

**AN ONLINE HEALTH INSURANCE MANAGEMENT SYSTEM
CASE STUDY: MENGO HOSPITAL**

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**A GRADUATION PROJECT REPORT SUBMITTED TO THE SCHOOL
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THE AWARD OF BACHELORS OF INFORMATION
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UNIVERSITY**

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DECLARATION

We declare that the material in this book has been done entirely by my effort and has not been presented elsewhere for any academic qualification.

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APPROVAL

This research project is submitted for examination with my approval as the academic Supervisor.

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DEDICATION

This book is dedicated to our parents plus the entire family

ACKNOWLEDGMENTS

First of all we would like to thank my supervisor for being there for me whenever we needed him and also offering advice where necessary.

We would like to extend my sincere gratitude to our parents, brothers and sisters plus the entire family for their love, care and financial support they have always given to us.

We would like also to thank our friends for being so cooperative and understanding.

We would also like to thank the respondents who returned the questionnaires and those who were cooperative to us.

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ABBREVIATIONS

DBMS	Database Management System
FK	Foreign Key
HTML	Hypertext Markup Language
ICT	Information and Communications Technology
MMS	Multimedia Messaging Service
OCL	Object Constraints Language
OLTS	Online Transaction Processing System
OSS	Open-source software
PDA	Personal Digital Assistant
PHP	Hypertext Preprocessor
PK	Primary Key
PMR	Patient Medical Record
SMS	Short Message Service
SQL	Structured Query Language
UML	Unified Modeling Language
VB	Visual Basic
WAP	Wireless Application Protocol
WML	Wireless Markup Language
MOS	Medical Outcome Services
VAS	Visual Analogue Scale
HRQOL	Health Related Quality Of Life

CHAPTER ONE

INTRODUCTION

1.0 Background

Health Insurance is a health financing mechanism that involves both pre-payment and risk pooling. The paper involves classification of Health Insurance arrangements basing on sources of financing Public and Private Health Insurance. Mengo hospital is located in Namirembe on Namirembe Hill,

P.o Box 7161 Kampala Uganda

Mengo hospital is a private hospital that provides health care services. Mengo hospital was founded in 1897 by Sir Albert Cook of the Church Missionary Society. Mengo is one of the major hospitals in Kampala and is licensed as a health delivery unit by the Ministry of Health. In 1958 the hospital was handed over by the church missionary society to an independent and autonomous Board of Governors and Registered Trustees.

The project is designed to increase health finances aiming at securing better, reserved and sustained investments in health to provide equity and improve health outcomes most especially for the poor. This objective is to guarantee equitable, suitable, and quality health care for all Ugandans.

1.1 Research Questions

Will the system completely eliminate the problems of the current one?

How will the System help the users?

How will the System help the Researchers?

How will the system help the Hospital?

1.2 Problems Statement.

According to Mrs. Victoria Ziwa the top nursing officer, a growing number of people are uninsured and many of these without insurance do not have jobs and can not afford the care. Mengo hospital has been encountering several problems mostly related increased insurance costs and quality of health care. the costs of insurance have increased dramatically for consumers and insurers because new technologies also allow us to treat more problems than ever before, unfortunately these new treatments are often costly like arthroscopic surgery and

some of the newer drugs are very expensive. Groups of people can join forces to purchase health insurance. For example, individuals who work for the same employer may join a group health insurance plan. Members of the same clubs, professions or unions can also do so because group plans tend to be less costly.

1.3 Main objective of the Project

To empower Health regulations aiming at assuring access to quality and affordable health products, devices and services especially those commonly used by the poor.

1.4 Specific Objective

To study and analyze the data in order to avoid bad governance of Health aiming at health system performances both at local and National level.

To gather and analyze the data that can be used to increase on Health service delivery.

To improve on record tracking of customer information.

To improve on the storage of customer records.

1.5 Justification of the Study

Many health insurances that use online system will still continue to face the problem of increased insurance costs and low number of people who are uninsured which is still accompanied with certain problems.

However, the magnitude of the problems defer from hospital to hospital. It is the researcher's view that this project be a useful resource for the user, and the management of Mengo Hospital.

The research aims to provide information that can be used when improving plans for Health insurance systems.

The research aims to provide information about the state of Health insurance systems which people can use and how they can be maintained.

The System will help the users to get information whenever they need it, since online information seeking and consultation can be done at anytime from anywhere, so it is accessible at your Convenience.

The System will help the Hospital to improve on record tracking of customer information and also help improve on storage of customer information through using a standardized database.

The system will help the researcher generate good governance of health aiming at improving health system performance both at local and national level.

1.6 Scope.

1.6.1 Academic scope

The academic scope involved reading books about Health, Insurance, and documents from the Ministry of Health.

1.6.2 Time Scope

The research took duration of four months to be completed

1.6.3 Geographical scope.

The research was conducted from Mengo hospital.

1.6.4 Content Scope

The Research involved the use of Hypertext Preprocessor (PHP), Visual Basic (VB), and (SQL) Structured Query Language to collect the required data.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter elaborates the importance of an Online Health Insurance Management system as viewed by different researchers, the benefits of using Health Insurance system where there will be provision of information and maintenance of the state of Health insurance systems. The problem under study to develop good health insurance systems aiming at improving health care services both at Local and National level.

The information that will be gathered will result into development of the database of Health Insurance management system. A database is a shared collection of logically related data and description of this data designed to meet the information needs of a user.

A **database** is a system intended to organize, store, and retrieve large amounts of data easily. It consists of an organized collection of data for one or more uses, typically in digital form. A database management system (DBMS) consists of software that operates databases, providing storage, access, security, backup and other facilities.

The information that will be gathered will result into development of the database of Health Insurance management system. A database is a shared collection of logically related data and description of this data designed to meet the information needs of a user.

Although database is a computer term, it can also even apply to the ways in which information is categorized, stored and used manually. For any information management there is a database which is a collection of related information grouped together as an item.

According to Gerald V. Post. Database Management system second edition Introduction page 5. Many business applications need the same features (efficient storage and retrieval of data, sharing data with multiple users, security, and so on). rather than re-create these features within every application of the program, it makes more sense to purchase a database management system that includes these basic facilities.

According to Kendall, J.E., K.E. System Analysis and design 5th edition, Prentice hall(1) page 735, Database are not merely a collection of files. Rather a database is a central source of data meant to be shared by many users for a variety of applications. The heart of the database is the database management system (DBMS), allows the creation, modification, and updating of the databases. The retrieval of data and the generation of reports.

According to Elmasri Navathe Fundamentals of database systems third edition, The database system should be self descriptive, that is it should contain not only the database but also a complete definition of the database structure and constraints.

2.1 Advantages of databases

Database stores data efficiently. If you set your database according to few basic rules, the data will be stored with minimal wasted space; additionally the data can be retrieved rapidly to answer any query.

Database maintains data consistency with minimal effort. Most systems enable you to create basic business rules when you define the data. For example price should always be greater than zero, these rules should be enforced for every form, user or program that access the data.

Easy integration of data through query language for example one application might collect data on customer returns, if programmers created separate programs and independent files to store this data, combining data would be difficult. With DBMS any data in the database can be retrieved, combined compared to using the query system.

Data independence. This refers to the separation of data definitions from the program, it enables you to change the data definitions without altering the program, and similarly data can be moved to new hardware or to a completely different machine.

2.2 Qualities of a good database

According to Ideal databases (5), an ideal database must be fast to use. If it has a web interface, that interface must be well engineered to minimize roundtrips to the server. It should be usable by many different people in the organization, with many different roles and needs.

According to Thomas Cannolly and Carolyn Begg, Database Systems, A practical approach to Design, Implementation and Management (6), a database system must be fast, be able to fulfill all its functions and be very efficient, Additionally it should be consistent. The qualities of a good database include the following.

Performance. A good database system should be robust thus enabling fast retrieval and update of the data it stores.

Sharing of data and multi-user Transaction processing. A database must allow multiple users to access the database at the same time. It should also allow on-line transaction processing (OLTP) applications.

Effectiveness. A good database system should be able to attain goals of the organization, it should also be able capable of providing and distributing of current information to appropriate users of the system.

Consistency .A good database system should be reliable; data should be compiled uniformly and consistently.

Timeless. A good database system should be designed to store both present and past information and be able to retrieve the data when required.

2.3 Types of databases

2.3.1 Operational database

These databases store detailed data about the operations of an organization. They are typically organized by subject matter, process relatively high volumes of updates using transaction

2.3.2 Data warehouse

Data Warehouses archive modern data from operational databases and often from external sources such as market research firms. Often operational data undergoes transformation on its way into the warehouse, getting summarized, anonym zed, reclassified, etc.

2.3.3 Analytical database

Analysts may do their work directly against, a data warehouse, or create a separate analytic database for **online analytical processing**. For example, a company might extract sales records for analyzing the effectiveness of advertising and other sales promotions at an aggregate level.

2.3.4 Distributed database

These are databases of local work-groups and departments at regional offices, branch offices, manufacturing plants and other work sites. These databases can include segments of both common operational and common user databases, as well as data generated and used only at a user's own site.

2.3.5 End-user database

These databases consist of data developed by individual end-users. Examples of these are collections of documents in spreadsheets, word processing and downloaded files, even managing their personal baseball card collection.

2.4 Online Systems

According to Online systems, www.fldfs.com/aadir/cmindex.htm (9) they are systems which are accessible on the internet. They are computer application systems where data is entered into the device, such as a terminal, that is connected directly to a computer. The user can interact with the computer through the terminal.

2.4.1 Advantages of Online Systems.

According to Henry C. Lucas, Information System Concepts for Management, (10) , online systems are easy to use and are understandable. They save time that would have been used to access information.

They are also installed to improve internal efficiency of the organization thus data is in order and very easy to access, retrieve, and update.

When accurate, current, and reliable data is provided, the data can be analyzed correctly and plans made and implemented at astounding speed due to proper automated documenting systems.

They are installed to improve internal efficiency of the organization thus data is in order and very easy to access, retrieve and update if necessary.

They increase security and protect the data from being misused. This is because only those authorized are able to access data. Therefore people without privileges are limited from accessing data and altering it.

Security is strict as these systems have a user log to show who accesses specific data and what changes they make to data. Features like the preservation of the original documents are added advantages.

This kind of System is mostly useful for Businesses that have branches all over the world, when certain users need access to data stored in another part of the world.

This system is already used in the following countries and they include:-

Brazil.

According to Online Systems, Wikipedia. The universal health care system was adapted in Brazil in 1988, after the end of the military regimes rule, However free health care was available many years before.

The health care in Brazil is provided by both Private and Government institutions. Public health care is provided to all Brazilians permanent residents and is free at the point of need. Child care is a central issue on the public policy agenda of developing countries.

Argentina.

Health care is provided through a combination of Employer and labor unions. Sponsored plans, (obras Satiates), Government insurance plans, public hospitals and clinics through private health insurance plans. The government assures the quality of care through federal standards. In Argentina the government does not participate in the day-to-day care or collect information about individuals.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

The online Health Insurance System of Mengo Hospital is paper-based where information is stored manually files and resources such as time is not a concern. In addition to that, the system is inconvenient. To develop an online Health Insurance system of Mengo Hospital, various tools and technologies will be employed.

Methodology refers to the method used for conducting research. The methods chosen for data collection of this project are a combination and quantitative methods which is often the best and most efficient approach to collecting in depth and complete information. Qualitative methods are for conducting researchers that rely on open ended exploration of people's words, thoughts, actions and intentions. They supply detailed and in depth information to provide outside audience with an understanding of what a target population may think or feel about a specific issue or environment. Purely qualitative methods include observation, focus groups and case studies. Quantitative methods include interviews, questionnaires and review of document were the chosen methods out of the above combination of techniques because of the advantages that each have.

3.1 Interviews

Interviews are completed by the interviewer based on the feedback of the responder and they are more personal than self-directed questionnaires. Examples include personal, telephone and key informant interviews.

Two main types of interviews are used in evaluation research.

Structured interviews, which emphasize on getting answers on carefully worded questions. Interviews are trained to deviate only minimally from the structured questions to ensure uniformity of the interview administration.

In-depth interview, Which is a dialogue between a skilled interviewer and the person being interviewed? Open-ended questions and extensive investigating characterize in-depth

interviews. The interviewer follows an interview guide that includes a list of questions or issues to be discovered that speeds up the interview and makes it systematic.

In-depth interviews are useful when the interview is about a highly sensitive matter where the respondents would feel more comfortable with an in depth interview than with a questionnaire as group discussion. It is also useful when the subject matter is complex and when you need detailed information. Individuals with special needs or physical disabilities may not be able to participate in questionnaires but easily interviewed.

3.1.1 Advantages of Interview

Interview is allowed to discover areas of his understanding, unrealistic expectation and expressions of the interviewee hence a collection of rich and detailed data

Face to face contact with the participant in order to get information from them that is useful. Interviewer has the opportunity to clarify question and to follow-up questions and probes, increasing the likelihood of useful responses.

3.2 Questionnaires

It is a special purpose document sent out to respondents that allows the analyst to collect information and opinions from the respondents. Questionnaires allow collection of data from a large number of people and then wide distribution ensures that some things remain anonymous leading to more honest answers. The use of standard question format can yield more reliable data than any other technique. This is a good method of crosschecking information that can be gathered by other methods.

3.3 Observations

We used the observation method to understand how the online system of Mengo Hospital operates in order to get a real feel of how the system works. This technique involves seeing various activities that occur to get clear view of what is taking place, other than the interviews that will be conducted and this will enable us to get first hand information.

Observation provides the evaluator with an opportunity to gather data while capturing a great variety of interaction. The techniques are also a way to learn about things the participants or the evaluators are unaware of or unable to discuss in focus group or interview.

3.3.1 Advantages of observation

- Provide good opportunities for identifying unanticipated outcomes
- Exist in natural, unstructured and flexible setting.
- Provides direct information about behavior of individual and groups.

3.4 System Analysis and Design.

In order to design a system that will facilitate the capture, storage and retrieval of customers' health records, the data collected will be analyzed using Hypertext Preprocessor (PHP) and Visual Basic (VB) to determine the best way it can be stored and retrieved through using the Entity Relationship model and Data Flow Diagrams.

3.5 System Implementation.

In order to implement the system, the researcher used Hypertext Preprocessor (PHP) because it's a widely used open source general purpose scripting language that is especially suited for web development and can be embedded into Hypertext markup language (HTML). It was used to create the interface of the database to develop the input forms and layouts.

3.6 Testing and Validation.

Testing is the process of exercising software to verify that it satisfies its requirements and to detect errors. Software testing is an empirical technical investigation conducted to provide stakeholders with information about the quality of the product or service under test, with respect to the context in which it is intended to operate. Validation of an Online Health Insurance Management System will be done so as to ascertain whether it will work as expected and produce desired results.

3.7 Design Priorities

- The system should be user friendly.
- The system should be easy and cheap to maintain.

CHAPTER FOUR

SYSTEM ANALYSIS AND DESIGN

4.0 Introduction

This chapter presents a need and the approaches to requirements engineering for online Health Insurance systems. Additionally, the operations support services required and the system's architecture for the development and deployment of the support services in a mobile hospital setting are discussed. Furthermore, a formal modeling and design of the some of the sub systems using UML and OCL is also presented. The architectures provided ensure that best clinical services and practices are guaranteed in mobile health care settings.

4.1 System Analysis

System analysis is a detailed review of the current system and what the new system will be expected to do. This section presents a detailed description of the situation on ground and the problems associated with the current system. The researcher describes the process that takes place from the time a patient enters in the hospital to the time when he or she leaves.

The goal of this study was to design patient's insurance record system for insurance department that stores, adds and retrieves important information about patients in the hospital. The designed database is intended to maintain Hospital data and help to organize and review input and output data from processes/operations.

4.1.1 System Study

The current system being used at Mengo hospital insurance department is a manual paper based system. When a patient comes to the insurance department details are written down by the nurse on duty and officer on duty. Here details like the Name, telephone, Gender, type of illness and insurance company and type of insurance plus charges per day if it at all he or she is admitted in private room are recorded. After the patient is given a patient card bearing his name, O.P number, address and insurance company used by the patient in Mengo hospital.

4.1.2 Strength of the Current System

From the data collected, in our opinion, the current system has got some advantages and they are as follows:

- The current system is very user friendly and therefore the work of nurses is very smooth.

- The other advantage of the current system in place is that, it is cheap to maintain the as the patients are admitted.
- The current system in place cannot be affected by inherent problems like power failure and computer viruses and high architectural investments.

4.1.3 Problems of the previous system

- Enormous Paper Work: Mengo hospital uses papers and files to record and store patients records.
- More Time Consuming: It takes a lot of time to compile periodical reports for incoming patients since it's cumbersome to handle all the papers and prepare the consolidated reports required by the hospital administrator.
- Wastage of space: Due to the large volumes of paper used to record the patients diagnosis more manual files are needed which end up taking up a lot of space, hence makes it hard to search for the required records.
- Improper compilation: Due to the tedious process of handling huge volumes of paper, the compilation could go wrong on different occasions.

4.1.4 Possible Solutions to the Current System

The drawbacks of the current system can be addressed by designing as insurance records System that will be used to boost up the Hospital performance. This will provide greater accuracy and more flexibility in the types of information and reports that can be generated by the program.

Other advantages of an Online health insurance management system include:

- Elimination of paper work: Little or no paper work will be involved in the recording of patients' details. This will therefore ensure efficiency in the whole system.
- Less time consuming: Query facility is possible in the patients' records system, so it takes less time in accessing the system to know the status of different patients
- Accurate Compilation: Reduces unnecessary file work and computerized report generation so the information is accurate.

4.1.5 Proposed System Requirements.

This section presents the user, system and functional requirements of the system.

4.1.6 User Requirements.

These are the requirements that the users of the proposed system want to accomplish. They are expressed in user terminology and perspective. The intended users of the system are the insurance staff. These users need to have minimum computer skills and no specialized technical knowledge is needed to use the system. The users' requirements include the following:

- Users need a system that is user friendly.
- The users want a system that records patient's details very fast and gives feedback as patient's identification number.
- They need a system that provides easy navigation from one interface to another with all that they require from each interface.
- The insurance department needs a system that can record and store the patients' details.
- The users need a system that shall minimize the quantity of data to be entered by the user through provision of options.
- The users need a system with first response time which can be accessed in the shortest time possible.
- Access restrictions/security, each user will be able to access the data to some limit but not all

4.2 Functional Requirements.

This system is the bulk of the document and precisely states the functions of the system.

These describe what the system should do, what facilities are required and activities that the system should carry out. Therefore, once the new system is put in place, it is expected to do the following:

- The system should be able to store and retrieve patients' details from the database.
- Freedom for ambiguity and navigability should be kept in mind while documentation.
- It is expected to capture patients, nurse, and insurance information and treatment information.
- The system is expected to offer fast and efficient.
- It is expected to produce more timely information.
- The system should offer enough authentication and security so that the database information is not corrupted.

- A facility to search, retrieve, update, and print out the details of patients for given period of time.
- The system shall allow authorized persons to edit data in the database; this includes modifying and deleting of unwanted records.
- A facility which will allow request for monthly, quarterly and yearly reports about patients.

4.3 System Requirements

System requirements are the software and hardware specifications that must be met for the system to effectively function. Justifying the nature of tasks performed, the developer recommended the following software and hardware requirements for the system. System requirement includes

- i. Software specification
- ii. Hardware specification

4.3.1 Hardware Requirements

Hardware Specification

The hardware specification is necessary since the software is to be on local area Network (LAN) being a computerized server system one computer is needed to act as the server at least one client computer in each department. The server is not much different from a client computer. It host the software have the central database to which the client shall log in to access the database. The server required more resources in terms of memory and hard disc space as compared to the client machines.

The following are the requirements needed on the server and the client machine in order to run the software

- i. The computer should have basic input devices such as keyboard, mouse and all the necessary input devices.
- ii. The database should be installed on a single computer. The system is expected to provide optimal performance or a medium size database. Therefore, it must have the following specifications. Pentium 111 processor to support all the operations of the database.
- iii. The computer should have minimum of 123mb of ram.40 GB hardware disc memory.
- iv. The software should print reports, receipts and other documentations.

- v. Updated antivirus system, preferably Symantec corporate Edition 10 and MacAfee version 8.

The following are the minimum specification for the system to function properly.

- Intel Pentium 3 Processor
- 128GB RAM
- 40GB hard disk space
- 1.3 GHz processor speed

Software Requirements.

The software specifications of the system include:

- The system should run on a computer with operating system Windows 2000, NT, XP, Vista and on all UNIX (federal) supported platforms.
- The system should run on any computer with primary memory/RAM greater than 128 MB and 10GB hard disk space.
- Wamp server from 5.0 to 2.0 versions
- At least 1.0 GHZ processor
- Browser types such as Mozilla Firefox, opera, internet Explorer

4.3.2 System Design.

This section presents the major algorithms that implemented the requirements stated, it illustrates the user interface design, dataflow diagram (Context) and the database design.

4.4 Dataflow Diagrams.

These show how data moves and changes through an IS (Information System) in a graphical top-down fashion. Thus a graphic representation of a system's components, processes and the interfaces between them

Defines the scope of the system

Provides on "outward" looking view from the system

Shows the other systems and/or groups of people that interact with the system

Shows the main flows of data

It is a simple DFD that depicts the system being studied as it relates to other systems, the business, and the outside world – the interfaces flowing to or from external entities.

Data Flow Diagram - 4 symbols (Gene and Samson convention)

Below are the symbols that were used in Data flow diagrams.

Table 4.1

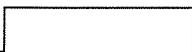

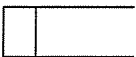
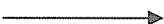
Symbol	meaning
	entity e.g. customer, employees, , Administrator
	Process acting on data e.g. Registration, and payment.
	A data store
	A data flow

Figure 4.1 Context Diagram

Level 0

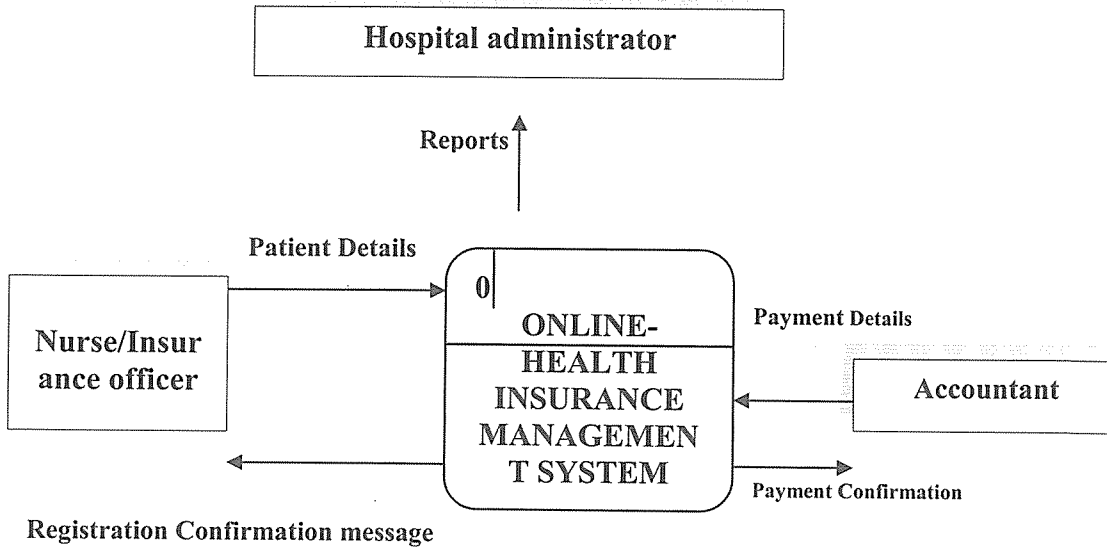
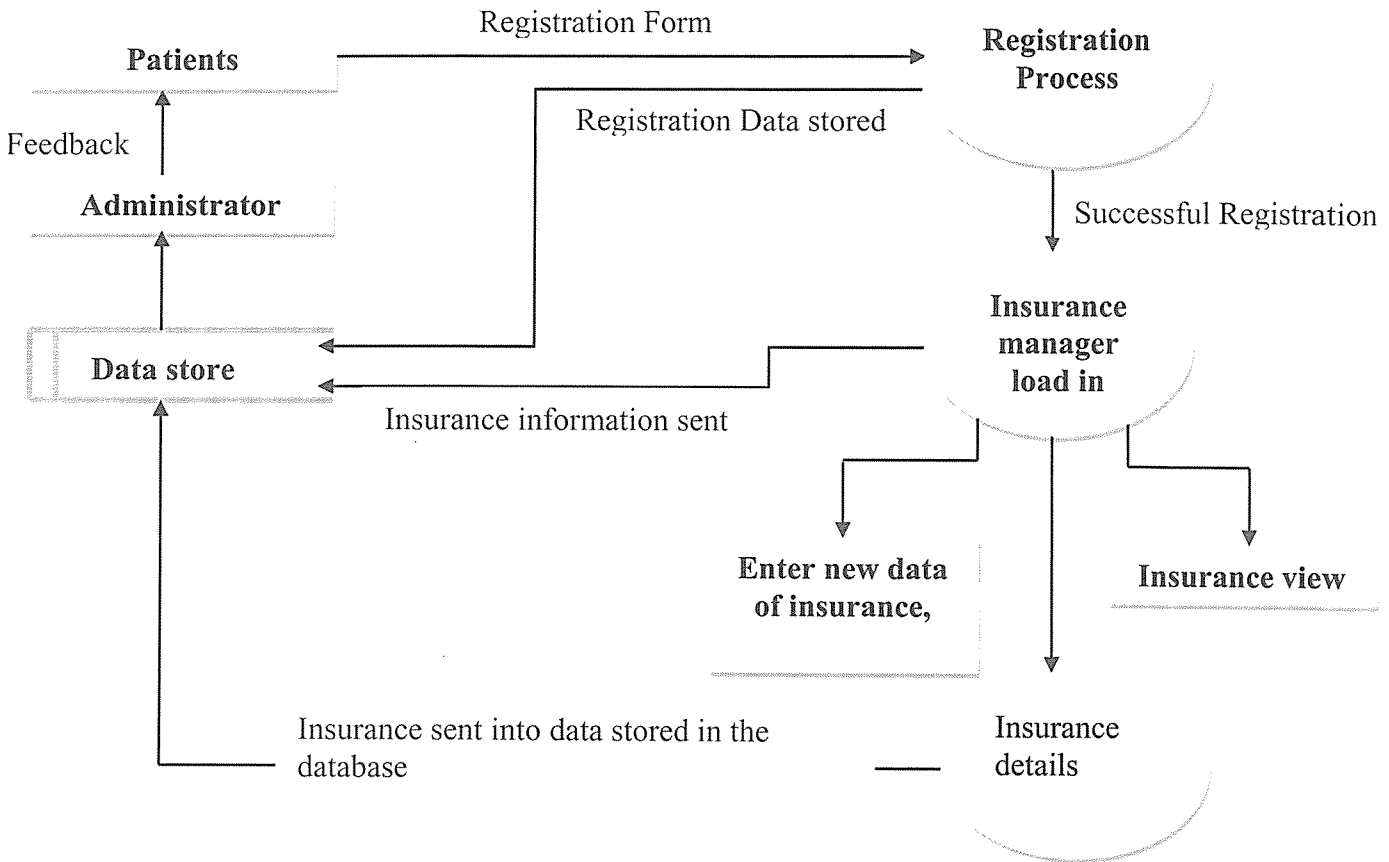


Figure 4.2 Level 1:

The figure 1 below represents the data flow diagram of the proposed customer records system.



4.4.1 Database Design

A database design ensures understanding of user's perspective of data, nature of the data itself, independent of its physical representations and use of data across user views. It presents a conceptual, logical and physical design of the database.

The design was created using entity relationship diagrams and tables. The following symbols were used.



Relationship line



Degree of Relationship

1 one symbol (1)

* Many symbol (M)

4.4.2 Conceptual Database Design

This presents the data entities of an organization and the relationship between the classes and entities of the workshop management information system. The researcher went ahead to identify the relationships and dependencies between the classes. To define the relationships between the classes, the researcher analyzed the inter connections between the classes.

Figure 4.3 Entity Relationship Diagram

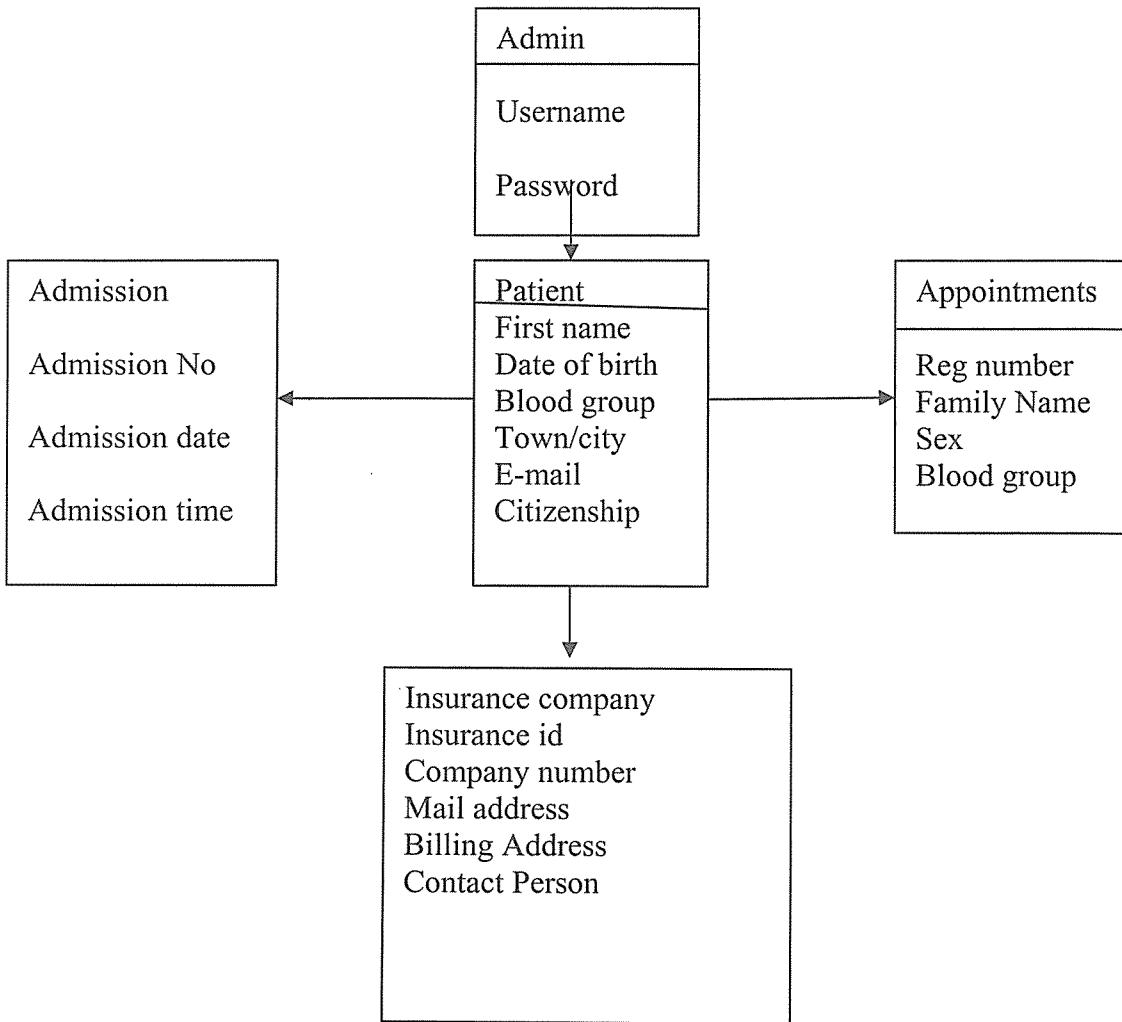


Figure 4.4 Database Design in mysql

phpMyAdmin Server: localhost Database: hospital2 Table: care_address_citytown InnoDB File: 4096 KB

Browse Structure SQL Search Insert Export Import Operations Empty Drop

Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/> nr	mediumint(8)		UNSIGNED	No		auto_increment	
<input type="checkbox"/> unece_modifier	char(2)	utf8_general_ci		Yes	NULL		
<input type="checkbox"/> unece_locode	varchar(15)	utf8_general_ci		Yes	NULL		
<input type="checkbox"/> name	varchar(100)	utf8_general_ci		No			
<input type="checkbox"/> zip_code	varchar(25)	utf8_general_ci		Yes	NULL		
<input type="checkbox"/> iso_country_id	char(3)	utf8_general_ci		No			
<input type="checkbox"/> unece_locode_type	tinyint(3)		UNSIGNED	Yes	NULL		
<input type="checkbox"/> unece_coordinates	varchar(25)	utf8_general_ci		Yes	NULL		
<input type="checkbox"/> info_url	varchar(255)	utf8_general_ci		Yes	NULL		
<input type="checkbox"/> use_frequency	bigint(20)		UNSIGNED	No	0		
<input type="checkbox"/> status	varchar(25)	utf8_general_ci		Yes	NULL		
<input type="checkbox"/> history	text	utf8_general_ci		No			
<input type="checkbox"/> modify_id	varchar(35)	utf8_general_ci		No			
<input type="checkbox"/> modify_time	timestamp		ON UPDATE CURRENT_TIMESTAMP	No	CURRENT_TIMESTAMP		
<input type="checkbox"/> create_id	varchar(35)	utf8_general_ci		No			
<input type="checkbox"/> create_time	timestamp			No	0000-00-00 00:00:00		

Check: All - Uncheck: All If checked:

Figure 4.5 Databases in Mysql

Server: localhost Database: hospital2 Table: care_billing_payment (Info) (Help)

Structure SQL Search Insert Export Import Operations Empty Drop

Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/> payment_id	tinyint(5)			No		auto_increment	
<input type="checkbox"/> payment_encounter_nr	int(10)		UNSIGNED	No	0		
<input type="checkbox"/> payment_receipt_no	int(11)			No	0		
<input type="checkbox"/> payment_date	datetime			Yes	0000-00-00 00:00:00		
<input type="checkbox"/> payment_cash_amount	float(10,2)			Yes	0.00		
<input type="checkbox"/> payment_cheque_no	int(11)			Yes	0		
<input type="checkbox"/> payment_cheque_amount	float(10,2)			Yes	0.00		
<input type="checkbox"/> payment_creditcard_no	int(25)			Yes	0		
<input type="checkbox"/> payment_creditcard_amount	float(10,2)			Yes	0.00		
<input type="checkbox"/> payment_amount_total	float(10,2)			Yes	0.00		

Print view: Relation view Propose table structure

fields: At End of Table At Beginning of Table Alter payment_id Go

Indexes: 0				Space usage		Row Statistics		
Keyname	Type	Cardinality	Action	Field	Type	Usage	Statements	Value
PRIMARY	PRIMARY	0		payment_id	Data	16,664 B	Format	Compact
index_payment_patnum	INDEX	0		payment_encounter_nr	Index	32,768 B	Collation	utf8_general_ci
index_payment_receipt_no	INDEX	0		payment_receipt_no	Total	49,192 B	Next Autoindex	

Create an index on 1 columns Go

Creation: Jun 17, 2010 at 09:53:20

Open new phpMyAdmin

4.5 Input/output screens

The researcher designed possible formatted, recommended input and output screens to be used for the proposed system. A sample of the input/output screen can be seen.

System Screen shots


Figure 4.6 Home screen

This figure below represents the homepage. On this page, there are links for example patients link which links to a page that enables the administrator to log in. This homepage also shows the mission and vision of the hospitals.

Mengo Hospital
Insurance Dept

Home
Patients
Appointments
Admission
Ambulatory
Medics
Doctors
Nursing
DR
Laboratories
Radiology
Pharmacy
System Admin
Intranet Email
Special Tools
Login

Headline



ABOUT MENGU HOSPITAL INSURANCE DEPT

Mengo Hospital, also known as Namirembe Hospital, is a hospital in Kampala, Uganda's capital and largest metropolitan area. The travel distance is 10 km from the city center.

The hospital is located on Namirembe Hill, in Lubaga Division, in the northwestern Kampala.

More about Mengo Hospital

Aims, mission, vision, mandate

MISSION

To provide specialized tertiary health care, train health workers and conduct research in line with the requirements of the Ministry of Health.

VISION

To become the leading Center of Excellence in Health Care delivery in Uganda.




Figure 4.7 System security login Screen

This represents the login form which the administrator to users to log in and views patients details.

In this case the password is aaa and users name is also aaa

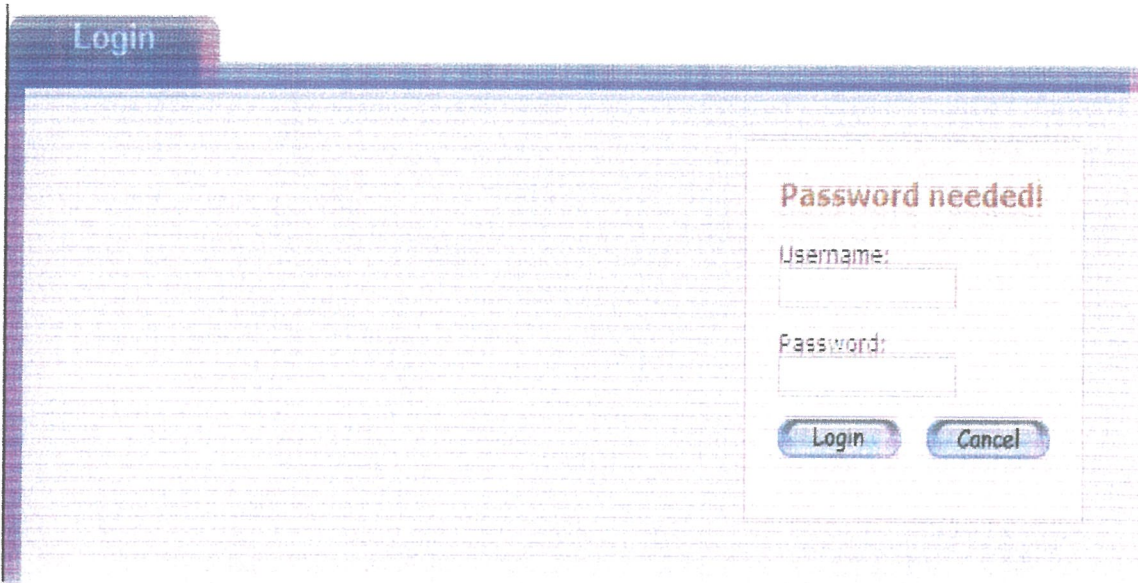


Figure 4.8 Patient registration

This figure represents patient's registration form. This form can be filled by both the administrator and the patients. It captures all details of the patients including the patient's photo. The patient is expected to save after filling the form.

The screenshot shows a web-based patient registration form. The interface includes a navigation menu on the left with options like Home, Patient, Appointments, Admissions, Ambulatory, Medics, Doctors, Nursing, OR, Laboratories, Radiology, Pharmacy, System Admin, Internet Email, Special Tools, and Login. The main form area is titled 'Person registration' and contains the following data:

Registration date	21/07/2011
Registration time	14:46
Title	DOCTOR
Family name	kavongo
Given name	alouius
Second name	peter
Third name	jhon
Middle name	
Maiden name	
Other names	
Date of birth	20/07/2011
Sex	<input type="radio"/> male <input type="radio"/> female
Blood group	<input type="radio"/> A <input type="radio"/> B <input type="radio"/> AB <input checked="" type="radio"/> O
Civil status	<input checked="" type="radio"/> Single <input type="radio"/> Married <input type="radio"/> Divorced <input type="radio"/> Widowed <input type="radio"/> Separated
Address	
Street	salama road No: 250
Town/City	No City defined yet. Please go to the main menu and click Special Tools -> Address Manager -> New data and enter City and ZIP data Zip: 256
Insurance	<input checked="" type="radio"/> Private insurance <input type="radio"/> Health Fund <input type="radio"/> Self pay
Insurance nr 1	qw insurance
Insurance Company	STATEWIDE INSURANCE COMPANY
Phone 1	0788234887
Phone 2	0772123466
Cellphone 1	
Cellphone 2	
Fax	+099098767

Figure 4.9 Patient registration results

- Mengo Hospital
Insurance Dept.
- Menu
 - Home
 - Patient
 - Appointments
 - Admission
 - Ambulatory
 - Medocs
 - Doctors
 - Nursing
 - OR
 - Laboratories
 - Radiology
 - Pharmacy
 - System Admin
 - Intranet Email
 - Special Tools
 - Login

Person registration

New person


PID Nr.	10000017		<p>Options for this person </p> <ul style="list-style-type: none"> <input type="checkbox"/> Admission - Inpatient <input type="checkbox"/> Visit - Outpatient <input type="checkbox"/> Appointments <input type="checkbox"/> Encounters' list <input type="checkbox"/> Medocs <input type="checkbox"/> DRG (composite) <input type="checkbox"/> Diagnostic Results <input type="checkbox"/> Prescriptions <input type="checkbox"/> Notes & Reports <input type="checkbox"/> Immunization <input type="checkbox"/> Measurements <input type="checkbox"/> Birth details <input type="checkbox"/> DB Record's History <input type="checkbox"/> Make PDF document
Registration date	21/07/2011		
Registration time	14:57		
Title	DOCTOR		
Family name	kayongo		
Given name	alousius		
Second name	peter		
Third name	jhon		
Date of birth:	20/07/2011		
Blood group	O		
Civil status	Single	Sex: male	
Address:		Nr.: 290	
Street:	salama road	Zip : 256	
Town/City:			
Phone 1	0789234567		
Phone 2	0772123465		
Fax:	+099098787		
Email	ka@hotmail.com		
SSS Nr.	234		
Religion	christian		
Ethnic origin	white		
Other Hospital Nr.	Demo 1: 33dddd		
Registered by	aaaa		

Figure 4.10 Patient registration report

Virtualstr. 89AA Phone: 1234567
Kampala Uganda Fax: 567890
Email: contact@xyz.com



Family name: kayongo Address: salama road 290
Given name: alousius 256
Date of birth: 20/07/2011
PID: 10000017

Person registration

Registration date: 21/07/2011
Registration time: 14:57:02

Title: DOCTOR
Sex: m
Blood group: O
Second name: peter
Third name: jhon
Civil status: Single

Phone 1: 0789234567
Phone 2: 0772123465
Fax: +099098787
Email: ka@hotmail.com
SSS Nr.: 234
Religion: christian

Figure 4.11 Screen shot for Insurance department

Represents the form that captures all the details about the insurance company. This form is filled by the administrator. After filling the form, the administrator for is expected to save the information. On this form, new insurance companies can also be registered,

Mengo Hospital
Insurance Dept. +

- Menu
 - Home
- + Patient
 - Appointments
- + Admission
 - Ambulatory
 - Medocs
 - Doctors
- + Nursing
 - OR
 - Laboratories
 - Radiology
 - Pharmacy
 - System Admin
 - Intranet Email
 - Special Tools
 - Login

Insurance Company :: New data

Please fill up all fields marked with *

* Insurance company ID:

* Insurance company name:

Main Address:

* Mailing Address:

* Billing Address:

Email Address:

Phone Nr.:

Phone Nr. (aux):

Fax Nr.:

Fax Nr. (aux):

Contact person:

Contact Person's Email Address.:

Contact Person's Phone Nr.:

Contact Person's Fax Nr.:

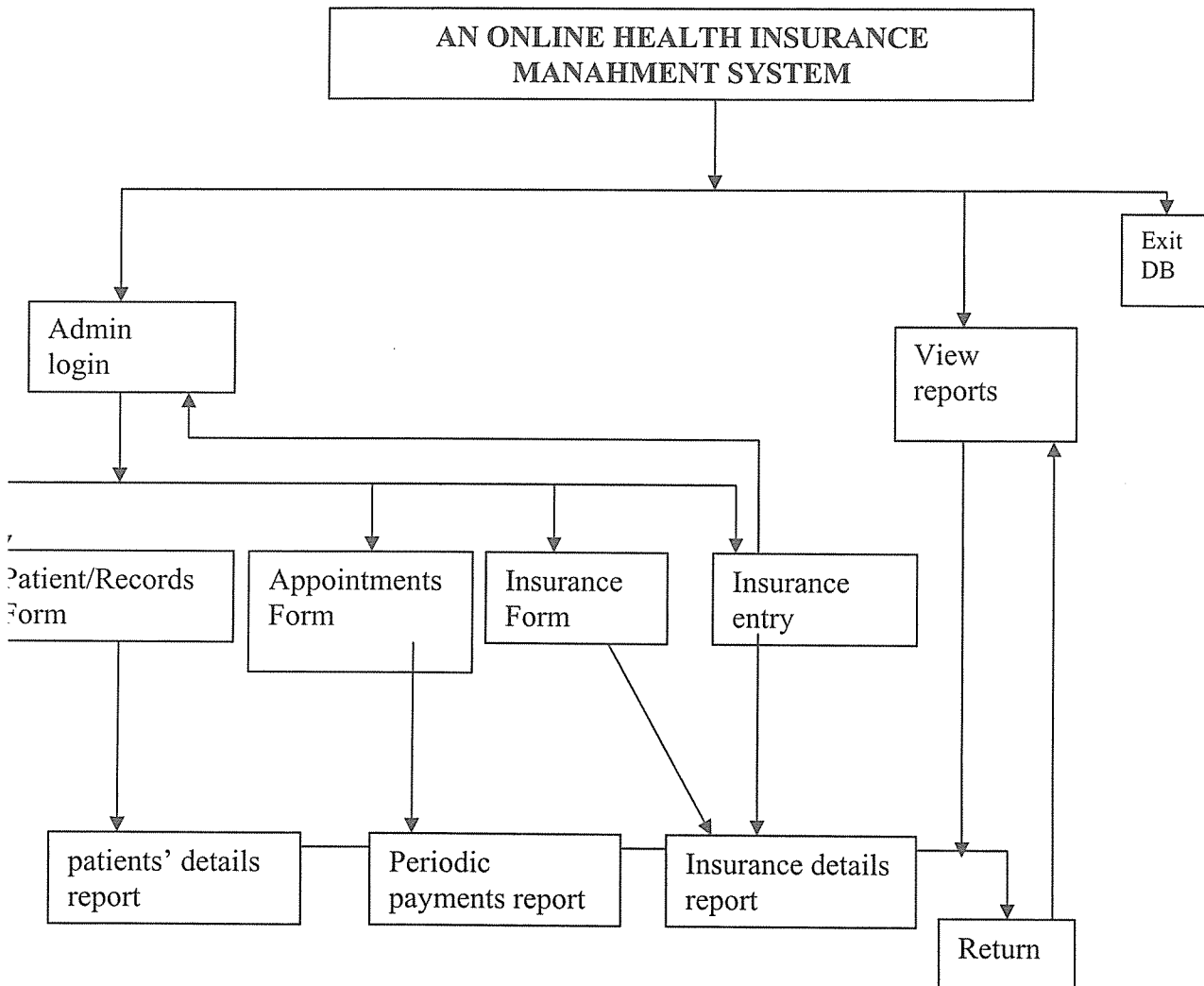
Figure 4.12 Screen shot for Insurance department report.

Insurance Company :: Data

Insurance company ID: execd 001
Insurance company name: EXECL INSURANCE COMPANY
Main Address: P.O.BOX456 Kampala,Uganda
Mailing Address: pobox25678kampala uganda
Billing Address: 1234mengo uganda
Email Address: execdinsurance@execd.ug
Phone Nr: 041234567
Phone Nr. (aux): +256789021
Fax Nr: 44444432
Fax Nr. (aux): 123465
Contact person: mrs.sarah
Contact Person's Email Address.: sarah@execd.ug
Contact Person's Phone Nr: peter2execd.ug
Contact Person's Fax Nr: sarah@execd.ug

Figure 4.13 User interface design

This illustrates the user interface components and how they are linked to make the system work.



The System will enable treatment of all kinds of patients, for example Tuberculosis, in general. All scores of MOS (Medical Outcome Services) and VAS (Visual Analogue Scale) increased as the patient's duration of TB treatment is shown in the table below. The system will show that among the patients, patients with TB therapy had the highest magnitude of HRQOL (Health Related Quality Of Life) scores regardless of the MOS subscale compared to patients starting or patients that had completed two months therapy.

The system will be able to show the reliability of Medical outcomes. For example in a Survey involving 133 tuberculosis in Kampala Uganda.

Table 4.3 Treatment therapy Records of patients

subscale	5	Chronbach's
Perceived health	2	0.81
Bodily pain	1	88
Quality of life	2	-2
Role of functioning	1	0.65
Vitality	4	-2
Mental Health	5	0.89
Cognitive function	4	0.90
Health distress	4	0.96
Physical functioning	6	0.88
Health transition	1	0.89

This table shows all the medical outcomes survey subscales had a correlation $p < 0.001$.

1. One individual missed social function response.
2. Internal consistency reliability cannot be calculated for a single item scale.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

This chapter summarizes the contributions of this thesis and highlights some areas for future study. The thesis provided a formal framework for usable operations support in online Health Insurance systems.

5.1 Summary

Practically demonstrate the feasibility of using mobile devices such as mobile phones and PDA in enhancing the effectiveness of health care professionals in the delivery of services to patients.

Identify the various support services in an online Health Insurance system which conforms to the treatment process followed by medical professionals in delivery health care centers. Furthermore, the support services were adequately depicted in a robust software and hardware architecture for easy implementation.

Use wireless markup language, Java technologies, and other tools to provide the required functionality for online Health Insurance systems, while ensuring that the applications are usable and deployable across various platforms. Move from informal specifications to formal specifications of online Health Insurance systems, thus ensuring that ambiguities and incorrectness in specifications were tactically handled to guarantee a dependable system adjudged usable by potential end users.

Provide a framework for measuring the usability of mobile health care applications by adapting the usability attributes specified by ITU, ISO and ANSI into a seven metrics questionnaire-based measurement.

Finally, although mobile health care applications are still at a very early stage of implementation and adoption in Uganda, the work provide a good specification document that will aid software developers in realizing suitable applications in this domain.

5.2 Conclusion

This research work has succeeded in demonstrating the practicability of deploying usable operations support services for care givers and other users in the health care sector for the purpose of effective and productive health care delivery in care centers. The operations support systems were provided within a framework modeled after the steps in the systems life cycle but with greater emphasis on formal design and usability evaluation of the prototype application.

The support services implemented were formally analyzed and designed to eliminate ambiguities and incorrectness in the product. The prototype application was measured with the usability dimensions suggested by ISO / ANSI / ITU and extended to meet the context in a clinic setting and found to have a “good usability” by the potential users of the final product.

Finally, the adoption of the product of this research work when deployed in care centers offers a good contribution for countries to meet some of the millennium development goals centre on health care by providing an effective IT-based support for care givers.

5.3 Recommendation

In a collaborative provision of medical services, patients’ data would need to be gathered from different medical institutions and distributed e-Health services. The use of mobile agents can be explored to successfully solve these problems by moving dynamically within an electronic health care network to obtain, analyze, filter and personalize the data and services required.

The application developed for this thesis is not multimedia capable. As mobile technologies advance, the application could be enhanced to handle multimedia functionality and real-time processes to facilitate telemedicine and other modern health care services and requirements.

With the increasing number of medical data generated and stored electronically within the system provided, data mining techniques could be used to discover, compose and analyze the data for more productive treatment processes by medical practitioners and care centers.

The prototype application developed in this thesis lacks autonomy for performing diagnostic tasks. Artificial Intelligence techniques such as machine learning, inference, and planning could be use to provide better support for care givers and ultimately make the system more acceptable.

Cryptographic techniques could be used to introduce security mechanism that ensures the confidentiality and privacy of sensitive electronic medical records in the system.

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PHP CODES

```
<?php
error_reporting(E_COMPILE_ERROR|E_ERROR|E_CORE_ERROR);
define('FROM_ROOT',1);

if(!isset($mask)) $mask=false;
if(!isset($cookie)) $cookie=false;
if(!isset($_chglang)) $_chglang=false;
if(!isset($boot)) $boot=false;
if(!isset($sid)) $sid="";

require('./roots.php');
require('./include/core/inc_environment_global.php');

// $db->debug=FALSE;

# Register global session variables
if(!session_is_registered('sess_user_name')) session_register('sess_user_name');
if(!session_is_registered('sess_user_origin')) session_register('sess_user_origin');
if(!session_is_registered('sess_file_forward')) session_register('sess_file_forward');
if(!session_is_registered('sess_file_return')) session_register('sess_file_return');
if(!session_is_registered('sess_file_break')) session_register('sess_file_break');
if(!session_is_registered('sess_path_referer')) session_register('sess_path_referer');
if(!session_is_registered('sess_dept_nr')) session_register('sess_dept_nr');
if(!session_is_registered('sess_title')) session_register('sess_title');
if(!session_is_registered('sess_lang')) session_register('sess_lang');
if(!session_is_registered('sess_user_id')) session_register('sess_user_id');
if(!session_is_registered('sess_cur_page')) session_register('sess_cur_page');
if(!session_is_registered('sess_searchkey')) session_register('sess_searchkey');
if(!session_is_registered('sess_tos')) session_register('sess_tos'); # the session time out start
time

$name="";
```

```
$bversion="";
$user_id="";
$ip="";
$cfgid="";
$config_exists=false;
```

```
$GLOBALCONFIG=array();
$USERCONFIG=array();
```

```
/******
```

```
**
```

```
phpSniff: HTTP_USER_AGENT Client Sniffer for PHP
```

```
Copyright (C) 2001 Roger Raymond ~ epsilon7@users.sourceforge.net
```

- * Check environment : Browser, OS
- * @param string \$bn name of browser
- * @param string \$bv version of browser
- * @param string \$f CFG filename
- * @param string \$i IP adress
- * @param string \$uid new guid (session var)
- * @return all parameter using &
- * @access public

```
*
```

```
* 02.02.2003 Thomas Wiedmann
```

```
*****
```

```
*
```

```
*/
```

```
require_once('./classes/phpSniff/phpSniff.class.php'); # Sniffer for PHP
```

```
function configNew(&$bn,&$bv,&$f,&$i,&$uid)
```

```
{
```

```
    global $HTTP_USER_AGENT;
```

```

global $REMOTE_ADDR;

# We disable the error reporting, because Konqueror 3.0.3 causes a runtime error output
that stops the program.
# could be a bug in phpsniff .. hmmm?
$old_err_rep= error_reporting(E_COMPILE_ERROR|E_ERROR|E_CORE_ERROR);

# Function rewritten by Thomas Wiedmann to use phpSniff class

# initialize some vars
if(!isset($UA)) $UA = "";
if(!isset($cc) ) $cc = "";
if(!isset($dl) ) $dl = "";
if(!isset($am) ) $am = "";

//$timer = new phpTimer();
//$timer->start('main');
//$timer->start('client1');
$sniffer_settings
=
array('check_cookies'=>$cc,'default_language'=>$dl,'allow_masquerading'=>$am);
$client = new phpSniff($UA,$sniffer_settings);

# get phpSniff result
$i=$client->get_property('ip');
$bv=$client->get_property('version');
$bn=$client->get_property('browser');

# translate some browsernames for "Care2x"
if ($bn == 'moz') { $bn='mozilla';}
else if ($bn == 'op') { $bn='opera';}
else if ($bn == 'ns') { $bn='netscape';}
else if ($bn == 'ie') { $bn='msie';}

```

```

$uid=uniqid("");
$f='CFG'.$uid.microtime().'cfg';

# Return previous error reporting
error_reporting($old_err_rep);
}

/**
 * Create simple session id (sid), save a encrypted sid to a cookie with a dynamic name
 * consisting of concatenating "ck_sid" and the sid itself.
 * For more information about the encryption class, see the proper docs of the pear's
 "hcmd5.php" class.
 */
//$sid=uniqid("");
$sid=session_id();
$ck_sid_buffer='ck_sid'.$sid;

include('include/core/inc_init_crypt.php'); // initialize crypt
$ciphersid=$enc_hcmd5->encodeMimeSelfRand($sid);
setcookie($ck_sid_buffer,$ciphersid);
$_COOKIE[$ck_sid_buffer]=$ciphersid;

#
# Simple counter, counts all hits including revisits
# Uncomment the following line if you like to count the hits, then make sure
# that the path /counter/hits/ and the file /counter/hitcount.txt are system writeable
#
// include('./counter/count.php');

if((isset($boot) && $boot)||!isset($_COOKIE['ck_config']||empty($_COOKIE['ck_config']))
{

```

```

    configNew($bname,$bversion,$user_id,$ip,$cfgid);
} else {
    $user_id=$_COOKIE['ck_config'];
}

#
# Load user config API. Get the user config data from db
#
require_once('include/care_api_classes/class_userconfig.php');
$cfg_obj=new UserConfig;

if($cfg_obj->exists($user_id)) {
    $cfg_obj->getConfig($user_id);
    $USERCONFIG=$cfg_obj->buffer;
    $config_exists=true; // Flag that user config is existing
} else {
    $cfg_obj->_getDefault();
    $USERCONFIG=$cfg_obj->buffer;
}

# Load global configurations API
require_once('include/care_api_classes/class_globalconfig.php');
$glob_cfg=new GlobalConfig($GLOBALCONFIG);

# Get the global config for language usage
$glob_cfg->getConfig('language_%');
# Get the global config for frames
$glob_cfg->getConfig('gui_frame_left_nav_width');
# Get the global config for lev nav border
$glob_cfg->getConfig('gui_frame_left_nav_border');

$savelang=0;
/*echo $GLOBALCONFIG['language_non_single'];

```

```

while (list($x,$v)=each($GLOBALCONFIG)) echo $x.'==>'.$v.'<br>';
*/
# Start checking language properties

if(!$GLOBALCONFIG['language_single']) {
    # We get the language code
    if($_chg_lang_&&!empty($lang)) {
        $savelang=1;
    }else{
        //echo $lang=$USERCONFIG['lang'];
        /* if($USERCONFIG['lang']) $lang=$USERCONFIG['lang'];
        * else include('chklang.php');
        * */

        if(empty($USERCONFIG['lang']) || !isset($USERCONFIG['lang'])) {
            // USERCONFIG contain a value
            if (empty($lang) || !isset ($lang)){
                // languae selection is not given, set the default language:
                $lang=$USERCONFIG['lang'];
            } else {
                // no language selection given, so try to find out what language
is used on this server
                include('chklang.php');
            }
        }
    }
}

}

}else{

# If single language is configured, we get the user configured lang

```

```

        if(!empty($USERCONFIG['lang'])                                &&
file_exists('language/'.$USERCONFIG['lang'].'/lang_'.$USERCONFIG['lang'].'_startframe.php')) {
        $lang=$USERCONFIG['lang'];
    } else {
        # If user config lang is not available, we get the global system lang configuration
        if(!empty($GLOBALCONFIG['language_default'])                &&
file_exists('language/'.$GLOBALCONFIG['language_default'].'/lang_'.$GLOBALCONFIG['language_default'].'_startframe.php')) {
        $lang=$GLOBALCONFIG['language_default'];
            } else {
                $lang=LANG_DEFAULT; # Comes from inc_environment_global.php, the last
chance, usually set to "en"
            }
        }
    }

#
# After having a language code check if the critical scripts exist and set warning
#
$installerwarn=file_exists('./installer/install.php');
if($installerwarn){
    #
    # Load necessary language tables
    #
    $lang_tables[]='create_admin.php';
    include_once('./include/core/inc_load_lang_tables.php');
    include_once('./include/core/inc_charset_fx.php');
    include_once('./include/core/inc_installer_warning.php');
    #
    # redirect to the installer page after timeout of 5 seconds
    #
    die('<meta http-equiv="refresh" content="5; url=./installer/">');
}

```



```

}

#
# Prepare language file path
#
$lang_file='language/'.$lang.'/lang_'.$lang.'_startframe.php';

#
# We check if language table exists, if not, english is used
#
if(file_exists($lang_file)) {
    include($lang_file);
} else {
    include('language/en/lang_en_startframe.php'); # en = english is the default language table
    $lang='en';
}

#
# The language detection is finished, we save it to session
#
$_SESSION['sess_lang']=$lang;

/*$ck_lang_buffer='ck_lang'.$sid;
setcookie($ck_lang_buffer,$lang);*/

/*$_COOKIE[$ck_lang_buffer]=$lang;*/
    //echo $mask;
if((isset($mask) && $mask)||!$config_exists||$savelang) {
    if(!$config_exists) {

        //$cfg_obj->getConfig('default');
        //$USERCONFIG=&$cfg_obj->buffer;

```

```

configNew($bname,$bversion,$user_id,$ip,$cfgid);

$USERCONFIG['bname']=$bname;
$USERCONFIG['bversion']=$bversion;
$USERCONFIG['cid']=$cfgid;
}
// *****
//save browser info to user config array
// *****
if(empty($ip)) $USERCONFIG['ip']=$REMOTE_ADDR;
$USERCONFIG['mask']=$mask;
$USERCONFIG['lang']=$lang;
if((((($bname=='msie')          ||($bname=='opera'))          &&($bversion>4))
||((($bname=='netscape')&&($bversion>3.5)) ||($bname=='mozilla')) {
    $USERCONFIG['dhtml']=1;
}
// *****
// Save config to db
// *****
$mask=$USERCONFIG['mask']; # save mask before serializing
$cfg_obj->saveConfig($user_id,$USERCONFIG);
setcookie('ck_config',$user_id,time()+(3600*24*365)); # expires after 1 year
}

#
# save user_id to session
#
$_SESSION['sess_user_id']=$user_id;
if(empty($_SESSION['sess_user_name'])) $_SESSION['sess_user_name']='default';

#
# set the initial session timeout start value
#

```

```

$_SESSION['sess_tos']=date('His');

#
# Load character set fx
#
include_once('include/core/inc_charset_fx.php');

#
# Load image fx
#
require_once('include/core/inc_img_fx.php');

#
# Start smarty templating
#
# Workaround for user config array to work inside the smarty class
#
$cfg = $USERCONFIG;

//while(list($x,$v)=each($cfg)) echo "$x => $v<br>";
require_once($root_path.'gui/smarty_template/smarty_care.class.php');
$smarty = new smarty_care('common');

#
# Window bar title
#
$smarty->assign('sWindowTitle',$LDMainTitle);

#
# Assign the contents frame source
#
$smarty->assign('sContentsFrameSource',"src = \"blank.php?lang=$lang&sid=$sid\"");

```

```

#
# Load the gui template
#
//require('gui/html_template/default/tp_index.php');
#
# If the floating menu window is selected
#
if($mask == 2){

    if($lang=='ar' || $lang=='fa')
        $smarty-
>assign('sBaseFramesetTemplate','common/frameset_floatingmenu_rtl.tpl');
    else
        $smarty-
>assign('sBaseFramesetTemplate','common/frameset_floatingmenu_ltr.tpl');

    $smarty->assign('sMenuFrameSource','src="main/menubar2.php"');
    $smarty-
>assign('sStartFrameSource',"src=\"main/indexframe.php?boot=1&lang=$lang&egal=$egal&
cookie=$cookie&sid=$sid&mask=2\"");

} else {
    $smarty->assign('sStartFrameSource',"src
=
\"main/indexframe.php?boot=1&mask=$mask&lang=$lang&cookie=$cookie&sid=$sid\"");

#
# Assign frame dimensions
#
$smartyy-
>assign('gui_frame_left_nav_width',$GLOBALCONFIG['gui_frame_left_nav_width']);
$smartyy-
>assign('gui_frame_left_nav_border',$GLOBALCONFIG['gui_frame_left_nav_border']);

if($lang=='ar' || $lang=='fa') {
    $smarty->assign('sBaseFramesetTemplate','common/frameset_rtl.tpl');
}

```

```
        //require('gui/html_template/righttoliftdefault/tp_index.php');
    } else{
        #
        # Else use normal frameset design
        #
        $smarty->assign('sBaseFramesetTemplate','common/frameset_ltr.tpl');
    }
}

#
# Display the frame page
#
$smarty->display('common/baseframe.tpl');

?>
```