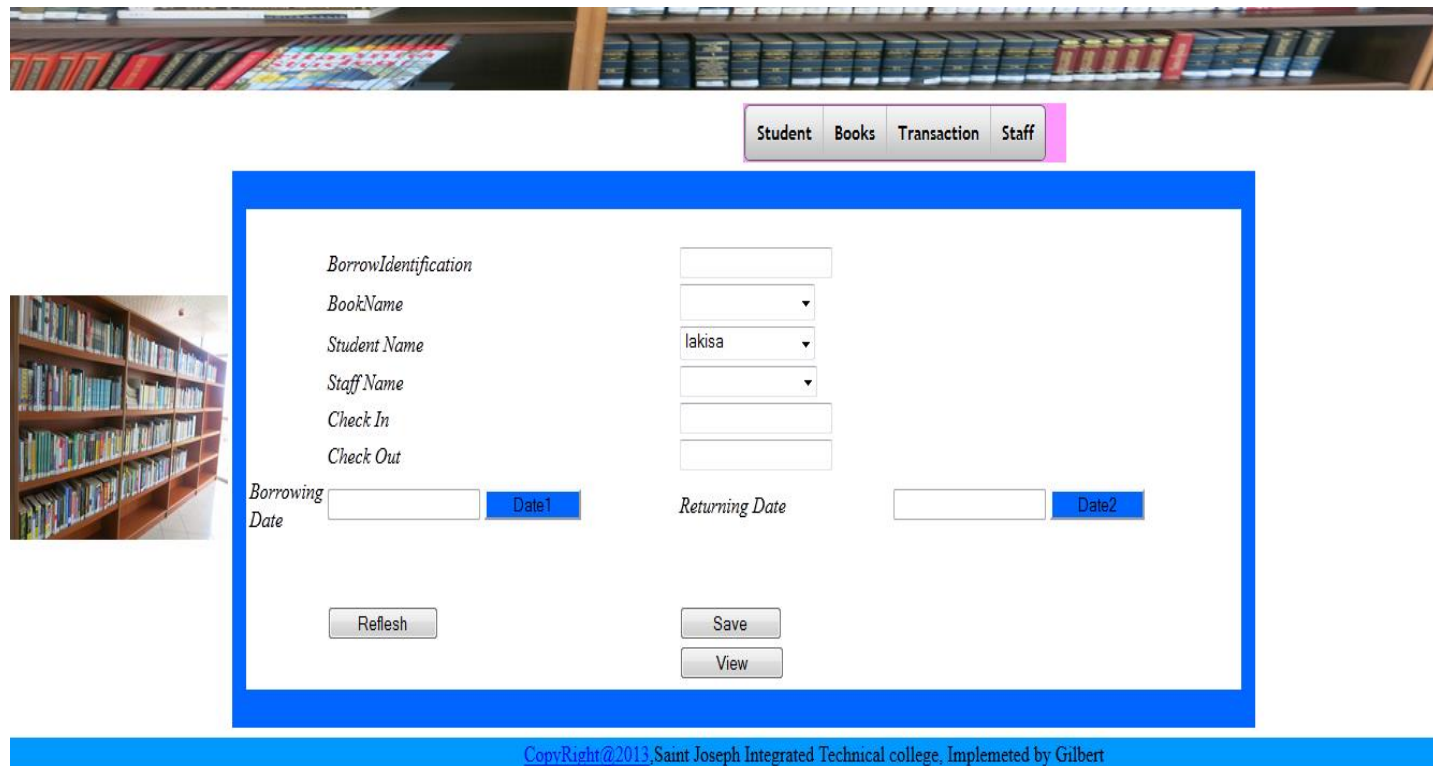
The login form is the form where a user or Administrator can use to put his/her username and password to enter into the System.



Figure 8.4: Login form

4.4 Borrowing Form

The borrowing form is the form where the librarian fills this form and save the information.



The screenshot displays a web-based borrowing form. At the top, a navigation bar contains four tabs: 'Student', 'Books', 'Transaction', and 'Staff', with 'Transaction' currently selected. The form itself is enclosed in a blue border and contains the following fields and controls:

- BorrowIdentification*: A text input field.
- BookName*: A dropdown menu.
- Student Name*: A dropdown menu with 'lakisa' selected.
- Staff Name*: A dropdown menu.
- Check In*: A text input field.
- Check Out*: A text input field.
- Borrowing Date*: A text input field followed by a blue 'Date1' button.
- Returning Date*: A text input field followed by a blue 'Date2' button.
- Buttons: 'Refresh', 'Save', and 'View' are located at the bottom of the form.

A footer bar at the bottom of the interface contains the text: [CopyRight@2013](#), Saint Joseph Integrated Technical college, Implemented by Gilbert.

Figure 9.4: Borrowing form

4.5 Staff Form

In the staff form, the librarian takes the information of the staff and save it in the system.

StaffID

FirstName

LastName

Gender

Post

Save

View

	StaffID	FirstName	LastName	Gender	Post
Edit Select	0	abc	abc	abc	abc
Edit Select	1	abc	abc	abc	abc
Edit Select	2	abc	abc	abc	abc
Edit Select	3	abc	abc	abc	abc

1 2

SqlDataSource - SqlDataSource1

Figure 10.4: Staff form

4.6 Book Registration Form

This book registration form helps the librarian to record the books in the system.

ContentPlaceHolder1 (Custom)

BookNumber	
Book Title	
Book Option	
Book Author	
Publishing Date	
ISBN	
	Save
	Update

Copyright@2013, Saint Joseph Integrated Technical college, Implemented by Gilbert

Figure 11.4: Book registration form

CHAP FIVE CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

It is now an established fact that management information system in library and information sciences through automation has become inevitable. The environments in which libraries operate are under the constant pressure of change. Libraries have to create environments that enable successful assessment and the implementation of results based on these assessments. Considering the above requirements, the present study attempted to make the library operations measurable, improvable and thus effective. The survey of readers on Library Automation and Library Effectiveness provided feedback on their perceptions and expectations.

Library management system will help the library of St Joseph to manage their books and all information .He/she will record books, record student and staff. It will be good to him or her to get the information in future.

According the achievement our system will allow St Joseph to manage its library. The system will allow also the borrowers to get the books easily.

Finally the system will allow St Joseph to save the data for long time in the secure ways.

5.2 Recommendation

We recommend that St Joseph to use this system to improve the quality of services.

We also recommend St Joseph to allow people from outside to use its library to develop the spirit reading.

BIBLIOGRAPHY

I. Books

Adams, R (1991); Management information software toll for European libraries, Prentice-Hall

Bromphy, P (2007); management information and decision support system in libraries, Aldershot

Casson, L (2002); A model of management information system for library and information service manager, McGraw-Hill

DATE C.J.(2000);An introduction to database systems, 7th edition Pearson Education Ltd

Gumilar, D (1995) Management information system in academic libraries, Irwin

Kenneth, C(2002);management information system, 7th Edition, Prentice-hall

Kenneth, D. Bailey (1978); Methods of social research, 2^{end} Edition, In m Publishing

Kuruppu, D(2002); Academic libraries and management information system, Pearson

Laudow, K (199); Management information systems: organization and technology, Prentice-hall

McClure, C (1998);Management information for library decision making advances in librarianship, McGraw-Hill

McClure, C (2002); Measuring academic library performance: A practical approach, American library Association

Michael, R(2001); Electronic Library and information system, Wiley

Mingers, J(1997); The nature of information and its relation to meaning, London & Francis

Murdick, G(2006); Information system for modern management, 2^{end} Edition, McGraw-Hill

Seltzer,M.(2008);Beyond Relational Databases, Pearson education Ltd

II. Courses Note,

UMUTESI 1, (2013);software engineering, ULK, Kigali

III. Electronic references

1. <http://www.inetsoftware.de/products/clear-reports/crystal-reports>
2. <http://www.microsoft.com/industry/government/products/vs2008.aspx>
3. <http://www.microsoft.com/sqlserver/2005/en/us/64-bit.aspx>