

KAMPALA INTERNATIONAL UNIVERSITY

SCHOOL OF COMPUTER STUDIES

PROJECT TITLE: DESIGN AND IMPLEMENTATION OF A

SECURELY AUTOMATED CENTRALIZED DATA

WAREHOUSE FOR GOVERNMENT

INSTITUTIONS.

CASE STUDY: POSTAL AND TELECOMMUNICATION

SERVICES GOVERNMENT OF

SOUTHERN SUDAN.

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DECLARATION

We Chol John and Kenedy Njogu do hereby declare to the best of our knowledge that this graduation project is our original work and it has never been submitted to any university or any other institution for the award of a Bachelor's Degree in Computer Science and Information Technology.

The literature and citations from other people's work has been duly referenced and acknowledged in the text, footnotes and biography.

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DEDICATION

We thank God Almighty for His never ending mercies and love to have seen us through the challenging college life and His grace which has seen us through and successfully.

Secondly to our parents, namely, Aguto Duom, Brother Mabior Deng Mabior without forgetting my beloved mother Achan Duom Wei, (from Southern Sudan), Yussuf Mugweru and Margret Muthoni (from Kenya) without whom our education would not have been a success. For all the love, understanding, encouragement, material and moral support we appreciate.

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We will not thank enough our parents who toiled for tuition fees and encouraged us throughout our course and have seen to our welfare at university, and for their undivided concern and attention, without which this project would never have made a milestone.

Finally but not least, we return the glory to Almighty God who made everything possible for us.

BLESS THE LORD, O MY SOUL

ALL MY INMOST BEING, BLESS HIS HOLY NAME

AND FORGET NOT ALL HIS BENEFITS.

Abstract

The role of IT in achieving the organization's strategic development goals has been an area of constant debate. This research report describes the experiences of a Postal and Telecom Company, in attempt to achieve strategic development goals through the adoption of IT. The implementation stage of the project involved setting a flexible program me and timescale from the start. Juba Postal and Telecom Company adopted a bottom up approach whereby potential users were consulted and involved in the process. Also the support of top management staff was crucial for the successful transition to the new system. Although there was no single ready-made solution that could fit the organizations requirements, they were able to identify appropriate construction industry software packages and integrate them through development of database system.

This report consists of six chapters as described below;

Chapter one:

Gives the background of the study, It also describes the Juba Postal and Telecom company and activities carried out. The statement of the problem, aim, specific aims justification and significance are also described.

Chapter two:

Highlights views from different scholars and the need for statistical computing.

Chapter three:

Highlights the project methodology. It describes data collection, analysis,

Hardware and software needs for the system implementation including the review of the new system.

Chapter Four

This chapter deals with preliminary design then a detailed design. Where the preliminary design may use the Computer Aided Software Engineering (CASE) tools and detailed design defines requirements for input, processing, storage and output as well as system control and backup. This includes the Conceptual, Logical and Physical modeling of the database.

Chapter Five

This chapter involves converting design specifications from the design phase into executable programs. It involves actual programming by writing codes using a selected programming language. After coding the system, it must be fully tested, after which implementation can take place.

Chapter Six

This chapter discusses on the recommendation on the new system. Looking on summary of the whole project and how the system is able to change according to the changes in environment and need. As it was alighted in the beginning of this project, this study came about as a result of the researcher's observation that there was a problem in carrying out daily operations.

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Chapter One

1.1 INTRODUCTION

The Telecommunications and Postal services is a Government ministry dealing in offering ICT services, and Postal Services to the people of Southern Sudan. According to H.E. Maj. Gen Gier Chuang Aluong, former Minister of Telecommunications and Postal Services, the government of Southern Sudan is committed to facilitating the growth and development of the Telecommunications and Postal sectors thereby ensuring the provision of universal and affordable services to all Southern Sudanese irrespective of ethnicity, gender, class, age, or geographical location.

1.2 BACKGROUND OF THE STUDY

The Telecommunications and Postal service is situated in Juba the capital of Southern Sudan. It deals with licensing of operators, regulation of tariffs, monitoring of Quality of service, printing and sale of stamps, manufacture and allocation of post boxes, the financial service market, enforcement of rules and regulations governing the operators. The ministry IT department, Postal Services department, Finance department, human resource department, telecom department, research, planning, and administration department.

1.3 PROBLEM STATEMENT

The ministry of Telecommunication and Postal services of Southern Sudan keeps its records in a manual filing systems. This causes slow retrieval of data when required. Also, different departments keeps their own records in their different offices, there is no common storage.

There are issues of security for these records like data loss, data anomalies, and physical destruction of files.

1.4 MAIN OBJECTIVE

The main objective of this research is to develop a computer based application that would automate and centralize the management of data and records of The Ministry of Telecommunication and Postal Services Southern Sudan.

1.4.1 SPECIFIC OBJECTIVE

- a) To implement security system for the stored data.

- b) To impose user level restrictions and access rights on who is supposed to access what and do what. That is in terms of data manipulation- adding records, modifying, updating, and deleting and monitoring by use of passwords and event logs.

1.5 SCOPE OF THE STUDY

The project is based on a telecommunication ministry that is involved in offering postal and telecommunications services in the government of Southern Sudan.

The study was carried on ministry's trading sections Registration and licensing of subscribers, regulation of tariffs, monitoring of quality of service, and postal services.

1.6 JUSTIFICATION OF THE STUDY

Information presented electronically can be available at user's convenient time, easy to retrieve in a processed way and easy to understand.

Electronic information can be available in a summarized form, reports produced by the databases for example. The job of summarizing can be done in a simple database query or a single click. The user, making use of information technology, can access the information he or she needs for the prevailing need with electronic information that can be easily shared to the rest of the world for basically sharing, criticism, and support.

1.7 RESEARCH QUESTIONS

- Can implementation of a database driven system improve on the efficiency of the automated Telecom and Postal Services system?
- Is it easy to implement an automated Telecom and Postal Services system that will ease the management of the organization data for easy control and administration?
- Will the implementation of a database link ease the process of updating the database?
- Will the implementation of a new automated Telecom and Postal Services system provides a long term solution to the current problem?

1.8 LIMITATION OF THE PROJECT

- ❖ Withholding of vital information: - The researchers had a challenging moment convincing the staff members of Juba telecom services department, especially the ones in high authority, to avail information that was vital to the research study.

- ❖ Biasness towards the researchers due to inferiority complex from the higher authorities can lead to withholding of vital information by some staff members.

As a result of limited time, lack of enough funds to support the study as a whole, withholding of vital information by the respondents as well as biasness towards the researchers due to inferiority complex from the higher authority; the research study on the department may only solve part of the problem since the researchers are not in a position to identify the problems affecting other departments not under study.

1.9 CONCEPTUAL MODELING

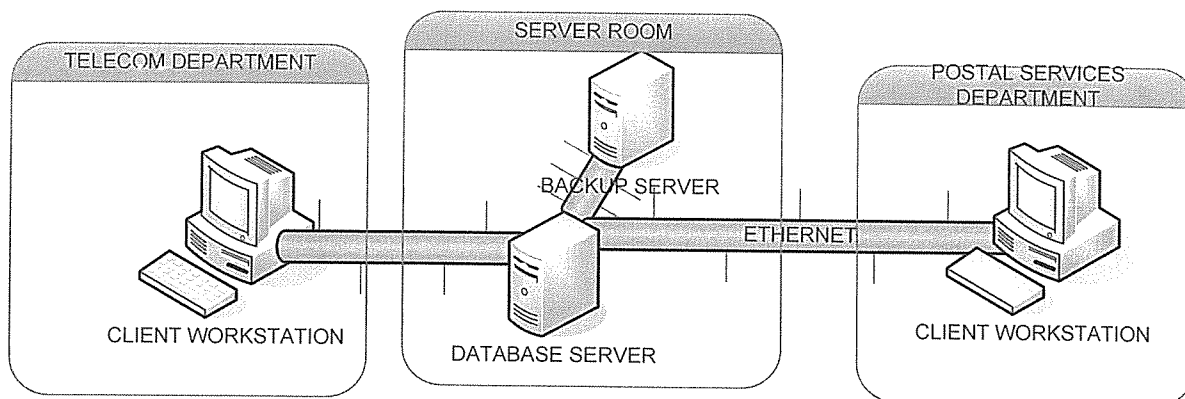


Figure 1: Showing the conceptual model

The servers are running on LINUX operating system and have oracle DBMS installed.

The backup server is to provide redundancy incase the DB server is down the connection remains on.

The client workstations are running on Windows XP operating system and have oracle DBMS installed and application installed which is Microsoft Visual Studio interfacing with the database reside at database server.

A LAN will be configured in the system to enable sharing of data between the departments and accessing the server. It will use TCP/IP protocol for the easy transfer of data from the server.

When a client sends a database request to the server, the server receives and executes SQL statement that is passed to it. The result of SQL statement plus any error condition that are returned are then sent back to the client.

1.10 CONCLUSION

This chapter provides the introduction to the project, the objectives, research questions, and the scope, limitation of the project, justification and conceptual frame work. The next chapter will delve into what other scholars have said or discovered about the field under study that is, literature review.

Chapter Two

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter covers what other scholars have said about the study title. This involved reading what other studies in the same field have revealed and in addition identifies a case that is implemented in reference to the revealed knowledge by previous authors. It also includes the research instruments. Information Technology and information systems have become a vital need for the success of most organizations. Talk of quick and accurate access of data and sharing of data and resources, computers and information technology must be involved.

2.1 INFORMATION SYSTEM

Jeffrey L. Whitten (Lonnie D. Bently, Victor M. Barlow) in the book 'System Analysis and design methods 3rd edition' defines information systems as an arrangement of people, activities, data, networks, and technology that are integrated for the purpose of supporting and improving the day-to-day operations in a business, as well as fulfilling the problem solving and decision making information needs of business managers. While Garry B. Shelly (Thomas J. Cashman, Misty E. Vermaat) in the book 'discovering computers' defines information systems as collection of hardware, software, data, people and procedures that work together to produce quality information.

2.2 MANUAL SYSTEM

A manual system is a set of integrated components that use human effort in each and every step of their activities. Manual systems have computers but they run their activities mostly through human efforts. For example, the employees have to enter data manually in every file and as a result work is slowed down. This manual system also leads to data duplication and inconsistency (Garcia-Molina, 2000).

2.3 AUTOMATION OF WORK

Steven Alter defines automation of work as the use of machines to perform tasks that people would otherwise do.

2.3.1 Report generation

Reports are used to display results. They are used for output that will be distributed or stored in paper form. They are also used to present summarized data. A report can easily handle multiple pages of output and it can also combine both detailed and summary data. A database system has the capabilities to generate reports whenever they are needed (Ramakrishna and Gehrke, 2000).

2.4 OPERATING SYSTEM

2.4.1 WINDOWS SERVER 2003

Windows Server 2003 (also referred to as Win2K3) is a server operating system produced by Microsoft, introduced on 24 April 2003. An updated version, Windows Server 2003 R2, was released to manufacturing on 6 December 2005. Its successor, Windows Server 2008, was released on 4 February 2008.

According to Microsoft, Windows Server 2003 is more scalable and delivers better performance than its predecessor, Windows 2000.

2.4.2 WINDOWS XP

In 2001, Microsoft released Windows XP (code named "Whistler"). The merging of the Windows NT/2000 and Windows 95/98/Me lines was finally achieved with Windows XP. Windows XP uses the Windows NT 5.1 kernel, marking the entrance of the Windows NT core to the consumer market, to replace the aging 16/32-bit branch. The initial release met with considerable criticism, particularly in the area of security, leading to the release of three major Service Packs. Windows XP SP1 was released in September 2002, SP2 came out in August 2004 and SP3 came out in April 2008. Service Pack 2 provided significant improvements and encouraged widespread adoption of XP among both home and business users. Windows XP

lasted longer as Microsoft's flagship operation system than any other version of Windows, from 2001 to January 30, 2007, when it was succeeded by Windows Vista.

2.4.2.1 Service pack 3

Windows XP Service Pack 3 (SP3) was released to manufacturing on April 21, 2008¹, and to the public via both the Microsoft Download Center and Windows Update on May 6, 2008. Service packs are the means by which product updates are distributed. Service packs may contain updates for system reliability, program compatibility, security, and more.

2.5 DATABASE

A database is a shared collection of related data designed to meet the information needs of the organization.

A **database** consists of an organized collection of data for one or more uses, typically in digital form. One way of classifying databases involves the type of their contents, for example: bibliographic, document-text, statistical. Digital databases are managed using database management systems, which store database contents, allowing data creation and maintenance, and search and other access.

A collection of data stored in a standardized format, designed to be shared by multiple users. (Database Management systems, Jerry Post 2001)

2.5.1 Centralized Databases

With a centralized database, all data are located at a single site. Users at remote sites may generally access the database using data communications facilities. They provide greater control over accessing and updating data than distributed databases but they are more vulnerable to failure since they depend on the availability of the resources at the central site.

¹ Window X service pack3 (SP3) was released to manufacturing on April 2008.

2.6 DBMS

Software that defines a database, stores the data, supports a query language, produces reports, and creates data entry screens. (Jerry Post 2001) Kroenke, D (2000) defines a database to be self describing. It contains, in addition to the users' source data, a description of its own structure. This description is called data dictionary (also called data directory or metadata). This promotes data independence, that is, it makes possible to determine the structure and content of the database by examining the database itself. If we change the structure of the data in the database, we enter only that change in the data dictionary. Those programs that process the altered data items must be changed.

He added on by saying that a database is a collection of integrated records. Bits are aggregated into bytes or characters, characters are aggregated into fields, fields are aggregated into records and records are aggregated into files. A database does include files of user data as well as a description of itself in metadata, indexes that are used to represent relationships among the data and also to improve the performance of database application and the data about the applications that use the database.

In addition to above, Fred, R and Jeffrey, A (1994) bring to our knowledge different types of databases.

2.6.1 Oracle

The Oracle Database (commonly referred to as Oracle RDBMS or simply as Oracle) is a relational database management system (RDBMS) produced and marketed by Oracle Corporation. As of 2010, Oracle has achieved a major presence in database computing for many years.

2.6.2 SQL*NET

This is an oracle tool that functions as the on-ramp to the database information superhighway. It facilitates the sharing of data between databases, even if those databases are on different types of servers running different operating systems and communication protocols. It also allows for client-server applications to be created; the server can then function primarily for database I/O, while the CPU requirements of an application can be moved to the front-end client machines (Kevin Looney).

2.6.3 Client-Server

Using client-server configuration allows work-load to be distributed between two machines. The first, called client supports the application that initiates the request from the database. The

back-end machine on which the database resides is called the server. The client bears most of the CPU workload, while the database server is dedicated to supporting queries, not application. When the client sends a database request to the server, the server receives and executes the SQL statement that is passed to it. The results of the SQL statement, plus any error conditions that are returned, are then sent back to the client (Kevin Looney, 1999).

2.7 DATAWAREHOUSE

A data warehouse (DW) is a database used for reporting. The data is offloaded from the operational systems for reporting. The data may pass through an Operational Data Store (ODS) for additional operations before it is used in the DW for reporting.

A data warehouse maintains its functions in three layers namely: staging, integration and access. A principle in data warehousing is that there is a place for each needed function in the DW. The functions are in the DW to meet the users' reporting needs. **Staging** is used to store raw data for use by developers (analysis and support). The **integration** layer is used to integrate data and to have a level of abstraction from users. The **access** layer is for getting data out for users.

This definition of the data warehouse focuses on data storage. The main source of the data is cleaned, transformed, catalogued and made available for use by managers and other business professionals for data mining, online analytical processing, market research and decision support (Marakas & O'Brien 2009). However, the means to retrieve and analyze data, to extract, transform and load data, and to manage the data dictionary are also considered essential components of a data warehousing system. Many references to data warehousing use this broader context. Thus, an expanded definition for data warehousing includes business intelligence tools, tools to extract, transform and load data into the repository, and tools to manage and retrieve metadata.

2.7.1 Advantages of Data Warehouse

1. **Increase Success Rate** through integrated requirements traceability and multiple data source analysis.
2. **Enables Strategic Information** to be consistently and accurately derived from operational (and external) data.
3. **Facilitates Impact Analysis** by linking strategic requirements to data models and designs of operational data sources.

4. **Visual Analysis of Transformation Process** to design the data extraction from the best of all redundant data sources.
5. **Supports Data Mart Integration** allowing phased, cost-effective Data Warehouse development.
6. **Database Creation** for all the major data warehouse “engines,” with reverse engineering from almost any DBMS.
7. **Supports Star and Snowflake Schema** allowing for optimized end user business query and reporting access, and improved query performance.

2.7.2 Architecture of data warehouse

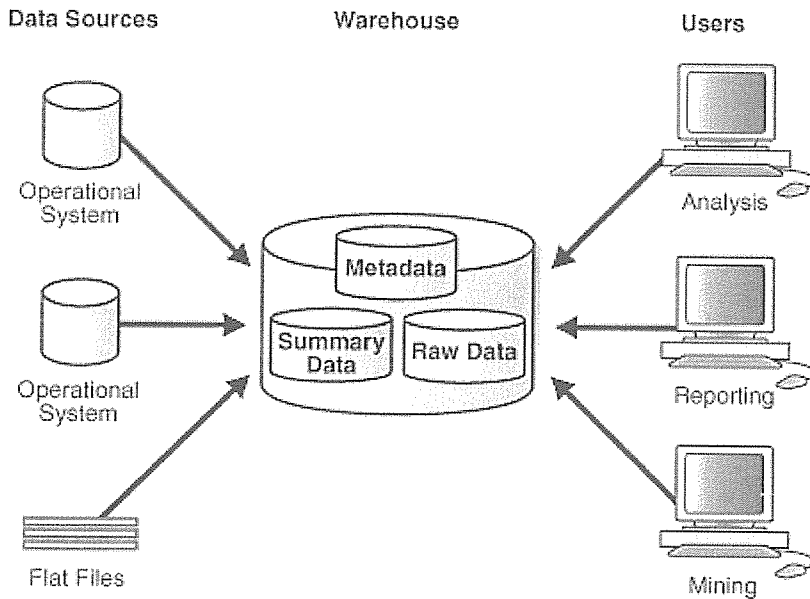


Figure 2: showing data warehouse architecture

2.8 TCP/IP

The **Transmission Control Protocol (TCP)** is one of the core protocols of the Internet Protocol Suite. TCP is one of the two original components of the suite, complementing the Internet Protocol (IP), and therefore the entire suite is commonly referred to as *TCP/IP*. TCP provides the service of exchanging data directly between two network hosts, whereas IP handles addressing and routing message across one or more networks. In particular, TCP provides reliable, ordered delivery of a stream of bytes from a program on one computer to another program on another computer. TCP is the protocol that major Internet applications rely on, applications such as the World Wide Web, e-mail, and file transfer.

2.9 COMPUTER SYSTEM

A computer system is a collection of input devices such as keyboard, mouse, output devices like printers and monitors, processing devices like the CPU and storage/memory devices like hard disk.

2.10 VISUAL STUDIO 2005

Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft. It can be used to develop console and graphical user interface applications along with Windows Forms applications, web sites, web applications, and web services in both native code together with managed code for all platforms supported by Microsoft Windows, Windows Mobile, Windows CE, .NET Framework, .NET Compact Framework and Microsoft Silver light.

Visual Studio includes a code editor supporting IntelliSense as well as code refectory. The integrated debugger works both as a source-level debugger and a machine-level debugger. Other built-in tools include a forms designer for building GUI applications, web designer, class designer, and database schema designer. It accepts plug-ins that enhance the functionality at almost every level—including adding support for source-control systems (like Subversion and Visual SourceSafe) and adding new toolsets like editors and visual designers for domain-specific languages or toolsets for other aspects of the software development lifecycle (like the Team Foundation Server client: Team Explorer).

2.11 GRAPHICAL USER INTERFACE

A **graphical user interface (GUI)**, often pronounced *gooey*, is a type of user interface that allows users to interact with programs in more ways than typing .A *GUI* offers graphical icons, and visual indicators, as opposed to text-based interfaces, typed command labels or text navigation to fully represent the information and actions available to a user. The actions are usually performed through direct manipulation of the graphical elements.

2.12 DEVELOPMENT METHODOLOGY

To ensure the success of a given organization, there is need of an information system that will handle all the needs of the users efficiently and effectively.

According to Kroenke, D (2000), an information system is an arrangement of people, data, processes, information presentation and information technology that interact to support and

improve day to day operations in a business as well as support the problem solving and decision making needs of management and users.

2.13 CONCLUSION

This chapter will deal with issues related to the subject under study and the tools that were used. The next chapter will mainly cover the analysis of the current system and the proposed system. It will answer the questions on how the problem was going to be solved.

Chapter Three

METHODOLOGY

3.1 INTRODUCTION

An information system plan is a roadmap indicating the direction of systems development, the rationale, the current situation, the management strategy, the implementation plan and the budget. Once the researchers selected a strategic plan and the systems area, information systems plan contains statement of corporate goals and specifies how information technology supports the attainment of those goals. Deciding the kind of system to be designed is an essential component of the industry planning process. Data collected for analysis was:

- ❖ Problems that are currently being faced in the telecom services system which is a manual system.
- ❖ Comments from the directors and staff members on how the old system was and what they are expecting from the new system.

3.2 TARGET POPULATION

The data collection technique targeted the members of the board of directors, staff and clients of postal and telecommunication services, government of Southern.

3.3 SAMPLING STRATEGIES

An interview was done for a few experienced selected individuals involved in telecommunications and Postal services hoping to extract more information from them about the system. They were expected to give information concerning telecommunications and Postal services procedure, information required in the whole process, and challenges expected during the initial phases of the project. This was used to gather specific as well as general opinion of the people regarding the existing system.

3.4 RESEARCH PROCEDURE

Firstly, a letter of introduction was secured from the faculty, which enabled traveling to the ministry of telecommunications and Postal services for the purpose of research. Schedules were drawn for collecting data from the ministry, so as not to disrupt normal work.

Staffs, directors, and other parties involved were observed, in interaction with clients, with the intention of knowing what information that is always required and could be computerized.

3.5 ANALYSIS

Analysis of the data involved analyzing of the interview and questionnaire documents.

Data analysis involved careful study of data for relevant documents such as interviews forms, and questionnaires.

3.6 DATA COLLECTION TECHNIQUES

In developing of the system there were a number of procedures and tools that were applied which included the software development tools which are all dependent on the experience of the researchers in regard to that particular area. The research started with data collection by reading the previous documents on how telecom services are carried out in the ministry. Thereafter the researcher collected data from ministry staff members, clients and advice from government sales and auditors and also other interested parties; this was done by the use of questionnaires, interview and observations.

3.6.1 Interviews

This is a fact finding technique that can allow the evaluation team to capture the perspective of the project participants, staff and others associated with the project. There are two types of interviews.

- Unstructured interviews

These were conducted with only a general goal or subject in mind and with few, if any, specific questions. The interviewer did count on the interviewee to provide a framework and directed the conversation.

This type of interview frequently gets off the track and the analyst prepares to redirect the interviewee back to the main goal or subject. For this reason, the unstructured interviews don't usually work well for systems analysis and design.

1. Structured interviews

The interviewer has a specific set of questions to ask the interviewee. Depending on the interviewee's responses, the interviewer has a direct additional question that can obtain clarification or amplification. Some of these questions are planned and others are spontaneous.

Types of Questions

- Open ended questions: allows the interviewee to respond in any way that seems appropriate.

- Closed-ended questions: restricts answers to either specific choices or short, direct responses.

Advantages of Structured interview

- It permits face to face interaction.
- It yields the richest form of data, details and insights.
- Enables the interviewer to probe for more feedback from the interviewee if the answer given seems not to be clear.
- Enables the interviewer to rephrase question to each other individual who is interviewed.
- It allows observation of non-verbal communication and study attitudes.

3.6.2 Questionnaires

These are set of documents with questions that can be sent out to respondents. Questionnaires are useful in gathering information from large number of people where an interviewer cannot get around with interviewing everyone. Questionnaires also yield more information and respondents remain anonymous. However this case study questionnaire was used as one of the fact finding tool because they are answered quickly by respondents who completes and returns questionnaires at their convenience and also the responses are quickly tabulated and analyzed.

3.6.3 Observation

This is a data collection technique whereby the researcher observes the events in the actual work place.

This fact finding technique enables the researcher obtain information that cannot be obtained with other techniques because it uses first hand information about how activities are carried out , it is time consuming because the researcher has to watch and it is well known people do not like being observed. This technique is often used when the validity of data collected through other methods is in question or when the complexity of certain aspects of the system prevents a clear explanation by the end-users.

The following points have to be kept into consideration.

- Determining who to observe.
- Establishing objectives of the observation.
- Preparing for the observation.
- Conducting the observation.
- Documenting the observation.
- Evaluating the observation.

This method also is not prone to unreliable feedbacks since the researcher gets first hand information to determine user requirements.

Advantages of observation include:

- Does not disrupt work.
- It's a method that protects confidential information process of the organization.
- It is applied to any type of population.
- Sometimes observations are carried out to check the validity of data obtained directly from individuals.
- The system analyst is able to see exactly what is being done. Complex tasks are sometimes difficult to clearly explain in words.
- Through observation, the analyst can identify tasks that has been missed or inaccurately described by other fact finding techniques.
- Observation is relatively inexpensive compared with other fact-finding techniques.
- Observation allows the systems analyst to do work measurements.

Disadvantages of Observation include:

- People are not comfortable while using the method
- Not all events were observable
- Employees tend to behave differently when they are being observed.

3.6.4 Document analysis

This method involved review of existing reports and documents to identify controls to understand the business or processes and provide evidence.

Types of documents review

- Public records are materials created and kept for the purpose of attesting to an event or providing an accounting. Public records can be collected from outside (external) or within (internal) the setting in which the evaluation is taking place and they can be helpful in better understanding the project participants and making comparisons between groups/communities.
- Personal Documents are first-person accounts of events and experiences. These “documents of life” include diaries, portfolios, photographs, artwork, schedules, scrapbooks, poetry, and letters to the papers. Personal documents can help the evaluator understand how the participant sees the world and what she or he wants to communicate to an audience.

Advantages of Document review

- It is an inexpensive way of acquiring information
- It is easily available depending on the document one needs.
- It provided opportunity for study of trends of events over time.
- Data collected was highly qualified, valid, available and reliable.
- It was used to find out the historical trends of events that seem impossible with other data collection methods.
- It is a strong base to build a question such as a reference.

3.7 DATA COLLECTION AND PRESENTATION

The method and instrument used to collect data largely determined the objectives of the project and the nature of the research undertaken. Consequently, in order to capture the appropriate requirements, various techniques in data collection were used in radical Business Process Reengineering (BPR) approaches. The qualitative and data sources included interviews and questionnaires, documents of the existing system, observation and secondary sources of data. Data collection involved reviewing primary and secondary sources including subscriber's registration and postal report to determine requirements for the new telecom and postal services system. This includes reviewing and determining as much relevant information regarding the ministry objectives, employees' requirement (liaison officer) and the system requirements. Through the process of gathering data emphasis was given on confidentiality as a top priority in order to elicit the support and cooperation of the respondents.

3.8 DATA ANALYSIS AND ANALYSIS OF USER REQUIREMENTS

The data collected was checked, coded and edited, tables were drawn and data entry necessary forms designed and relations established. The queries formulated; all the schematic representation of the databases were developed beforehand to allow comparison identifications.

3.9 SYSTEM DEVELOPMENT METHODOLOGY

The project followed the four fundamental phases of the system development life cycle (SLDC) namely planning, analysis, design and implementation.

Planning, The scope and boundaries of the problems identified and plan development strategy and goals, a feasibility study were conducted.

Analysis, Problems, their cause and effect were analyzed. The requirements were also analyzed and a set of analysis models built from the gathered information.

Design, here the actual physical design of the solution was developed. The architecture design, interface design and database design produced.

Implementation, The prototype of the system will be tested to ensure it performs as expected. An implementation plan will also be developed.

The application was developed using VB.Net software and oracle database management system and windows XP operating system and Ms Word software would be used to process the whole project report.

3.10 DEVELOPMENT TOOLS

3.10.1 DBMS

- DBMS (Database management systems) is software that enables the users define create and maintain database and also provide controlled access to the databases.

A database is a collection of related data designed to meet the information needs of the organization.

However this system must have a database in which all the data would be captured and stored in the main server and later retrieved at the industry.

3.10.2 Operating system

An operating system (OS) is an interface between hardware and user which is responsible for the management and coordination of activities and the sharing of the resources of a computer, that acts as a host for computing applications run on the machine.

Users may also interact with the operating system with some kind of software user interface like typing commands by using command line interface (CLI) or using a graphical user interface. For hand-held and desktop computers, the user interface is generally considered part of the operating system.

A strong anti-virus would be installed into the machines to prevent them from virus attacks and collapsing most of the time hence losing data and relevant information.

3.10.3 Programming language

In our system we used VB.Net programming language because it supports user interface which is the essential part for the development of this system.

3.10.4 Project plan schedule

There are several project plans method but for this project a Gantt chart was used. A Gantt chart was used to list activities and their relationships among different activities. It can also be used to show the events and the interdependencies among activities. A schedule was drafted using a Gantt chart to show activities and respective dates.

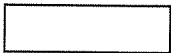
The advantage of Gantt charts are their simplicity and linearity. The researcher can visually perceive the length of each activity. Another advantage is that the researcher can easily see the interdependence among the activities so that possible bottlenecks and alternative path to an event can easily be visualized.

GANTT CHART

ID	Task name	August	September	October	November	December
1	Project plan	<div></div>				
2	Analysis		<div></div>			
3	Design			<div></div>		
4	Implementation				<div></div>	

Table 1: showing GANTT CHART

Legend



3.11.4 Risk assessment

Here we assessed on the probability of the successful implementation of the system using the available technology.

However lack of knowledge about the application area lead to delays in completing the project, there is need to read and understand the application area and relevant sources.

Lack of familiarity with development tools will lead to delays in completing the programming tasks which is needed to upfront training in these tools.

The different phases of the SDLC are not easy to manage; implementation will take long followed by design, then analysis and planning.

Designing good questionnaires and interview questions cannot be underestimated; ample time is needed to be taken when designing good questionnaires.

3.12 CONCLUSION

This chapter mainly deals with the fact-finding methods and the scope at which the research will concentrate on. The user, system, functional and non-functional requirements are as well identified. The next chapter will mainly cover the design of the proposed system.

Chapter Four

SYSTEMS ANALYSIS AND DESIGN

4.0 INTRODUCTION

This chapter deals with preliminary design than a detailed design. Where the preliminary design may use the Computer Aided Software Engineering (CASE) tools and detailed design defines requirements for input, processing, storage and output as well as system control and backup. This includes the Conceptual, Logical and Physical modeling of the database.

4.1 SYSTEMS ANALYSIS

Systems analysis is a problem-solving technique that decomposes a system into its component pieces for the purpose of studying how well those component parts work and interact to accomplish their purpose. It is driven by the business concerns of system owners and system users. Hence, it addresses the Data, Process and interface building blocks from system owners' and system users' perspectives.

System analysis was part of preliminary investigation of the previous system. A detailed study of the previous system was done in order to find out: -

- 1) The challenges of that system.
- 2) The user requirements.
- 3) The inputs to the system.
- 4) The outputs generated.

Advantages of System Analysis:

- 1) Helped in pinpointing the problem.
- 2) Helped in setting system goals.
- 3) Helped to determine the boundary of the project by taking into consideration the limitations of the available resources.

4.1.1 Investigation

An investigation was carried out to establish how the existing system functions and what its problems were. This led to a definition of a set of options from which the users could choose their required system. In carrying out an investigation, information about the current system

was collected and by recording the problems and requirements described by the users of the current system, a picture of the required system was build.

To help in investigation, the following fact finding techniques were used:

INTERVIEWS

Table 2: Investigation table

INTERVIEW GUIDE		
Interviewees: Postal and telecom services Employees		
Subject: Postal and telecom Services System		
Time Allocated	Interviewer Question or Objective	Interviewee Response
1 to 2 min	Objectives Open the interview -introduce the research team -thank the interviewee for their time -State the purpose of the interview	
5 min	Question 1 What is the current procedure used in getting customer details? What details are take at that time?	
5 min	Question 2 How Long does a customer wait before being served? Approximately how long does it take to get all the information from the customer?	
5 min	Question3 What can you say about the current subscribers' registration process?	
3 min	Question4 Approximately how long does it take to come up with	

	urgently needed information from your files?	
5 min	Question 5 How do you feel about the current system? Do you find any problems in using the current system? If yes, name them.	
5 min	Question 6 What improvements would you like in the new system?	
5 min	Question 7 What do you think about development and implementation of a computerized system?	
1 min	Objective Conclude the interview: thank the interviewee	
General Comments and Notes		

Interview with a few clients.

Question asked:

How would you rate the services offered by the ministry of telecommunication and postal services GOSS?

Can you make a suggestion of any improvements you feel should be made on the postal and telecom system?

Anything more the client would wish to add to improve the efficiency of the current sale service system.

DOCUMENT REVIEW

The researcher will review some documents in the ministry to find out the trends in registration processes, the structure of invoices and reports among other things

First, the systems analyst would want to trace the history that leads to the project. To accomplish this, the analyst will collect and review the documents that describe the problem. These included:

- Interoffice memoranda, studies, minutes, suggestion box notes, customer complaints and reports that document the problem area.

- Registration records, performance reviews, work measurement reviews and other scheduled operating reports.

In addition to documents that describe the problem, the researcher will also review the documents that described the operations of telecommunication and postal services GOSS. These documents included:

- The ministry's mission statement and strategic plan.
- Formal objectives for the telecommunication and postal services GOSS ministry.
- Policy manuals that may place constraints on any proposed system.
- Yearly and monthly reports of registration.
- Invoices.
- Receipts books.

OBSERVATION.

The researcher spent sometimes in the ministry of telecommunication and postal services GOSS, observing all the activities that went on and studying how processes were being carried out.

4.1.2 Conclusions

Several major problems are identified with the current system as stated below:

It is difficult to keep track of the ministry' operations due to the large amount of paperwork involved. This can be proved by the long period of time it takes to come up with the reports that shows the ministry's income and expenses for a given period of time.

Because of the vast amount of paperwork that mostly involves numerical figures; the reports produced are mostly inconsistent and inaccurate due to human error.

The working environment is not conducive for the employees in the ministry due to many file cabinets that occupies a lot of space causing congestion.

Paper documents (records) can be easily destroyed or misplaced and in most cases there is normally no backup for the documents which means that there is a risk for loss of important information.

It takes time to come up with urgently needed information due to the type of filing system that is being used. This led to unnecessary delays.

4.1.3 Recommendation (Proposed System)

After analyzing the current system and in order to improve the current situations caused by the current system, considerations should be made to implement a secure automated centralized computerized data warehouse. This will increase the ministry's performance by improving the quality of service, security and redundancy of data and, utilization of resources (including people), faster access to management information and reduction of expenditure.

4.1.4 Requirements of the Proposed System

After data collection and analyzing, the researcher is to come up with the requirements of the new system. The system, after completion is expected to:

- 1) Expedite the processing of registration through improved data capture technology.
- 2) Keep track of registered telecommunication companies and radios operators in Southern Sudan.
- 3) Improve data availability through the implementation of RAID 1 technology.
- 4) Enhance security through implementation of check point firewalls.
- 5) Allow concurrency access to data from a central location.
- 6) Improve client registration and management.
- 7) Create an account for every one of the ministry's clients.
- 8) The system should determine which contract has expired and send notifications.
- 9) Keep track of the postal items such as parcel, mails made by the customers (pending, in-progress, completed) and of deliveries made to customers.
- 10) Produce receipts of services offered.

4.1.5 Benefits of the proposed system

The proposed system will lead to the following benefits to the ministry telecommunication and postal services GOSS:

- 1) Improves transaction processing time for vast client transaction.
- 2) Improves storage capacity through implementation of electronic filing system.

- 3) Easy backups for cases where records are damaged.
- 4) Better methods of record retrieval through special search program that it provides.
- 5) Easy report generation.
- 6) Generation of consistent and accurate information on demand.
- 7) Utilization of human resources and time.
- 8) Proper maintenance of records for future reference.
- 9) The system is not prone to manipulation and alterations.

4.2 SYSTEM DESIGN

4.2.1 Overview

System design is the specification or construction of a technical, computer based solution for the business requirements identified in a system analysis. Whereas system analysis emphasizes the business problem, system design focuses on the technical or implementation concerns of the system. It is driven by the technical concerns of system designer. System design is looked at from three perspectives:

- Logical design
- Physical design
- Database design

4.2.1.1. Logical design

Logical designs (logical models) depict what a system is or what a system must do but not how the system will be implemented. They are implementation independent, that is, they depict the system independent of any technical implementation.

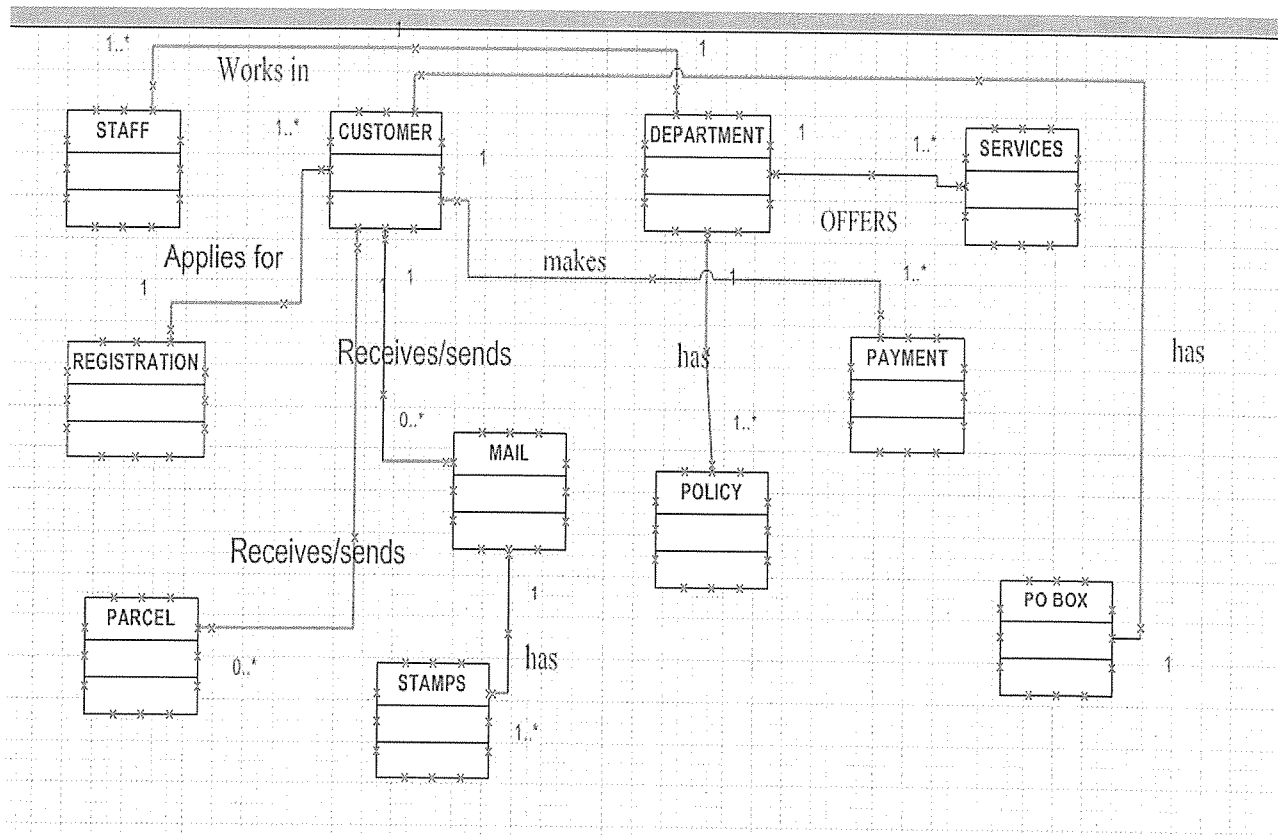


Figure 3 Showing Conceptual Design of the Database

4.2.1.2 Physical design

Physical Design (Physical Models) show not only what a system is or does, but also how the system is physically and technically implemented. They are implementation dependent because they reflect technology choices and the limitations of those technology choices.

User interface design

User interface design is the specification of a dialogue or conversation between the system user and the computer. The dialogue generally results in data input and information output a File Specification/System inputs.

The Proposed system will contain the following entities and attributes:

Customer Details entity :{ customer id, customer names, sex, address, nationality, state, city, street, plot no, email, phone}

Staff entity:{staff id, staff name, date of birth, nationality, job title, sex, date of employment, marital status, next of kin, address, telephone, cell phone, state, city, district, email, academic qualification, department id}

Services entity :{ service id, type of service, date of service }

Department entity :{ department id, department name, head of department, location, service id }

Registration entity :{ registration id, type of registration, date of registration, duration, customer id }

Inventory entity :{ inventory id, item name, department id, description }

Mails entity :{ mail id, mail id, mail type, weight, price, customer id, date sent/received, address }

P .o box entity :{ box no, location, date of receipt, customer id }

Payment entity :{ payment id, service id, date of payment, payment mode, amount, receipt no, reason for payment }

Registration entity :{ registration id, type of registration, date of registration, duration, customer id }

Policy entity :{ policy id, department id, policy type, }

Renewal entity :{ receipt no, date of renewal, service id, customer id }

Parcel entity :{ parcel id, parcel weight, price, date sent/received, customer id, address }


MDI Form

Login form

Output Design

System outputs are used to present data to the users. The System will contain the following Reports.


Customer Details Report



GOVERNMENT OF SOUTHERN SUDAN
GOSS

Government of Southern Sudan

MINISTRY OF POSTAL AND TELECOMMUNICATION
GOVERNMENT OF SOUTHERN SUDAN(GOSS)



MINISTRY OF TELECOMMUNICATION & POSTAL SERVICES
GOSS

Ministry of Telecommunication
& Postal Services

CLIENTS REPORT

February 14, 2011


CLIENT ID	CLIENT NAME	SEX	ADDRESS	NATIONALITY	EMAIL
2	CHOL DENG	MALE	12	SOUTHERN SUDAN	chol@yahoo.com

LICENCE INFORMATION

LICENCE ID	TYPE OF LISENCE	DATE OF LICENSE	APPLICATION FEE	INITIAL LICENCE	OPERATING LICENCE
2	PUBLIC POSTAL OPER	3/23/11	\$2000	400,000.00	10,000,000.00

Figure 4: Showing Customer details Report


Payment reports



GOVERNMENT OF SOUTHERN SUDAN
GOSS

Government of Southern Sudan

MINISTRY OF TELECOMMUNICATIONS AND POSTAL SERVICE
GOVERNMENT OF SOUTHERN SUDAN(GOSS)



MINISTRY OF TELECOMMUNICATION & POSTAL SERVICES
GOSS

Ministry of Telecommunication
& Postal Services

PAYMENT REPORT

Monday, February 14, 2011

RECEIPT NO	DATE OF PAYMENT	AMOUNT	PAYMENT ID	PAYMENT MODE
23001	12/6/2011 6:33:12PM	20000	1	CHECK

TYPE OF LISENCE	DATE OF LICENSE	DURATION	CLIENTS NAME
APPLICATION SERVICE PROVIDER	8/31/2006 12:00:00AM	TWO YEARS	CHOL DENG

Figure 5: Showing Payments Reports

4.2.3 Database design

Postal and Telecom Services System is based on Relational Database management systems. This kind of database implements data in a series of two-dimensional tables that are related to one another via foreign keys. Each table consists of named columns and any number or unnamed rows.

The name of the database that will contain the files for the Postal and Telecom services system is Goss.

4.2.3.1 Validation

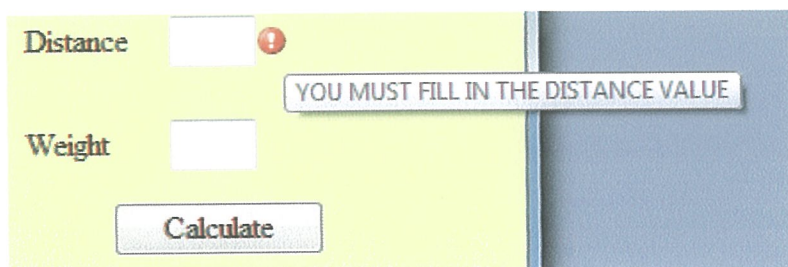
Data validation is an attempt to build into the computer program the power to detect whether entries made are correct. The incorrect data items are detected and reported. The validation checks used in this project include:

Input check

The system should not allow fields that are mandatory to left unfilled

e.g.

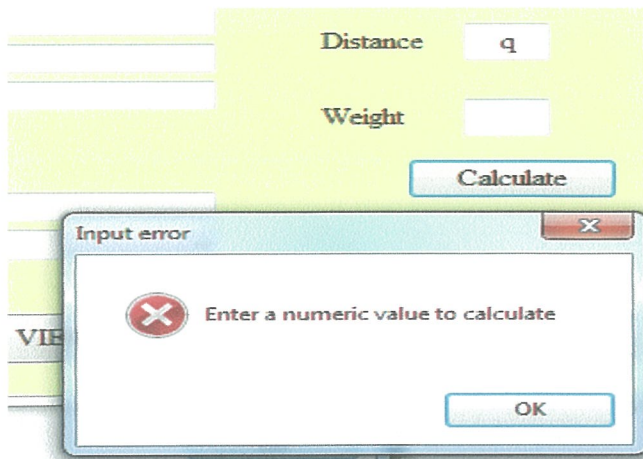
Figure 6 Showing input validation

The image shows a web form with a light yellow background. It has two input fields: 'Distance' and 'Weight'. The 'Distance' field is empty and has a red exclamation mark icon to its right. A message box with a grey border and a light blue background is positioned over the 'Distance' field, containing the text 'YOU MUST FILL IN THE DISTANCE VALUE'. Below the 'Weight' field is a 'Calculate' button with a grey border and a light blue background. The form is set against a blue textured background.

Format check

This check ensures that fields are entered using the correct data types, that is, a non numeric field should not have numeric data and vice versa.

Figure 7 showing format check



4.2.3.2 Systems security

SOFTWARE

Use of passwords to allow only authorized users to gain access to the systems documents.

Install anti-virus software that will help detect and clear viruses.

Take regular backups in case of data loss.

HARDWARE

Lock all computer room doors to restrict any physical access.

Employ watch guards if need be to restrict any physical access.

Keep all hardware away from fire and water.

4.3 Conclusion

The chapter basically has exhausted the design process with all the diagrams that support each design level. The next chapter will look into the implementation of the new system.

Chapter Five

SYSTEM DEVELOPMENT AND IMPLEMENTATION

5.1 INTRODUCTION

System development involves converting design specifications from the design phase into executable programs. It involves actual programming which involves writing codes using a selected programming language. After coding, the system must be fully tested, after which implementation can take place.

5.2 SYSTEM CODING

The database and the Visual Studio interface were created independently before they were connected. The database was created using Oracle 10g Express Edition and the interface was created using Microsoft Visual Studio 2005. The connection between the database and the interface was done using Microsoft ODBC Data Source Administrator.

5.3 SYSTEM TESTING

Testing was done to determine whether the system produces the desired results and whether it satisfies the user's requirements.

System testing, also known as integrated testing, tests the functioning of the information system as a whole to determine if discrete modules will function together as planned.

5.3.1 TEST PLAN

Table 3 Showing System Test Plan

Test No	Module	Purpose	Test Data	Expected Results
1	Password	To check if password gives access to the system	"goss"	Access to the system is granted.
2	Password	The check if password gives access to the system	Any other character other than "goss"	A message box is displayed stating "invalid password"
3	Login	To check if login is successful. Displays the	Click on the	The forms will be displayed

	success	home Forms.	buttons.	
4	Home Form	To check if form displays all the forms in the system	Click on form tabs.	The particular form will be displayed.
5	Customer details form	To check if the customer details tab displays the customer details form on the screen.	Click on the customer details tab.	Customer details form appears.
6	Registration details form	To check if the Registration tab displays the Registration form on the screen	Click on the Registration form	Registration form appears.
7	Staff details form	To check if Staff tab displays the Staff form on the screen	Click on the Staff tab.	Staff form appears
10	Mails details form	To check if Mails tab displays the Mails form on the screen	Click on the Mails tab.	The Mails form appears on the screen.
11	Inventory details form	To check if the Inventory tab displays the Inventory form on the screen	Click on Inventory tab.	The Inventory form appears on the screen.
12	Stamps details form	To check if the Stamps tab displays the Stamps form the system	Click on the Stamps tab.	The Stamps form appears on the screen.
13	Renewal details form.	To check if Renewal tab displays the Renewal form on the	Click on the Renewal tab.	Renewal details form appears on the screen

		screen		
14	Payment details form	To check if the Payment tab displays the Policy form on the screen	Click on the Payment tab.	Payment details form is displayed on the screen
15	Services details form	To check if the Services form displays the on the screen	Click on Services tab.	Services form is displayed on the screen.
16	Parcels details form	To check if the Parcels form displays the on the screen	Click on Parcels tab.	Parcels form is displayed on the screen.
17	Policy details form	To check if the Policy form displays the on the screen	Click on Parcels tab.	Parcels form is displayed on the screen.
18	P o box details form	To check if the P o box form displays the on the screen	Click on P o box tab.	P o box form is displayed on the screen.
19	Department details form	To check if the Department form displays the on the screen	Click on Department tab.	Department form is displayed on the screen.
20	Report form	To check if the Report form displays the on the screen	Click on Report button.	Report form is displayed on the screen.

5.3.2 Unit testing

This is the first stage of testing; this is done by using written test planning and prepared test data. The path consists of a number of test runs such as valid paths through the codes. For

each test run, there is a list of condition tested, the test data used and expected results. All the forms that are on the system are tested against the test plan and conditions.

5.3.2.1 Integration testing

This is the interfaces between programs in the same function area. Each program is linked to other programs with which it interacts. The whole process must be in a specific sequence and within specified response time. The integration between the program interfaces created in Visual Studio 2005 and the database created in Oracle 10g XE is fully tested to ensure that they are effectively linked.

Once the system is implemented it must be tested against the specifications supplied by client. Programs have been tested first by testing the system database, looking on the database connection with the Visual Studio 2005 graphical user interface. Also the testing has been done to test the links of the command buttons are working properly.

5.4 PROJECT IMPLEMENTATION.

This tests the whole system by linking together all the programs subsystems. Bugs are recorded and categorized in terms of priority are fixed and those with less priority can be addressed in the follow-ups releases. The following are also carried out.

Performance testing validates that all the response times or transaction periods specified in the functional specifications can be met by the system especially when it is fully loaded. Involves timing how long the system takes to respond to a user request, timing normal case path through and exception cases.

Regression test, this ensures that the correction during the system test have not introduced new bugs, and test the key functions.

Acceptance testing, this proves to the client, that the system, meets the business requirement agreed upon, in the functional specification. The tested data is replaced with live data provided by the client. The client records all errors and other aspects. They are discussed with the developer, whereby, the errors are corrected by the developer, and the changes are implemented at the expenses of the client.

Data take-on and conversion, the data from the current system is transferred safely to the new system. This is done by:

- i) User enters data; one has to ensure that data entry errors are controlled.

ii) Data conversion by using a developed program that transfers data from the current format to the new format.

User training, training should take place in learning environment with competent trainers and with well defined training objectives. The training should cover all the function of the system until when the users are competent in the use of the system. The training is done by the system developers, more experienced staff.

Installation and change over, this involves the following.

Installation on site, the hardware is brought; the software is installed (that is operating system and management information system)

Site commissioning, the system is installed on site, connected to any other third party component; commissioning test are running to identify discrepancies between interfaces, until the system work without any problem.

System change over, direct method is used, it occurs when at given time one system end, and a replacement start immediately. The advantage is that it is the cheapest and there is a clear break between current system and new system.

Table 4 Showing Implementation Plan

	Time frame							
	2 weeks	2 weeks	3 weeks	3 days	2 weeks	1 week	1 week	unlimited
Performance testing								
Regression test								
Acceptance testing								
Data take-on and conversion								
User training								
Training of the staff								
Installation								
Maintenance								

5.5 USER INTERFACE.

The user can easily access the database by using their account name and password to sign in and view the systems interfaces that enables the customers to make register and even to make payments.

5.6 SYSTEM CONVERSION

The system conversion is done by putting the new system into work. But this will depend on the agreement between the system designer and the organization. Once the system implementation is done, clients or staff can be able to access the new system. Clients and Staff can decide whether to use the new system or the existing one.

5.7 CONCLUSION

In this chapter we have been looking on how the implementation process has been done, we have also see how the program has been tested, implementation of the project and the system, the user interface design and finally system conversion.

Chapter Six

RECOMMENDATIONS AND CONCLUSION

6.1 INTRODUCTION

In this chapter we shall discuss on the recommendation on the new system. We will be looking on summary of the whole project and also how the system can be able to change according to the changes in environment and need. As it has been highlighted in the beginning of this project, this study came about as a result of the researcher's observation that there was a problem particularly with the Juba Postal and Telecom services especially in its operations including storage and retrieval of registration information.

6.2 EVALUATION OF THE NEW SYSTEM

The Juba Postal and Telecom services comprises of several modules of program. The system is developed using Microsoft Visual Studio 2005 Professional Edition. The major aim of its development is to enable the Juba Postal and Telecom services to overcome problems in their current system.

6.3 APPROACH ADOPTED.

Structured methodology was used to develop the system. It involved breaking down the system into modules, which are developed one at a time.

Advantages of structured methodology

Completing one module, testing and validating it is much faster and easier than doing it for a whole compact system.

The system produced is of high quality.

Chances of the system failing is almost none.

6.4 FILE AND GENERAL SYSTEM SECURITY

Maintaining system security is a top priority. This will prevent people from tampering with information or even trying to access information without permission. There are several ways of doing this:

Back Up: at least two copies of back up files should be kept in separate locations to avoid any calamities e.g. fire break out and theft, which destroys the files.

Physical Security: this can be done by:

- Placing security guards to watch over the computer rooms.
- Installing alarm systems in the computer rooms so that any break-ins can be detected.
- Store CD's and external hard disks in fire proof safes.
- Scan all internal disks and don't allow any external disks into the computer rooms.
- Each user should have a user name and passwords so as to grant them access to the system.
- Right protection of the disk so that no alterations can be done on information held on the disks.

6.5 RECOMMENDATIONS

The researcher recommends that the application be developed further to include more help files, handle other information needs like interaction with the company website, and more rigorous security measures. The researcher also recommends the further development of the system to include other departments.

6.6 AREAS FOR FURTHER WORK

Since the system was under operation, the researchers were involved in system support which includes the following activities:

Program maintenance

System recovery

Technical support

System enhancement

If opportunity allows, the researchers hoped that the features that had not been implemented on this application but were originally desired features would be taken into consideration in order to improve on the efficiency, reliability and user friendliness of the of the system.

6.7 CONCLUSIONS

The Juba Postal and Telecom Services System software is efficient for the vast amounts of information in the Ministry. However to bring in more efficiency in the Ministry, the same kind of software should be extended to the other departments.

The application will save the Postal and Telecom Services department a lot of manpower and high operational costs, stationery and time.

Appendix 1

Definition of terms

BPR	Business process Reengineering
DBA	Database administrator
DBMS	Database management system
TCP	Transmission control protocol
IP	Internet protocol
OS	Operating system
IDE	Integrated development environment.
MS	Microsoft
DW	Data warehouse
SDLC	System Development Lifecycle
ODS	Operational Data Store
DM	Data Mart
CLI	Command Line Interface.
MTC & PS	Ministry of Telecommunications and Postal Services.
GOSS	Government of Southern Sudan

Appendix 2

SYSTEM DESIGN

Figure 8: Showing Login Form

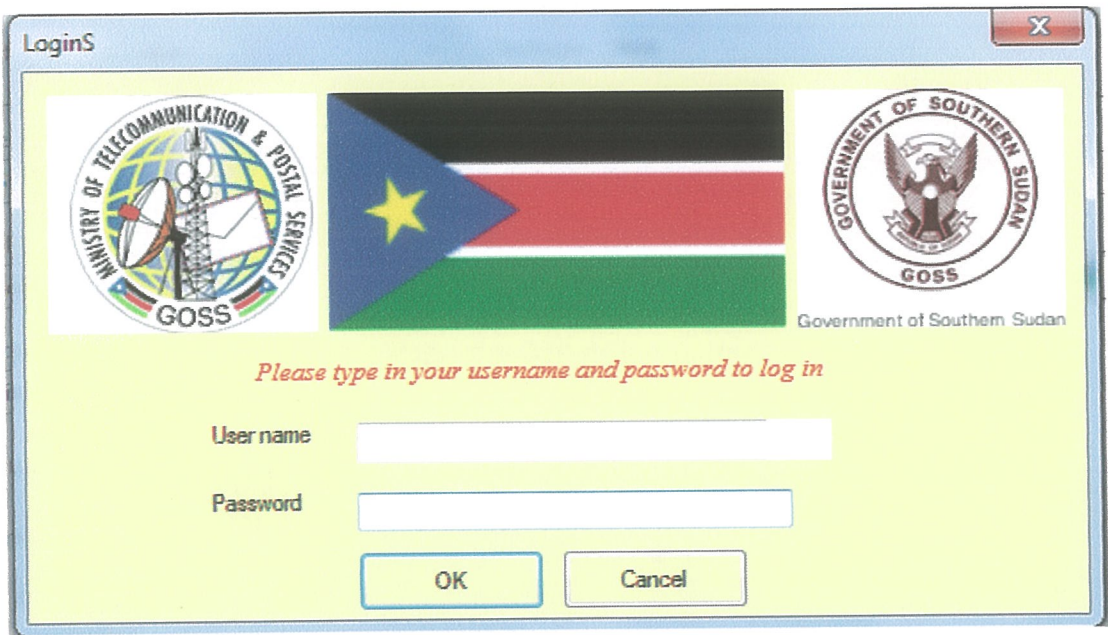


Figure 9: Showing Home Form

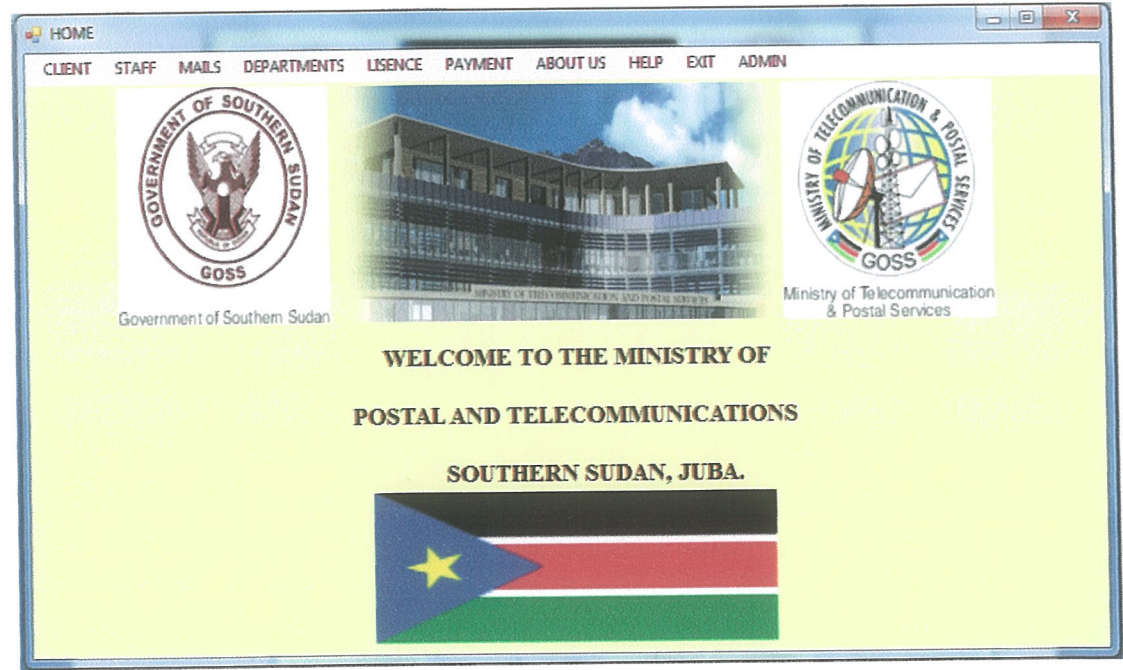


Figure 10: Showing Clients Form

CLIENTS

NATIONALITY CITY SEARCH

<<PREVIOUS

NEXT>>

REPORT

CLIENTS ID:

CLIENTS NAME:

SEX:

ADDRESS:

NATIONALITY:

CITY:

EMAIL:

TELEPHONE:

FAX:

SAVE ADDNEW DELETE EXIT VIEW BACK HOME

Figure 11: Showing Staffs form

STAFFS

<<PREVIOUS

NEXT>>

BACK HOME

VIEW

EXIT

STAFF ID:

STAFF NAME:

DATE OF BIRTH:

NATIONALITY:

SEX:

JOB TITLE:

DATE OF EMPLOYMENT:

MARITAL STATUS:

ADDRESS:

CITY:

ACADEMIC QUALIFICATION:

DEPARTMENT ID:

SAVE

DELETE

ADDNEW

REPORT

Figure 12: Showing P.O. Boxes form

The screenshot shows a window titled "PO_BOXES" with a yellow background. On the left, there are two buttons: "<<PREVIOUS" and "NEXT>>". To the right of these buttons are five input fields: "BOX NO:" (a text box), "LOCATION:" (a text box), "DATE OF PAYMENT:" (a date picker showing "Monday , February 14, 2011"), "CUSTOMER NAME:" (a text box), and "CLIENT ID:" (a dropdown menu). At the bottom of the window, there is a row of six buttons: "SAVE", "ADDNEW", "DELETE", "VIEW", "EXIT", and "BACK HOME".

Figure 13: Showing Mails form

The screenshot shows a window titled "MAILS" with a yellow background. On the left, there are two buttons: "<<PREVIOUS" and "NEXT>>". Below these buttons are two radio buttons: "LETTER SEND" and "LETTER RECEIPT". To the right of the radio buttons are five input fields: "MAIL ID:" (a text box), "MAIL TYPE:" (a text box), "COST:" (a text box), "ADDRESS:" (a text box), and "CLIENTS ID:" (a dropdown menu). To the right of these fields are two more input fields: "Distance" and "Weight", both with text boxes. Below these two fields is a "Calculate" button. At the bottom of the window, there is a row of six buttons: "ADDNEW", "SAVE", "DELETE", "VIEW", "EXIT", and "BACK HOME".

Figure 14: Showing Department form

The screenshot shows a window titled "DEPARTMENTS" with a yellow background. On the left, there are two buttons: "<<PREVIOUS" (highlighted with a blue border) and "NEXT>>". To the right of these buttons are four input fields labeled "DEPARTMENT ID:", "DEPARTMENT NAME:", "HEAD OF DEPARTMENT:", and "LOCATION:". At the bottom of the window, there is a row of six buttons: "SAVE", "ADDNEW", "DELETE", "VIEW", "EXIT", and "BACK HOME".

Figure 15: Showing Licenses form

The screenshot shows a window titled "LICENCES" with a yellow background. On the left, there are four buttons: "<<PREVIOUS" (highlighted with a blue border), "NEXT>>", "VIEW", and "BACK HOME". To the right of these buttons are seven input fields labeled "LICENCE ID:", "TYPE OF LISENCE:", "DATE OF LICENSE:", "CLIENTS ID:" (with a dropdown arrow), "APPLICATION FEE:", "INITIAL LICENCE:", and "ANNUAL OPERATING LICENCE:". At the bottom of the window, there is a row of four buttons: "ADDNEW", "SAVE", "DELETE", and "EXIT".

Appendix 3

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