CHRISTIAN SERVICE UNIVERSITY COLLEGE

DEPARTMENT OF COMPUTER SCIENCE

AUTOMATED SYSTEM FOR NATIONAL HEALTH INSURANCE SCHEME

(NHIS) CLAIMS

KWABUAH RAPHAELKA TENKORANG

JUNE, 2015

DECLARATION

I have the greatest, sincere and profound pleasure to declare that I am responsible for any blunder of misquotation and misconception of information found in this study, except any imaginary information that have been deployed inconsiderately from available books and journals.

Declared by

Raphaelka Kwabuah Tenkorang (10144437)   ....

    (Student)   Signature   Date

SUPERVISIOR'S DECLARATION

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision laid down by the Department of Computer Science, Christian Service University College.

Certified by

Mrs. Judith N. A. Nkum Ayembillah   …………………….   …………………...

(Supervisor)   Signature   Date

Dr. Thomas Yeboah   …………………….   …………………….

(Head of Department)   Signature   Date

ABSTRACT

The processing of claims is very cumbersome and at a cost to the service providers, therefore the need to design software to eliminate the deficiencies in the existing system. The centralized NHIS claims systems will reduce the extra cost of acquiring health management system and thereby encourage more providers to associate with the insurance scheme. It will as well facilitate the ease and prompt payment of provider's claims. NHIS claims systems streamline claims processing, speed access to customer information, and ensure the security of private medical information. This also reduce the labour costs associated with processing covered lives claims, thereby utilizing a single platform for all incoming data sources, automatically route claims for review and approval, and increase the accuracy and timeliness of payments. Shrink your paper storage and document retrieval costs while complying with regulatory standards. Though this project would be applicable to every hospital or health institution that serves as a NHIS service provider, it mainly factors Nyame Ani Hospital health insurance system as the area of research or case study. Since its inception, the Nyame Ani Hospital has been one of the reliable providers especially to its customers. (NHIS Directorate, 2011).

CONTENTS

CHAPTER THREE

CHAPTER FOUR

CHAPTER FIVE

CHAPTER SIX

CHAPTER ONE

INTRODUCTION

1.1   INTRODUCTION

The Automated System for National Health Insurance Scheme (NHIS) Claims is a flexible and user-friendly, which is designed and developed to deliver real conceivable benefits to hospitals operating under the NHIS. The system is designed for multispecialty hospitals, to cover a wide range of hospital services and dispensing cost that are covered by the NHIS of Ghana. The system is an integrated end-to-end NHIS claims system that provides relevant information across the hospital to support effective decision making for patient care, hospital administration and critical financial accounting, in a seamless flow. NHIS has a drug list with predetermined maximum prices of drugs for accredited providers of Pharmaceutical Services. These accredited Pharmacies have difficulties dispensing drugs to clients of the scheme because the process is manually done.

Since its induction, the issue of payment of what is due the service provider for their rendered service over a period has been a big blow to the national health scheme. After claims are submitted to the NHIS office, officials of NHIS will go through the paper based claims to check for false claims and errors. This process takes a long time thereby delaying the payment of claims. However, the NHIS Claims System is proposed to be an online (client server) whereby each service rendered by a provider is captured and accumulated on the server to facilitate the easy payment of periodic claims.

Though this project would be applicable to every hospital or health institution that serves as a NHIS service provider, it mainly factors Nyame Ani Hospital health insurance system as the area of research or case study. Since its inception, the Nyame Ani Hospital has been one

of the reliable providers especially to its customers. (NHIS Directorate, 2011). Over the years, the processing of claims has been very cumbersome and sometimes become an added cost to these providers. One the other hand, officials of NHIS sometimes had to go through difficulties investigating into provided insurance claims and thereby run into cost or end up paying more than is necessary to the disloyal providers. There are other issues that crop up from the dispensary sector. For instance, the health insurance has a drug list with predetermined maximum price of the drugs for accredited providers of Pharmaceutical Services. These accredited Hospital Pharmacy shops encounter difficulties as regards dispensing drugs to the clients of the scheme as it is done manually. (NHIS Directorate, 2012)

The Automated System for National Health Insurance Scheme (NHIS) Claims is a desktop application suite designed to improve the quality and management of NHIS providers claims of services rendered to patients. The improvement will be in the area of clinical process analysis and also in activity-based costing. The system will also enable accredited health institutions to develop health service delivery system and improve upon the effectiveness and quality of service by providing a centralized database system that will reduce the challenges of NHIS service provider claims. Managing the key processes efficiently is critical to the success of the hospital.

1.2   PROBLEM STATEMENT

As prior pointed out, the NHIS has over the years had numerous challenges with payment of service providers. This has led many health providers to retract the services from the National Health Insurance Scheme. (Daily News, 2007).

The information is very difficult to retrieve and to find particular information like for instance, to find out about the patient's history, the user has to go through various registers. This results in inconvenience and wastage of time and also does not facilitate the appropriate claims payment due the providers. The information generated by various transactions takes time and efforts to be stored at right place. Various changes to information like patient details or immunization details of child are difficult to make as paper work is involved. Manual calculations are error prone and take a lot of time this may result in incorrect information. For instance, the preparation of patient's bill for the various treatments or services rendered. (GHS, 2006)

The system is designed to keep patients records and also most importantly automatically automate the cost incurred by eachclient per visit as well as monthly summation for reimbursment from the NHIS.

1.3   SCOPE AND LIMITATION OF THE EXISTING SYSTEM

According to the existing system, patient's information is created by just writing the Patients name, age and gender. Whenever this said patient pays a visit without health identification card then his/her information is re-created freshly (Duplication of records).

Bills are generated by recording price for each facility provided to patient on a separate sheet and at last they all are summed up.

Diagnosis information to patients is generally recorded on the document, which contains patient information. This is destroyed after some time period to decrease the paper load in the store house or records room.

Immunization records of children are maintained in pre-formatted sheets, which are kept in a file.

Information about various diseases is not kept as any document. Doctors themselves do this job by remembering various medicines.

Calculations of the costs of services rendered are to be as per the health service provider.

The physicians have to remember various medicines available for diagnosis that are covered by the insurance scheme.

1.4   PROPOSED SYSTEM

The centralized Automated System for NHIS Claims will reduce the extra cost of acquiring health management system and thereby encourage more providers to associate with the insurance scheme. It will as well facilitate the ease and prompt payment of provider's claims.

The Automated System for NHIS Claims streamline claims processing, speed access to customer information, and ensure the security of private medical information. The system will reduce the labor costs associated with processing of covered lives claims. A single platform will be utilized for all incoming data sources and automatically sent to claims for review and approval which will increase the accuracy and timeliness of payments.

Nonetheless, there is the need to design software system to eliminate the deficiencies in the existing system. By this medium will enable NHIS to make potential service providers readily apply for accreditation, generate all required reports, monitor inventory levels and finances, speed up the processing of claims, facilitate speedy dispensing of drugs to the

clients, monitor events and assess the profitability of the services being rendered, and to provide comprehensive and up-to-date reports for effective and timely decision-making.

1.5   OBJECTIVES OF THE STUDY

1.5.1   Main Objective

The Automated System for NHIS Claims aims to reduce or eliminate the health facilities the stress of compiling and submitting NHIS claims each month to the NHIA for reimbursement.

1.5.2   Specific Objectives

To enable quick retrieval of accurate and up-to-date patient information and to boost up health delivery time.

To minimize office space used to keep paper based documents

To Streamline and accelerate the processing of claims, reduce errors, and minimize manual intervention.

To ensure that processes are controlled and resulting documentation is retained and archived in compliance with the national health insurance scheme policies.

1.6   RESEARCH QUESTIONS

- How will a patient's record be retrived from the system when he/she pays a visit to the clinic?

- How will the system sum up the cost incured on a patient?

- How will the system accumulate all the cost incure during the month?

1.7   SYSTEM DESIGN AND METHODOLOGY

1.7.1   Methodology of Research

A methodology is defined as a collection of procedures, techniques, tools and documentation aids which will help developers in their efforts (both product and process related activities) to implement a new system.

For successful implementation, a well-organized and systematic approach is crucial. Therefore, several methodologies were developed to encourage the systematic approach to planning, analysis, design, testing and implementation. Methodologies offer various tools and techniques to assist in analysis, design and testing in terms of detailed design of software, data flowcharts and database design.

Methodology is essential and vital in every project development because;

- To complete a project within time and budget with the expected scope and quality we need methodologies which provide for a framework.

- Most methodologies have in common planning, developing and managing stages. They suggest to the development team the ways of thinking, learning and arriving at a regular feasible solution. (Van Kemp, 1999)

Selecting an ideal methodology was based on project requirements and goals.

- Functional Decomposition: The methodology should have stages according to the interrelated activities which can be grouped into different functional areas.

- Requirement Changes: If required, methodology provides scope to change the requirement.

- Manage Risks: Determined the risk is an important activity to develop a project.

- Iterative approach: Iteration allows refinement of requirement as well as design.

- Documentation: Methodology provides support for large documentation.

- Analysis and Design Support: A well-defined structure of the methodology helps for analysis and designing to development process.

- Implementation: The system should be implemented as per plan.

- Testing Support: More testing, more reliable the product is.

- Object Oriented Approach: Object oriented concepts will be used in developing the project as it supports component reusability. (McClobe, 2002)

1.7.2   The Methodology

Waterfall Methodology

Based on quite a number of researches, a project can be better managed when segmented into a hierarchy of chunks such as phases, stages, activities, tasks and steps. It follows a linear structure starting from requirement analysis, through design, implementation and maintenance. Being the most widely accepted methodology for student projects, this model has been well tried and tested. Each phase of it has sub phases which produce deliverables. (Van Kemp, 1999)   Requirements are fixed at initial stages before proceeding with development plans in system development projects; the simplest rendition of this is called the "waterfall" methodology.

The waterfall provides an orderly sequence of development steps and helps ensure the adequacy of documentation and design reviews to ensure the quality, reliability, and maintainability of the developed software. While many these days criticize the "waterfall methodology" as being needlessly slow and cumbersome, to the most it does illustrate and delivers. (Van Kemp, 1999)

1.7.3 Benefits Of The Proposed System

The database system approach for the health insurance institution offers a number of advantages over the existing manual system. However, the role of the Automated System for NHIS Claims system will benefit the National Health Insurance Authority to increase in efficiency and proper delivery of services in respect to the following;

Data Accessibility and Responsiveness

The database system will provide retrieval paths to each item of data; this will give users more flexibility in retrieving data. This will save space and time required to keep and retrieve a patient's record.

Reduce Data Redundancy

With the database approach, data files will be integrated into a single and logical structure. In addition, each data item occurrence will be ideally recorded in only one place in the database.

Consistency of Data

By eliminating data redundancy, inconsistencies will be reduced.

Easy Payments of Claims

It accumulates the cost of services rendered by the health providers onto the centralized server system therefore due payments can be accessed and promptly paid.

Sharing of Data

All authorized users of the system will share all the available data.

Security, Privacy and Integrity Controls

The administrator has the sole responsibility of ensuring security, controls of updating, accessibility and protection of data which ensure security of health records.

Accelerate Claims Processing

The computerized health insurance processing system will streamline and accelerate the processing of claims, reduce errors, and minimize manual intervention. The manual tasks are automated and deploy a single input management platform to manage health insurance information systems.

CHAPTER TWO

LITERATURE REVIEW

2.1   INTRODUCTION

In 2004, Ghana started implementing a National Health Insurance Scheme (NHIS) to remove cost as a barrier to quality healthcare. Providers were initially paid by fee - for - service. In May 2008, this changed to paying providers by a combination of Ghana - Diagnostic Related Groupings (G-DRGs) for services and fee - for - service for medicines through the claims process. However, The Claims processes being predominantly manual have experienced a number of challenges especially among the authority and providers. These include administrative capacity, technical, human resource and working environment challenges contributing to delays in claims submission by providers and vetting and payment by schemes (Government of Ghana, 2004).

The introduction of the NHIS was purported to abolish what was formerly referred to as the "cash and carry" system of health care delivery. Under the system, patients; including those who had attended hospitals with emergency cases were required to pay money at every point of service delivery. For instance, an accident bleeding patients or near-to-death health issues only have the chance to be attended to by doctor after payments have been made. Many lives were being lost for the mere reason of not having immediate cash on them or that friends and relatives were not around to make the required advanced payment. This led to many patients dying before being taken care of.

On the verge of getting rid of the "cash and carry" method, the health system being replaced with this equitable insurance scheme that ensured that treatment was provided first before payment. This purpose was lived by the government to abolish "cash and carry" and today,

the Health Insurance Scheme in Ghana is seen as one of the positive developments the nation can boast of. (Ghana Ministry of Health, 2007).

However, under the constitution, there is the establishment of the National Health Insurance Authority which licenses, monitors and regulates the operation of health insurance schemes in Ghana. (Government of Ghana, 2004)

2.2   TYPES OF HEALTH INSURANCE

There are three main categories of health insurance in Ghana.

The first and most popular category is the district mutual health insurance scheme, which is operational in every district in Ghana. This is the public/non-commercial scheme and anyone resident in Ghana can register under this scheme. If you register in 'District A' and move to 'District B', you can transfer your insurance policy and still be covered in the new district. The district mutual health insurance scheme also covers people considered to be indigent – that is too poor, without a job and lacking the basic necessities of life to be able to afford insurance premiums.

Apart from the premium paid by members, the district mutual health insurance schemes receive regular funding from central government. This central government funding is drawn from the national health insurance fund. Every Ghanaian worker pays 2.5% of their social security contributions into this fund and the VAT rate in Ghana also has a 2.5% component that goes into the fund. (National Health Insurance Authority, 2008)

To sign up for the district mutual health insurance scheme, you need to get to the district assembly where you reside or look for the offices of the scheme and register. You will fill a form, offering some basic personal information and you will be asked to present at least two passport pictures. You will need to fill forms for dependants above below 18 as well.

The second category of health insurance comprises the private commercial health insurance schemes, operated by approved companies. You can just walk into any of such companies and buy the insurance for yourself and dependents. Commercial health insurance companies do not receive subsidy from the National Health Insurance Fund and they are required to pay a security deposit before they start operations.

The third category of health insurance is known as the private mutual health insurance scheme. Under this, any group of people (say members of a church or social group) can come together and start making contributions to cater for their health needs, providing for services approved by the governing council of the scheme. Private mutual health insurance schemes are not entitled to subsidy from the National Health Insurance Fund. (Ghana Ministry of Health, 2007).

2.3   IDENTIFIED CHALLENGES OF CLAIMS MANAGEMENT PROCESSING

The main technical challenges faced by the health insurance system were inappropriate computer software utilization for claims processing due to inherent delays in executing commands and limited ability to verify written diagnosis due to non-medical background of claims officials.   Again, all outpatient claims were processed without verification from folders unlike inpatient claims where because of the larger tariffs involved, saw the claims officer verifying the folder of every inpatient claim submitted i.e. matching the claims submitted with the actual record of treatment as contained in the inpatient folder.

Working environment challenges were over crowded offices, perceived work overload ("over work"), lack of a comprehensive conditions of service document and stress from increased predisposition to file for financial distress with the introduction of the new tariffs. (NHIS Directorate, 2012)

Provider Claims Management Challenges

The health insurance claims management challenges identified could be classified as technical, human resource, working environment and financial challenges. Technical challenges from the provider's perspective resulted in the rejection of unverifiable claims mainly as a result of poor filing systems resulting in missing folders of treated clients. Claims forms were often incompletely filled especially portions on 'claim number'. There were challenges with verifying compliance with Standard Treatment Guidelines for non-medical billing officers e.g. transcription of doctor's diagnosis of "Enteritis" as "Enteric Fever" on claims form by accounting officers. The working environment challenges reflected in stress of work from delayed reimbursement resulting in delays in paying off hospital suppliers and poor information flow between the scheme and providers leading sometimes to conflicts.

In addition to above, the other provider financial challenge was chronic income loss from two main conditions: the non-inclusion of quinine syrup on the insurance drug list (for treating severe malaria in children). (NHIS Directorate, 2012)

Factors Associated With Claims Rejection

As far as rejection of claims is concerned, there is need to differentiate between total rejection of a whole claim as opposed to partial rejection of claims submitted. A claim is said to have been rejected totally if none of the amount claimed is reimbursed. Two main reasons given by the Scheme Managers for total rejection of claims are no evidence of service being rendered and client ineligibility through expiration of NHIS card or the submission of an insurance number which is unknown to the scheme by provider. The reasons for partial rejections or deductions are drugs not on insurance drug list, overcharging of drugs, overcharging for particular diagnosis, quoting wrong diagnosis e.g. bill for severe malaria while Ghana - Diagnostic Related Groupings (G-DRG) quoted is for simple malaria and arithmetical errors.

Similar factors are associated with both Schemes for the rejection of claims. (Government of Ghana, 2004)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1   INTRODUCTION

Software engineering is carry out of using preferred procedure techniques to progress the quality of a software development effort. A methodology is defined as a collection of procedures, techniques, tools, and documentation aids which will help developers in their efforts (both product and process related activities) to implement a new system. For successful implementation, a well-organized and systematic approach is crucial. Therefore, several methodologies were developed to encourage the systematic approach to planning, analysis, design, testing and implementation.   Methodologies offer   various   tools and techniques to assist in analysis, design and testing in terms of detailed design of software, data flowcharts and database design.

Methodology is essential and vital in every project development because;

i. To complete a project within time and budget with the expected scope and quality we need methodologies which provide for a framework.

ii. Most methodologies have a general planning, developing and managing stages in common. They suggest the development team the ways of thinking, learning and arriving at a regular feasible solution. (Van Kemp, 1999)

To select an ideal methodology was based on project requirements and goals.

Functional Decomposition: The methodology should have stages according to the interrelated activities which can be grouped into different functional areas.

Requirement Changes: If required, methodology provides scope to change the requirement.

Manage Risks: Determined the risk is an important activity to develop a project.

Iterative approach: Iteration allows refinement of requirement as well as design.

Documentation: Methodology provides support for large documentation.

Analysis and Design Support: A well-defined structure of the methodology helps for analysis and designing to development process.

Implementation: The system should be implemented as per plan.

Testing Support: More testing, more reliable the product is.

Object Oriented Approach: Object oriented concepts will be used in developing the project as it supports component reusability. (McClobe, 2002)

3.2   THE METHODOLOGY

Waterfall Methodology

A project can be better managed when segmented into a hierarchy of chunks such as phases, stages, activities, tasks and steps. It follows a linear structure starting from requirement analysis, through design, implementation and maintenance. Being the most widely accepted methodology for student projects, this model has been well tried and tested. Each phase of it has sub phases which produce deliverables. (Van Kemp, 1999) Requirements are fixed at initial stages before proceeding with development plans in system development projects; the simplest rendition of this is called the "waterfall" methodology, as shown in the following figure:
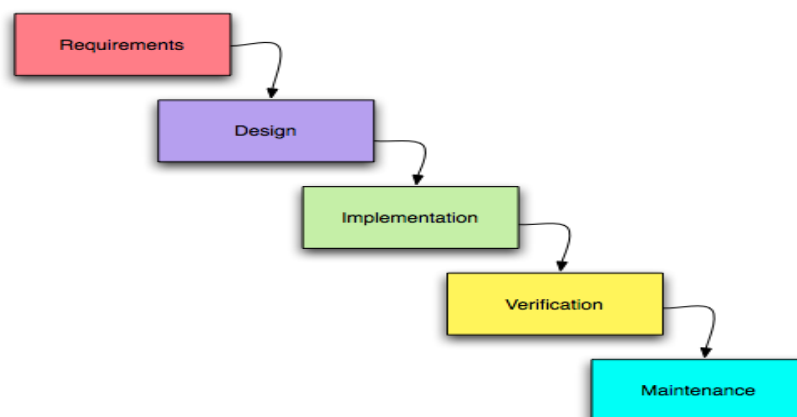
Figure 3.1: Waterfall model

Figure 3.1 illustrates a few critical principles of a good methodology:

- Work is done in stages

- Content reviews are conducted between stages

- Reviews represent quality gates and decision points for continuing

The waterfall provides an orderly sequence of development steps and helps ensure the adequacy of documentation and design reviews to ensure the quality, reliability, and maintainability of the developed software. While many these days criticize the "waterfall methodology" as being needlessly slow and cumbersome, to the most it does illustrate and delivers. (Van Kemp, 1999)

The waterfall model application

Requirement Gathering and analysis: During this stage, the possible requirements needed to develop the NHIS DeskNetClaims system were captured and documented by way of visiting the health facility site and asking verbal question related to the system. A research was conducted which includes brainstorming about the system. At this phase, how the system will be and what purpose it will fulfill was dtermined. In other to gather the requirement specifications, the health facility was visited periodically to observe the various activities pertaining to the NHIS system.

System Design: The system design phase involved formulating the basic design of the software on paper. At this phase, requirement specifications gathered from first phase were studied, a system design was prepared. This is where how the system is going to put into being was determined. The system's architecture is also built thereby specifying and factoring the hospital's available hardware. For instance, the system was to be built considering the fact that NHIS have the network system already in place and functioning as

need so plans as to how the system ought to work at different networks of the NHIS was planned. During this process various NHIS processes used at the hospitals in units were critivally examined. An instance is, the OPD unit performs various activities so a unit called "Patient's Folder" was created, which contains the records all patients.

Implementation: With inputs from system design, the system was first developed in small programs called units as stated in the design stage, which are integrated in the next stage of the Waterfall Model. Here the system as developed with Visual Studio were designed in a modular way (sub modules) and later integrated into other sub modules that had already been done at the Verification phase of this model. Each unit was developed and tested for its functionality which is referred to as Unit Testing. For instance, in creating the "Patient Folder", a unit was created to register new patients in the system and existing patient's search etc. This "Patient Folder" was created to serve as reference to the core activities performed at other sub modules such as "Attendance", "Consultation" etc.

Verification: All the various units developed in the implementation phase are integrated into a system after testing of each unit. Post integration the entire system is tested for any faults and failures. The whole design and its construction are put under a test to check its functionality. If any error surfaces during this the process, the error is identified and reworked until it fully passes tests.

Maintenance: This being the final phase is needed to ensure that the system will continue to perform as desired. Once the various testing were done, the NHIS DeskNetClaims system was deployed and released into the client environment (thus NHIS accredited health facilities). Under this stage, if some issues come up as a result of being tested or used in the

client environment, they are fixed and released as patches. Also to enhance the product some better versions are released. Maintenance is done to deliver these changes in the client environment.

3.3   FEASIBILITY STUDY

Depending on the results of the initial investigation the survey is now expanded to a more detailed feasibility study. **Feasibility Study** is a test of system proposal according to its workability, impact on the organization, ability to meet needs and effective use of the resources. (Reddy & Govindarajulu, 2007). It focuses on these major questions:

What are the user's demonstrable needs and how does a candidate system meet them?

What resources are available for given candidate system?

What are the likely impacts of the candidate system on the organization?

Whether it is worth to solve the problem?

During feasibility analysis for this project, following primary areas of interest are to be considered.

Investigation and generating ideas about a new system does this.

Steps of the Feasibility Analysis

Eight steps involved in the feasibility analysis are:

i.   Form a project team and appoint a project leader.

ii.   Prepare system flowcharts.

iii.   List out the potentials of the proposed system.

iv.   Define and identify characteristics of proposed system.

v.   Determine and evaluate performance and cost effective of each proposed system.

vi.   Weight system performance and cost data.

vii.   Select the best-proposed system.

viii.   Prepare and report final project directive to management.

The Technical Feasibility

This is the study of resource availability that may affect the ability to achieve an acceptable system. This evaluation determines whether the technology needed for the proposed system is available or not. The purpose of the technical feasibility is to evaluates and brings outs the following questions;

1. Would the project achieve its intended purpose when completed?
2. Can the work for the project be done with current equipment existing software technology and available personnel?
3. Can the system be upgraded if developed?
4. If new technology is needed then what can be developed?
5. This is concerned with specifying equipment and software that will successfully satisfy the user requirement. (Reddy & Govindarajulu, 2007)

3.4   TECHNICAL NEEDS OF THE SYSTEM

An important issue for the development of a project is the selection of suitable technical system thus, front-end and back-end. When the project was decided to be developed one had to go through an extensive study to determine the most suitable platform that may suit the needs of the health institution, as well as helps in its development. The aspects of the study included the following factors.

Front-End Selection

The front-end or user side of the Automated System for NHIS Claims System was developed with Microsoft Visual Studio 2010. As may be required of user friendly application;

    i.   It must have a graphical user interface that assists employees having or not having any IT background.

   ii.   Scalability and extensibility.

  iii.   Flexibility.

  iv.   Robustness.

   v.   According to the health institutions requirement and the culture.

  vi.   Must provide excellent reporting features with good printing support.

 vii.   Platform independent.

viii.   Easy to debug and maintain.

  ix.   Front end must support some popular back end systems such as SQL database

Back-End Selection

    i.   Multiple user support.

   ii.   Efficient data handling.

  iii.   Provide inherent features for security.

  iv.   Efficient data retrieval and maintenance.

   v.   Stored procedures.

  vi.   Popularity.

 vii.   Operating System compatible.

viii.   Easy to install.

  ix.   Various drivers must be available.

   x.   Easy to implant with the Front-end.

The project centers on the existing computer system (hardware, software specifications) in other to function as proposed.

3.5 HARDWARE AND SOFTWARE SPECIFICATIONS

The proposed system may require following computer hardware specifications to function efficiently;

- Computer system with 1Ghz processor speed or higher

- 1 Gigabyte (GB) of Memory (RAM) or above

- 1 GB Free Hard disk space

- Network Interface Card

- LaserJet or Inkjet Printer

The software specifications may also require the following for an efficient performance;

- Any Microsoft Windows or operating supporting .NET framework

- .NET Framework 3.0 or higher

- Microsoft Report Viewer 2 or higher

- Microsoft SQL Server 2005 Express Edition or any commercial version.

3.6 DEVELOPMENT TOOLS AND PLATFORM

The Development Platform and Programming Language that was used to in developing the Automated System for NHIS Claims include**;**

- Visual Studio.NET (VB.NET)

- Microsoft SQL Server 2005 Express Edition

Moreover, the system is built to be used on Microsoft Windows OS platform and is compatible with Windows XP SP2, Windows 7 or Windows 8 or any other platform that supports .NET framework. This alternative was not adapted because of finding a way to wiggle out of challenging tunnel but because;

- Microsoft platform is easy to users familiarize.

- It has more supporting technologies

- It has a greater market share compared to the others and it is the most widely used technology in Ghana.

- Mainly, Microsoft platform was adapted in other to save the health institution who already have computers that are being used under this platform.

Visual Studio.NET (Visual Basic.NET)

Visual Studio is an integrated development environment (IDE) from Microsoft. It uses Microsoft software development platforms such as Windows API, Windows Forms, Windows Presentation Foundation, and can also produce both native code and managed code. (Melberck Publication, 2010)

Visual Basic.NET (VB.NET) is an object-oriented programming language that supports all the four features of object-oriented programming, thus, encapsulation, abstraction, inheritance and polymorphism. The .NET Framework provides some predefined classes, which the programmer can use in Visual Basic .NET applications. For example, if one creates a Windows application, the form added to the application inherits either for the System.Windows.Forms.Form bases class or from another existing form.   To handle

exceptions in a VB.NET application, one can use the System.Exception class, and in addition you can create your own class to use them in VB.NET application. (NIIT, 2005)

The 2010 version of Visual Basic.NET offers an easy-to-use language to explain some complex tasks. Although it never hurts to have an understanding of what is happening at the lowest levels, Visual Basic 2010 frees the programmer from having to deal with the mundane complexities of writing Windows applications. You are free to concentrate on solving real problems. (Kierra & Newsome, 2012).

The following are the merits that led to the choice of Visual Studios compared to other platforms;

- Automatic Memory Management: The Common Language Runtime (CLR) feature of the .NET framework provides the garbage collection feature for managing the lifetime of an object. This process relieves the programmer of the task of manual memory management by de-allocating the blocks of memory associated with objects that are no longer used. (NIIT, 2007)
- It has in-built Reporting designing tools that can be used for reporting.
- Visual Studio includes enhanced support for debugging multiple threads. (Ward, 2011)

Microsoft SQL Server Database Management System (DBMS)

A database management system (DBMS) gives the user access to their data and enables them to transform the data into information. Examples of DBMS include dBase, paradox, IMS and SQL Server. These systems allow users to create, update and extract information from their database. (UK Essays, 2011)

A database is a structured collection of data. Data refers to the characteristics of people, things and events. MS SQL Server stores each data item in its own fields. The fields relating to a particular person, thing or event are bundled together to form a single complete unit of data, called a record (it can also be referred to as raw or an occurrence). Each record is made up of a number of fields. No two fields in a record can have the same field name. (UK Essays, 2011)

MS SQL Server is one of the leading DBMS and was adapted for our system design because it is the only Database that meets the uncompromising requirements of today's most demanding information systems. Moreover MS SQL Server leads the industry in both performance and capability and is portable, distributed, and open DBMS that delivers unmatched performance, continuous operation and support for every database.

The key features that motivate us to its choice is that MS SQL Server is a high performing fault tolerant DBMS specially designed to handle large database application and support for multiple processors. It also has failover features which can be guaranteed to contribute to the avoidance of organizational downtimes. (UK Essays, 2011).

CHAPTER FOUR

SOFTWARE REQUIREMENTS SPECIFICATIONS

4.1   REQUIREMENT SPECIFICATION

A requirement is a high-level, abstract statement of a service that the system should provide or a constraint on the system. In this chapter, we will consider the following;

- Functional requirements

- Non-functional requirements

- Security requirements

4.2   FUNCTIONAL REQUIREMENTS

These are the requirements of a system that describe the functionality that the system is expected to provide. In other words, functional requirements describe the system function in detail, its inputs, processes and outputs. The Automated System for National Health Insurance Scheme (NHIS) will primarily provide a more precise management tool that will establish security, improve data accuracy, and allowing a patient confidence in the hospital. The majority of the claims officers, who will benefit from this system, currently use their judgment and expertise to anticipate the outcome of a situation. They also rely on manual data records and poorly captured data from the current state of traditional records keeping. The following represents some of the functional requirements for this project:

- The new system will function in compliance with Standard Treatment Guidelines and adhere to Health Service requirements.

- The system will provide a patient with accurate and up-to-date data.

- Ease of graphic user-interface use that can be accessible.

- The system will grant technician or general communications and training documents

- The system will t supply a prototype or process to approve its customization

- Backup data restore capabilities should be granted

- The system will supply standard reports for decision making

- The system will provide standard error checking

- The system will provide data integrity checks to ensure data remains consistent and updated. (Van Kemp, 1999)

4.3   NON-FUNCTIONAL REQUIREMENTS

These are the requirements which are not directly concerned with the specific functions delivered by the system but may relate to the emergent system properties such as reliability, response time and storage capacity. They normally place restrictions or constraints on the system being developed and the development process. However, non-functional requirements are not always concerned with the software. It arises through user needs. (Van Kemp, 1999).

The Non-Functional Requirements largely depends on the part of the users of the existing system to give the requirement specifications because they are the people who finally use the system. This is because the requirements have to be known during the initial stages so that the system can be designed according to those requirements. It is very difficult to change the system once it has been designed and on the other hand designing a system, which does not cater to the requirements of the user, is of no use. (Heizen, 2000). The following represents some of the non-functional requirements for the Automated System for National Health Insurance Scheme (NHIS):

- Response and processing time must be acceptable by user.

- When checking the database for errors, a total scan of the data is required, rather than selecting a sample record.

- The system should allow adding more information to allow a greater connectivity rate

- The system should provide documentation to inform users of system functionality and any change to the system.

- The system should provide friendly graphical interface to ensure ease of use when end- users utilize the system functionality.

A common problem with non-functional requirements is that they are difficult to verify. They may be written to reflect general goals of the user such as ease of use, the ability of the system to recover from failure or rapid user response but may cause problems for system developers as they leave scope for interpretation and subsequent dispute once the system is delivered.

4.4   SECURITY REQUIREMENTS

The Automated System for National Health Insurance Scheme (NHIS) is one of those that have great security challenge. Traditionally, security is incorporated in a software system after all the functional requirements have been addressed. Although, security requirements are non-functional requirements, it is deliberately avoided within the non-functional requirements due to the crucial role they play in the success of any health system. Below are lists of the NHIS Claims system security requirements.

- The Insurance system will include controls to prevent deliberate or accidental attempts to replace code.

- The system will have zero-tolerant with regard to compromising.

- The system will provide accurate time and date settings.

- The system will not allow improper actions.

- The system will not allow tampering with records.

4.5   SYSTEM MODULES DESCRIPTION

The Automated System for National Health Insurance Scheme (NHIS) system consists of the following modules;

PATIENTS MODULE:

In patient module here, the eligible users, thus the record officers, can registered the new patient, during registration have to enter the patients basic information. When the patient visits the hospital these officials check if patient is new (first time visit) or old (has ever visited). If new, a patient's folder is created for and then added to the Attendance List for the day. On the other hand, old patient's folder is searched and retrieved by his/her OPD number and also registered into the day's Attendance Records. There are two types of patient one is *Inpatient* and another is *Outpatient*. During entry of patient's attendance record, the officer indicates if the patients came with National Health Insurance Scheme Card or not. By this, it is determined by the systems either to prepare patient's bill for outright payment or forwarded to the NHIS server system to accumulate into the said hospital's (service provider) rendered services database.

PROCEDURES

The Procedures Module consists of the Vital Stats and Consultation. Vital Stats section is where patient issues are sorted to determine which kind of health assistance needed by patient. They are directed to this Vital Stats the moment the patient's attendance record are taken because patients without attendance identity cannot be found within the system for any other service. The following are some of the patient's information taken by health assistance at the Vital Stats;

- Patient temperature

- Blood Pressure (BP) Level

- Body Weight

- Patient's Initial Complaint (reason of visit)

CONSULTATION

At the Consultation module the patient sees a medic, physician or doctor to be diagnosed. It strictly requires registered medic's username and password to access this module. When adding new consultation entry, the medic searches the patient by his/her O.P.D number to pull-up the patient's personal information such as name, gender, age etc and national health insurance status. After diagnosis, the medic is supposed to enter the diagnosis of patient and also to enter appropriate prescription. If the patient came without insurance, a patient's invoice, which pertains the cost of consultation is automatically prepared and sent to the Billing section where he/she is directed to make payments.

DISPENSARY

Dispensary is where patient receives drugs which had been prescribed by the medic during consultation. Only pharmacists are eligible to access this section, where they are supposed to select according to the doctor's prescription, the available to the health provider. For non-insured patients, an invoice is automatically generated to be paid at the billing section before being supplied with the said drugs.

BILLING

The Billing module is where *payable services* of the health service provider are accumulated to be paid as the patient goes through the various health processes. *Payable Services* are

services that are not covered by the national health insurance and services which are rendered non-insured patients. This section is handled by the accounts clerks of the health service provider.

PROVIDER CLAIMS ACCOUNT

This section accumulates the data of all the NHIS Providers' transactions within a period of time. It is only accessible at the NHIS regional centre where providers are to submit their various claims for their pays. The Provider Claims Account module is considered as the server side of the systems.

4.6   ANALYSIS OF REQUIREMENTS

The oriented problem solving is the construction of a model. This model abstracts the essential details of the underlying problem from its usually complicated real world. The Unified Modeling Language (UML) is the standard language used to specify, visualize, construct and document all the artifacts of a software system. UML is a general purpose language that includes a graphical notation used to create an abstract model of a system. UML diagrams represent three different views of a system model:

Functional Requirements view - emphasizes on the functional requirements of the system from the user's point of view. An example is a use case diagram

Static Structured View – emphasizes on the static structure of the system using objects, attributes, operations and relationships. An example is a class diagram

Dynamic Behavior View – emphasizes on the dynamic behavior of the system by showing collaborations among objects and changes to the internal states of objects. An example is a sequence diagram.

4.7   DATA MODELING

Data modeling is a method used to define and analyze data requirements needed to support the business processes of an organization. The data requirements are recorded as a conceptual data model with associated data definitions.

4.8   ENTITIES

The entities involved in this project are Patient, Nurse, Physician, and Pharmacist.

4.8.1   Entity Relationship Diagram

In entity-relationship model is an abstract and conceptual representation of data. Entity-relationship modeling is a database modeling method, used to produce a type of conceptual schema or semantic data model of a system, often a relational database, and its requirements in a top-down fashion. Diagrams created by this process are called entity-relationship diagrams. Figure 4.1 below, depicts the entity relationship diagram for the system.
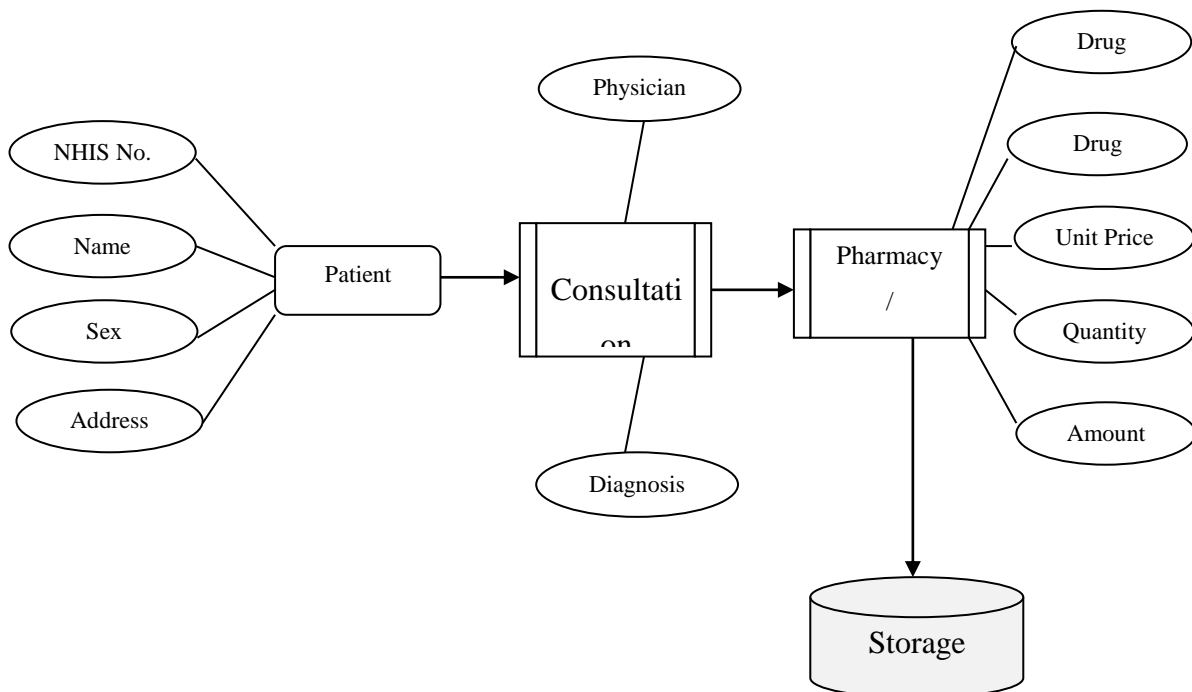
Figure 4.1: Entity Relationship Diagram for NHIS

4.8.2   Use Case Diagram

The use case diagram, in the context of the software development life cycle, is a process in which use cases are used as a primary artifact for establishing the desired behaviour of the system, for verifying and validating the system's architecture, for testing, and for communicating among the stakeholders of the project.

4.8.3   UML Use Cases

A use-case tells a stylized story about how an end-user interacts with the system under a specific set of circumstances. The story may be narrative text, an outline of tasks or interactions, a template-based description, or a diagrammatic representation. Regardless of its form, a use-case depicts the system from the end-user's point of view. The figure below depicts the UML Use Case of the Automated System for National Health Insurance Scheme (NHIS);
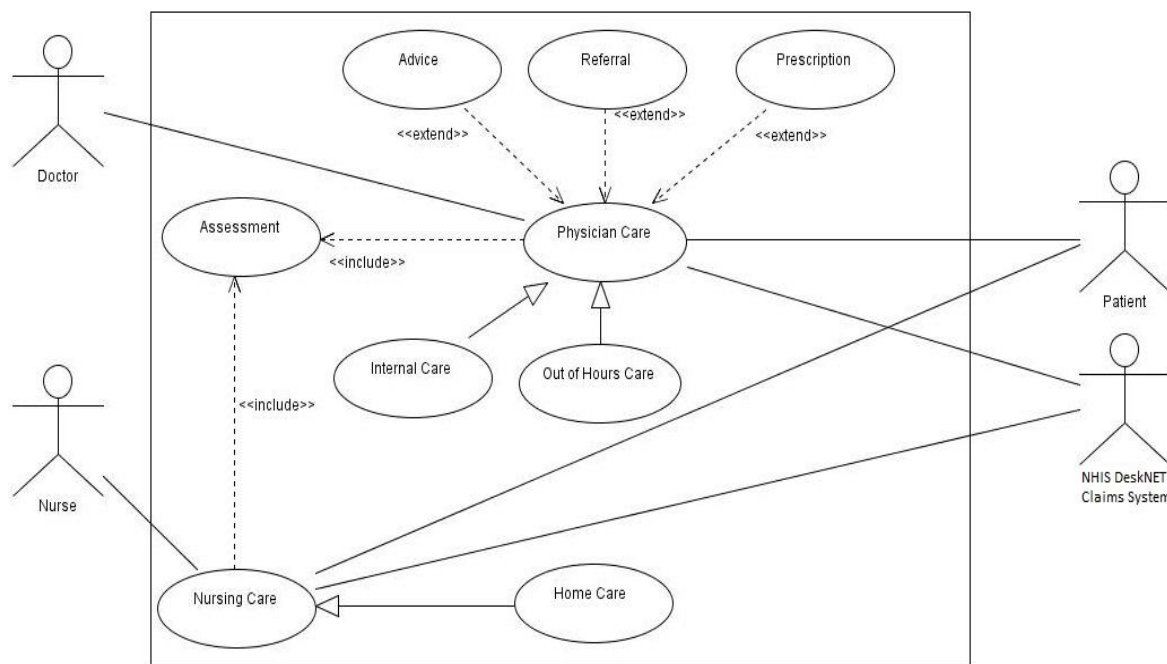
Figure 4.2: NHIS DesknetClaims System Use Case
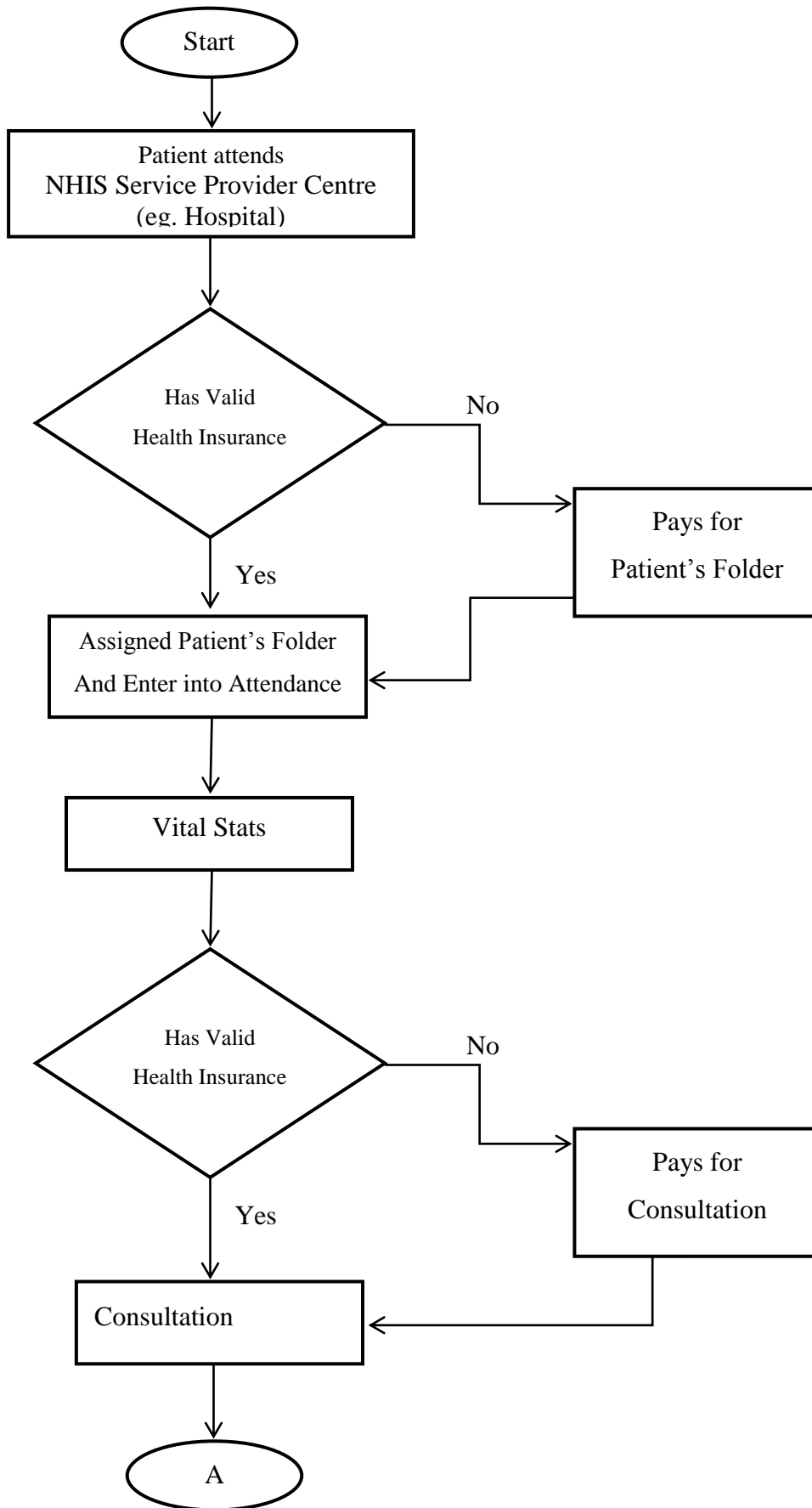
Figure 4.3*:* Flow Chart the Automated System for National Health Insuarance Scheme (Part 1)
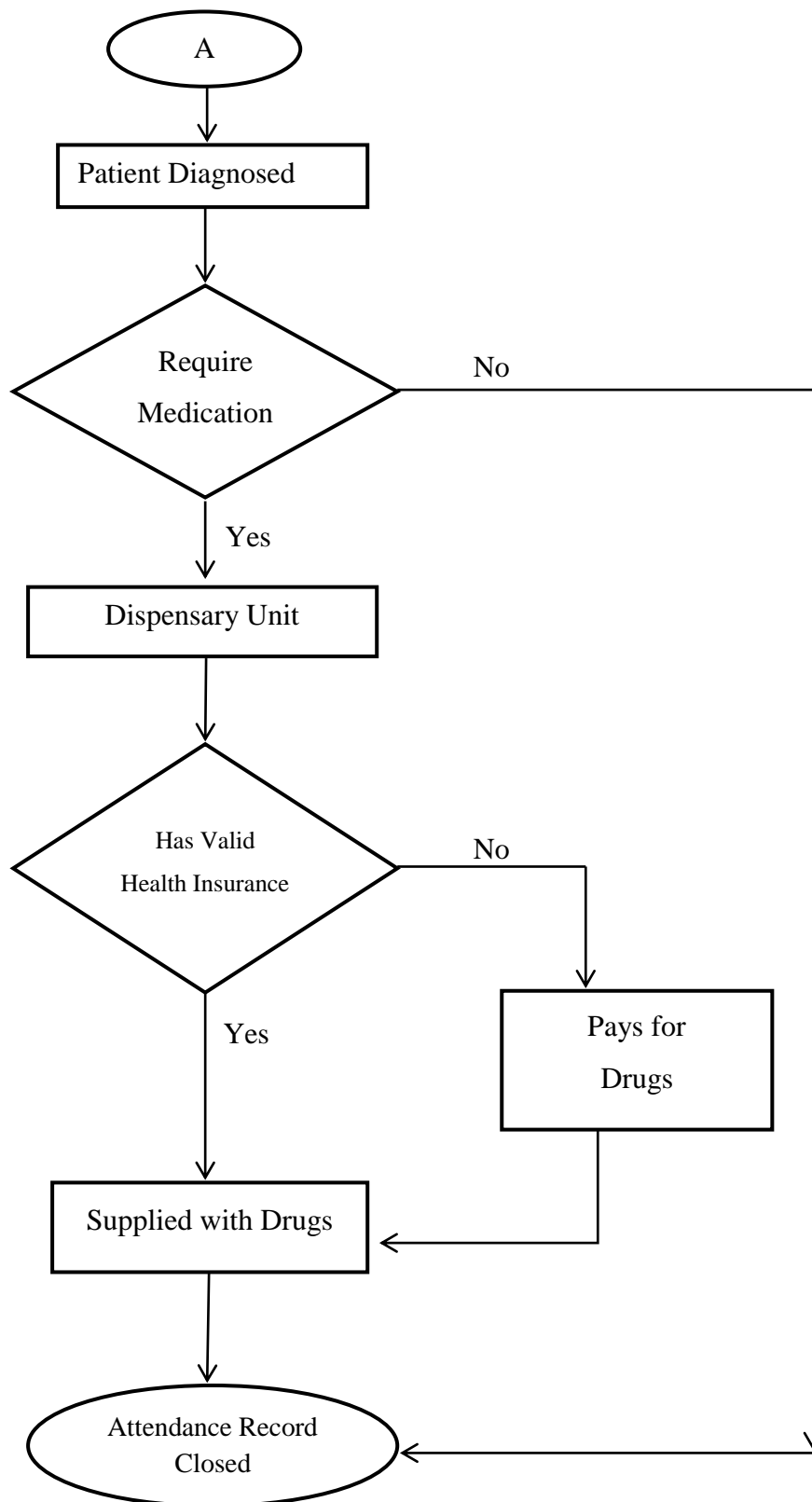
Figure 4.3 :Flow Chart the Automated System for National Health Insurance Scheme (Part

2)

CHAPTER FIVE

SYSTEM DESIGN AND IMPLEMENTATION

5.1 SYSTEM ARCHITECTURAL DESIGN

The Automated System for National Health Insurance Scheme (NHIS) which is developed as an electronic database system to help the health insurance institution to increase in efficiency and also resolve or alleviate the various issues encountered in the manual systems.

The functions performed by this new system can be classified under the entire category of the Application Development Model or Architecture Types. These are the presentation layer, business service layer and the data service layer. The presentation layer which is also the user services layer provides the user interfaces meant to be interacted with by the technical operators, whereas the business layer controlling the enforcement of business rules on the data like the prior cited raw material testing instance. The third part, thus, the data service layer also comprises the manufacturing process data and the functions for manipulating the data. (NIIT, 2007)

In spite of this, the new system's architectural design is based on a Two-Tier Architecture. The two-tier architecture divides an application into two components;

- Client: - which implements the user interface

- Server: - which stores data.

In the case of two-tier architecture, the user and data services are to be located separately on different machines. (NIIT, 2007). For this reason, our database was designed to be installed and configured on a data repository server, whereas the application is to be installed on the client computers being operated by the technical users at their various units.
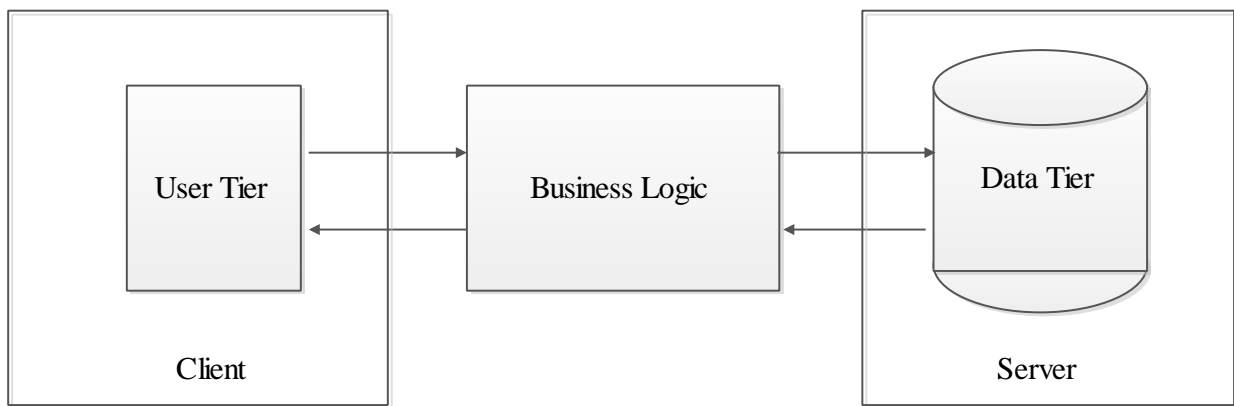
Figure 5.1: Two-Tier Application Model/Architecture. (NIIT, 2010)

The Automated System for National Health Insurance Scheme (NHIS) has been developed in accordance with the technical aspects as per the requirements of the health insurance institution.

5.2   DATABASE DESIGN

After carefully understanding the requirements of the health insurance system as operated by the Nyame Ani Hospital, the entire data storage requirements were divided into tables.

Moreover, the tables within the backend database are normalized to avoid any anomalies during the course of data entry. These anomalies were counted according to the following;

Avoiding delay: The processing delay resulting from data preparation or data entry operations is called bottlenecks. Avoiding bottlenecks should be one objective of input.

Avoiding errors: Through input validation the system ensures that the right date is entered by the user.

Avoiding extra steps: This is to avoid the input design that cause extra steps in processing saving or adding a single step in large number of transactions saves a lot of processing time or takes more time to process. (NIIT, 2007)

This new system is designed to ensure that required data were decomposed by way of splitting relations into multiple relations to eliminate anomalies and maintain anomalies and maintain data integrity. To have this accomplished, we use normal forms or rules for structuring relation in check with the following database anomalies;

Insertion anomaly: Inability to add data to the database due to absence of other data.

Deletion anomaly: Unintended loss of data due to deletion of other data.

Update anomaly: Data inconsistency resulting from data redundancy and partial update (NIIT, 2010)

The database is designed with not less than twenty-five entities/tables in order to make our system function as expected. The entity relationship diagram as shown in Figure 4.1 above depicts the major structure of the new system.

5.3   DATABASE SCHEMA

Following are the database schema of the Automated System for National Health Insurance Scheme (NHIS)
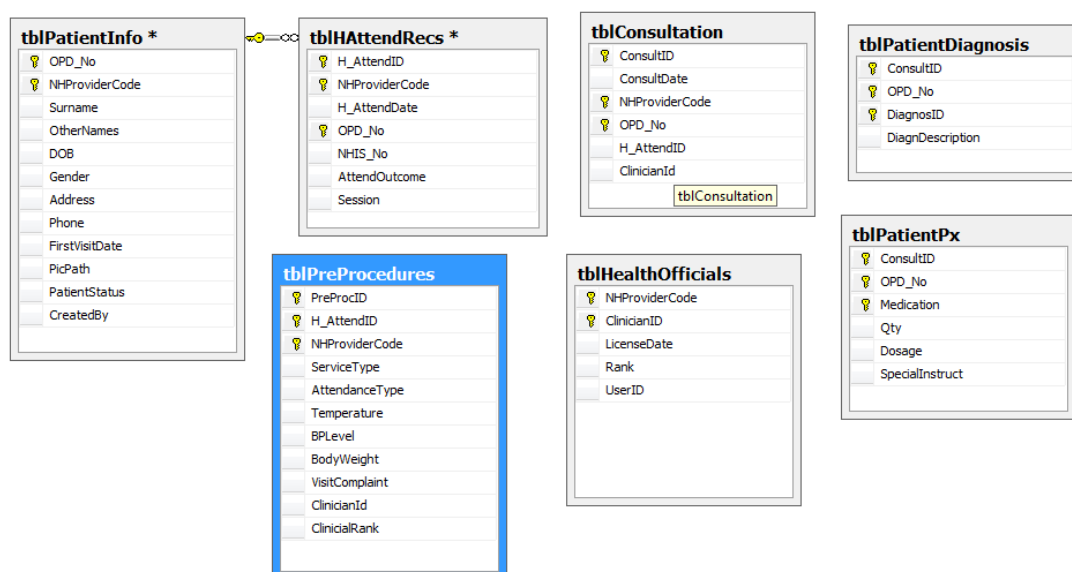
Figure 5.2*:* Patient information, Attendance Record, Vital Stats and Consultation Schema
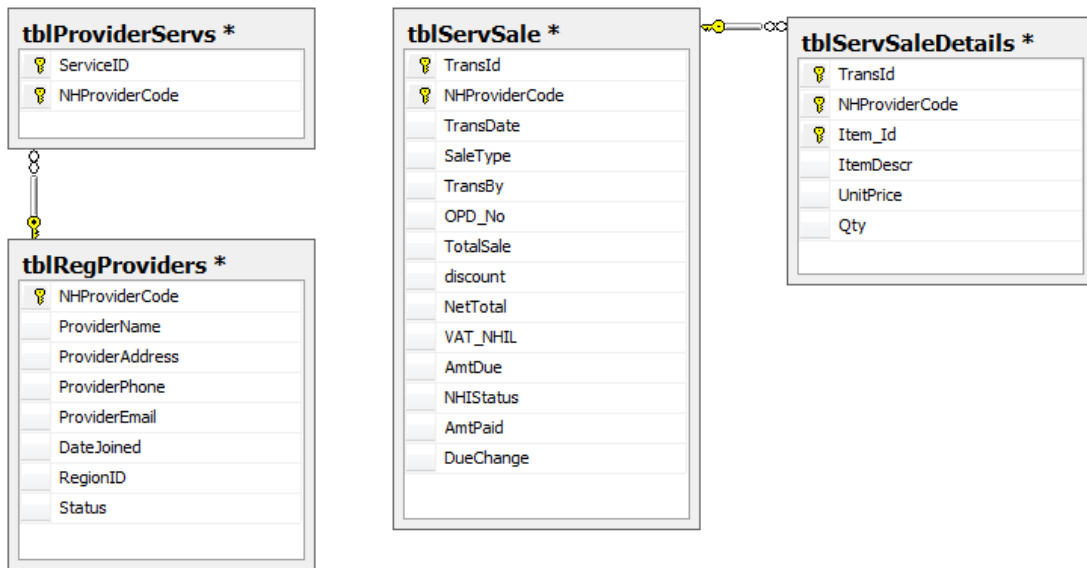
Figure 5.3: Providers Service or Sales Database Schema
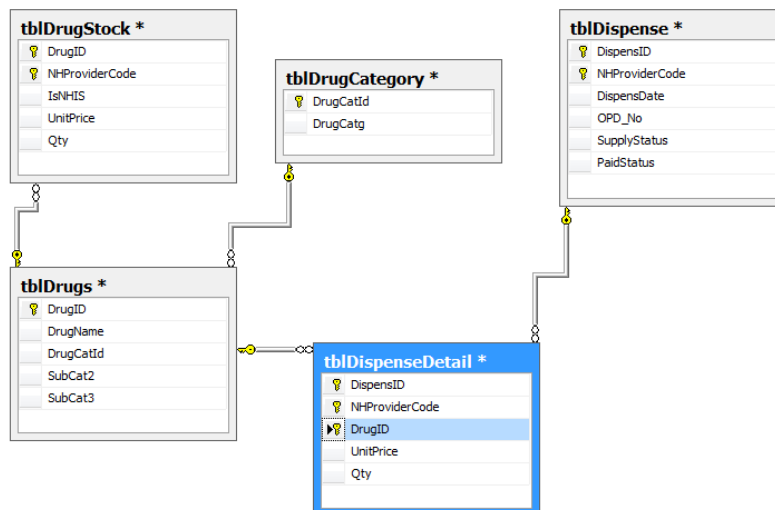
Figure 5.4: Drugs and Dispensary Database Schema

5.4   USER INTERFACE DESIGN

Good design is not just what looks good. It also needs to perform, convert, astonish, and fulfill its purpose. It can be innovative or it might just get the job done. A good design cannot be measured by a finite way; however, multiple perspectives are needed.

Inspired by Dieter Rams, the notion behind the design of this system which long kept a list of what a good design is. It is ever expanding and some things are more important in some

39

projects than other. Below is how my list looks right now – greatly inspired by, but focused more on interface design. (Lovell, 1995)

With that in mind, the new system is designed in a unified manner such that users have comfort in using it. The Automated System for National Health Insurance Scheme (NHIS) is packaged in a Graphic User Interface (GUI) to enable both the novice computer user and expert to work with. The following are the Graphic User Interface attributes employed for our system design;

Tab-Paged Commands: A series of tabs that will enable user to navigate through the system modules. Sub-modular functions are grouped under these Tabs.

Standard Toolbar: This consists common buttons with icons are used to execute actions relating to the active module or sub-module in focus.

Shortcut Pane: This is a pane of shortcuts to navigate through the various major modules that have been visited within the system.

The Automated System for National Health Insurance Scheme (NHIS) consists of the following user interfaces.

5.4.1   The Welcome Screen

The welcome screen introduces the user to the systems whiles the essential components of the application are initialized is shown up as in Figure 5.5.

*Figure 5.5: T*he Welcome Screen

5.4.2   User Authentication Screen

This screen, thus the User Authentication, follows after the Welcome screen. It is the main entry to the program. It allows the users to enter his/her username and password before being given access to the system. Failure to be successfully authenticated by the system renders the application being disabled such that it cannot be used.
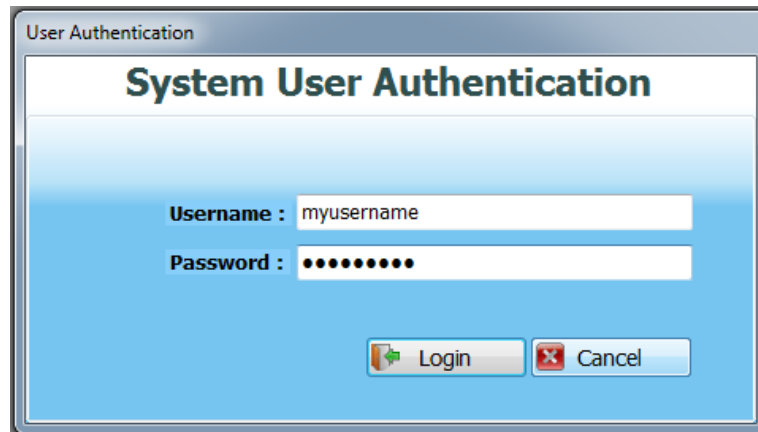
Figure 5.6: User Authentication Screen

5.3.2   The Mother Window

The Mother window enables multiple windows of the system modules which are considered as child windows to reside under a single parent window. It allows the module windows to be embedded in a unified environment.

This window consists of a main Tab control, common toolbar, Recent Items pane and the main document area to hold up windows being worked with as shown in Figure 5.7.
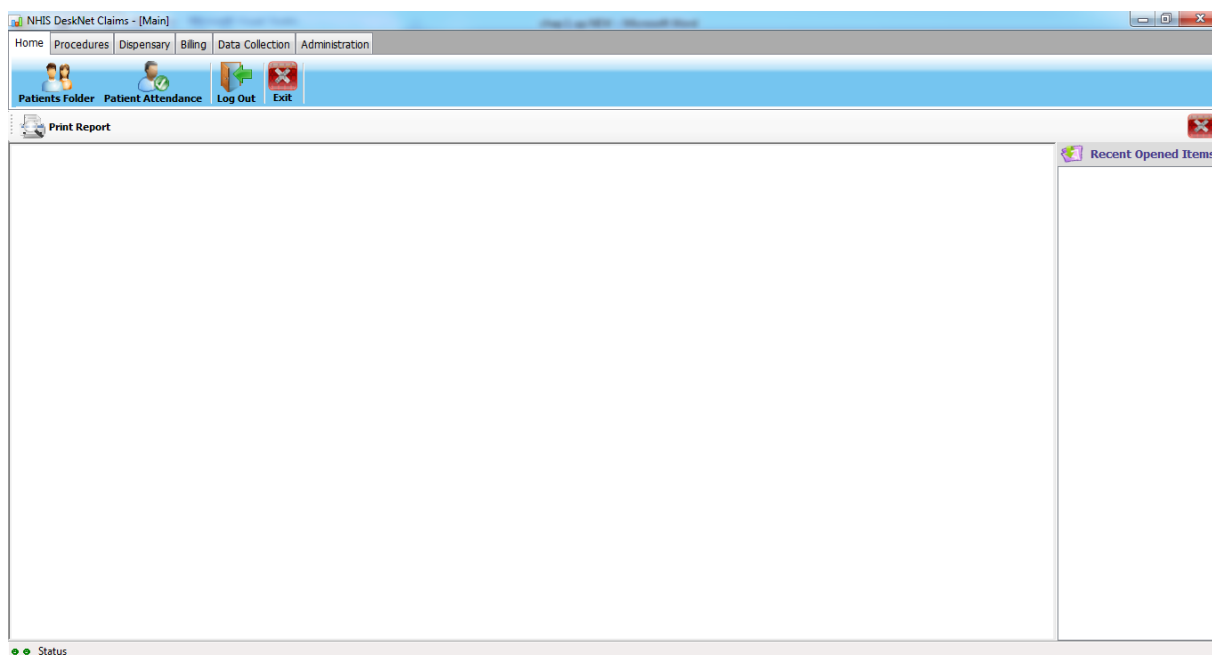
Figure 5.7 The Mother Window

The following are the components of the Mother window

5.4.4   The Navigation Tab Control

The Navigation Tab control consists of groups of related modules or sub-modules which are used to get access to the various parts of the application such as; Patients Folder, Attendance Records, Consultation Module etc.

This navigation tab has six (6) major tab pages under which are found the various command of the system's modules.   The following are the various Tab Pages with their respective commands;

Home: The Home tab has – Patients Folder, Patient Attendance, Logout and Exit commands.

Procedures: The Procedures tab has – Vital Stats and Consultation commands to get to their respective modules.

Dispensary: The Dispensary has only the Dispensary command.

Billing: The Billing tab has Patient Invoice command which has the sub-module that generates invoice and accept payments of non-insured patients.

Data Collection: This also has the Patients Morbidity and Provider Claims Accounts commands.

Figure 5.8 – 5.13 below show the various components of the Navigation Tab Control.

Figure 5.8: Home Tab Page and its Components
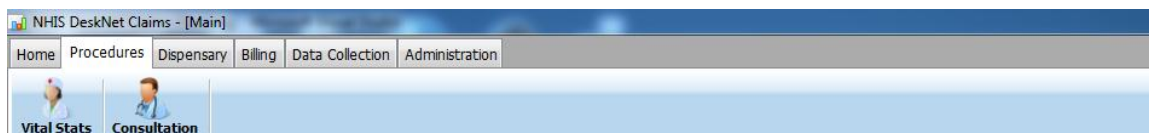
Figure 5.9 : Procedures Tab Page and its Components

Figure 5.10: Dispensary Tab Page and its Component

Figure 5.11: Billing Tab Page and its Components

***Figure 5.12*:** Data Collection Tab Page and its Components

43
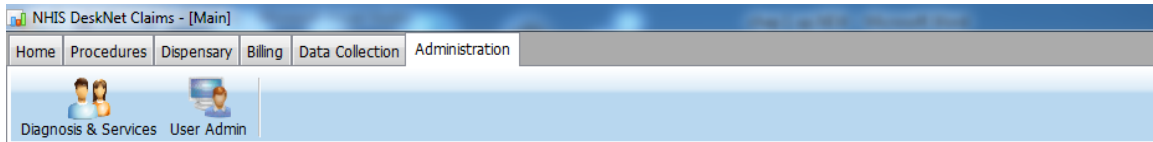
Figure 5.13: Administration Tab Page and its Components

5.4.5   The Common Toolbar

The Common Toolbar comprises of commands issued to perform the various functions of the system. Like any windows' standard toolbar, it is common to almost all said modules.

This toolbar commands function differently in relevance to the module in focus.   The commands include; New, Update, Search, Delete and Print Report. Figure 5.14 shows the Common Toolbar of the developed system.
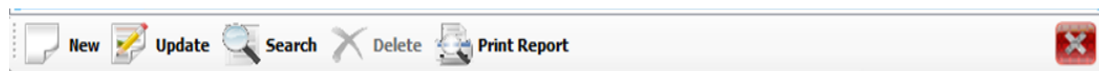
Figure 5.14: The Common Toolbar

5.4.6   The Patients Folder Sub-Module

Patient's module can be accessed from the Patients Folder window which contains all the patients registered into system per the insurance service provider. From this section the hospital's record department can register new patients or search their information. When on this module, clicking *New* button from the ***common toolbar*** will open a blank where the patient's information can be entered. However, by double-clicking of a particular patient's folder will pop-up the full health details for the patient as shown in Figure 5.15 – 5.17.
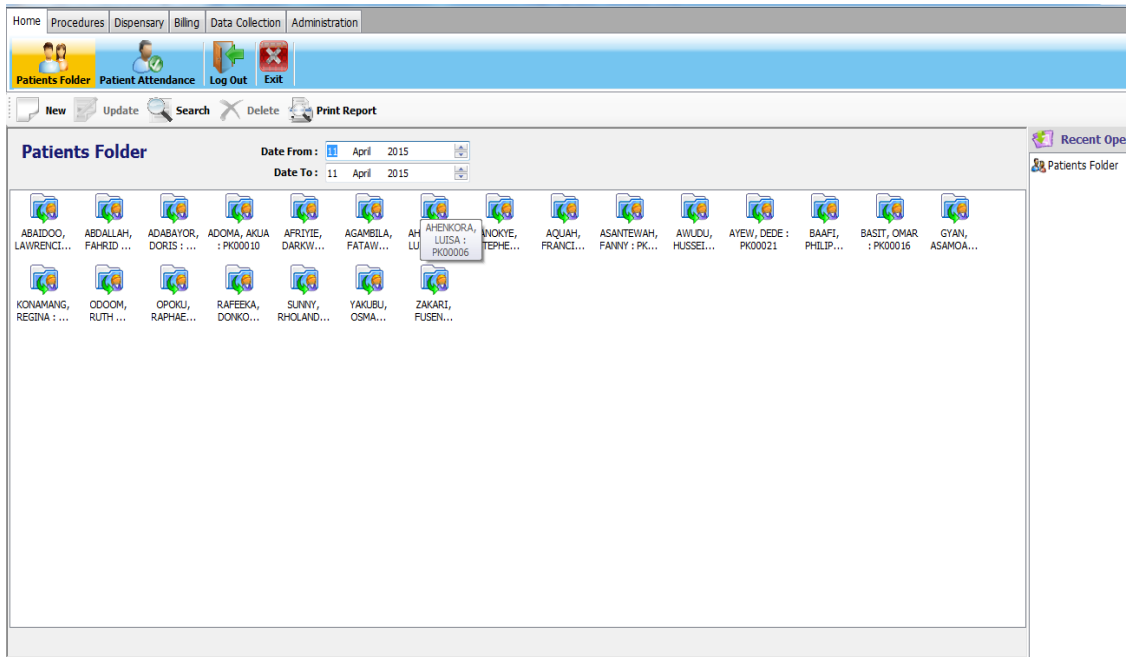
Figure 5.15: Patients Folder Sub-module
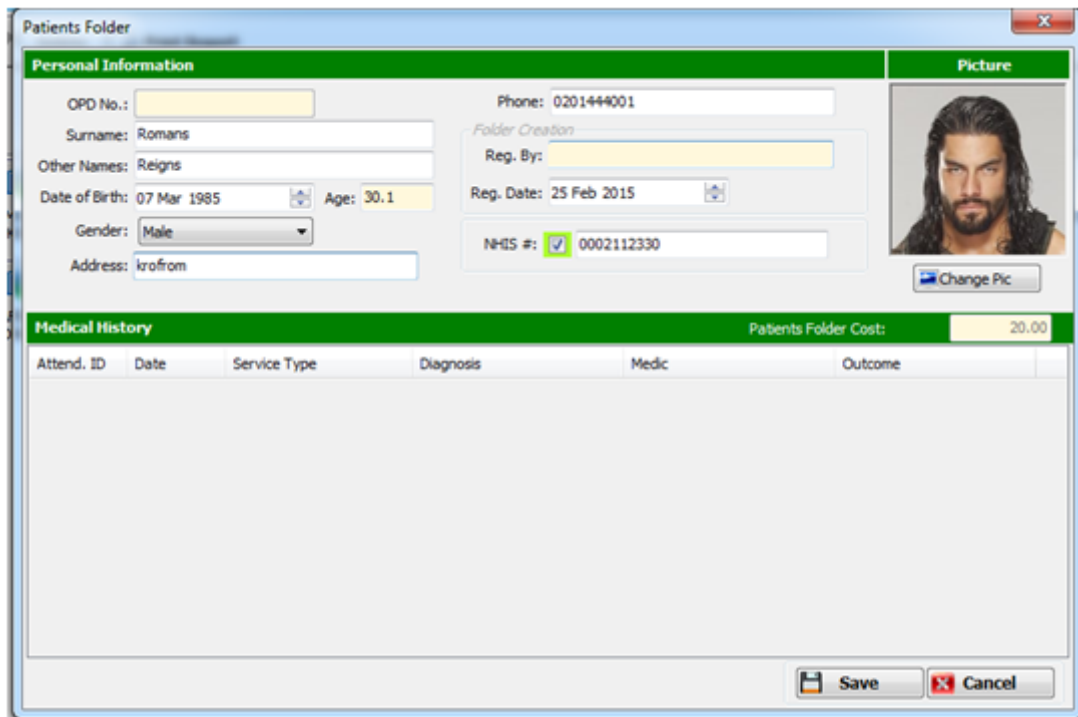
Figure 5.16: New Patient Registration window

Figure 5.17: Registered Patient Folder detail window

5.4.7 Patient Attendance Sub-Module

The Patient Attendance has the record of patient's visits at a particular health insurance service provider centre. Before service can be rendered to a patient, his/her *folder* has to be retrieved and updated with the current visit information. This is done by the provider or hospital's administration or records department. A patient's *folder* here contains the health or medical information of the patient within a particular hospital. If a patient is new or has never visited the said hospital before, a new folder would have to be created. It's only when a patient's attendance record is taken, can he/her be rendered further services. The record staff would have to know and search the patient's OPD number before the record can be saved. Figure 5.18 and 5.19 show the Patient Attendance module.

Figure 5.18: Patient Attendance Sub-module
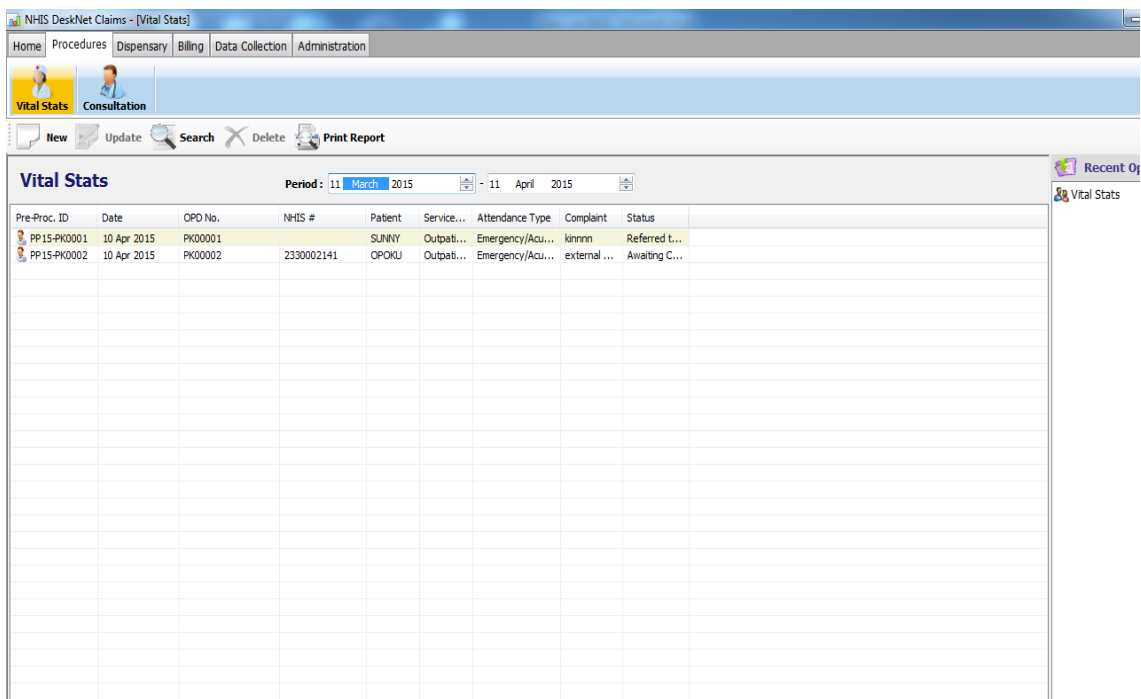
Figure 5.19: Patient Attendance Entry Form

5.4.8 The Vital Stats Sub-Module

The Vital Stats section is a patient ailment complaints are taken in order to determine where he/she has to be referred to. It also helps to decide which a health specialist (special medic) is to help the patient. At this section, some information such as; body temperature and blood pressure level (B.P) as well as the purpose of the patient's visit are gathered before being referred for medical consultation. A patient can also be offered a first aid if required for this section. However, the cost of the given first aid is billing against the patient. For this reason, if the patient is insured (with NHIS card), his/her bill is forward and accumulated to the NHIS Server where the provider may go for the claims payment. On the other hand, if the patient is not insured (without NHIS card), a bill is generated for him/her which has to be paid at the provider's accounts department before being rendered further services. Figure 5.20 and 5.21 show this section.

Figure 5.20: Vital Stats Sub-module

Figure 5.21: Vital Stats Entry Sub-module

5.4.9 Consultation Sub-Module

This sub-module is strictly operated by doctors or qualified health assistants or physicians of a hospital (NHIS health provider). Because the information here is very critical, it require a secured credentials to access this section. The doctor would have to enter the diagnostic detail of the patient and also enter prescription information that may help the patient in treating his/her ailment. Figure 5.22 – 5.23 depict the consultation sub-module.
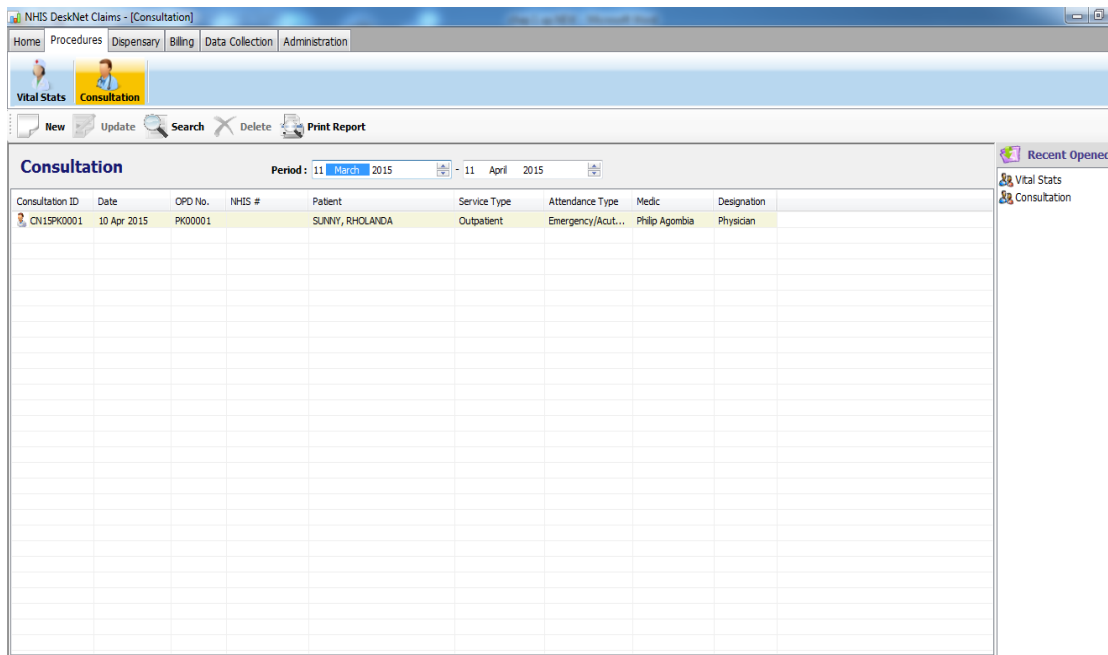
Figure 5.22: Consultation Sub-module
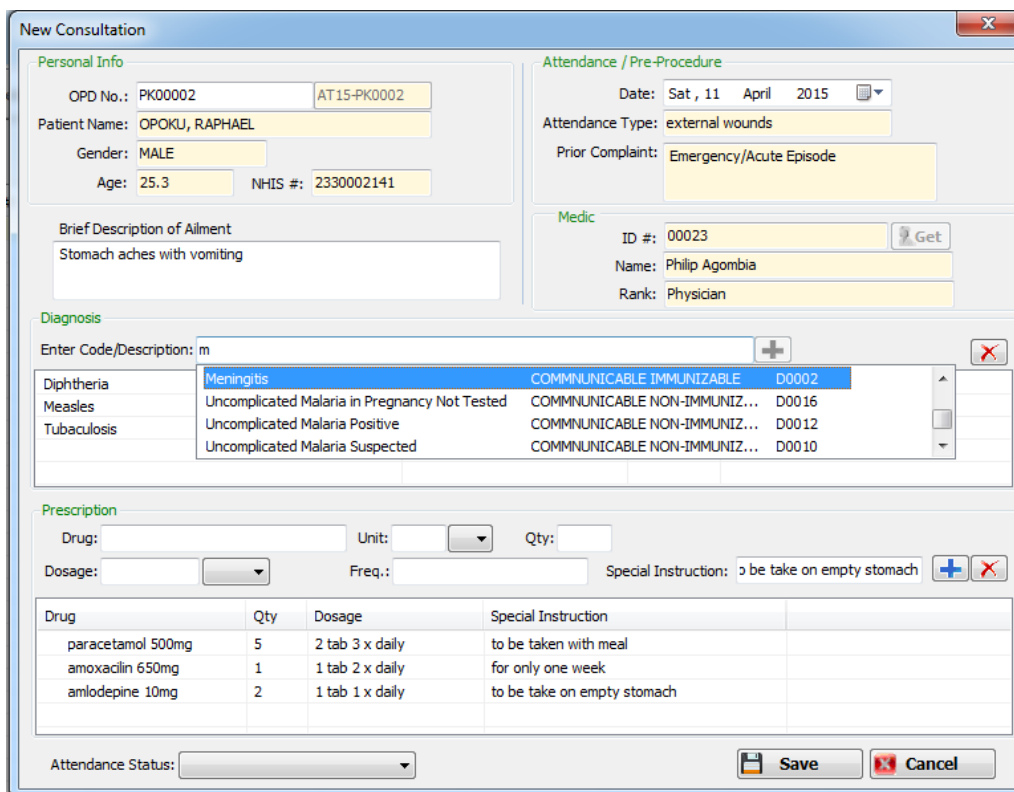
*Figure 5.23***:** Consultation Entry Sub-module

5.4.10 Dispensary Sub-Module

The Dispensary sub-module is where patients receive the supply of drugs as prescribed by the doctor from the consultation sub-module. The dispenser or pharmacist searches the prescription detail by the patient's OPD number and the selected those available within the hospital's stock. Again, if the patient is without health insurance, a billing is generated according to the selected drugs, which is to be paid at the accounts department before being supplied. Else, the cost of the selected drugs is forwarded to the NHIS server on behalf of the hospital. Figure 5.24 – 5.25 depict the dispensary sub-module

Figure 5.24: Dispensary Entry Sub-module

Figure 5.25 Dispensary Entry Sub-module

5.4.11 Patient Invoice Sub-Module

The Patient Invoice sub-module is only accessible by account clerks of the provider hospitals. It has the generated bills of services or sales rendered to patients without health insurance. When such patients are referred here, the account clerks retrieve their according to their OPD number and receives cash before further services or drugs can be supplied to the patient. This sub-module is shown in Figure 5.26 – 5.28

Figure 5.26: Patient Invoice Sub-module

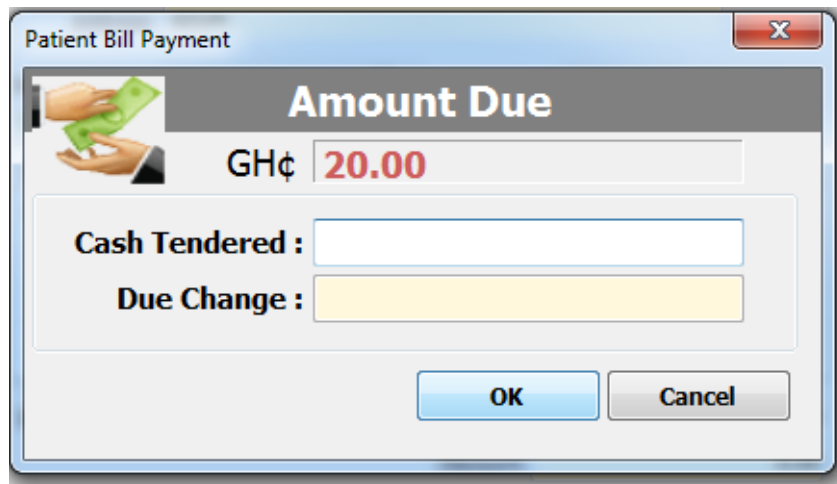*Figure 5.27:* Patient Bill detail

Figure 5.28: Patient Bill Payment

5.5   PROJECT TESTING

5.5.1   Compilation Test

This project was developed stressfully testing along at the sub-modular and modular stages. This was done so in other get ample time to fix some of the unexpected deadlocks and stability problems that only occurred when components were exposed to very high transaction volumes.

5.5.2   Execution Test

This project was possible to be executed successfully because of the trait of diligence taken into account from the scratch coding. By breaking tasks into smaller units, the purpose was able to be achieved onto a successful execution.

5.5.3   Output Test

The successful output screens are placed in the output screens section.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1   INTRODUCTION

This goal of achieving this project's success was not by a mere dreaming. In fact, I have gone through the lot to make this mark.   However, I had to strategize to cope with the circumstances in order to achieve the objective of this project.

Though I can't boast of doing much, I am so pleased to have come this far, because the project has been appreciated by all the technical users and health insurance provider. Besides, these technical users are the ones to receive the bigger thumb-ups.

6.2   CONCLUSION

Single-handling a project, such as this huge health system is first and foremost the first challenge that I can't deny thereof.   As the saying goes, "success cannot be achieved on a silver platter, I never got it easy coming up this level of achievement, however, I can't so much enlighten on complains. As such, one of the greatest challenges was to work all out under the '*dumsor*' era, coupling daily work routines with the deadlines. I would not be counting the broad challenge with the health system in other not to broaden up the threat over my strength.   God being so good I have been able to catch up with most of the objectives though, but not fully as expected.

6.3   RECOMMENDATIONS

I wish to continue working on this project and tackle more aspects of the health system such as admissions etc. Moreover, I would want to incorporate further security functions.

REFERENCES

Daily News. (2007, June 21). A Better Health Care Delivery. *Daily Times*, p. 3.

GHS. (2006). The Need for Affordable and Accessible Health. *Ghana Press House* (p. 3). Accra: Mr Joseph Atkwinson.

Government of Ghana. (2004). NHIS Policy Framework for Ghana. *National Health Insurance Act 2003*, Act 650.

Heizen, N. (2000). Software System Design. In N. Heizen, *Software System Design* (p. 81).

Kierra, T., & Newsome, B. (2012). *Steps Guide - Microsoft Visual Basic 2010.* Ohio: Wrox.

Lovell, S. (1995). Dieter Rams: As Little Design as Possible. Oklahoma: Amazon.

McClobe, S. (2002). *Project Management Concepts.* Oklahoma: Wrox Publishers.

Melberck Publication. (2010). *Microsoft Visual Studio*. Retrieved November 3, 2014, from www.melberckpublications.com/programming/Microsoft_Visual_Studio: http://www.melberckpublications.com/programming/Microsoft_Visual_Studio

Ministry of Health, Ghana. (2007). Independent. *Health Sector Programme of Week (Draft)*, 35.

National Health Insurance Authority. (2008). *NHIS Tarrif and Benefits Package Manual.* Accra: Accra Press.

NHIS Directorate. (2011, February 15). *NHIS accredited institutions.* Retrieved November 1, 2014, from National Health Insurance Scheme of Ghana: www.nhis.gh.com

NHIS Directorate. (2012). *The Challenges Thereof.* Accra: Government Press.

NIIT. (2005). Student Guide Developing Enterprise Wide Application – Part 1 (.NET), Introduction to VB.NET, p. 2A.3, Mastermind Series. NIIT.

NIIT. (2007). Master Mind Series - Developing Enterprise Wide Application – Part 1 (.NET). In *Introduction to VB.NET* (p. 2A. 42). NIIT.

NIIT. (2010). Mastermind Series, Student Guide. In NIIT, Developing Enterprise Wide Application – Part 1 (.NET) - Introduction to VB.NET (p. 133). NIIT.

Reddy, R. M., & Govindarajulu, D. P. (2007). Process Models for Software Architecture. *International Journal of Computer Science and Network Security*, 245.

UK Essays. (2011). *DBMS Gives The User Access Information Technology*. Retrieved January 8, 2015, from UK Essays - Information Technology: http://www.ukessays.com/essays/information-technology/dbms-gives-the-user-access-information-technology-essay.php

Van Kemp, P. (1999). *A Software Engineering Approach.* Stolkholm: UniMark Publisehers.

Ward, K. (2011). *Upgrading to Visual Studio 2010*. Retrieved January 14, 2012, from Visual Studio Magazine: http://visualstudiomagazine.com/articles/2010/06/01/upgrading-to-visual-studio-2010.aspx, [Date Accessed: May, 14, 2014])

APPENDIX A

INSTALLATION GUIDE

In order to enable the system to run successfully, ensure the steps below are followed;

Step 1: .NET and SQL Server Installation and Configuration:

i.   Insert the CD-ROM, browse and open the directory (folder), "*INSTALL FILES*" as shown in figure A1.

ii.   Double-click each of the following files within this directory (as labeled, ***dotNetFx40_Full_x86_x64.exe*** and ***ReportViewer2010.exe***) to install following the install wizard.

iii.   In case the computer being installed on does not have MS SQL Server, then double-click the file ***SQLEXPR_ADV.exe*** to install MS SQL Server 2005 Express edition on your computer. During installation ensure to create a password for the '*sa*' account by selecting mixed mode authentication.
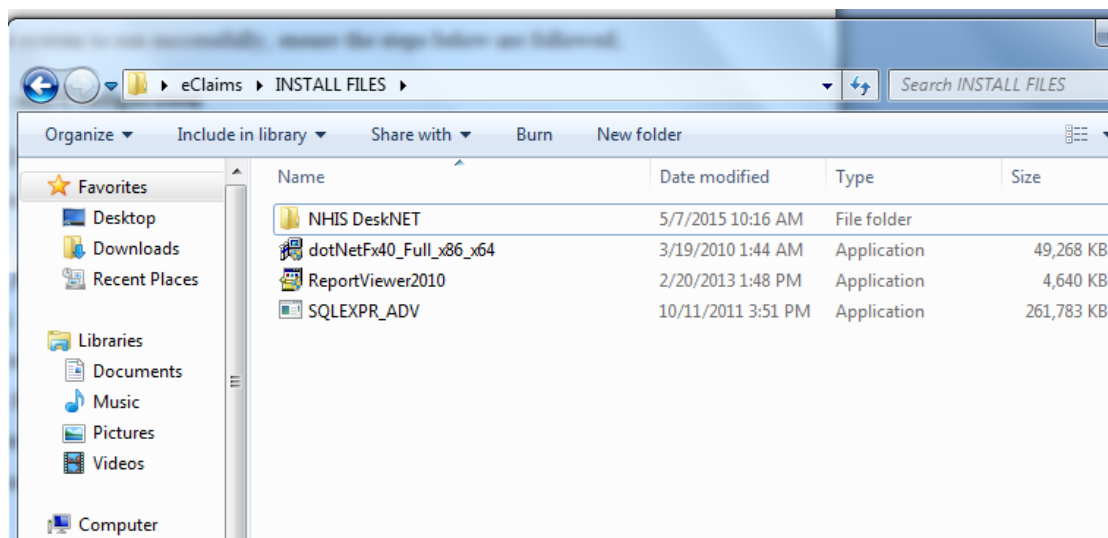

Figure A1   .NET and SQL Server Files

Step 2: The Automated System for National Health Insurance Scheme Installation:

With the CD-ROM inserted into your drive, browser the directory labeled "***NHIS DeskNET***" within the "***INSTALL FILES***" directory as indicated in Figure A2.

Double-click on NHIS DeskNetClaims Installer and follow the installation wizard as shown in Figure A3.
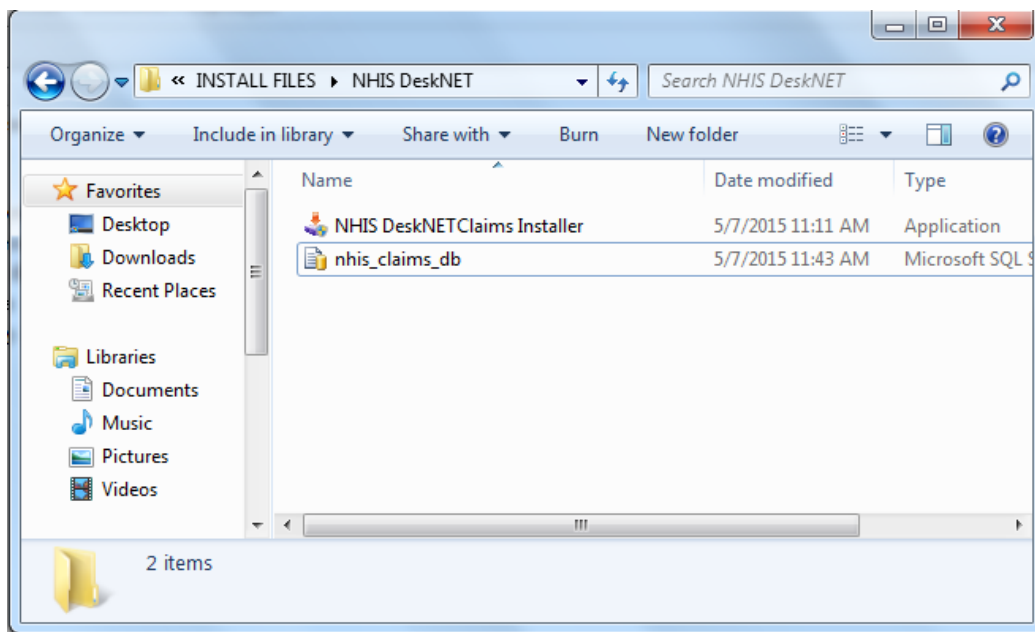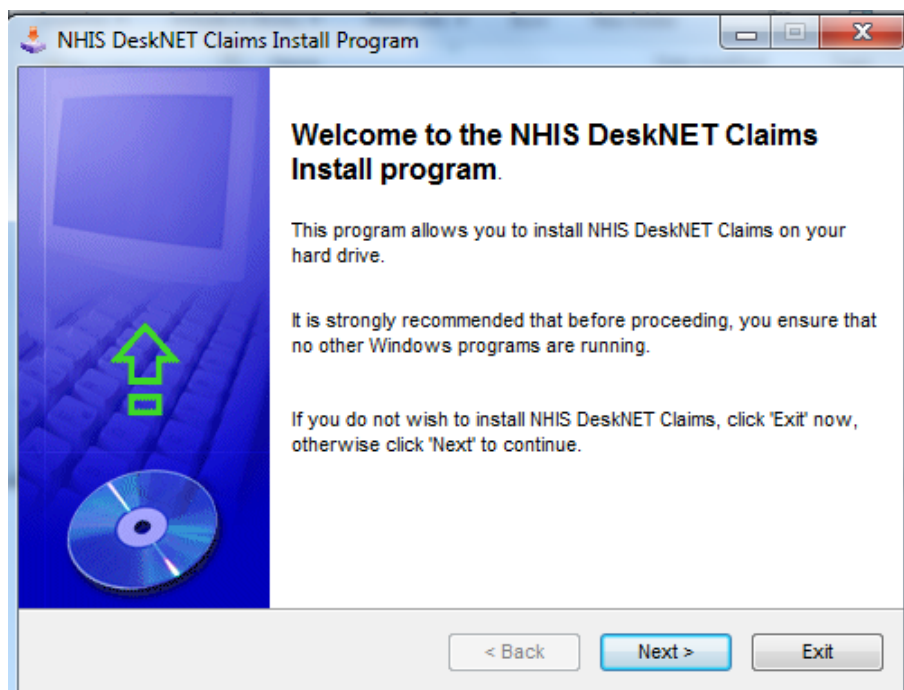

Figure A2 NHIS DeskNET directory

Figure A3 NHIS DeskNET Claims Install Wizard

Step 3:   Initial Configuration.

i.   From the same directory indicated in Step 2, double-click to open the file, "***nhis_claims_db.sql***", which would be opened by Microsoft SQL Management Studio (if not, then open from the Management Studio manually).

ii.   Enter your SQL Server Login and Password and click on Connect button.

iii.   Click on the "Execute" button from SQL Management Studio or press the "F5" key from your keyboard, to execute the database script as shown in Figure A4.
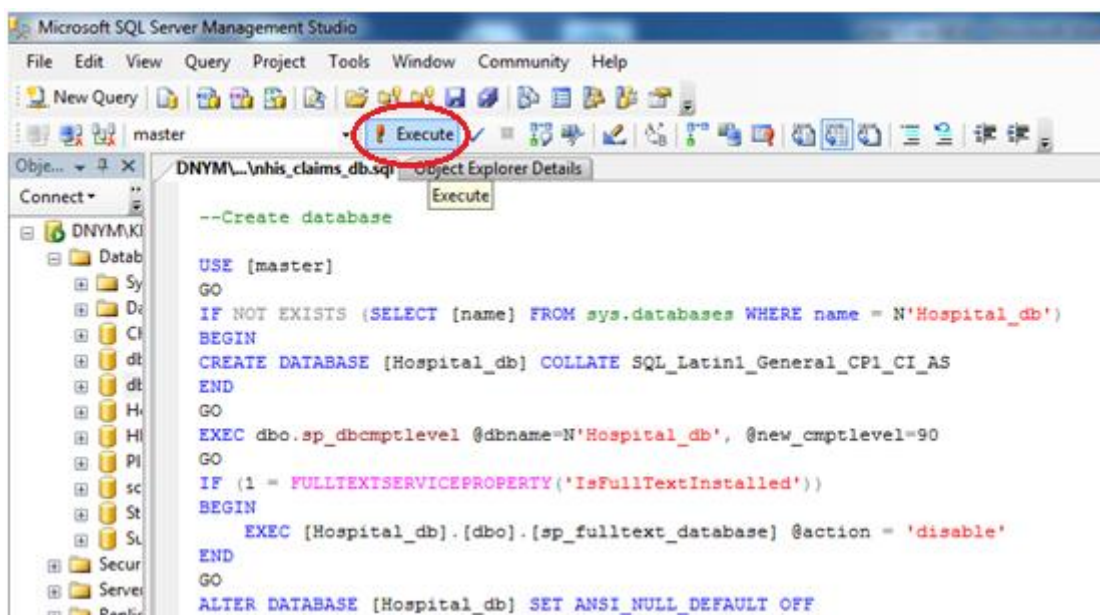

Figure A4   Executing the data script

Step 4:   Database Connection Setup.

i.   Click on Start Menu, then All Programs, then NHIS DeskNet Claims directory, then NHIS DeskNet Claims program. For the first time, the program will pop up with a Database Connection Setup dialog.

ii.   From the Database Connection Setup dialog enter your SQL Server name, User ID (Login name) and Password as shown in Figure A5.

iii.   Click the ***Save*** button as shown in below. The system will automatically restart to check if the connection settings provided was correct.
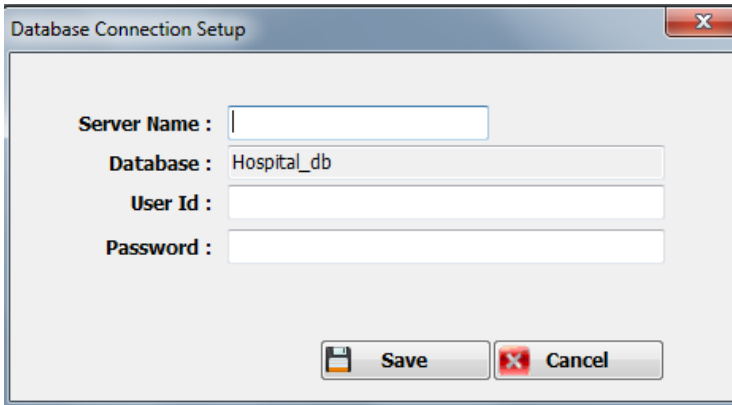
Figure A5 Database Connection Setup

i.   The initial username and password for the system is; "admin", "admin" respectively.

APPENDIX B

USER MANUAL

The main objective of this user manual is to help users of the system get used to the operation

of NHIS DeskNetClaims. It serves as guide for users, as to how to navigate through the basic

modules and component of the system.

1. Run NHIS DeskNetClaims from the Program Menu. The system will load with the
   Welcome Screen as shown in Figure B1.

Figure B1   Welcome screen

2. From the User Authentication screen, enter your username and password in their
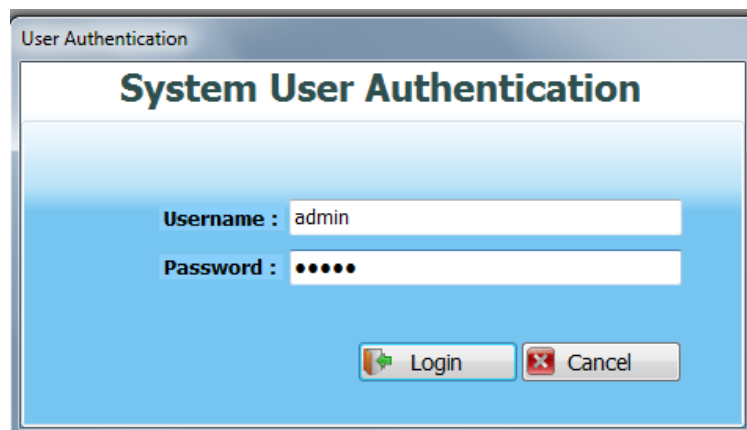   respective fields as shown in Fig B2.

Figure B2   User Authentication Screen

3.   From the Navigation Tab control, click on "*Home*" to make it active.

4.   Click on *Patients Folder* button to open the patient's folder

5.   To register new patient, click on *New* button (which is the first button of the Common Toolbar). This is will open the *New Patient* dialog.

6.   Enter patient information and click on the Save button from this New Patient dialog. These steps are indicated in Figure B3 and B4 below
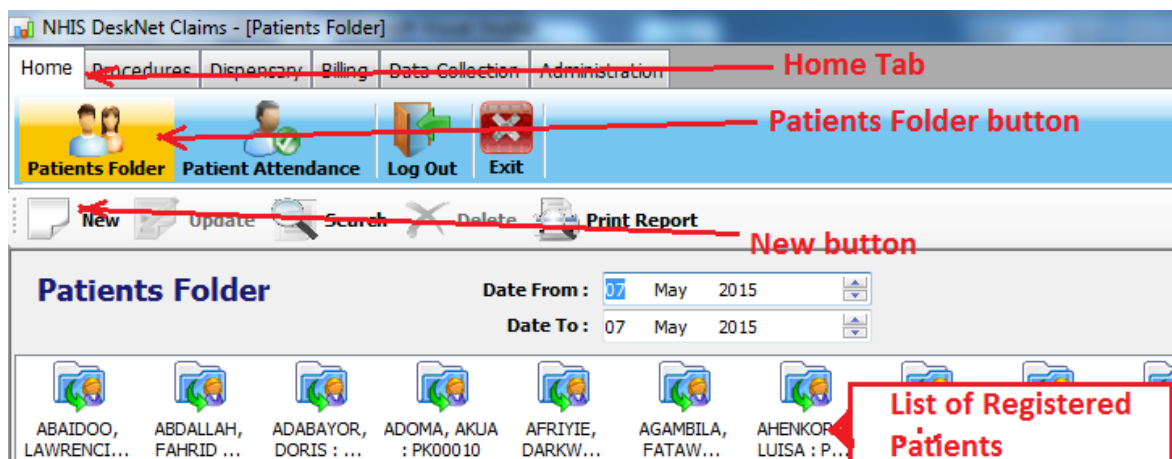

Figure B3   Patient Registration

***Figure B4*:** New Patient dialog

7. To retrieve a registered patient's information, Click ***Search*** and enter the patient's name or OPD number. This will display list of patients whose name of number begin with your keyed in letters as shown in Figure B5. When desired is found, double-click to open detailed.
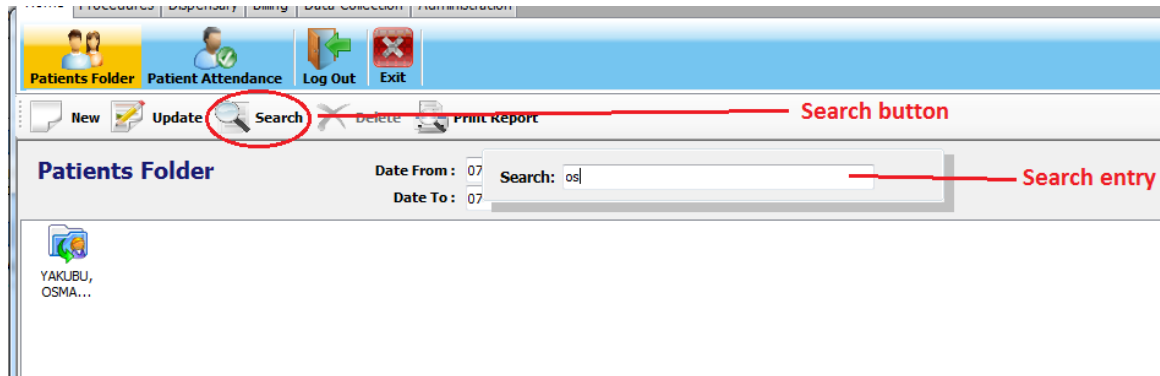

Figure B5 Patient Search