

CDR Mining and Analysis System



BY

Henkel Chamboko

CDR Mining and Analysis System

BY

Henkel Chamboko

Submitted in partial fulfillment of the requirement for the degree of

Bachelor of Science Information Systems Honors

Department of Information Systems and Computer Science in the

Faculty of Science and Technology at the

Midlands State University

GWERU

October 2013

Supervisor MR. S MUSUNGWINI

Abstract

The purpose of this research was to build an Information System based solution which would help address challenges of slow CDR requests, inaccurate response to requests, workload of data mining procedures and the risks associated with connecting manually to live database exposing live database to risks. CDR mining and analysis system is an electronic data mining and analysis system which is intranet based for security reasons. This system was developed to address risks (preventing write access to the live database) that are associated with manually connecting to the live billing database to extract Call Detail Records (information relating to an individual) and at the same time reducing work load on the IT team of Tel-One and letting them focus their attention on other important tasks. The system enables authorized users from the relevant departments to be able to conduct CDR mining and analysis from their relevant department and have their results displayed for their use pronto by emailing function which encrypts the data as pdf and sends it as an attachment. The system was also developed for use to react to external customers known as subscriber to react to their itemized bill request as well as create a summary explanation for the result produced to ensure that the request answers exactly what the user requested. The researcher carried out a thorough research of the problems mentioned above using fact finding methodologies. The researcher used interview, observations and questionnaires to research the project. After analyzing the gathered information the researcher developed the CDR mining and analysis system by implementing system development tools namely PHP programming Language Java Scripting (JS) and Mercury Mail for sending email, MySQL data base for storing the data Dreamweaver for integrated development environment and apache which supplied a web server for handling http protocol connections over the internet.

DECLARATION

I Henkel Chamboko hereby declare that I am the sole author of this thesis. I authorize the University of Midlands State University to lend this thesis to other institutions or individuals for the purpose of scholarly research.

Signature _____ Date _____

APPROVAL

This dissertation/thesis entitles “CDR Mining and Analysis System” by Henkel Chamboko meets the regulations governing the award of the degree of Bachelor of Science Information Systems Honors Degree of the Midlands State University, and is approved for its contribution to knowledge and literal presentation.

Supervisor

Date

ACKNOWLEDGEMENTS

I would like to thank my parent for social, financial support and kind words useful remarks and comments and the influence and encouragement they gave me and that from my colleagues.

I would like to show my deepest gratitude to my supervisor who guided me through-out the research study and all the encouraging words he gave me. Without his supervision and constant help this dissertation would not have been possible.

I would like to thank the whole Department for information systems and computer science lecturers and dean who introduced me to all the basic to sophisticated underlying concepts relating to this research study which made the research a zealous journey, and the project itself a success.

I would like to thank also Tel-One for allowing me to conduct this research study based on their organization. I thank you for the permission to use copyrighted pictures and logos for inclusion in my dissertation study. I thank you for the all the guidelines and information that contribute to the success of this project.

DEDICATION

I would like to dedicate all my effort for the development of this system to mom. Mom this one is for you.

CONTENTS

Chapter 1: Introduction1

1.1 Introduction 1

1.2 Background of the study..... 1

1.2.1 Vision..... 4

1.2.2 Business Strategy 4

1.2.3 Core Values..... 4

1.2.4 Mission Statement..... 4

1.2.5 Departmental Mission 5

1.2.6 Departmental vision 6

1.2.7 Departmental Strategy 6

1.2.8 Problem Definition..... 6

1.3 Aims 7

1.4 Objectives 7

1.5 Instruments 8

1.6 Justification of Project..... 11

1.7 Conclusion..... 11

Chapter 2: Planning Phase.....13

2.1 Introduction 13

2.2 Reasons for building the system..... 13

2.3 Identify business value 14

2.4 Feasibility Study..... 15

2.4.1	Technical Feasibility	15
2.4.2	Economic Feasibility	16
2.4.3	Social Feasibility Study	22
2.4.4	Operational Feasibility	23
2.5	Work plan	24
2.6	Conclusion	24

Chapter 3: Analysis Phase.....25

3.1.	Introduction.....	25
3.2.	Information gathering methodologies.....	25
3.2.1.	Interview	25
3.2.2.	Questionnaire	28
3.2.3.	Observation.....	30
3.3.	Analysis of existing system	31
3.4.	Process Analysis	32
3.5.	Data Analysis	34
3.5.1.	Context Diagram and DFD.....	34
3.6.	Weaknesses of current system	36
3.7.	Evaluation of Available Alternatives.....	37
3.7.1.	Outsourcing.....	37
3.7.2.	Improvement	38
3.7.3.	Development In house	39
3.8.	Requirements Analysis	40
3.8.1.	Functional Requirements (Use Case diagram)	40
3.8.2.	Non-functional requirements	42

3.9.	Conclusion	43
------	------------------	----

Chapter 4: Design Phase44

4.1	Introduction	44
4.2	System Design.....	44
4.2.1	Context Diagram of the proposed System.....	46
4.2.2	Dataflow Diagram of the proposed System	47
4.3	Architectural Design	49
4.4	Physical Design	49
4.4.1	Network Software and Hardware Configurations	50
4.4.2	Configurations And Network Layout Considerations.....	52
4.4.3	Software and Hardware Interaction.....	54
4.5	Database design.....	56
4.5.1	Database Concertpt.....	56
4.5.2	ANSI-SPARK Model.....	59
4.5.3	Database Tables	62
4.5.4	Entity Relationship Model.....	65
4.6	Program Design.....	69
4.6.1	Sequence Diagram.....	70
4.6.2	Class Diagram	72
4.7	Interface design	74
4.8	Conclusion.....	80

Chapter 5: Implementation Phase.....81

5.1.	Introduction	81
------	--------------------	----

5.2.	Coding (Pseudo Code).....	81
5.3.	Testing	88
5.3.1.	Bottom up testing	89
5.3.2	Unit testing.....	90
5.3.3	White box.....	91
5.3.4	Black box	92
	Module Testing	94
	System Testing	94
	Complete flow process on the systems core with valid data test runs	95
	E-mailing and document creation test runs.....	96
	Mining and Analysis Filters Accuracy test runs.....	97
	Archiving test runs.....	98
	Preset and notification test runs	98
	Login accounts test runs.....	98
	Report Generation test runs	101
	Alpha Testing	102
	Beta Testing	102
	Verification and Validation.....	102
5.3.5.	Verification.....	102
5.3.6.	Validation	103
5.4.	Installation	103
5.4.1.	Consideration for deployment method.....	103
5.4.2.	Changeover Strategies	108
5.4.2.1	Direct.....	109
5.4.2.2	Parallel Changeover (developers choice).....	109

5.4.2.3	Phased Changeover.....	109
5.4.3.3	Changeover	110
5.5.	Maintenance	111
5.5.1.	Corrective Maintenance	112
5.5.2.	Perfective Maintenance	112
5.5.3.	Adaptive Maintenance.....	113
5.5.4.	Preventive Maintenance	113
5.6.	Conclusion.....	114
	Bibliography	177
	Electronic Site References	179

LIST OF ACCRONYMS

CSA	(Customer Services Administrator)
ITERC	(Internal Employees Requesting CDRs)
MO	(Mining Officer)
SCD	System Context Diagram
DFD	Dataflow Diagram
ERD	Entity Relationship Diagram
ERRD	Enhanced Entity Relationship Diagram
IT	Information Technology
NIS	Network Inventory System

LIST OF TABLES

Table 2.1: Economic Feasibility Test	17
Table 2.2 Gant Chart for proposed system development.....	24
Table 4.1: Network Configurations	50
Table4.2: Network Setup Configurations	51
Table 4.3: Server Configurations: CDR Mining and Analysis Server.....	51
Table 4.4: Desktop Workstation/Client Server (for users CSA, ITCR, MO and Admin).....	52
Table 4.5: cdr_details_master	62
Table 4.6: cdr_details_temp.....	63
Table 4.7: Country_Definitions	63
Table 4.8: Customer_Details	63
Table 4.9: Line_Details.....	64
Table 4.10: Route_Definitions.....	64
Table 4.11: Trunk_Definitions.....	64
Table 4.12: Users	64
Table 4.13: Requests.....	65
Table 4.14: saved_query	65

LIST OF FIGURES

Fig 1.1 Tel-One Organizational Structure.....	3
Fig 3.1 Activity Diagram the proposed system.....	33
Fig 3.2 Key for Context Diagram.....	34
Fig 3.3 Context Diagram/level 0 DFD for CDR mining and analysis System.....	35
Fig 3.4 Use Case Diagram for CDR mining and analysis process	41
Fig 4.1 Context diagram for CDR Mining and Analysis System.....	47
Fig 4.2 DFD for CDR Mining and Analysis System.....	48
Fig 4.3 Network layout for the proposed system.....	50
Fig 4.4 Database design Model for proposed system (ANSI-SPARC Model)	58
Fig 4.4 Database design Mapping Model for proposed system (ANSI-SPARC Mapping Model)	61
Fig 4.5 Enhanced Entity Relationship Diagram for the proposed system	69
Fig 4.6 sequence diagram for the proposed system.....	71
Fig 4.7 Class diagram for the proposed system.....	73
Fig 4.8 Proposed Interface design.....	74
Fig 5.1 white box test runs.....	91
Fig 5.2 Black box test runs	94
Fig 5.2 System testing test runs	95-101
Fig 5.4 installation guide figures.....	108

LIST OF APPENDICES

APPENDIX A: User Manual	115
APPENDIX B: Interview Schedule	139
APPENDIX C: Questionnaire.....	140
APPENDIX D: Observation	141
APPENDIX E: Source Code.....	142

Chapter 1: Introduction

1.1 Introduction

CDR, (Call Detail Record) Mining and Analysis System will be an inside system restricted to internal users within the organization. This system will be used by users in the organization to mine data pertaining to calls made as per their queries effortlessly there by easing the pressure of work on IT personnel. The system will mine data based on filtering rules specified by the user, apply some parameters to analyze the data. the system will be able to give an explanation of what filters rules and parameters have been used to arrive to the presented output. The complete data mining process will be done electronically by the system after the user specifies the required input. The system will be able to limit the time of CDR requesting and result by making e-mail able to the destination email.

1.2 Background of the study

According to Harold R. Kerzner (2003), background of study refers to information essential to understanding of a problem or situation. It can be well understood as the statement identifying where the study well emanated from. Tel-One has state of the art business systems and hardware aggressive enough for the telecommunications industry. However a slight inconsistency can be noted if the flow of call data records is analyzed critically. Network Inventory System (NIS) is responsible for collecting CDRs from the exchanges and pushing them to the billing server for billing purposes other systems are in place to monitor the collection and storing of CDRs before they are collected by the NIS. Unfortunately there is no system that supports the mining and analysis of the CDRs once they are collected. This dissertation study attempts to address this inconsistency to result in a much efficient muscle of IT resources for the organization.

Background of Organization

Tel-One (PVT LTD is a telecommunications services company partly owned by the government.

Tel-One is the only provider of fixed telecommunications services in Zimbabwe. It offers internet, landline telephones, terrestrial and satellite connectivity and Internet Service Provider

serves known as Com-One. In technical terminology summed as voice data and internet services. The products are explained later in this chapter.

Historical Development

In 1999 PTC (Posts and Telecommunications Corporation) was unbundled into its distinct SBUs (Small Business Units) namely Tel-One, POSB, (Post Office Savings Bank), ZIMPOST (Zimbabwe Postal Services) and the birth of a new youngster NETONE to participate in the industry as a mobile telecoms operator. Immediately in 1999 Tel-One complied with all the necessary requirements of Zimbabwe telecommunication and became registered as a separate entity under the Companies Act 1 of Zimbabwe of 1890.

As any telephone operator in Zimbabwe, Tel-One's activities are governed by a regulatory body called POTRAZ (Postal and Telecommunication regulatory Authority of Zimbabwe) this is responsible for gusseting rules in the industry and punishing foul play in the industry.

Currently, due to competition and technological trends Tel-One has lost its monopoly powers to the new entrants in the industry. In place is an Oligopoly kind of market in existence. There are four telephone operators in the industry and whose activities directly affect each other. The following are the operators and their and their relevant market;

TELONE	FIXED OPERATOR
ECONET	MOBILE OPERATOR
NETONE	MOBILE OPERATOR
TELECEL	MOBILE OPERATOR

TEL-ONE ORGANIZATIONAL STRUCTURE

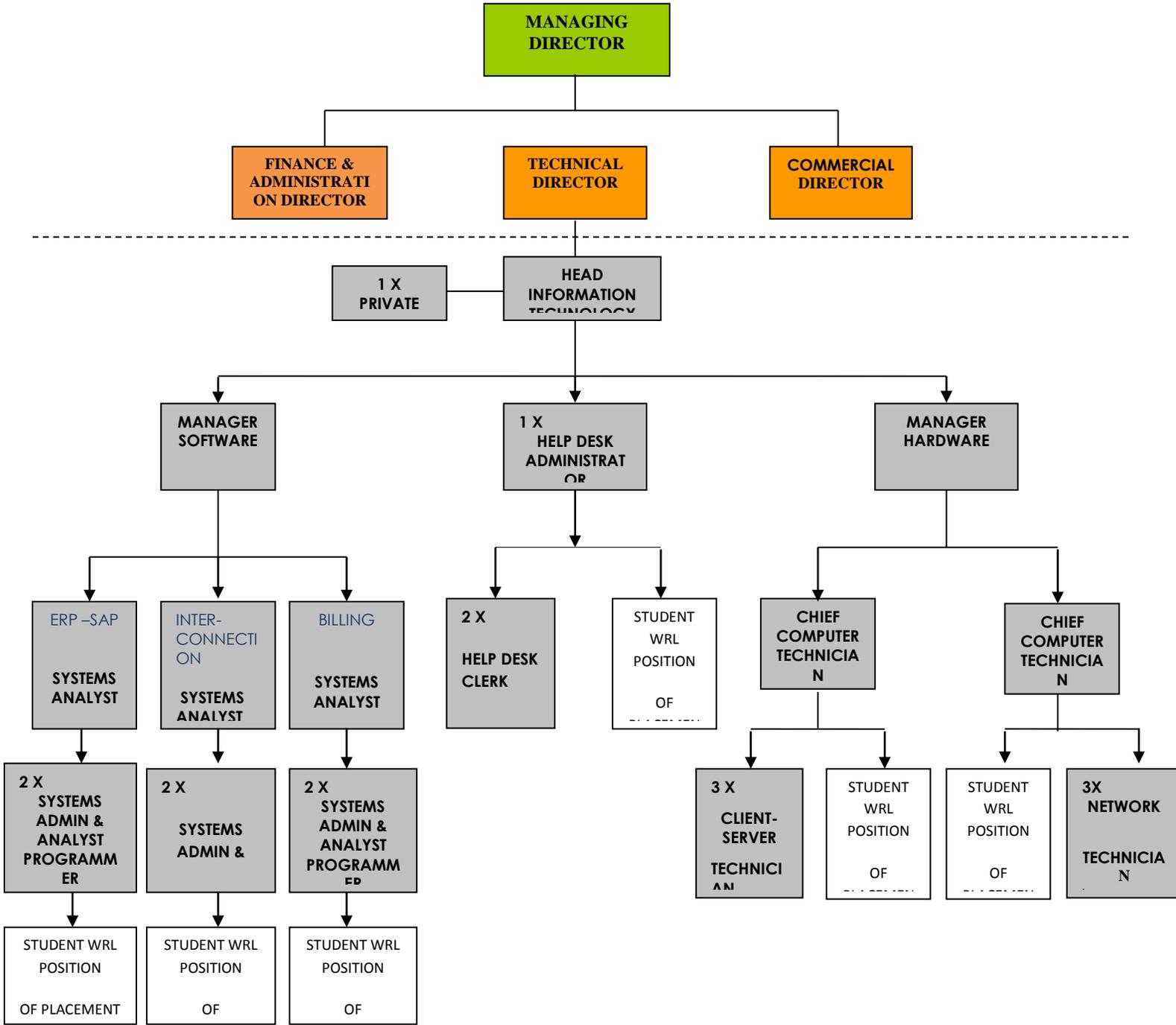


Fig 1.1 Tel-One Organizational Structure.

1.2.1 Vision

Tel-One's vision is to be the hub of excellence in providing multi-media telecommunications services in Zimbabwe.

1.2.2 Business Strategy

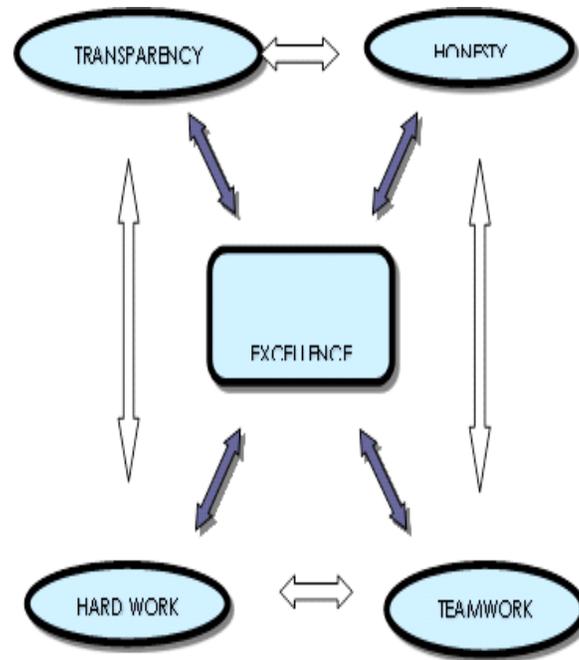
According to Michael Porter (1994), Strategy is a plan, Business strategy is a well-articulated vision of where a business seeks to go and how it expects to get there. It is the form by which a business communicates its goals. Management constructs this plan in response to market forces, customer demands and organizational capabilities; market forces create the competitive situation for the business, customer demands comprise the wants and needs of the individuals and companies who purchase the products and services available in the marketplace whilst organizational capabilities include the skills and experience that give the corporation a currency that can add value in the marketplace. The main idea is to come up with a product offering that is distinct or unique, each business will have a per level plan that is the strategy which is updated at every time to time basis this is given guide by the mission, vision and core-values.

1.2.3 Core Values

According to Modern (1997), values provide a wider framework by which we define a mission, objectives and strategies. Values form the foundation of the business as well as governing the behaviour of employees. Tel-One core values are that in pursuit of its vision and mission, Tel-One upholds the following principles and core values:

1.2.4 Mission Statement

According to Henry Mintzberg and H. Fayol (1975), a mission describes the organization's basic function in society, in terms of the products and services it produces for its customers. Tel-One mission is to efficiently provide multi-media telecommunication services and to link Zimbabwe to the outside world through honest and motivated teams.



- **Excellence**

Continuous improvement on innovations guided by autonomy, self-esteem and empowerment

- **Honesty /Ethical Practices**

A work ethic founded on trust.

- **Hard Work**

Aim to selfless commitment and dedication to duty by motivated, recognized staff with a charismatic leadership.

- **Team Work**

A unity of purpose of a loving family focusing on customers and social responsibility.

- **Reliability**

Upholding the virtues of integrity and professionalism.

1.2.5 Departmental Mission

Provide it services to support Tel-One strategic goals in the most efficient and economical methods possible by leveraging technology and resources.

1.2.6 Departmental vision

Establish and execute a strategic it direction that will align with and support business programs and initiatives in a fiscally responsible manner. Understanding the business processes and identify the technology that will improve service delivery.

1.2.7 Departmental Strategy

Described as overall plan of the manner in which an organization will intend to spread and use the IT resources and technologies in attainment of the cooperate objectives. It entails all the IT policy made by the IT department the tactics it wishes to employ at a certain period regarding the attainment and use of such. Primarily it focuses on a department's expenditure towards IT and IS resources. Michael Porter (2003) This is when an attempt is made to align the business strategy against the IT and the IS strategy The business aims to set itself ahead of its competitors in the industry by becoming a world class leader thereby creating operational excellence by well addressing this integration, with the efficiency of the company's spending on technology; how people, for example the organization's customers and employees, exploit technologies in ways that create tremendous value for the organization, Michael Porter (2003). For Tel-One,

- To enhance and maintain an integrated and secure IT platform, that enables Tel-One to do its business using technology to gain competitive advantage.
- To ensure that Tel-One ICT users are well informed of their responsibilities and roles as regards computer equipment and business data thereby guaranteeing the correct and secure operation of information processing facilities.
- To have an improved response time to fault attention and resolution
- To improve up-time of IT software and hardware and reduce down time to zero
- Great team work

Departmental Motto

-We see solutions while others see problems-

1.2.8 Problem Definition

This is a summary of the problem to be solved. This statement illustrates the scope of the problems to be solved by the project that is to be undertaken. It emphasizes on the scope of what does this project need to do for u by pin pointing to us. The statement will point to the next step which is planning what to do about the differences that is the planning is what is to be done,

Bently, L (2007) to address the problems. The problems being faced with the current operations are noted and then refined to form a list of separate problems that need to be addressed. The project Problem Definition, list of problems to be addressed by the project that have been noted are as follows.

- Originally with sufficient approval the IT team is the one that mines these CDRs manually from billing databases.
- The flow process of CDRs request and feedback takes long.
- The constant manual database connections and queries expose the data to human disturbance.
- the CDR mining function adds on much work load to the IT team which can be done electronically
- The CDRs that can be mined are those of a much later time the average time is 2 days away for internal requests
- The process of CDR mining itself is time consuming
- Manual CDR mining and filtering is a series of processes which makes it easy to pass incorrect parameters for example filters and may require redoing and even that the result may even go without being noticed that its results are not so correct as there is no means to notice that the result is exactly what was requested.

1.3 Aims

To create an Information system based solution to remove manual CDR mining from the IT team and enable the inside organization users to mine their own CDRs as and when they need them. The system should also maintain data security to private organizational data, CDRs
The system should also ease work load of the IT team by removing the CDR mining and analysis function to the respective users who require the CDRs. The system aims to limit manual connections to the live database which make it prone to human errors, and unintentional tempering. The system will provide a record of all the filters used to mine the data.

1.4 Objectives

According to Selah (2009), objectives are a specific result that a person or system aims to achieve within a time frame and with available resources. According to the business dictionary,

objectives are basic tools that underlie all planning and strategic activities which serve as the basis for creating policy and evaluating performance. The projects objectives have also been styled in respective manner against the problems definition.

- Enable relevant users to be able to mine CDRs
- Eliminate manual CDR analysis
- Eliminate manual connections to live database for CDR analysis (using read only access)
- Provide more up-to-date CDRs for external clients forwarded by customer services
- Make CDR results available faster
- Ease work load of the IT team
- Provide an electronic CDR mining
- Provide a rule based analysis of CDRs
- Provide CDR filtering
- To provide a result explanation after applying the mining, filters and analysis rules/ parameters.

1.5 Instruments

This section illustrates explicitly the instruments to be used to develop the proposed system. The instruments required would be as follows;

JavaScript (JS)

JavaScript resides inside HTML documents, and can provide levels of interactivity to web pages that are not achievable with simple HTML. This is an interpreted computer programming language which is part of web browsers it has implementations to allow client-side scripts to interact with the user. See Justification of instruments.

Source: http://www.java.com/en/download/faq/java_javascript.xml accessed 2013-08-04 17:51

Dreamweaver 8 (Integrated Development Environment)

This is an IDE (Integrated Development Environment) with leading web development tools that aid efficient design, development and maintenance of standards-based websites and applications.

Dreamweaver 8 provides a powerful combination of visual layout tools, application development features, and code editing support. See Justification of instruments.

Source: <http://www.adobe.com/support/documentation/en/dreamweaver/dw8/releasenotes.html> accessed 2013-08-04 17:52

Xampp (Integrated Development Platform collectively cementing Apache, MySQL, PHP +, phpMyAdmin)

This is a developers platform application which is used to integrate Apache, MySQL, PHP +, phpMyAdmin, Webalizer, Mercury Mail Transport System for Win32 and NetWare Systems v3.32, Ming, FileZilla FTP Server.

Source: <http://www.apachefriends.org/en/faq-af.html> accessed 2013-08-04 17:52

Apache (Web Server-contained in Xampp)

Recognized as the world's most popular Web server which has played a pivotal role in the growth and development of the world wide web. A web server being a computer program that delivers (serves) content, such as web pages, using the Hypertext Transfer Protocol (HTTP), over www.

PHP (Programming language contained in Xampp)

Web based server side scripting language

PHP-MySQL(database system contained in Xampp)

PHP and MySQL combine to be an easy yet powerful way to create dynamic web pages that actually interact with web based application visitors. HTML can create useful and well formatted web pages. With the addition of PHP and MySQL you can collect data from your users, create specific content on the fly, and do many other things that HTML alone can't do. See Justification of instruments.

Source: <http://dev.mysql.com/doc/> accessed 2013-08-04 17:56

phpMyAdmin (Database Management System-contained in MySQL for MySQL)

This is a free software tool written in PHP, intended to handle the administration of MySQL over the Web. phpMyAdmin supports a wide range of operations on MySQL, MariaDB and Drizzle. Frequently used operations (managing databases, tables, columns, relations, indexes, users, permissions and other DBMS related operations) can be performed via the user interface, while you still have the ability to directly execute any SQL statement. See Justification of instruments.

Source: http://www.phpmyadmin.net/home_page/index.php accessed 2013-08-04 18:02

Justification of Instruments

The chosen instruments will enable an effective solution to be crafted for the problems mentioned in the problem definition.

APACHE is a leading webserver which will allow the system to be web based and ease as it also allows a level of code support for development activities. This will offer a very high response to users queries as the result are sent via email and the system will be web based and will be available pronto see in this chapter Objectives bullet 4 and 5.

PHP is a powerful scripting language which can attain a high level of interactivity for the dynamic web pages for the web based application.

MySQL has a powerful database engine called ISAM which offers one of the fastest query manipulation speeds desired for data mining and is able handle vast sums of data and mass simultaneous complex query execution. This will offer a very high response to users queries see in this chapter Objectives bullet 4 and 5. Tel-one currently uses MySQL. MySQL database will be easy to use as the organization is already familiar with MySQL databases hence any maintenance will be made easy. Moreover it will add a degree of ease when the proposed system will interact with the other systems currently present at the organization, easy integration with the current software infrastructure will be experienced. MySQL data base offers a high degree of security for the system will carry important data for the organization

PHP MYADMIN is a database management system which is ached into the Xampp platform for supervising the MySQL database hence its usage is simple and will allow easy query execution

and CDR relating data movement and operations to be secure. phpMyadmin offers a very high degree of security

DREAMWEAVER is an IDE most compatible for use in integrating php and java scripting language. It offers some auto code generation utilities making development ease.

To supervise the movement of data from live database to systems database during mining

XAMPP is a development platform most compatible for use in integrations listed above which makes it very simple to use the combination of java php and mysql limitless and effortless.

XAMPP also offers mercury mail which is a handler for mailing activities which are needed to mail the mining results in the system.

1.6 Justification of Project

There is an increased need for such a system as currently all the systems in use have a gap that reflect the inability to address problems mentioned in the problem definition, and as such requires such a system to be implemented. The system will use a MySQL based database this will not be difficult to implement as the current database is already running on oracle and hence oracle DBMS is already there. This system will reduce work load from the IT team reduce potential disturbance of live database through manual connections to the live database. It will improve the decision making of internal users based on the timely CDR availability of analyzed CDRs. The CDRs with an explanation of the rules, filters, and analysis parameters will make it easier to identify where incorrect filters, and the like. have been applied. The potential users and management of the IT department have shown zeal towards the system, suggesting that its user acceptance will be greater with the support of most of the stakeholders of the proposed system.

1.7 Conclusion

The CDR mining and analysis problem has been well spelt it this chapter and has been noted that remarkable benefits will be enjoyed by the users if the system is developed.

This chapter has introduced the project by clearly identifying, formulating and stating the problem definition, aims, objectives and justification of the proposed system. it is now important to come up with a project plan for the identified problem.

2 Chapter 2: Planning Phase

2.1 Introduction

According to Koontz, H et al (1968), “Planning is deciding in advance - what to do, when to do & how to do. It bridges the gap from where we are & where we want to be”. A plan is a future course of actions. It is an exercise in problem solving & decision making. Planning is determination of courses of action to achieve desired goals.

This chapter is focused on why build the system, a critical analysis of whether it is worth-while building this system and a clear plan of how proceed with the research study. It critically tests to see whether the development of the system should be continued; there is a focus on the system's business value, its contribution to the organization which are tangibles and intangibles, if the organization will experience any losses due to the investing into this system. This chapter will focus on the feasibility of the system technically if there is sufficient technical know-how and expertise. Economically if the organization will benefit materially, gain a monetary benefit from the introduction of the system directly or indirectly. The social groups affected indirectly or directly if they will positively advocate for the system and find it useful. Lastly a work plan will be created.

2.2 Reasons for building the system

The fast changing business environment is one of the greatest influences contributing to the building of the system. Information needs to be made available and well-presented when needed so that the internal customers can make decisions that they need to make immediately. Whether be it fraud mitigation by the external users, could be the police and the like. According to www.telephonytp2013/businessnewsdaily.com (accessed 22 August 2013), The information should be presented as soon as required. This also applies to users inside the organization from network designing which require to make immediate analysis and decision to contributed to business continuity and for example the system may help identify lost CDRs which is lost money because a CDR mean money, it's a record of money.

The building of this system has been highly propelled by the frequent requests from the internal customers who constantly require filtered data and analyzed data as per varying requirements.

Further and most importantly the processes of data collection filtering and analysis has been time consuming and highly disturbing to the system administrator of the billing system and the interconnection department as the queries change they require varied time frames to be accomplished and terribly disturb other constant processes as it moves their concentration from their usual business task and responsibilities to responding to the CDR queries for indefinite times.

This system will enable the systems administrators at Tel-One to have ease of pressure of work as they will not conduct manual CDR mining anymore. The development of the CDR mining and analysis is a further extension of the current systems available at the organization which supports telephony business within the organization, thus this will add more business value in to the organization.

The system will now provide a dynamic and flexible CDR mining for the respective users which is automatic and instant and provide an explanation for the results so that the customers get the information they need and how they need it, pronto (where and when needed).

2.3 Identify business value

According to Sward. D, (2006), he defined business value as “the benefits that can be achieved by embarking on the project that will increase the goodwill of the business in terms of efficiency and effectiveness.”

The system development will cause the business to react much faster to the queries and mitigate fraud and eventually gain greater control over the business processes. The system administrators will be afforded a job description more stable and less indefinite process and allow them to concentrate more on their core job description tasks.

This system will cause an increase in the confidence of database reliability as the analysts will no longer access the live database directly as will exposes it a great risk of disturbance and more.

The CDR system is a value adding system which will add material value to the business by enhancing the current systems and reduce risks which will potentially cause losses which can be converted into great money values.

2.4 Feasibility Study

Bentley, L and Whitten, J (2007) he defines feasibility as, "the analysis of a problem to determine if and how it can be effectively solved. Feasibility study is the process of determining whether the system to be developed by the system developer offer solutions to the defined problems."

The Feasibility study helps to critically analyze the worthiness of the system based on four perspectives namely Technical, Economic, Social and Operational. The analysis is examined below. For a system to pass feasibility it should score satisfactorily in the mentioned perspectives. It is not an insane practice for organizations to indulge into projects which may seem to be economically unfeasible in the current times because sometimes business comes at a cost when your competitors become skilled and acquire high-end technology, organizations may end up acquiring them as they have become costs of doing business, or else acquire this technology ahead of others to become a world class leader in the respective industry and as if kill competition. Otherwise it is essential that a project passes economic feasibility and all the other feasibility study perspectives for it to be undertaken by the organization with poise, self-assuredly.

2.4.1 Technical Feasibility

Norman, R, J (1999), he cites that "Technical Feasibility is the measure of the practicality of a specific technical information system solution and the availability of technical resources. It measures the extent to which the system can be successfully designed, developed and implemented given all technical constraints"

Analysts and programmers that are ready to contribute to the development and support the implementation of the CDR mining and analysis system are there and the analyst has had a good history of such project development and control of such systems. The analyst has also had an

industrial experience working in the telecoms environment for 12 (twelve) months in the respective organization Tel-One and a 5 (five) months industrial experience in the respective department that the system is intended to be implemented, IT Business Systems department for Interconnection Systems administration and management. This will form a very strong interface for easy relating between the parties forming a strong interface between the analysts and the programming team. Through-out the whole organization all the users are computer literate and a considerable ratio is skilled in ERP systems currently being used hence very little user training will be required.

2.4.2 Economic Feasibility

According to Castro et al (2002) he propagates economic feasibility as, “a method to find out whether the benefits expected from the new system outweighs the incurred costs of carrying out the project”. For economically feasible systems the system should overall result in an excess of benefits over costs to pass the economic feasibility study hence otherwise a cash-flow sensitive organization may discredit it due to its demand for more money resources but may be forced to conduct further study based on the value it may bring the

The CDR system is a value adding system which will add material value to the business by enhancing the current systems and reduce risks which will potentially cause losses which can be converted into great money values.

Table 2.1: Economic Feasibility Test

Estimated Cost Item	2013	2014	2015	2016	2017
Currency	US\$	US\$	US\$	US\$	US\$
Tangible and Intangible Benefits					
Reduced risk from live database *see notes (calculated as per Earnest and Young conventions for risk provisions)	5000	5 000	5000	5000	5000
Increased customer satisfaction *see notes	5600	5600	4800	4800	4800
Theft control and fraud recovery	10000	10000	9800	9800	9800
Total Tangible and Intangible Benefits	20600	20600	19800	19800	19800
<u>Developmental costs</u>					
<u>Personnel Costs</u>					

Systems Analyst (400hrs@\$10/hr.)	4000	0	0	0	0
Programmer (300hrs@\$10/hr.)	3000	0	0	0	0
User Training *see notes	1000	0	500	0	0
<u>New Hardware equipment bought</u>					
20 New computers	Already available	0	0	0	0
1 servers	2000	0	2000	0	0
UPS	Already available	0	0	0	0
UTP cables	Already available	0	0	0	0
<u>Software</u>					
MySQL database server	50	0	0	0	0
Adobe Dreamweaver	50	0	0	0	0
Total Developmental Costs	10100	0	2500	0	0
<u>Operational Costs</u>					
Analyst Programmer (Maintenance)	1000	2000	2000	2000	2000

*see notes					
Computer Usage	0	500	1000	1000	1000
Database license *see notes	500	500	500	500	500
Equipment Maintenance	0	1000	1000	1000	0
Total Operational Costs	(1500)	(4000)	(4500)	(4500)	(3500)
TOTAL BENEFITS	20600	20600	19800	19800	19800
Less TOTAL COSTS	(11600)	(4000)	(4500)	(4500)	(3500)
NET BENEFITS	<u>9000</u>	<u>16600</u>	<u>15300</u>	<u>15300</u>	<u>16300</u>

Notes

- **Data base license**
Cost is expected to increase due to the increase in the users allowed to access the system. In the following year concurrent users are expected to increase as the system will have gained sufficient acceptance and users have gained confidence and are comfortable to use the system and exhaust its full potential. The number of users will fill to maximum possible capacity.
- **Maintenance Fees**
Estimated to initially prevail in the second month and maintain a constant cost through the years.
- **The Analyst Programmer**
Costs are expected to increase for the same reason with introduction of new client base group
- **User Training**
Includes costs of refreshments and snacks for the initial training for all the users across the regions, the later will be a provisional training fee suppose any major changes need to be done and also for training due to changes from maintenance activities the cost will be summoned to cover any means to be used to communicate and train the users of new utilities or changes as forth.
- **Increased customer satisfaction**
Value added by the system is expected to increase the subscriber base of Tel-One through increased customer satisfaction by the value added by the effective response of CDR mining re quests more over the usage of the system will improve the quality of the network by helping to monitor the network, by analyzing call routing calling behaviors patens and trunk sizes through the effective use of the system.

a) Return On Investments (ROI)

According to Alvarez (2007), “Return on Investment determines the lifetime profitability of different investments”. A positive ROI shows that a project is viable as there will be a return to the initial investment while a negative ROI shows that the project is not viable as there will be no return to the initial investment. Since the ROI is highly positive, this suggests that the project is viable.

$$\left[\frac{(20600+20600+19800+ 19800+19800) - (11600+4000+4500+4500+3500)}{(20600+20600+19800+ 19800+19800)} \right] * 100$$

$$\text{ROI} = 65.223\%$$

Advantages of return on investment

- It measures the rate of return on investment on the overall project.
- It is a simple way of calculating return on an investment

Disadvantages of return on investment

- It ignores the timing of costs and benefits
- Does not take into account the time value for money

b) Net Present Value analysis

Many scholars defines it with many jargon but in another simple way, Randall (1996) simply puts it across as “the value an investment must represent today on a discounted cash-flow basis to make an investment worthwhile after taking into account the cost of the investment”. NPV is an appraisal technique with discounted cash flows by which adjustments are made to take into account the reliability of the project and realizes the time value for money in the project flows. It makes use of the discounting rate factor. It does so by discounting the future cash flows by a percentage known as the Discount Rate. This method is mainly applicable where cash flow projects are for a number of years and not only for one year since it might be misleading.

Fomular;

$$\text{Net present value} = \sum \text{yearly Cash flow} / (1+r)^n$$

Where n = base year, r = discounting rate

$$r = 0.09$$

$$\frac{\sum (9000+16000+15300+15300+16300)}{(1+0.09)^n}$$

$$= \frac{\text{value of discounted cash flows at year 5}}{= \$46730.06}$$

Advantages

- It takes account of the time value for money
- Can determine the profitability of the whole project.

Disadvantages

- It ignores the returns on cash flow if a project pays back early or late.
- Discounting rates are simply fictitious because it's a mere estimate.
- Coming up with a discounting rate in itself can be difficult

2.4.3 Social Feasibility Study

According to Dennis (2010) specifies, the main aim of social feasibility study is to evaluate how the project is likely to impact on the stakeholders at large. Social feasibility focuses on identifying the project beneficiaries other than the company and its clients but considers the wider society". Evidently social feasibility study attempts to analyze how the system acceptance is likely to prevail. It looks at the users and other stakeholders of the system how they will be affected by the proposed system as it is implemented and how they will likely respond to such.

The people within the organization who frequently require CDR information will like the system and it will most unlikely face resistance as the users have pleaded for such a tool which will

allow them to serve the interests of their customers, without seeking assistance from the IT department. The IT team will advocate for its internal customers to use the system as it will reduce them from the burden of workload by divorcing them from tasks of CDR mining and analysis.

2.4.4 Operational Feasibility

According to Michele, E (2008) he cited “operational feasibility aka known as organizational feasibility, deals with the effects of the system on the stakeholders in the organization and whether the system will be a welcome development to management”.it attempts to study how the system will impact on the business processes and operations. A system that fails in this study will be one that falls short to fuse into the complex processes in the operations of the organization or one that will fail to simulate the organizations processes or ones that will require a change in organization stricter business re-engineering where the stewardship of the business are reluctant to do so. But however it remains for the analyst to advise; According to Michael Porter (2007), ”or organizations to completely embrace the power of IT and accomplish their vision of being the world class leader in their industry they will require to conduct business re-engineering”, D’Aveni (2007) in his study towards the information systems triangle where business strategy aligns with organizational strategy and information systems strategy and causing shifts in business processes.

The system will help complement business activities for example fraud analysis by a mere looking at the results from analyzed CDR Data even sending complex queries which the system can respond to with ease..

2.5 Work plan

Work plan is a timed schedule for events used to control the commencement of a project. Gantt came up with such a by using pictorial depiction of the schedule of events for a given project based on a chart. The one which became famously known as the Gantt Chart,. Michele, E (2008) The researcher implemented the Gantt chart to illustrate the schedule of events.

Start date of plan ... 08 August 2013

End date of plan ... 15 October 2013

Table 2.2 Gantt Chart for proposed system development

DATE/PHASE	week 1	week 2	week 3	week 6	week 10	week 11	Week12
Proposal							
Feasibility							
Analysis							
Logical design							
Physical design and development							
Testing							
Implementation							
Documentation							

Source: Michele, E (2008)

2.6 Conclusion

The project plans have been clearly set out and all tests on the validity of the thesis have been conducted and the project has passed as feasible hence it is now encouraged to continue with further research into the project by gathering more fact for the project.

Chapter 3: Analysis Phase

3.1. Introduction

This chapter focuses on the analysis of the current system where we conduct a detailed study of the current system. A critical analysis of the current system is conducted in this section. It shall highlight the various methods used by the analyst to gather information of the current system, called fact finding techniques. It will help the analyst to gain an in-depth understanding of the current system from various angles through various fact finding instruments e It also is going to depict the current system by the use of DFDs and context diagrams and the current systems weaknesses. The chapter will also further explore other options to evaluate if building a new CDR mining system is the most suitable option than other means of acquiring a CDR mini and analysis.

3.2. Information gathering methodologies

According to Jefery (2007) Information gathering is the process of acquiring information about present situations so as to gain an understanding of the state of.

The analyst carried out an interview, issued out a number of questionnaires and further more carried out an observation study on the IT team as they reacted to CDR mining tasks that they were presented with for a span of 6 months during his time of industrial attachment, and a further 2 weeks of critical analysis. The analyst used the following fact finding techniques in order to gain a fair appreciation of the current system;

1. Interview
2. Questionnaires
3. Observation

3.2.1. Interview

According to Kumar (2008), an interview is a conversation between two or more people where questions are asked by the interviewer to elicit facts or statements from the interviewee, the interview types range from structured to unstructured. In a structured interview, the researcher asks a set of predetermined questions, using the same wording and order of questions as specified

by the interview schedule and structured interviews were used to solicit ate information from the system users. Evidently;

This is a fact finding technique by which the Analyst structures a set of questions to be asked to the users of the existing system to be able to gain an understanding of the current system, how it works, the data storage and mediums used ,currently how data moves through the various process within the system and its state the processes involved and the like to be able to craft an understanding which can simulate the processes to devise plans of addressing the problems of current system.. The analyst chose this technique as first choice because it is an exchange that helps the analyst to get an overall understanding for the current system physically, logically and functionally. The technique is usually the first fact finding technique used as it gains a greater understanding towards a phenomenal and unlock an outside the box appreciation towards the subject. The interviewer will have room for probing (asking questions to further understand) and in effect will have a concise logical understanding of the system.

Five arranged interviews were carried out on the days of Monday the 12th, 13th, 16th, 19th August 2013. In all cases the interviewer being the analyst.

Interview one was conducted by the analyst with the IT Billing Server personnel at Tel-One. The interview was scheduled 12th August 2013 from 9.00am to 10.30am which it occurred and was very fruit-full. It enabled the analyst to understand how the CDRs are collected and preserved and the nature that they take during and after processing.

Interview two was conducted by the analyst with IT interconnection server personnel at Tel-One. The interview was scheduled 12th August 2013 from 11.00am to 12.30am which it occurred and was very fruit-full. It enabled the analyst to understand how the CDRs are collected and preserved and the nature that they take during and after processing which will be used for use against business partners on the international scale the business partners being other telecoms companies that the organization does business with.

Interview three was conducted by the analyst with a Network design personnel at Tel-One. The interview was scheduled 13th August 2013 from 9.00am to 9.30am which it occurred and was very fruit-full. It enabled the analyst to understand the various CDR data that the Network design

department regularly needed and how they usually would request for such. From time to time the data would enable the personnel to produce information, usage for a particular trunk.

Interview four was conducted by the analyst with the Customer Services Officer at Tel-One. The interview was scheduled 16th August 2013 from 9.00am to 9.30am which it occurred and was very fruit-full. The interview enabled the analyst to find out the processes that are involved from when an external customer requests for call information and the formats it is then presented in and how it is made available to the customer.

Interview five was conducted by the analyst with an external customer (subscriber) who intended to obtain an itemized telephone bill for land line (fixed subscriber line) at Tel-One. The interview was scheduled 19th August 2013 from 9.00am to 9.30am which it occurred and was very fruit-full. The interview enabled the analyst to find out how the customers felt about the current service, how long it took for them to get the itemized bills and if the information it presents is useful enough for their needs.

The interviewing technique was successful in gaining the needed information but during the way the following pros and cons were witnessed by the analyst also see appendix

Advantages of using Interview

- The interview enabled the interviewer to obtain non-verbal cues of the interviewee such as body language for example reluctance to release information that is private or sensitive
- The interview enabled the interviewer to gather facts of interest raised in the interview by the interviewer's answers and build more questions along that direction.
- The interview made the interviewer feel as if he/she is part of the development process this caused motivation and enthusiasm which lead to the interviewers participating more going a further mile as drawing the logical flow of CDR files currently used in the system.
- The Interview may be impractical due to the location of interview. However the analyst conducted the interviews at the interviewees' respective offices on site. During the course of the interview the interviewee took the analyst for a guided tour to understand more on the processes involving the data in question for his research study to become much practical as

well as the relevant equipment and systems. This made the interview more practical and improved the gathering of facts upon the system.

Disadvantages of using interviews

- An interview is critical, it required careful planning for it to be successful and gather the correct data, as so it took continuous good analysis of what the analyst intended to get out of the interviews and how exactly to ask for such in the most appropriate manner, this meant skillfully plotting questions.
- Interviewing is very time consuming and therefore it is a cost involving and reduces production as it takes the employees off their work, this initially poses a disturbance to the interviewer who works under pressure or needs to meet deadlines that the interview may be consuming his time. Hence interviews need to be planned well ahead so that the interviewee has already set aside for the interview in advance and is not disturbed from his work.
- Success of interviews was highly dependent on the systems analyst's interpersonal skill as the interviewees' kept on drifting off the expected course of the interview and sent various body language from reluctance to give off private information to excited this requires skill to keep the interviewees interested and motivated to give off information, to maintain participation. The interviewer should use the non-verbal cues to drive the conversation and ponder on his agenda objectively.

3.2.2. Questionnaire

According to Kumar (2008), A questionnaire is a group of printed questions used to collect information from the people who answer them (usually called respondents) evidently;

This is a fact finding technique in which the analyst will have to draw up a set of questions and present them to respondents the respondents will answer the question at their own time and place and return them by casting them into a sealed box. The major emblem of this technique is that it promotes privacy of respondent's response. That is why the analyst decided to imply its usage in his fact finding process, it allowed him to gain information that may be sensitive and or otherwise may have been left uncovered but discovered in a later stages of project development. Hughes and

Douglass (2003) Software Projects Management states, any further elements discovered in a much later stage may be more costly to address otherwise had it not been discovered and addressed earlier.

The analyst set out a number of questionnaires to find out the perception of the external users. The questionnaires would draw up an honest opinion to back-up the responses of the external users interviewed as mentioned above and their personalized opinion, also see appendix

Advantages of using Questionnaires

- Anonymity was promoted as is in most questionnaires asked will give an honest opinion rather than when the respondents knew that they were being observed their responses will be biased.
- The respondents gave honest answers and used their own pace so they gave an honest and relaxed response.

Disadvantages of Questionnaires

- There was no room for asking questions, where some answers given were not clear hence some respondents ended up responding with spoiled answer that is. not applicable answers or not directed to the question.
- The questionnaires restricted the respondents' answer by the guided questioned posed in the questionnaires; hence the customers were only restricted to answering only questions directed to the questions given in the questionnaire.
- The questionnaires used a sample of the population which was assumed to represent the whole population which is however not necessarily true in the real world though it gave an idea from the sample of the selected target audience.
- Some questionnaires that had unclear answers were considered as spoiled questionnaires, and hence the patient's opinion was lost

3.2.3. Observation

According to Kumar (2008) This involves a direct interaction and observing how people work in the existing system and how the existing system itself works. Evidently;

This is a fact finding technique in which the analyst gains an understanding of the current system by mere perceiving the respondent as he carries out his regular activities being investigated that is all processes concerning CDR data mining activities and analysis and noting down key elements, facts found. In this technique the users of the current system are observed by the analyst/interrogator to gain a firsthand insight of the actual system fragments or comprehensively, its processes and procedures and how it works, the problems associated and the flaws within it.

Lastly to get the part of the system analysis together an observation was conducted on the 21st to 23rd August 2013. The analyst had an industrial attachment for six months where he had another 6 (six) months understudying billing processes and handling CDR requests and billing processes. The observation conducted here was to fully study how other IT personnel reacted to the CDR data-mining process requests, also see appendix

Advantages of using Observations

- Observation presented firsthand information of how IT personnel reacted to CDR mining requests the processes and sequence of procedures.
- The observation did not require any planning
- The observation is a production conscious technique; it did not cause any loss of production or compromise CDR mining and analysis time for the IT personnel during the course of the observation.
- It provided a practical implementation and validation of facts gathered in the interviews giving a better understanding of the system practically.
- The observation offered clarification and identification of certain system elements which had been in the interview, as well as Identify inherent traits of the miss-harps in the system like the fragments of mined CDRs which may be duplicated in various formats during mining processes.

Disadvantages of using Observations

- Some of the attendants acted biasedly when they were observed because they knew they were under observation.
- Some clarification was required here and there which declared interrupting the on-going process.

3.3. Analysis of existing system

Having gathered and obtained the necessary information utilizing each of the information gathering techniques, analyzing the gathered information to come up with process and data models of the current system used. The analysis process covered the analysis of inputs, processes and outputs of the system obtained during information gathering. The major aim of this process was to understand the current system so as to develop a blueprint for the development of the new system. , the result of the analysis is as follows.

.An individual subscriber makes a call. The call details is captured by a switch at the relevant exchange and relayed until it reaches the billing server for billing to be conducted. Situation may arise where the users internal to the organization (Network Design Department, interconnections department and the like.) and external user's subscribers, police and other bodies may require call information. When such a situation arises the customer will make such a request which will be issued, external customer via Customer Services Officer and internal customers via the respective departments' manager and approved by the data administrator in the IT department. Once the request is approved it is submitted to the IT personnel for data mining to be conducted and an analysis is carried out. The IT personnel will forward the response to; for internal customers, to the respective departments' manager who will forward it to the relevant customer who made the request. For external customers it is forwarded to Customer Services Officer via mail or hand collection. Call Detail Record is very sensitive information for whose use is only restricted to the Network Design, IT, Interconnections departments' use only. Any other departments requiring use of the data will have to issue a written request to the Technical Director himself and gain a response based on his response. No one is allowed to conduct a mining request request a query which will exceed the number of preset records allowed to his profile.

During the actual process of CDR mining, CDR data is captured by a switch at the exchange. The CDR is forwarded by NIS (Network Inventory System -the system itself is a large multi-use telecoms system responsible for full billing process and network equipment inventory) to the billing server. IT personnel will conduct a manual connection to the data base and implement the use of generic tool to mine the data and analyze it in a form required by the customer as per the presented request. The IT personnel will copy the CDRs from the live billing server database via the manual connection to the live database and copy the CDRs to a local disk that is work station. The data is saved in file and analyzed via different general purpose software.

3.4. Process Analysis

According to Burkan (2005) “An activity diagram illustrates the dynamic nature of a system by modelling the flow of control from activity to activity. It represents an operation on some class in the system that results in a change in the state of the system”. Typically, activity diagrams are used to model workflow or business processes and internal operation in the mining and analysis process. It illustrates how process control will be retained and handed over to spawning processes.

ACTIVITY DIAGRAM FOR THE PROPOSED SYSTEM

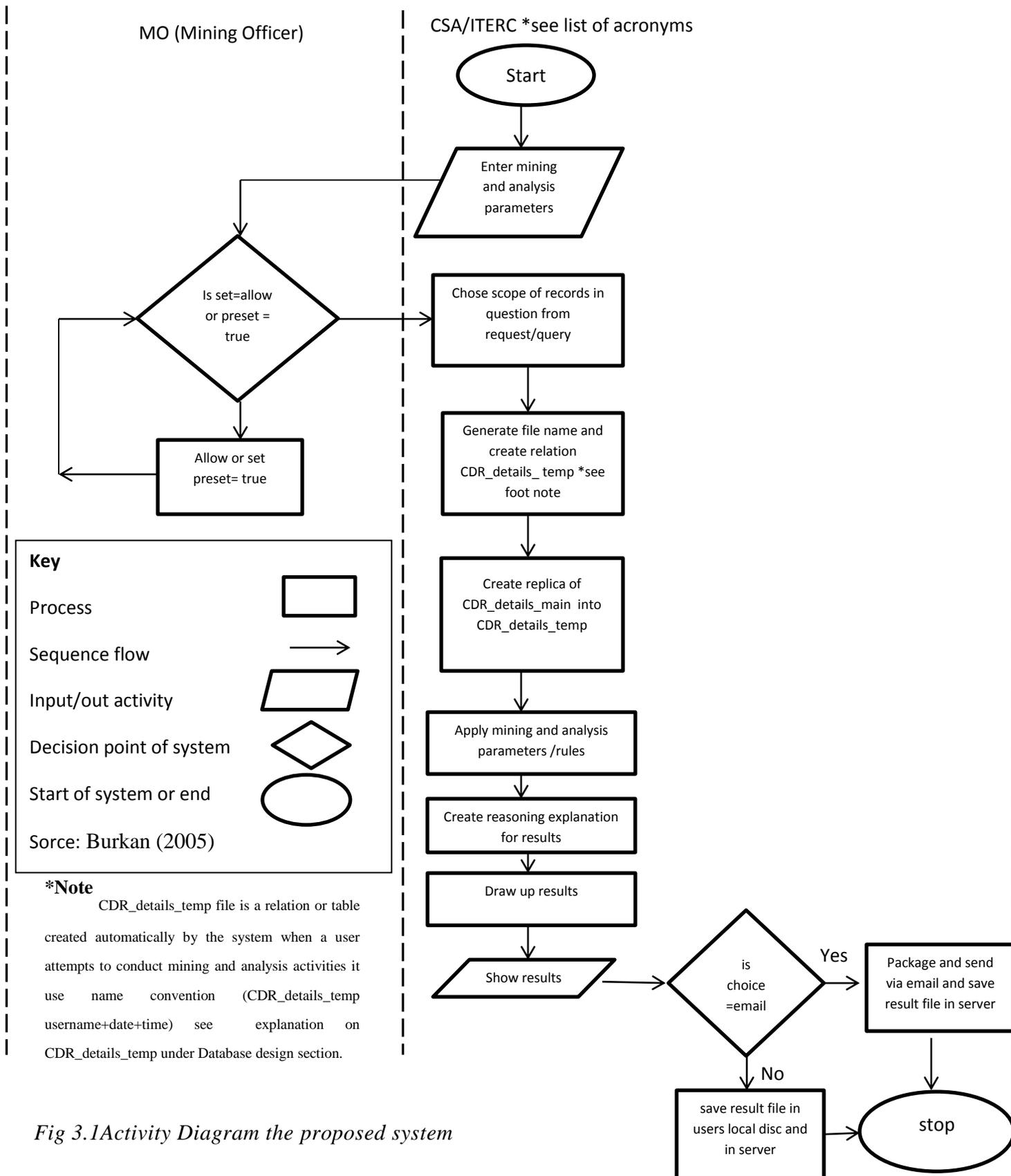


Fig 3.1 Activity Diagram the proposed system

3.5. Data Analysis

Kumar (2008) defines data analysis as the process of evaluating data using analytical and logical reasoning to examine each component of the data provided. This form of analysis is just one of the many steps that must be completed when conducting a research experiment. Data from various sources is gathered, reviewed, and then analyzed to form some sort of finding or conclusion. There are a variety of specific data analysis method, some of which include data mining, text analytics, business intelligence, and data visualizations.

3.5.1. Context Diagram and DFD

According to Bentley (2001) System Context Diagram (SCD) in software engineering and systems engineering is a diagram that represents the Actors outside a system that could interact with that system. This diagram is the highest level view of a system. All entities are either people or external systems and the major process in the middle will be the system itself and no data stores are shown in a level 0 DFD.

The symbols used by the Data flow diagram are as shown by the key

DFD KEY

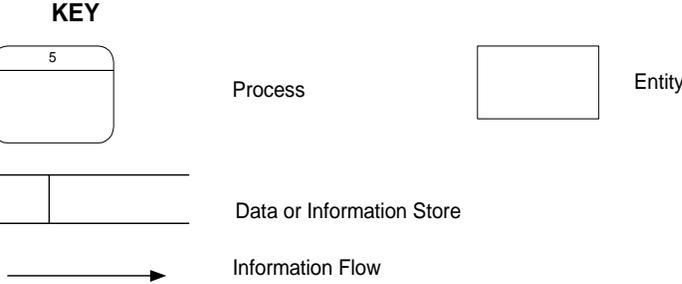


Fig 3.2 Key for Context Diagram

CONTEXT DIAGRAM FOR CDR MINING AND ANALYSIS SYSTEM

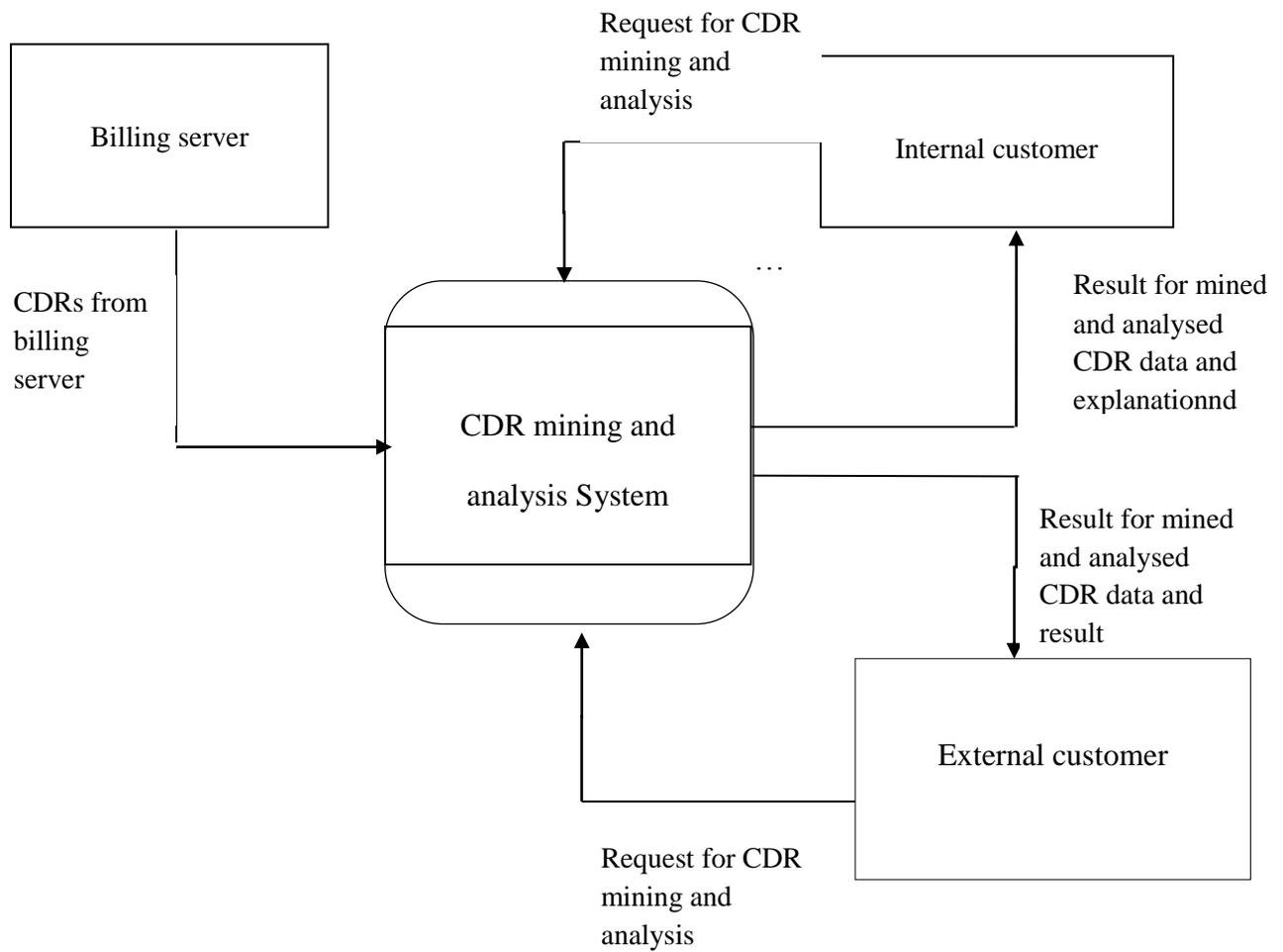


Fig 3.3 Context Diagram/level 0 DFD for CDR mining and analysis System

3.6. Weaknesses of current system

Currently CDR data mining and analysis was being done manually by the use of generic general purpose tools and the data had to be imported to a text-pad file for use and manual calculations will be conducted on that data analyzed. This system had many inconsistencies late-lone to mention the processes of requesting the CDRs and the complete set of sub processes to ensure the result of the request was sent. This section analyses the weaknesses of the current system critically and the later will break them down into functions of the system aka functional requirements.

The system had the following challenges;

- It takes too long for CDR mining request to be approved and to be responded to as the request has to go through many channels for approval before the request is actually processed. Generally, the flow process of CDRs request and feedback takes long.
- The data mining process takes too much employee time and processor time for the IT personnel conducting the CDR mining because the process is conducted on the IT personnel's workstation (work desktop PC) and the processor time on his machined is greatly chewed and he is un able to conduct other processes until the CDR mining process is complete
- The process of CDR mining will take time and requires accuracy and as it is done by a human, problems of human error are inherent the current system however will face such a challenge.
- Sometime the IT personnel may forget what was the mining rules applied to arrive to a particular result of mined CDR data. The system does not provide an explanation of the results stored.
- The CDR mining process required that the IT personnel conduct a manual connection to the live database which contains the CDRs, this causes a completely high risk to the live database, as the database will be prone to being subjected to harsh changes which will cause

ail effects to the organization. This is as if a light phenomenal from a general eyes perspective but very critical if you understand it from the light of the importance of the data. This server keeps the most precious data of the whole organization which is the only data most closely related to money values. Hence any such potential vulnerability should be minimized at all costs.

3.7. Evaluation of Available Alternatives

In the context of the system proposed by the requirements the organization has three options to acquire such functionality. The organization can either outsource the system from another organization, improve or consider the systems analyst to develop another system to bridge this gap in the organizations' business systems. The options are further evaluated in detail as follows scholarly;

3.7.1. Outsourcing

Lewis (2006) defined outsourcing as 'the transfer of an internal service function to an outside vendor'. In its most basic form, outsourcing is a fancy term for having someone else to do your work. Outsourcing is buying a software package that will be developed, tried and tested by an external company. This is generally referred to as the process of subcontracting another firm or organization to create a new system.

Careful considerations have to be taken into account before such can be opted.it was not recommended to indulge in outsourcing for the system for the many disadvantages stated.

Advantages

- The system will be made available and the system will be delivered in very little time.
- Requires less technical staff.as such IT personnel and the analyst as well as the other individuals will be relieved and can still work on other equally important tasks brought to their attention

Disadvantages

It is not recommended to subcontract for the following reasons that were established through research

- Threat to company confidentiality and security is greatly increased since inner company information is let out to strangers, (for example knowledge like CDR company drawings and formulas) CDR is vital and top classified data to the organization and hence subcontracting such an area is already of tremendously fruitless debate.
- The control of certain parts of the organization that the system has been subcontracted might be lost to the subcontractor since they will be the ones in charge of monitoring the section, in this context CDR mining and analysis section..
- Hidden costs are inevitable as there are other costs that may be incurred other than those specified in the contract of subcontracting. Further costs may be incurred when the company wishes to review the costs in the light of the aforesaid costs not covered by the contract.

3.7.2. Improvement

According to Lewis (2006), "This involves restructuring of the current system and trying to improve its efficiency". This is the process of trying to improve the current system by perhaps adding new modules. Not necessarily every system can be improved to meet certain requirements other than it becomes improvement by extension. The NIS system can be changed improved by extension to meet the requirements stated but it comes at a great cost.

- The organization will have to pay for additional licensing
- The organization will have to pay for the programmers expenses and programmer time
- The organization will have to wait until the agreements have been made and agreed which will take time because the owners of NIS are a multinational and NIS itself is a big system
- Integration will be very complex because the system is big
- The organization becomes too dependent on one system
- The organization will have to pay additional license fees for that module.

3.7.3. Development In house

Lewis (2006) identified in-house software development as a software package developed to handle information requirements for a specific type of business. The firm can create a computerized information system that is specifically for Practical Action. Based on the alternatives' evaluations and results of the feasibility study carried out, It was resolved that the new system be developed because it promoted security of classified data which the system mainly deals with and that control of such should be retained at all times by Tel-One. The system is less costly to develop. Below are more merits to the development of the system.

- Security of classified data CDR is promoted.
- The organization will not have to pay additional license fees for that module.
- Implementation and integration will be very simple as the system depends only on the billing server and stands alone. System will be developed in-house tis makes it easier to implement that is the integrate proposed system with existing system and technology.
- The organization spreads its strength among independent system hence NIS may not monopolize the organization for controlling a big arms IT systems in the organization.
- The Skills of the development team will be improved by the development of the system.
- It is less expensive to implement this strategy since the development team will be part of the company's workforce.
- The in-house development is well in line with company budgetary constraints.
- The developed system will accurately meet constraints of existing system and technology, as it will be crafted by the personnel who actually faced the problem.
- Since documentation is produced at the end of the project, system support can be easy and maintainable by other personnel (not necessarily those who designed the system).
- It can solve unique user requirements as users will be involved in the development of the system and contribute what they require
- The system designed will conform to the needs of the firm leading to the design of a system that will be effective and efficient.

Disadvantages

- In-house system development is time consuming.
- The organization suffers all the risk if the project fails, quoted from Bob Hughes and Mike Cotterell (2003) in Software Projects Management.

3.8. Requirements Analysis

This section analyses the requirements of the proposed system. It can be understood as the strategy to building blocks of the proposed system. The requirements are spelt based on functional and non-functional basis.

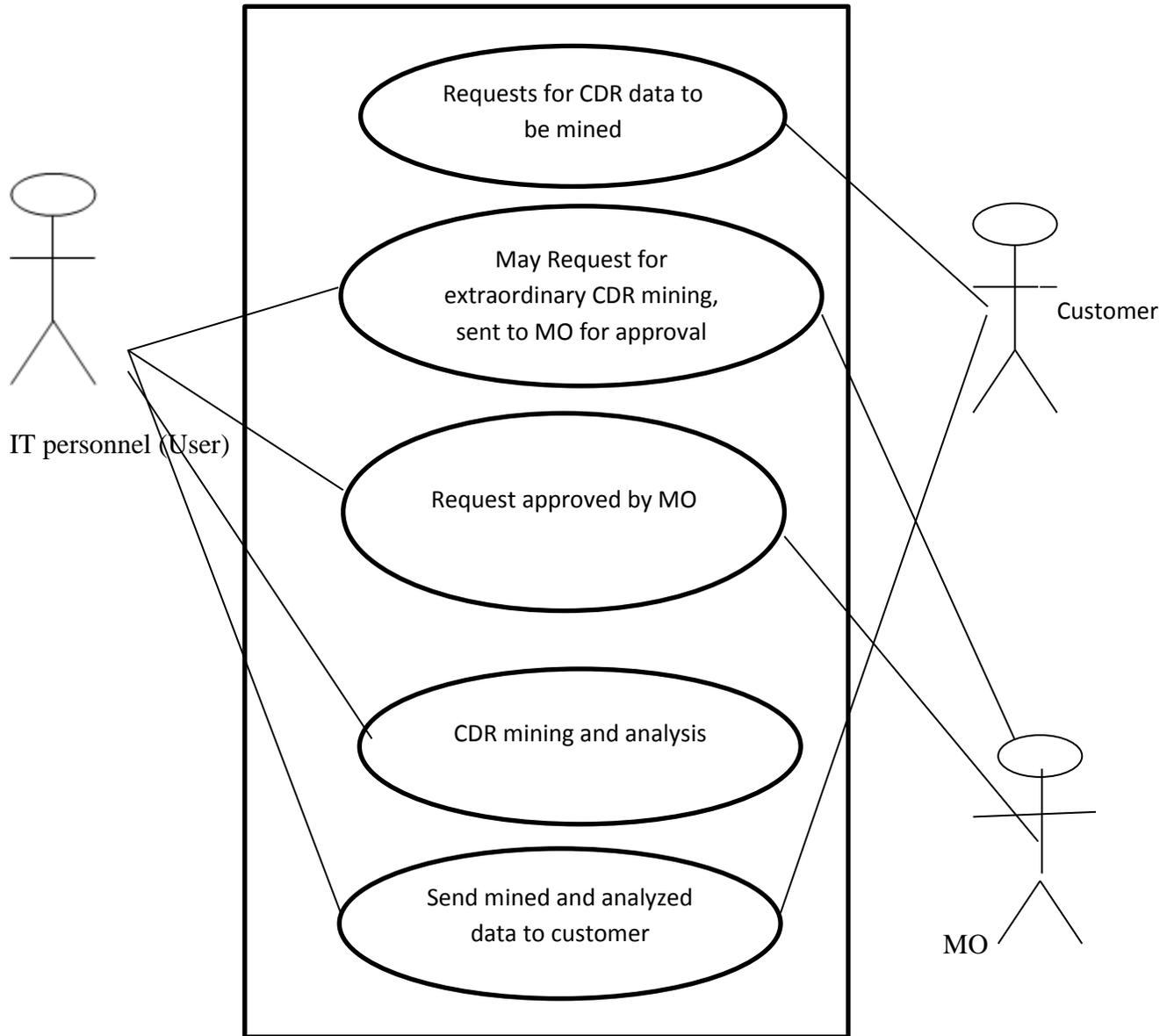
3.8.1. Functional Requirements (Use Case diagram)

According to Chung, Brian, Nixon and Eric (2000), the functional requirements (also called functional specifications), define the capabilities and functions that a System must be able to perform successfully. These are basically a list of functions to be created in the system. These can be used as points of measure for the system to measure progress. They ensure all the requirements of the system have been met and included in the system. The system requirements will be depicted using a use case diagram

USE CASE Diagram

According to Shelly, Cashman and Rosenblatt (2009) they described a use case diagram as a diagram that visually represents the interaction between users and the information system. Use case diagram is a pictorial representation of the processes in a system. It shows the actor that are involved and the processes that they conduct, this show an Arial view of function inherent in the system. This is the starting point for drawing up function requirements.

USE CASE DIAGRAM FOR CDR MINING AND ANALYSIS PROCESS



*Note MO (Grants Preset for max allowed results in a mining and analysis session)

Fig 3.4 Use Case Diagram for CDR mining and analysis process

Functions

- Create user allowed to access the CDR data and eligible to send CDR mining requests
- User creates a request for CDR mining
- Request approval by MO
- CDR data visual analysis
- Show an explanation of mined data
- Enable Changing mining rules
- Package the result of request and send it via email
- Package the result of request and save it to local disk on workstation.

3.8.2. Non-functional requirements

Security

The system should not at any time allow CDR file of more than 500 lines per particular user as per company constitution else the system will need three passwords from Technical director, Super user of system and the head IT to conduct such on extraordinary situations. This constraint protects CDR data that a promiscuous user may have access and be permitted to mine CDR data and collect big enough data for malicious purposes. The measure ensures such will never occur. The security is further ensured by the use of approvals from the administrator for a mining to be done and a preset approval from the admin can be set too, but with limit of 100 records. The CDR data accumulates at a rate exponential to that so the CDR data is safe.

Error Handling and Extreme conditions

The system should be well validated and crafted with good error handling

Stability

The system deals with a vast database and hence it need a large amount of processor capacity and RAM and a good validation to ensure it runs smoothly and is robust. The system should be well validated to ensure that it does not crash.

Usability

The system should be user friendly and prove usable to even the most trivial computer user. It should be usable such as it must be as easy as possible to define mining rule for the system, like all calls made by 0773 446 556 yesterday.

Operability

The system allow the users to perform the tasks that they require to perform, the system must be effective for example the system must allow the users to send a CDR mining request and receive confirmation with little or no delay and have their query process in a considerably reasonable time of less than a 1second to minute depending on complexity of query.

Performance

The system must provide reasonable response times by reacting to queries in a very short time on the vast database efficiently and making sure that the system meets expected quality of output.

System Interfacing

The system should be highly interactive and user friendly this will encourage users to gain very fast user acceptance of the system and start using it on their own, as explain by Technology Acceptance (TAM) Model by Davis (1996)

3.9. Conclusion

The chapter has unveiled the detailed description of the current system. All the requirements of the system have been sufficiently research and a strong understanding of the current processes functions and data flow have been made. This left it easy for the analyst to begin his designing of the proposed system and its development.

Chapter 4: Design Phase

4.1 Introduction

This chapter focuses on the proposed system. Previous chapters have afforded the analyst to well understand the existing system of how CDR mining and analysis was being carried out at Tel-One, through analysis based on tools like fact findings and pictorially depicting system and its requirements. The previous chapter has made it clear to understand how the system processes will contribute and fuse into the business processes. With that this chapter now focuses how to craft an IS (Information System) based solution. The chapter well understands the processes in the current system and attempts to create a new computerized system consistent with the business processes. The chapter will clearly show how the proposed system will be crafted based on software engineering practices and standards. The system processes and other system elements will be depicted based on tools such as the Data Flow Diagram, System Flow Chart, package diagram and even database architecture. This chapter spells the whole architecture of the proposed system which will guide the development (programming modules architecture nature **and functions and** the hardware infrastructure necessary).

4.2 System Design

According to Puntambekar (2009) “This is the process of defining the components, modules, interfaces, and data for a system to satisfy specified functional requirements and non-functional requirements”. System design is the style by which the software of a system will work interacting with the users and external environment. It usually implies the use of tools like Data Flow Diagrams. System design will show the processes and sub-processes to be involved in the proposed system. It shows the CDR mining and analysis processes and sub-processes. In the proposed system, a request is made by user who is within the organization since the system is restricted to operate based on an extranet for security reasons. There are two normal user profiles ITERC (Internal Employees Requesting CDRs), who represent external customers and the other internal customers.

External Customer

For security reasons the system will be reduced to 'for use within the organization only'. For a request from the external customer to be processed a request is issued to the CSA (Customer Services Administrator). The CSA conduct the mining process if he does not have sufficient preset a request is automatically issued to the MO (Mining Officer). for increased presets to carry out the mining activity together with a summary of the request he intends to carry out The MO will approve the request and the user can continue with the mining processes. Otherwise if a preset is already set by the MO to a sufficient preset level the user can immediately proceed to do the mining without the request thereby making results available pronto

Internal customer

He, the ITERC (Internal Employee Requesting CDR) user directly logs on to the system and conducts a mining and analysis procedure the system checks against his preset limit (total number of records allowed to mine per user at a time) if the request exceeds the preset, thye system immediately alerts the user and produces a request to his superior called MO (Mining Officer). The MO will approve the request and the user can continue with the mining processes. Otherwise if a preset is already set by the MO to grant access to a specific user the user can automatically proceed to do the mining and analysis without any request thereby making results available pronto

Mining and analysis

The user specifies the mining rules and analysis criteria for the system and prompts the mining and analysis processes to begin. After this then the system creates a temporary database table for CDR mining purposes *see "Temporary Relation" in this section. The system mines a snap short of database data from the system (raw CDR records only those in question) and copies it to the temporary database table/relation the full database query for data mining is then applied. The analysis rules are applied. The result is produced. A statement of reasoning explanation is created for the results and presented.

Packaging and Sending

The results are then packed in an excel or text file and sent to the requester via email

A copy of the mined data is kept in the CDR Mining and Analysis database Server.

The temporary relation is then destroyed.

Temporary Relation

For simultaneous mining by many users it is inefficient and risky to mine on the live Main CDR database server. Migrating the data onto a hardcoded relation will mean either one data mining process at a time because each mining process will require to use the table each time or many tables which will violate normalization rules as stated by Software engineering principle by Ralph and Wand (2009).

4.2.1 Context Diagram of the proposed System

Context diagram aka organizational context diagram, According to Bentley (2001) “System Context Diagram (SCD) in software engineering and systems engineering is a diagram that represents the Actors outside a system that could interact with that system”. The SCD is a diagrammatic depiction of the scope of the system. SCD shows the actors called external entities that interact with the system. The SCD for the proposed system will show the people and other systems that will interact with the proposed system. It will also show the data that will be exchanged between the system and the actor in the outside world such as outside the system scope itself. These are where the system may require data and also where the system may produce information for the external entities.

CONTEXT DIAGRAM FOR THE PROPOSED SYSTEM

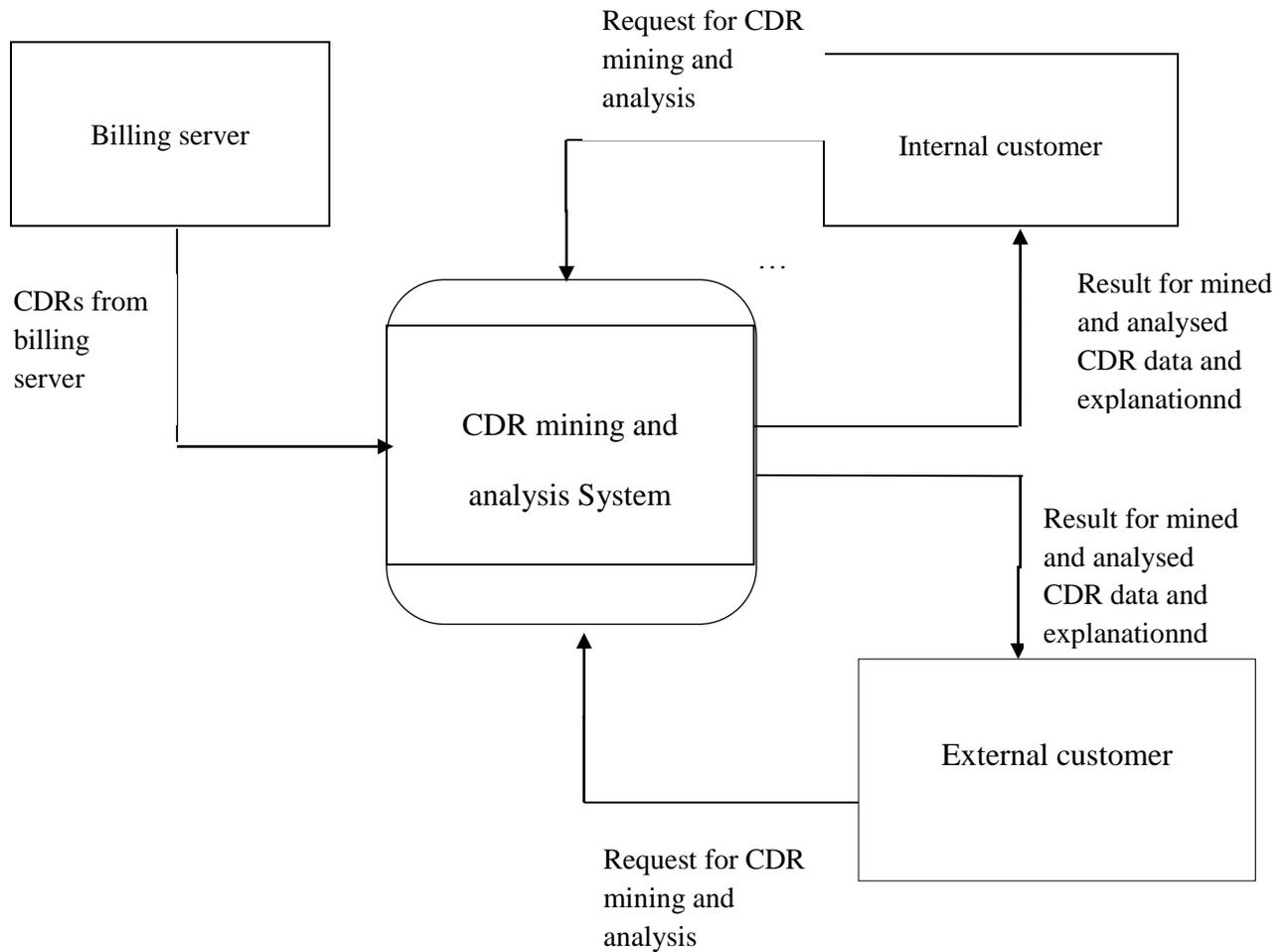


Fig 4.1 Context diagram for CDR Mining and Analysis System

4.2.2 Dataflow Diagram of the proposed System

Bentley (2001) States, “a DFD “Data Flow Diagram” is a graphical representation of the flow of data through an information system as stipulated”. It enables you to represent the processes in your information system from the viewpoint of data. It is a detailed enhancement of the SCD for the system it shows the major processes and sub-processes within itself. It gives an explicit view of the interactions between the system and the entities. It will show the actual processes that the

entities will exchange data with. The system will show the sequence of processes of the CDR mining process the data stores used to store data and the entities.

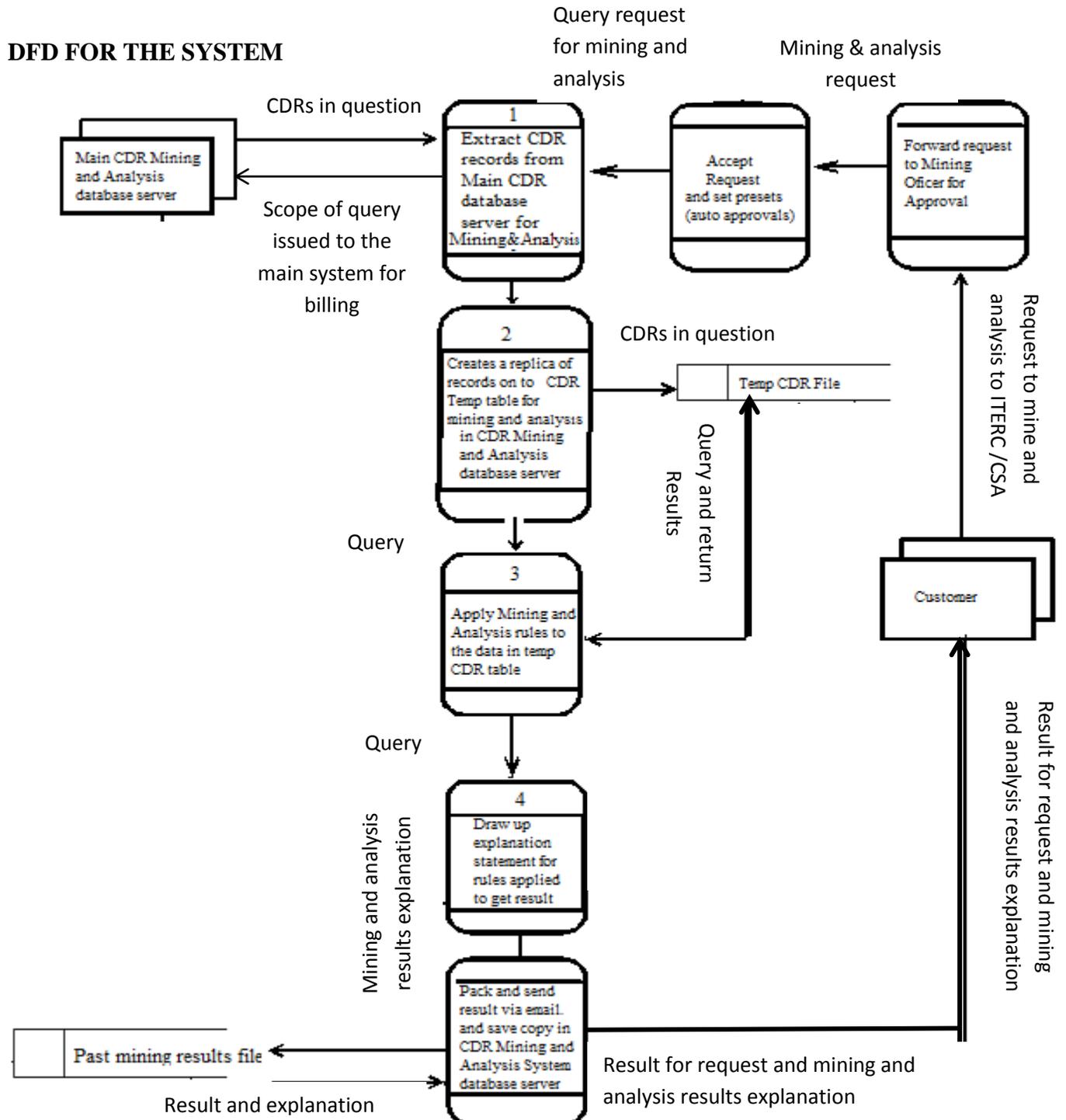


Fig 4.2 DFD for CDR Mining and Analysis System

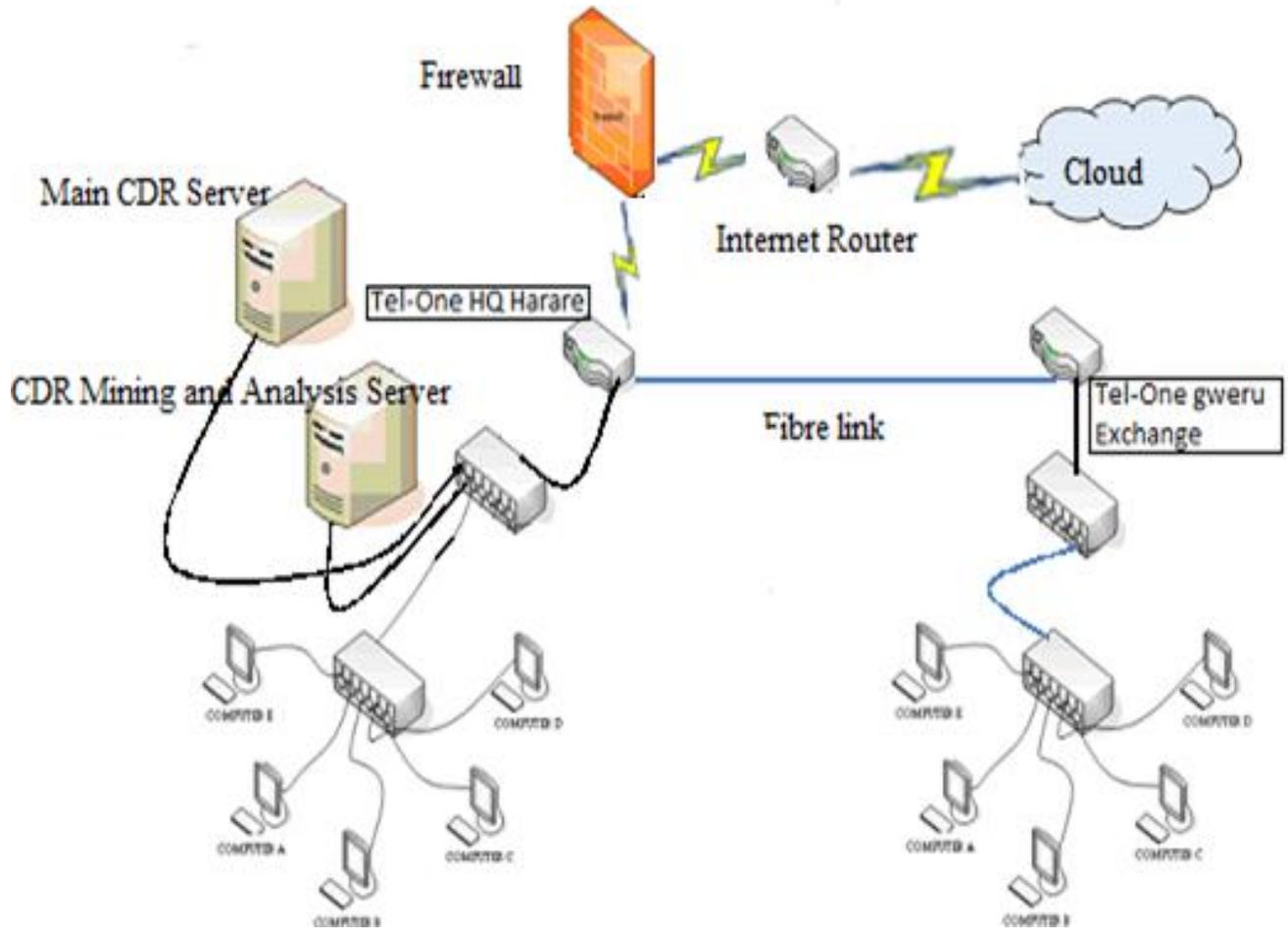
4.3 Architectural Design

Sommerville (2004) wrote; “architecture of a system describes the overall organization and structure of the system in terms of its major constituents and their interactions It can be divided into two different categories which are software architecture design and hardware architectural design”. Carlos and Otero (2003) the software architecture of a program or computing system is a depiction of the system that aids in the understanding of how the system will behave. It is the foundational activity that evaluates and translates requirements (both functional and non-functional) into a collection of design elements that specify structural and behavioral aspects of the major components of the system together with their provided quality and interrelationship required to support the detailed design and construction of systems and products resulting from such activities. The Architecture design identifies the full hardware setup and hardware and software configurations necessary for the system to work, the major system components necessary for the system to operate how they will be connected to each other the several machines involved, people and other elements that help to make up the complete system. This provides a description of the technical platform (environment) on which the proposed system will run. It describes the logical and physical layout of the system including the specifications of hardware, software, data, procedures, and the people to be involved. Next section is the architectural design of the proposed system. A good architecture will help identify design risks and mitigate them early in the development process. It helps minimize bottlenecks in the system caused by hardware, software factors through an analysis of their configurations.

4.4 Physical Design

According to Mishra (2012) physical design is a graphical or diagrammatic representation of a system showing the system's internal and external entities, and the flows of data into and out of those entities. This involves the translation of the abstract logical model into the specific technical design. It is the design of the hardware and software that the proposed system is going to operate on. The architecture design shows the minimum requirements needed for the proposed system to run. The sections show the hardware platform required by the system. The configurations need to be accurate for the system to cooperate correctly and not produce any ailments during uptime.

Tel-One CDR mining and Analysis System Network Layout



Source: Sommerville (2004)

Fig 4.3 Network layout for the proposed system

4.4.1 Network Software and Hardware Configurations

Table 4.1: Network Configurations

Item	Specification
------	---------------

Fibre links	Multimode Graded Index Fibre Optic cable
Network cables	Shielded Twisted Pair Cat 5

Source : Behrouz A. Forouzan (2007)

Table4.2: Network Setup Configurations

Item	Specification
Router (for www gateway)	CISCO ASR 9000 Series
Router (for intranet)	CISCO ASR 9000 Series
Switch	CISCO 2960 Series 24 Ports

Source: Leinwand, Pinsky and Culpepper (1998)

Table 4.3: Server Configurations: CDR Mining and Analysis Server

Item	Specifications
H.D.D	2 Terabytes (Tera) SATA Raid Technology
Backup	SATA RAID Technology
RAM	16 Gigabyte (Gig)
Processor	16 GHz Dual Core processor Pentium M Multi-threaded
Network card	12GHz/s Gigahertz per second (Mbps)
Display	Digital Monitor
Model	IBM Think Server
USB Ports	8 USB Ports
Fast Backup Media	Compact Disc (CD) Writer Drive

Table 4.4: Desktop Workstation/Client Server (for users CSA, ITERC, MO and Admin)

Item	Specification (requirements)
Model	Desktop /laptop HP Compaq Pentium IV / AMD Athlon3000+
H.D.D	100GB
RAM	4 Gigabyte
Processor	3.0 GHz
Network card	256Mbps
Display	Digital 17 inch Monitor
Mouse	USB Optical Mouse
Keyboard	USB Keyboard
USB Ports	4Ports
Ethernet Interface	2 Ports

4.4.2 Configurations And Network Layout Considerations

This section will explore the reasons why the analyst recommended the mentioned hardware configurations and the network components and layout.

Desktop workstations

These are normal desktop computers for the users that they will use to issue queries to the CDR Mining Analysis Server. These machines are used for data mining and analysis by the users. The computers will be a mere interface into the CDR Mining and Analysis Server, and so will not need any special extra capacity but be of normal capacity.

Switch, CISCO 2960

Has a larger capacity of 24 ports which enables the network to carry many users.

Router, CISCO ASR 9000 Series /7200 series and 7200 Series

ASR 9000 Family represents an exciting new paradigm in the world of Carrier Ethernet with routing capabilities of up to 10 Gbps. It will provide high capabilities of a gateway escape to the www. All www requests will be forwarded through this gateway. The other router of the same type will also be used to aggregate requests to the CDR mining and Analysis system and traffic from the various users. The ASR 9000 has fiber capabilities. ASR 9000 affords great bandwidth at very high frequency rates. The routers will consolidate the intranet of the organization and handle traffic. The capacity of the routers will enable a state of the art network infrastructure which will almost never constrain the mining and analysis processes. However as a substitute the 7200 Series can also be used to ease cash-flows as the ASR 9000 series cost a premium. www.cisco.com/en/US/docs/routers/asr9000/software/asr9k_r4.2/general/release/notes/reln_a9k_42.html Accessed 2013-09-10 13:37 “SPA port accepts an Small Form-Factor Pluggable (SFP) module with a duplex LC-type receptacle that allows connection to optical fiber”. High security is installed in the ASR 9000 Series router which affords high data secrecy on the intranet based on its software level security.

Firewall

Creates a strengthened security within the LAN and discourage the CDR data which is highly classified data to be accessed on the www perspective.

Server

The system contains persistent files which are always expanding and hence the system needs a high capacity server. Mining and analysis processes are heavy processes which require a lot of processing power not to mention many users may conduct heavy mining and analysis processes from remote locations at the same time which calls for high processor time and capabilities.

Network link configurations

Fiber link is preferred because it provides the fastest query responses as far as technology today has advanced. The enable the various exchanges to conduct mining and analysis as if they were on a Local Area Network the rest of the network links will be connected using cat5 network cable of twisted pair which is the fastest and economic on short distances, locally communicating with a local server or switch with the intention to escape to a WAN.

4.4.3 Software and Hardware Interaction

This section will reflect how the hardware and software of the proposed system will interact to each other. It will show a description and the relevance of each component shown on the Network layout diagram for the proposed system. This section categorizes the components activity based on their

Desktop Workstation

This is any computer terminal which can be either dump or active.in this context is rather a dump terminal as far as this system is concerned, because it cannot process any information on itself. The desktop workstation is responsible for enabling the user to login to the remote system, CDR Mining Analysis System. This machine will allow the user to conduct mining and analysis activities form a remote location.

Switch aka hub

This is an electronic device that is used to connect two or more computers to be networked. This device connects computers with a twisted pair cable. It can also join other switches to create a hierarchical network. When a request is issued by the user it is moved in the network to the switch which will aggregate the request from other users to be able to conduct mining and analysis activities at the same time. The request are moved to the router

Router

This is an intelligent switch which routes data based on an algorithmic table and rule such as shortest path first, SPF. This device is almost a computer on its own.it enable a LAN (Local Area Network) to be connected to another to create a WAN (Wide Area Network). This device will

enable a user of the system from remote LAN to be consolidated into the LAN that contains the CDR Mining and Analysis System to be able to conduct mining and analysis activities. The router will get request from the switch and will interface with the router from the main branch of Tel-One which receives intranet traffic. The collection of all the routers before the firewall consists of the Tel-One Intranet –defined as the collection of WAN computers of an organization working based on http protocols. The Internet gateway router will be responsible for creating an escape to the internet from the organization.

Server

This is a powerful computer which carries out complex calculations. It carries applications and or database based on the systems architecture. The server will carry the CDR mining and Analysis System and database. Another server for the NIS system which contains the Main CDR files for the NIS system which originally stores the CDR will be present at the Tel-One Main branch. When any mining activity needs to be conducted, it is issued directly to the CDR Mining and Analysis server which carries out its own authentication procedures. The request parameters are deduced and the record in question are mined and replicated from the NIS system database Main CDR database server will which will be contained the relation CDR_details_main into the CDR Mining and Analysis System server relation called CDR_details_temp. The full mining and analysis rules are then applied and the mining and analysis process is then conducted. When the results are created they can be sent via email to the customer.

Firewall

Is a software that is used to protect the LAN or WAN of an organization against external attacks from a public network. Virtually this device will be between the organization's LAN or WAN and its outside router which routes its traffic to the outside world. This device filters traffic to and from the network. It can restrict certain users from accessing the local environment. However the firewall can be a physical device or a virtual device which is mere software as it is in this context. The firewall will be used to protect privacy of CDR data and to prevent external parties from conducting mining activities or sniffing data from inside our intranet network. Further data security is emphasized on the routers by masking ip addresses that are not allowed to access the intranet and the CDR Mining and Analysis Server.

4.5 Database design

According to Elmasri et al (c2006), A database is an organized collection of data. Another scholar, Manning, M.V. (c2004) database may be defined as a collection of *persistent* data that can be *shared* and *interrelated*. He expanded his definition of the concept of databases as follows;

Persistent, this means that data resides on stable storage such as magnetic disk or tape. This data has been accepted by the Database Management System (DBMS) for entry into the database and it can be subsequently removed from the database only by some explicit request to the DBMS

Shared, meaning that a database can have multiple uses and users it can be shared by many functions and systems. *Interrelated*, meaning that data is stored as separate units but can be retrieved to form a composite picture like a full record containing the address and personal details of the caller and the destination country he called.

Evidently a database is an application which will keep data to be used by the system. The proposed system will keep the data for mining processes in a relational manner for an efficient storage and use and also secure storage. The data will be kept in a normalized form to ensure optimum performance with a tremendously good response time in mining data from the database. The data storage for this system is critical because the way in which data is stored will greatly affect the speed at which it is retrieved such as query manipulation and response time. The proposed system will implement the use of a MySQL database because fast, reliable open source relational database.

4.5.1 Database Concept

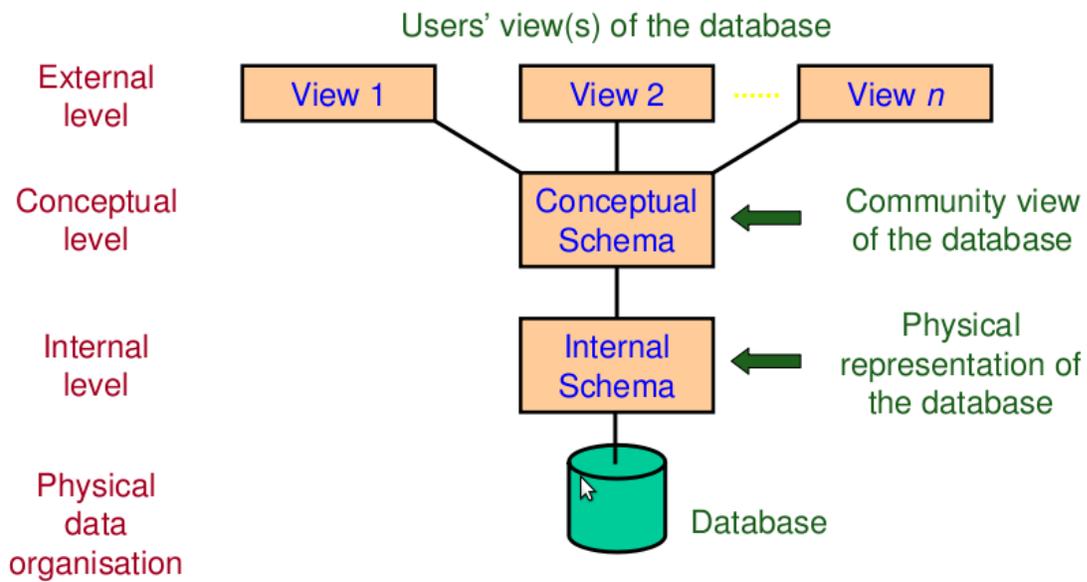
This is the concept of deciding how exactly data will be stored in the database. Kaufmann (1999) points out that a database design is the process of producing a detailed data model of a database. The database system is designed from a functional viewpoint starting with a high level view and progressively refining it into a more detailed design. The system is viewed as a collection of objects which translate to relations in database terminology rather than functions and is decentralized and each object manages its own information. In designing the database for the

proposed system the system will be designed from a 3-level view architecture developed by the SPARC research group below illustrates how the database design will be implemented.

DATA-BASE DESIGN ANSI-SPARC 3 LEVEL ARCHITECTURE

ANSI-SPARC
Architecture
for Databases

The Three-Level Architecture - I



Source: Kaufman (1991)

Fig 4.4 Database design Model for proposed system (ANSI-SPARC Model)

4.5.2 ANSI-SPARK Model

According to Kaufmann (1999) ANSI-SPARC is an acronym for the American National Standard Institute-Standard Planning and Requirements Committee. ANSI_SPARC aka 3-level architecture is a model which simplified the structure of data by identifying three levels representing different degrees of abstraction.

This model has been chosen to implement the database. The model contains three level;

- External level
- Conceptual level
- Internal level (includes physical data storage)

External

The user's view of the database describes a part of the database that is relevant to a particular user. It excludes irrelevant data as well as data which the user is not authorised to access. The data is displayed in relevance to the format that is relevant to the user The databases records can be viewed using forms, reports and tables This level allows for abstraction of the whole system from the user only letting the user with the function necessary for him to do his activities, it mask the rest of the system and its architecture away from the user. It allows the different users to have different views based on their roles. It is this part of the architecture which will allow the MO to be able to conduct presets for the ITERC users without any ITERC users being able to do the same it is also the same part of the architecture which allows the administrator to be the only user type who can see the users in the system and be able to suspend users without other users seeing such. In this level each user can have his own personalized view based on his role in the mining and analysis activities. Each user view can have the same data but presented in different ways like MO can have date shown as long date while ITERC user can have date shown as short date but its all picking from the same field/attribute.

Conceptual

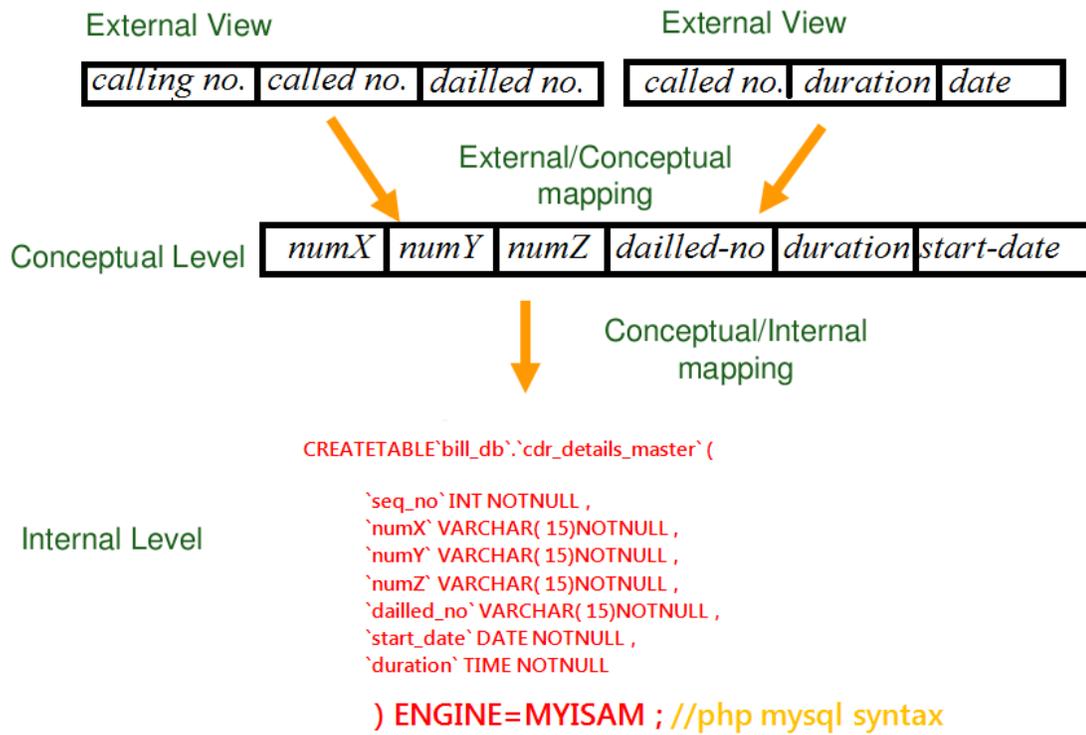
The conceptual level is a way of describing what data is stored within the whole database and how the data is inter-related. The conceptual level does not specify how the data is physically stored. Usually referred to as the community view as it show the comprehensive community of fields in the system it show all the database tables involved and their fields. The users views are derived from this level and their data can be traced to here. This level keep a collection of all the data that is in the system that can be accessed and used by any user of the system. It will contain the actual data such as the CDR files for the system as well as the mined data will be used at this level. This level allows abstraction from the definition of the data because it is contained in the internal level.

Internal Level

The internal level involves how the database is physically represented on the computer system. It describes how the data is actually stored in the database and on the computer hardware. This is the part of the database design where the data elements are stored. The data structures used to hold the data in the shown in the community view is described here using some language like sql statements for example definitions of attributes customer_id, like varchar() size 15. It will concern how CDR data related data is stored in the system its data types and the actual physical locations such as the addressing for the actual CDR data its Hard disc drive location and actual hashing algorithms for addressing the data. It will hide the unnecessary data of the data definitions from all the other users because they only want to conduct mining activities and will not be interested in this information.

Database Design Mapping Model for CDR Mining and Analysis System

External/Conceptual Mapping and Conceptual/Internal Mapping



Source: Kaufman (1991)

Fig 4.4 Database design Mapping Model for proposed system (ANSI-SPARC Mapping Model)

4.5.3 Database Tables

This section illustrates the data definition of the relations/ tables used in the system. Below are the relations used by the analyst in the designing of the system

Table 4.5: cdr_details_master

	Field	Type	Collation	Attributes	Null	Default	Extra	Action							
<input type="checkbox"/>	seq_no	int(15)			No		auto_increment								
<input type="checkbox"/>	numX	text	latin1_swedish_ci		No										
<input type="checkbox"/>	numY	text	latin1_swedish_ci		No										
<input type="checkbox"/>	numZ	text	latin1_swedish_ci		No										
<input type="checkbox"/>	dailed_no	text	latin1_swedish_ci		No										
<input type="checkbox"/>	start_date	date			No										
<input type="checkbox"/>	start_time	time			No										
<input type="checkbox"/>	duration	time			No										
<input type="checkbox"/>	in_route	text	latin1_swedish_ci		No										
<input type="checkbox"/>	out_route	text	latin1_swedish_ci		No										
<input type="checkbox"/>	in_trunk	text	latin1_swedish_ci		No										
<input type="checkbox"/>	out_trunk	text	latin1_swedish_ci		No										
<input type="checkbox"/>	pulse	int(4)			No										
<input type="checkbox"/>	origin_country	text	latin1_swedish_ci		No										
<input type="checkbox"/>	destination_country	text	latin1_swedish_ci		No										
<input type="checkbox"/>	acc_no	varchar(15)	latin1_swedish_ci		No										

Thus table contains the main CDR data it is the data in the Main CDR details which is produced by the NIS and is resident in the NIS database server. This is the parent table by which the whole CDR mining and analysis is based on. The fields review the domain of the mining process as well as the analysis.

Table 4.6: cdr_details_temp

	Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/>	seq_no	int(15)			No		auto_increment	      
<input type="checkbox"/>	numX	text	latin1_swedish_ci		No			      
<input type="checkbox"/>	numY	text	latin1_swedish_ci		No			      
<input type="checkbox"/>	numZ	text	latin1_swedish_ci		No			      
<input type="checkbox"/>	dailed_no	text	latin1_swedish_ci		No			      
<input type="checkbox"/>	start_date	date			No			      
<input type="checkbox"/>	start_time	time			No			      
<input type="checkbox"/>	duration	time			No			      
<input type="checkbox"/>	in_trunk	text	latin1_swedish_ci		No			      
<input type="checkbox"/>	out_trunk	text	latin1_swedish_ci		No			      
<input type="checkbox"/>	in_route	text	latin1_swedish_ci		No			      
<input type="checkbox"/>	out_route	text	latin1_swedish_ci		No			      
<input type="checkbox"/>	pulse	int(4)			No			      
<input type="checkbox"/>	origin_country	text	latin1_swedish_ci		No			      
<input type="checkbox"/>	destination_country	text	latin1_swedish_ci		No			      
<input type="checkbox"/>	acc_no	varchar(15)	latin1_swedish_ci		No			      

Thus table is a replica of the data in the Main CDR server of the NIS database server. When a mining and analysis query is issued the records in question are copied from the NIS database server/Main CDR server to the CDR_details_Master table (this table). The full analysis can now be conducted on this table in the CDR Mining and Analysis System Server. This relation is a virtual relation. It is created each time mining and analysis activities need to be conducted and a different one for each user with a different naming. The naming for this file will use the following convention, “CDR_details”_+ username + date +time.

Table 4.7: Country_Definitions

	Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/>	id	int(11)			No		auto_increment	      
<input type="checkbox"/>	country_name	varchar(15)	latin1_swedish_ci		No			      
<input type="checkbox"/>	prefix	varchar(4)	latin1_swedish_ci		No			      

Thus table maps country prefix to the actual country name.

Table 4.8: Customer_Details

	Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/>	customer_id	int(15)			No		auto_increment	      
<input type="checkbox"/>	acc_no	varchar(8)	latin1_swedish_ci		No			      
<input type="checkbox"/>	name	varchar(15)	latin1_swedish_ci		No			      
<input type="checkbox"/>	surname	varchar(30)	latin1_swedish_ci		No			      
<input type="checkbox"/>	id_num	varchar(15)	latin1_swedish_ci		No			      
<input type="checkbox"/>	address	varchar(40)	latin1_swedish_ci		No			      
<input type="checkbox"/>	physical address	varchar(40)	latin1_swedish_ci		No			      
<input type="checkbox"/>	contact_no	varchar(30)	latin1_swedish_ci		No			      

Thus table contains the actual details pertaining to the customers who any subscriber line service, in short contains customer's personal details

Table 4.9: Line_Details

	Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/>	line_id	int(15)			No			
<input type="checkbox"/>	acc_no	varchar(15)	latin1_swedish_ci		No			
<input type="checkbox"/>	line_number	int(15)			No			
<input type="checkbox"/>	date_created	date			No			
<input type="checkbox"/>	status	varchar(15)	latin1_swedish_ci		No	Working		
<input type="checkbox"/>	date_terminated	date			No			

Thus contains details of a particular line.

Table 4.10: Route_Definitions

	Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/>	id	int(11)			No		auto_increment	
<input type="checkbox"/>	prefix	varchar(7)	latin1_swedish_ci		No			
<input type="checkbox"/>	router	varchar(15)	latin1_swedish_ci		No			

Thus maps the route prefix such as route code to the actual names of the router gateway for example 00918 for AT&T

Table 4.11: Trunk_Definitions

	Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/>	id	int(11)			No		auto_increment	
<input type="checkbox"/>	prefix	varchar(3)	latin1_swedish_ci		No			
<input type="checkbox"/>	exchange_name	varchar(15)	latin1_swedish_ci		No			

Thus maps the trunk prefix that is the trunk code to the actual exchange names for example 054 for Gweru

Table 4.12: Users

	Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/>	user_id	int(11)			No		auto_increment	
<input type="checkbox"/>	username	varchar(15)	latin1_swedish_ci		No	ITERC		
<input type="checkbox"/>	password	varchar(15)	latin1_swedish_ci		No			
<input type="checkbox"/>	type	varchar(10)	latin1_swedish_ci		No			
<input type="checkbox"/>	presets	int(4)			No			

Thus contains all system users for authentication and access levels roles, profiles and permissions.

Table 4.13: Requests

	Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/>	req_id	int(11)			No		auto_increment	      
<input type="checkbox"/>	summary	varchar(200)	latin1_swedish_ci		No			      
<input type="checkbox"/>	records	int(4)			No			      
<input type="checkbox"/>	date_time	varchar(20)	latin1_swedish_ci		No			      
<input type="checkbox"/>	user	varchar(15)	latin1_swedish_ci		No			      

Thus contains notifications of request from users for preset raise.

Table 4.14: saved_query

	Field	Type	Collation	Attributes	Null	Default	Extra	Action
<input type="checkbox"/>	query_id	int(15)			No		auto_increment	      
<input type="checkbox"/>	date	date			No			      
<input type="checkbox"/>	time	time			No			      
<input type="checkbox"/>	query_string	text	latin1_swedish_ci		No			      
<input type="checkbox"/>	number_of_retreived_record	int(15)			No			      
<input type="checkbox"/>	location_of_result	text	latin1_swedish_ci		No			      
<input type="checkbox"/>	d_route	text	latin1_swedish_ci		No			      
<input type="checkbox"/>	user	varchar(15)	latin1_swedish_ci		No			      

This keeps a history of all the mining queries issued and the names of the result .pdf files.

location_of _result contains the file name, query string contains explanation of request aka mining parameters, d_route contains the email the result was sent to.

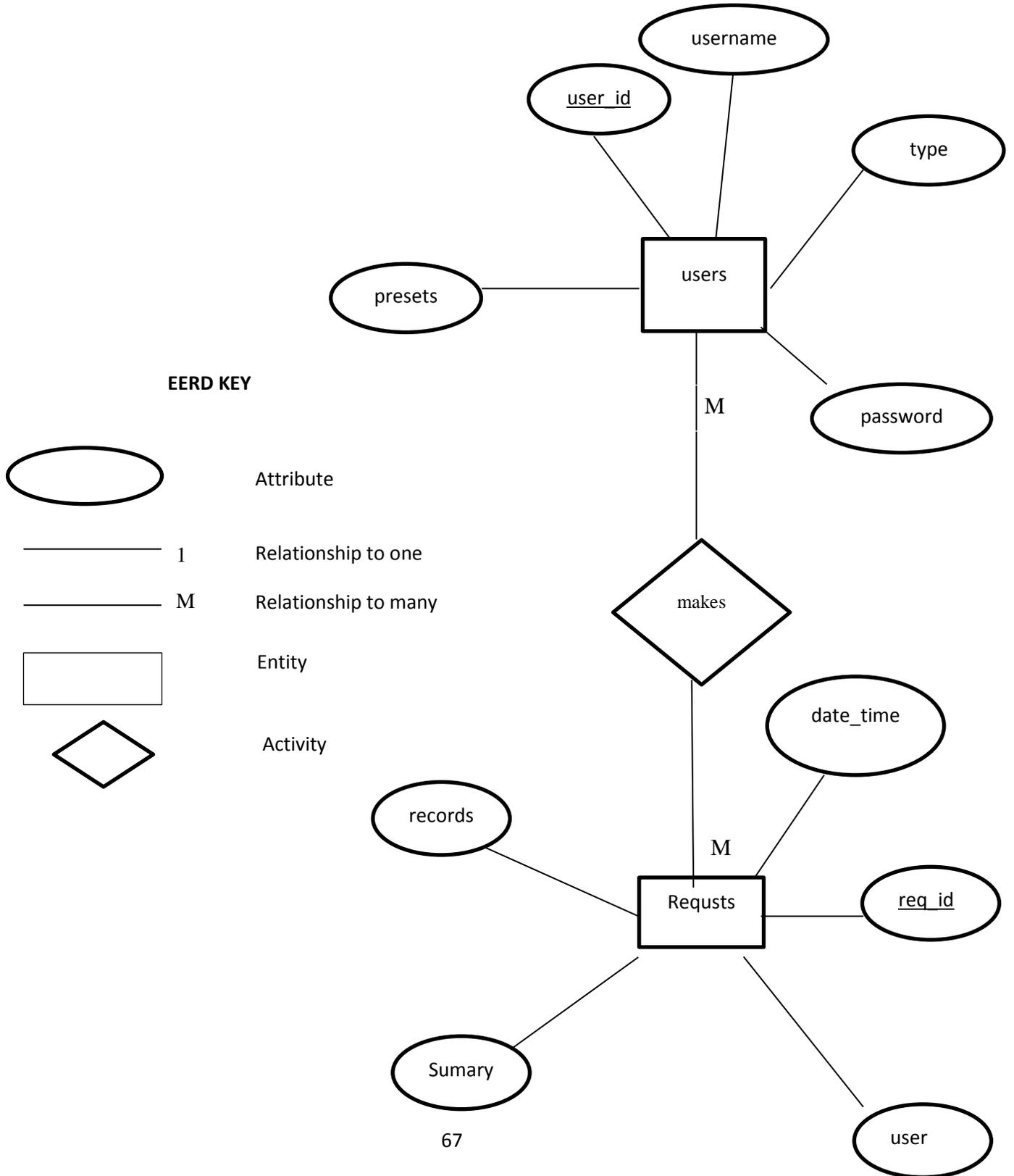
4.5.4 Entity Relationship Model

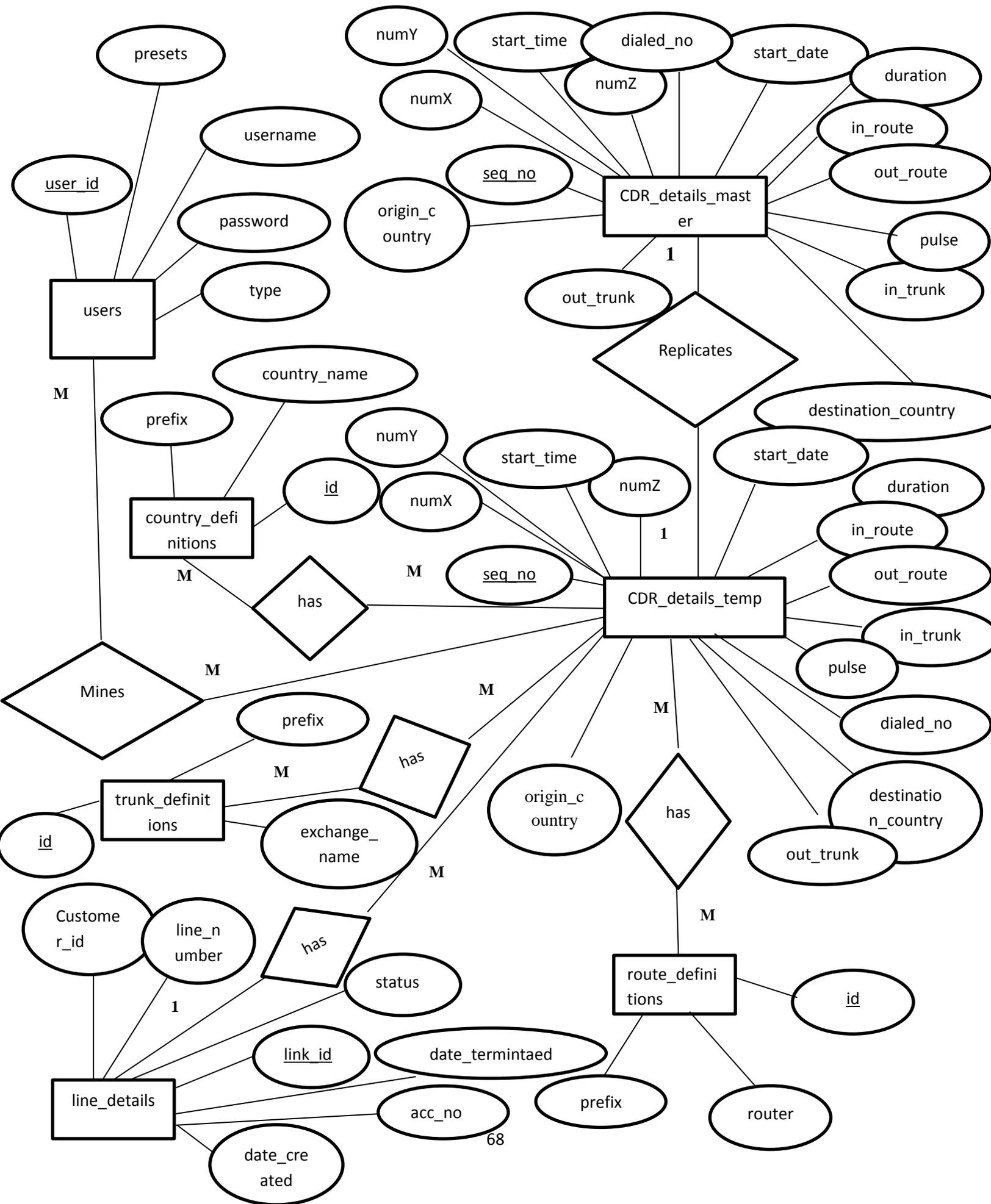
According to Bagui and Earp (2011) an enhanced entity-relationship (ER) diagram is a specialized graphic tool that illustrates the relationships between entities in a database. ER diagrams often use symbols to represent three different types of information. Boxes are commonly used to represent entities. Diamonds are normally used to represent relationships and ovals are used to represent attributes.

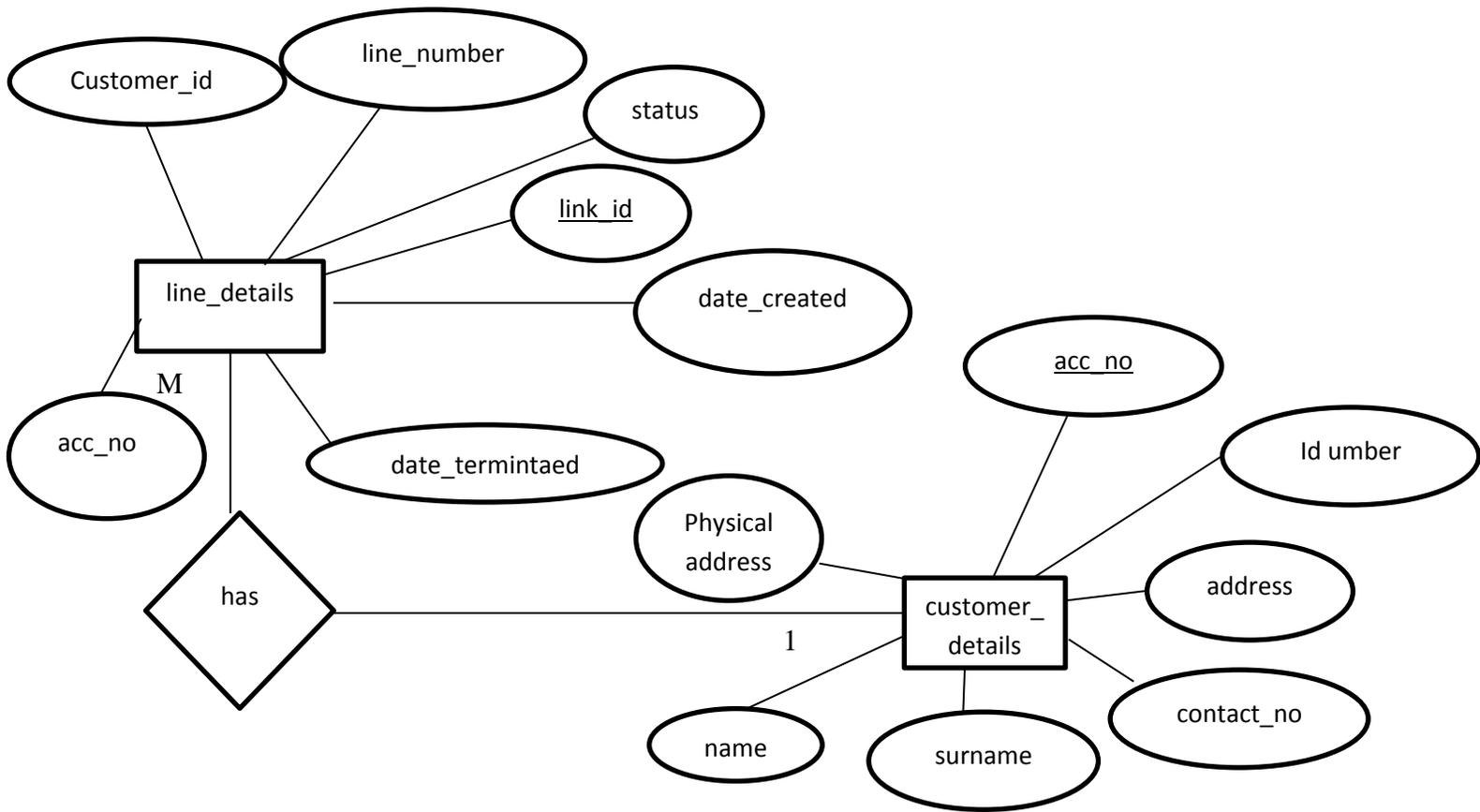
Evidently an overall discussion will leave it to the understanding , in software engineering, an entity-relationship model (ERM) is an abstract and conceptual representation of data. Entity-relationship modelling is a database modelling method, used to produce a type of conceptual

schema or semantic data model of a system, often a relational database, and its requirements in a top-down fashion. The Entity Relationship models show the relationship between the various entities in the system and their attributes/fields. The Entity Relationship Diagram is the preferred logical data model to model the proposed system because of its pictorial approach and that it is a clear and an accurate depiction of the entities and their relationships .It also provides focus on the data with a single system boundary .It can also be easily navigated, that is it is laid out in an organized fashion to allow for relationships among the entities to be easily followed. The subsequent section shows an outline of a fully normalized Enhanced-Entity-Relationship diagram for the proposed system. The EER was implemented by the analyst to illustrate the relationships between the entities in the proposed system. He identified the relations applicable to the scope of his research study such as one call will have one particular country destination and origin, this tool diagram made it easier for the analyst to diagrammatically express such relationships and the entities.

ENHANCED ENTITY RELATIONSHIP MODEL/DIAGRAM







Source: BaguiBargui (2011)

Fig 4.5 Enhanced Entity Relationship Diagram for the proposed system

4.6 Program Design

According to Meyers (2005) “The program design involves the designing of modules, classes and functions of the proposed system.” The SSDM (structured approach to system design methodology) as implemented by the researcher is based on the breaking down of the system into subsystems which are further broken down into modules. Program design concerns how the analyst structured the system, it shows functions that will influence the input and out formats for the proposed system. This design also illustrates how the system

will be broken down into activities of processes and their sequence. This design implies the use of various other tools to aid in the program design.

4.6.1 Sequence Diagram

According to Robert(1998). This is a kind of interaction diagram that shows how processes operate with one another and in what order A sequence diagram shows objects arranged in a sequence. It depicts the objects and classes involved in the scenario and the sequence exchanged between objects needed to carry out the functionality of the scenario.

THE SEQUENCE DIAGRAM FOR THE PROPOSED SYSTEM

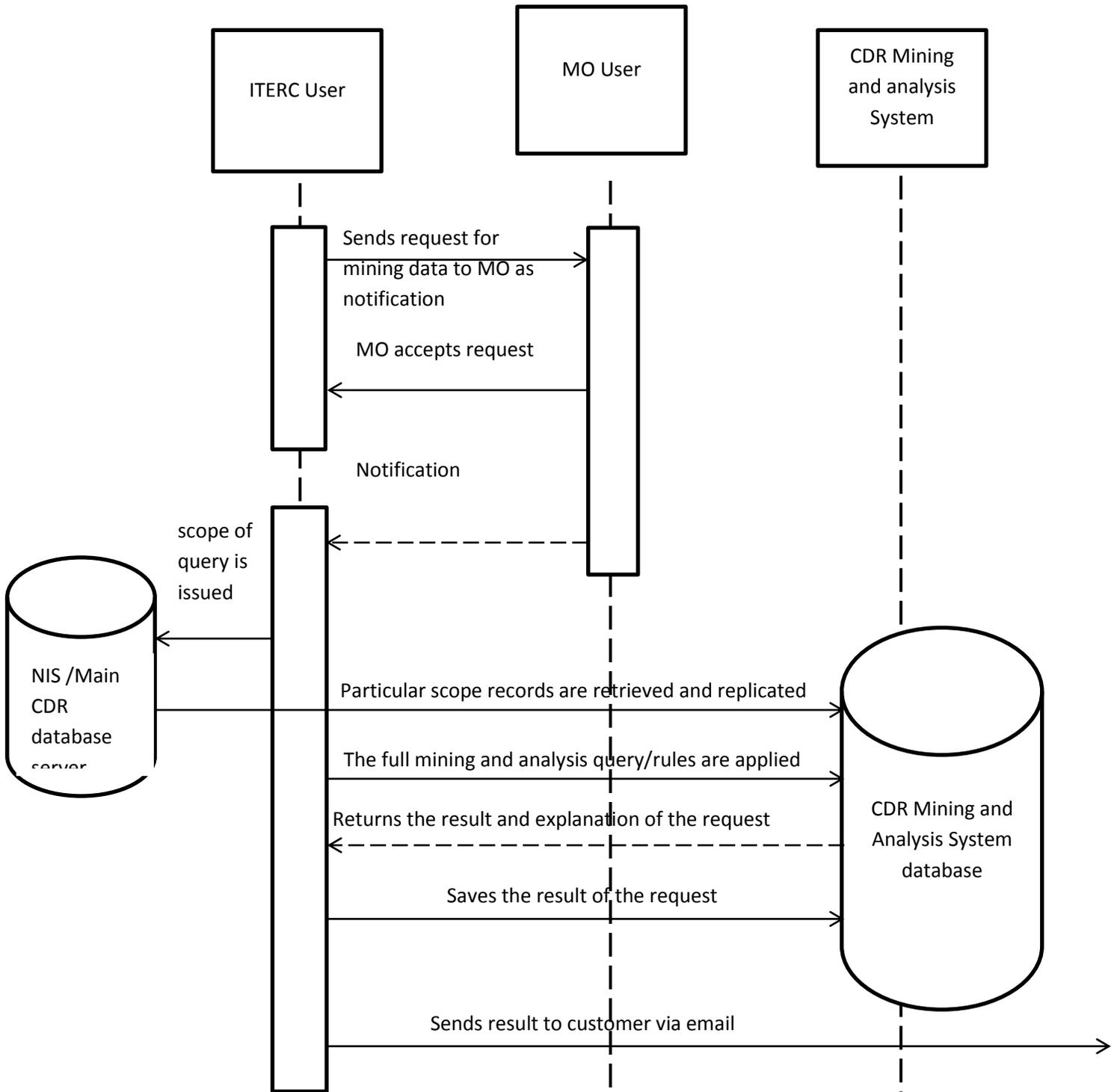


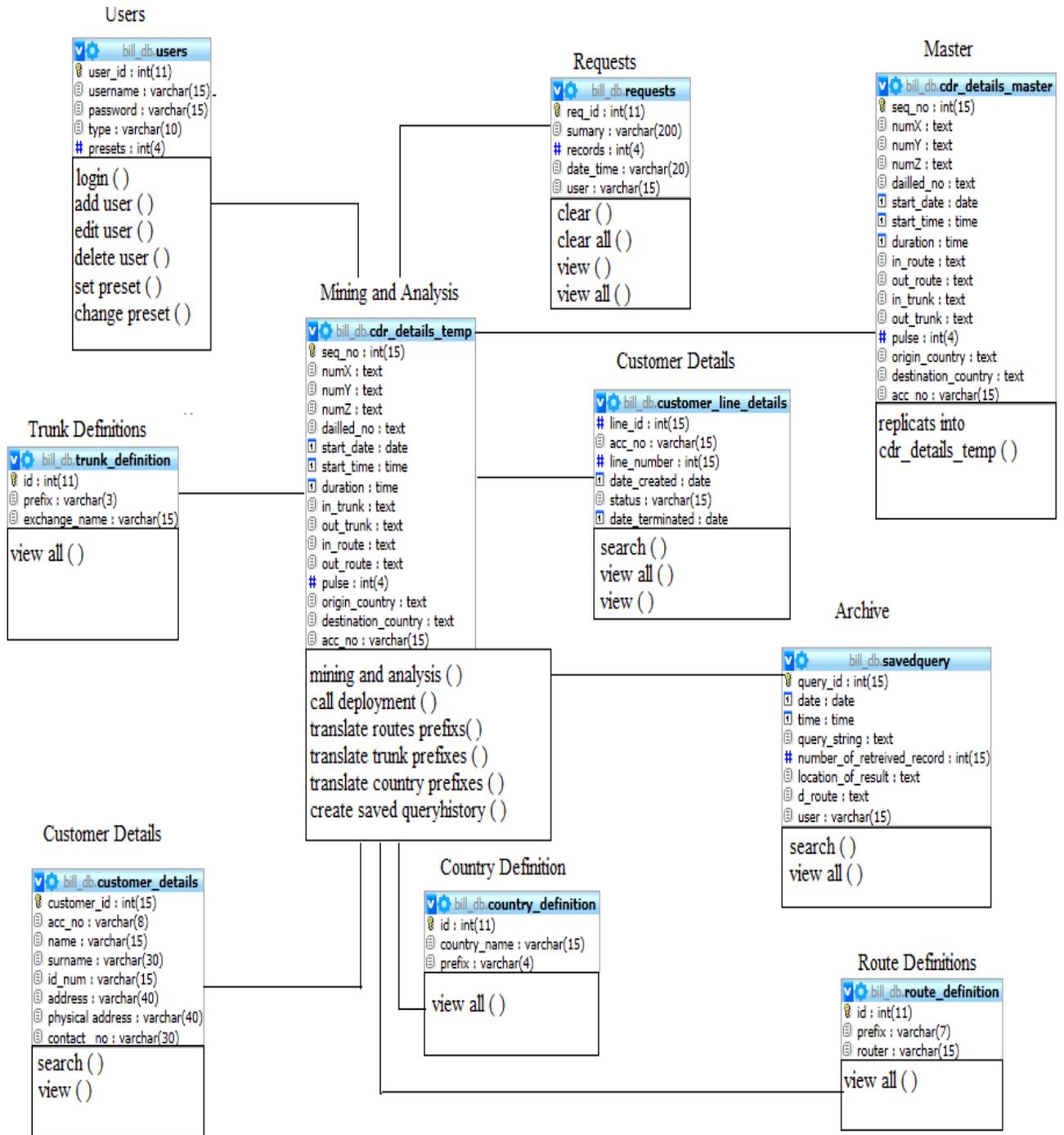
Fig 4.6 sequence diagram for the proposed system

4.6.2 Class Diagram

According to Unhelkar (2005).It describes the information without reference to any particular implementation.

Class diagram is an object oriented pillar which forms the building blocks of the system. This helps to illustrate the classes that will be used by the programmer and show explicitly the attributes required or included in a particular classes and the functions they will perfume for the modules.

CLASS DIAGRAM FOR THE PROPOSED SYSTEM



Source: Unhelkar (2005)

Fig 4.7 Class diagram for the proposed system

4.7 Interface design

According to MacGraw(1992) interface design is the process of defining how the system will interact with external entities; it is aimed at enhancing the visual, usability and technological qualities of an interface. Interface design also adds to the satisfaction of the person using a product or a service.

Evidently, interface design concerns with the designing of the layout arrangement and collaboration of the input and output forms of the system. The design will be centered on the functions that the system should perform and the data elements involved. This design will illustrate how the system will be intended to accept input such as specifying a mining and analysis query that is the specifying mining and analysis rules, as well as how the results will be displayed to the user by the system. The diagrams in this section will demonstrate the concept of how data is accepted and information is displayed in the system.

Login input form

User log in

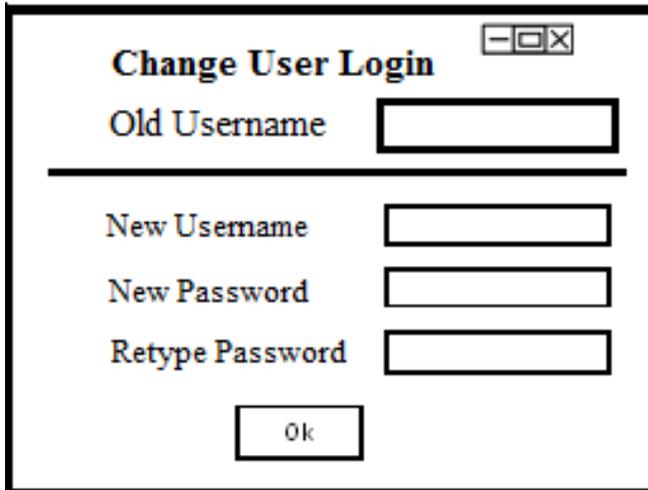
Username

Password

Login

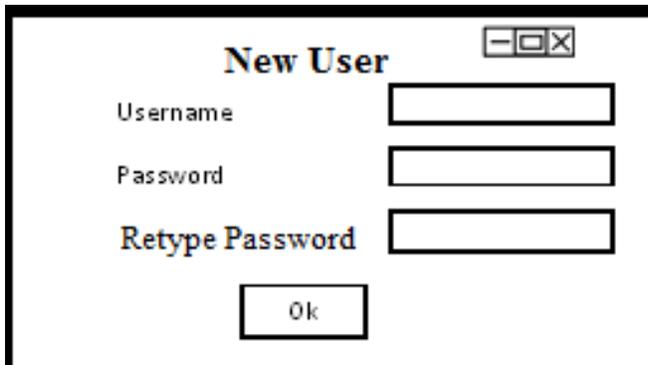
Fig 4.8 Proposed Interface design

Change Login details input form



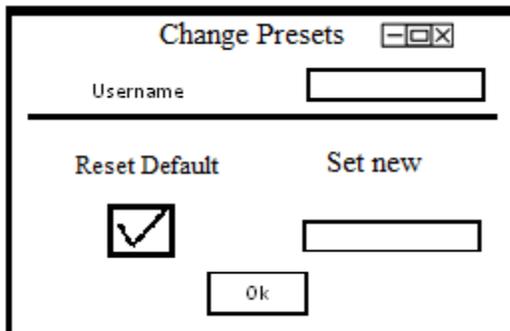
A dialog box titled "Change User Login" with standard window controls (minimize, maximize, close) in the top right corner. The form contains four input fields: "Old Username", "New Username", "New Password", and "Retype Password". A horizontal line separates the "Old Username" field from the others. At the bottom center is an "Ok" button.

New User input form



A dialog box titled "New User" with standard window controls in the top right corner. The form contains three input fields: "Username", "Password", and "Retype Password". At the bottom center is an "Ok" button.

Set or change presets input form



A dialog box titled "Change Presets" with standard window controls in the top right corner. The form contains a "Username" input field at the top, separated from the rest of the form by a horizontal line. Below the line are two options: "Reset Default" with a checked checkbox, and "Set new" with an empty input field. At the bottom center is an "Ok" button.

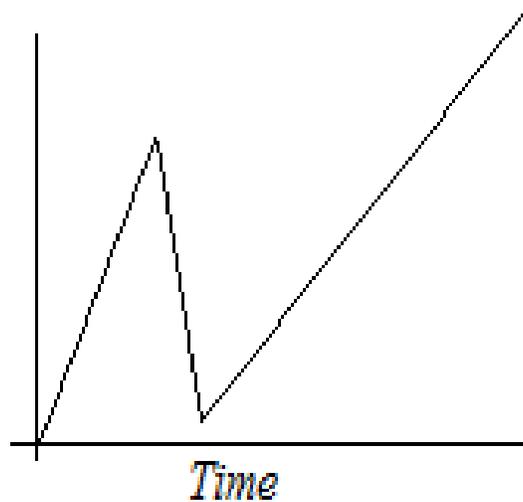
Home output form

HOME



Home|Mining and Analysis |Users|Presets|Reports|

|Quick Search|

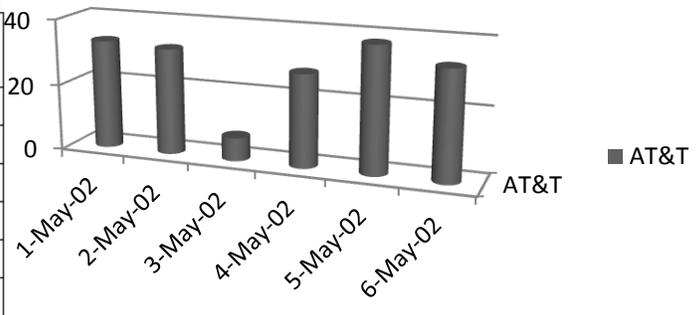


Welcome to CDR mining and Analysis System

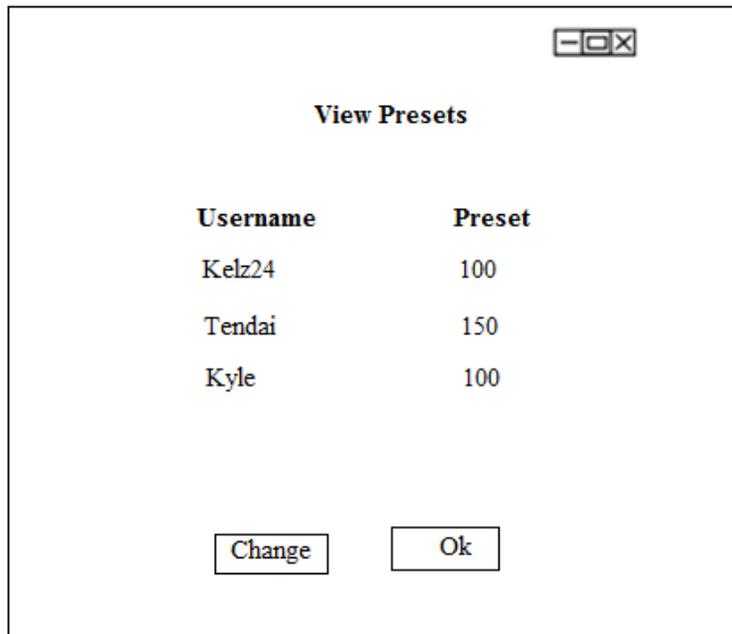
Mining and Analysis Rules input form

Customer name	<input type="text"/>	<input type="radio"/> include visualizations
email	<input type="text"/>	<input type="radio"/> include real names
retype email	<input type="text"/>	<input type="radio"/> include advanced data
Mining and Analysis		
Caller	<input type="text"/>	<input type="text"/>
Called	<input type="text"/>	<input type="text"/>
Diverted to	<input type="text"/>	<input type="text"/>
Dailed digits	<input type="text"/>	<input type="text"/>
Between Dates	<input type="text"/>	<input type="text"/>
Between Times	<input type="text"/>	<input type="text"/>
duration	<input type="text"/>	<input type="text"/>
In Via town	<input type="text"/>	<input type="text"/>
Out via town	<input type="text"/>	<input type="text"/>
Pulses	<input type="text"/>	<input type="text"/>
Origin Country	<input type="text"/>	<input type="text"/>
Destination Country	<input type="text"/>	<input type="text"/>
<input type="button" value="OK"/>		

Deployment output form

Date: 13 August 2013 13.07.03hrs Requestor: General User: Tendai Chamisa (MO)					AT&T Trunk usage  <table border="1" style="display: none;"> <caption>AT&T Trunk Usage Data</caption> <thead> <tr> <th>Date</th> <th>Usage</th> </tr> </thead> <tbody> <tr><td>1-May-02</td><td>35</td></tr> <tr><td>2-May-02</td><td>32</td></tr> <tr><td>3-May-02</td><td>5</td></tr> <tr><td>4-May-02</td><td>25</td></tr> <tr><td>5-May-02</td><td>35</td></tr> <tr><td>6-May-02</td><td>28</td></tr> </tbody> </table>	Date	Usage	1-May-02	35	2-May-02	32	3-May-02	5	4-May-02	25	5-May-02	35	6-May-02	28																									
Date	Usage																																											
1-May-02	35																																											
2-May-02	32																																											
3-May-02	5																																											
4-May-02	25																																											
5-May-02	35																																											
6-May-02	28																																											
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Calling number</th> <th style="text-align: left;">Called number</th> <th style="text-align: left;">Diverted</th> <th style="text-align: left;">Duration</th> <th style="text-align: left;">Router</th> </tr> </thead> <tbody> <tr> <td>026304499827</td> <td>02636637889</td> <td>02761152626</td> <td>00.12.34</td> <td>AT&T</td> </tr> <tr> <td>026304377839</td> <td>02768767542</td> <td>02768767542</td> <td>00.04.39</td> <td>AT&T</td> </tr> <tr> <td>026304788944</td> <td>02776373838</td> <td>02768767542</td> <td>00.16.34</td> <td>AT&T</td> </tr> <tr> <td>026304333736</td> <td>02766373737</td> <td>02768767542</td> <td>01.11.31</td> <td>AT&T</td> </tr> <tr> <td>026304222271</td> <td>02768767542</td> <td>02763772737</td> <td>00.51.02</td> <td>AT&T</td> </tr> <tr> <td style="text-align: center;">...</td> </tr> <tr> <td>TOTAL</td> <td>Calls 257</td> <td>Diverts 17</td> <td>17.21.02</td> <td></td> </tr> </tbody> </table>	Calling number	Called number	Diverted	Duration	Router	026304499827	02636637889	02761152626	00.12.34	AT&T	026304377839	02768767542	02768767542	00.04.39	AT&T	026304788944	02776373838	02768767542	00.16.34	AT&T	026304333736	02766373737	02768767542	01.11.31	AT&T	026304222271	02768767542	02763772737	00.51.02	AT&T	TOTAL	Calls 257	Diverts 17	17.21.02		MINING EXPLANATION: result shows search for all calls made via the AT&T router between 1st May 2002 to 6th may 2002 filter result to display caller called number diverted number duration and the router			
Calling number	Called number	Diverted	Duration	Router																																								
026304499827	02636637889	02761152626	00.12.34	AT&T																																								
026304377839	02768767542	02768767542	00.04.39	AT&T																																								
026304788944	02776373838	02768767542	00.16.34	AT&T																																								
026304333736	02766373737	02768767542	01.11.31	AT&T																																								
026304222271	02768767542	02763772737	00.51.02	AT&T																																								
...																																								
TOTAL	Calls 257	Diverts 17	17.21.02																																									
ANALYSIS EXPLANATION: Plot router usage trend																																												
<input type="button" value="Save and Send"/> <input type="button" value="X"/>																																												

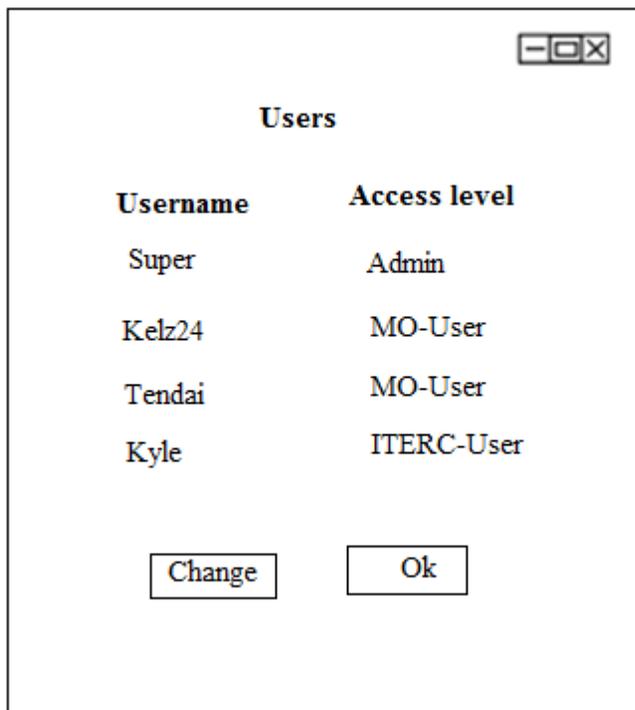
Presets output form



A screenshot of a dialog box titled "View Presets". The dialog box has a standard window control bar (minimize, maximize, close) in the top right corner. The main content is a table with two columns: "Username" and "Preset". The table contains three rows of data. At the bottom of the dialog box, there are two buttons: "Change" and "Ok".

Username	Preset
Kelz24	100
Tendai	150
Kyle	100

Users Output form



A screenshot of a dialog box titled "Users". The dialog box has a standard window control bar (minimize, maximize, close) in the top right corner. The main content is a table with two columns: "Username" and "Access level". The table contains four rows of data. At the bottom of the dialog box, there are two buttons: "Change" and "Ok".

Username	Access level
Super	Admin
Kelz24	MO-User
Tendai	MO-User
Kyle	ITERC-User

Reports output form

Reports

Specify report filters

Found 2 records as per request [Mining History]

CDR Mining and Analysis System Report

File name	Date & Time	Summary of Request	Records	User
cdrmay	1jan 13 12.00	Find all calls to 300245	89calls	Super
cdrrune	3apr 13 13.37	Find all call to Cyprus	76calls	kelz24

Date 6 may 2013
Time 16.13hrs
2 Records Found

4.8 Conclusion

The comprehensive picture of the proposed system has been presented in wording and diagrammatically using the aid of various tools to mimic the architecture in the hardware, the software, the system processes and decisions among and all other system design aspects. The attempt was to present sufficient information to lead to a full understanding of the comprehensive system. In effect the researcher was able to have his ideas cascaded from the researcher's intellectual into the chapter. The system is now vivid of how the researcher developed the system and the development and design considerations have been fully exhausted. Every system needs to be tested against error and bugs hence since the full system has been developed it is critical for the researcher to begin the next chapter which will focus on attest plan and the actual testing so that the proposed system can be implemented.

Chapter 5: Implementation Phase

5.1. Introduction

The proposed system has been developed and the full description of the problems mentioned in the problem definition that is the the onset of the project are expected to have been met through the plans specified in the design phase. The solution cannot be reliable hence the users and even the developers themselves cannot be confident of the system unless it is tested this chapter focuses on how the system will be tested for consistency, errors, validity and verified to be the actual solution required. It entails various other testing like integrity, security and the like. as well as the options that were available to the developer. The system must be fully tested before implementation. This phase focuses on the testing conducted on the proposed system, after its testing the preparation of the system to be final product to be used by the end users. This phase includes the scheduling a plan for the installation and implementation of the proposed system including the changeover technique used by the developer.

5.2. Coding (Pseudo Code)

This involved turning program logic into specific instructions that are to be executed by the computer system, B Agarwal and S R Tayal (2007).

Means semi Code, This is like an algorithm of the programming structure that illustrates how the functional specifications have been attained. It shows a step by step program flow of how the programmer programmed the system, the emulations the looping constructs, query injections and sequential program flow and program control structures are shown in this. Most importantly, the pseudo code is (as suggested by its name) like a programming language but itself is not a language as it follows no strict rules its basic illustration of programming structure hence is independent of any language it may contain semi English statements which can be translated to actual programming language

LOGIN

If password or username is not given

{Msg : Enter valid username and password}

else {

encrypt password using md5

search passwords in database}

if search results=1 {

show home page}

else {

Msg: username and password invalid

Redirect to home

End}

ADD USER

If password or username is not given {

Msg : Enter username and password}

If password<8 or has no capital or has no numeric character {

*Msg : Password does not meet password complexity rules set by Tel-one (IT-policy revised 2012)
password should have at least one numeric at least one character, 8 characters and should
contain at least one capital letter.}*

else {

encrypt password using md5

search passwords in database}

```
if search results=0{  
  
  preset=100  
  
  insert username and password and preset into database  
  
  Msg : New user added  
  
  Redirect to users}  
  
Else if results=1{  
  
  Msg : Username already exists try changing username  
  
End}
```

CHANGE USERNAME AND PASSWORD

```
(user located by Admin user)  
  
search username and password in database  
  
if result =1  
  
( enters new username and password)  
  
If password or username is not given{  
  
  Msg : Enter username and password }  
  
Else If password<8 or has no capital or has no numeric character {  
  
  Msg : Password does not meet password complexity rules set by Tel-one (IT-policy revised 2012)  
  password should have at least one numeric at least one character, 8 characters and should  
  contain at least one capital letter.}  
  
else {  
  
  encrypt password using md5
```

search username and password in database }

if search results=0 {

update username and password in database

Msg : updated username and password

Redirect to users}

Else{

Msg : Username already exists try changing username}

End

DELETE USER

(enter username)

Select username from users where username =username

If delete button clicked{

Delete from users where username=username

Redirect to users}

End

PRESETS

(enter username)

Select username and presets from users where username =username

If change preset button clicked{

(enter new preset values)

```

If isnumeric or not ="" and =<150{

update users where username=username with preset =new preset

Msg: New Preset set

else Msg: Please enter a numeric value

}

```

End

MINING AND ANALYSIS

(user specifies mining and analysis parametres)

```

if customer name ="" {Msg: enter customer name}

else if email or verify email="" { Msg: enter email and verify email}

else {

construct result explanation statement from parameters specified by user

construct mining and analysis criteria based on user specified rules

mine data from live db to cdr temp database table

apply analysis and filtering rules }

if include advanced data =checked{

show colomns, in_route, out_t route, in_trunk ou_ trunk, orign_country, destination_country and
sequence number of call}

if include real names and mask prefixes=checked{

    map prefixes with actual data and replaces prefix with real name }

```

```

if include Visializations=checked{

  assign session variable show_visio=true}

select data from cdr_details_master i.e live cdr batadase table from live db

count records in result

p=select preset from users where username =username from login session variable.

if count>p {

  Msg: you are allowed to mine that much data consult Administrator

  //count is the number of the requested preset

  Insert into request table count, username, date, time, request sumary}

else

  insert the data in cdr_details_temp table for further analysis

  assign session variables to (username, query result explanation,date,filename_to_save_results)

  insert query details in savedquery table for history keeping values (date,time,email,query result
  explanantion,filename)

  redirect to deployment

Else{ Msg: your query yielded no results}

End

DEPLOYMENT

Select * from cdr_details_temp table and show that is the results of the mining process

Display in a table

If session variable show_visio=true {

```

calculate formulas and show results

Display graphs(){

Do for traffic on route trunk and countrys

get data from cdr_details_temp table

load into a .json syntax file and save file

read data from .json syntax saved file

plot graph using the values read

End function

}

Display from session variables customer name,date,time,query_result_explanation }

If clicked button email=true {

Create pdf file

*Save result out put from php page as pdf with filename from session variable
filename_to_save_results*

Select email and filename from savedquery where filename_to_save_results =filename

Attach pdf file and send to email

If result=true { Msg: email with request results sent}

Else { Msg: E-mail not sent check your network or consult with your mail server }

}

End

ARCHIVE

Select* from savedquery table

Display in table

If resend mail button clicked{

Select email and filename from savedquery where filename_to_save_results =filename

Attach pdf file and send to email

If result=true { Msg: email with request results sent}

Else { Msg: E-mail not sent check your network or consult with your mail server }

}

End

PRESETS

Select username and preset from users

Display result

Select username and preset from users

Update presets from users where username =username

End

5.3. Testing

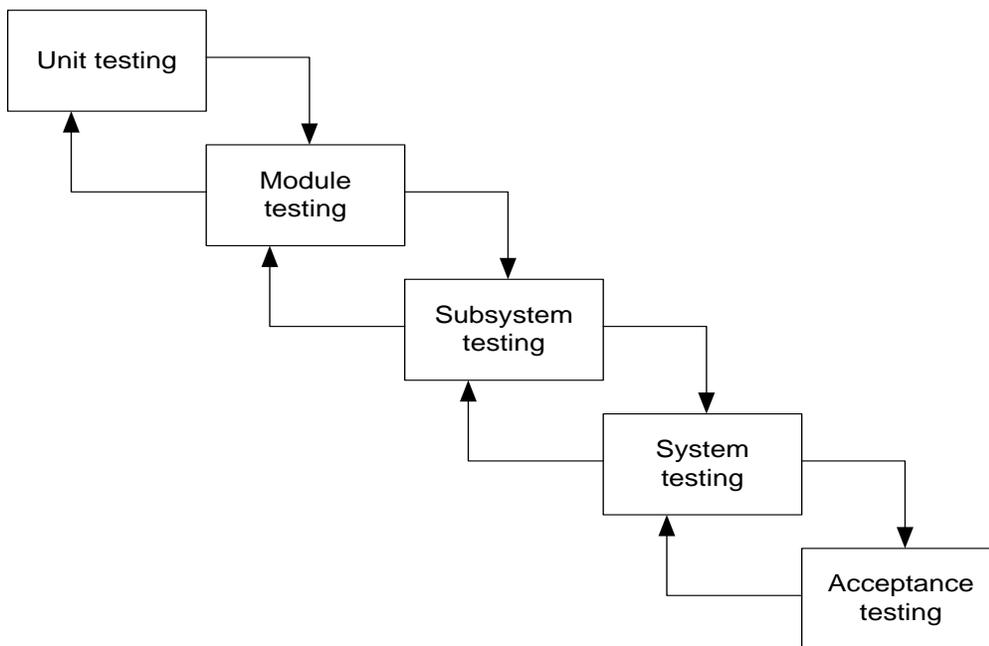
According to Agarwal B., Tayal SP., Gupta, M (2009) sums testings as the process when the system is tried or tested to see if it really meets the predetermined objectives or requirements of the project.

Testing is the process by which a developed system is tested for errors to see its validity and robustness. If a system passes these tests then the developers and users can be confident of the IS (information systems) based solution. The system will be tested by analyzing the code itself then

the functionality that is the white box and black box. The system will be tested for functionality and also how the system forms or modules interact with each other. The system will be tested using the bottom up technique whereby the system is examined from the smallest possibly testable unit called unit testing. The system will be tested through various stages of testing to testing the system as a whole and till it was tested for its acceptance by the users. To achieve this the developer scheduled a testing plan based on the bottom up technique as illustrated below.

5.3.1. Bottom up testing

According to Gary (2009) he called this model the general testing process



Source: Gary, System Analysis and Design (2009)

Bottom Up technique is a technique by which software development team attempt to check a software product for errors by starting from the smallest unit considered white box testing gradually incrementing in scope till whole system is tested for errors.

The developer chose this technique to accomplish the testing required for the CDR mining and Analysis System. The developer tested the system from the smallest testable unit gradually

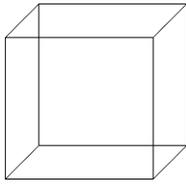
increasing in scope into module, subsystem and system the whole system then acceptance. as illustrated by the above diagram. The testing managed to uncover a many errors before system deployment and were all fully corrected before the system was implemented. The testing progressed the system noted a few flaws which required the structure of the system or its various components to be fine-tuned to respond directly to the system's requirements. After changes were made the system was retested the same stage for example when errors were noted in the module testing stage the analyst referred back to the previous phase where the errors were corrected. The logical back flow reveal how it is possible that errors found in testing a in a later testing stage can be addressed by referring back to an earlier stage of the testing plan. The developer took advantage of this. The testing was very successful. The sub sections illustrate explicitly how the developer tested the system implementing the bottom up testing style. The developer ran many tests on the data but will only show a few important examples of tests ran

5.3.2 Unit testing

According to Shannon, Miller and Prewitt (2005) illustrated that unit testing is the first real test phase that a piece of software undergoes. The developer tests each module or object for its functionality against what is expected of it. However Agarwal (2010) cites that unit testing is when individual unit that make up modules are tested before they are combined together to form modules. This testing phase should answer the question, are the module components or procedures doing what they are supposed to be doing?

Clearly unit testing concerns the testing of the system's very smallest program components. Testing is done by testing unit by unit Gary (2009) defines unit as the smallest testable item of a system possibly for example text boxes for input, search queries if they are retrieving correct data. Many scholars have agreed that the test can be broken down into two major types of unit tests namely white box and black box, where the former tests if the program code is logically correct and the later tests if a system unit is functionally correct that is the unit functionality eg. text box able to hold and pass numeric values. The developer implied both of these tests as illustrated below.

5.3.3 White box



According to Sheikh and Koirala (2009) aka structural testing this technique pays much attention to the internal processes of the units. It focuses on the internal working detail of a unit and identifies errors not revealed by the black box approach. In this approach, test groups have complete knowledge about the internal structure of the software. It is an approach to testing where the tests are derived from knowledge of the software's structure and the implementation. It is usually applied to relatively small program units such as sub routines or the operations associated with an object.

Signified by a white box by virtue of the reason that the tester will examine the inside of the system by examining the actual code inside the system as shown by the white box where you can see the inside.

The developer applied this testing technique, to apply it the developer analyzed actual code written to attempt to find logical errors in the program flow of the system. Below shows evident snippets of how the user applied this testing technique.

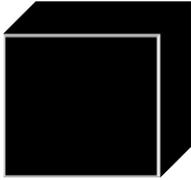
```
<?php session_start();if (!isset($_SESSION['MM_Username'])) { header('Location: login.php');
}>
<?php require_once('Connections/authconn.php'); ?>
<?php
if (!isset($_SESSION['MM_Username']))
close_session() ;

$user= $_POST['username'];
$password=$_POST['password'];
$type=$_POST['type'];
//validation
if (isset($_POST["create"])){
if ((($_POST['username'])=="") {echo "Enter username";}
else
if ((($_POST['password'])=="") {echo "Enter password";}
else{
$user= $_POST['username'];
$password=$_POST['password'];

//password complexity rules
if (strlen($password)<6){echo"Password does not meet complexity rules standards enforced by
telone for security purposes, password should be not less than 6 characters";}
```

Fig 5.1 white box test runs

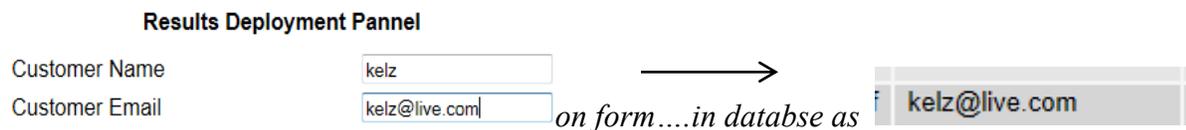
5.3.4 Black box



According to Agarwal (2010) testing involves testing of the inputs and outputs produced by the system units without taking into consideration the internal operations of the system. It involves looking at the program specification and creating a set of test data that covers all the input and outputs and program functions.

Signified by a black box shown above by reason that it is assumed the code is masked away from the testing team. The developer applied this testing technique, to apply it the testing team was entering data into the system and examining how the system holds the data if it is preserving the formats for the data this was done by checking the data as it sit in the database for example when entering new user the testing team check if the CDR record is being preserved in its right syntax after it is mined from the live database server to the new system and also the email supplied if it is being preserved correctly. Extreme and invalid test data was prepared and fed in to the system. The system would not continue with invalid data. .Below shows evident snippets of how the user applied this testing technique.

Examples of test run



Invalid data

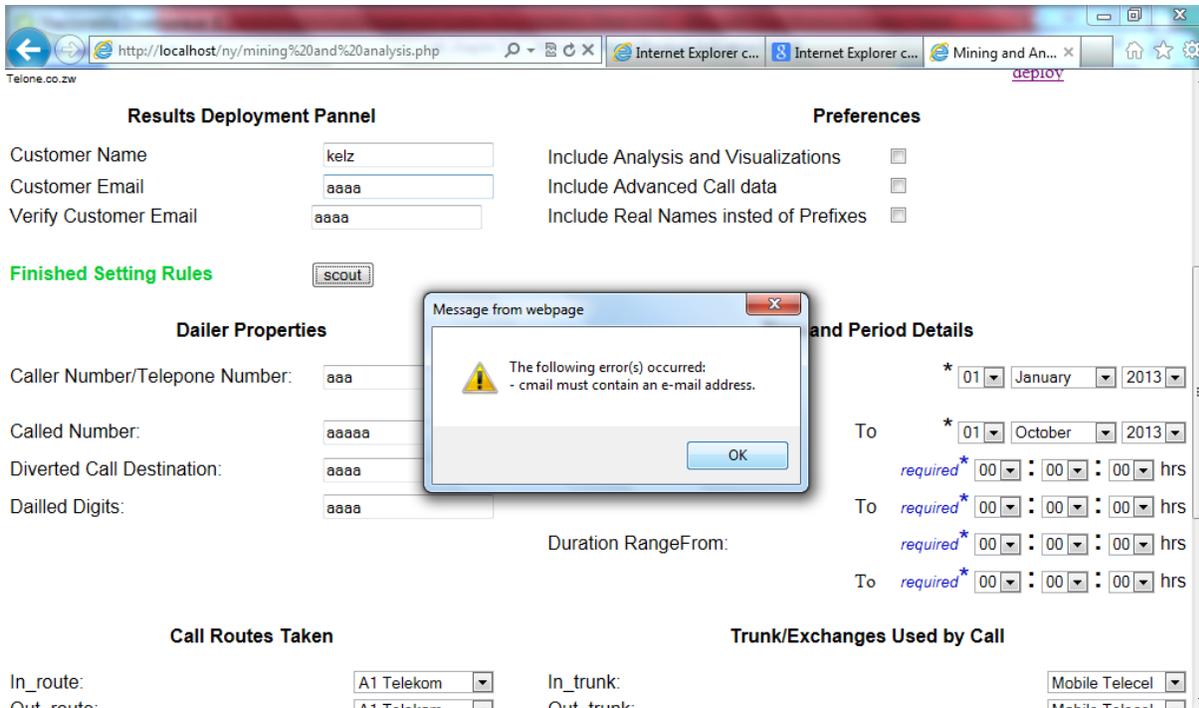


Fig 5.1 example test run I

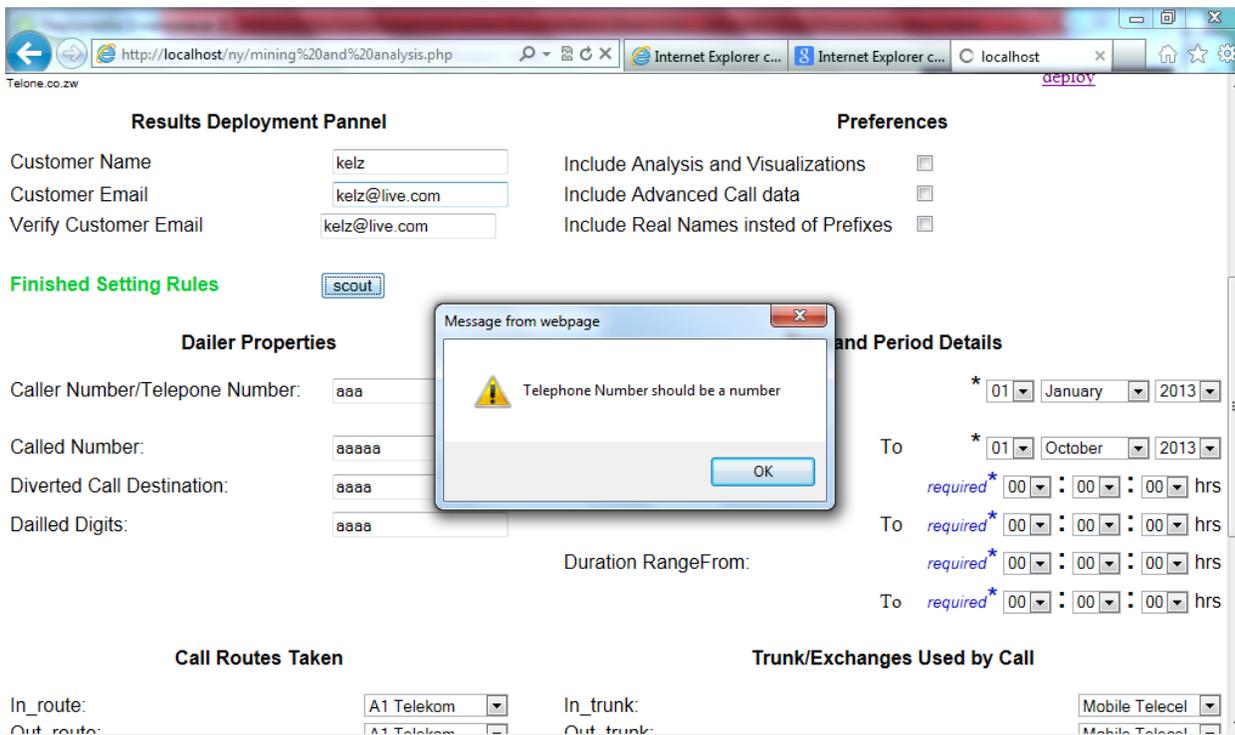
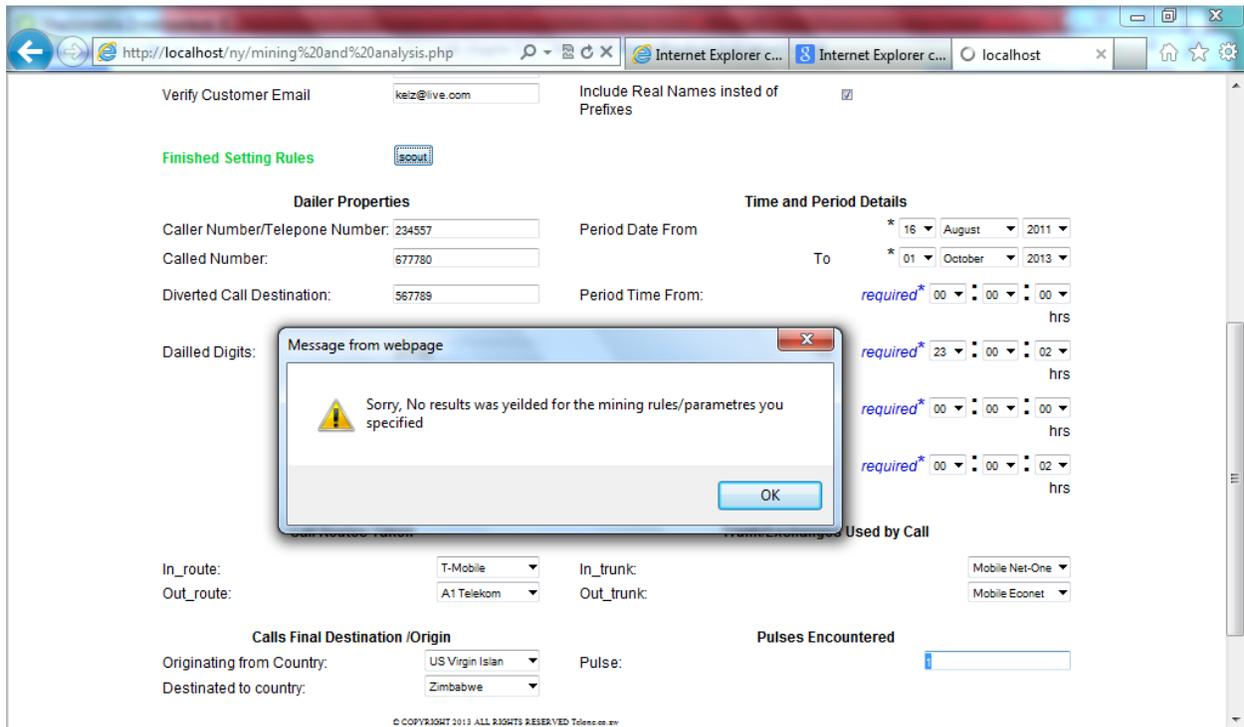


Fig 5.2 Black box test runs

Module Testing

According to Agarwal, Tayal and Maheśa (2009) In module testing the units that have been tested are intergrated and they are combined into logical. This aims at uncovering simple module-to-module intergration failures, it verifies that when parameters are passed between routines, the pieces communicate correctly and generate appropriate outputs.

To achieve this, the testing team broke down the system into modules namely login, presets, reports, mining and analysis and deployment. The testing team tested each individual module to see if the modules behaved correctly. All modules behaved correctly as they were intended. The mining and analysis module was tested for behaviour with correct data but which will match no results is given



System Testing

According to Agarwal (2009) Ssystem Testing is a process concerned with finding errors that result from unanticipated interactions between subsystems and system components. It is also concerned with validating that system meets its functional and non-functional requirements. System testing kinds include alpha testing, beta testing and acceptance testing. The main

objective behind testing is to establish whether the system is working according to the specified requirements and expectations.

To archive this, the testing team put together all the modules of the system. The sub-systems were integrated to form the full system. The testing team plotted a set of test data that is valid and invalid data to test the systems robustness. The testing team inputted valid CDR data into the live system. The calls details were known. The testing team then ran the system. With from zero to max, null to extreme cases of data they had come up with in their test data schedule.

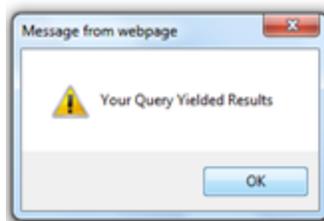
The test team carried a sheet for testing documentation which they recorded the test they conducted and the results which helped them to debug errors. The major module testing test runs conducted by the testing team were as illustrated.

Complete flow process on the systems core with valid data test runs

A new user was created and the system was relogged in with new user.

An attempt was made to mine the CDR record which was identified in the live system database.

And an analysis was also asked and the system yielded results.



From : Tel-One
 Name : Kels
 Date : Tue 15 Oct 2013
 Time : 18:53:35
 E-mail : bedelchamboko@gmail.com

Request : Please find a record of all calls made in the period 2013-01-01 to 2013-10-18 between 00:00:00hrs to 23:59:59hrs lasting between 00:00:00 and 23:59:59 to Zimbabwe

We found 3 calls relating to your request

Calling Number	Called Number	Dailed Numbers	Date	Time	Duration	Is trunk	Out trunk	Is route	Out route	Pales	Origin Country	Destination Country	seq_no
309876	789890	678989	2013-10-04	11:00:03	00:00:47	077	099	2400300	2600200	0	0970	0263	577
309876	567890	234567	2013-01-07	21:00:09	00:02:21	099	073	2320588	2163000	3	0260	0263	578
309876	456789	456787	2013-06-04	12:32:07	00:02:01	071	099	2341590	2280300	2	0380	0263	579

Total Calls : 3 Dailed Numbers : 3 Total Duration : 0

© COPYRIGHT 2013 ALL RIGHTS RESERVED Telekom.co.zw

Sum

Send as email

Data Visualisation

The test showed that the system was working well.

E-mailing and document creation test runs.

From previous test the CDR Mining and Analysis results were sent via email and were successfully received in the developer's email.

Google

Gmail - 1-50 of 64

COMPOSE

Primary

Inbox (14)

- Starred
- Important
- Sent Mail
- Drafts (15)
- Spam (1)
- Trash
- Circles
- Personal
- Travel
- More

Search people...

- JULIA MUTONH...
- aaron chatsakama
- Dereck Chamboko
- edith zindimo
- edna.muteswa55...
- Elton Muteswa
- phanuel takawira
- Rudo Lorraine Mu...
- ednamuteswa Inv...

From	Subject	Date
edna.muteswa55@gmail.com	hi	Oct 11
me	Tel-One CDR Mining and Analysis System inc response to your request. - Thanks for requestingDear sir/madam : As per your requ	Oct 4
Edna Muteswa	texta cash - Find attachment.	Oct 4
me	2013-10-03 21:40hrs backup documentation odr mining and analysis	Oct 3
me	backup chapter 4 not complete +chapter 1,2,3 marked *commented proceed.	Sep 10
Edna, me (3)	greetings - Noted with thanks. Original Message From: Henkel Chamboko [mailto:henkelchamboko@gmail.com]	Sep 9
me	(no subject) - referenced bt not finalized	Sep 5
Kudzai Mutembwa	Fwd: - Forwarded message From: Kudzai Mutembwa <kudzaimutembwa@gmail.com> Date:	Sep 4
me	bkup final yr dissertation odr minin - cptr 1 polised 2	Sep 2
Edna, me (2)	RE: Budget for the month - Ok thnx: mom luv u too. Sent via Nokia Email Original message From: Edna	Sep 2
Gmail Team	Welcome to the new Gmail inbox - Hi Henkel Meet the new inbox: Inbox tabs put you back in control with simple organization so tl	Aug 17
me	WhatsApp Chat with Nyasha chpwo - 8/1/2013 21:37:39: Kelz scopion: Hey wsup 8/1/2013 21:52:27: Nyasha chpwo: Hey 8/1/2013	Aug 5
henkel chamboko	Greetings of the new season. - Hello sir hope you well! Kindest regards and warmest greetings too you from bustline computers pvt	Aug 5
info	Account details for 3290661383 at Svanto.net (pending admin approval) - 3290661383, Thank you for registering at Svanto.net. Yo	Jun 22
Mail, me (2)	Delivery Status Notification (Failure) - Delivery to the following recipient failed permanently: jimmy@harvatel.com Technical detai	Jun 21
me, Mail (2)	android simulator for pc - Delivery to the following recipient failed permanently: jimmy@harvatel.com Technical details of	Jun 21
admin	Your registration is complete. - Hello henkel, Your registration was successful. Login at www.classifieds.co.zw and start posting or	Jun 6
hcs401and208 projects	Fwd: HCS 401 research letter and guidelines - Forwarded message From: hcs401and208 projects <m5uocomputerprojects@gmail.i	Jun 3
me	FC pass - kelz	Apr 25
me, Mail, Trust, Anyway (9)	log book - wats up bro From: Henkel Chamboko <henkelchamboko@gmail.com> To: anywayt@yahoo.com Sent:	Apr 2
Tauya Mutambanengwe (2)	(no subject) - On Tue, Mar 12, 2013 at 12:19 PM, Tauya Mutambanengwe <teemaxpro@gmail.com> wrote:	Mar 12
Dzidzai Chapfuwa	spm - hgdsfgykjpg.p	Mar 3
Edna Muteswa	psmas receipt - Good morning son Please find the attachment as per your request. Have a blessed day. Mom.	Feb 28

75%



Mining and Analysis Filters Accuracy test runs

Furthermore the testing team went on to test the rest of the modules by checking to see the CDR in the live cdr streaming testing environment before it was mined. After the CDR mining and analysis the system was tested to see if the CDR Mining and Analysis request was saved for record purposes. The CDR was checked in the Archive module and it was seen to be present.

The screenshot shows the 'Reports' page of the Tel-One CDR Mining And Analysis System. The page title is 'Tel-One CDR Mining And Analysis System inc'. The browser address bar shows 'http://localhost/ny/reports.php'. The page contains a search form for 'Specify Desired Report' with fields for 'Request From (Date)', 'Request From (Time)', and 'Sumat'. Below the search form is a table of reports.

File Name	Result Explanation	Date Requested	Time	Records	E-mail	Username
cdr_2013_10_14_22_40_47Super.pdf	Please find a record of all calls made encountering 11 pulses in the period 2013-01-01 to 2013-10-13 between 00:00:00hrs to 23:59:59hrs lasting between 00:00:00 and 23:59:59	2013-10-14	22:40:47	9	kylie@live.com	Super
cdr_2013_10_14_22_40_47Super.pdf	Please find a record of all calls made encountering 11 pulses in the period 2013-01-01 to 2013-10-13 between 00:00:00hrs to 23:59:59hrs lasting between 00:00:00 and 23:59:59	2013-10-14	22:40:47	9	kylie@live.com	Super
cdr_2013_10_14_22_40_47Super.pdf	Please find a record of all calls made encountering 11 pulses in the period 2013-01-01 to 2013-10-13 between 00:00:00hrs to 23:59:59hrs lasting between 00:00:00 and 23:59:59	2013-10-14	22:40:47	9	kylie@live.com	Super

Below the table, there is a footer with the text: '© 2013 Tel-One CDR Mining And Analysis System Inc. All Rights Reserved. A product of Tel-One Systems 110877 880 Information Systems Support 1/80 TelOne.co.uk'.

Archiving test runs

The testing team attempted to resend the result of the request. The result was successfully received by the developer in his email box.

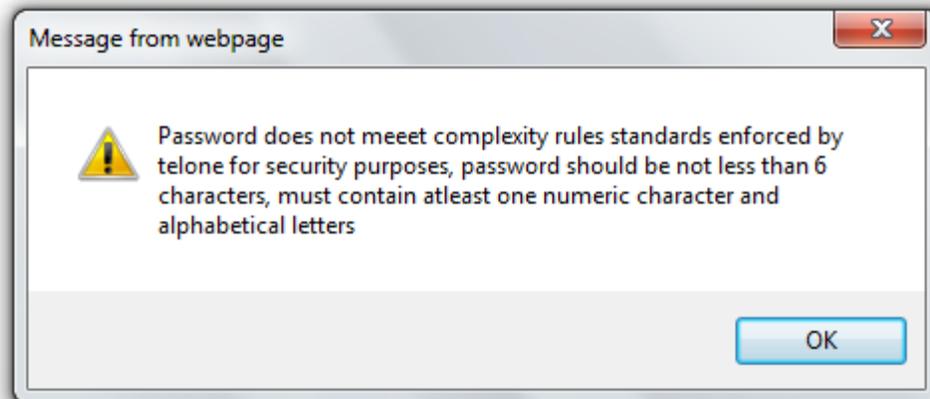
The testing team went onto to view the report of the system operations showing queries issued by attempting to conduct any mining and analysis procedure. The request the testing team had issued was found hence the module was reporting well.

Preset and notification test runs

The programming team went on to change the presets for the user as an administrator and try to conduct an operation that will yield more than a preset (max request results allowed for a user to mine at a time) he was given and the system denied the query hence the presets module was working well and well integrated. A notification was immediately issued to the MO this was confirmed because the testing team then immediately relogged in with an MO login and a notification was noted in the home page. The notification was being issued promptly. The testing team cleared the notification by giving the user more an increase preset privilege to execute his mining and analysis operations he intended to do. The team relogged in with the less privileged preset user whose privileges had been increased and tried to mine more records as would be permitted by the addressed request notification. The mining and analysis process yielded results and was successful. This proved beyond doubt the Presets and Notification Modules were working effectively and had been well integrated into the system.

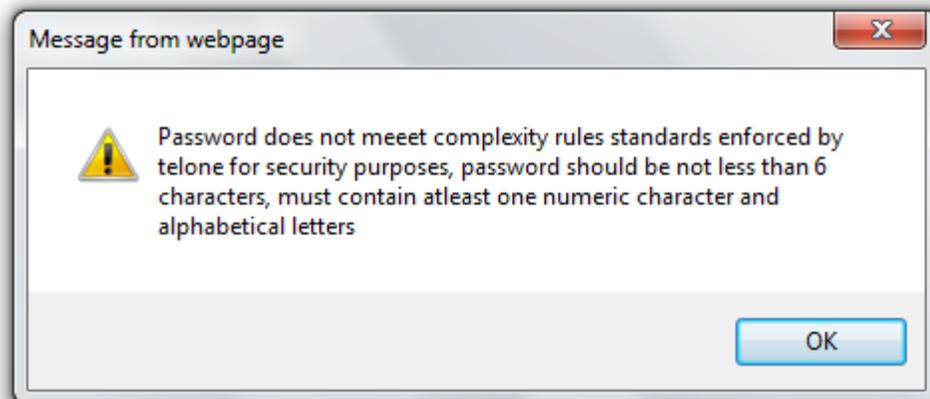
Login accounts test runs

The testing team went on to try to change a user's login details who was in the system and the testing team then attempted to login with the new login details they had created and was successful. The testing team tried to input a password that failed to meet password complexity rules and were disallowed by the system.

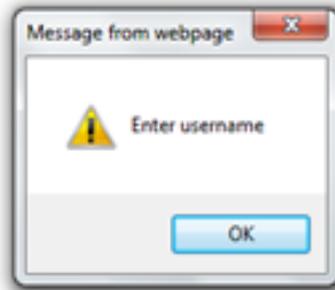


The testing team tried to create a user with no username and were disallowed. The testing team tried to create a user with no password and were disallowed. The testing team revealed the database of the system to view the passwords for the users and could not see them because the passwords were encrypted based on md5() encryption standard. The testing team attempted to delete an administrator password and were disallowed by the system. The testing team deleted another user from the system. The testing team then went on to try to login with the deleted user's login details and was disallowed by the system.

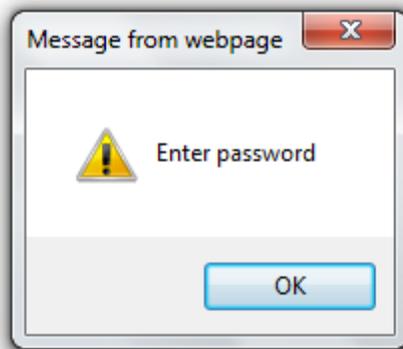
Login with password that does not meet complexity rules or creating user login which does not meet password complexity rules



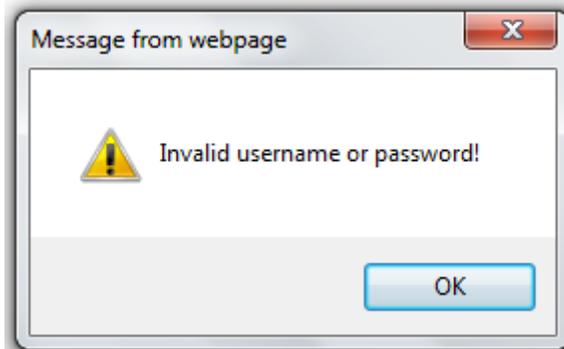
Login with no username and create user login with username message



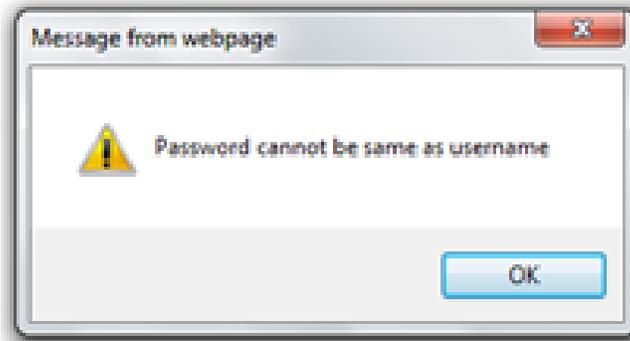
Login with no password and create user login with no password message



Login with deleted password



Creating user login with password same as username



Creating username with valid username and password.

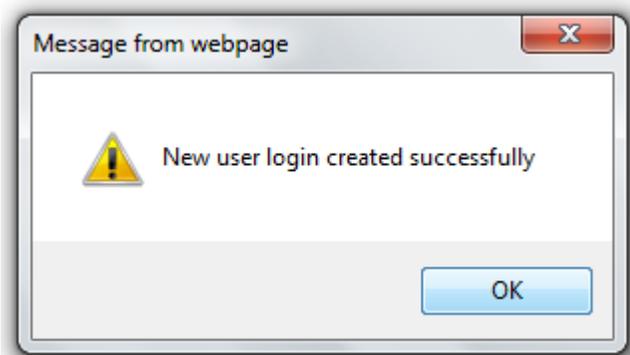


Fig 5.3 System testing test runs

Report Generation test runs

The users went on to conduct report request from a mining and analysis operation they had conducted which will to try to produce a report which will include the mining queries they had issued. The result showed the actual results that they had issued and the filters they had entered were effected accurately. The testing team went on to throw a wild card on the report generation and the system yielded correct results. The testing team also attempted to send a request to produce a reports based on data they wasn't sure of by creating a report based on a fragrant of data the system yielded correct results by injecting a "MySQL where like " clause query. This proved that the reports module was working effectively and had been well integrated into the system.

The system performed exceptionally well to gain the confidence of the developing team as well as the testing team unusually.

Alpha Testing

According to Agarwal and Tayal (2007) alpha test is conducted at the developer's site by the customer under the project team's guidance. In this test users test the software on the development platform and point out errors for correction. It has limited ability to expose errors for correction because it is conducted by a few users on the developer's platform. Once it's done, the product will be ready for transition to customer site for implementation and development.

To carry out this test the testing team allowed the IT department staff to use the system and give feed back to the developer. All miss harps noted were corrected

Beta Testing

Agarwal and Tayal (2007) stated beta testing is done at user's site and the system is exposed to a number of users. Developer may not be present at the site, there is real life software experience without actual implementation, in this test users record their observations, mistakes, errors and report them periodically. Users also get an opportunity to suggest modification, a major change or deviation.

To carry out this test the testing team took the system to Interconnection department and the system was posed to many users to use the system and give feed back to the developer. All miss harps noted were corrected

Verification and Validation

According to Agarwal and Tayal (2007) verification and validation is the name given to the checking and analysis process that ensure that software conforms to its specification and meet the needs of customers who are paying for the software.

5.3.2. Verification

James (2004) pointed out that verification is the process of confirming that a design entity functionally (Software) performs as intended, that is one entity defines what is intended and

another entity implements what is intended. This checks whether the system that has been built is the right product. It tries to see if the user requirements and system specifications are well represented by the system.

Evidently attempts to find out if the developer is building the right system to achieve this, the testing team continuously made a comparison between the functionality in the current system with those created for the new system. This verified that the product was the right system

5.3.3. Validation

According to Aristides Dasso, Ana Funes (2007) It is referred to as the beta testing. It ensures that the system addresses the client's needs, through system testing, beta testing, and client acceptance testing. It establishes the fitness of a software product for its operational mission.

Evidently attempts to find out if the developer is building “the system right”. To achieve this, the testing team continuously made a comparison between not on the functionality but the behavior of the functionality in the current system with that behavior created for the new system. This validated the product was built right.

5.4. Installation

Section gives a clear discrete procedure of how system will be installed prior to running on live environment. The section will also give a short comment on the reasons for the chosen deployment method for the system.

This process is a guideline of how the system should be installed. CDR mining and Analysis System is a web-based interactive application. As suggested any web based application will require a host fortunately. Tel-One will host this application on its own which will serve it from huge costs of running a web hosted by a third party.

5.4.1. Consideration for deployment method

The development team decided for the system to be internally hosted and to sit on an intranet of the organization because of the very high security concerns associated with the CDR data aka “telecoms organizations’ currency”. This major concern strongly emphasizes high security needs to the safe keeping and preservation of this organization’s data thereby strongly discouraging the

subcontracting of any CDR operations procedures or mining and analysis to any third party organization *see Chapter 3 Section: 3.7.1 Outsourcing Alternative*. More over hosting of such a system on a third party's equipment will attract high costs to the organization.

However it is highly envisaged that the system be hosted internally in the organization its self. It is beyond doubt that this choice will add value and enrich the business and attract null hosting costs *see Chapter 2 Section: 2.4.2 Feasibility, Economic*. And *Chapter 2 Section: 2.3 Identifying business value*.

Step1

Install php mysql xampp full version.

(This contains Apache HTTP server responsible for interpreting internet protocols for the system and all web service related functions

Contains also MySQL for database and DBMS for database administration that is the query handling for accessing retrieving and storing data from the database for the system.

Contains also Tomcat a web agent for for administering the http protocol transportation

Contains also FileZila handles all java scriptssuch as sending mail together with mecury mail)

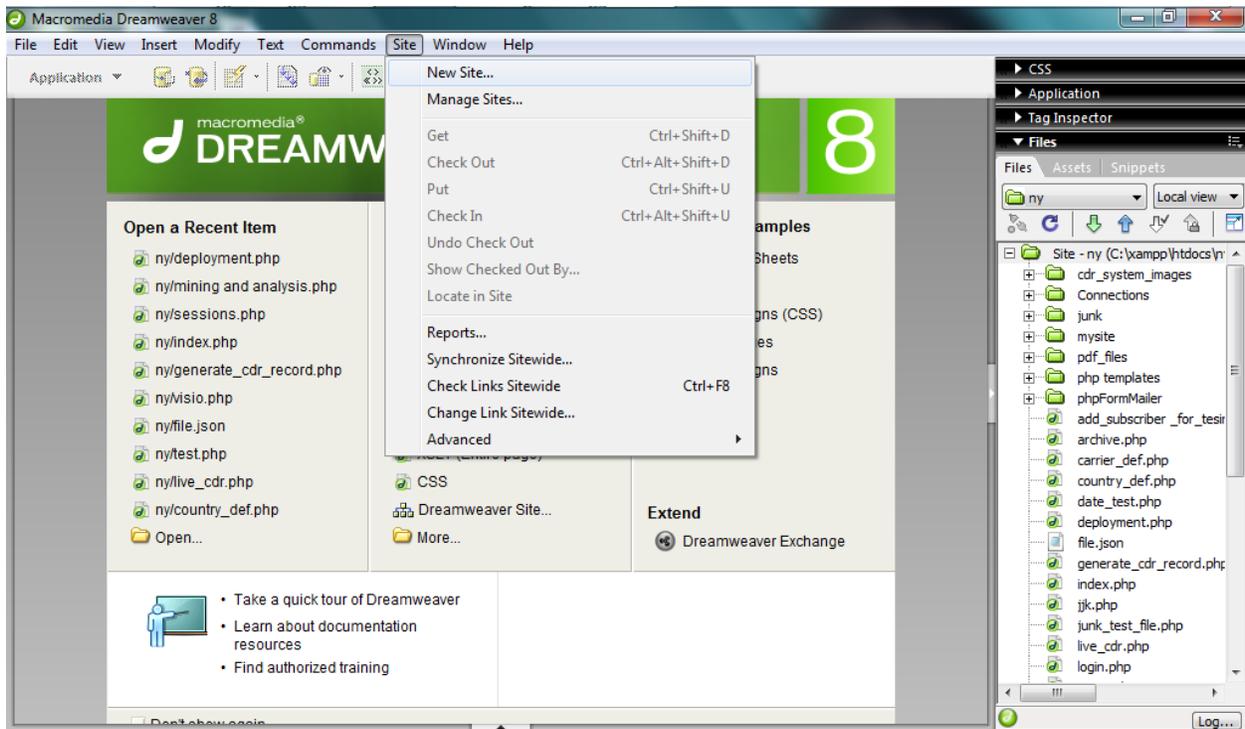
Step 2

Create Site to map the apache file server to the root destination of the CDR Mining and Analysis System use the follow through guide in this section listed after Step3

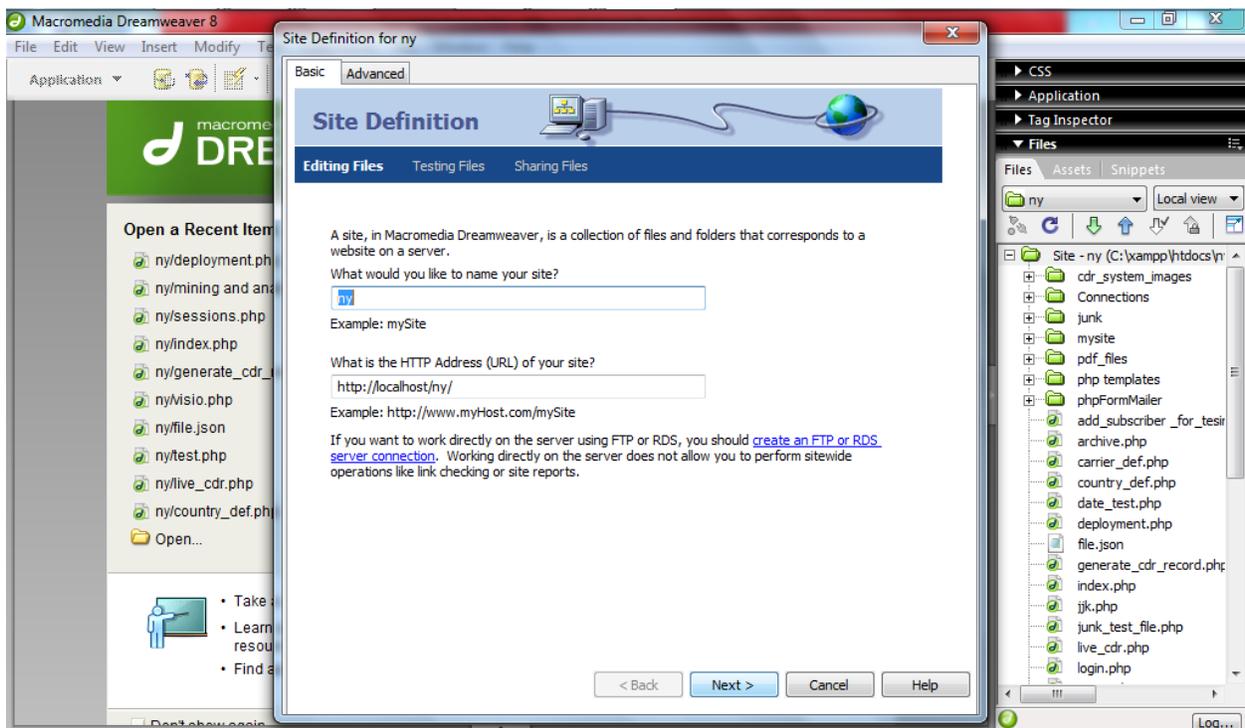
Step3

Copy folder named "ny" to destination named "C:\xampp\htdocs\"such that you have a valid directory named "C:\xampp\htdocs\ny\"

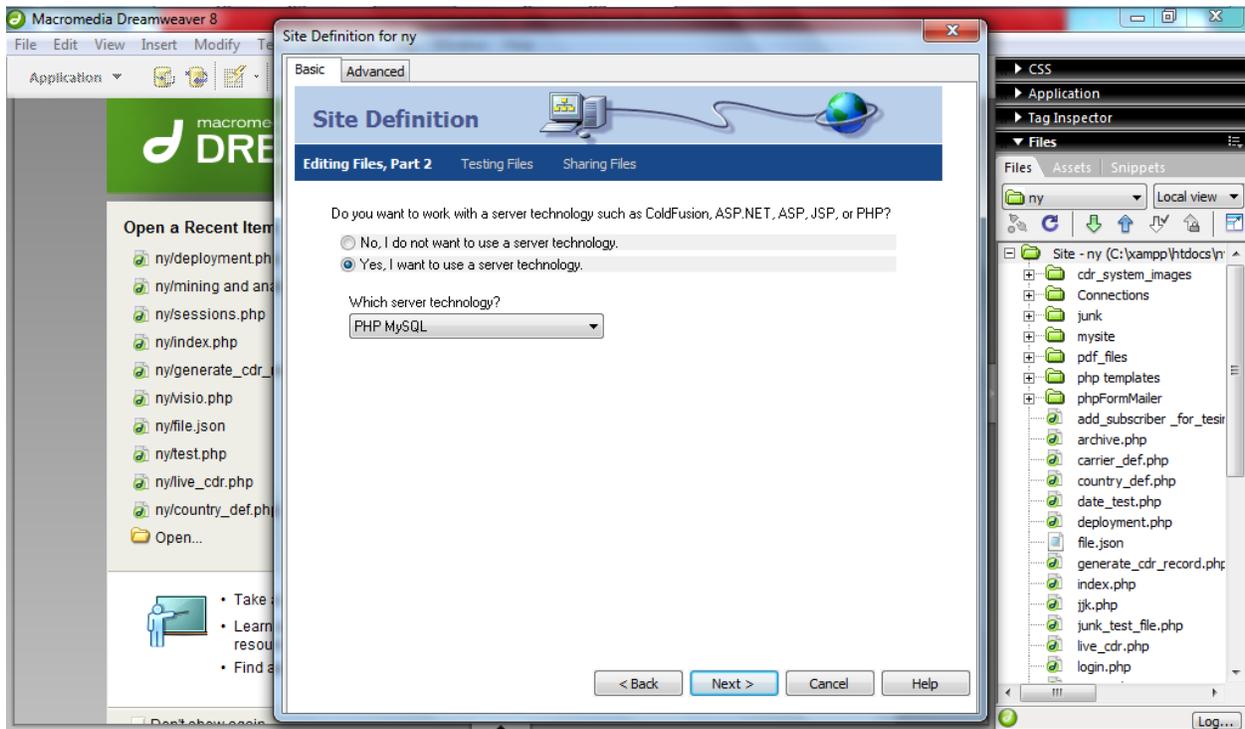
Copy folder named "data" to destination named " C:\xampp\mysql\"such that you have a valid directory named " C:\xampp\mysql\data\"



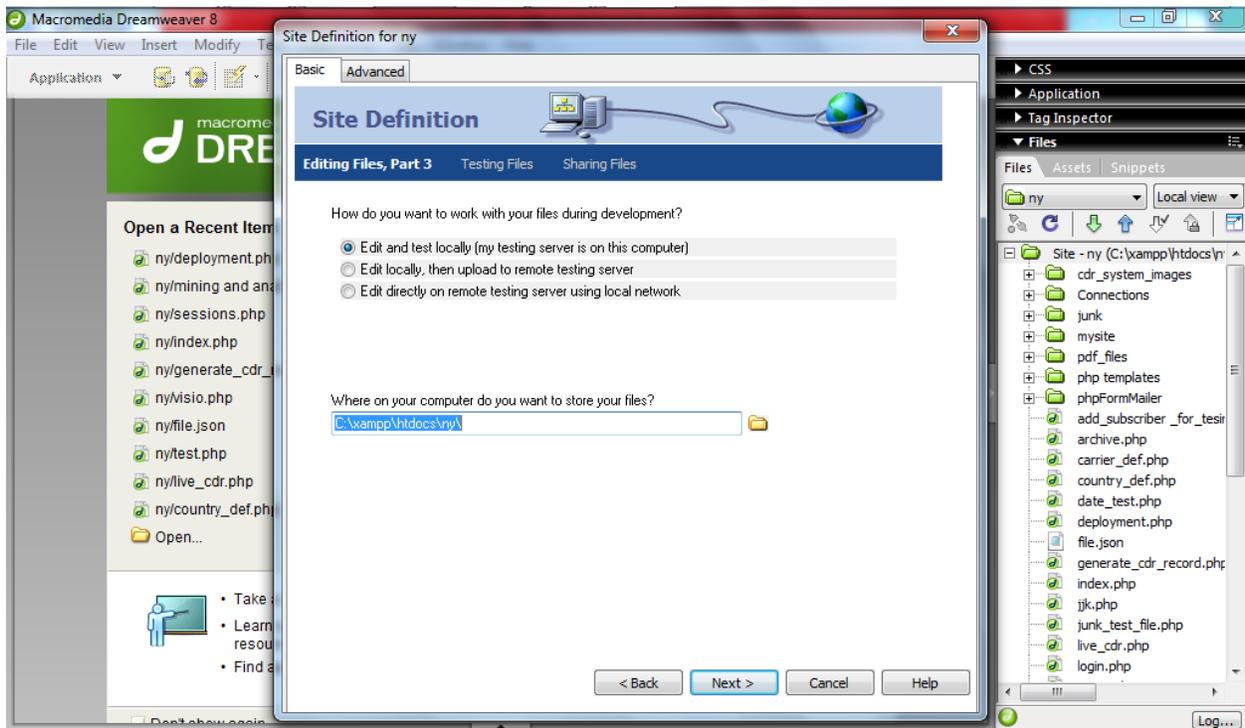
Enter the following and click next



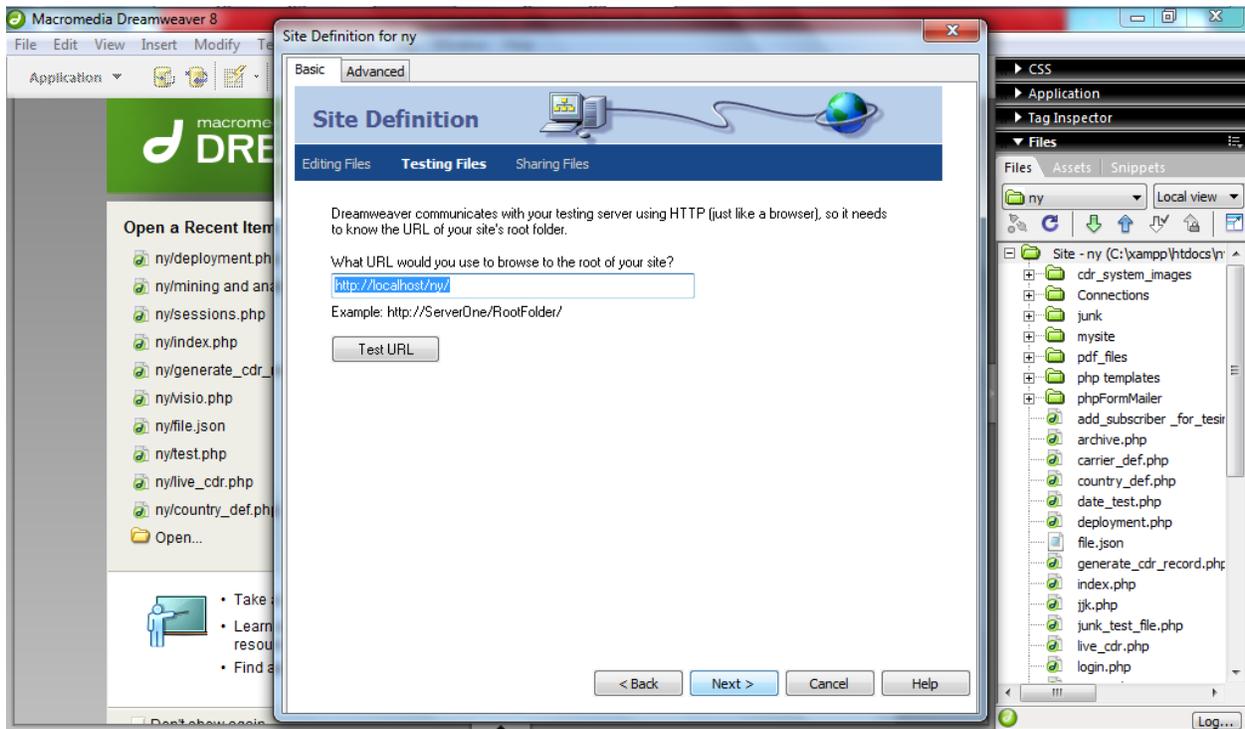
Enter the following and click next



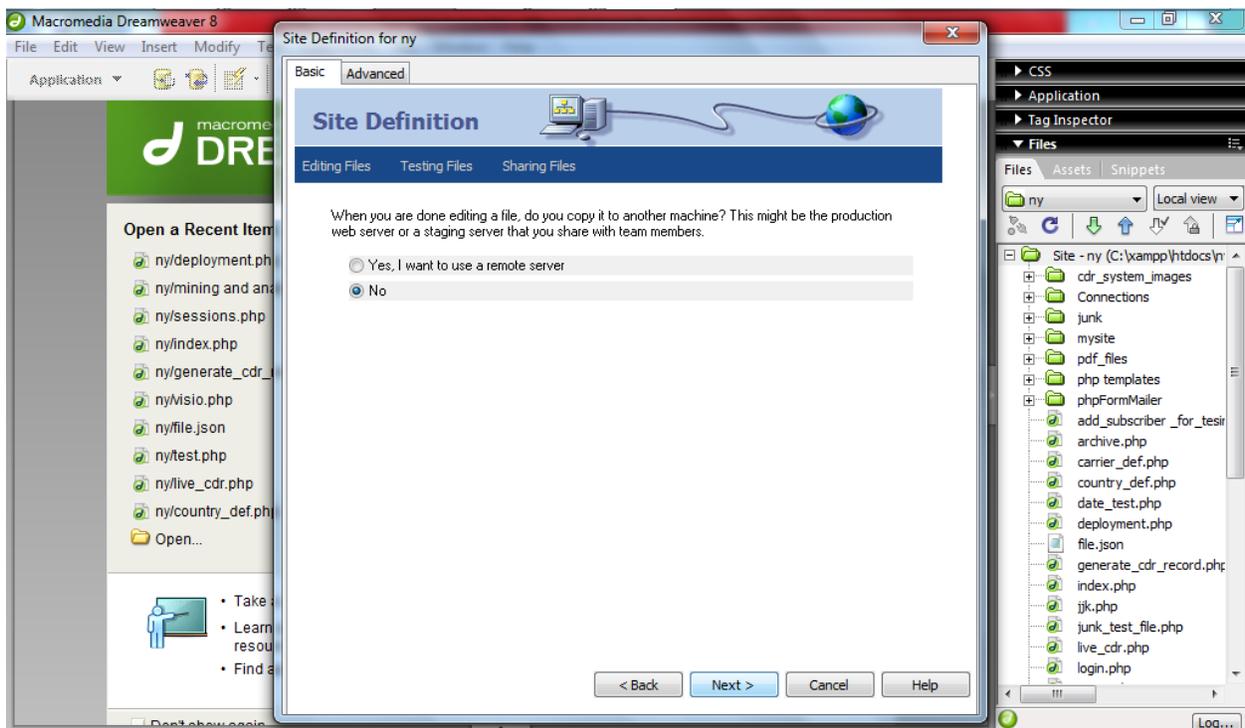
Enter the following and click next



Enter the following and click next



Enter the following and click next



You must see your new site configurations now and click next

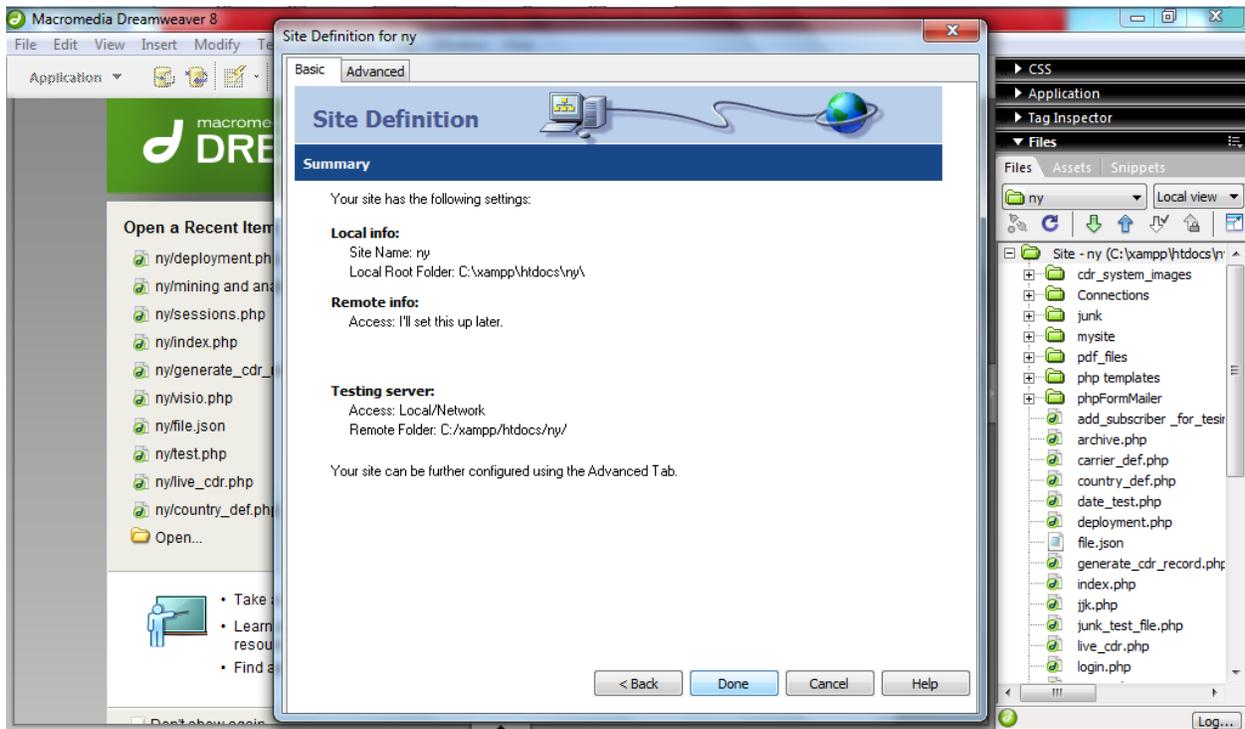


Fig 5.4 installation guide figures

Congratulations site set up is finished the program can now be run for the first time and will be accessible from any remote location on the LAN within the intranet.

Please ensure that your network is masked from outside access such that no-one enters into the intranet, confirm with your network administrator for ensuring security on the network for the system.

5.4.2. Changeover Strategies

This final product of the project will be introduced into the organization thereby eventually discontinuing the current system. The available changeover strategies or conversion methods there were available to the developer were as follows;

- Direct Conversion
- Parallel Conversion(Chosen)
- Phased Conversion
- Pilot Conversion

5.4.2.1 Direct

According to Peter and Connor (2004), that using the direct changeover strategy, the old system is abandoned completely and a new system is out into operation on a particular date and the two systems that is the old one and the new one do not have to run con-currently, the old system is abandoned once the new system becomes operational.

Evidently in this strategy the current system is immediately discontinued and replaced with the new system. The major characteristic of this strategy is that is most adopted for very small projects very less risky and particularly small firms. However in contrary Tel-One is a very big organisation and the new system deals with critical data. The developers shunned from using it because if the new system produces any inaccuracy it will greatly cost the organisation hence this strategy is not the most ideal one to use.

5.4.2.2 Parallel Changeover (developers choice)

According to Peter and Connor (2004) Parallel changeover method requires that both the old and new information systems operate fully for a specified period of. Data is put into both systems, this allows the accuracy of the new system to be checked which helps build confidence that the new system is working properly.

Clearly this changeover strategy is when the current system is run in conjunction with the new system for a while, and gradually discontinued. The two systems are runs parallel to each other noting any short comings of the new system but continuously checking its output against that of the current system and making necessary changes. The developer chose this choice because it is an option the guarantees undiscovered-error proof solution during system implementation. All ill behaviour is corrected before the new system is fully running on it own and the organisation has vested all confidence in its output.

5.4.2.3 Phased Changeover

According to Carpenter (2001) This is a technique by which the developer introduces one phase of the new system at a time until the whole old system has been completely replaced, A module

at a time can be converted to the new system in phases until the whole system is transferred. Errors can be worked on as they appear.

Evidently this changeover strategy is when a system is divided into phases usually modules. The modules are then introduced into the system one by one while being integrated into one big system. The emblem of this strategy is that it is most fitted for vast systems which can be maybe about 100 000 lines of code while this system is about 30 000 lines of code if measured using SLOC. The developers shunned away from using this strategy because of its suitability for large systems where the new system is not a vast system but rather a very powerful system.

5.4.3.3 Changeover

According to Gary et al (2011), Pilot conversion is a selective implementation method. Installation of the new system is only to those departments that require the use of the system. During this pilot operation, the old system continues to operate for the entire organization, including the pilot site. After the system proves successful at the pilot site, it is then implemented in the rest of the organization.

Evidently this is the strategy by which the new system is introduced into the organisation by being introduced department by department. Clearly, this system changeover strategy is best suited for vast systems as well which are very complex and whose training and migration processes take a very long time to complete. Mostly this strategy is most favoured ERP system which are incredibly big systems and such systems may implement a hybrid combination of such with phased where the system is introduced department or branch by branch after fully introduced throughout the organisation wide scope it is then use sometime and gradually discontinued when manage feel it is now safe to do so. Again this technique is most suited for vast and complicated systems for these reasons the developer shunned away from using this strategy because it is unnecessary for a system like the new system rather will just lead to wasting resources. Evident enough the new system is not a complex system at-least only slightly in its structure but rather a very powerful system

5.5. Maintenance

According to Doyle (2009), maintenance is the process of modifying and refining the system after it has been delivered and is in use. This is a continuous process. It is usually done annually or when the need arises. Maintenance begins soon after the system is installed and lasts as long as the system is in use.

Evidently this is the iterative process by which a system is continuously matched with the users' requirements and the new ever changing requirements of the users. The system will continuously be calibrated to respond directly to these abrupt changes in needs of the system users and to make clear cut, delivered solutions such that they are able to efficiently meet their intended requirements. In IS terminology referred to as corrective, adaptive and perfective maintenance respectively. The system should be maintained based on the mentioned types of maintenance as examined below. Clearly system maintenance solely major objective is to ensure that the CDR Mining and Analysis System will be able to meet its requirements continuously and the proposed IS solution attempts to never out date by updating itself with new needs within its context. Chiefly it should be realized that testing validates an IS solution and boosts its stakeholders confidence, but does not necessarily mean that a solution is complete but however other errors may still be noted later on after the system is deployed and has started to be used in the live environment or that it has shortcomings. This is what the maintenance process addresses as well as those shortcomings triggered by changes in the environment which will cause the system to need some slight twitching to respond to such changes. Neglected by most scholars Kaseem A Saleh (2009) mentions a fourth maintenance technique called Preventive maintenance which is used to prevent further maintenance

Below assesses how the maintenance has been carried out in the proposed system and will be continuously carried. As mentioned maintenance falls in four distinct categories as illustrated;

- Corrective
- Perfective
- Adaptive
- Preventive

5.5.1. Corrective Maintenance

According to Saleh (2009) Corrective maintenance activities involve the diagnosis of reported software errors and making the necessary changes to fix them. Typically software errors are reported by users after encountering them during software use. Other errors are reported by the testers prior to the delivery and deployment of the software in the market and these reported errors are scheduled for maintenance. He further stated, sometimes high-impact and critical errors affecting the software operation, may be noted their rectification is initiated immediately because of their importance.

An overall understanding may suggest, as stated earlier in the introduction of the section the previous tests may still have been completed with no errors found but some errors may be found by the user after system is working in the live environment. To achieve this testing the development team will be sent an email containing the bug explanation from the users using the email address embed in the system. The development team will immediately schedule the bug for correction, examine the bug and tactfully address the error by drawing a plan for the correction of the bug by modifying system designs and functionality as required or simply modifying code and apply the changes as patches.

5.5.2. Perfective Maintenance

Kaseem A Saleh (2009) defined perfective maintenance as the activities that involve software changes leading to improving the functional and non-functional aspects of the software. Example modifying the user interface to optimize the user interactions and increase the system usability is considered a perfective activity.

Evidently perfective maintenance is aimed at fine tuning a valid IS based solution (that has met requirements, aims and objectives) such that it effectively meets its required functionality in an efficient way simply. To achieve this, the development team will attempt to make query result response time excellent when mining data by indexing the data base such that the records are accessed easily. As this system is a robust interactive web based system dealing with mass data flowing in in-real time for mining it may also be very beneficial if queries are optimized to improve response time using a pseudo SEO (Search Engine Optimisation where references are indexed for fast query implementation during result look up of queries) as discussed by

<https://support.google.com/webmasters/answer/35291?hl=en> Accessed 2013-9-30 13:36 hrs. The development team may make changes to the interface to produce a mood that increases concentration and also may include small sub-functions to stimulate a good experience to the users as they use the system.

5.5.3. Adaptive Maintenance

According to Saleh (2009) adaptive maintenance activities involve adapting the software to other operating activities or to a new software or hardware paradigm or technology. Configuring the software to deal with new user interface technology or to be ported to another operating system is considered to be adaptive maintenance.

To achieve this, the system will continuously be changed to meet ever changing needs of the industry. Users will continuously give feeds backs on a quarterly basis of their experiences and if any changes are required by the users. The industry may set new requirements and the business partner agreement may cause adaptive changes to the system. These changes are industry/market triggered. Business partners like AT&T switching agreements may be amended such that Tel-One traffic to the west region that is the western America will be channeled via new route/carrier Kelcom. This will cause the system to be changed by integrating a new route definition to allow accurate mining and analysis of CDR data.

5.5.4. Preventive Maintenance

According to Kaseem A Saleh (2009) this involves system changes intended to improve the future maintainability of the system and reduce the possibility of finding more errors; it is normally triggered by the maintenance team or upper management. Its main impact is to reduce the maintenance costs in the long run. Examples include system restructuring, changing the algorithms and data structures used and enhancing the system documentation.

Evidently this technique of maintenance attempts to ensure that a system is made out-datedness proof by ensuring that it no longer runs beyond the changes in the needs of the users. This is ensured by furnishing the system with sub-functionality that enables the super user to be able make changes to system which react directly to the changes in the needs of the users and the

industry triggers mentioned earlier on in adaptive maintenance. The changes will not need any developer to effect such changes. To achieve this CDR Mining and Analysis System is a very robust and powerful system which will enable unimagined data analysis capabilities beyond imagination. The developer gladly furnished the system with configurations changeable at runtime such as changing the presets for a user the admin can set presets to users that is the grant user to be able to make a query of a specified limit of records.

5.6. Conclusion

The development team has successfully developed and designed an IS based solution for the problems mentioned in the problem definition all length and extreme cases have been fully tested. Evidently the system was tested for errors thoroughly and passed through all the various tests it was posed against. The developers are now totally confident that their system is now a finished product verified to address its core aims and object and validated as a right solution built the right way. The project has been a success.

APPENDIX A: User Manual

CDR Mining and Analysis

User Manual

Getting Started

Installation Guide

User Guide

Welcome to Tel-One Intranet

CDR Mining and Analysis System inc

Good morning please submit authentication...



Username

Password



Table of Contents

Getting Started: Opening Application	118
Login Page	119
To Login	119
Home Page	120
Mining and Analysis Page	120
To conduct mining	120
Deployment Page	122
To Print Results.....	122
To Send as E-mail	122
Archive Page	123
To Find and resend archived doc	123
Presets Page	125
To restore default for a user	125
To set new Preset for a user	125
To clear a notification	126
Users Page 127	
To Create User Login.....	127
To Change User Login.....	127
To Delete User Login.....	128
Reports Page	129

To search by date, time, email, username, number of records yielded	129
To search with filtering columns to show	130
To search by key word in result explanation	130
To print report	130
Quick Search Page	130
To search subscriber details by ID Number.....	130
To search subscriber details by Account Number	131
To search line details of by phone number	131
Country Definitions Page	132
Route Definitions Page.....	133
Trunk Definitions Page.....	134
Subscribers Page	135
Subscriber Lines Page	136
Live CDR Streaming Page	137
About Page	138
End of User Guide.....	138

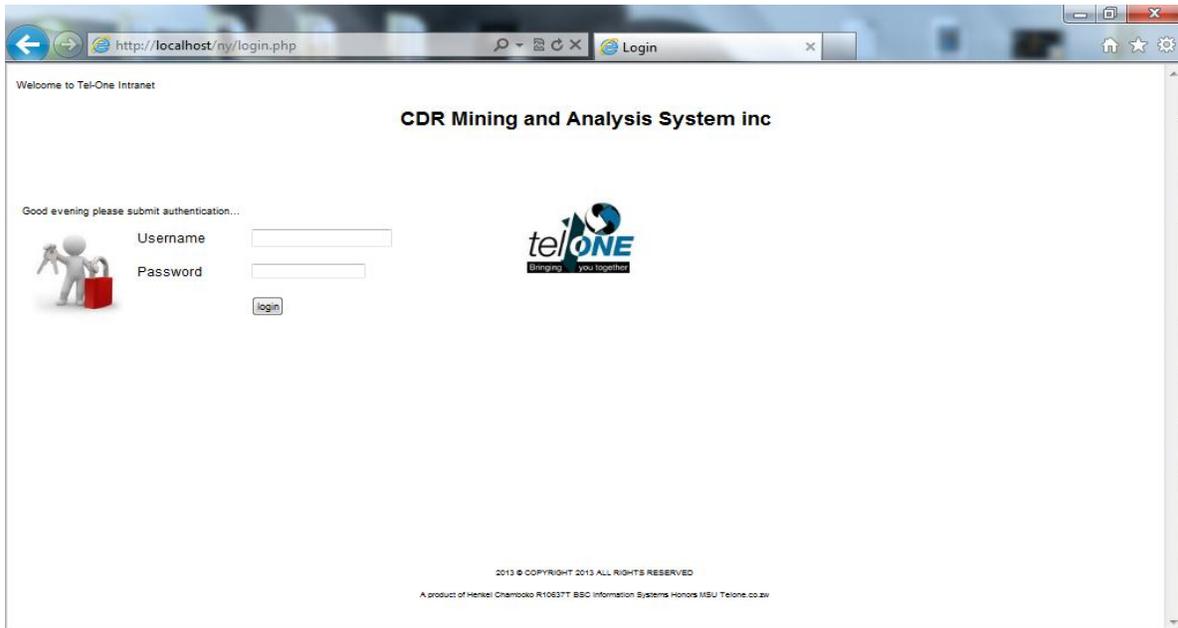
1 Getting Started: Opening Application

1. Navigate to the program by entering the website name depending on your host. Otherwise use `http://localhost/ny/login.php`



This will take you to the login web page

2 Login Page

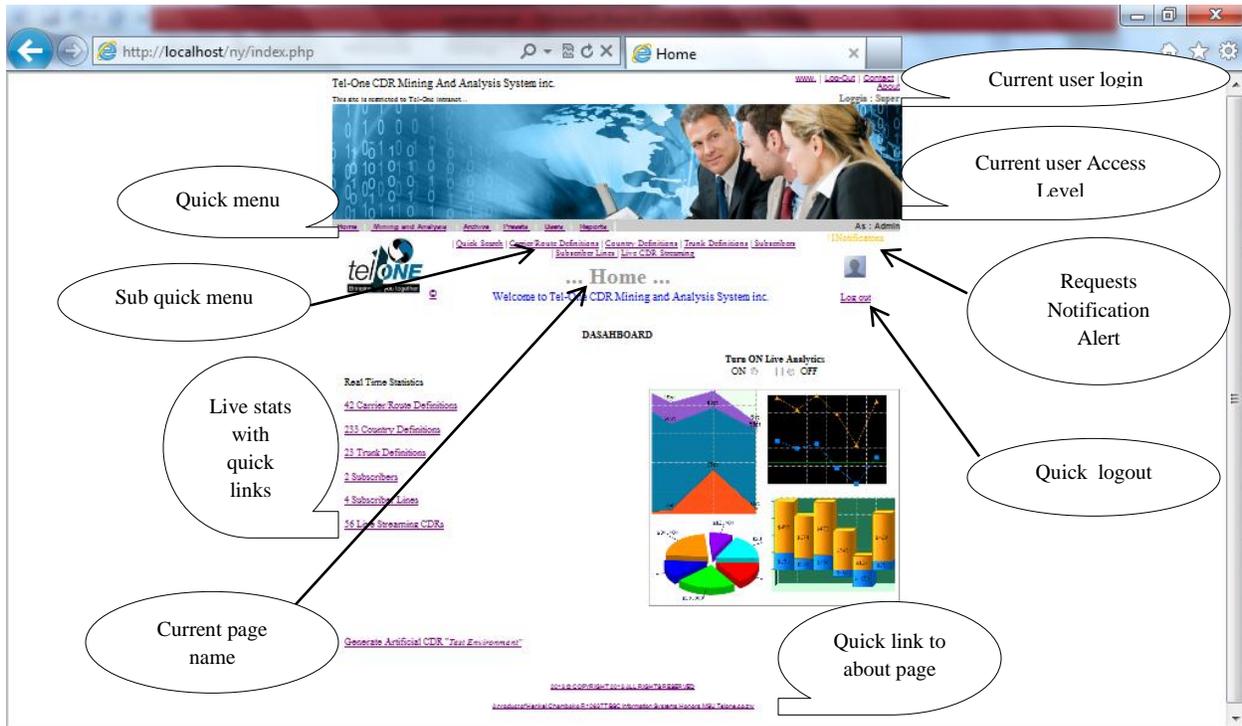


This will take you to the Home page

To Login

2. Submit login and click Login

3 Home Page



Shows an over view of the whole system some quick menu options may not show depending on users' access levels

Click Mining and Analysis on the quick menu

This will take you to Mining and Analysis

4 Mining and Analysis Page

To conduct mining

1. Enter customer's name who the result is to be given to
2. Enter the customers e-mail where the result will be sent to
3. Confirm the customers e-mail
4. Choose your preferences for the search
5. Set the mining parameters for example which route, which telephone number fields marked with asterisk "*" are mandatory period and duration use a default parameter if not given. Supply only the fields that contain what you are looking for the system uses and inference engine which can work with insufficient parameters even only one values can be used for example pulse 11 can yield results
6. Where the filters are not know for example when you do not know or have the particular route you are looking for, for calls that had a pulse of 11 set the route parameter to Not Specified.

Click scout

alhost/ny/mining%20and%20analysis.php

Mining and Analysis

Tel-ONE CDR Mining And Analysis System inc

This site is restricted to Tel-ONE intranet.

www | Log-Out | Contact | About
Legriss : Stepper

Home | Mining and Analysis | Archive | Presets | Users | Reports | Admin

Quick Search | Carrier Route Definitions | Country Definitions | Trunk Definitions | Subscribers | Subscriber Lists | Live CDR Streams

telONE
Mining and Analysis System inc

... Mining and Analysis ...

Finished Setting Rules

Results Deployment Pannel

Customer Name
Customer Email
Verify Customer Email

Preferences

Include Analysis and Visualizations
Include Advanced Call data
Include Real Names Instead of Prefixes

Dallier Properties

Caller Number/Telephone Number:
Called Number:
Diverted Call Destination:
Dalled Digits:

Time and Period Details

Period Date From: 01 January 2013
To: 01 October 2013
Period Time From: 00:00:00 hrs
To: 23:59:59 hrs
Duration RangeFrom: 00:00:00 hrs
To: 23:59:59 hrs

Routes Taken

In route: A1 Telecom
Out route: A1 Telecom

Trunk/Exchanges Used by Call

In trunk: Mobile Telecom
Out trunk: Mobile Telecom

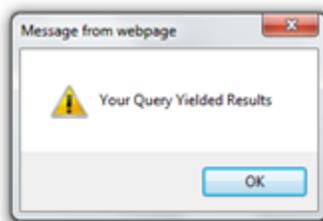
Final Destination / Origin

Originating from country: Zimbabwe
Destinated to country: Zimbabwe

Pulses Encountered

© 2013 Tel-ONE Mining and Analysis System Inc. All Rights Reserved.
A product of Tel-ONE, Charlotte, NC 28207. 999-Information Systems, Wireless, Video, Tel-ONE, LLC

You will be prompted with the following message before the system displays your results



That should take you to deployment page which will show you the results for your mining and analysis parameters.

5 Deployment Page

The screenshot shows a web browser window displaying the 'CDR Mining And Analysis System inc.' interface. The browser address bar shows 'http://localhost/ny/deployment.php'. The page header includes navigation links: Home | Data Mining and Analysis | Prints | Archive | Users | Reports. The main content area displays a search result for a specific request. The request text is: 'Please find a record of all calls made encountering 11 pulses in the period 2013-01-01 to 2013-10-13 between 00:00:00hrs to 23:59:59hrs lasting between 00:00:00 and 23:59:59'. Below this, it states 'We found 9 calls relating to your request'. A table lists the call details with columns: Calling Number, Called Number, Diverted To, Dialed Numbers, Date, Time, Duration, In trunk, Out trunk, In route, Out route, Pulses, Origin Country, Destination Country, and seq_no. Summary statistics at the bottom show: Total Calls: 9, Dialed Numbers: 9, Total Duration: 0. There are buttons for 'Print' and 'Send as email'. A 'Data Visualisation' link is also present. The footer includes 'Band Rate for the Period and Filtered Selection'.

Calling Number	Called Number	Diverted To	Dialed Numbers	Date	Time	Duration	In trunk	Out trunk	In route	Out route	Pulses	Origin Country	Destination Country	seq_no
3924884	7207628	392995	392995	2013-10-06	04:40:19	00:01:18	848	076	2342091	2343343	11	0672	0091	568
7548359	3422066	4430780	4430780	2013-10-06	04:41:43	00:09:16	099	071	2040438	2400700	11	0687	0094	569
4034387	3592350	1544953	1544953	2013-10-06	04:10:31	00:04:00	04	070	2400885	3027204	11	0243	0964	570
301880	2443302	6642593	2443302	2013-10-08	01:06:49	00:05:18	099	848	2400100	2400885	11	0261	0500	571
7822351	1643412	1768659	1643412	2013-10-08	07:45:54	00:07:25	027	068	2341091	3023200	11	0680	0082	572
687256	1136783	1889911	1136783	2013-10-08	09:12:56	00:04:00	029	086	3023703	2400100	11	0421	0974	573
5501401	4323889	2425563	4323889	2013-10-08	03:43:13	00:02:08	027	079	5050234	3023703	11	1268	0038	574
687256	1136783	1889911	1136783	2013-10-08	09:12:56	00:04:00	029	086	3023703	2400100	11	0421	0974	575
5501401	4323889	2425563	4323889	2013-10-08	03:43:13	00:02:08	027	079	5050234	3023703	11	1268	0038	576

Total Calls: 9 Dialed Numbers: 9 Total Duration: 0

© COPYRIGHT 2013 ALL RIGHTS RESERVED TELONE INC.

[Print](#)

[Send as email](#)

[Data Visualisation](#)

Band Rate for the Period and Filtered Selection

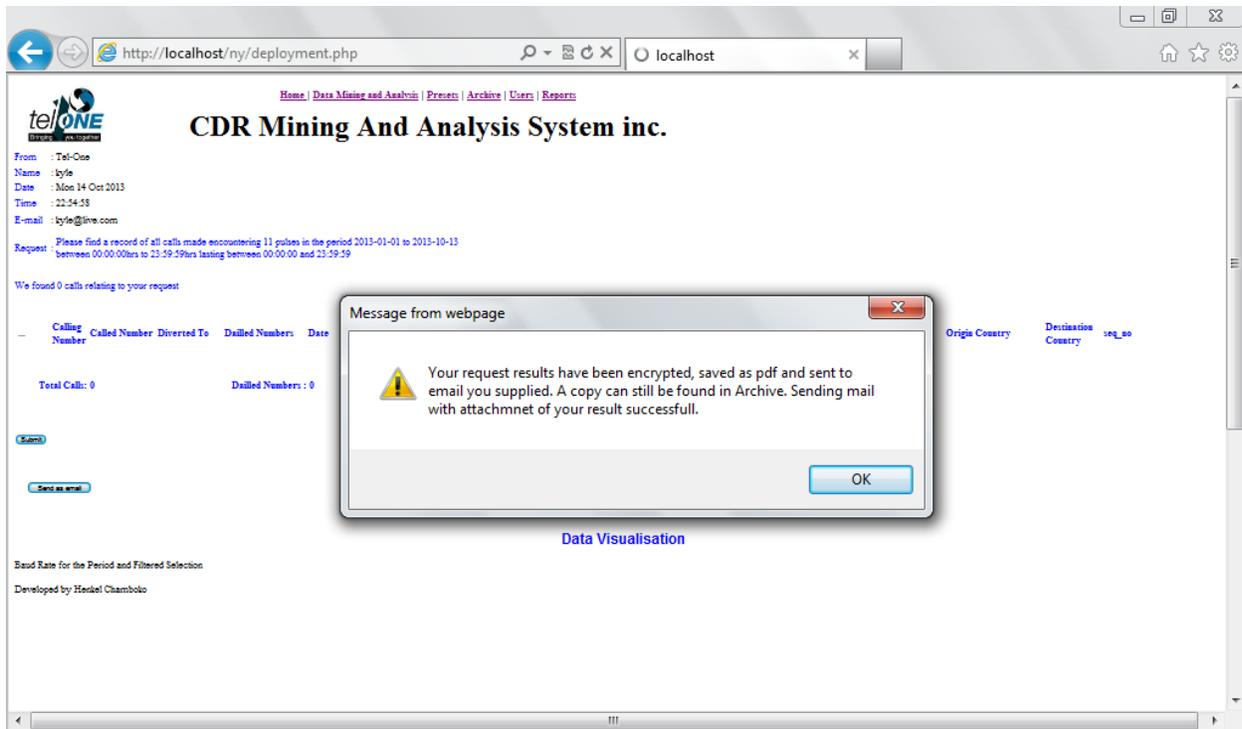
To Print Results

1. Click on print to print the results

To Send as E-mail

1. Click on send as email to send to the pre-specified email

You will be prompted with the following message



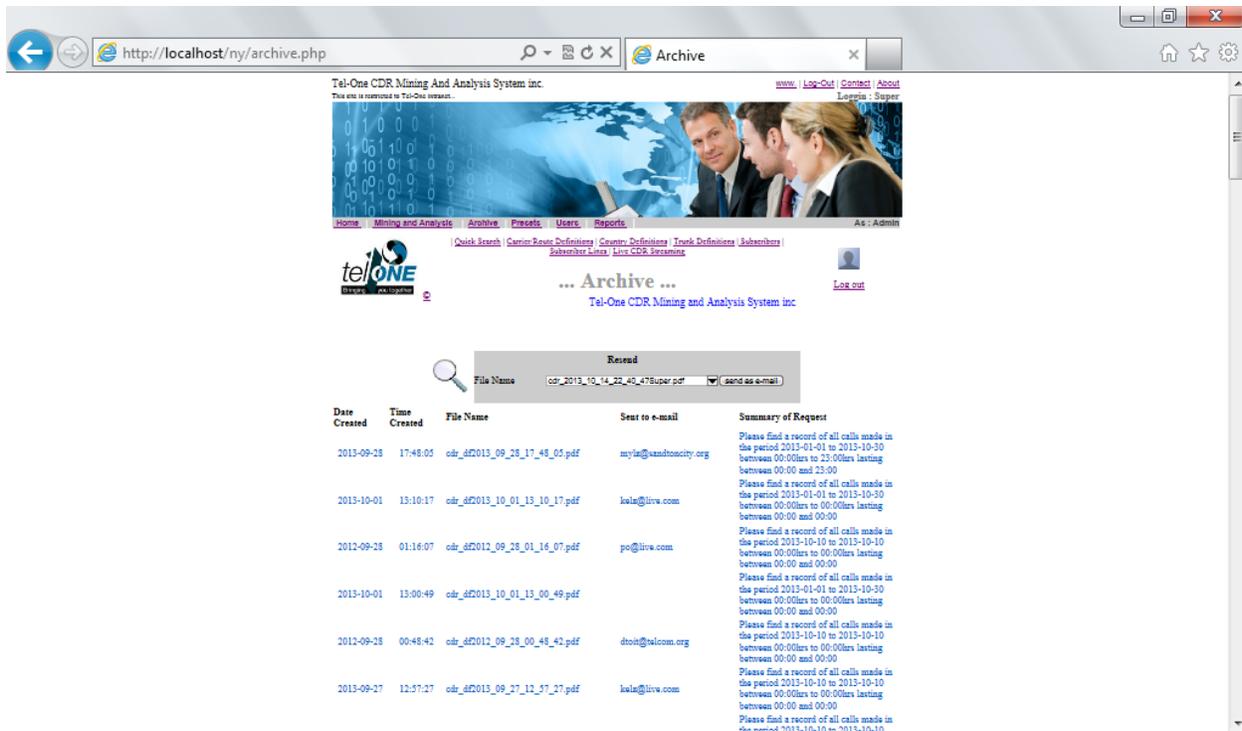
To check for a mining result that has been mined before. From Homepage click Archive

It should take to Archive page

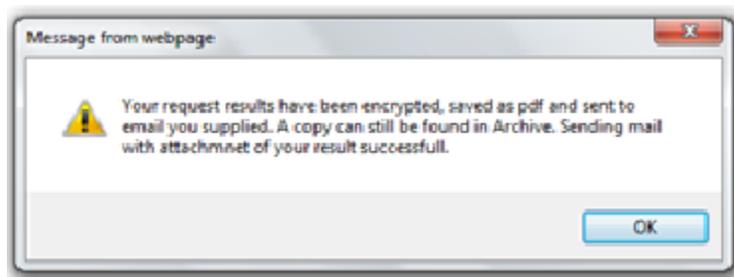
6 Archive Page

To Find and resend archived doc

1. Locate the document via the search bar or manually from the list and click resend. This should resend your results to the customer you will be prompted with a message as follows



This confirms that your mail has been sent



To Change presets, from the Home page click Presets on the Quick Menu this should take you to the Presets page

To Clear notifications, from the Home page click Presets on the Quick Menu this should take you to the Presets page

7 Presets Page

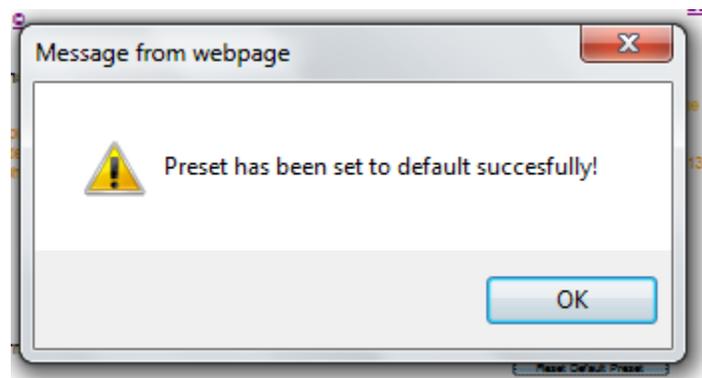
The screenshot shows the 'Presets' page of the Tel-ONE CDR Mining And Analysis System. The page includes a navigation menu with options like Home, Mining and Analytics, Archive, Presets, Users, and Reports. A search bar is located at the top. Below the navigation, there is a section for 'Pending Notifications' with a table of notifications. The 'Specify New Preset' section has a dropdown menu for 'Username' set to 'Derek2013' and buttons for 'Set New Preset' and 'Reset Default Preset'. A table of users is displayed below, showing Login_ID, Username, and Presets.

Login_ID	Username	Presets
52	Super	100
50	Henkel2013	5
40	kyle2013	100
51	Kevin2013	100
55	Derek2013	100

To restore default for a user

Choose the user name from the drop down menu, and click Reset Default Preset.

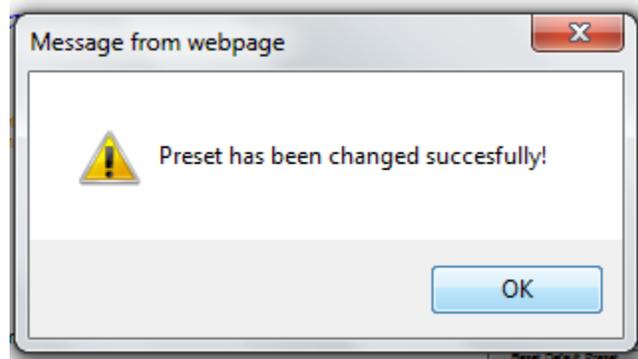
You will be prompted with the following message



To set new Preset for a user

1. Choose the user name from the drop down menu, specify the new preset and click on set new preset

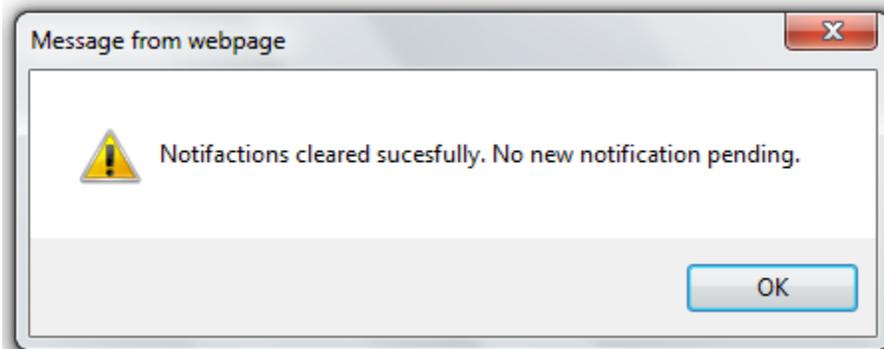
You will be prompted with the following message



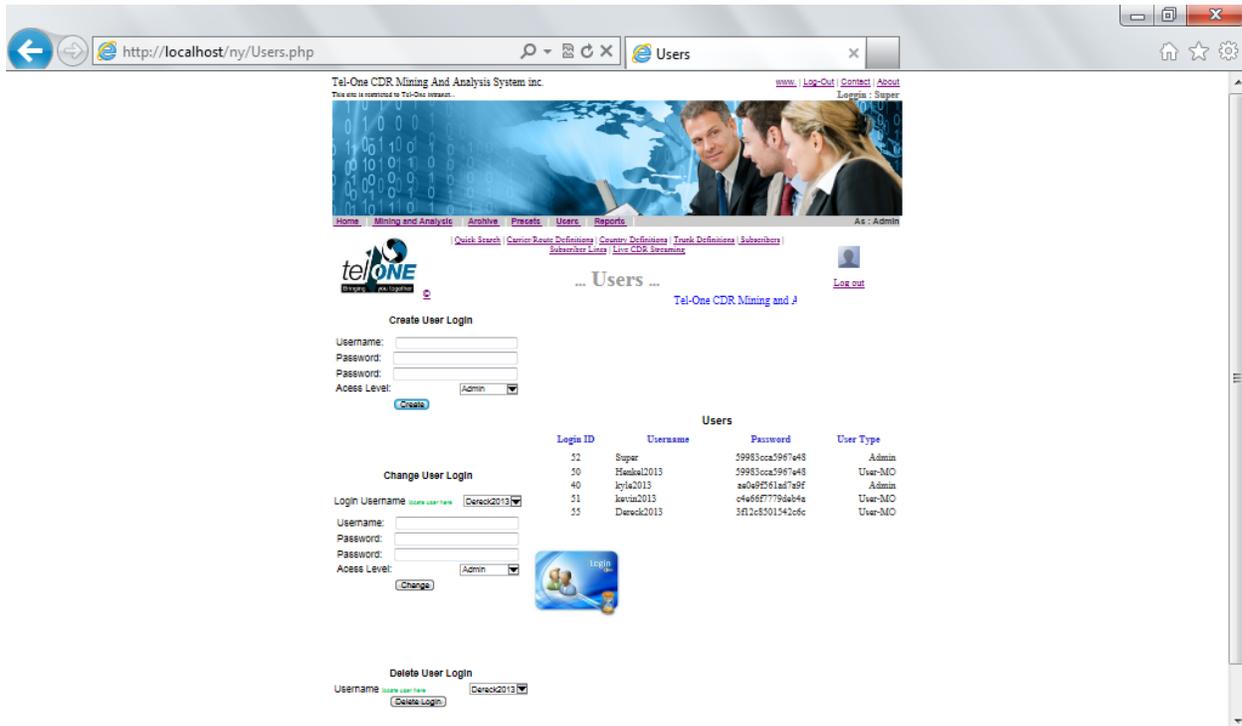
To clear a notification

1. Ensure you have considered all requests before clearing. After fully considering, Click on clear notifications

You will be prompted with the following message



8 Users Page



Tel-One CDR Mining And Analysis System inc.
This site is restricted to Tel-One internet.

Home Mining and Analytic Archive Presets Users Reports
Quick Search Center Views Definitions Country Definitions Trunk Definitions Subscriber Lines Live CDR Examine
As - Admin

... Users ...

Tel-One CDR Mining and A [Log out](#)

Create User Login

Username:
Password:
Password:
Access Level:

Change User Login

Login Username:
Username:
Password:
Password:
Access Level:

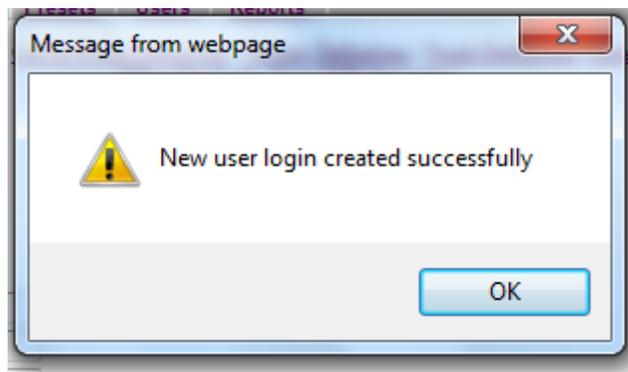
Delete User Login

Username:

Login ID	Username	Password	User Type
52	Super	59983cca5967e48	Admin
50	Hankal2013	59983cca5967e48	User-MO
40	Iyia2013	ae0692561ad7a9f	Admin
51	Kevin2013	c4e067779a04a	User-MO
55	Dereck2013	3f12c85015420fc	User-MO

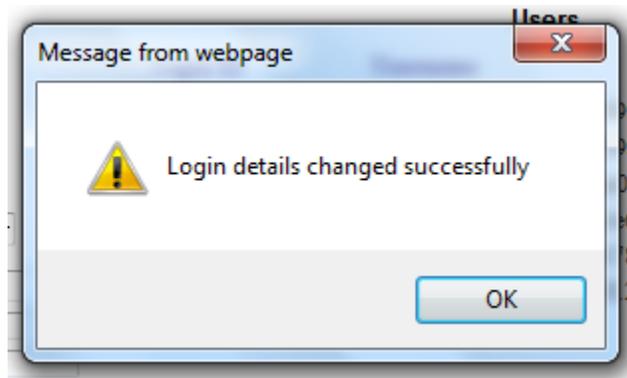
To Create User Login

1. Enter new user's username and password
2. Repeat password on the pass word confirmation and click create
You will be prompted with the following message box



To Change User Login

1. Locate user's username from the drop down-menu on the Change User Login Panel
2. Enter new username and new password
3. Repeat password on the pass word confirmation and click change



To Delete User Login

1. Locate user's username from the drop down-menu on the Delete User Login Panel and click delete login



9 Reports Page

CDR Mining and Analysis System Inc REPORT

Prepared by : Super
 Date : Tue 16 Oct 2013
 Time : 06:48:58

File Name	Result Explanation	Date Requested	Time	Records	E-mail	Username
cdr_2013_10_14_22_40_47Super.pdf	Please find a record of all calls made encountering 11 pulses in the period 2013-01-01 to 2013-10-13 between 00:00:00hrs to 23:59:59hrs lasting between 00:00:00 and 23:59:59	2013-10-14	22:40:47	9	kyle@live.com	Super
cdr_2013_10_14_22_40_47Super.pdf	Please find a record of all calls made encountering 11 pulses in the period 2013-01-01 to 2013-10-13 between 00:00:00hrs to 23:59:59hrs lasting between 00:00:00 and 23:59:59	2013-10-14	22:40:47	9	kyle@live.com	Super
cdr_2013_10_14_22_40_47Super.pdf	Please find a record of all calls made encountering 11 pulses in the period 2013-01-01 to 2013-10-13 between 00:00:00hrs to 23:59:59hrs lasting between 00:00:00 and 23:59:59	2013-10-14	22:40:47	9	kyle@live.com	Super

[Print Report](#)

© 2013 Tel-One Systems Inc. All Rights Reserved.
 A Division of Netel Systems 810077 880 Information Systems Group 1800 Toronto, ON

To search by date, time, email, username, number of records yielded

1. In the Specify Desired Report panel specify only the desired criteria inference engine will tune itself to use only available data. Date and time are mandatory fields and click search by criteria.
2. Specify the columns to show. see next function below

To search with filtering columns to show

1. From previous function do step 1 then
2. specify the columns to show
3. then click search by criteria

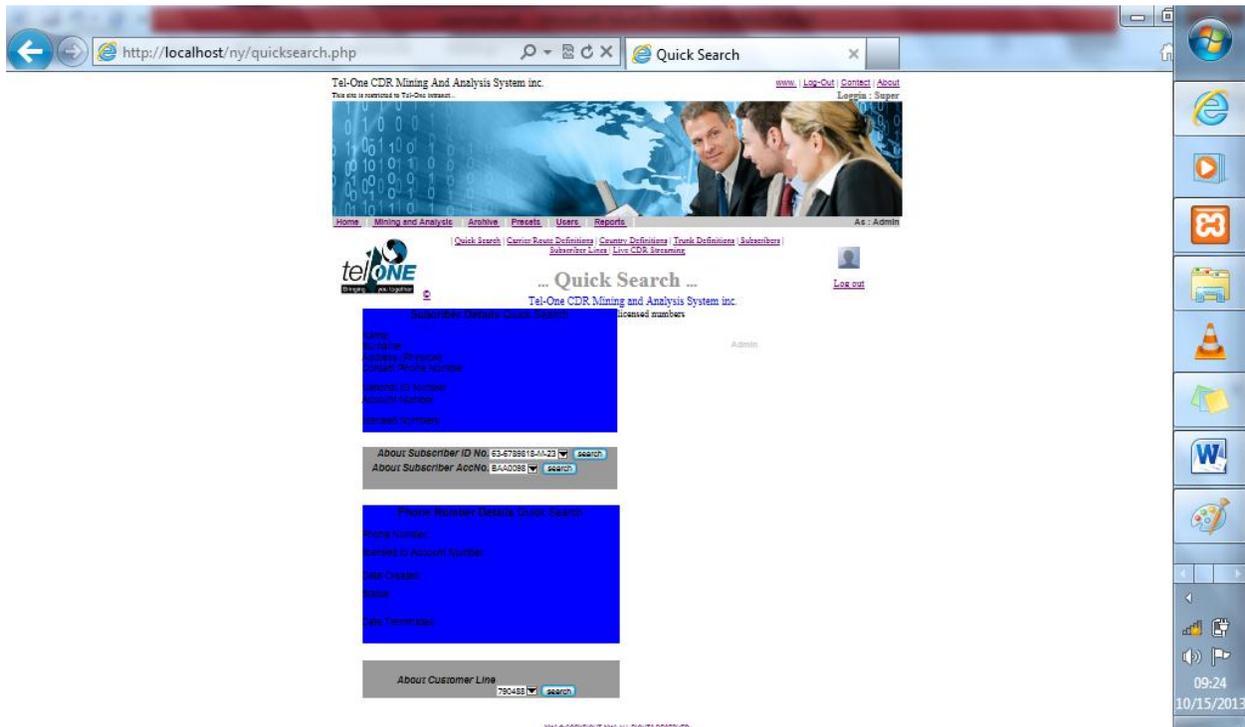
To search by key word in result explanation

1. In the search by keyword panel specify the columns to show
2. Enter the key word contained in the result explanation and click search by key word

To print report

1. Click on print report and the report will start to print

10 Quick Search Page



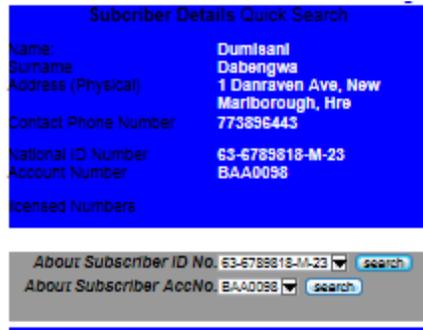
To search subscriber details by ID Number

1. In subscriber details quick search panel enter the subscribers Id number in the about subscriber id number field and click the search next to it

To search subscriber details by Account Number

1. In subscriber details quick search panel enter the subscribers account number in the about subscriber account number field and click the search next to it

The search result will be as follows



Subscriber Details Quick Search

Name:	Dumisaani
Surname	Dabengwa
Address (Physical)	1 Danraven Ave, New Marlborough, Hre
Contact Phone Number	773896443
National ID Number	63-6789818-M-23
Account Number	BAA0098
icensed Numbers	

About Subscriber ID No. 63-6789818-M-23

About Subscriber AccNo. BAA0098

To search line details of by phone number

1. In the phone number details quick search panel enter the line phone number in the about phone number field and click the search next to it



Phone Number Details Quick Search

Phone Number:	400988
icensed to Account Number	BAA0098
Date Created	1998-10-04
Status	working
Date Terminated	0000-00-00

About Customer Line 790488

12 Route Definitions Page



Tel-One CDR Mining And Analysis System inc. [www](#) | [Log Out](#) | [Contact Us](#)
This site is restricted to Tel-One intranet... [Logout](#) : Super

[Home](#) | [Mining and Analysis](#) | [Reports](#) | [Users](#) | [Reports](#) | [AS : Admin](#)

[Quick Search](#) | [Carrier/Route Definitions](#) | [Country Definitions](#) | [Trunk Definitions](#) | [Subscribers](#) | [Subscriber Lists](#) | [Voice CDR Processing](#)

telONE **CDR Mining and Analysis System inc.** [Log out](#)

Carrier	Prefix
Bell	3026103
Fioo	3023703
Rogers	3027204
Telus	3032200
AT&T2	3104101
Sprint	3160100
Verizon Wireless	2040438
T-Mobile	2620125
Vodafone	2620208
3	2342091
O2	2341091
Orange	2343343
T-Mobile	2343091
Vodafone	2341590
Bouygues	2082031
Orange	2080131
SFR	2081031
Cyprus	5050234
Telestra	5050134
Vodafone	5050379
au	4540492
SoftBank	4402081
oileh	4500818
Globe	5150201
Movistar	2140731
Orange	2140733
Vodafone	2140130

Orange	2600300
T-Mobile	2600200
T-Mobile	2163000
Vodafone	2167000
Orange	2320588
T-Mobile	2320328
A1 Telekom	2320100

[http://localhost/ny/carrier_def.php](#)

[Product/Service/Change B-10697766C Information & Home Icons 11/20/2009](#)

This is a Static page only for viewing how carrier codes or prefixes are mapped against their real names.
The prefixes they are licensed to use

13 Trunk Definitions Page



This is a Static page only for viewing how the local trunks prefixes or local dialing codes are mapped against the exchange names

14 Subscribers Page

Tel-One CDR Mining And Analysis System Inc.
This site is restricted to Tel-One internet.

Home Mining and Analysis Archive Presets Users Reports
Quick Search Carrier Keys Definitions Counter Definitions Trunk Definitions Subscribers
Subscriber Lines Live CDR Streaming

... Subscribers ...
Tel-One CDR Mining and Analysis !

acc_no	Name	Surname	ID-Number	Address	Contact_no
BAA0098	Dumizani	Debangwa	63-6789818-M-23	1 Dumavva Ave, New Machobane, Hw	773896443
BAA0097	Takudavva	Samutwvo	23-1616789-N-63	17213 Ghasak Avenue Borrorvale West Hw	0772654345,0773366712

© 2008 Copyright © All Rights Reserved
A product of NetTel (Pty) Ltd 08600 77880 Information Systems (Pty) Ltd, Tel-Aviv, IS

This is a Static page only for viewing the subscribers who have accounts with Tel-One. They are the holders of at least one telephone line to many.

15 Subscriber Lines Page

http://localhost/ny/subsclines.php

TelOne CDR Mining And Analysis System Inc.
This site is restricted to TelOne internet.

Home | Mining and Analysis | Archive | Presets | Users | Reports | A: Admin

Quick Search | Carrier Rates Definitions | Country Definitions | Trunk Definitions | Subscribers | Subscriber Lines | Intra CDR Resampling

telONE
TelOne CDR Mining and Analysis System Inc.

...Subscriber Lines ...

acc_no	Phone Number	Date Created	Status	Date Terminated
BAA0098	309876	1998-01-28	working	0000-00-00
BAA0098	400988	1998-10-04	working	0000-00-00
BAA0099	877484	2012-10-04	working	0000-00-00
BAA0097	790488	2011-08-17	Working	0000-00-00

ALL RIGHTS RESERVED

© 2008 TelOne CDR Mining and Analysis System Inc.

16 Live CDR Streaming Page

http://localhost/ny/live_cdr.php
live Streaming of CDRs

Tel-ONE CDR Mining And Analysis System inc.
This site is powered by Tel-ONE instant.



[Home](#) | [Mining and Analyze](#) | [Archive](#) | [Presets](#) | [Users](#) | [Reports](#)

[Quick Search](#) | [Carrier Route Definitions](#) | [Country Definitions](#) | [Trunk Definitions](#) | [Subscriber Lines](#) | [Live CDR Streaming](#)

*****Warning :running in test mode*****

Warning : CDR Mining and Analysis Now In Testing Environment View !!!

Live Streaming of Call Detail Records
(as it sits on the mediation server shown in real syntax)

Sample CDR

23 3924884 7297628 393995 393995 2013-10-06 04:40:19 00:01:18 2342091 2343343 848 076 11 0672 0091 BAA0090

seq_no	numX	numY	numZ	dailied_no	start_date	start_time	duration	in_route	out_route	in_trunk	out_trunk	pulse	country	from	country	to	acc_no
23	3924884	7297628	393995	393995	2013-10-06	04:40:19	00:01:18	2342091	2343343	848	076	11	0672	0091	BAA0090		
41	6500078	2882959	1768424	2882959	2013-10-06	01:30:38	00:00:48	3160100	2320588	073	017	14	0373	0965	BAA0090		
18	309876	759990	678989	647849	2013-10-04	11:00:03	00:00:47	2600300	2600200	077	099	0	0970	0263	BAA0098		
22	7368359	3652066	4630780	4630780	2013-10-06	04:41:43	00:09:16	2404438	2400700	099	071	11	0687	0094	BAA0090		
21	5884081	2969199	701355	701355	2013-10-06	08:33:41	00:01:39	3160100	2341990	758	054	16	0591	0248	BAA0090		
20	8718177	4393915	6928231	6928231	2013-10-06	08:01:21	00:05:39	2720161	3032200	009	021	17	0503	0241	BAA0090		
16	309876	5678990	234567	567898	2013-01-07	21:00:09	00:02:21	2320588	2163000	099	073	3	0260	0263	BAA0098		
17	309876	4567898	456787	567898	2013-06-04	12:32:07	00:02:01	2341950	2280300	071	099	2	0380	0263	BAA0098		
24	7870523	6292596	4059531	4059531	2013-10-06	09:12:34	00:01:39	2280300	5050234	017	027	0	0299	0855	BAA0090		
25	6698926	2608496	4576968	4576968	2013-10-06	01:35:21	00:05:45	2320588	2280300	099	009	0	0690	0055	BAA0090		
26	1052199	5181586	5196860	5196860	2013-10-06	04:57:19	00:05:40	2082031	4540492	848	020	0	0691	0385	BAA0090		
27	4034387	3592850	1544953	1544953	2013-10-06	04:10:31	00:04:00	2400885	3027204	074	070	11	0243	0964	BAA0090		
28	3373139	2501108	4541956	4541956	2013-10-06	08:48:30	00:01:07	2140130	3032200	073	079	18	0066	0358	BAA0090		
29	7851102	251870	4785662	4785662	2013-10-06	01:14:33	00:04:32	2400200	2167000	079	04	19	0048	0372	BAA0090		
30	2939121	5112838	3846634	3846634	2013-10-06	08:15:00	00:04:56	2080131	5050379	021	020	16	0852	0238	BAA0090		
31	5721817	2121137	6587895	6587895	2013-10-06	02:56:56	00:03:26	2720161	2620128	04	027	18	0051	0372	BAA0090		
40	3891516	7269900	5793487	7269900	2013-10-08	01:48:48	00:06:30	2280200	2080131	055	017	6	0380	0358	BAA0090		
33	2298786	415378	1941138	1941138	2013-10-06	04:16:16	00:02:30	3023703	2600300	009	099	1	0691	0091	BAA0090		
34	2422858	4314255	1493726	1493726	2013-10-06	08:16:11	00:06:30	3104101	2720231	073	079	8	0084	0081	BAA0090		
24	7870523	6292596	4059531	4059531	2013-10-06	09:12:34	00:01:39	2280300	5050234	017	027	0	0299	0855	BAA0090		
25	6698926	2608496	4576968	4576968	2013-10-06	01:35:21	00:05:45	2320588	2280300	099	009	0	0690	0055	BAA0090		
26	1052199	5181586	5196860	5196860	2013-10-06	04:57:19	00:05:40	2082031	4540492	848	020	0	0691	0385	BAA0090		
27	4034387	3592850	1544953	1544953	2013-10-06	04:10:31	00:04:00	2400885	3027204	074	070	11	0243	0964	BAA0090		
28	3373139	2501108	4541956	4541956	2013-10-06	08:48:30	00:01:07	2140130	3032200	073	079	18	0066	0358	BAA0090		
29	7851102	251870	4785662	4785662	2013-10-06	01:14:33	00:04:32	2400200	2167000	079	04	19	0048	0372	BAA0090		
30	2939121	5112838	3846634	3846634	2013-10-06	08:15:00	00:04:56	2080131	5050379	021	020	16	0852	0238	BAA0090		
31	5721817	2121137	6587895	6587895	2013-10-06	02:56:56	00:03:26	2720161	2620128	04	027	18	0051	0372	BAA0090		
40	3891516	7269900	5793487	7269900	2013-10-08	01:48:48	00:06:30	2280200	2080131	055	017	6	0380	0358	BAA0090		
33	2298786	415378	1941138	1941138	2013-10-06	04:16:16	00:02:30	3023703	2600300	009	099	1	0691	0091	BAA0090		
34	2422858	4314255	1493726	1493726	2013-10-06	08:16:11	00:06:30	3104101	2720231	073	079	8	0084	0081	BAA0090		
35	1982025	1019761	925061	925061	2013-10-06	01:08:43	00:04:05	3032200	2320588	029	027	17	0675	0034	BAA0090		
36	7740576	7648696	3288544	3288544	2013-10-06	07:11:27	00:01:35	2400100	3026103	029	070	7	0683	1670	BAA0090		
37	390946	4098944	493863	493863	2013-10-06	08:25:17	00:02:57	5050379	3104101	081	027	10	0974	0851	BAA0090		
38	1729416	3683789	2433902	2433902	2013-10-06	03:51:51	00:04:38	2320588	2280200	079	070	6	0264	0370	BAA0090		
39	6210821	2264817	1717432	1717432	2013-10-06	01:41:14	00:09:05	2341091	2040438	071	055	5	0261	0599	BAA0090		
42	3768799	1148418	2819748	1148418	2013-10-08	03:39:05	00:09:38	2600200	4500818	086	029	2	0261	0242	BAA0090		
43	4698956	4684592	6247949	4684592	2013-10-08	00:41:32	00:08:53	2280300	2720161	848	061	6	0221	0257	BAA0090		
44	7677835	3098956	2596042	3098956	2013-10-08	00:14:55	00:06:03	2400200	2280300	758	020	17	0286	0604	BAA0090		
45	2884134	2257428	1682419	2257428	2013-10-08	08:04:13	00:05:28	4540492	5050134	020	009	9	0994	0248	BAA0090		
46	6355337	912372	890049	912372	2013-10-08	08:12:52	00:09:27	2400885	2343091	021	068	0	0386	0995	BAA0090		
47	3593555	7993355	976288	7993355	2013-10-08	07:52:14	00:02:25	3104101	5050134	064	070	3	0670	0040	BAA0090		
48	301880	2443302	6662933	2443302	2013-10-06	01:06:49	00:05:18	2400100	2400885	099	848	11	0261	0500	BAA0090		
49	5158912	2607765	8436642	2607765	2013-10-06	00:29:44	00:07:41	2400700	2140731	017	009	5	0378	0241	BAA0090		
50	4254803	1390097	5679284	1390097	2013-10-08	03:23:15	00:05:18	2280200	2620128	758	061	20	0598	0590	BAA0090		
51	6686223	8562967	687726	8562967	2013-10-08	03:38:13	00:02:58	2167000	2320328	039	079	9	0092	0254	BAA0090		
52	7533319	4548300	3423425	4548300	2013-10-08	04:43:16	00:06:41	2081031	3160100	054	017	20	0260	0994	BAA0090		
53	5597745	5922259	7005307	5922259	2013-10-08	08:47:02	00:09:16	2140130	2280200	039	071	12	0046	0064	BAA0090		
54	4916052	2481839	2682282	2481839	2013-10-08	09:54:16	00:09:11	4540492	4402081	758	029	3	0265	0974	BAA0090		
55	7822351	1643412	1768659	1643412	2013-10-08	07:45:34	00:07:25	2341091	3032200	027	068	11	0680	0082	BAA0090		
56	5997690	4519397	633916	4519397	2013-10-08	00:22:51	00:08:26	2040438	2320328	064	029	4	0230	0372	BAA0090		
57	419868	6390350	3164707	6390350	2013-10-08	08:31:13	00:09:49	2140130	2280200	039	055	17	0390	0995	BAA0090		
58	687295	1136783	1899911	1136783	2013-10-08	09:12:56	00:04:00	3023703	2400100	029	086	11	0421	0974	BAA0090		
59	5801401	4323889	2423663	4323889	2013-10-08	03:42:13	00:02:08	5050234	3023703	027	079	11	1268	0558	BAA0090		
60	449216	3704468	1800362	3704468	2013-10-08	04:35:36	00:05:09	3160100	2341091	076	04	10	0229	0226	BAA0090		
61	1198704	3729141	4369476	3729141	2013-10-08	01:27:57	00:06:02	3104101	3026103	020	073	3	0992	0359	BAA0090		
62	563184	4937906	2337323	4937906	2013-10-08	04:02:51	00:09:01	2400100	2720161	027	086	2	0501	0053	BAA0090		
63	687295	1136783	1899911	1136783	2013-10-08	09:12:56	00:04:00	3023703	2400100	029	086	11	0421	0974	BAA0090		
64	5801401	4323889	2423663	4323889	2013-10-08	03:42:13	00:02:08	5050234	3023703	027	079	11	1268	0558	BAA0090		
65	449216	3704468	1800362	3704468	2013-10-08	04:35:36	00:05:09	3160100	2341091	076	04	10	0229	0226	BAA0090		
66	1198704	3729141	4369476	3729141	2013-10-08	01:27:57	00:06:02	3104101	3026103	020	073	3	0992	0359	BAA0090		
67	563184	4937906	2337323	4937906	2013-10-08	04:02:51	00:09:01	2400100	2720161	027	086	2	0501	0053	BAA0090		
68	7726007	7745040	4586914	7745040	2013-10-08	03:41:56	00:00:17	3104101	3160100	081	077	10	0252	1767	BAA0090		
69	1178261	1390463	4749448	1390463	2013-10-08	08:06:03	00:09:40	2080131	2320328	079	04	20	0421	0261	BAA0090		
70	3492711	6199984	4084543														



[Home](#) | [Mining and Analysis](#) | [Archive](#) | [Presets](#) | [Users](#) | [Reports](#) As : Admin

[Quick Search](#) | [Carrier/Route Definitions](#) | [Country Definitions](#) | [Trunk Definitions](#) | [Subscribers](#) | [Subscriber Lines](#) | [Live CDR Streaming](#)



... About ...

Final Word from Henkel Chamboko



[Log out](#)

@ for more info see CDR Mining and Analysis System documentation at [www.msu-e-brary](#)

Copyright

This system is protected by International Computer laws and domestic ICT laws of Zimbabwe all unauthorised copyright use reproduction is prohibited as decided by Henkel Chamboko.

Abstract

original intent was to illuminate manual data base connection to obtain CDR data by offering a powerhouse type solution to address CDR Mining and Analysis for Tel-One. This system is an analytical system that is very powerful that can be used to an incredible advantage. This system can unveil many data trends such as measure trunk size by simply filtering the scouting parameters to a single trunk and filtering a particular period and leaving other parameters open. This will return for you a trunk-size per given period. i.e. total number of calls and duration of calls gain a particular trunk. this system is a very powerful tool in the hands of a creative individual the system can also stretch far to mining a particular persons calls history period aka itemised bill call history exclusive of charges. As explained by Henkel Chamboko the Programmer Developer and Analyst of this work.

Approach ;

The concept illustrated by this system is derived from a very strong thought the approach used is functional driven approach to programme development which concentrates on the chief data CDR, and what we can do with that data (functions) against the needs of the CDR data users to afford the organisation a competitive advantage.

Further thought,

To further develop the power and utility of the system the developer encourages to include the following extensions

1. Ranking of results
2. Filtering results by a particular field
3. Export results to excel function at client side

Yours Programmer Developer and Systems Analyst (for this project)

Henkel Chamboko (BSC Information Systems Hons, MSU,Zimbabwe)

CDR Mining and Analysis System inc was Developed by Henkel Chamboko 4th year student me, as my dissertation Project in partial full-fulfillment of my Bachelor of Science Hons Information Systems at Midlands State University 2013. I hope the system will be of great use

1)Zim -> 263-77340649 Henkelchamboko@gmail.com 2)SouthAfrica -> 0027736304566 kelz453@live.com

2013 © COPYRIGHT 2013 ALL RIGHTS RESERVED

A product of Henkel Chamboko R10637T BSC Information Systems Hons MSU Telone.co.zw

18 End of User Guide

APPENDIX B: Interview Schedule

DateInterviewer.....

TimeInterviewee.....

Subject core.....

What data exactly is usually requested from the billing server relating to CDRs.....

What format is the data usually requested as.....

How frequent is the data requested for.....

Who are the end users of the data.....

What operations are performed on the data before it is given to the requester

.....

What is the length of the usual output of CDRs traditionally obtainable from the IT

department.....

How long does it take to clear a request.....

What challenges are faced if any, in the mining and analysis process that you en-counter.

.....

APPENDIX C: Questionnaire

Participant name.....

Participant Stakeholder type for example customer, internal employees, police/invstigations and the like.

.....

How do you rate reaction towards Itemized Bill request from Tel-One

.....

.....

How is the Itemized bill request service

.....

.....

How Often do you usually ask for itemized bill (tick one),

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------

Weekly Monthly Daily Rarely

Are they improvement that you would welcome towards the call detail information mining specify.....

.....

Is there any-thing you would like add or say relating to call data mining/itemized bill processing for Tel-One.....

.....

CDR mining data is for use for inside employees as well as for customers. This questionnaire was designed to cater for both parties in reacting to the questionnaire internal employees will replace "itemized bill" statement with term "CDR data" so make sure stakeholder type in given clearly. This will help in questionnaire answering and evaluation.

APPENDIX D: Observation

Participant NameParticipant Post.....

Date.....Location.....

Time.....

Observer Full Name

*Using the Score Sheet **Rating basis** - Does the task/activity display matters of interest, problems that require an IS based solution Score (Out of 5)*

A score of 0 - means Critical need for solution

A score of 5 - means Procedure is excellent no needs for a solution.

Date, time & Duration	Task /activity	Rating (/5)	Summary of description of problem and possible solutions
Findings			
Recommendations			

Thank You for your participating

APPENDIX E: Source Code

- **Login**
- **Mining and Analysis**
- **Home aka index**

Login

```
<?php if (isset($_SESSION['MM_Username'])){ session_destroy();}session_start();?>
<?php require_once('Connections/authconn.php'); ?>

<?php //clear previous mining results
mysql_select_db($database_authconn, $authconn);
    $deletesql="DELETE FROM cdr_details_temp";
    $deleteres=mysql_query($deletesql); ?>

<?php

if (isset($_POST["login"])){
$user= $_POST['username'];
$pass= $_POST['password'];
$type= $_POST['type'];
//validation

if ((($_POST['username'])=="") {echo "<script>window.alert('Enter username');</script>";}
else if ((($_POST['password'])=="") {echo "<script>window.alert('Enter password');</script>";}
else if ((strlen($pass)<6)or (!preg_match('/[A-Za-z]/', $pass) && preg_match('/[0-9]/', $pass))){
//password complexity rules
    echo "<script>window.alert('Password does not meet complexity rules standards enforced by telone for security
purposes, password should be not less than 6 characters, must contain atleast one numeric character and alphabetical
letters');</script>";}

    else if ((strlen($pass)>=6)&&(preg_match('/[A-Za-z]/', $pass) && preg_match('/[0-9]/', $pass))){
        //password encryption
        $pass=md5($_POST['password']);

        //check availability
        mysql_select_db($database_authconn, $authconn);
        $qr = "SELECT * FROM users WHERE username='$user'";
        $rrs = mysql_query($qr, $authconn) or die(mysql_error());
        $nrows = mysql_num_rows($rrs);
            //echo $user          ;
            //echo $pass;
            if ($nrows==1){
            //echo $nrows;
            //retrieves session variables
            $rows=mysql_fetch_array($rrs);

            $_SESSION['usrtype']=$rows['type'];
            $_SESSION['usrpreset']=$rows['presets'];
            $_SESSION['MM_Username']=$rows['username'];

            //redirect to main page
            echo "<script>window.location='index.php'</script>";

            }
        else
```

```

        {
            echo " <script>window.alert('Invalid username or password!');</script>";
        }
    }
?>
<style type="text/css">
<!--
.style1 {
    font-size: large;
    font-weight: bold;
}
.style2 {
    font-size: 12px;
    font-family: Arial, Helvetica, sans-serif;
}
.style3 {font-family: Arial, Helvetica, sans-serif}
-->
</style>
<title>Login</title><span class="style2">Welcome to Tel-One Intranet</span>
<span class="style2">
<label>
<p align="center" class="style1"> CDR Mining and Analysis System inc </p>
<form name="form1" method="POST" action="<?php echo $loginFormAction; ?>">
    <p align="center">
        <label for="Submit"></label>
    </p>
    <p align="center">&nbsp;</p>
    <p align="center">&nbsp;</p>
    <table width="586" border="0" align="left" cellpadding="2" cellspacing="5">
        <tr>
            <td colspan="3"><span class="style3">
                <!--the code bellow is used to display the message of the input validation-->
                <span class="style2"><?php
date_default_timezone_set('Africa/Harare');
$date_hours=date("H");
if ($date_hours>="0" && $date_hours<="12")
echo "Good morning"." ".$_POST["fname"]."";
else if ($date_hours>="12" && $date_hours<="15")
echo "Good afternoon"." ".$_POST["fname"]."";
else
echo "Good evening"." ".$_POST["fname"]."";
?> please submit authentication...</span></span></td>
            </tr>

            <tr>
                <td width="124" rowspan="3"><label for="label"></label>
                    <input type="image" name="imageField2" src="cdr_system_images/untitledlogin.png" id="label" /></td>
                <td width="124"><div align="right" class="style3">
                    <div align="left">Username</div>
                </div></td>
                <td width="306"><input name="username" type="text" id="username" maxlength="30" /></td>
            </tr>
            <tr>
                <td><div align="left" class="style3">Password</div></td>
                <td><label for="textfield"></label>
                    <input name="password" type="password" id="password" maxlength="30" /></td>
            </tr>
            <tr>
                <td height="28"><div align="right"><span class="style3"></span></div></td>
                <td><div align="left"><font face="Arial" color="#000000" size="1">
                    <input name="login" type="submit" id="login" value="login" />
                </font></div></td>
            </tr>

```

```

</tr>
</table>
<p>
  <label for="imageField"></label>
  <label for="imageField"></label>
  <input name="imageField" type="image" id="imageField" src="cdr_system_images/Capture.JPG" align="middle" />
</p>
<p>&nbsp;</p>
<p>&nbsp;</p>
<p>&nbsp;</p>
</form>
</label>
<p>&nbsp;</p>
<p>&nbsp;</p>
<p>&nbsp;</p>
<p>&nbsp;</p>
<p>&nbsp;</p>
<p>&nbsp;</p>
<p>&nbsp;</p>
<p>&nbsp;</p>
<p style="margin-left: 20" align="center"><font face="Arial" color="#000000" size="1">2013 &copy;
  COPYRIGHT 2013 ALL RIGHTS RESERVED</font></p>
<p style="margin-left: 20" align="center"><font face="Arial" color="#000000" size="1">A product of Henkel Chamboko
  R10637T BSC Information Systems Honors MSU Telone.co.zw</font></p>

```

Mining and Analysis

```

<?php session_start();if (!isset($_SESSION['MM_Username'])) { header('Location: login.php'); }?>

<?php require_once('Connections/authconn.php'); ?>
<?php require_once('Connections/authconn.php'); ?>
<?php require_once('Connections/authconn.php'); ?>

<?php

if (isset($_POST['scout'])){
//Accepts values
$start_date=$_POST['y']. "-" .$_POST['m']. "-" .$_POST['d'];
$end_date=$_POST['y1']. "-" .$_POST['m1']. "-" .$_POST['d1'];
$start_time=$_POST['st1']. ":" .$_POST['st2']. ":" .$_POST['st3'];
$end_time=$_POST['et1']. ":" .$_POST['et2']. ":" .$_POST['et3'];

$dh1=$_POST['dh1'];
$dm1=$_POST['dm1'];
$ds1=$_POST['ds1'];

$dh2=$_POST['dh2'];
$dm2=$_POST['dm2'];
$ds2=$_POST['ds2'];

$duration1=$dh1. ":" . $dm1. ":" . $ds1;
$duration2=$dh2. ":" . $dm2. ":" . $ds2;

//maps with actual route trunk and country
if(!$_POST['cname']<>"") {echo " <script>window.alert('Please enter valid name of customer');</script>";}

//validats values
elseif (($_POST['cmail']<>($_POST['cmail2'])){echo " <script>window.alert('Email and email veification must be the
same');</script>";}
//validates phone numbers and pulse
elseif (($_POST['numX']<>"")and(!is_numeric($_POST['numX']))) {echo " <script>window.alert('Telephone Number
should be a number');</script>";}

```

```

        elseif (($_POST['numY']<>"")and(!is_numeric($_POST['numY']))) {echo " <script>window.alert('Dailed number
should be a number');</script>";}
        elseif (($_POST['numZ']<>"")and(!is_numeric($_POST['numZ']))) {echo " <script>window.alert('Diverted number
should be a number');</script>";}
        elseif (($_POST['dailed_no']<>"")and(!is_numeric($_POST['dailed_no']))) {echo " <script>window.alert('Dailed
digits should be a number');</script>";}
        elseif (($_POST['pulse']<>"")and(!is_numeric($_POST['pulse']))) {echo " <script>window.alert('Pulse should be a
number');</script>";}

        //validates Period date
elseif ($_POST['y']>$_POST['y1'])
    {
        echo " <script>window.alert('Base date, From can not be less than last date of period, check, Period Date,
year');</script>";
    }
    elseif (($_POST['y'])==($_POST['y1'])and($_POST['m']>($_POST['m1'])))
        {echo " <script>window.alert('Base date, From can not be less than last date of period, check, Period Date,
month');</script>";
        }
    elseif (($_POST['y'])==($_POST['y1'])and($_POST['m'])==($_POST['m1'])and($_POST['d']>($_POST['d1'])))
        {echo " <script>window.alert('Base date, From can not be less than last date of period, check, Period Date,
dates');</script>";}

        // add > nowdate
        //validates Period time
        elseif( $_POST['st1']>$_POST['et1']) {echo " <script>window.alert('End time cannot be less than start time, check,
Period Time');</script>";}
        elseif( ($_POST['st1'])==($_POST['et1'])&&($_POST['st2']>($_POST['et2'])))
            {echo " <script>window.alert('End time cannot be less than start time, check, Period Time');</script>";}

        // >now time
        //validates duration
        elseif ($dh1>$dh2){echo " <script>window.alert('Last time range value can not be less than first time value for
duration range, check, Duration Time');</script>";}
        elseif (($dh1== $dh2)and($dm2<$dm1))
            {echo " <script>window.alert('Last time range value can not be less than first time value for duration range, check,
Duration Time');</script>";}
        else

mysql_select_db($database_authconn, $authconn);
$query_reccdrmastr = sprintf("SELECT * FROM cdr_details_master");
$reccdrmastr = mysql_query($query_reccdrmastr, $authconn) or die(mysql_error());
$row_reccdrmastr = mysql_fetch_assoc($reccdrmastr);
$totalRows_reccdrmastr = mysql_num_rows($reccdrmastr);

        //values for chnging from prefixes names to real names
        $b1=$_POST['origin_country'];
        $b2=$_POST['destination_country'];
        $b3=$_POST['in_route'];
        $b4=$_POST['out_route'];
        $b5=$_POST['in_trunk'];
        $b6=$_POST['out_trunk'];

        if (isset($_POST['prfx'])) {

        //maping for real values against

        //echo $reccdrmastr['numX'],$row_reccdrmastr,$totalRows_reccdrmastr;
        if ($_POST['origin_country']<>"") {

```

```

mysql_select_db($database_authconn, $authconn);
$qr1 = ("SELECT * FROM country_definition where prefix='$b1'");
$rec1 = mysql_query($qr1, $authconn);
$rowcountry1 =mysql_fetch_array($rec1);}

if ($_POST['destination_country']<>""){
mysql_select_db($database_authconn, $authconn);
$qr2 = ("SELECT * FROM country_definition where prefix='$b2'");
$rec2 = mysql_query($qr2, $authconn);
$rowcountry2 =mysql_fetch_array($rec2);}

//mysql_select_db($database_authconn, $authconn);
if ($_POST['in_route']<>""){
mysql_select_db($database_authconn, $authconn);
$qr3 = ("SELECT * FROM route_definition where prefix='$b3'");
$rec3 = mysql_query($qr3,$authconn);
$rowrouter3 = mysql_fetch_array($rec3);}

//mysql_select_db($database_authconn, $authconn);
if ($_POST['out_route']<>""){
mysql_select_db($database_authconn, $authconn);
$qr4=("SELECT * FROM route_definition where prefix='$b4'");
$rec4 = mysql_query($qr4,$authconn);
$rowrouter4 = mysql_fetch_array($rec4);}

//mysql_select_db($database_authconn, $authconn);
if ($_POST['in_trunk']<>""){
mysql_select_db($database_authconn, $authconn);
$qr5 = ("SELECT * FROM trunk_definition where prefix='$b5'");
$rec5 = mysql_query($qr5,$authconn);
$rowtrunk5 = mysql_fetch_array($rec5);}

//mysql_select_db($database_authconn, $authconn);
if ($_POST['out_trunk']<>""){
mysql_select_db($database_authconn, $authconn);
$qr6 = ("SELECT * FROM trunk_definition where prefix='$b6'");
$rec6 = mysql_query($qr6,$authconn);
$rowtrunk6 = mysql_fetch_array($rec6);}

//masking the prefixes and replacing with real names
$b1=$rowcountry1['country_name'];
$b2=$rowcountry2['country_name'];
$b3=$rowrouter3['router'];
$b4=$rowrouter4['router'];
$b5=$rowtrunk5['exchange_name'];
$b6=$rowtrunk6['exchange_name'];}

//creates result explanation
$qbase0="Please find a record of all calls made";
$qbase1a=" from ".$_POST['numX'];
$qbase1b=" to ".$_POST['numY'];
$qbase2=" diverted to ".$_POST['numZ'];
$qbase3=" dailled digits ".$_POST['dailled_no'];
$qbase4=" via in route ".$b3;
$qbase5=" via out route ".$b4;
$qbase6=" with in trunk ".$b5;
$qbase7=" and out trunk ".$b6;
$qbase8=" encountering ".$_POST['pulse']." pulses";
$qbase9=" in the period ".$start_date." to ".$end_date;
$qbase10=" between ".$start_time."hrs to ".$end_time."hrs";
$qbase11=" lasting between ".$duration1." and ".$duration2;
$qbase12=" made from ".$b1;

```

```

$ibase13= " to ".$b2;

$query_base=$ibase0;

//check if para is provided and includes it in result explanation and in the querying parameters.
if ($_POST['numX']<>""){ $query_base=$query_base.$ibase1a;
$wr_para=" numX=".$_POST['numX']. " and ";}

if ($_POST['numY']<>""){ $query_base=$query_base.$ibase1b;
$wr_para=" numY=".$_POST['numY']. " and ";}

if ($_POST['numZ']<>""){ $query_base=$query_base.$ibase2;
$wr_para=$wr_para."numZ=".$_POST['numZ']. " and ";}

if ($_POST['dailed_no']<>""){ $query_base=$query_base.$ibase3;
$wr_para=$wr_para."dailed_no=".$_POST['dailed_no']. " and ";}

if ($_POST['in_route']<>""){ $query_base=$query_base.$ibase4;
$wr_para=$wr_para."in_route=".$_POST['in_route']. " and ";}

if ($_POST['out_route']<>""){ $query_base=$query_base.$ibase5;
$wr_para=$wr_para."out_route=".$_POST['out_route']. " and ";}

if ($_POST['in_trunk']<>""){ $query_base=$query_base.$ibase6;
$wr_para=$wr_para."in_trunk=".$_POST['in_trunk']. " and ";}

if ($_POST['out_trunk']<>""){ $query_base=$query_base.$ibase7;
$wr_para=$wr_para."out_trunk=".$_POST['out_trunk']. " and ";}

if ($_POST['pulse']<>""){ $query_base=$query_base.$ibase8;
$wr_para=$wr_para."pulse=".$_POST['pulse']. " and ";}

$query_base=$query_base.$ibase9;//mandatory field
$query_base=$query_base.$ibase10;//mandatory field
$query_base=$query_base.$ibase11;//mandatory field
$wr_para=$wr_para."start_date>=".$start_date." and start_date<=".$send_date." and ";
$wr_para=$wr_para."start_time>=".$start_time." and start_time<=".$send_time." and ";
$wr_para=$wr_para."duration>=".$duration1." and duration<=".$duration2."";

if ($_POST['origin_country']<>""){ $query_base=$query_base.$ibase12;
$wr_para=$wr_para." and origin_country=".$_POST['origin_country']. "";}

if ($_POST['destination_country']<>""){ $query_base=$query_base.$ibase13;
$wr_para=$wr_para." and destination_country=".$_POST['destination_country']. "";}

//query result explanation fully created above
//query parametres set stored in $wr_para

//****open4debuging
//echo $wr_para;

//****open4debuging
//echo $query_base;

mysql_select_db($database_authconn, $authconn);

//select records here

$sql1="SELECT * FROM cdr_details_master where $wr_para"; //
$result1=mysql_query($sql1);

require_once('sessions.php');

```

```

// If successfully queried
if($result1){
// Count how many row has this passkey
$count=mysql_num_rows($result1);
// $row_c= mysql_fetch_assoc($result1);
// if found this passkey in our database, retrieve data from table "temp_members_db"
    if($count>0){
        if ($count>$_SESSION['usrpreset']){echo " <script>window.alert("Your query was not completed your
results are more than your Preset allowance assigned to you, however a request has been launched to the MO to allow you
sufficient privileges to allow you to process your request.");</script>";

                date_default_timezone_set('Africa/Harare');

                $reqcount=$count;
                $reqsumry="Grant me Sufficient privileges for request :".$query_base;
                $reqwhen=date("H:i:s, D d m Y");
                $requser=$_SESSION['MM_Username'];

                mysql_select_db($database_authconn, $authconn);
                //select records here
                $sreq="insert into requests
(summary,records,date_time,user)values('$reqsumry','$count','$reqwhen','$requser')";
                $resreq=mysql_query($sreq);
                echo "<script>window.location='mining and analysis.php'</script>";}
                if ($count<=$_SESSION['usrpreset']){
                //begin loop
                mysql_select_db($database_authconn, $authconn);
                $deletesql="DELETE FROM cdr_details_temp";
                $deleteres=mysql_query($deletesql);

                while($rows=mysql_fetch_array($result1)) {

                //mysql_data_seek($result1);

                $numX=$rows['numX'];
                $numY=$rows['numY'];
                $numZ=$rows['numZ'];
                $dailled_no=$rows['dailled_no'];
                $start_date=$rows['start_date'];
                $start_time=$rows['start_time'];
                $duration=$rows['duration'];
                $in_route=$rows['in_route'];
                $out_route=$rows['out_route'];
                $in_trunk=$rows['in_trunk'];
                $out_trunk=$rows['out_trunk'];
                $pulse=$rows['pulse'];
                $origin_country=$rows['origin_country'];
                $destination_country=$rows['destination_country'];
                $acc_no=$rows['acc_no'];

                mysql_select_db($database_authconn, $authconn);
                // Insert data that retrieves from "temp_members_db" into table "registered_members"
                $sql2="INSERT INTO cdr_details_temp (numX, numY, numZ, dailled_no, start_date, start_time, duration,
in_trunk, out_trunk ,in_route, out_route, pulse, origin_country, destination_country, acc_no)VALUES('$numX', '$numY',
'$numZ','$dailled_no', '$start_date', '$start_time', '$duration', '$in_trunk', '$out_trunk', '$in_route', '$out_route', '$pulse',
'$origin_country', '$destination_country', '$acc_no')";
                $result2=mysql_query($sql2);}

                date_default_timezone_set('Africa/Harare');
                $date=date("Y-m-d");
                $time=date("H:i:s");

```

```

$docdate=date("Y_m_d");
$doctime=date("H_i_s");
$docname="cdr_".$docdate."_".$doctime.$_SESSION['MM_Username'].".pdf";
$d_route=$_SESSION['email'];
$user=$_SESSION['MM_Username'];
$_SESSION['docname']=$docname;

mysql_select_db($database_authconn, $authconn);
$query = "INSERT INTO savedquery(date, time, query_string, number_of_retreived_record, location_of_result, d_route, user)
VALUES ('$date','$time','$query_base','$count','$docname','$d_route','$user')";
mysql_query($query, $authconn);}

if($result2){echo " <script>window.alert('Your Query Yielded Results you can proceed to Deployment Page');</script>";
echo " <script>window.location='deployment.php'</script>";
}
else {echo " <script>window.alert('Sorry, No results were yeilded for the mining rules/parametres you specified');</script>";}
}

}}
?>
<?php
mysql_select_db($database_authconn, $authconn);
$query_reccountry = "SELECT * FROM country_definition";
$reccountry = mysql_query($query_reccountry, $authconn) or die(mysql_error());
$row_reccountry = mysql_fetch_assoc($reccountry);
$totalRows_reccountry = mysql_num_rows($reccountry);

mysql_select_db($database_authconn, $authconn);
$query_rectrunk = "SELECT * FROM trunk_definition";
$rectrunk = mysql_query($query_rectrunk, $authconn) or die(mysql_error());
$row_rectrunk = mysql_fetch_assoc($rectrunk);
$totalRows_rectrunk = mysql_num_rows($rectrunk);

mysql_select_db($database_authconn, $authconn);
$query_recroute = "SELECT * FROM route_definition";
$recroute = mysql_query($query_recroute, $authconn) or die(mysql_error());
$row_recroute = mysql_fetch_assoc($recroute);
$totalRows_recroute = mysql_num_rows($recroute);

mysql_select_db($database_authconn, $authconn);
$query_reclinedetails = "SELECT * FROM customer_line_details";
$reclinedetails = mysql_query($query_reclinedetails, $authconn) or die(mysql_error());
$row_reclinedetails = mysql_fetch_assoc($reclinedetails);
$totalRows_reclinedetails = mysql_num_rows($reclinedetails);

?>

<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
<title>Mining and Analysis </title><style type="text/css">
<!--
.style1 {
font-family: Arial, Helvetica, sans-serif;
font-size: xx-large;
}
.style2 {
font-size: x-large;
font-weight: bold;

```

```

}
.style3 {color: #00CC33}
.style4 {font-family: Arial, Helvetica, sans-serif}
.style6 {color: #FF0000}
.style7 {
    font-style: italic;
    font-size: small;
    color: #0000CC;
}
}
.style11 {color: #0000CC; font-size: small; }
.style12 {font-size: 24px}
.style16 {color: #000000; font-size: large;}
.style17 {color: #999999}
.style19 {font-family: Arial, Helvetica, sans-serif; font-weight: bold; }
.style24 {font-family: Arial, Helvetica, sans-serif; color: #000000; }
.style25 {color: #000000}
.style26 {
    color: #FFFFFF;
    font-weight: bold;
}
}
.style28 {font-size: 24px; color: #0000FF; }
.style52 {color: #000000; font-size: 18px;}
.style53 {font-family: Arial, Helvetica, sans-serif;
    color: #999999;
    font-size: 14px;
}
}
.style54 {color: #FFFFFF;
    font-family: Arial, Helvetica, sans-serif;
}
}
.style33 {font-family: Arial, Helvetica, sans-serif;
    font-size: 14px;
    color: #999999;
    font-weight: bold;
}
}
.style36 {color: #666666}
.style38 {font-size: 12px}
.style40 {color: #333333;
    font-family: Arial, Helvetica, sans-serif;
}
}
.style41 {font-size: 18px;
    color: #0000FF;
}
}
.style46 {font-size: 16px}
.style47 {font-size: 14px}
.style8 { font-size: 36px;
    font-weight: bold;
    color: #999999;
}
}
-->
</style>
<script type="text/JavaScript">
<!--
function MM_findObj(n, d) { //v4.01
    var p,i,x; if(!d) d=document; if((p=n.indexOf("?"))>0&&parent.frames.length) {
        d=parent.frames[n.substring(p+1)].document; n=n.substring(0,p);}
    if(!(x=d[n])&&d.all) x=d.all[n]; for (i=0;!x&&i<d.forms.length;i++) x=d.forms[i][n];
    for(i=0;!x&&d.layers&&i<d.layers.length;i++) x=MM_findObj(n,d.layers[i].document);
    if(!x && d.getElementById) x=d.getElementById(n); return x;
}

function MM_validateForm() { //v4.0
    var i,p,q,nm,test,num,min,max,errors="",args=MM_validateForm.arguments;

```



```

<td width="210" height="18" bordercolor="#000000" bgcolor="#CCCCCC"><div align="right" class="style33">
  <div align="left" class="style36">
    <div align="right"><span class="style40"><?php echo "As : ".$_SESSION['usrtype'];?></span></div>
  </div>
  <div align="center" class="style17"></div>
  <div align="right"></div>
  <div align="right"></div>
</div></td>
</tr>
</table>
<table width="940" height="133" border="0" align="center" cellpadding="0" cellspacing="0">
  <tr>
    <td width="176" rowspan="3"><div align="center"><span style="margin-left: 20">
      <input type="image" name="imageField22" src="cdr_system_images/Capture.JPG" id="imageField22" />
      <span class="style46"><font face="Arial" color="#000000"><a href="about.php">&copy;</a></font></span>
    </span></div></td>
    <td width="590" height="54"><div align="center" class="style47">
      <p style="margin-left: 20">| <a href="quicksearch.php">Quick Search</a> | <a href="carrier_def.php">Carrier/Route
      Definitions</a> | <a href="country_def.php">Country Definitions</a> | <a href="trunk_def.php">Trunk Definitions</a> | <a
      href="subscribers.php">Subscribers</a> | <a href="subclines.php">Subscriber Lines </a> | <a href="live_cdr.php">Live CDR
      Streaming</a></p>
    </div></td>
    <td width="174" rowspan="3" bgcolor="#FFFFFF"><p style="margin-left: 20">
      <label for="label4"></label>
    </p>
    <p align="center" style="margin-left: 20">
      <input type="image" name="imageField3" src="cdr_system_images/silhouette36.png" id="label4" />
    </p>
    <p align="center" style="margin-left: 20"><a href="login.php">Log out</a></p></td>
  </tr>
  <tr>
    <td><div align="center"><span class="style8"><span class="style12">...</span> Mining and Analysis <span
    class="style12">...</span></div></td>
  </tr>
  <tr>
    <td height="20"><div align="center" class="style41">
      <marquee>
        Tel-One CDR Mining and Analysis System inc.
      </marquee>
    </div></td>
  </tr>
</table>
<p>&nbsp;</p>
<form id="form2" name="form2" method="post" action="">
<table width="936" align="left">
  <tr valign="baseline">
    <td height="28" colspan="2" align="right" nowrap="nowrap"><div align="center" class="style4"><strong>Results
    Deployment Pannel </strong></div></td>
    <td rowspan="2">&nbsp;</td>
    <td colspan="3" rowspan="2"><div align="center"><span class="style19">Preferences</span></div></td>
  </tr>
  <tr valign="baseline">
    <td rowspan="2" align="right" nowrap="nowrap"><div align="left" class="style4">Customer Name </div></td>
    <td rowspan="2" align="right" nowrap="nowrap"><label for="label4"><span class="style4">
    <span class="style28">*</span>
    <input name="cname" type="text" id="cname"
    onblur="MM_validateForm('cname','R','cmail','RisEmail','cmail2','RisEmail');MM_validateForm('cname','R');return
    document.MM_returnValue" />
    </span></label></td>
  </tr>
  <tr valign="baseline">
    <td rowspan="2">&nbsp;</td>
  </tr>
  <tr valign="baseline">
    <td rowspan="2">&nbsp;</td>

```

```

<td colspan="2" align="right" nowrap="nowrap"><span class="style25">
  <label for="checkbox"></label>
  </span>
  <div align="left" class="style24">Include Analysis and Visualizations </div></td>
<td width="141"><input name="visua" type="checkbox" id="visua" value="checkbox" /></td>
</tr>
<tr valign="baseline">
  <td align="right" nowrap="nowrap"><div align="left"><span class="style4">Customer Email </span></div></td>
  <td align="right" nowrap="nowrap"><span class="style4">
    <span class="style28">*</span>
    <input name="cmail" type="text" id="cmail" onblur="MM_validateForm('cmail','RisEmail');return
document.MM_returnValue" />
    </span></td>
  <td height="11" colspan="2" align="right" nowrap="nowrap"><div align="left"><span class="style24">Include Advanced
Call data </span></div></td>
  <td><input name="adv" type="checkbox" id="adv" value="checkbox" />
  <div align="left" class="style24"></div></td>
</tr>
<tr valign="baseline">
  <td width="232" align="right" nowrap="nowrap"><div align="left"><span class="style4">Verify Customer Email
</span></div></td>
  <td width="164"><div align="right"><span class="style4"><span class="style28">*</span>
  <input name="cmail2" type="text" id="cmail2" onblur="MM_validateForm('cmail2','RisEmail');return
document.MM_returnValue" />
  </span></div></td>
  <td rowspan="3">&nbsp;</td>
  <td colspan="2"><span class="style4">Include Real Names insted of Prefixes</span></td>
  <td><input name="prfx" type="checkbox" id="prfx" value="checkbox" /></td>
</tr>
<tr valign="baseline">
  <td height="11" align="right" nowrap="nowrap">&nbsp;</td>
  <td width="164">&nbsp;</td>
  <td colspan="3">&nbsp;</td>
</tr>
<tr valign="baseline">
  <td height="13" align="right" nowrap="nowrap"><div align="left"><span class="style4"><span
class="style3"><strong>Finished Setting Rules</strong></span></span></div></td>
  <td><span class="style4">
  <input name="scout" type="submit" id="scout" value="scout" />
  </span></td>
  <td colspan="3">&nbsp;</td>
</tr>
<tr valign="baseline">
  <td align="right" nowrap="nowrap" bgcolor="#FFFFFF">&nbsp;</td>
  <td bgcolor="#FFFFFF">&nbsp;</td>
  <td bgcolor="#FFFFFF">&nbsp;</td>
  <td colspan="3" bgcolor="#FFFFFF"><p>&nbsp;</p>
  <p>&nbsp;</p></td>
</tr>
<tr valign="baseline">
  <td colspan="2" align="right" nowrap="nowrap" bgcolor="#FFFFFF"><div align="center"
class="style4"><strong>Dailler Properties </strong></div></td>
  <td width="56" bgcolor="#FFFFFF">&nbsp;</td>
  <td colspan="3" bordercolor="#0000FF" bgcolor="#FFFFFF"><div align="center" class="style4"><strong>Time and
Period Details</strong></div></td>
</tr>
<tr valign="baseline">
  <td align="right" nowrap="nowrap" bgcolor="#FFFFFF"><div align="left" class="style4">
  <p>Caller Number/Telepone Number:</p>
  </div></td>
  <td bgcolor="#FFFFFF"><p align="right" class="style4">
  <label for="label2"></label>

```

```



```

```

        <option value="2007">2007</option>
        <option value="2008">2008</option>
        <option value="2009">2009</option>
        <option value="2010">2010</option>
        <option value="2011">2011</option>
        <option value="2012">2012</option>
        <option value="2013" selected="selected">2013</option>
    </select>
</div></td>
</tr>
<tr valign="baseline">
    <td align="right" nowrap="nowrap" bgcolor="#FFFFFF"><div align="left" class="style4">Called Number:</div></td>
    <td bgcolor="#FFFFFF"><div align="right" class="style4">
        <label for="label"></label>
        <input type="text" name="numY" id="label" />
    </div></td>
    <td bgcolor="#FFFFFF">&nbsp;</td>
    <td align="right" nowrap="nowrap" bordercolor="#0000FF" bgcolor="#FFFFFF"><div align="left" class="style4">
        <div align="right">To</div>
    </div></td>
    <td colspan="2" bordercolor="#0000FF" bgcolor="#FFFFFF"><div align="right" class="style4"><span
class="style7">required</span><span class="style11"><span class="style12">*</span></span>
    <select name="d1" id="d1">
        <option value="01" selected="selected" >01</option>
        <option value="02">02</option>
        <option value="03">03</option>
        <option value="04">04</option>
        <option value="05">05</option>
        <option value="06">06</option>
        <option value="07">07</option>
        <option value="08">08</option>
        <option value="09">09</option>
        <option value="10">10</option>
        <option value="11">11</option>
        <option value="12">12</option>
        <option value="13">13</option>
        <option value="14">14</option>
        <option value="15">15</option>
        <option value="16">16</option>
        <option value="17">17</option>
        <option value="18">18</option>
        <option value="19">19</option>
        <option value="20">20</option>
        <option value="21">21</option>
        <option value="22">22</option>
        <option value="23">23</option>
        <option value="24">24</option>
        <option value="25">25</option>
        <option value="26">26</option>
        <option value="27">27</option>
        <option value="28">28</option>
        <option value="29">29</option>
        <option value="30">30</option>
        <option value="31">31</option>
    </select>
    <select name="m1" id="m1">
        <option value="01">January</option>
        <option value="02">February</option>
        <option value="03">March</option>
        <option value="04">April</option>
        <option value="05">May</option>
        <option value="06">June</option>

```

```

<option value="07">July</option>
<option value="08">August</option>
<option value="09">September</option>
<option value="10" selected="selected">October</option>
<option value="11">November</option>
<option value="12">December</option>
</select>
<select name="y1" id="y1">
<option value="2001" >2001</option>
<option value="2002">2002</option>
<option value="2003">2003</option>
<option value="2004">2004</option>
<option value="2005">2005</option>
<option value="2006">2006</option>
<option value="2007">2007</option>
<option value="2008">2008</option>
<option value="2009">2009</option>
<option value="2010">2010</option>
<option value="2011">2011</option>
<option value="2012">2012</option>
<option value="2013" selected="selected">2013</option>
</select>
</div></td>
</tr>
<tr valign="baseline">
<td align="right" nowrap="nowrap" bgcolor="#FFFFFF"><div align="left" class="style4">Diverted Call
Destination:</div></td>
<td bgcolor="#FFFFFF"><div align="right" class="style4">
<label for="textfield"></label>
<input type="text" name="numZ" id="numZ" />
</div></td>
<td bgcolor="#FFFFFF">&nbsp;</td>
<td align="right" nowrap="nowrap" bordercolor="#0000FF" bgcolor="#FFFFFF"><div align="left" class="style4">Period
Time From:</div></td>
<td colspan="2" bordercolor="#0000FF" bgcolor="#FFFFFF"><div align="right" class="style4"><span
class="style7">required</span><span class="style11"><span class="style12">*</span></span>
<select name="st1" size="1" id="st1">
<option value="00" selected="selected">00</option>
<option value="01">01</option>
<option value="02">02</option>
<option value="03">03</option>
<option value="04">04</option>
<option value="05">05</option>
<option value="06">06</option>
<option value="07">07</option>
<option value="08">08</option>
<option value="09">09</option>
<option value="10">10</option>
<option value="11">11</option>
<option value="12">12</option>
<option value="13">13</option>
<option value="14">14</option>
<option value="15">15</option>
<option value="16">16</option>
<option value="17">17</option>
<option value="18">18</option>
<option value="19">19</option>
<option value="20">20</option>
<option value="21">21</option>
<option value="22">22</option>
<option value="23">23</option>
</select>

```

```
<span class="style2">:</span>
<select name="st2" size="1" id="st2">
  <option value="00">00</option>
  <option value="01">01</option>
  <option value="02">02</option>
  <option value="03">03</option>
  <option value="04">04</option>
  <option value="05">05</option>
  <option value="06">06</option>
  <option value="07">07</option>
  <option value="08">08</option>
  <option value="09">09</option>
  <option value="10">10</option>
  <option value="11">11</option>
  <option value="12">12</option>
  <option value="13">13</option>
  <option value="14">14</option>
  <option value="15">05</option>
  <option value="16">16</option>
  <option value="17">17</option>
  <option value="18">18</option>
  <option value="19">19</option>
  <option value="20">20</option>
  <option value="21">21</option>
  <option value="22">22</option>
  <option value="23">23</option>
  <option value="24">24</option>
  <option value="25">25</option>
  <option value="26">26</option>
  <option value="27">27</option>
  <option value="28">28</option>
  <option value="29">29</option>
  <option value="30">30</option>
  <option value="31">31</option>
  <option value="32">32</option>
  <option value="33">33</option>
  <option value="34">34</option>
  <option value="35">35</option>
  <option value="36">36</option>
  <option value="37">37</option>
  <option value="38">38</option>
  <option value="39">39</option>
  <option value="40">40</option>
  <option value="41">41</option>
  <option value="42">42</option>
  <option value="43">43</option>
  <option value="44">44</option>
  <option value="45">45</option>
  <option value="46">46</option>
  <option value="47">47</option>
  <option value="48">48</option>
  <option value="49">49</option>
  <option value="50">50</option>
  <option value="51">51</option>
  <option value="52">52</option>
  <option value="53">53</option>
  <option value="54">54</option>
  <option value="55">55</option>
  <option value="56">56</option>
  <option value="57">57</option>
  <option value="58">58</option>
  <option value="59">59</option>
```

```
</select>
<span class="style2">:</span>
<select name="st3" size="1" id="st3">
  <option value="00">00</option>
  <option value="01" >01</option>
  <option value="02">02</option>
  <option value="03">03</option>
  <option value="04">04</option>
  <option value="05">05</option>
  <option value="06">06</option>
  <option value="07">07</option>
  <option value="08">08</option>
  <option value="09">09</option>
  <option value="10">10</option>
  <option value="11">11</option>
  <option value="12">12</option>
  <option value="13">13</option>
  <option value="14">14</option>
  <option value="15">05</option>
  <option value="16">16</option>
  <option value="17">17</option>
  <option value="18">18</option>
  <option value="19">19</option>
  <option value="20">20</option>
  <option value="21">21</option>
  <option value="22">22</option>
  <option value="23">23</option>
  <option value="24">24</option>
  <option value="25">25</option>
  <option value="26">26</option>
  <option value="27">27</option>
  <option value="28">28</option>
  <option value="29">29</option>
  <option value="30">30</option>
  <option value="31">31</option>
  <option value="32">32</option>
  <option value="33">33</option>
  <option value="34">34</option>
  <option value="35">35</option>
  <option value="36">36</option>
  <option value="37">37</option>
  <option value="38">38</option>
  <option value="39">39</option>
  <option value="40">40</option>
  <option value="41">41</option>
  <option value="42">42</option>
  <option value="43">43</option>
  <option value="44">44</option>
  <option value="45">45</option>
  <option value="46">46</option>
  <option value="47">47</option>
  <option value="48">48</option>
  <option value="49">49</option>
  <option value="50">50</option>
  <option value="51">51</option>
  <option value="52">52</option>
  <option value="53">53</option>
  <option value="54">54</option>
  <option value="55">55</option>
  <option value="56">56</option>
  <option value="57">57</option>
  <option value="58">58</option>
```

```

        <option value="59">59</option>
    </select>
    hrs
</div></td>
</tr>
<tr valign="baseline">
    <td height="24" align="right" nowrap="nowrap" bgcolor="#FFFFFF"><div align="left" class="style4">Dailled
Digits:</div></td>
    <td bgcolor="#FFFFFF"><div align="right" class="style4">
        <label for="textfield"></label>
        <input type="text" name="dailled_no" id="dailled_no" />
    </div></td>
    <td bgcolor="#FFFFFF">&nbsp;</td>
    <td bordercolor="#0000FF" bgcolor="#FFFFFF"><div align="right"><span class="style4"></span><span
class="style4">To </span></div></td>
    <td colspan="2" bordercolor="#0000FF" bgcolor="#FFFFFF"><div align="right" class="style4"><span
class="style7">required</span><span class="style11"><span class="style12">*</span></span>
    <select name="et1" size="1" id="et1">
        <option value="00">00</option>
        <option value="01">01</option>
        <option value="02">02</option>
        <option value="03">03</option>
        <option value="04">04</option>
        <option value="05">05</option>
        <option value="06">06</option>
        <option value="07">07</option>
        <option value="08">08</option>
        <option value="09">09</option>
        <option value="10">10</option>
        <option value="11">11</option>
        <option value="12">12</option>
        <option value="13">13</option>
        <option value="14">14</option>
        <option value="15">15</option>
        <option value="16">16</option>
        <option value="17">17</option>
        <option value="18">18</option>
        <option value="19">19</option>
        <option value="20">20</option>
        <option value="21">21</option>
        <option value="22">22</option>
        <option value="23" selected="selected">23</option>
    </select>
    <span class="style2">:</span>
    <select name="et2" size="1" id="et2">
        <option value="00">00</option>
        <option value="01">01</option>
        <option value="02">02</option>
        <option value="03">03</option>
        <option value="04">04</option>
        <option value="05">05</option>
        <option value="06">06</option>
        <option value="07">07</option>
        <option value="08">08</option>
        <option value="09">09</option>
        <option value="10">10</option>
        <option value="11">11</option>
        <option value="12">12</option>
        <option value="12">12</option>
        <option value="13">13</option>
        <option value="14">14</option>
        <option value="15">05</option>

```

```
<option value="16">16</option>
<option value="17">17</option>
<option value="18">18</option>
<option value="19">19</option>
<option value="20">20</option>
<option value="21">21</option>
<option value="22">22</option>
<option value="23">23</option>
<option value="24">24</option>
<option value="25">25</option>
<option value="26">26</option>
<option value="27">27</option>
<option value="28">28</option>
<option value="29">29</option>
<option value="30">30</option>
<option value="31">31</option>
<option value="32">32</option>
<option value="33">33</option>
<option value="34">34</option>
<option value="35">35</option>
<option value="36">36</option>
<option value="37">37</option>
<option value="38">38</option>
<option value="39">39</option>
<option value="40">40</option>
<option value="41">41</option>
<option value="42">42</option>
<option value="43">43</option>
<option value="44">44</option>
<option value="45">45</option>
<option value="46">46</option>
<option value="47">47</option>
<option value="48">48</option>
<option value="49">49</option>
<option value="50">50</option>
<option value="51">51</option>
<option value="52">52</option>
<option value="53">53</option>
<option value="54">54</option>
<option value="55">55</option>
<option value="56">56</option>
<option value="57">57</option>
<option value="58">58</option>
<option value="59" selected="selected">59</option>
</select>
<span class="style2">:</span>
<select name="et3" size="1" id="select3">
<option value="00">00</option>
<option value="01" >01</option>
<option value="02">02</option>
<option value="03">03</option>
<option value="04">04</option>
<option value="05">05</option>
<option value="06">06</option>
<option value="07">07</option>
<option value="08">08</option>
<option value="09">09</option>
<option value="10">10</option>
<option value="11">11</option>
<option value="12">12</option>
<option value="13">13</option>
<option value="14">14</option>
```

```

<option value="15">05</option>
<option value="16">16</option>
<option value="17">17</option>
<option value="18">18</option>
<option value="19">19</option>
<option value="20">20</option>
<option value="21">21</option>
<option value="22">22</option>
<option value="23">23</option>
<option value="24">24</option>
<option value="25">25</option>
<option value="26">26</option>
<option value="27">27</option>
<option value="28">28</option>
<option value="29">29</option>
<option value="30">30</option>
<option value="31">31</option>
<option value="32">32</option>
<option value="33">33</option>
<option value="34">34</option>
<option value="35">35</option>
<option value="36">36</option>
<option value="37">37</option>
<option value="38">38</option>
<option value="39">39</option>
<option value="40">40</option>
<option value="41">41</option>
<option value="42">42</option>
<option value="43">43</option>
<option value="44">44</option>
<option value="45">45</option>
<option value="46">46</option>
<option value="47">47</option>
<option value="48">48</option>
<option value="49">49</option>
<option value="50">50</option>
<option value="51">51</option>
<option value="52">52</option>
<option value="53">53</option>
<option value="54">54</option>
<option value="55">55</option>
<option value="56">56</option>
<option value="57">57</option>
<option value="58">58</option>
<option value="59" selected="selected">59</option>
</select>
hrs
</div></td>
</tr>
<tr valign="baseline">
<td align="right" nowrap="nowrap" bgcolor="#FFFFFF"><span class="style4"></span></td>
<td bgcolor="#FFFFFF">&nbsp;</td>
<td bgcolor="#FFFFFF">&nbsp;</td>
<td bordercolor="#0000FF" bgcolor="#FFFFFF"><span class="style4">Duration RangeFrom:</span></td>
<td colspan="2" bordercolor="#0000FF" bgcolor="#FFFFFF"><div align="right" class="style4"> <span
class="style7">required</span><span class="style11"><span class="style12">*</span></span></span>
<select name="dh1" size="1" id="dh1">
<option value="00" selected="selected">00</option>
<option value="01">01</option>
<option value="02">02</option>
<option value="03">03</option>
<option value="04">04</option>

```

```

<option value="05">05</option>
<option value="06">06</option>
<option value="07">07</option>
<option value="08">08</option>
<option value="09">09</option>
<option value="10">10</option>
<option value="11">11</option>
    <option value="12">12</option>
<option value="13">13</option>
<option value="14">14</option>
<option value="15">15</option>
<option value="16">16</option>
<option value="17">17</option>
<option value="18">18</option>
<option value="19">19</option>
<option value="20">20</option>
<option value="21">21</option>
<option value="22">22</option>
<option value="23">23</option>
</select>
<span class="style2"></span>
<select name="dm1" size="1" id="dm1">
  <option value="00" selected="selected">00</option>
  <option value="01">01</option>
  <option value="02">02</option>
  <option value="03">03</option>
  <option value="04">04</option>
  <option value="05">05</option>
  <option value="06">06</option>
  <option value="07">07</option>
  <option value="08">08</option>
  <option value="09">09</option>
  <option value="10">10</option>
  <option value="11">11</option>
  <option value="12">12</option>

  <option value="13">13</option>
  <option value="14">14</option>
  <option value="15">15</option>
  <option value="16">16</option>
  <option value="17">17</option>
  <option value="18">18</option>
  <option value="19">19</option>
  <option value="20">20</option>
  <option value="21">21</option>
  <option value="22">22</option>
    <option value="23">23</option>
  <option value="24">24</option>
  <option value="25">25</option>
  <option value="26">26</option>
  <option value="27">27</option>
  <option value="28">28</option>
  <option value="29">29</option>
  <option value="30">30</option>
    <option value="31">31</option>
  <option value="32">32</option>
    <option value="33">33</option>
  <option value="34">34</option>
  <option value="35">35</option>
  <option value="36">36</option>
  <option value="37">37</option>
  <option value="38">38</option>

```

```
<option value="39">39</option>
      <option value="40">40</option>
<option value="41">41</option>
<option value="42">42</option>
      <option value="43">43</option>
<option value="44">44</option>
<option value="45">45</option>
<option value="46">46</option>
<option value="47">47</option>
<option value="48">48</option>
<option value="49">49</option>
      <option value="50">50</option>
<option value="51">51</option>
<option value="52">52</option>
      <option value="53">53</option>
<option value="54">54</option>
<option value="55">55</option>
<option value="56">56</option>
<option value="57">57</option>
<option value="58">58</option>
<option value="59">59</option>
  </select>
<span class="style2">:</span>
<select name="ds1" size="1" id="select4">
  <option value="00">00</option>
  <option value="01">01</option>
  <option value="02">02</option>
  <option value="03">03</option>
  <option value="04">04</option>
  <option value="05">05</option>
  <option value="06">06</option>
  <option value="07">07</option>
  <option value="08">08</option>
  <option value="09">09</option>
  <option value="10">10</option>
  <option value="11">11</option>
  <option value="12">12</option>
  <option value="13">13</option>
  <option value="14">14</option>
  <option value="15">05</option>
  <option value="16">16</option>
  <option value="17">17</option>
  <option value="18">18</option>
  <option value="19">19</option>
  <option value="20">20</option>
  <option value="21">21</option>
  <option value="22">22</option>
  <option value="23">23</option>
  <option value="24">24</option>
  <option value="25">25</option>
  <option value="26">26</option>
  <option value="27">27</option>
  <option value="28">28</option>
  <option value="29">29</option>
  <option value="30">30</option>
  <option value="31">31</option>
  <option value="32">32</option>
  <option value="33">33</option>
  <option value="34">34</option>
  <option value="35">35</option>
  <option value="36">36</option>
  <option value="37">37</option>
```

```

<option value="38">38</option>
<option value="39">39</option>
<option value="40">40</option>
<option value="41">41</option>
<option value="42">42</option>
<option value="43">43</option>
<option value="44">44</option>
<option value="45">45</option>
<option value="46">46</option>
<option value="47">47</option>
<option value="48">48</option>
<option value="49">49</option>
<option value="50">50</option>
<option value="51">51</option>
<option value="52">52</option>
<option value="53">53</option>
<option value="54">54</option>
<option value="55">55</option>
<option value="56">56</option>
<option value="57">57</option>
<option value="58">58</option>
<option value="59">59</option>
</select>
hrs
</div></td>
</tr>
<tr valign="baseline">
<td colspan="2" align="right" nowrap="nowrap" bgcolor="#FFFFFF"><span class="style4"></span></td>
<td bgcolor="#FFFFFF">&nbsp;</td>
<td bordercolor="#0000FF" bgcolor="#FFFFFF"><div align="right">To</div></td>
<td colspan="2" bordercolor="#0000FF" bgcolor="#FFFFFF"><div align="right"><span class="style4"></span>
class="style7">required</span><span class="style11"><span class="style12">*</span></span>
<select name="dh2" size="1" id="dh2">
<option value="00">00</option>
<option value="01">01</option>
<option value="02">02</option>
<option value="03">03</option>
<option value="04">04</option>
<option value="05">05</option>
<option value="06">06</option>
<option value="07">07</option>
<option value="08">08</option>
<option value="09">09</option>
<option value="10">10</option>
<option value="11">11</option>
<option value="12">12</option>
<option value="13">13</option>
<option value="14">14</option>
<option value="15">15</option>
<option value="16">16</option>
<option value="17">17</option>
<option value="18">18</option>
<option value="19">19</option>
<option value="20">20</option>
<option value="21">21</option>
<option value="22">22</option>
<option value="23" selected="selected">23</option>
</select>
<span class="style2">:</span>
<select name="dm2" size="1" id="select2">
<option value="00">00</option>
<option value="01">01</option>

```

```
<option value="02">02</option>
<option value="03">03</option>
<option value="04">04</option>
<option value="05">05</option>
<option value="06">06</option>
<option value="07">07</option>
<option value="08">08</option>
<option value="09">09</option>
<option value="10">10</option>
<option value="11">11</option>
<option value="12">12</option>
<option value="12">12</option>
<option value="13">13</option>
<option value="14">14</option>
<option value="15">05</option>
<option value="16">16</option>
<option value="17">17</option>
<option value="18">18</option>
<option value="19">19</option>
<option value="20">20</option>
<option value="21">21</option>
<option value="22">22</option>
<option value="23">23</option>
<option value="24">24</option>
<option value="25">25</option>
<option value="26">26</option>
<option value="27">27</option>
<option value="28">28</option>
<option value="29">29</option>
<option value="30">30</option>
<option value="31">31</option>
<option value="32">32</option>
<option value="33">33</option>
<option value="34">34</option>
<option value="35">35</option>
<option value="36">36</option>
<option value="37">37</option>
<option value="38">38</option>
<option value="39">39</option>
<option value="40">40</option>
<option value="41">41</option>
<option value="42">42</option>
<option value="43">43</option>
<option value="44">44</option>
<option value="45">45</option>
<option value="46">46</option>
<option value="47">47</option>
<option value="48">48</option>
<option value="49">49</option>
<option value="50">50</option>
<option value="51">51</option>
<option value="52">52</option>
<option value="53">53</option>
<option value="54">54</option>
<option value="55">55</option>
<option value="56">56</option>
<option value="57">57</option>
<option value="58">58</option>
<option value="59" selected="selected">59</option>
</select>
<span class="style2">:</span>
<select name="ds2" size="1" id="select5">
```

```
<option value="00">00</option>
<option value="01" >01</option>
<option value="02">02</option>
<option value="03">03</option>
<option value="04">04</option>
<option value="05">05</option>
<option value="06">06</option>
<option value="07">07</option>
<option value="08">08</option>
<option value="09">09</option>
<option value="10">10</option>
<option value="11">11</option>
<option value="12">12</option>
<option value="13">13</option>
<option value="14">14</option>
<option value="15">05</option>
<option value="16">16</option>
<option value="17">17</option>
<option value="18">18</option>
<option value="19">19</option>
<option value="20">20</option>
<option value="21">21</option>
<option value="22">22</option>
<option value="23">23</option>
<option value="24">24</option>
<option value="25">25</option>
<option value="26">26</option>
<option value="27">27</option>
<option value="28">28</option>
<option value="29">29</option>
<option value="30">30</option>
<option value="31">31</option>
<option value="32">32</option>
<option value="33">33</option>
<option value="34">34</option>
<option value="35">35</option>
<option value="36">36</option>
<option value="37">37</option>
<option value="38">38</option>
<option value="39">39</option>
<option value="40">40</option>
<option value="41">41</option>
<option value="42">42</option>
<option value="43">43</option>
<option value="44">44</option>
<option value="45">45</option>
<option value="46">46</option>
<option value="47">47</option>
<option value="48">48</option>
<option value="49">49</option>
<option value="50">50</option>
<option value="51">51</option>
<option value="52">52</option>
<option value="53">53</option>
<option value="54">54</option>
<option value="55">55</option>
<option value="56">56</option>
<option value="57">57</option>
<option value="58">58</option>
<option value="59" selected="selected">59</option>
</select>
hrs
```

```

        </span></div></td>
    </tr>
    <tr valign="baseline">
        <td colspan="2" align="right" nowrap="nowrap" bgcolor="#FFFFFF">&nbsp;</td>
        <td bgcolor="#FFFFFF">&nbsp;</td>
        <td colspan="3" bgcolor="#FFFFFF"><p>&nbsp;</p>
        <p>&nbsp;</p></td>
    </tr>
    <tr valign="baseline">
        <td height="35" colspan="2" align="right" nowrap="nowrap" bgcolor="#FFFFFF"><div align="center"
class="style4"><strong>Routes Taken </strong></div></td>
        <td bgcolor="#FFFFFF">&nbsp;</td>
        <td colspan="3" nowrap="nowrap" bgcolor="#FFFFFF"><div align="center" class="style4"><strong>Trunk/Exchanges
Used by Call </strong> </div>
        <div align="center" class="style4"></div>
        <div align="center" class="style4"></div></td>
    </tr>
    <tr valign="baseline">
        <td align="right" nowrap="nowrap" bgcolor="#FFFFFF"><div align="left" class="style4">In route:</div></td>
        <td bgcolor="#FFFFFF"><div align="right" class="style4">
        <div align="left">
        <select name="in_route">
        <option value="" <?php if (!(strcmp("", $row_recroute['prefix']))) { echo "selected=\"selected\""; } ?>>Not
Specified</option>
        <?php
do {
?>
        <option value="<?php echo $row_recroute['prefix']?>"<?php if (!(strcmp($row_recroute['prefix'],
$row_recroute['prefix']))) { echo "selected=\"selected\""; } ?>><?php echo $row_recroute['router']?></option>
        <?php
} while ($row_recroute = mysql_fetch_assoc($recroute));
$rows = mysql_num_rows($recroute);
if($rows > 0) {
    mysql_data_seek($recroute, 0);
    $row_recroute = mysql_fetch_assoc($recroute);
}
?>
        </select>
        </div>
    </div></td>
    <td bgcolor="#FFFFFF">&nbsp;</td>
    <td align="right" nowrap="NOWRAP" bgcolor="#FFFFFF"><div align="right"><span class="style4">In
trunk:</span></div></td>
    <td colspan="2" nowrap="nowrap" bgcolor="#FFFFFF"><div align="right" class="style4">
        <div align="right">
        <select name="in_trunk">
        <option value="" <?php if (!(strcmp("", $row_rectrunk['prefix']))) { echo "selected=\"selected\""; } ?>>Not
Specified</option>
        <?php
do {
?>
        <option value="<?php echo $row_rectrunk['prefix']?>"<?php if (!(strcmp($row_rectrunk['prefix'],
$row_rectrunk['prefix']))) { echo "selected=\"selected\""; } ?>><?php echo $row_rectrunk['exchange_name']?></option>
        <?php
} while ($row_rectrunk = mysql_fetch_assoc($rectrunk));
$rows = mysql_num_rows($rectrunk);
if($rows > 0) {
    mysql_data_seek($rectrunk, 0);
    $row_rectrunk = mysql_fetch_assoc($rectrunk);
}
?>

```

```

        </select>
    </div>
</div></td>
</tr>
<tr valign="baseline">
<td bgcolor="#FFFFFF"><span class="style4">Out route:</span></td>
<td bgcolor="#FFFFFF"><div align="right" class="style4">
<div align="left">
<select name="out_route">
<option value="" <?php if (!(strcmp("", $row_recroute['prefix']))) {echo "selected=\"selected\"";} ?>>Not
Specified</option>
<?php
do {
?>
<option value="<?php echo $row_recroute['prefix']?>"<?php if (!(strcmp($row_recroute['prefix'],
$row_recroute['prefix']))) {echo "selected=\"selected\"";} ?>><?php echo $row_recroute['router']?></option>
<?php
} while ($row_recroute = mysql_fetch_assoc($recroute));
$rows = mysql_num_rows($recroute);
if($rows > 0) {
mysql_data_seek($recroute, 0);
$row_recroute = mysql_fetch_assoc($recroute);
}
?>
</select>
</div>
</div></td>
<td bgcolor="#FFFFFF">&nbsp;</td>
<td nowrap="nowrap" bgcolor="#FFFFFF"><div align="right"><span class="style4">Out trunk:</span></div></td>
<td colspan="2" nowrap="nowrap" bgcolor="#FFFFFF"><div align="right" class="style4">
<div align="right">
<select name="out_trunk">
<option value="" <?php if (!(strcmp("", $row_rectrunk['prefix']))) {echo "selected=\"selected\"";} ?>>Not
Specified</option>
<?php
do {
?>
<option value="<?php echo $row_rectrunk['prefix']?>"<?php if (!(strcmp($row_rectrunk['prefix'],
$row_rectrunk['prefix']))) {echo "selected=\"selected\"";} ?>><?php echo $row_rectrunk['exchange_name']?></option>
<?php
} while ($row_rectrunk = mysql_fetch_assoc($rectrunk));
$rows = mysql_num_rows($rectrunk);
if($rows > 0) {
mysql_data_seek($rectrunk, 0);
$row_rectrunk = mysql_fetch_assoc($rectrunk);
}
?>
</select>
</div>
</div></td>
</tr>
<tr valign="baseline">
<td align="right" nowrap="nowrap" bgcolor="#FFFFFF"><span class="style4"></span></td>
<td bgcolor="#FFFFFF"><div align="right"><span class="style4"></span></div></td>
<td bgcolor="#FFFFFF">&nbsp;</td>
<td bgcolor="#FFFFFF"><p class="style4">&nbsp;</p>
<p class="style4">&nbsp;</p></td>
<td colspan="2" bgcolor="#FFFFFF"><div align="right"><span class="style4"></span></div></td>
</tr>
<tr valign="baseline">

```

```

        <td colspan="2" align="right" nowrap="nowrap" bgcolor="#FFFFFF"><div align="center" class="style4"><strong>Final
Destination / Origin </strong></div></td>
        <td bgcolor="#FFFFFF">&nbsp;</td>
        <td colspan="3" bordercolor="#F0F0F0" bgcolor="#FFFFFF"><div align="center" class="style4"><strong>Pulses
Encountered </strong></div></td>
    </tr>
    <tr valign="baseline">
        <td align="right" nowrap="nowrap" bgcolor="#FFFFFF"><div align="left" class="style4">Originating from
country:</div></td>
        <td bgcolor="#FFFFFF"><div align="right" class="style4">

            <div align="right">
                <select name="origin_country">
                    <option value="" <?php if (!(strcmp("", $row_reccountry['prefix']))) {echo "selected=\"selected\"";} ?>>Not
Specified</option>
                    <?php
do {
?>
                        <option value="<?php echo $row_reccountry['prefix'];>"<?php if (!(strcmp($row_reccountry['prefix'],
$row_reccountry['prefix']))) {echo "selected=\"selected\"";} ?>><?php echo $row_reccountry['country_name'];></option>
                    <?php
} while ($row_reccountry = mysql_fetch_assoc($reccountry));
                    $rows = mysql_num_rows($reccountry);
                    if($rows > 0) {
                        mysql_data_seek($reccountry, 0);
                        $row_reccountry = mysql_fetch_assoc($reccountry);
                    }
?>
                </select>
            </div>
        </div></td>
        <td bgcolor="#FFFFFF">&nbsp;</td>
        <td bordercolor="#F0F0F0" bgcolor="#FFFFFF"><span class="style4">Pulse:</span></td>
        <td colspan="2" bordercolor="#F0F0F0" bgcolor="#FFFFFF"><div align="right" class="style4">
            <label for="textfield"></label>

            <div align="right">
                <input name="pulse" type="text" id="pulse" maxlength="3" />
            </div>
        </div></td>
    </tr>
    <tr valign="baseline">
        <td align="right" nowrap="nowrap" bgcolor="#FFFFFF"><div align="left"><span class="style4">Destinated to
country:</span></div></td>
        <td bgcolor="#FFFFFF"><div align="right">
            <select name="destination_country">
                <option value="" <?php if (!(strcmp("", $row_reccountry['prefix']))) {echo "selected=\"selected\"";} ?>>Not
Specified</option>
                <?php
do {
?>
                    <option value="<?php echo $row_reccountry['prefix'];>"<?php if (!(strcmp($row_reccountry['prefix'],
$row_reccountry['prefix']))) {echo "selected=\"selected\"";} ?>><?php echo $row_reccountry['country_name'];></option>
                <?php
} while ($row_reccountry = mysql_fetch_assoc($reccountry));
                $rows = mysql_num_rows($reccountry);
                if($rows > 0) {
                    mysql_data_seek($reccountry, 0);
                    $row_reccountry = mysql_fetch_assoc($reccountry);
                }
?>
            </select>
        </div>
    </td>

```

```

        </div></td>
        <td bgcolor="#FFFFFF">&nbsp;</td>
        <td bordercolor="#F0F0F0" bgcolor="#FFFFFF">&nbsp;</td>
        <td colspan="2" bordercolor="#F0F0F0" bgcolor="#FFFFFF">&nbsp;</td>
    </tr>
</table>
    <label for="Submit"></label>
</form> <p>&nbsp;</p> </td>
</tr>
</table>
<p align="center" style="margin-left: 20"><font face="Arial" color="#000000" size="1"><a href="about.php">2013 &copy;
COPYRIGHT 2013 ALL RIGHTS RESERVED</a></font></p>
<p style="margin-left: 20" align="center"><font face="Arial" color="#000000" size="1"><a href="about.php">A product of
Henkel Chamboko R10637T BSC Information Systems Honors MSU Telone.co.zw</a></font></p>
</body>
</html>
<?php
mysql_free_result($reccountry);

//mysql_free_result($rectrunk);

//mysql_free_result($recroute);

mysql_free_result($reclinedetails);

//mysql_free_result($reccdrmastr);

//mysql_free_result($rectrunkmain);
?>

```

Home aka index

```

<?php session_start();if (!isset($_SESSION['MM_Username'])) { header('Location: login.php');
}??>
<?php require_once('Connections/authconn.php'); ?>
<?php

mysql_select_db($database_authconn, $authconn);
$query_reccountry = "SELECT * FROM country_definition";
$reccountry = mysql_query($query_reccountry, $authconn) or die(mysql_error());
$row_reccountry = mysql_fetch_assoc($reccountry);
$totalRows_reccountry = mysql_num_rows($reccountry);

mysql_select_db($database_authconn, $authconn);
$query_rectrunk = "SELECT * FROM trunk_definition";
$rectrunk = mysql_query($query_rectrunk, $authconn) or die(mysql_error());
$row_rectrunk = mysql_fetch_assoc($rectrunk);
$totalRows_rectrunk = mysql_num_rows($rectrunk);

mysql_select_db($database_authconn, $authconn);
$query_recroute = "SELECT * FROM route_definition";
$recroute = mysql_query($query_recroute, $authconn) or die(mysql_error());
$row_recroute = mysql_fetch_assoc($recroute);
$totalRows_recroute = mysql_num_rows($recroute);

```

```
mysql_select_db($database_authconn, $authconn);
$query_recsubsc = "SELECT * FROM customer_details";
$recsubsc = mysql_query($query_recsubsc, $authconn) or die(mysql_error());
$row_recsubsc = mysql_fetch_assoc($recsubsc);
$totalRows_recsubsc = mysql_num_rows($recsubsc);
```

```
mysql_select_db($database_authconn, $authconn);
$query_reccdrmaster = "SELECT * FROM cdr_details_master";
$reccdrmaster = mysql_query($query_reccdrmaster, $authconn) or die(mysql_error());
$row_reccdrmaster = mysql_fetch_assoc($reccdrmaster);
$totalRows_reccdrmaster = mysql_num_rows($reccdrmaster);
```

```
mysql_select_db($database_authconn, $authconn);
$query_recsubcline = "SELECT * FROM customer_line_details";
$recsubcline = mysql_query($query_recsubcline, $authconn) or die(mysql_error());
$row_recsubcline = mysql_fetch_assoc($recsubcline);
$totalRows_recsubcline = mysql_num_rows($recsubcline);
```

```
mysql_select_db($database_authconn, $authconn);
$query_recreq = "SELECT * FROM requests";
$recreq = mysql_query($query_recreq, $authconn) or die(mysql_error());
$row_recreq = mysql_fetch_assoc($recreq);
$totalRows_recreq = mysql_num_rows($recreq);
?>
```

<html>

<head>

<meta http-equiv="Content-Type" content="text/html; charset=windows-1252">

<title>Home</title>

<style type="text/css">

<!--

```
.cdr_temp {
    margin-left: plces;
}
```

```
.style8 {
    font-size: 36px;
    font-weight: bold;
    color: #F0F0F0;
}
```

```
.style24 { font-weight: bold; color: #FFFFFF; }
```

```
.style26 {
    font-family: Arial, Helvetica, sans-serif;
    color: #999999;
    font-size: 14px;
}
```

```

}
.style28 {
    color: #FFFFFF;
    font-family: Arial, Helvetica, sans-serif;
}
.style33 {
    font-family: Arial, Helvetica, sans-serif;
    font-size: 14px;
    color: #999999;
    font-weight: bold;
}
.style16 {color: #000000; font-size: 18px;}
.style36 {color: #666666}
.style38 {font-size: 12px}
.style39 {color: #999999}
.style40 {
    color: #333333;
    font-family: Arial, Helvetica, sans-serif;
}
.style41 {
    font-size: 18px;
    color: #0000FF;
}
.style46 {font-size: 16px}
.style47 {font-size: 14px}
.style48 {color: #FFCC00}
-->
</style>
<script type="text/JavaScript">
<!--
function MM_popupMsg(msg) { //v1.0
    alert(msg);
}
//-->
</script>
</head>

<body topmargin="0" leftmargin="0" rightmargin="0" bottommargin="0" marginheight="0"
marginwidth="0" bgcolor="#FFFFFF">
<table width="840" height="75" border="0" align="center" cellpadding="0" cellspacing="0">
<tr>
<td height="19"><span class="style16">Tel-One CDR Mining And Analysis System inc.
</span></td>
<td height="19"><div align="left" class="style26">
<div align="right"><a href="http://www.telone.co.zw/">www.</a> | <a
href="login.php">Log-Out</a> | <a href="http://www.telone.co.zw/contact/harare/cdb"

```

```

onClick="MM_popupMsg('Now Redirecting to www...')">Contact</a> | <a
href="about.php">About</a></div>
  </div></td>
  <td>&nbsp;</td>
</tr>
<tr>
  <td height="19"><span class="style38">This site is restricted to Tel-One intranet...</span>
</td>
  <td height="19"><div align="right"><span class="style36"><span style="margin-left: 20;
font-weight: bold;"><?php echo "Loggin :
".$_SESSION['MM_Username'];?></span></span></div></td>
  <td width="4"><div align="right" class="style26"></div></td>
</tr>
<tr>
  <td height="19" colspan="3"><label for="imageField"></label>
  <input type="image" name="imageField" src="cdr_system_images/About-Us-image.jpg"
id="imageField"></td>
</tr>
<tr>
  <td width="726" height="18" bordercolor="#000000" bgcolor="#CCCCCC"
class="style24"><span class="style28"><font size="2">&nbsp;<a href="index.php">
Home&nbsp;</a>&nbsp;</span>|&nbsp;<a href="mining and analysis.php"> Mining and
Analysis</a> &nbsp;</span>|&nbsp;<a href="archive.php">Archive
</a></font>&nbsp;</span><font size="2"><font size="2">
  <a href="presets.php">
  <?php if ($_SESSION['usrtype']<>"User-ITERC"){echo "Presets";}?>
  </a></font>&nbsp;<?php if ($_SESSION['usrtype']<>"User-ITERC"){echo " | ";}?>&nbsp;<span>
</font><a href="Users.php"><font size="2">
  <?php if ($_SESSION['usrtype']=="Admin"){echo "Users";}?>
  </a></font>&nbsp;<?php if ($_SESSION['usrtype']=="Admin"){echo " | ";}?>&nbsp;<a
href="reports.php">
  <?php if ($_SESSION['usrtype']=="Admin"){echo "Reports";}?>
  </a></font>&nbsp;<?php if ($_SESSION['usrtype']=="Admin"){echo " | ";}?>&nbsp;</span>
</font></span></td>
  <td width="210" height="18" bordercolor="#000000" bgcolor="#CCCCCC"><div
align="right" class="style33">
  <div align="left" class="style36">
  <div align="right"><span class="style40"><?php echo "As :
".$_SESSION['usrtype'];?></span></div>
  </div>
  <div align="center" class="style39"></div>
  <div align="right"></div><div align="right"></div></div></td>
</tr>
</table>
<table width="940" height="783" border="0" align="center" cellpadding="0" cellspacing="0">
  <tr>

```

```

<td width="176" rowspan="3"><div align="center"><span style="margin-left: 20">
  <input type="image" name="imageField2" src="cdr_system_images/Capture.JPG"
id="imageField2" />
  <span class="style46"><font face="Arial" color="#000000"><a
href="about.php">&copy;</a></font></span> </span></div></td>
  <td width="590" height="54"><div align="center" class="style47">
    <p style="margin-left: 20">| <a href="quicksearch.php">Quick Search</a> | <a
href="carrier_def.php">Carrier/Route Definitions</a> | <a href="country_def.php">Country
Definitions</a> | <a href="trunk_def.php">Trunk Definitions</a> | <a href="subscribers.php">
Subscribers</a> | <a href="subclines.php">Subscriber Lines </a> | <a
href="live_cdr.php">Live CDR Streaming</a></p>
  </div></td>
  <td width="174" rowspan="3" bgcolor="#FFFFFF"><p style="margin-left: 20">
    <label for="label"></label>
  </p>
    <p align="center" style="margin-left: 20">      <span class="style48"><?php
if(($_SESSION['usrtype']<>"User-ITERC")&&($totalRows_recreq>"0")){echo
$totalRows_recreq." Notificatons !";} ?>
    </span></p>
    <p align="center" style="margin-left: 20">
      <input type="image" name="imageField3" src="cdr_system_images/silhouette36.png"
id="label">
    </p>
    <p align="center" style="margin-left: 20"><a href="login.php">Log out</a></p></td>
</tr>
<tr>
  <td><div align="center"><span class="style8 style39">... Home ...</span></div></td>
</tr>
<tr>
  <td height="20"><div align="center" class="style41"><marquee>
    Welcome to Tel-One CDR Mining and Analysis System inc.
  </marquee>
</div></td>
</tr>
<tr>
  <td colspan="3"><p align="center">&nbsp;</p>
  <p align="center"><strong>DASAHBOARD</strong></p>
  <table width="370" border="0" align="right" cellpadding="0" cellspacing="0">
    <tr>
      <td colspan="8"><div align="center"><strong>Turn ON Live Analytics
</strong></div></td>
    </tr>
  </table>
  <td width="39">&nbsp;</td>
  <td width="39">&nbsp;</td>
  <td width="41"><label for="radiobutton">

```

```

    <?php if (isset($_POST['radiobutton'])) { require_once('rnd_cdr.php'); }?>
</label></td>
<td width="13" bgcolor="#FFFFFF" >&nbsp;</td>
<td width="52" bgcolor="#FFFFFF"> ON
<input name="radiobutton" type="radio" id="radiobutton" value="radiobutton"></td>
<td width="7"><label for="radiobutton">|</label></td>
<td width="138">|
    <label for="label">
        <input name="radiobutton" type="radio" id="radio" value="radiobutton">
OFF</label></td>
<td width="41">&nbsp;</td>
</tr>
<tr>
<td>&nbsp;</td>
<td>&nbsp;</td>
<td>&nbsp;</td>
<td bgcolor="#FFFFFF" >&nbsp;</td>
<td bgcolor="#FFFFFF">&nbsp;</td>
<td>&nbsp;</td>
<td>&nbsp;</td>
<td>&nbsp;</td>
</tr>
<tr>
<td height="219" colspan="8"><span style="margin-left: 20"></span></td>
</tr>
</table>
<p style="margin-left: 20">&nbsp;</p>
<p style="margin-left: 20">Real Time Statistics</p>
<p style="margin-left: 20"><a href="carrier_def.php"><?php echo $totalRows_recroute ?>
Carrier/Route Definitions</a></p>
<p style="margin-left: 20"><a href="country_def.php"><?php echo $totalRows_reccountry
?> Country Definitions </a></p>
<p style="margin-left: 20"><a href="trunk_def.php"><?php echo $totalRows_rectrunk ?>
Trunk Definitions </a></p>
<p style="margin-left: 20"><a href="subscribers.php"><?php echo $totalRows_recrsubsc ?>
Subscribers</a></p>
<p style="margin-left: 20"><a href="subscines.php"><?php echo $totalRows_recrsubscine
?> Subscriber Lines </a></p>
<p style="margin-left: 20"><a href="live_cdr.php"><?php echo $totalRows_reccdrmaster ?>
Live Streaming CDRs</a></p>
<p style="margin-left: 20">&nbsp;</p>
<p style="margin-left: 20">&nbsp;</p>
<p style="margin-left: 20">&nbsp;</p>
<p style="margin-left: 20">&nbsp;</p>

```

```
<p style="margin-left: 20"><a href="generate_cdr_record.php">Generate Artificial CDR
&quot;<em>Test Environment&quot; </em></a></p>
<p style="margin-left: 20">&nbsp;</p>
<p style="margin-left: 20" align="center"><font face="Arial" color="#000000" size="1"><a
href="about.php"><font face="Arial" color="#000000" size="1"><a href="about.php"> 2013 ©
COPYRIGHT 2013 ALL RIGHTS RESERVED</a></font></p>
<p style="margin-left: 20" align="center"><font face="Arial" color="#000000" size="1"><a
href="about.php">A product of Henkel Chamboko R10637T BSC Information Systems Honors
MSU Telone.co.zw</a></font> </p></td>
</tr>
</table>
<p style="margin-left: 20">&nbsp;</p>
</body>

</html>
<?php
mysql_free_result($reccountry);

mysql_free_result($rectrunk);

mysql_free_result($recroute);

mysql_free_result($recsubsc);

mysql_free_result($reccdrmaster);

mysql_free_result($recsubsline);

mysql_free_result($recreq);
?>
```

Bibliography

1. Agarwal, B., Tayal, SP., Gupta, M., *Software Engineering and Testing*, (2009), Jones & Bartlett Learning Press.
2. Bagui ,S., and Earp, R., *Database Design Using Entity-relationship Diagrams 4th Edition*, (2011), CRC Press.
3. Bently, L., *Systems Analysis and Design for the Global Enterprise 7th Edition*, (2001) Irwin/McGraw-Hill Publishing house.
4. Burkan, S., (2005) , *The Art of Project Management 1st Edition*, O’Riely Media Publishing Company.
5. Chung, L., Brian, A., Nixon, E., *Functional and Non-Functional Requirements in Software Engineering Volume 5*, (2000), Kluwer Academic.
6. *Cisco ASR 9000 Series Aggregation Services Router SIP and SPA Hardware Installation Guide*(2013)
7. Dennis, L., *Systems analysis and design 5th Edition*, (2010) Wiley House.
8. Elmasri et al *Fundamentals of Database Systems*, (c2006), Dorling Kindersley (India) Pvt. Ltd.
9. Forouzan, Behrouz A, *Data communications and networking . - 4th Edition* (2007) McGraw- networking series McGraw Hill Publishing Company.
10. Gary, B., Shelly, T., Thomas, J., Cashman and Rosenblatt, L., *System Analysis and Design*, (2009), McGraw Hill Publishing Company.
11. Gary, B., Shelly, T., Thomas, J., Cashman, Harry, J., Rosenblatt, L. *Systems analysis and design 8th Edition* ,(2010), Cengage Learning.
12. Ghezzi, C., Jazayeri, M., and Mandrioli D. *Fundamentals of Software engineering 2nd Edition*, (2004). Prentice hall of India Publishing Company India.
13. Harold R. Kerzner *Project Management: A Systems Approach to Planning, Scheduling, and Controlling*
14. Hughes, B., and Cotterell, M., *Software Project Management - 5th Edition* (2009) McGraw-Hill Publishing Company.

15. James, P., *Verification Plans: The Five-day Verification Strategy for Modern Hardware Verification Languages, illustrated edition*, (2004), Springer Publishing Company.
16. Jeffrey, L., Lonnie, D., *Systems analysis and design methods 5th edition*, (2007), McGraw-Hill/Irwin.
17. Jones, D., *The Definitive Guide to Quality Application Delivery*, (2008), Real-time Publishers.
18. Kaseem, A., Saleh *Software engineering*, (2009), J. Ross Publishing.
19. Kumar, R., *Research Methodology* (2008), S.B Nangia, for APH publishing Co-operation.
20. Leinwand, Pinsky, and Culpepper, *Cisco Router Configuration*, (1998) Indianapolis, Indiana: Cisco Press. India.
21. Lewis, J., *Fundamentals of Project Management 3rd Edition* (2006), Worksmart Publishing company.
22. Manning, M.V. *Database: Design, Application Development and Administration 2nd Edition*, (c2004), McGraw Hill.
23. Randall, H., *Advanced level Accounting 3rd Edition*, (1996), Happer Collins Publishers
24. Sommerville. I., (2004), *Software Testing*,
25. Mishra, J. (2012), *Software Engineering 6th Edition*, Pearson Educational International pub. India.
26. McGraw, L., (1992), *Designing and Evaluating User Interfaces for Knowledge-Based Systems 2nd Edition*, Ellis Hollywood.

Electronic Site References

1. <http://dev.mysql.com/doc/> accessed 2013-08-04 17:56
2. <http://phpmygraph.abisvmm.nl/#horizontalPolygonGraph> accessed 2013-10-04 17:19
3. <http://stackoverflow.com/questions/17195280/php-mail-function-return-true-but-no-message> accessed 2013-10-04 17:50
4. <http://www.adobe.com/support/documentation/en/dreamweaver/dw8/releasenotes.html> accessed 2013-08-04 17:52
5. http://www.agisis_data_mining_and_analysis.org Accessed 2013-10-04 17:50
6. <http://www.apachefriends.org/en/faq-af.html> accessed 2013-08-04 17:52
7. <http://www.daniweb.com/web-development/php/threads/347696/sending-email-from-localhost-in-xampp-windows> accessed 2013-10-04 17:51
8. <http://www.devmanuals.com/tutorials/php/emai-with-pdf-attachment.html>
9. <http://www.hosting.com/support/upload/dreamweaver/> accessed 2013-9-30 13:10
10. http://www.java.com/en/download/faq/java_javascript.xml accessed 2013-10-04 17:51
11. http://www.phpmyadmin.net/home_page/index.php accessed 2013-08-04 18:02
12. <http://www.telephonytp2013/businessnewsdaily.com> accessed 2013-08-22 17:51
13. <https://support.google.com/webmasters/answer/35291?hl=en> 2013-9-30 13:42
14. http://www.cisco.com/en/US/docs/routers/asr9000/software/asr9k_r4.2/general/release/notes/reln_a9k_42.html accessed 2013-09-10 13.37