



Masters Project Final Report

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Safety Lockers & Key Management System For Hatton National Bank

**A dissertation submitted for the Degree of Master of
Information Technology**

P K M Muthukumarana

University of Colombo School of Computing

2017



Declaration

The thesis is my original work and has not been submitted previously for a degree at this or any other university/institute.

To the best of my knowledge it does not contain any material published or written by another person, except as acknowledged in the text.

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This is to certify that this thesis is based on the work of

Mr./Ms.

under my supervision. The thesis has been prepared according to the format stipulated and is of acceptable standard.

Certified by:

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Date:

Abstract

Hatton National Bank is one of the leading private sector banks in Sri Lanka which has existed in the banking industry for over a decade where it has over 250 service outlets all over the island and it caters over 1millions customers in different demographical areas where the bank offers different types of services and banking products including safety lockers which can be considered as one of the main product which bank can earn direct fee-based income as well as increase low cost deposit portfolios .

The Locker and Key Management system is adhered to the central principle of authorization known as Maker-Checker Principle , where there must be at least two individuals are necessary for its completion ; While one individual may create a transaction and the other individual is involved in confirmation/authorization of the same . The system contains four main categories of users roles which are known as banking assistant , junior executive, executive and administrator. Each of the users functions differs according to their user work class and privileges and operations are assigned according to the work class.

Prior to designing the system, the background analysis has been carried out for the purpose of understanding business requirements and different software engineering techniques that were used . So as a result of that a web based locker system was developed with Admin functions like user creation , create & edit user passwords , adding lockers , adding keys and Operations functions like creating & modifying customer , verifying customer details , maintaining pending customers , creating & modifying lockers , verifying lockers , uploading signatures & verifying , updating & verifying locker access , recovery & approval of rentals , adding & verifying key transfers , inquiries menu and statistical reports.

The system was developed using the latest technology and user friendly interfaces . PHP is used as the main programing language and MYSQL was used as the database whereas Ajax , JQuery and Bootstrap was used in interface designing and validation which give great user experience rich set of functionalities and functional testing was carried out to make sure that the system functions were working as intended.

The new system will help the bank to save their time and resources in an effective manner and this has become a solution for operational issues and risk ,that the bank face related to lockers and key transfers. And statistical reports provide the bird's eye view of the current and future business trends as well as missed opportunities which help the management to make their decisions.

Acknowledgement

I would like to express my special thanks and sincere gratitude to the entire lecture panel and the staff who are working at the University Of Colombo School of computing as they have given me tremendous support and opportunities to do my masters degree of Information Technologies.

Firstly I would like to thank my project supervisor , Mr. G.K.A Dias for instructing and guiding me to complete my project successfully . The knowledge which he has given on System Analysis and Design helped me and laid a great foundation to design my project . I sincerely and humbly offer my gratitude for the inspiring guidance and precious advice that have been given throughout the project.

Also I would like to thank Dr. Prasad Wimalarathne who has given me practical aspects of programming which I feel I . The knowledge which I gained through his sessions helped me in the development phase in the project.

Once again I thank all the members of the academic lecture panel for giving me a corpus of enormous knowledge and experience through the past two years , which helped me to boost my self-confidence and take up challenges..

Also I would like to thank all the members of the HNB staff who are attached to locker department and shared their valuable time with me to provide requirements and knowledge even though they were busy at the branches and specially with their responsibilities.

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List of abbreviation

| Term | Definition |
|------------------|--|
| LC&KM | Locker Control and Key Management System |
| CBSL | Central Bank of Sri Lanka |
| HNB | Hatton National Bank |
| BA | Banking assistant |
| SOL | Service outlet (branch) |
| KYC | Know your customer |
| CIF | Customer Identification number |
| TTUM | Transfer Transactions file |
| OD | Over draft |
| SQL | Structured Query Language |
| DB | Database |
| DBMS | Database Management System |
| RDBMS | Relational Database Management System |
| HTML | Hypertext Markup Language |
| CSS | Cascading Style Sheet |
| UI | User Interface |
| IDE | Integrated Development Environment |

Chapter 1 : Introduction

1.1 Introduction

This chapter describes about the project and its need for the client. Give a clear understanding about the business background and its business client the main aspects of this chapter . It is also addresses the problem domain and how the proposed solution can handle them.

1.2 Client and the business

Hatton National Bank is one of the leading private banks in Sri Lankan banking sector which are mainly involved in banking business. In 1888 the hill station of Hatton was the genesis of a bank which nationalization process in the 1970s saw the Bank acquiring the branches of National Grindlays Bank in Kandy and Nuwara Eliya, heralding the change of name to Hatton National Bank, as it is known today.

HNB branch network has spread island wide with 250 branches with over 5000 staff members attached to those branches .

1.3 Problem domain and motivation

Safety lockers was introduced in mid 70 's which bank holds the reputation of being the pioneer to introduce this product to the private banking sector. This is one of the main sources by which the bank earns income on fee-based commission.

Since the bank has performed well in the business and generated more profits from interest income ,the bank didn't pay much attention to fee-based income. However with the changes in policies by CBSL (to reduce the interest margin) the bank is compelled to focus more on fee-based income.

Even though safety locker is a good product for income generation those bank could not grabbed that opportunity due their locker procedures. All the procedures were done manually which there were no proper rental and other charges recovery methods.

Some of the manual processes are shown in the figure 1 which is given below.

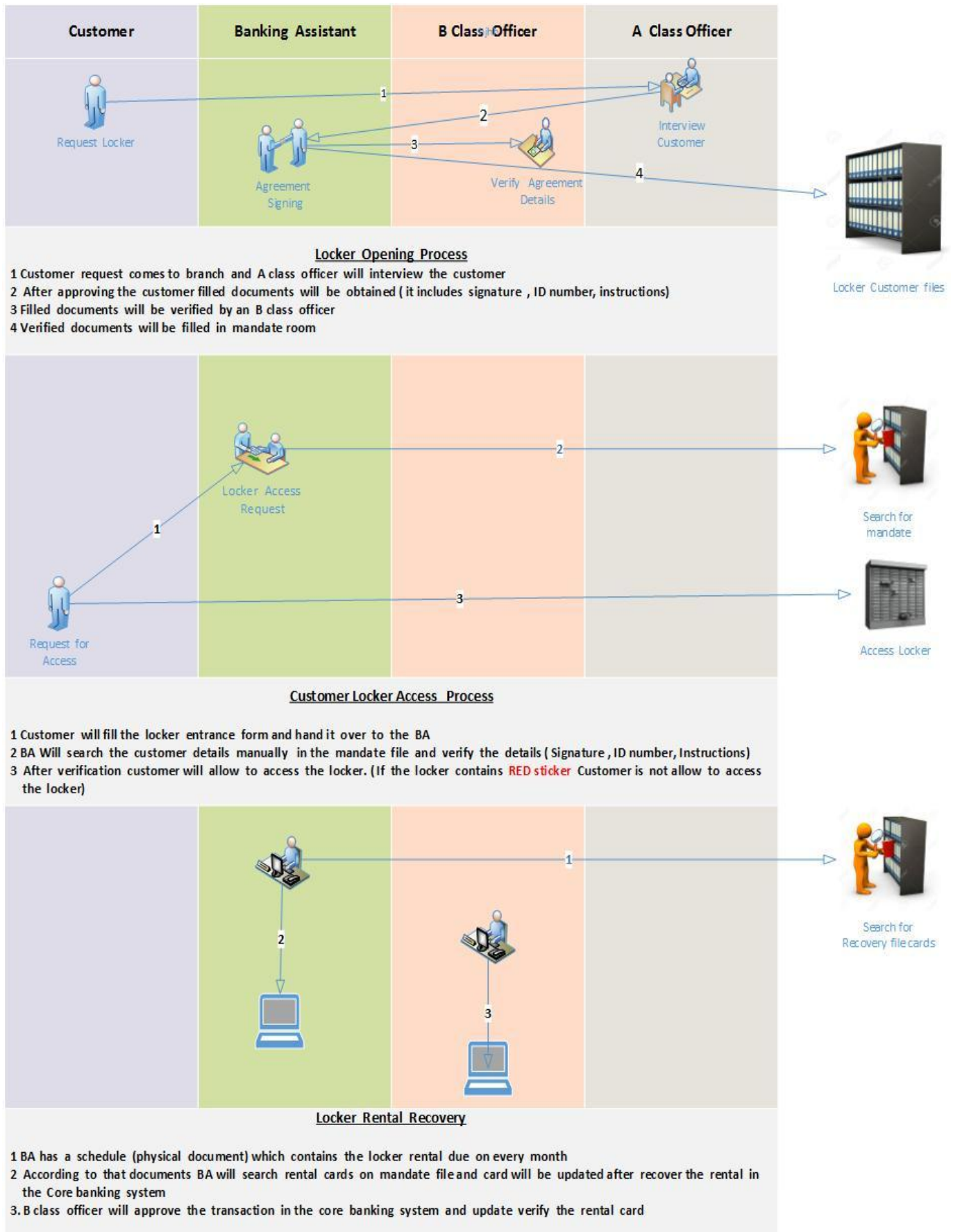


Figure 1.1 Current locker process

1.4 Objectives

The ultimate objective of this project is to introduce resource consumption and cost effective reliable Locker and Key management system to the bank. Therefore the system focuses on

- Improve efficiency & productivity of the company resources to reduce maintenance cost
- Enhance customer relationship and improve customer satisfaction
- Covering all main business process through computerized system.
- Increase the availability of information in quick time
- Increase banks fee base income by introducing proper recovery mechanism through system.
- Smooth the business operation flow .
- Strengthen the customer bank relationship.
- Bringing new customers and new business to bank to increase profit.
- Improve the accuracy , transparency and reduce mistakes in this product.
- Strengthen the recovery process.
- Reduces the security and other legal issues which can cause to banks good will .
- Enforce bank staff to follow proper banking procedures.

1.5 Scope of the project

Scope of the project mainly based on Web based locker control and key management system which automate all the manual processes . The scope of this project covers the current manual process through different types of modules .

Administration Module

Most of the administration functions will be covered through this module . User controls , User group controls and vault keys maintenance are some of the main activities under this module

Customer Module

Mainly customer details are handled under this module which create customers in the system , and modification of customer details are some of the functions of this module

User Module

Under this module users will be able to modify their profile data such as passwords , and assigned branch.

Locker Module

Most of the manual practices currently done by the branches are automated under this module . In addition to that dual control mechanism was integrated in most of the functions in this module. Locker assignment , Locker access updating , restriction controlling , user verification by ID and signature are some of the main functionalities which will be covered under this module .

Recovery Module

In the current context only locker rental was charged and it was done manually. Excess visit charges and overdue charges will be introduced in addition to locker rental and all the recovery processors will be automated.

Key Transfer Module

Handling vault keys is a big responsibility for which there was no proper mechanism to follow up those transfers in the branch network . With the new proposed system that risk will be eliminated by automating those transfers .

Inquires & Reports module

Report generation and inquiry are covered under this module. Some of the reports which were generated under this module will help the bank to make decisions and to identify resource utilization .

1.6 Overview of chapters

This section explains each chapter in this document in brief

Chapter 1: Introduction

In this chapter, a reader can identify what is the project, why is it needed, what are the motivation, the problem domain to be addressed, and some brief description about the client and the business background of the client.

Chapter 2: Background

This chapter gives an idea about the existing system and analysis of problems of the existing manual system.

Chapter 3: Analysis And Design

Both functional and nonfunctional requirements are described in this chapter. Techniques used to gather requirements and what are the new requirements identified will be included in this chapter. Design of the proposed solution for the problem domain is described in this chapter where the methods, algorithms, and data structures etc. used to create the solution and use case diagrams, class diagrams, sequence diagrams, etc. will be describe in this chapter

Chapter 4: Implementation

This chapter will discuss the implantations of the LC&KM , the technology selection & implementation technologies, the tools utilization, how the system directories looks like, how the data model mapped with the application, user access matrix with comparing to the functions and user roles, and the user interface design

Chapter 5: User Evaluation And Testing

This chapter will discuss how the system testing was carried out for LC&KM . This will further discuss the available testing methods, test plan, the functions covered in the testing cycles, the sample executed test cases with description, expected results and the status of the test cases and analysis of the system test results and usability testing.

Chapter 6: Conclusion and Future Work

This chapter will discuss whether the developed system able to achieved the anticipated benefits or the goals. Further, this chapter will discuss the future improvements to be done to the LC&KM system.

Chapter 2 : Background

2.1 Introduction

This chapter will focus on the review of similar system available in the market and what the specialties there are in the proposed LC&KM system than in those systems. Further it will review the different implementation technologies available for web application development.

2.2 Literature Review

The Lockers and key management system can be categorized as a management information system and the below sections will look into the similar systems that are provided in the similar kind of functions.

As mentioned in the section 1.5 of chapter 1 , the locker management , user management , smoothing the recovery process , key transfer management and reporting are the main functions that will be covered in the LC&KM system

As per the research done , no evidence have been found about the availability of same kinds of system but there are different kinds of locker management systems which run under management information system category which most of the systems use in educational institutes.

The main functionality of the LC&KM is not the accessing the locker which is a part of functionality , and there are different kinds of system which deal with accessing locker as their main function and they don't contain rental recovery module and key transfer modules .As a result of that most of the system doesn't fit into the banking context.

If we consider the software available for locker and key management system there are couple of rich applications which provides some of the functionalities that LC&KM system requires but they are not suitable in this context and the differences that each one of it has with LC&KM system under section 2.4

2.3 Similar systems

EZFacility's locker management system [1]

This system centralize web based locker management system which mainly focuses on controlling lockers for schools and universities. This system has the following facilities which match with bank locker system.

- Charge, record, and track custom locker rental fees.
- Search for available lockers by size.
- Track and collect equipment fees, late fees, and replacement fees.
- Run reports to view expiring rentals during a specified date range.

But this system is not suitable as a candidate system for banks locker system due to following reasons

- Lockers in the bank and lockers in the school operate in totally different environment
- EZFacility's locker management system is a proprietary software
- Software has incompatibility issues

Locker GM system [2]

This system is developed for a locker which are used in gyms. Some of the functions are of the system are as follows

- Online registration from their mobile device or computer
- Locker finder & selector
- Retrieval of their locker combination 24x7
- Online payment via credit card
- Reminders to remove locker contents before rental expires
- Renew rentals online

Features of the above software does not match with the banks requirements and the operation domains are totally different.

2.4 Technology Aspect

There are ranges of different kind of technologies available for implementation a web applications like LC&KM system . Each of these technologies has its own pros and cons. The few main development technologies together with hosting and DB technologies and its major pros and cons will be discussed in the following section.

2.4.1 Technologies For Development

This section describes some of the technologies which are concerned with development of the LC&KM system and the pros and cons of them.

- PHP [3]

PHP is a server scripting language, and a powerful tool for making dynamic and interactive web pages. PHP has lot of advantages like open source, support community, speed, easy to use, stable, powerful library support, built-in database connection module and different platform support. There are some security concerns because this is an open-source language but applications like Facebook is based on PHP.

- Asp.Net. [4]

Asp.Net is a Microsoft's web applications framework. This is widely used and is a very strong platform. The main advantage of that is ,it has very rich IDE and supports fast development. It supports lot of 3rd party development libraries and components. The main drawback of this is that it needs licenses for commercial use and deployment.

- JAVA and JSP Servlets [5]

JSP and Servlet is Java language based web application development platform. JSP is a webpage scripting language that can generate dynamic content while Servlets are Java programs that are already compiled which also creates dynamic web content. In MVC context the JSP act as a view and the Servlet act as a controller.

The main advantages of the Java platform is that it runs on different OS platforms other than Windows. So it's portable. Further it's Object Oriented and has very good performance. Disadvantage is that it's bit complicated and has less support of direct IDE.

2.4.2 Technologies for Hosting

Comparing and contrasting of hosting technologies which can be used to host the program are described in this section.

- WAMP server [6]

The acronym WAMP refers to a set of free (open source) applications, combined with Microsoft Windows, which are commonly used in Web server environments. Microsoft Windows is the operating system (OS), Apache is the Web server, MySQL handles the database components, while PHP represents the dynamic scripting languages. The main advantage here is that it's inexpensive and less time consuming in configuration.

- Internet Information Server [7]

Internet Information Server (IIS) is a webserver of Microsoft to use with windows operating system. This is the recommended webserver for Microsoft technology based applications. The main disadvantage of this is the licensing cost.

2.4.3 Technologies for Database

Databases which are considered to develop the project are briefly described here and advantages and disadvantages are described briefly

- Microsoft SQL Server [8]

Microsoft SQL Server is a relational database management system developed by Microsoft. The latest version is SQL Server 2014 and the latest review version is SQL Server 2016. The main advantage of MS SQL is that it's very strong and widely used commercial DB technology and it provides strong support for .Net based applications than other DB applications. Today it's the recommended DB technology for .Net applications. The downside is the licensing cost of MS SQL which is very high.

- Oracle [9]

The Oracle is a commercial DB from Oracle Corporation and it's the market leader in its category today. Oracle provide wide range of DB solutions from small in-house application to large scale enterprise solutions. The main advantage of the Oracle is that it's very strong and has wide range of functionalities but it also has licensing cost disadvantage.

- My SQL [10]

MySQL is an open-source relational database management system and it's one of the world widely used RDBMS. Since this is an open source, more research has been done on this to check the feasibility to use it for LC&KM . But when considering My SQL the following table shows the advantages and disadvantages with regard to the other DBMS soft wares.

| Advantages | Disadvantages |
|---|-------------------------------------|
| Open-Source | Not fully SQL-compliant |
| Easy To Use | Stability Issues |
| Inexpensive | Heavily Dependent On Addons |
| Support Is Readily Available whenever Necessary | Relatively Poor Performance Scaling |

Table 2.1 - Advantages And Disadvantages MY SQL

Chapter 3 : Analysis and Design

3.1 Introduction

The main intention of this chapter is to discuss and analyze the gathered functional and non-functional requirements of the LC&KM system. This will also discuss the different techniques which were used to gather these user requirements.

3.2 Current System

There is no proper automated system for managing locker operations and related functions . All the operations are carried by the manually and the efficiency is depending on the individual who is attached to the locker department in the branch. Locker opening , locker access and rental recovery are the major functions of the system for which currently cost is high in both economically and resources .

When opening a new locker , a customer will interview and the customer will be asked to complete the mandate and the complete document will be lodged in the mandate room , where all the information are only available in the physical locker mandate , when user needs information regarding the locker each time the user visits locker room to fulfill his requirement.

On the other hand when the customer comes to visit the locker, the user has to check the signature and other instructions by searching the mandate where mandate are not in order or they have gone missing. This is a time consuming process which ultimately results in poor customer service.

Also the rental recovery process carried out by the person who is attached to locker department and different people carried out that process in different ways and the productivity of the process totally depends on the individual . Some poor methods will result in loss of revenue for the bank.

All of these frustrations and disappointments together with wasting valuable time of the employees and their customers bank , ultimately bank has to go for computerized solution for this matter.

3.3 Proposed System

As the problems discussed in the *section 3.2* , the proposed system will be an all-in one application suite while providing the solution to the issues of the current system, it will provide comprehensive set of functionalities to run the Locker Management and Key Transfers .

LC&KM system will be an individual module based web system which contain the following different main modules to handle the unique requirements.

- Administration Module
- Customer Module
- User Module
- Locker Module
- Recovery Module
- Key Transfer Module
- Inquires & Reports module

3.4 PACT analysis

The LC&KM system should be user centered as much as possible .Therefore PACT analysis is carried out where PACT analysis is defined as a user requirement document that is used for a more detailed designed brief. This analysis is a way of reflecting about people, activities, content and lastly technology . By performing a PACT analysis it would be useful for design activities , understanding the current situations, seeing where possible improvements can be made and envisioning future situations.

A questionnaire was issued to each staff member who is attached to locker department via emails and part of the questionnaire is shown in figure 3.1 and the full questionnaire is attached in appendix B .



LOCKER AND KEY MANAGEMENT SYSTEM QUESTIONNAIRE FORM

- 12 What is the average time gap between two customers who access their lockers ?
- Below 1 minute
 - Between 1 – 5 minutes
 - Between 6 – 10 minutes
 - Between 11 – 15 minutes
 - Over 15 minutes
- 13 How often the staff rotation happen in a branch (changing staff in locker department) ?
- Weekly
 - Monthly
 - Quarterly
 - Semi annually
 - Yearly
- 14 Do you think that , by introducing a new system you will be able to solve all the problems related in locker processes and provide good customer service ?
- Strongly agreed
 - Agreed
 - Somewhat agreed
 - Disagreed
 - Strongly Disagreed
- 15 What is the most time consuming stage in safety locker process ?
- New lockers opening
 - Locker rental recovery
 - Locker user visits verification
 - Excess locker visits charges recovery
 - Vault key transfers

Figure 3.1 – Questionnaire Form

Considerable member of staff has responded to the above questionnaire in which the respondent rate is over 75% . By analyzing the result statistically it is clear that over 90% of staff strongly agreed that the they can resolve problems related to locker process by introducing a new system and the figure 3.2 shows one of the output from the above analysis.

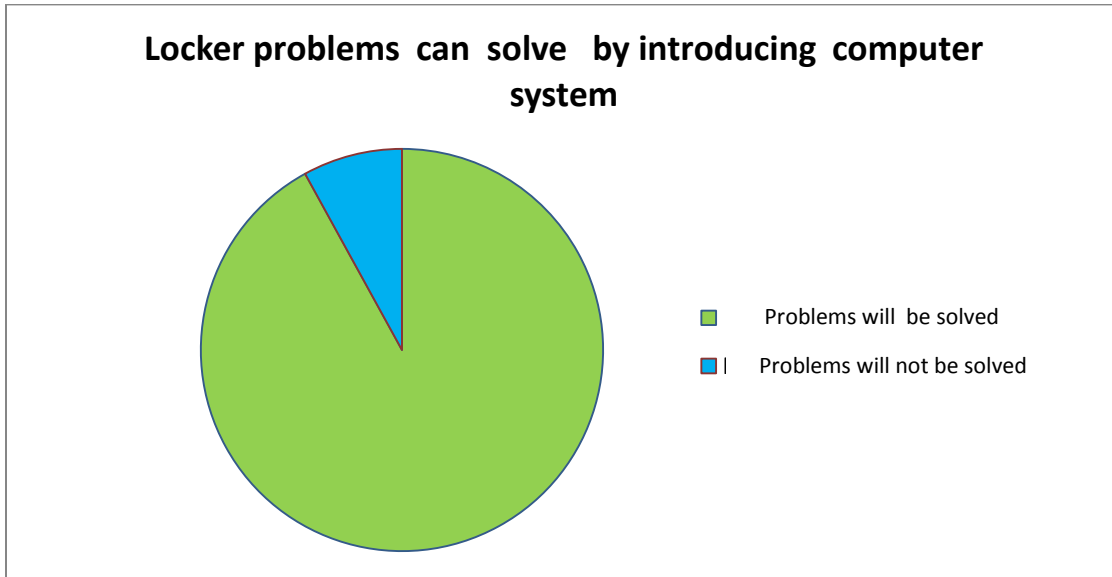


Figure 3.2 – Questionnaire Result Analysis

With the PACT analysis, the target audience and their requirements were identified including the activities, contexts and technologies. From this analysis, I could develop clearly and non ambiguity scenarios of how these users would interact with the system.

3.5 Requirements gathering

Requirements are the a thing that is needed or wanted to the client. To provide the best solution to the clients, requirements should be collected from all possible aspects and carefully study them. The following methods were carried out in gathering information

To give the best solution to an identified problem, the analyst must go through every single aspect of the existing system and has to collect details from every level of staff in an organization. To get a good idea about the requirements, the author has to use several requirement gathering methods.

3.6 Requirement gathering methods used

This section describes the requirement gathering methods used

- Questionnaires :- As discussed in the section 3.4 a Set of questions were given to the users which helped to identify their requirements in the new system. Some of the questions that were used to gather information are shown in the figure 3.1
- Site visits :- visited the location where the locker transitions happened. This helped to understand the physical environment and how the interaction happened between those objects.
- Interviews :- interviews were carried out specially with the bank higher level officers who are responsible for controlling procedures and locker controls. Specially with the senior manager level and above.
- Using existing documents :- This method was very effective and useful with regard to identifying the bank's procedures and controls which are currently enforced. Bank's procedure manual and the past issued circulars were studied in gathering the information.

3.6.1 Problems encountered in requirements gathering

Some of the problems which were encountered during the requirements gathering are listed in this section.

- Nearly 25% of the staff have not responded to the questionnaire which were sent through email
- There are over 120 branches that offer locker facilities and conducting interview for all those branches was not an easy task
- Branches which I selected had the most number of lockers and they are the busiest branches in the bank network. The environment which the interview was carried out in a busy environment (noisy) and many interferences occurred while I was interviewing the staff. Because of that some staff couldn't concentrate on the interview
- Language came up as a barrier when I was conducting the interview with some branch members. Specially with Jaffna branch in which the staff handling lockers spoke only Tamil for which I used another staff member to act as a translator in requirement gathering.

- Different branches follow different procedures and some branches are violating operational procedures in the bank.
- Some staff members were willing to share their experience while some staff were reluctant to share (disclose) their knowledge in locker operations

3.7 Outcome of the requirement gathering

Since the requirements which were gathered were used different methods, requirements were ambiguous. So those requirements should be carefully analyzed and categorized, by which the developer will be able to understand it. Requirements which were gathered through the above process could be categorized into two which is functional and non functional requirements.

3.8 Requirements Identifications

After analyzing the requirements of the system requirements were categorized into two which were functional and non functional. Through the functional requirements a customer expects what the locker system will do and its functionality. Non functional requirements describe how the locker system works in a banking context

3.8.1 Functional Requirements

This specifies the behavior and the functions of the system which is very important to identify the requirements unambiguously. Functional requirements of the LC&KM are briefly described in this section.

- a) System should be a web based system which users will be able log into the system from any branch
- b) Users should get their access privileges according to the user work class (eg :- banking assistant, B class officer and A class officer)
- c) Should be a separate module in the locker system which can handle key transfers in the branch
- d) User should be able to change their SOL (branch) which those SOL id changes should be authorized by a higher level user or A class officer

- e) Users creations and vault key creations only can be done by users who are attached to the human resources department
- f) Customers should be identified by a unique CIF number which should be authorized by both A and B class officers (to comply with KYC policy in the bank)
- g) Locker assignment (creating lockers for customers) process should contain dual verification which B and A class officers should verify accordingly .
- h) Automatically lien the security account when opening the locker account
- i) Keep tracking record of locker requests (Pending request)
- j) Lockers visits should be updated systematically
- k) Verification details should be available in the system which users do not need to search for locker mandates in the cupboards
- l) All the recovery processes should be automated (rental recovery , excess visit charges , overdue interest charges)
- m) Since all the recovery process happen in the core banking system , locker system should transfer recovery file to core system in TTUM format accepted by core banking system
- n) There should be manual recovery process for OD current accounts
- o) There should be a separate menu for inquiries about customer details , locker history etc..
- p) There should be a separate menu for reports from which it should be able to extract the following details
 - Locker trail report
 - Locker Access detail report
 - History report for locker owners
 - Locker rental recovered reports
 - Overdue payments reports
 - Vacant lockers report
 - Excess visit Report
 - Letters printing for overdue customers
 - Branch income statement

3.8.2 Non functional requirements

Non-functional requirements specify the quality of the system. It is mostly related to the user satisfaction. This has high impact for success of the product. Even though the system meets the

functional requirements, to be a sustainable product, it should have very good set of non-functional requirements.

- Performance : - A person who is handling lockers not only handle lockers from which he/she may handle multiple departments work in a given time and customers who deal with the bank are demanding . So system performance should be high to provide good customer service
- Interface :- Since the bank staff only wants to use this system there is no high expectation of interface . But they expect interfaces which are similar to the core banking interface since they are used to that interface.(most recently using links to be displayed in the home page)
- Availability/Reliability :- The System should be up and running through the working hours and the data provided should be accurate and reliable. Unavailability can make customer dissatisfied as well as waste bank staff's time.
- User friendly :- Staff in the bank has different level of computer literacy in which user friendliness is an important aspect to consider .
- Accuracy and Integrity :- Rental and other recoveries contain debiting customer accounts .Those are financial transactions in which accuracy and integrity should be high.
- Security :- Rental and other recoveries happen in the core banking system where the data will be transferred as a data file from locker server to core banking server. Those files should be uneditable and if editable there should be a mechanism to identify those (calculating hash value for the file)
- Respond Time : - LC&KM system should respond user request (maximum 25ms in normal network condition) as far as possible. After requesting some result by user, the result will be set by the system soon and , it should not take a long time to give the result. If it takes longer due to network or other issues, the proper response should be provided to the user to understand the situation.

3.8.3 System requirements

To run the system smoothly and efficiently software need to have certain hardware and software components. This section will describe the system requirements for the LC&KM .

- **Web Server Requirements :-** This is where the application will be hosted and the requirements are given as below.
 - OS: Windows
 - Minimum 2 GHz processor (x64 Processor)
 - Minimum 50 GB free hard disk space
 - Minimum 2 GB RAM (4 GB Recommended)
 - Microsoft .net framework 4.5
 - My SQL connection
 - Connection to Local Area Network (LAN)

- **Database Server Requirements :-** This will represent the hardware and software requirements of the database server host the database of LC & KM
 - My SQL 5.6.17
 - Minimum 4 GB RAM (8 GB Recommended)
 - Minimum 2 GHz processor – Dual Core
 - Minimum 50 GB free hard disk space
 - Connection to Local Area Network (LAN)

- **Client Machine requirements :-** This will explains the minimum requirements of the client computer that can access the LC&KM system
 - Minimum 1 GHz processor & 1 GB RAM
 - Connection to Local Area Network (LAN)
 - Windows O/S with any web browser (Microsoft Internet Explorer 7 or higher, Google Chrome or Mozilla Firefox are the recommended with 1024*768 resolution)

3.9 Designing

This section will discuss the design of the LC&KM system , conceptual model , goals and other relations.

3.9.1 Designing Approach

There are different software design and development methodologies available in industry. A methodology can be simply defined as a set of procedure that one follows from the beginning to the completion of the software development process.

To develop the locker management , Object-Oriented Analysis and Structured System Analysis and Design [11] are both considered .

Formal methodical has been used by the Structured System Analysis and Design and it follows the waterfall life cycle method starting from feasibility study to the physical implementation . There are three main techniques used by the above methodology named logical data modelling , data flow modeling and entity behavior modeling.

- Logical Data Modeling :- identification , modeling , documentation and gathering system requirements are some of the important processes involved in this phase and the data are classified further into entities and relationships.
- Data Flow Modeling :- tracking the data flow in a software system and clearly analyzing the processes, data stores, external entities and data movement are the main processes in the phase
- Entity Behavior Modeling :-The main process of this phase , involves identifying and documenting the events influencing each entity and the sequence in which these events happen.

Object-oriented analysis (OOA) is the process of analyzing a task [12], to develop a conceptual model that can then be used to complete the task. A typical OOA model would describe computer software that could be used to satisfy a set of customer-defined requirements.

During the analysis phase of problem-solving, a programmer might consider a written requirements statement, a formal vision document, or interviews with stakeholders or other interested parties. The task to be addressed might be divided into several subtasks (or domains), each representing a different

business, technological, or other areas of interest. Each sub-task would be analyzed separately. Implementation constraints, (e.g., concurrency, distribution, persistence, or how the system is to be built) are not considered during the analysis phase; rather ; they are addressed during object-oriented design (OOD).

The conceptual model that results from OOA will typically consist of a set of use cases, one or more UML class diagrams, and a number of interaction diagrams. It may also include some kind of user interface mock-up.

By analyzing the above mentioned factors ,Object oriented Analysis method was selected as the methodology to software engineering approach to design the LC&KM system. Conceptual model of the LC&KM system is covered by using Use Case diagram, the structure of the system is covered by Class diagram, the behavior of the system through sequence and database designed for of system is through Entity Relationship (ER) diagrams.

3.10 High-Level System Architecture

The system that is going to develop for the locker management should exists in one central location preferably in central location (HNB towers) which is control at the data center personnel in the bank. All the branches which have the system should be able to access the system in the respective branches and access to the system should be given through the Hatna Net as all other systems work

By considering the factors which are mentioned above and to cater for the requirements the client server model is the best architecture for the system and below diagram (*figure 3.3*) shows the high-level system architecture of the LC&KM .

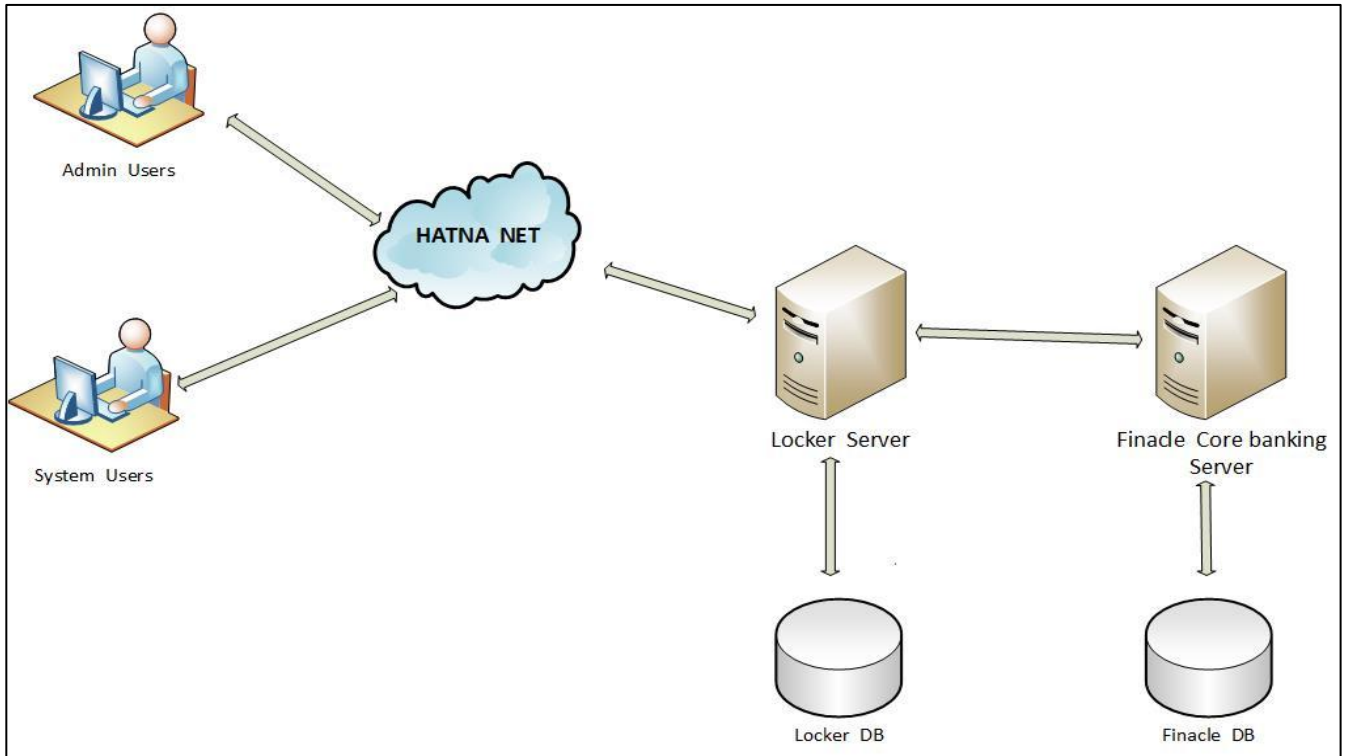


figure 3.3 Overall System Architecture

There are two types of main users in the system , shown in the figure 3.3 named as system and admin user. All the users log into the Hatna Net which is the official intra net for HNB.

Through the Hatna Net users login to the locker system hosted at central location and the locker server communicate both locker database and Finacle core banking system according to the user requirements .

3.11 UML diagrams

UML is an industry standard modeling language with a rich graphical notation, and comprehensive set of diagrams and elements. A comprehensive UML modeling tool like Enterprise Architect is the ideal way to take control of the current project. UML is based on Object Oriented Programming (OOP) Concepts.

3.11.1 Use Case Diagram

Capturing the dynamic behavior of a system is one of the most important aspects of modeling system. Dynamic behavior means the behavior of the system when it is operating . Following diagram shows high level use case diagram of the system. Detail Use case diagrams are shown in appendix A

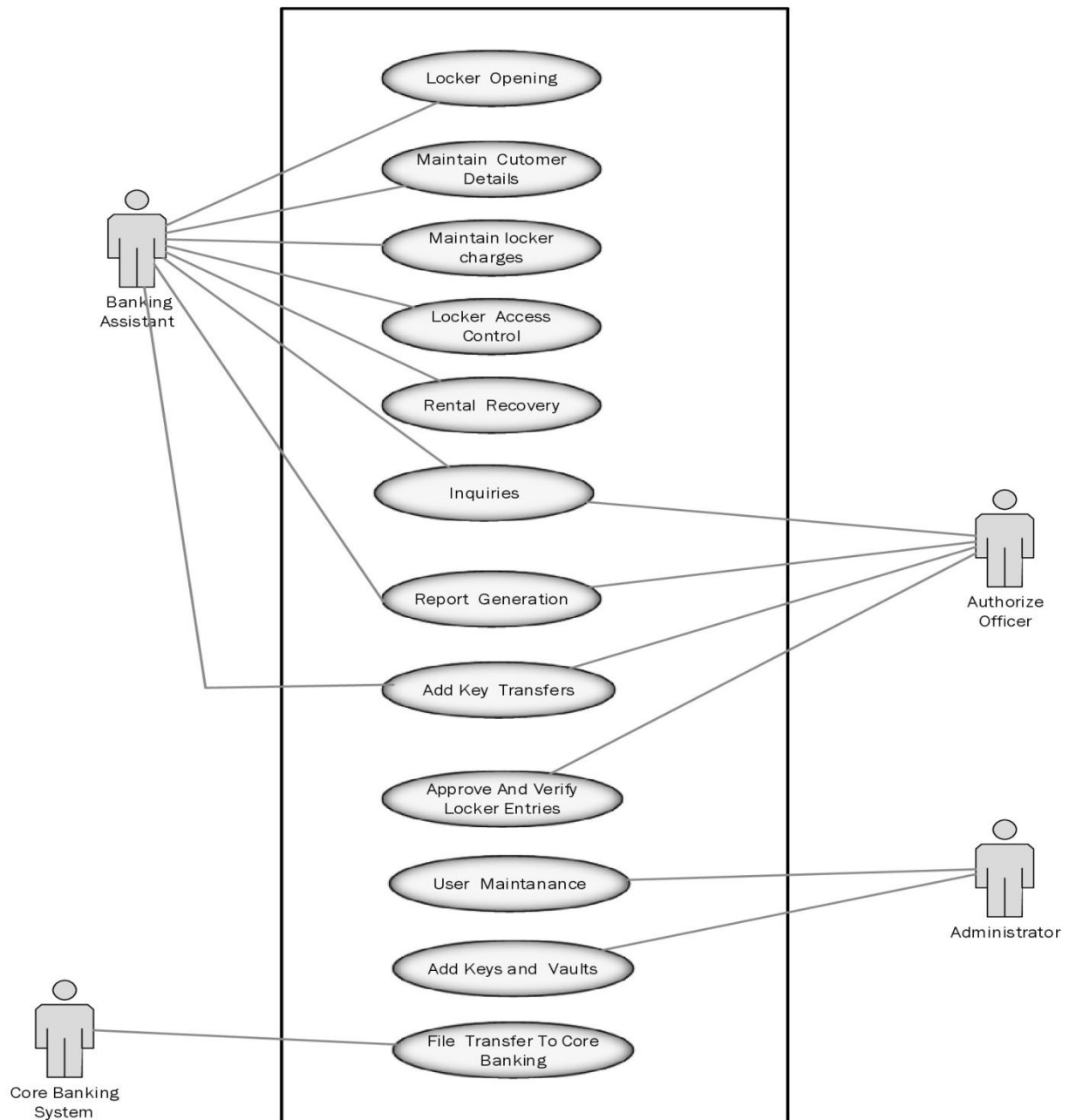


figure 3.4 Overall System Use Case

3.11.2 Use Case Narratives

| | |
|-----------------------------|---|
| Use Case Description | Customer Detail Creation |
| Use Case ID | LC_1 |
| Actor/s | Banking Assistant , Authorization Officer |
| Pre Condition | Customer should be an existing customer in the bank which has an account and CIF in the core banking (FINACLE) system. |
| Normal Flow | <ol style="list-style-type: none"> 1) Customer comes and fill the locker mandate and give it to the banking staff 2) Staff will verify all the details and obtain the CIF from the core banking system 3) Then input all the relevant details in the locker management system 4) Save the data in the system and handed over the documents to the authorizing officer . 5) Officer also carries the verification of data in the system and approve the CIF in the locker system |
| Alternate Flow | <ol style="list-style-type: none"> 2.a . User doesn't have a CIF or Account in core banking system <ul style="list-style-type: none"> • User has to open account / CIF in Finacle system and open and continue with locker opening process 3.a . User doesn't fill all the mandatory fields and save the data <ul style="list-style-type: none"> • Message will be shown , where user won't allow to submit the data until the mandatory fields are completed . 3.b. User input incorrect data or input data violate the checks in system <ul style="list-style-type: none"> • message will be displayed with the relevant description of the constraint |
| Post Condition | <ol style="list-style-type: none"> 1. After the officer approves the CIF customer will be created in the system 2. Audit record will be generated and updated in the database |
| Assumptions | Customer is not a minor. |

| | |
|-----------------------------|---|
| Use Case Description | Customer Detail Modification |
| Use Case ID | LC_2 |
| Actor/s | Banking Assistant , Authorization Officer |
| Pre Condition | <ol style="list-style-type: none"> 1 . Customer should have a CIF in the locker system and it should be in verified state 2. Some selected data are only allowed to modify |
| Normal Flow | <ol style="list-style-type: none"> 1) Customer hand over the written request for the modification of details 2) User verify the physical evidence with the system and carry on with modification. 3) After completing the modification in the system user will hand over the document to authorized officer to verify 4) Save the data in the system and handed over the documents to the authorizing officer . 5) Officer will scrutinize the details and verify the modification |
| Alternate Flow | <ol style="list-style-type: none"> 5.a . Officer find a error in input data <ul style="list-style-type: none"> • Officer will return the modification through the system to user |
| Post Condition | Audit record will be generated and updated in the database |
| Assumptions | After the approval original document will lodge in the vault . |

| | |
|-----------------------------|---|
| Use Case Description | Creating the locker and assigning the locker to the Customer |
| Use Case ID | LC_3 |
| Actor/s | Banking Assistant , Authorization Officer |
| Pre Condition | Customer Should have a CIF |
| Normal Flow | <ol style="list-style-type: none"> 1) User will receive the locker mandate with the already created CIF 2) User will create the locker account in the system and assign the locker number to vacant primary locker in the system 3) User will put lien in the core banking system manually and handed over the documents to officer to approve 4) Officer will authorize the account in the locker system and |
| Alternate Flow | <ol style="list-style-type: none"> 2.a . user enter incorrect locker number <ul style="list-style-type: none"> • system will prompt an error message by indicating the error b. Security account is not a savings account <ul style="list-style-type: none"> • system will pop up message and user won't allow to proceed further c. Account balance is not sufficient when placing lien <ul style="list-style-type: none"> • Stop processing the details until the security deposit is maintain |

| | |
|-----------------------|--|
| | 4.a . Account balance is not sufficient when approving the lien <ul style="list-style-type: none"> Locker account is not approved until the security deposit is made |
| Post Condition | Audit record will be generated and updated in the database |
| Assumptions | All the mandatory data like identity number , operating instructions , security details will be inserted in to the system |

| | |
|-----------------------------|---|
| Use Case Description | Adding Joint parties to the locker |
| Use Case ID | LC_4 |
| Actor/s | Banking Assistant , Authorization Officer |
| Pre Condition | <ol style="list-style-type: none"> Approved locker account should exists in the system There should be an primary user assigned to the account Maximum 2 joint parties are allowed for a given account All the joint parties should have CIF's in the locker system |
| Normal Flow | <ol style="list-style-type: none"> User has to obtain fresh locker mandate from the users User join the other parties to the account using locker system After saving the data in the system user will hand over the documents to the authorized officer Officer will scrutinize the data and if data are in order officer will approve the account |
| Alternate Flow | <ol style="list-style-type: none"> There are other pending modifications to be approved <ul style="list-style-type: none"> System will not enable to enter the data until the pending modification is approved or reversed |
| Post Condition | <ol style="list-style-type: none"> Documents will handed over to system user to upload the signatures to the system Audit record will be generated and updated in the database |
| Assumptions | Locker mandate is complete and in order . |

| | |
|-----------------------------|--|
| Use Case Description | Uploading the signature |
| Use Case ID | LC_5 |
| Actor/s | Banking Assistant , Authorization Officer |
| Pre Condition | <ol style="list-style-type: none"> Customer Should have a locker account and account should be approved status No pending modifications exists to a locker account |
| | <ol style="list-style-type: none"> User has to obtain the locker mandate and scan the signature |

| | |
|-----------------------|--|
| Normal Flow | <ol style="list-style-type: none"> 2) User has to select the correct locker account 3) Upload the signature to the system using upload signature option 4) Officer will be acknowledge by the system and after verifying the physical data officer will approve the signature |
| Alternate Flow | <ol style="list-style-type: none"> 3.a Locker account is a joint account <ol style="list-style-type: none"> a.1 User has to scan individual signature separately and upload to the system a.2 Officer has to verify the signature individually 4.a . User scanned incorrect signature <ol style="list-style-type: none"> a.1 Officer will delete the record and return to the user for rescan the signature |
| Post Condition | Audit record will be generated and updated in the database |
| Assumptions | Locker mandate is complete and in order . |

| | |
|-----------------------------|--|
| Use Case Description | Removing the parties from the locker |
| Use Case ID | LC_6 |
| Actor/s | Banking Assistant , Authorization Officer |
| Pre Condition | <ol style="list-style-type: none"> 1. Locker should be a joint account 2. There should not be unapproved signatures to this lockers 3. Deleting party should be joint party (not the primary holder) |
| Normal Flow | <ol style="list-style-type: none"> 1) User has to obtain the clear instruction from all the users or valid legal evidence 2) |
| Alternate Flow | <ol style="list-style-type: none"> 3.a Locker account is a joint account <ul style="list-style-type: none"> • User has to scan individual signature separately and upload to the system • Officer has to verify the signature individually 4.a . User scanned incorrect signature <ul style="list-style-type: none"> • Officer will delete the record and return to the user for rescan the signature |
| Post Condition | Audit record will be generated and updated in the database |
| Assumptions | Locker mandate is complete and in order . |

| | |
|-----------------------------|---|
| Use Case Description | This use case is use to update locker visit details |
| Use Case ID | LC_7 |
| Actor/s | Banking Assistant |
| Pre Condition | Customer should have an locker account |
| Normal Flow | <ol style="list-style-type: none"> 1) Customer comes and fills the form and gives the form with NIC /Passport 2) BA goes to locker access screen on the system 3) Enter the locker number in the locker number field in the screen 4) Customers details will appear on the screen 5) BA checks the NIC , operation instructions and signature. 6) If the details are correct allow customer to operate the locker |
| Alternate Flow | <ol style="list-style-type: none"> 2.a . user enters incorrect locker number <ol style="list-style-type: none"> a.1 system will prompt an error message by indicating the error 4.a Customer has arrears payments <ol style="list-style-type: none"> a.1 system will pop a message showing the total arrears amount in it 4.b Customer access is restricted due to law enforcement <ol style="list-style-type: none"> b.1 pop up message will display the details of 5.a Customer verification fails . (ID number differs , signature differs or operating instructions mismatched . <ol style="list-style-type: none"> a.1 customer will not be able to access the locker |
| Post Condition | User visit detail will update in the system which is used for excess charge recovery |
| Assumptions | All the mandatory data like identity number , operating instructions and signatures are available in the system |

| | |
|-----------------------------|--|
| Use Case Description | Freezing locker account Manually |
| Use Case ID | LC_8 |
| Actor/s | Banking Assistant , Authorization Officer |
| Pre Condition | <ol style="list-style-type: none"> 1. There shouldn't be any pending status changes 2. Locker accounts are in operative status |
| Normal Flow | <ol style="list-style-type: none"> 1) User should obtain the physical evidence before modification (death certificate , court order , customer consent letter) 2) User will change the status of the locker in the system |

| | |
|----------------|---|
| | <ul style="list-style-type: none"> 3) Officer will check the document and approve 4) Locker account will be frozen from the system and status updated as 'Freeze' |
| Alternate Flow | |
| Post Condition | Audit record will be generated and updated in the database |
| Assumptions | |

| | |
|-----------------------------|---|
| Use Case Description | Unfreezing locker account Manually |
| Use Case ID | LC_9 |
| Actor/s | Banking Assistant , Authorization Officer |
| Pre Condition | <ul style="list-style-type: none"> 1. There shouldn't be any pending status changes 2. Locker account should be in freeze status |
| Normal Flow | <ul style="list-style-type: none"> 1) User should obtain the physical evidence before modification (death certificate , court order , customer consent letter) 2) User will change the status of the locker in the system from freeze to unfreeze 3) Officer will check the document and approve 4) Locker account will be freeze from the system and status updated as 'unfreeze' |
| Alternate Flow | |
| Post Condition | Audit record will be generated and updated in the database |
| Assumptions | |

| | |
|-----------------------------|--|
| Use Case Description | Locker charges maintenance |
| Use Case ID | LC_10 |
| Actor/s | A class officer , B class officer |
| Pre Condition | <ul style="list-style-type: none"> 1) User work class should be more than 150 2) No pending modifications should exists in the system |
| Normal Flow | <ul style="list-style-type: none"> 1. B class officer goes to the relevant account and do the modification (has to input Approval number in the system) 2. Document handed over to the A class officer and after scrutinizing the document modification will be updated |
| Alternate Flow | |
| Post Condition | 1. Audit record will be generated and updated in the database |

| | |
|--------------------|---|
| | 2. Approval will be lodge with the file |
| Assumptions | Prior approval has taken for the customer to change the charges |

| | |
|-----------------------------|---|
| Use Case Description | Pending locker customer maintaining |
| Use Case ID | LC_11 |
| Actor/s | Banking Assistant , Authorization Officer |
| Pre Condition | Unavailable lockers for the branch |
| Normal Flow | <ol style="list-style-type: none"> 1. Filled document will be obtained from the customer 2. User will update the details in the “pending customers” module 3. User will submit the details in the system and hand over the documents to the officer 4. Officer will approve in the system |
| Alternate Flow | |
| Post Condition | When their lockers are vacant customers will inform through the mail or telephone |
| Assumptions | |

| | |
|-----------------------------|---|
| Use Case Description | Daily Rental Recover file generation - Automation |
| Use Case ID | LC_12 |
| Actor/s | Banking Assistant |
| Pre Condition | <ul style="list-style-type: none"> • There should be no records in the pending rental recovery table • No previously executed rental recovery run for a given date and given branch |
| Normal Flow | <ol style="list-style-type: none"> 1. User will log into the system and click on the rental recovery 2. System will check the rental overdue accounts and update in rental recoverable table with all the details and text file will be transferred to Finacle core banking system 3. Officer logs to the core banking system and executes the rental recovery in core banking system 4. Core banking system will read the text file and do the recovery in the core banking system and transfer the recovered text file from core system to locker system (this contains account recovered , amount recovered , etc....) 5. After file transfer is done core banking system will generate successful message . |
| Alternate Flow | <ol style="list-style-type: none"> 1.a Previously recovery file generation is done <ul style="list-style-type: none"> • Locker system will pop up error message and the user won't allow |

| | |
|-----------------------|---|
| | <p>run the recovery run for the particular date</p> <p>5.a Recovery hasn't performed due to non availability of funds and etc</p> <ul style="list-style-type: none"> Those records will be excluded in the text file which is sent from the core system <p>b Funds are not enough to recover the rental</p> <ul style="list-style-type: none"> available amount will be recovered and the amount is recovered in the text file and transferred to the locker system |
| Post Condition | |
| Assumptions | Link between Finacle core server and the Locker system are working properly. |

| | |
|-----------------------------|---|
| Use Case Description | Daily Rental Recovery file Uploads - Automation |
| Use Case ID | LC_13 |
| Actor/s | Banking Assistant |
| Pre Condition | <ol style="list-style-type: none"> Daily recovery run has already been executed in the locker system. Updated recovery file from Finacle core system should exist in the locker system |
| Normal Flow | <ol style="list-style-type: none"> User logs to the system and executes the file upload System will read the file sent from core banking system and update the recovery details accordingly Next recovery date will be automatically adjusted |
| Alternate Flow | <ol style="list-style-type: none"> When there are no funds available <ul style="list-style-type: none"> The Due amount and the due date will not change and try to recover in the next day recovery run When partial recovery happens <ul style="list-style-type: none"> The amount recovered will be updated while the due date will not be adjusted |
| Post Condition | |
| Assumptions | Finacle recovery is successful and relevant accounts have been debited. |

| | |
|-----------------------------|--|
| Use Case Description | Excess visit charges file generation - Monthly |
| Use Case ID | LC_14 |
| Actor/s | Banking Assistant , Authorizing Officer |
| Pre Condition | <ul style="list-style-type: none"> This can be executed only one time for a given month There should not pending recovery files which do not perform |
| | 1. User will log in to locker system and select excess recovery option |

| | |
|-----------------------|---|
| Normal Flow | <ol style="list-style-type: none"> 2. System will check the execution month and get the details of previous month excess visits 3. All the details will be uploaded in the locker management system 4. After the complete updating in the system will generates success message to the user 5. After success message text file with all record (including arrears data will transfer to core banking system) |
| Alternate Flow | <ol style="list-style-type: none"> 1.a. Charges file already generated in the current account <ul style="list-style-type: none"> • System will output an error messaging which the user won't allow to generate the excess visit charges b. No records to recover <ul style="list-style-type: none"> • System will display a message and abort the process c. No records to recover |
| Post Condition | Officer will perform recovery of excess file in core banking system and transfer the updated file to locker system |
| Assumptions | |

| | |
|-----------------------------|--|
| Use Case Description | Excess visit charges file Upload - Daily |
| Use Case ID | LC_15 |
| Actor/s | Banking Assistant / Authorized Officer |
| Pre Condition | Arrears data has already been transferred to core banking system and updated file from core banking system should exist in the locker system |
| Normal Flow | <ol style="list-style-type: none"> 1. User logs to the locker system and perform the excess charges uploads in the system 2. System will update the date and the recovery in the locker system |
| Alternate Flow | <ol style="list-style-type: none"> 2 a. no data for recoveries for a given date <ul style="list-style-type: none"> • System will display a message and abort the process |
| Post Condition | |
| Assumptions | |

| | |
|-----------------------------|---|
| Use Case Description | Manual Recovery |
| Use Case ID | LC_16 |
| Actor/s | Banking Assistant / Authorized Officer |
| Pre Condition | <ol style="list-style-type: none"> 1. There should be arrears in rental or excess visit charges 2. Funds should not be available in the recovery account or cannot recover from the given account |

| | |
|-----------------------|--|
| Normal Flow | <ol style="list-style-type: none"> 1. user takes the arrears report from the locker system 2. depends on that report user will debit the customer accounts in core banking system and approve the transaction in the core system 3. user will select manual recovery option in the locker system update the system 4. Authorized officer will approve the manual recovery in the locker system |
| Alternate Flow | <ol style="list-style-type: none"> 3 a. User doesn't enter mandatory fields (Finacle reference number , etc ..) <ul style="list-style-type: none"> • System will give an error message and block the user from submitting the transaction |
| Post Condition | |
| Assumptions | <ol style="list-style-type: none"> 1. Relevant approval has been taken from the manager of the account holder in writing 2. Automation recovery processes has been executed before manual recovery |

| | |
|-----------------------------|---|
| Use Case Description | Add/ Modify/Reject/ Cancel key transfer in the system |
| Use Case ID | HNB_LC_5 |
| Actor/s | A class Officer / B class officer |
| Pre Condition | <ol style="list-style-type: none"> 1. User work class should be greater than 150 2. Key transfers only can happen between staff who belong to the same SOL 3. Currently input officer should have the physical key under his possession. |
| Normal Flow | <ol style="list-style-type: none"> 1. Officer logs in to the system and clicks on key transfer menu 2. Input all the necessary data including the keys receiving officer and save 3. Receiving officer will accept the keys in the system |
| Alternate Flow | <ol style="list-style-type: none"> 2 . a. Input officer selects the incorrect officer as the recipient <ul style="list-style-type: none"> • Input officer will go to modify option in key transfer menu and modify the recipient user b. Inputter decides to cancel the key transfer <ul style="list-style-type: none"> • Input officer will go to modify option in key transfer menu and modify the recipient user c. Input officer accidentally selects user whose work class is 150 <ul style="list-style-type: none"> • System will popup a message and stop the key transfer performing in the system 3 . a Accepting officer reject to apply the keys in the system (reasons and other details has to be input in the system) <ul style="list-style-type: none"> • Input officer adds a fresh key transfer to another officer |
| Post Condition | A class officer (work class over 350) officer should approve the key transfer |
| Assumptions | |

3.11.3 Class Diagram

Following figure 3.4 shows the abstract view of the class diagram

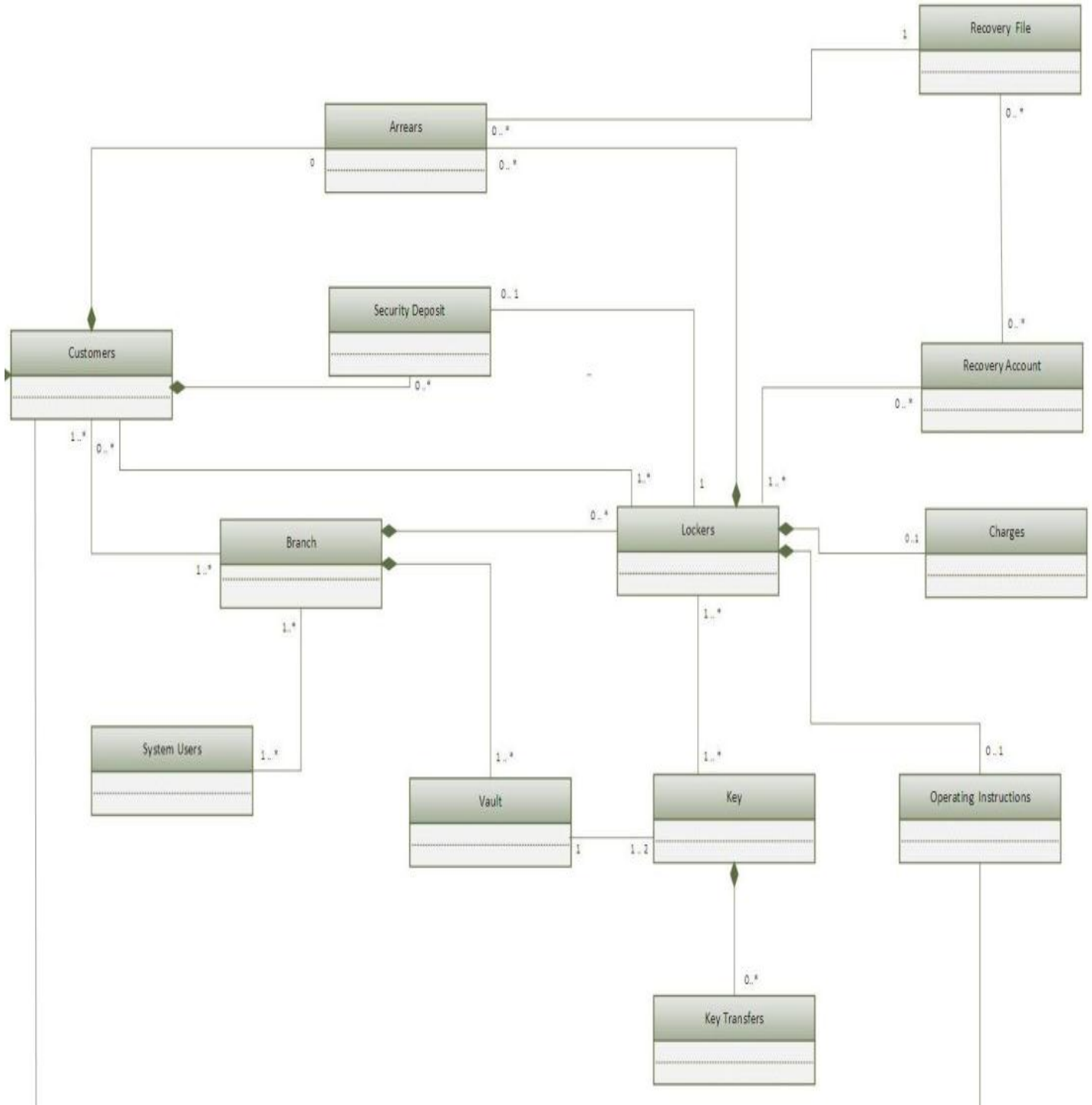


figure 3.5 - Abstract View of the Class Diagram

3.11.4 Sequence Diagram

The sequence diagram is used primarily to show the interactions between objects in the sequential order, and the interactions that are occurred. The following figures show functional sequence diagram of customer locker visits

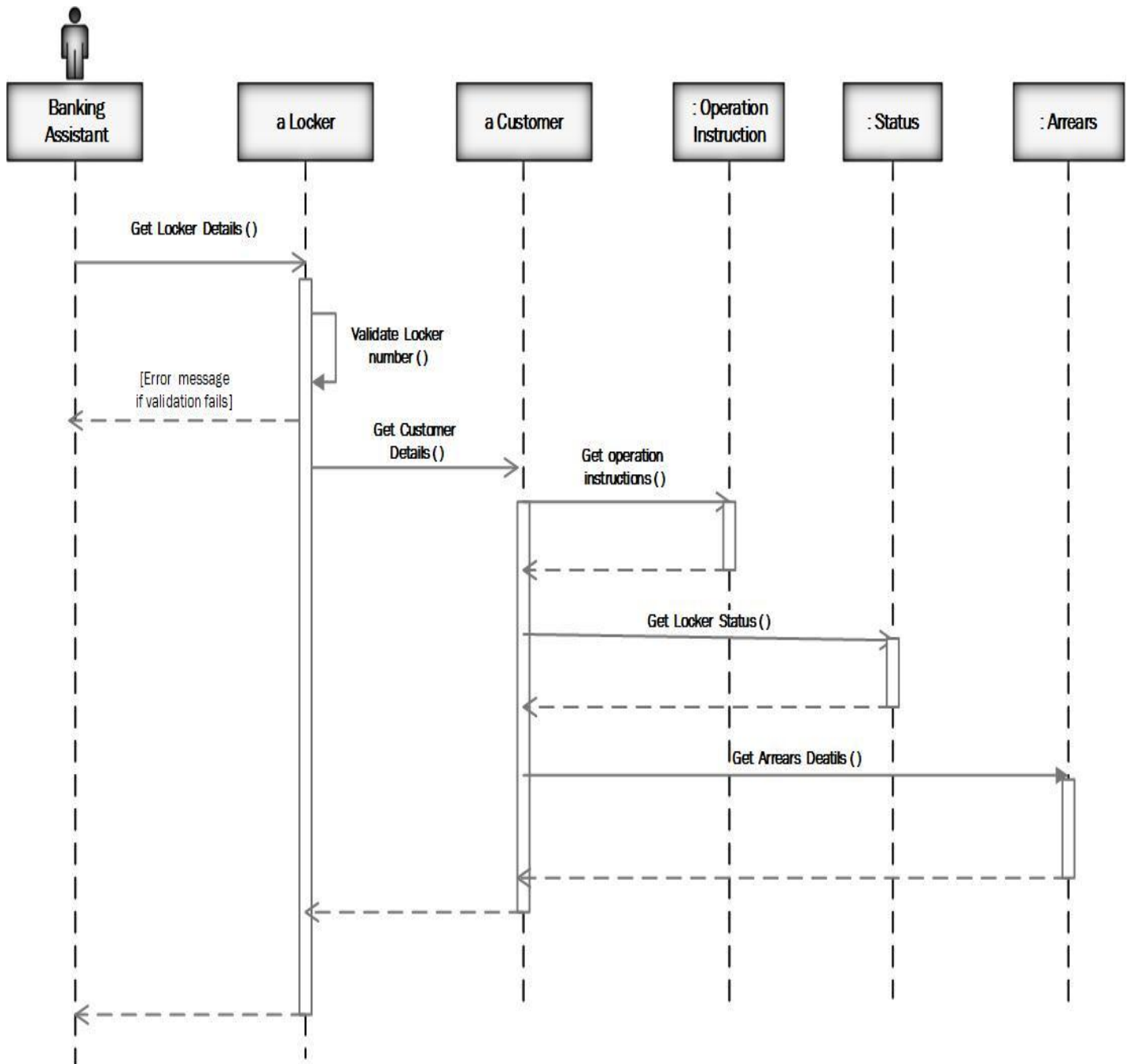


Figure 3.6 - Sequence Diagram of Customer Locker Visits

3.11.5 Activity Diagram

Procedural flow of actions that are part of a larger activities are shown using activity diagrams which these diagrams are shown more detail level of use case diagrams. The figure 3.6 shows that the activity diagram for locker customer creation.

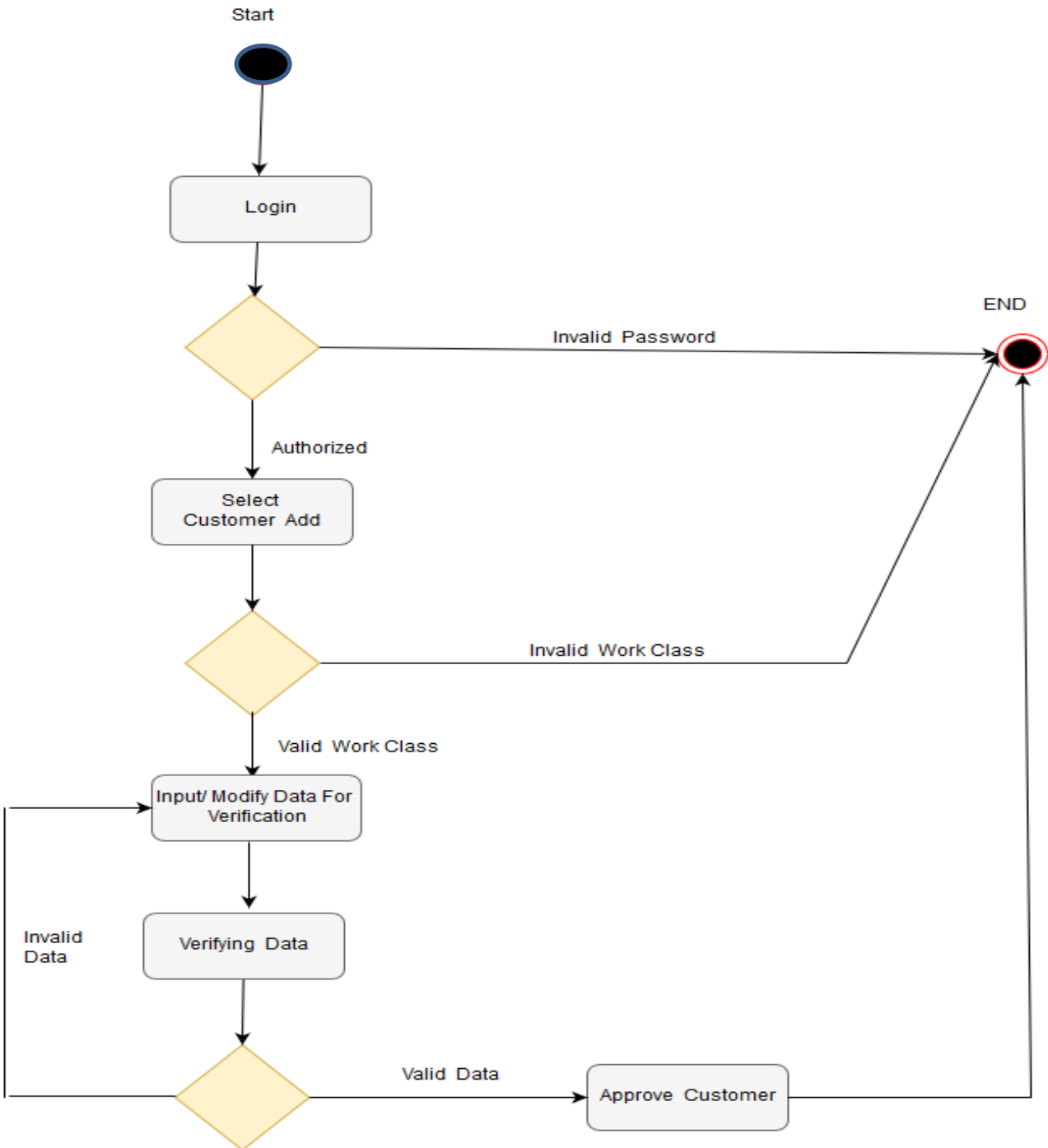


Figure 3.7 - Activity Diagram For Locker Customer Creation

3.11.6 State Transition Diagram

The state transition diagrams is used to graphically represent the transition between states of the system objects. The figure 3.7 shows the state transition diagram for Locker assignment for customers.

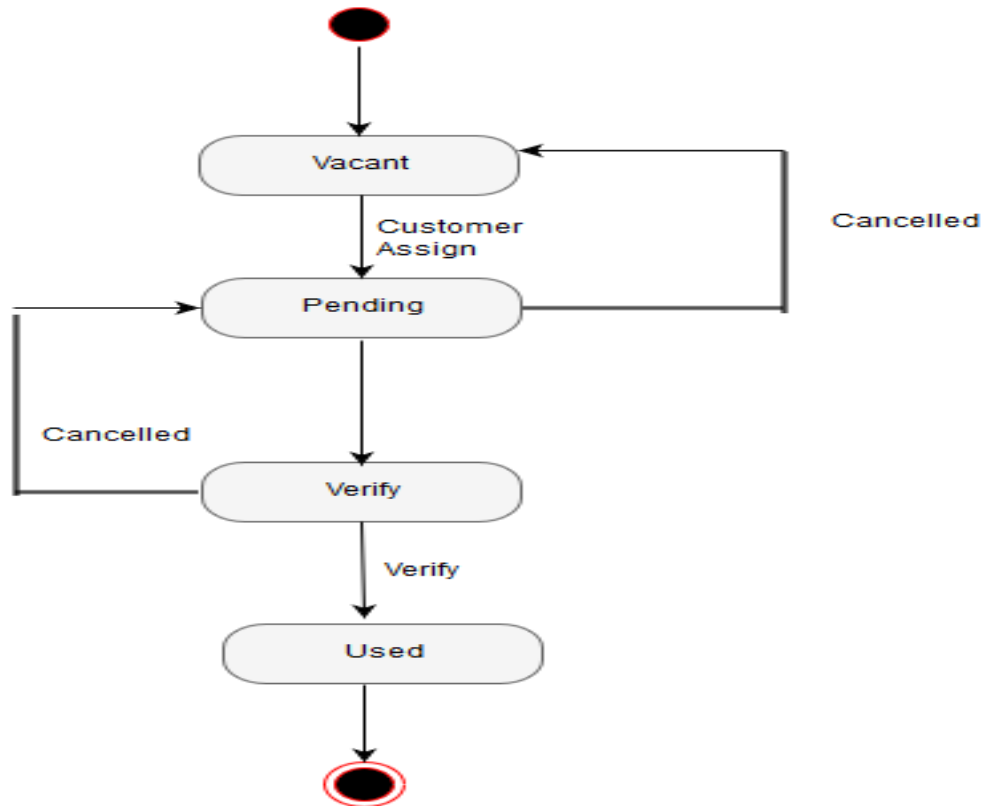


Figure 3.8 - State Transition Diagram For Locker Assignment For Customers

3.12 Database Design

Concept of Relational database has been used to design the database.

An Entity Relationship Diagram (ERD) is a visual representation of different data using conventions that describe how these data are related to each other. It describe how data should be organized and how data should be managed. This particular chapter helps to identify the correct data model for LC&KM

The following figure (figure 3.8) shows the Entity relationship diagram of the LC&LM system.

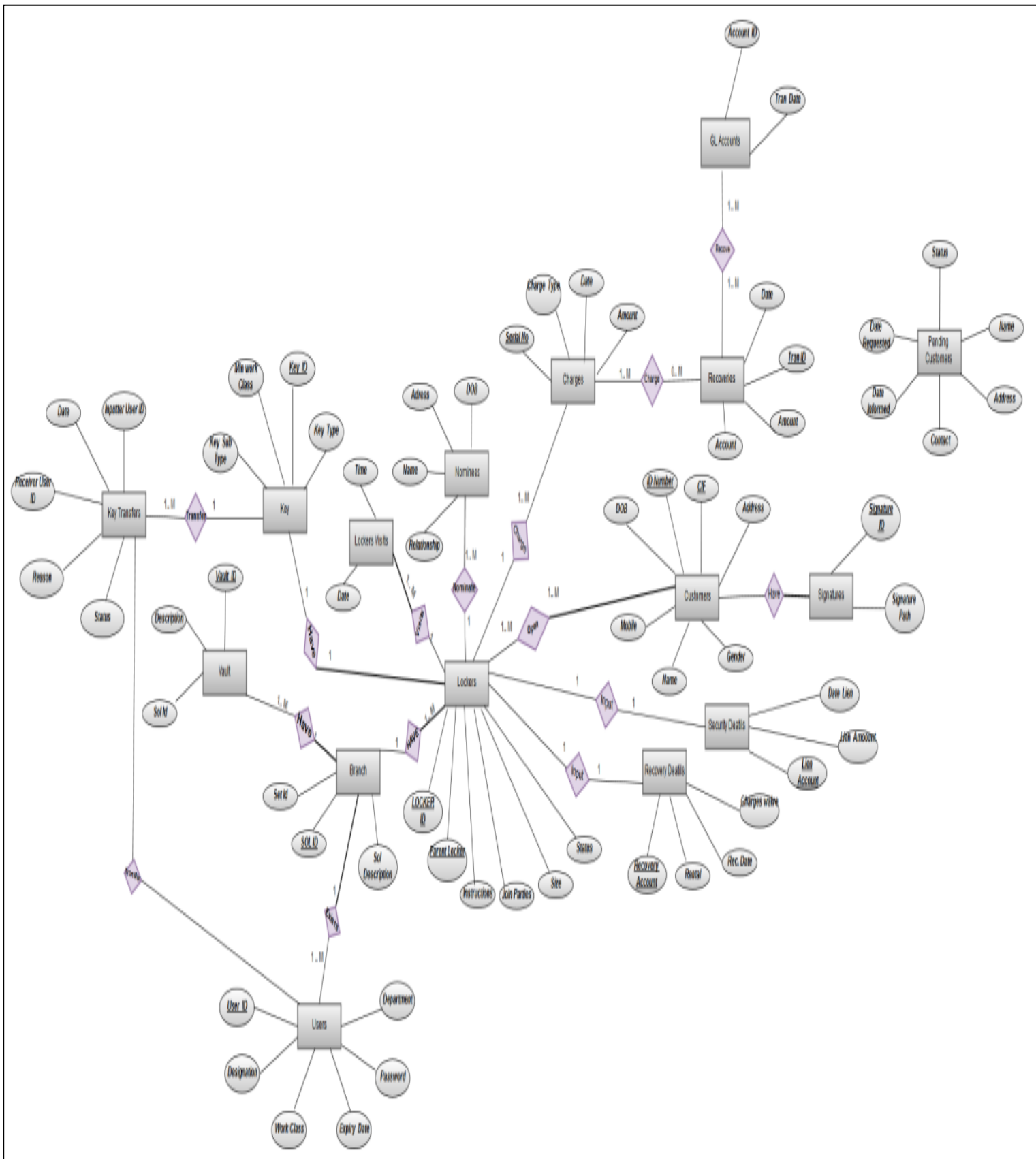


figure 3.9 - Entity Relationship Diagram

3.13 Design Tools

Following table describes the tools and technology that are used to design the LC&KM system

| Tool | Description |
|---------------------|---|
| Microsoft Word 2013 | Documentation and reporting has been done using this tool. |
| Draw.IO | draw.io is a browser based diagramming application. It is available as an online application with optional integration to various cloud storage options. Therefore no need of special software need to installed to machines . This tool has been used to draw All the UML diagrams (Class , Activity , state , etc) and the Entity Relationship diagram as well |
| MS Visio 2010 | MS visio is a is a diagramming and vector graphic application which comes under Microsoft products. This Tool Has been used to design system architecture and Other diagrams in the documentation. |

Table 3.1 - Tools And Technology Used For Designing

Chapter 4 : Implementation

The following chapter mainly focuses on the implementation of LC&KM system and the tools and technology that had been used , system directories , interface design and user access control matrix.

4.1 Introduction

When considering Software development life cycle implementation is considered as one of the main phases . Coding and programme development are main activities that are carried out in this section based on the requirements collected in the early phases .

4.2 Implementation Technologies

There are many different softwares and technologies available in the market and selecting the most suitable tools and technologies are more important in implementation. The selection that we make in this phase can directly affects the success or failure of the project .

Requirements gathered through system users , licensing issues , hosting capabilities , knowledge and experience of the development staff are some of the key factors that HNB has considered when selecting the technology and tools..

The current trend for HNB is to develop softwares in open source software which resolves licensing problem .Also they currently use apache and My Sql , middleware softwares for banking operations.

To comply with the current banking trend and the operations it is decided to use PHP as a developing language , Apache as hosting server and My Sql as the database.

- PHP

As discussed in section 2.4.1 PHP is a powerful scripting language for dynamic and interactive web pages. There are plenty of resource and support communities outside and PHP is a simple , easy to use and different powerful libraries available. Most importantly this is open source and there is no need to have licenses to use this . The PHP language has been selected to use as the server side programming language as a result of the above facts.

- **My SQL**

Since My SQL is an Open source , free support is available , easy to use and developers are familiar with this database therefore I have decided to select My SQL for database implementation .

- **WAMP**

Currently WAMP server is being used in the bank for some middle ware software , for hosting and it is an open source the WAMP server has been selected for hosting . since most of the database and PHP configurations are being done by the WAMP itself , it is easy for anyone to install and work with it.

Besides than the above mentioned technologies and tools there are some other supportive technologies which have been used in implementation , the details of those technologies and tools are shown in table 4.1.

| Technology / Tool | Description And Usage |
|-------------------|--|
| HTML | HTML [13] is the standard markup language for creating Web pages, The tags describe the document content. All the interfaces were designed using the HTML in LC&KM system |
| CSS | CSS [14] is a language that describes the style of an HTML document and how the HTML elements should be displayed. All the UI styling in the LC&KM uses the CSS for styling |
| jQuery | jQuery [15] is a cross-platform JavaScript library designed to simplify the client-side scripting of HTML. The purpose of jQuery is to make it much easier to use JavaScript on your website. This was used in client side validations and other controls. |
| Ajax | Ajax [16] (Asynchronous JavaScript and XML) is a method of building interactive applications for the Web that the process user requests immediately. Most dynamic controls and formatting are done using this technology in the system |

| | |
|--------------|---|
| Bootstrap | Bootstrap [17] is the most popular HTML, CSS, and JavaScript framework for developing responsive, mobile-first web sites. Some menus and reporting functions are being developed using Bootstrap in LC&KM. |
| SQL | SQL stands for Structured Query Language and it is the standard language for accessing databases. This is simple and very powerful language which is used in the LC&KM for all the database related work |
| Heidi SQL | HeidiSQL [18] is a useful and reliable tool designed for web developers using the popular MySQL server. This enables to browse and edit data, create and edit tables, views, procedures, triggers and scheduled events. Also, you can export structure and data either to SQL file, clipboard or to other servers. |
| Dream weaver | Adobe Dreamweaver CC [19] is a web design and development application that combines a visual design surface known as Live View and a code editor with standard features such as syntax highlighting, code completion, and code collapsing as well as more sophisticated features. This tool is used for customize and modify UI's in LC&KM system . |

Table 4.1:- Technologies used for implementation

4.3 System Directories

Figure 4.1 shows the system directories of Locker Control and Key transfer management in net beans IDE

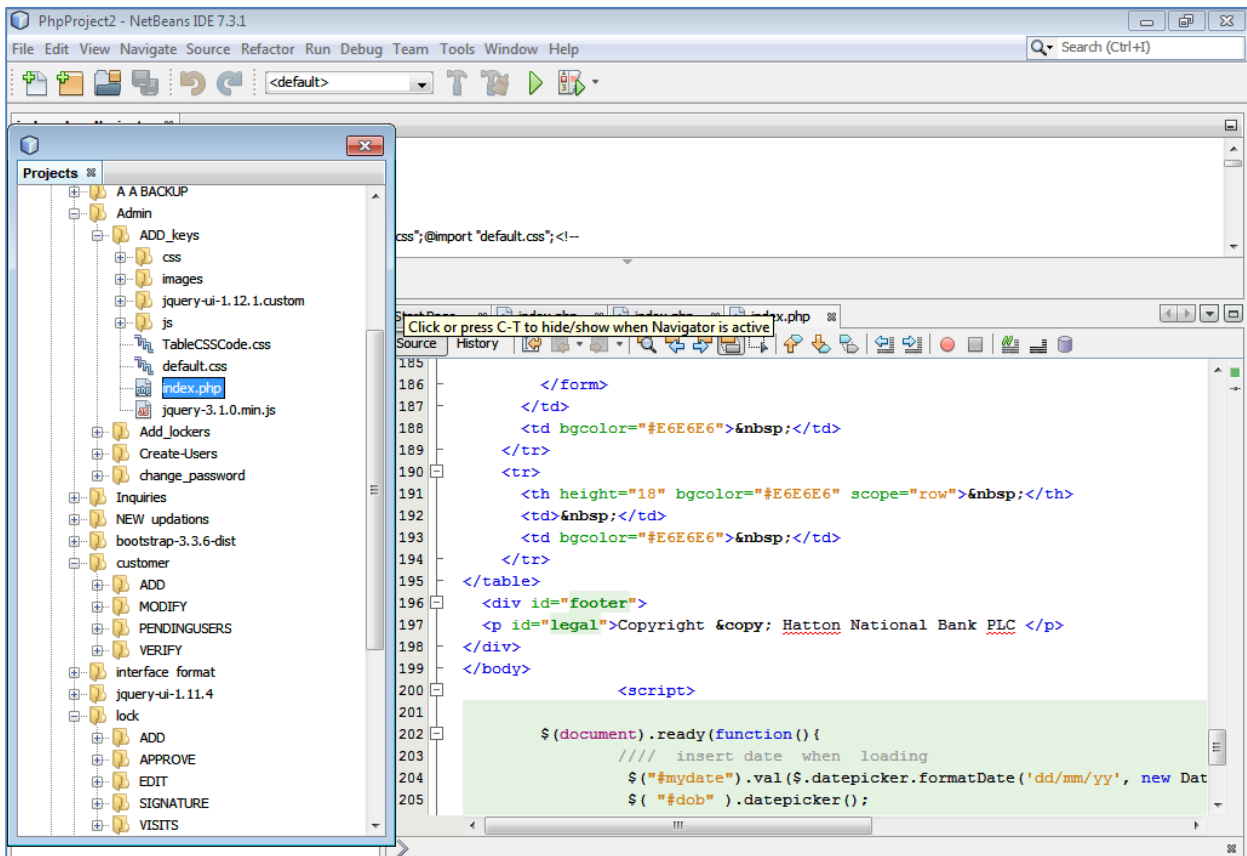


Figure 4.1 -Main System Directory

4.4 System User Access Matrix

Mainly there are 4 users types (roles) in the LC&KM system where those users handle range of different functionalities in the system, The following table 4.2 shows the user role and the description of their role,

| Role | Description |
|-------------------|--|
| Administrator | Performs the duty as system Administrator. |
| ‘A’ Class Officer | System User whose work class is over 350. Mainly acts the role of a manager . |
| ‘B’ Class Officer | System User whose work class is below 350 and over 250. Mainly acts the role of a Junior Executive in a bank . |
| Banking Assistant | System User whose work class is below 150. Mainly acts the role of a Banking Assistant or Trainee Banking Assistant. |

Table 4.2:- User Roles and their Description

The following *Table 4.3* shows the access of different user roles for major functions of LC& LM web application . [√] Have the access, [X] Do not have access

| Function of the System | User Role | | | |
|---|---------------|-------------------|-------------------|-------------------|
| | Administrator | “A” Class Officer | “B” Class Officer | Banking Assistant |
| Create Users | √ | X | X | X |
| Edit Users | √ | √ | X | X |
| Delete User | √ | √ | X | X |
| Approve User | √ | √ | X | X |
| Edit Passwords | √ | √ | √ | √ |
| Add/Edit/Delete Lockers | √ | X | X | X |
| Add/Edit/Delete Keys | √ | X | X | X |
| Add/Edit/Delete CIF’s | X | X | X | √ |
| Verify CIFs | X | X | √ | X |
| Approve CIF’s | X | √ | X | X |
| Verify Cancellation of CIF | X | √ | X | X |
| Add Customers To Pending List | X | X | X | √ |
| Verify/Approve Pending List | X | √ | √ | X |
| Add/Update/Modify /Delete Locker Assignment | X | X | X | √ |

| | | | | |
|--|---|---|---|---|
| Verify Locker Assignment | X | X | √ | X |
| Approve Locker Assignment | X | √ | X | X |
| Cancel Locker Verification | X | √ | X | X |
| Upload/Edit/Cancel/Delete Customer Signatures | X | X | X | √ |
| Approve Customer Signature | X | √ | √ | X |
| Revoke Customer Signatures | X | √ | √ | X |
| Locker Visit Update | X | X | X | √ |
| Locker Visit Approve | X | X | √ | X |
| Revoke Locker Visits | X | √ | X | X |
| Add/Edit/Cancel Nomination Details | X | X | X | √ |
| Approve Nomination Details | X | √ | √ | X |
| Add / Edit Key Transfers | X | √ | √ | X |
| Accept / Decline Key Transfers | X | √ | √ | X |
| Approve Key Transfers | X | √ | X | X |
| Revoke Key Transfers | X | √ | X | X |
| Execute Daily Recovery run | X | X | X | √ |
| Perform Manual Recovery | X | X | X | √ |
| Approve Manual Recovery | X | √ | √ | X |
| Revoke Manual Recovery | X | √ | X | X |
| Visit Inquiries on the system | X | √ | √ | √ |
| Take reports from the system | X | √ | √ | √ |

Table 4.3:- User Access Matrix

4.5 Implementation Of User Interfaces

User Interfaces (UI) is considered as the bridge where end users will interact with the system. When considering the user interfaces it should be user friendly , easy to learn , simple and should provide the functionality that the user requires.

The main aim of the implementation of UI for the LC&KM is to make interfaces simple with less ambiguity and user friendly as much as possible. I have chosen the light colours for the UI , to make use of interface that is simple and less inconsistency for the end users. Common classes and JQuery/Javascript were used to maintain reusability and consistency.

Most of the users who use core banking are used to vertical menu option rather than horizontal menu options. Therefore to adhere to their common practice LC&KM system uses vertical navigation in all the main menu options.

Also most of the screen is in similar format which the user doesn't feel any inconsistency when they traverse through different screens. To clearly identify the screens each screen has the heading named with its functionality in the system and different screens use different light colors .

To reduce the user effort on inputting data most of the input has been given through list and other pop ups so user neither input everything manual nor to care about the input formats which improve both efficiency and the accuracy.

One of the main aspects of the LC&KM to allow reusing factor of the UI which reduce the complexity of usability. Menu system and grid based layout are the example for these designs.

The following figures of the LC & KM UIs covers the major UIs of the system and it shows the simplicity, user-friendliness and the consistency of the system.

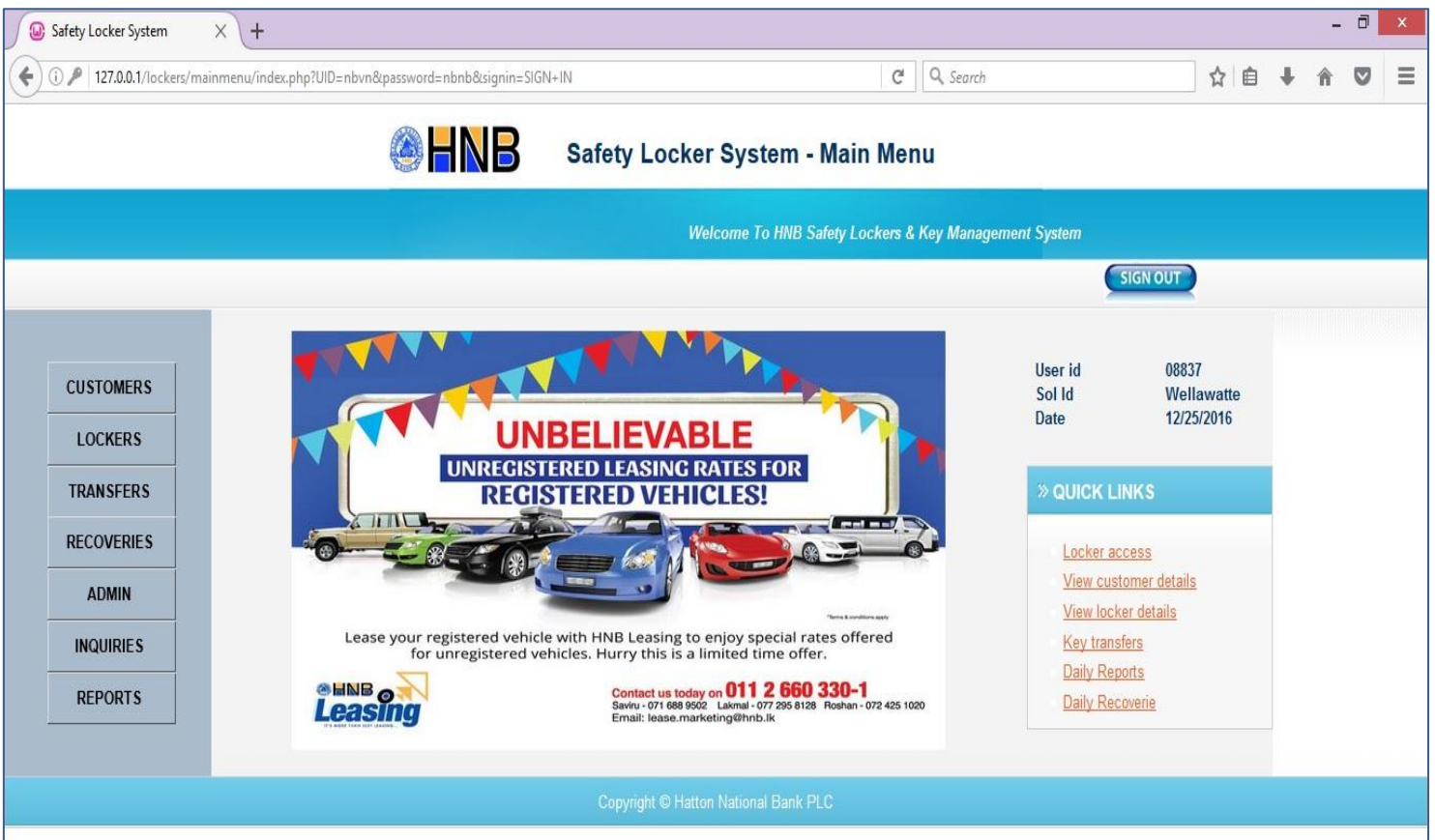


Figure 4.2: -Main Menu Of The system

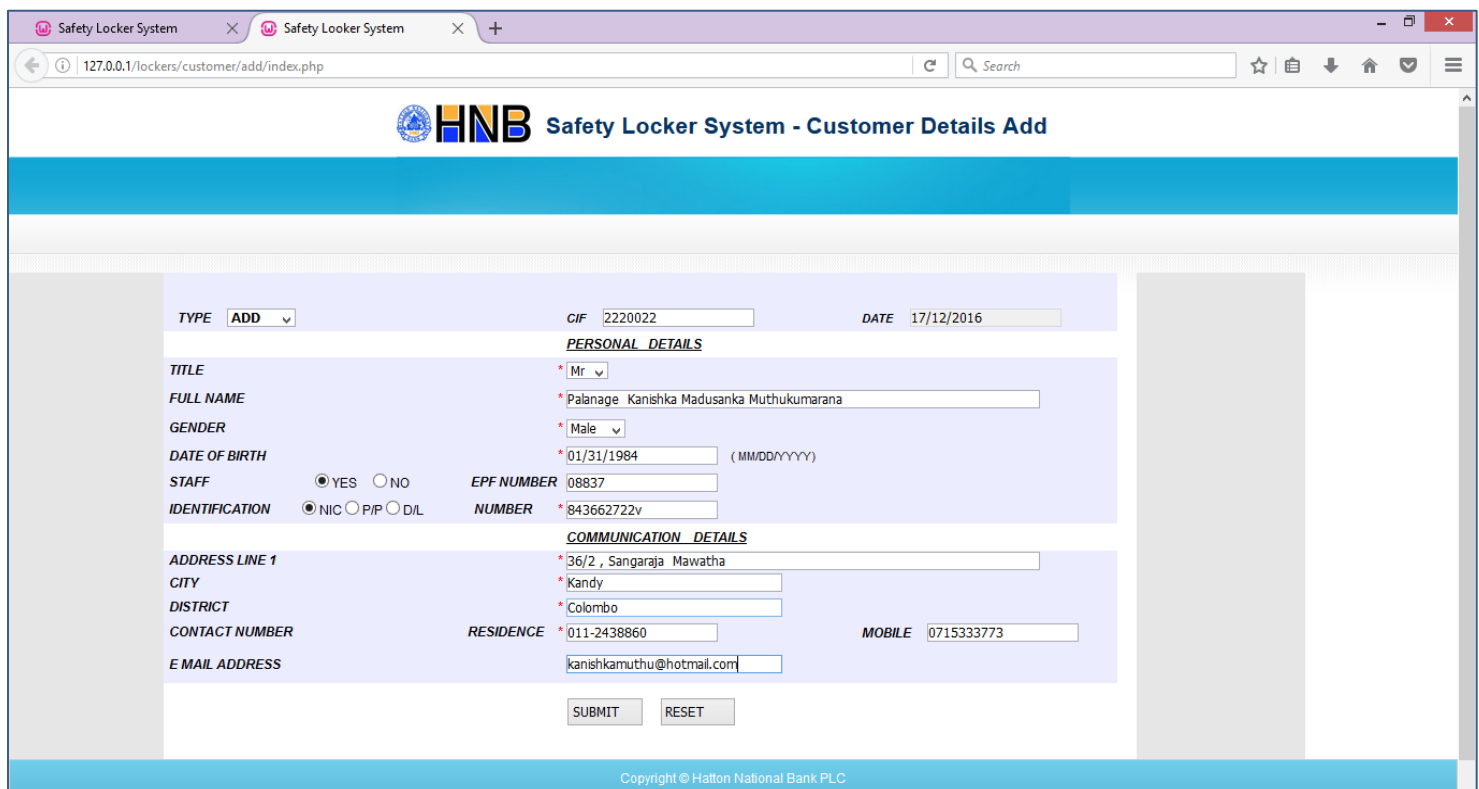


Figure 4.3: - Customer Adding Screen Of The System

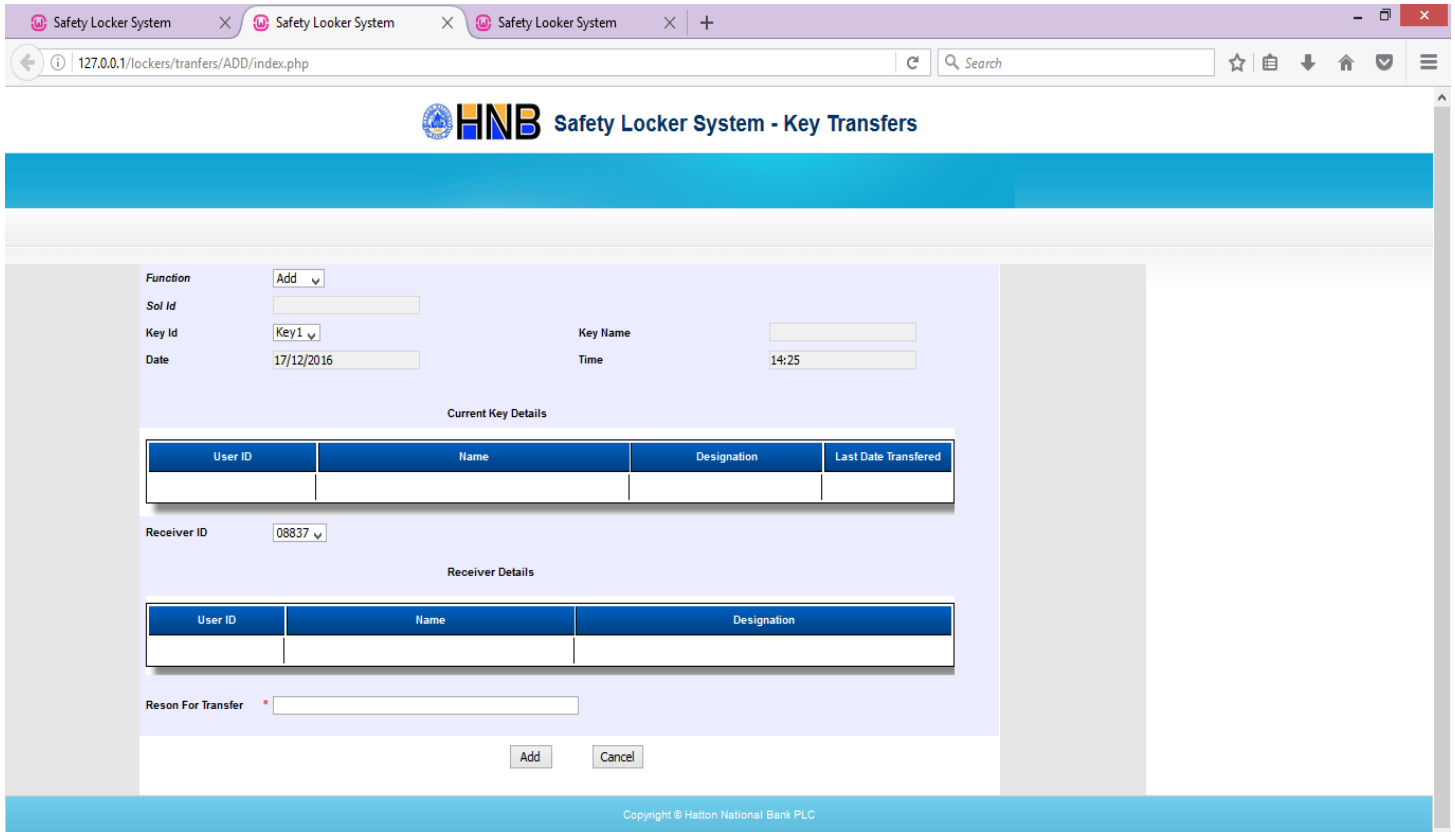


Figure 4.4: - Key Transfers Screen

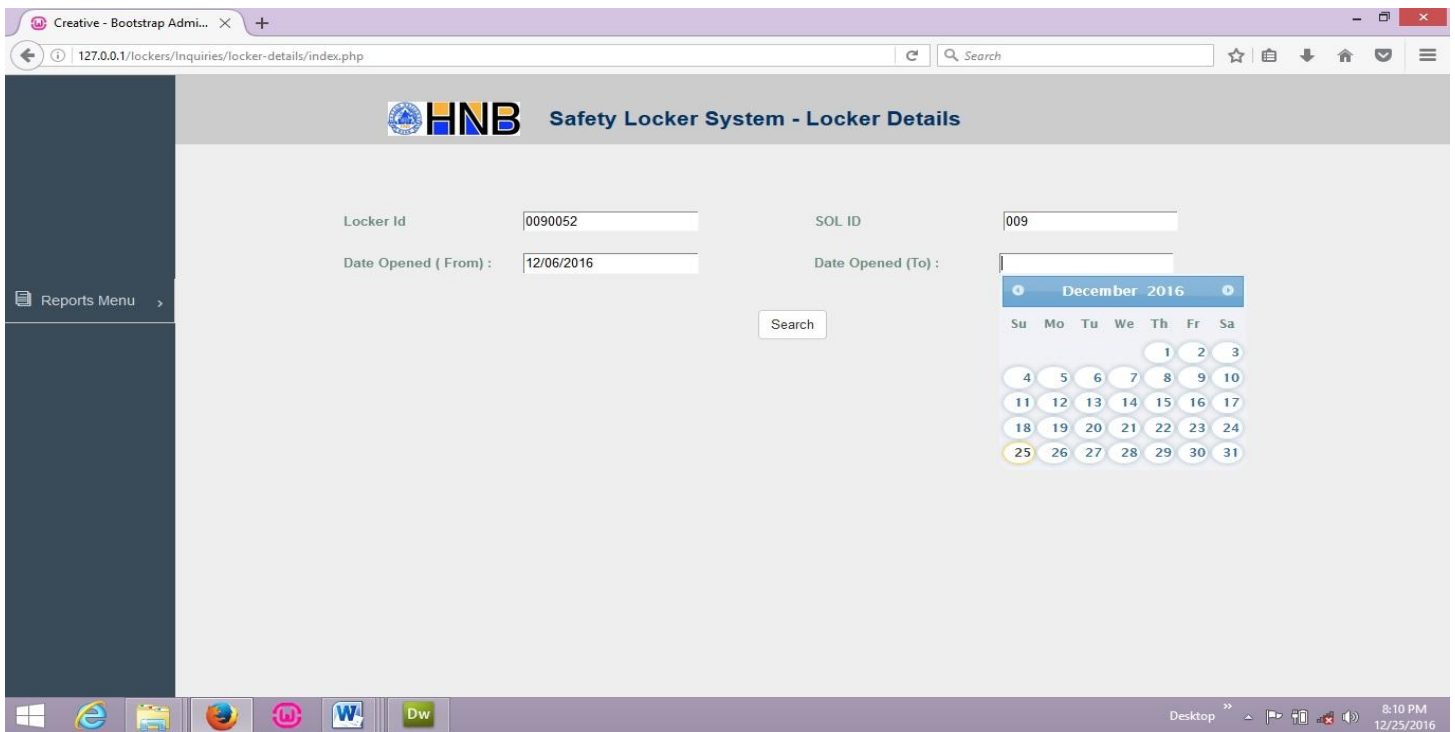


Figure 4.5: - Reports selection Menu

Chapter 5 : User Evaluation And Testing

5.1 Introduction

The main objective of the testing procedure is to make sure that LC&KM system meets all the functional , non-functional , security and user interface requirements. Since the LC&KM system is an application which is a client server based (Web application) testing was designed to cover a wide range of functionalities .

5.2 Test Procedure

Firstly system testing of the LC&KM application was carried out to the customer's functional and non-functional , security and system requirements. After this , usability testing was carried out to make sure that the interfaces of LC&KM are meet the user expectation both in requirements efficiency and effectiveness in satisfaction and simple manner.

5.2.1 System Testing

Initial testing was carried out by the system developer and there after different type of system testing was carried out by both developer and System implementation division of HNB to verify the requirements.

The Functionality Testing, Non-Functional Testing, Security Testing, Interface Validation and Verification Testing and Compatibility Testing were done during the system testing session. The test cases attached in **Appendix D** were used to execute and verify this system testing process

- Functionality Testing

This is the process where it verifies whether the system meets all the functional requirements of the LC&KM Portal mentioned in section 3.8.1. Also the entire application was tested for detailed functional testing and verification. Mainly white box and black box testing are carried out in this phase for test process

- Non Functionality Testing

The LC&KM system was tested for Non Functional requirements mentioned in section 3.6.2.

- Security Testing

Security is one of the main aspects from the business user since the LC&KM involves debiting customer accounts for recoveries. Therefore it is very important to carry testing to find out , whether there are any vulnerable areas in the system. Security Requirements which are mentioned under 3.8.2 are tested to verify the that the client's security aspects are met.

Under this section, the LC&KM has further tested for the authorizations of the different user roles , since incorrect authorization settings might cause a lot of issues. Based on the Cases which are mentioned in the Table 4.3 testing was carried out .

- Interface testing

The main interfaces are in LC&KM web based interfaces and the testing was carried out to test and validate the user interfaces of these modules

This include the clarity and correctness of the Menus, Menu Items, Text, Text Fields, Drop Down, Checkboxes, Radio Buttons, Buttons, Required Fields, Calendar control , reporting interfaces and other Controls.

- Compatibility Testing

There are considerable number different machines among the HNB branch network where they use different browsers in different machines. Therefore the compatibility testing verified the cross browser compatibility and view ports of different resolutions.

For browser testing, the LC&KM web application was tested to verify the support Internet Explorer, Mozilla Firefox and Google Chrome browsers with different versions and resolution testing was carried out which support 1024*768

Usability testing is carried out after completion of the above testing which is mentioned in section 5.2.1

5.2.2 Usability Testing [20]

The LC&KM system was tested to verify the user friendliness as well as total user acceptance of the system. This usability testing mainly covered easy to use, clarity of the instruction & the messages provided and the overall satisfaction of the user

5.3 Test Plan

High level test plan prepared for testing is shown in this chapter where as test cases that have been used for verification are attached in appendix D. Other than that evaluation questionnaire was given to the each participant of the testing process.

1. Scope

This covers the usability testing of LC&KM web application which were designed for the HNB

2. Purpose

The main purpose of this testing is to verify and get a clear picture of user satisfaction and how far LC&KM system meets the expectation of the functional and non functional requirements.

3. Location

Testing will be carried at separate different branches specially in Colombo district. Some of the testing will be carried out by visiting the branch premises while others were done through remote logging . Ten branches will be taken as sample branches for testing.

4. Sessions

Time taken for each testing is planned between 60 to 90 minutes for several days and all the testing will be carried out after 3.30 pm (after the working hours of the bank). Each participant will be given separate testing session and staff members attached to the head office branch were given many sessions due to the convenience to reach them.

5. Equipment

One selected desktop PC which was used by the locker handling staff from each branch will be selected as test machine and databases and servers will be hosted in the same PC.

6. Scenarios

Since the limitation of the time approximately 12 scenarios will be tested and all the testing will be carried out in the testing desktop .

7. Metrics

Measurements that will be collected in to two sections , qualitative and quantitative. Time to create customer , time to update locker visits and time to get arrears of details, etc .Qualitative details such as satisfaction , security , adherence to the bank policies are listed under this while the data will be collected through a questionnaire .

8. Roles

For each branch minimum of three users will be selected which represent different user class. Banking assistant will represent the work class 150 , junior executive will represent work class 250 and executive and above positions will represent the work class of 350.

9. Test cases and execution results

Test cases which are attached under appendix D are carried out and the test cases are categorized based on their function. The expected results validation and verification will be carried out by comparing with the actual results of the system.

Usability testing will be carried out by analyzing the questionnaire which was given to the staff who tested the system

5.4 Test Result And Evaluation

1. System Test

The test plan was executed in two iterations . After the first iteration it was found that nearly 9% - 12% scenarios were found and those failed cases were fixed and tested in the second iteration. For each bug fixing unit testing, integration testing and regression testing was carried out until it passes the testing. Over all result shows satisfaction where the system covers most of the functionalities which business users request.

2. Usability Testing

After deploying the LC&KM and the testing was carried out by the actual users nearly thirty people from ten different branches, employees were given a questionnaire to get the feedback to evaluate the system. Collected data was analyzed and following figure shows the analyzed results using statistics charts.

USER EVALUATION FORM

User Evaluation and Feedback for Locker System For HNB PLC Required *

Branch * :- Designation * :- Name :-

1. Do you think the locker system successfully covers the business requirement. *

Strongly Agreed

Agreed

Disagree

Strongly Disagree

2. Interfaces in the Locker system are user - friendly? *

Strongly Agreed

Agreed

Disagree

Strongly Disagree

3. Overall appearance of pages are pleasant to look and easy to identify elements on that ?*

Strongly Agreed

Agreed

Disagree

Strongly Disagree

4. Simplicity and easiness of learning Locker System ? *

Very Easy

Easy

Difficult

Not Easy At All

Figure 5.1: - User Evaluation Form

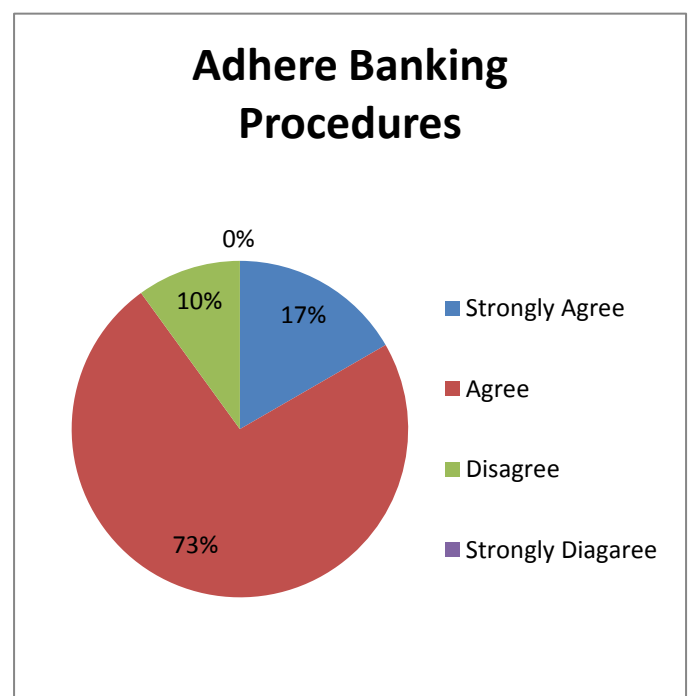
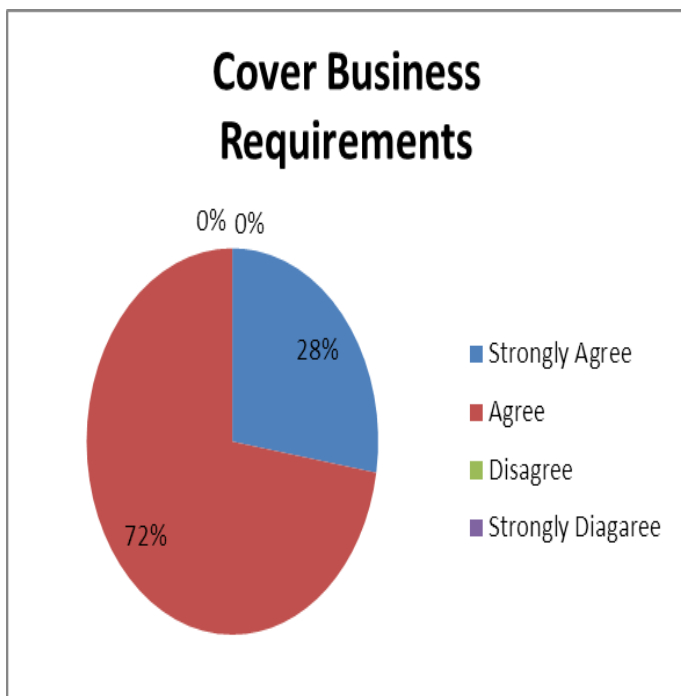
According to the result of the data which analyzed (figure 5.2) , nearly 28% of the selected users strongly agreed that the system covered the business and 72% agreed to the point whereas there were no user who disagreed or strongly disagreed with the point.

When considering the lockers system and its adherence to the Bank's procedures majority of users (70%) agrees and 17% strongly agrees with the point where 13% disagree and no body is in the category of strongly disagree .

With respect to the other factors user friendliness , ease of learning , appearance etc .. more than 75% of the users agree that system fulfill their requirements.

According to the statistics it is clear that 10% of users strongly agree and 73% are agreeing which totals over 80% of the system and there are no unsatisfied users . The result obtained from the collected data has proven that the system is accepted by the majority of the sample users in the organization.

Other than this most of the business users have suggested that SMS alert should be included in the system , so the main customer of the locker can be automatically inform when he/she accessing his locker .



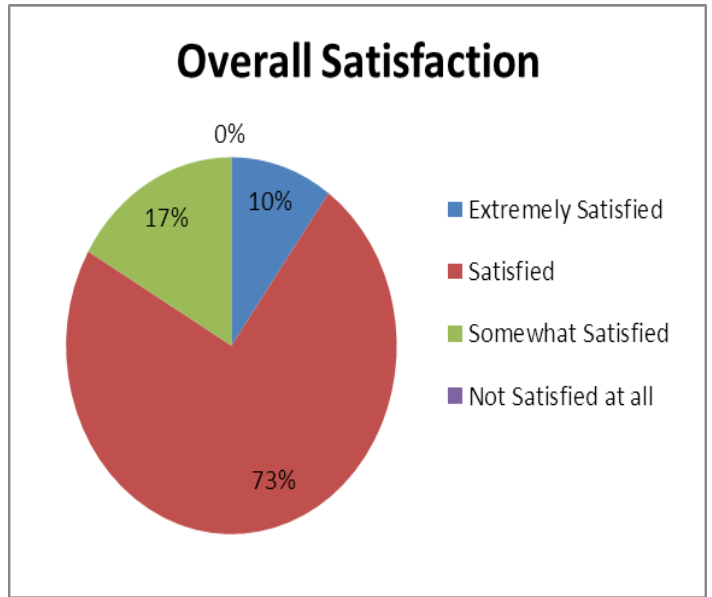
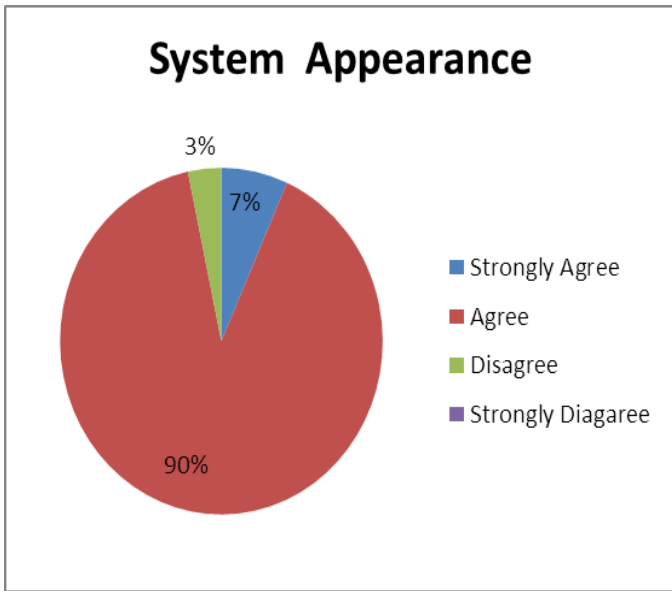
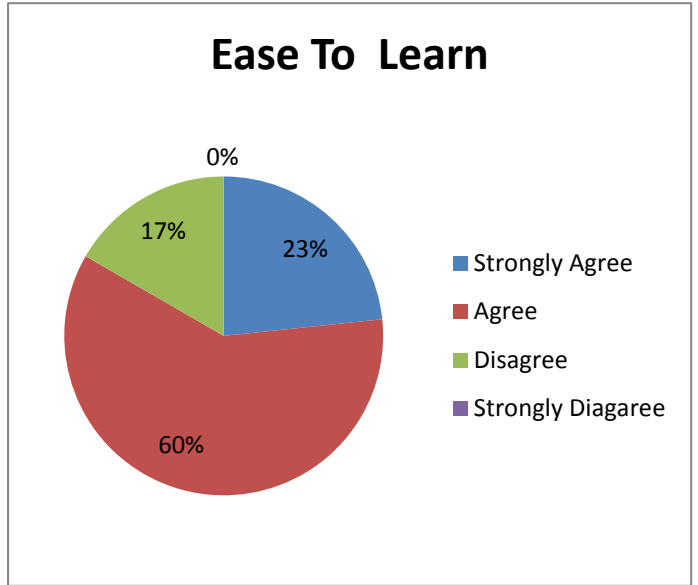
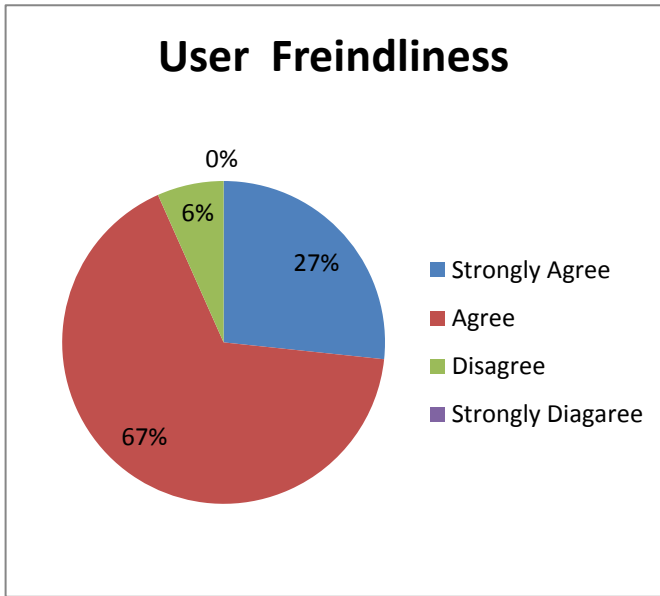


Figure 5.2: - Analyzed Result Of Evaluation

Chapter 6 : Conclusion and Future Work

6.1 Introduction

The conclusion of the LC&KM and its future enhancement are emphasized in this section . Through this section initial goals , achievements and limitations are discussed and then the future enhancement will be discussed . The conclusion and the overall satisfaction will be delivered as the latter part of the section

6.2 Achievement of Objectives and Goals

The main aim of this LC&KM is to develop application to give a software solution for Hatton National Bank to manage their locker and key handling operations while completing the Masters of information technology system conducted by University of Colombo.

The main criteria which are used to identify the objectives are achieved or not is the feedback and the evaluation of the system users. By the analysis of the user feedback it is clear that most of the staff who work in HNB are satisfied with the system and they agreed that LC&KM system has fulfilled their requirements . Able to fulfill the customer requirements , providing less error system and achieving customer satisfaction is a proof that the system objectives and goals are successfully met.

Other than the customer satisfaction , when developing the system lots of different lessons were learnt as a developer and experienced great exposure in development technologies. Developing locker control and key management system gave me a great opportunity to apply my theoretical knowledge in practical situations . Also this project helped me to understand SDLC , from requirement gathering to development and testing ,the use different technology and tools , used different external component and the procedures of the bank and why they are implemented .

Overall practical work carried out throughout the project gave me a vast knowledge and exposure as software developer which is considered as a great achievement of this project.

This project ultimately fulfill the main objectives and achieved the targeted goals successfully

6.3 Future Work And Enhancements

Even though the users are satisfied with the system that was implemented there are some enhancements as well as recommendations given by the users which were highlighted by the system users .

1. SMS Alerts for Locker Accessing and Key Transfers

This requirement was mainly identified through the system user feedback where locker owners will get a SMS to their mobile phone when the locker visit is updated in the system. By introducing these alerts to the system users will expect to reduce the forgeries and reduce the disputes regarding lockers.

On other hand when you input key transfer in the system , users will communicate manually to accept/reject the transfer. Until user login or informing by the inputter, user will not know about the transfer which is sometimes time consuming process. By developing this SMS alerts this problem will be solved , while the time user input the key transfer receiver will get a SMS message which includes all the details of the key transfer.

Bank's SMS gateway will be used to achieve this task where the mobile number and the message will be passed on to the gateway and rest of the process will be handled by the gate way as a normal message.

2. Email Notification for Pending Locker Customers

According to the current system when a locker is vacant system users have to inform customers in pending list using telephone by which sometimes customers aren't contactable where branch has to try for several times and that is a time consuming process.

With this future enhancement users do not have to keep on calling the customers for vacant lockers. When the locker is vacant the system automatically triggers and select the customer from the list and send , an email .

This process will be handled by the email client in the bank , where text file will be generated in the LC&KM system and forward the file to email server .

3. More Reports for Analytical Purpose

Developed system support different types of reports where the recommendation is to improve those reports to graphical charts to get more data and clear idea so easily. When the reports are represented in a graphical way it will be helpful for users to analyze business which would help the future expansion of the business of the bank.

6.4 Conclusion

The LC&KM purely web based system and consists of different modules and are based on wide range of technical components and web services. For the overall project it took over 400 hours which included planning, design, development, implementation and deployment.

The knowledge and the experience which I gained throughout this project as a software developer and system analysis is vast and that it will add value to my career in the industry.

Not only technical skills but also analyst other general skills like documentation skills , communication skills were also developed through this project.

I believe that all this knowledge which I gathered throughout the course and project will help me to boost my career and drive me to my future goal very easily.

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Appendices

Appendix A – Design Diagrams

- Following Figure A -1 shows detailed use case of the system.

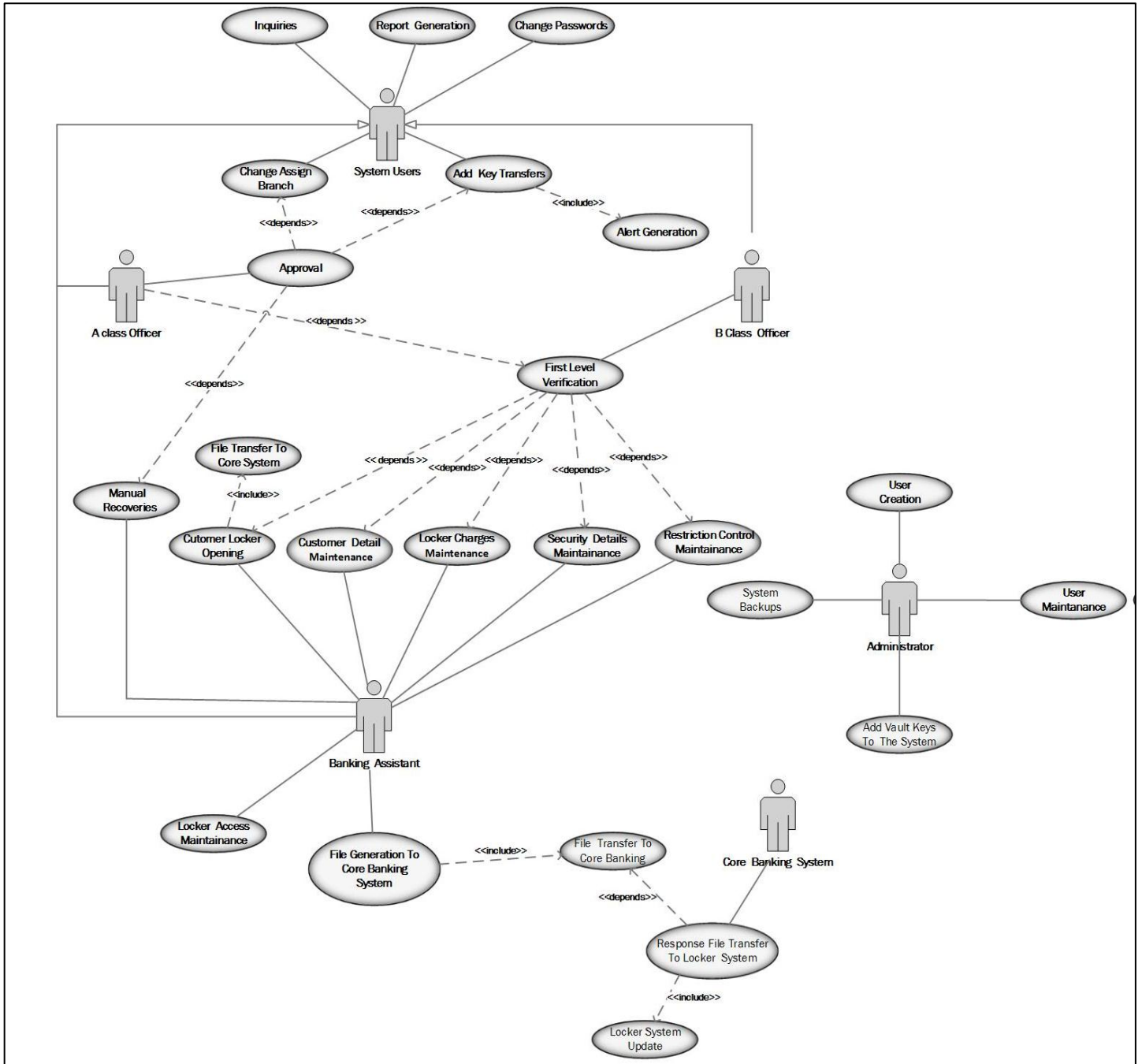


Figure A-1 - Detail Use Case Diagram Of The System

- Following Figure A -2 shows Use Case diagram for Banking Assistant

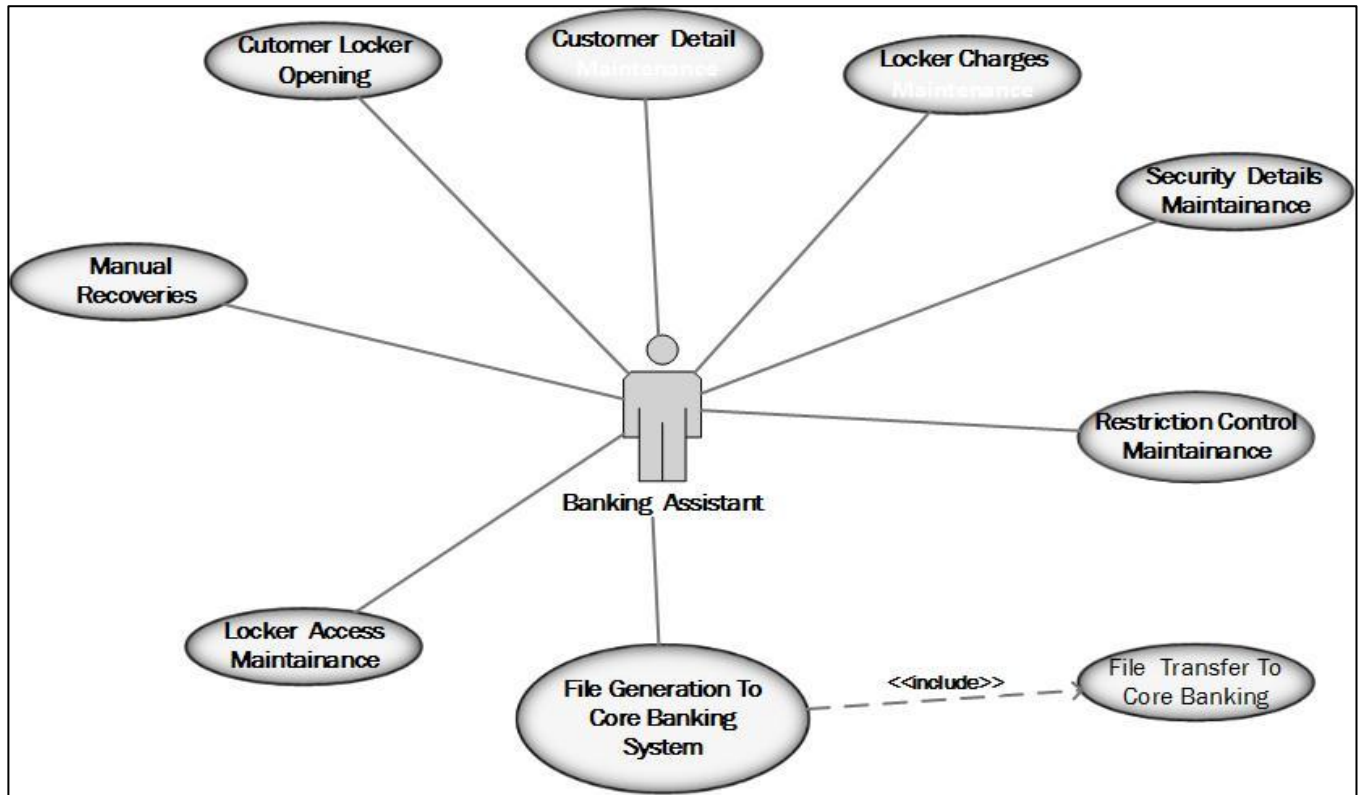


Figure A-2 - Use Case Diagram for Banking Assistant

- Following Figure A -3 shows Use Case diagram for system user (Authorized officers)

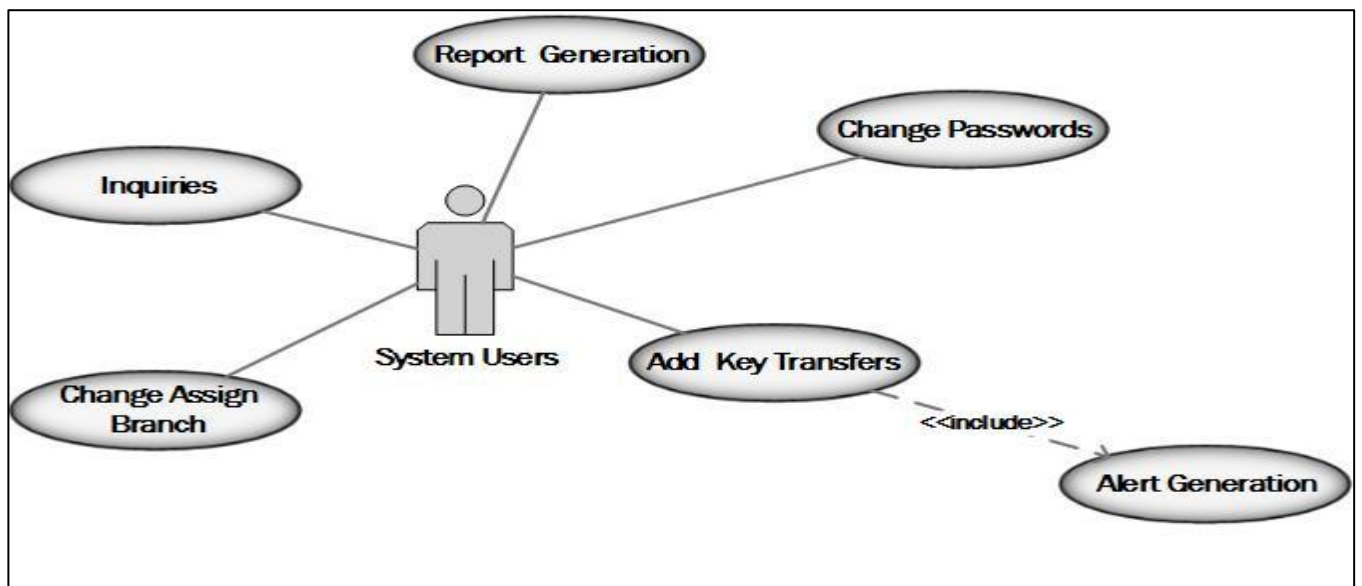


Figure A-3 - Use Case Diagram for System Users

- Following Figure A -4 shows Use Case diagram for Administrative User

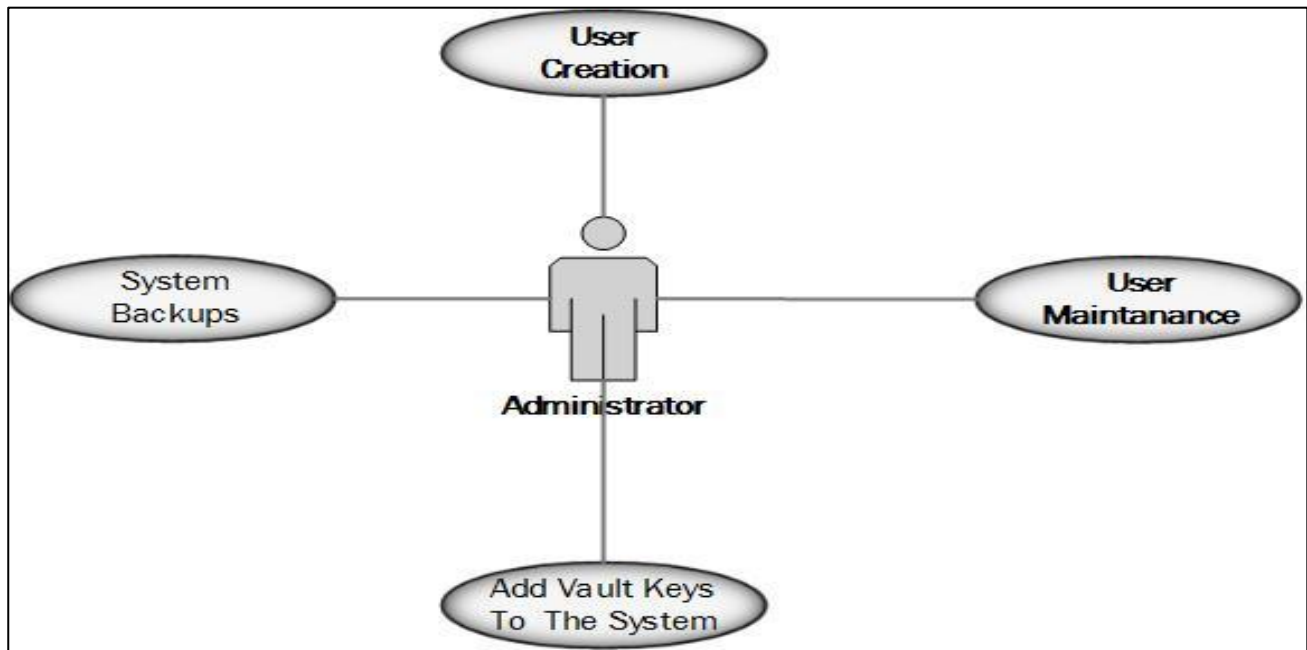


Figure A-4 - Use Case Diagram for Administrative Users

- Following Figure A -5 shows Use Case diagram for Core Banking System

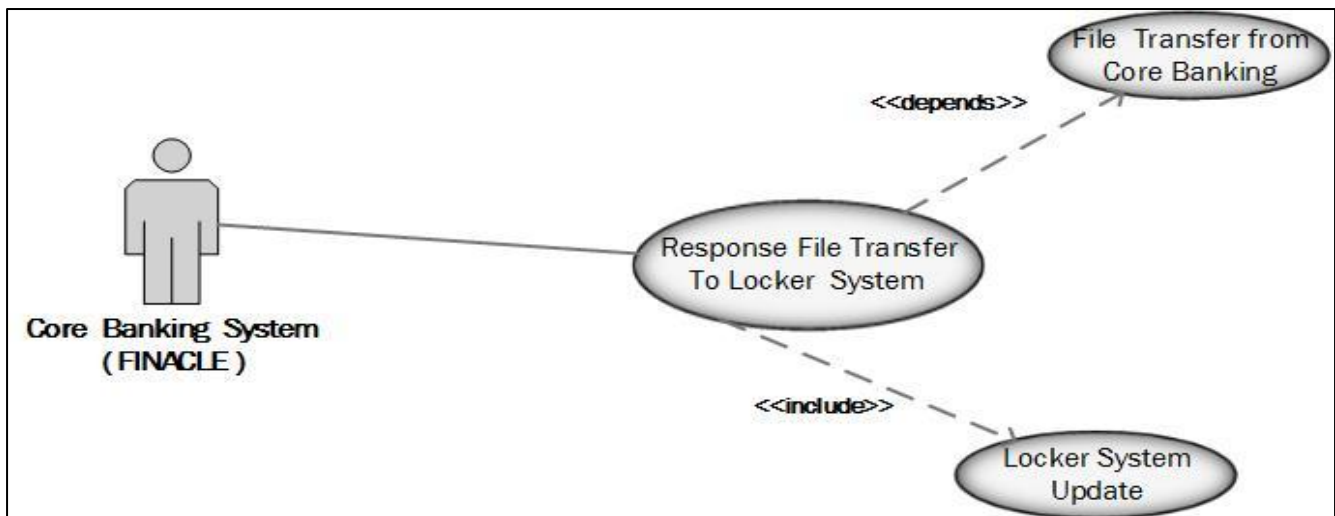


Figure A-5 - Use Case Diagram Core Banking System

Appendix B – Questionnaire

This section elaborates the questionnaire used in PACT analysis



LOCKER AND KEY MANAGEMENT SYSTEM QUESTIONNAIRE FORM

Questions mark with * are compulsory

1. Name :-
2. Branch :-
3. Designation * :-
4. Gender * (Male /Female) :-
5. Work Experience *(In years Bank) :-
6. Work Experience *(In years Locker Dept.) :-
7. How do you rate your IT skills *
(1: Poor to 5 : expert) :-
8. Do You have separate PC for Locker :- YES NO
9. How do you rate the current locker process
(1 : Very Poor to 10 : excellent) :-
10. Do you really need a system for handling locker functions :- YES NO
- 11 Average number of customer visits per a day to access their safety lockers ?
 - 1 - 15
 - 16 - 30
 - 31 - 45
 - 46 - 60
 - Over 60



LOCKER AND KEY MANAGEMENT SYSTEM QUESTIONNAIRE FORM

- 12 What is the average time gap between two customers who access their lockers ?
- Below 1 minute
 - Between 1 – 5 minutes
 - Between 6 – 10 minutes
 - Between 11 – 15 minutes
 - Over 15 minutes
- 13 How often the staff rotation happen in a branch (changing staff in locker department) ?
- Weekly
 - Monthly
 - Quarterly
 - Semi annually
 - Yearly
- 14 Do you think that , by introducing a new system you will be able to solve all the problems related in locker processes and provide good customer service ?
- Strongly agreed
 - Agreed
 - Somewhat agreed
 - Disagreed
 - Strongly Disagreed
- 15 What is the most time consuming stage in safety locker process ?
- New lockers opening
 - Locker rental recovery
 - Locker user visits verification
 - Excess locker visits charges recovery
 - Vault key transfers



LOCKER AND KEY MANAGEMENT SYSTEM

QUESTIONNAIRE FORM

- 16 Do you think dual control mechanism (approve by two officers) will help the bank to maintains their procedures of control ?
- Strongly agreed
 - Agreed
 - Somewhat agreed
 - Disagreed
 - Strongly Disagreed
- 17 Will it be useful to scan customer locker mandate and NIC (national identity card) with the signature of the locker customer in the database ?
- Always useful
 - Useful in sometimes
 - Useful but waste of resources
 - Totally waste of resources
 - Totally waste of time
- 18 How many rental recoveries usually take place for a given date ?
- 1 - 20
 - 21 - 40
 - 41- 60
 - 61- 80
 - Over 80
- 19 What are the information accesses restrictions expected from the safety locker system with regards to the branch ?
- Staff can view and modify any branch's customer data
 - Staff only can modify and view data whose customers belongs to that particular branch
 - Staff can modify other branch details which given special permission temporary by higher authority
 - Staff can modify other branch details which given special permission permanent by higher authority
 - Staff can view and modify any branch's customer data



LOCKER AND KEY MANAGEMENT SYSTEM QUESTIONNAIRE FORM

20 How is the accessibility for the software to be provided ?

- Software should be installed in a centralize server and all the accessibilities links should be given through bank intranet (HATNA NET)
- All the branches given a separate server and all the staff of that particular branch will have access to that server by a common link
- All the branches given a separate server and only the staff who in locker department will have the access to that server by installing software in to their machines
- Software is installed in a specific machine which accessing the system can only be done through that machine.

21 . Any Other suggestions and comments ?

Appendix C – User Evaluation Form

This section elaborates the user evaluation form which used in system testing and evaluation



USER EVALUATION FORM

User Evaluation and Feedback for Locker System For HNB PLC

Required *

Branch * :-

Designation * :-

Name :-

1. Do you think the locker system successfully covers the business requirement. *

- Strongly Agreed
- Agreed
- Disagree
- Strongly Disagree

2. Interfaces in the Locker system are user - friendly? *

- Strongly Agreed
- Agreed
- Disagree
- Strongly Disagree

3. Overall appearance of pages are pleasant to look and easy to identify elements on that ?*

- Strongly Agreed
- Agreed
- Disagree
- Strongly Disagree

4. Simplicity and easiness of learning Locker System ? *

- Very Easy
- Easy
- Difficult
- Not Easy At All



USER EVALUATION FORM

5. Do You think the system adhere the procedure of manual in the HNB ? *

- Strongly Agreed
- Agreed
- Disagree
- Strongly Disagree

6. System considerably reduce the operation time with respect to the old manual process ? *

- Strongly Agreed
- Agreed
- Disagree
- Strongly Disagree

7. How Often the system freeze or give errors (system crash) ? *

- Frequently
- Average
- Seldom
- Not At All

8. How does the usefulness of the Locker system ? *

- Highly useful
- Moderately useful
- Slightly useful
- Not at all

9. How satisfied are you with the security of this software ? *

- Extremely Satisfied
- Satisfied
- Somewhat Satisfied
- Not Satisfied at all



USER EVALUATION FORM

10. What is your overall satisfaction with the Locker System ? *

- Extremely Satisfied
- Satisfied
- Somewhat Satisfied
- Not Satisfied at all

11. Any Special Remarks/comments on the Current System

12. Any Special feature/s or function/s that not included to the current system which you recommend to insert in the future?

Appendix D – System Test Cases And Results

| ID | Test Case Name | Test Description | Expected Result | Actual Result | Status Pass/Fail |
|-----------------------|-------------------------|--|--|---------------|------------------|
| Customers Menu | | | | | |
| 1 | Add Customer | User Adds customer to the system | <ul style="list-style-type: none"> • If the work class is over 160 system will generate an message “ User work class is not sufficient” and block user from further processing • If All the mandatory fields are not filled user will not be allowed to submit the data and system will focus on the fields which are blank and mandatory . • If Staff radio button is checked and EPF number is blank, system will raise an error message showing “EPF No Cannot Be Blank” and stop processing further • After clicking the submit button , if all the data are in order customer details will be updated in the system and system popup an successful message. | As Expected | Pass |
| 2 | Cancel Adding Customer | User cancels the customer from the which already created in the system | <ul style="list-style-type: none"> • If the work class is over, 160 system will generate a message “ User work class is not sufficient” and block user from further processing • User inputs the CIF and all the details of the pending customer are loaded and all the input fields will be disabled . • If the CIF doesn’t have any modifications system will pop message “NO modifications Pending” • After clicking the cancel button if CIF is correct with pending modification system will delete the record from the system and pop up a message saying “Successfully Cancelled” | As Expected | Pass |
| 3 | Modify Customer Details | User modifies the customer details which are in approved status | <ul style="list-style-type: none"> • If the work class is over 160 system will block the user from further processing and give an alert and stop processing further . • If there are previous pending modifications , system will pop up a message “Pending Modification Exists” and user will be blocked from further processing • After inputting the Customer CIF | As Expected | Pass |

| | | | | | |
|---|-------------------|---|--|-------------|------|
| | | | <p>customer details will automatically populate in the screen</p> <ul style="list-style-type: none"> • If all the mandatory fields are not filled system will pop up message and focus on the mandatory fields which are not filled and stop processing further • After filling all the data , the newly modified data will be update in a temporary table with updating pending modification flag to YES and displays a message saying “Successfully Updated” | | |
| 4 | Verify customer | Verify the customer details both newly entered and modified | <ul style="list-style-type: none"> • If user work class is below 160, system will pop up an error displaying “User work class is insufficient” • Dropdown for the CIF loaded with the CIFs which are pending modification • After selecting the CIF from the drop-down all user details will be populated and all the fields will be disabled so the modifications cannot be done on the screen. • After clicking on verify button unauthorized CIF will be approved and if the CIF is modification new data will be updated in the system . | As Expected | Pass |
| 5 | Pending Customers | Branch user keeps track of pending customers and ADD/Modify/Cancel/Approve are main functions | <ul style="list-style-type: none"> • If the selected function is Approve and work class is below 160 system will pop up an error displaying “User work class is insufficient” • If selected function is Add, Cancel or Modify and work class is Over 160 system will pop up an error displaying “User work class is insufficient” • If the all the mandatory fields are not entered and you try to submit system will pop up an error message and focus on blank fields while stop processing further .Else user will get successful updated message. • If the user selected Cancel or Verify function ; all the fields will be disabled except the ID field and after user input the NIC number and relevant details will auto populate . • If the user selected Modify function ; and after selecting the CIF all the details will populate in the screen that is relevant to the user . • After inserting the valid data to the | As Expected | Pass |

| | | | | | |
|---------------------|--------------------|--|---|-------------|------|
| | | | boxes and clicking on submit function the user will get a successful message from the system | | |
| Lockers Menu | | | | | |
| 6 | Locker Add /Cancel | User Assigns /Cancel lockers to the Customers | <ul style="list-style-type: none"> • If user work class is above 160, system will pop up an error displaying “User work class is insufficient” • When loading the screen sol id Should be auto populated to which the user belongs . • After selecting the Size of the locker Vacant lockers of the particular branch will populate the locker id dropdown list so the user can select the parent locker. • After selecting the parent locker from the system Locker number will be updated in the Locker Id field. • If user inputs invalid CIF system will display error message saying “Invalid CIF” • If the security account is not savings type system will display an error message , “Invalid Account Type” • After clicking the submit button , if all the data are in order , customer details will be updated in the system and system will popup an successful message. • When user selects the Cancel option from the function list all the fields will be disabled except the Locker Id field so user can input the locker id which he wants to cancel. • After click on the cancel button with valid locker id system will output success message . | As Expected | Pass |
| 7 | Locker Edit /Close | User modifies or closes the locker which is already assigned in the system | <ul style="list-style-type: none"> • If user work class is above 160 system will pop up an error displaying “User work class is insufficient” • User will input the locker id(LIC) where if the LIC is correct the relevant data will load to the screen whereas ID the LIC is incorrect system will generate an error message. • If the selected function is edit then both the close reason and close date fields will be disabled for user input • If the block reason code is blank and | As Expected | Pass |

| | | | | | |
|---|------------------------|---|--|-------------|------|
| | | | <p>the selected function is edit with locker status is Restricted , system will display an error message and stop user from processing further</p> <ul style="list-style-type: none"> • If the close date is blank with selection of the function Close system will throw an exception message screening “Close Date Cannot Be Blank”. • If the select function is “Cancel” ; all the fields except the LIC will be disabled where user can input the valid LIC and after successful cancellation system will display success message. | | |
| 8 | Locker Authorize | User Approves the Lockers which were newly created or modified | <ul style="list-style-type: none"> • If user work class is above 160 , system will pop up an error displaying “User work class is insufficient” • When loading the screen solid Should be auto populated which the user belongs to. • Dropdown for the LIC loaded with the CIFs which have pending modification • After selecting the Locker no relevant details will auto populate and all other fields are being disabled. • If users select verify selected record will be authorized and display successfully the updated message. | As Expected | Pass |
| 9 | Add / Delete Signature | User Uploads /deletes signatures and Identity of the locker customers | <ul style="list-style-type: none"> • If user work class is above , 160 system will pop up an error displaying “User work class is insufficient” • LIC no is mandatory if user tries to add or delete without LIC no system will generate error message and block the user from further processing • After selecting the LIC all the CIF which are related to the locker will be loaded to the CIF dropdown. • IF customers signature already exists and user tries to add then system will raise an error displaying “ Signature Already Exists” • If the attached file is not an ‘JPG’ or ‘PNG’ file format system will raise an error message saying “Invalid File Format” • If selected Function is delete, all the fields except the LIC and CIF fields will | As Expected | Pass |

| | | | | | |
|----|---------------------|--|---|-------------|------|
| | | | <p>be disabled so user can select the LIC and the related CIF which he wants to delete</p> <ul style="list-style-type: none"> • After successfully processing the operation , user will display and success message depends on the operation that he has performed . | | |
| 10 | Approve signature | User will approve the adding and deletion of the customers signature | <ul style="list-style-type: none"> • If user work class is below 160 system will pop up an error displaying “User work class is insufficient” • After user selecting the function , approval option and the approval type system will be populated pending customers CIF’s to the CIF dropdown • After selecting the CIF customers details with the Image will load to the screen so the authorized person can view all the details on the screen. • If there are no operations for the given approval type CIF dropdown won’t load ant CIFs to it. • After click on the Verify button relevant record will be approved and user will display a successful message on the screen. | As Expected | Pass |
| 11 | Locker Visit Update | User will update the locker visits of the customer | <ul style="list-style-type: none"> • If user work class is below 160 system will pop up an error displaying “User work class is insufficient” • All the data will be auto uploaded after user has input the LIC in the Locker Id input field. • If the entered LIC is incorrect , system will pop out an error message saying “Invalid Locker ID” • Time and the date field automatically in filled with the form loads and the time is updated in every 30 seconds • When clicking on the view images button system will load the relevant signature and ID of the relevant customer displays on the screen • If there are pending locker visits to approve , user will not allowed to input any new locker visits until the old visit is approved and system will display a message , “Pending Visits exists for this locker” . | As Expected | Pass |

| | | | | | |
|----------------------|-----------------------|---|--|-------------|------|
| | | | <ul style="list-style-type: none"> • If there are any arrears payments to be done system will generate message saying that "Arrears payment exists". • If the locker is restricted , system will pop up a message and block user from processing further. • After click on the submit button transaction will be updated in unauthorized status and output the message of "Successfully updated the record" | | |
| 12 | Locker Visit Approval | System user will approve the locker visits of the customers which are in unauthorized status. | <ul style="list-style-type: none"> • If user work class is below 160 , system will pop up an error displaying "User work class is insufficient" • When user login to the approved menu all the pending locker visits will be loaded to the Locker id dropdown • When selecting the locker id all the relevant details related to the locker visit will be updated in the screen with the signature on the screen. • After clicking on the verifying button and all the input details are In order , system will display a successful message. | As Expected | Pass |
| Key Transfers | | | | | |
| 13 | Add Key Transfers | System User will input the Key Transfers to another user in the system | <ul style="list-style-type: none"> • When user selects the key transfer menu , user home sol id and time and current own keys will be loaded with the page • If user does not own any keys the key ID drop down will be blank and user will not be able to proceed further. • Input time is refreshed in every 30 seconds • Main details of the key will be populated in the screen after selecting the key id from the dropdown list. • After selecting the key id Receiver user id dropdown list will be populated with the same user work class or above and in the same SOL. • System will display an error message saying "Reason for transfer cannot be blank" if the user submits the transfer without filling the reason. • If user adds a key transfer for a key which is already not approved system will | As Expected | Pass |

| | | | | | |
|-------------------|--------------------------------|--|--|-------------|------|
| | | | <p>generate an error displaying the message “unauthorized transaction pending “ .</p> <ul style="list-style-type: none"> • After adding the transfer if the transfer is success system will output message saying “Successfully Created Record” and unauthorized key transfer will be created in the system. | | |
| 14 | Accept / Decline Key Transfers | User will accept / Decline the key transfer from the system which has inputted in the system | <ul style="list-style-type: none"> • When loading the accept/ transfer menu key id drop down will be populated with the key id’s which was added previously to the user as receiver . • If the user selects decline and clicks on submit with reason for submit field blank system will generate an error displaying “Decline Reason cannot be blank” and stop processing further • If user accepts and submits the status of the key transfer will be changed to ACCEPT status and ownership of the key will change to the receiver with successful message displaying on the screen. • If user declines the transfer Status of the key transfer will change to DECLINE while the ownership remains with the inputter and displays “Key Transfer Decline” . | As Expected | Pass |
| 15 | Approve Key Transfer | User will approve the key transfer which are in ACCEPT status | <ul style="list-style-type: none"> • If user work class is below 300 , system will pop up an error displaying “User work class is insufficient” • When loading the Key transfer approve screen all the key transfers which are in the status of approve and belongs to the approving user’s SOL id will be loaded to the key id dropdown. • After selecting the Key ID from the drop down list all the inputter and receiver details of the each key transfer will be displayed on the screen. • After clicking on the verify button key transfer will get approved and system will display a successful message. | As Expected | Pass |
| Recoveries | | | | | |
| 16 | Daily Recovery | User executes the recovery process in the system daily | <ul style="list-style-type: none"> • If user work class is over 160 , system will pop up an error displaying “User work class is insufficient” • If user selects file generation except for | As Expected | Pass |

| | | | | | |
|----|-----------------|--|---|-------------|------|
| | | | <p>the recovery type all the other fields will be disabled in the recovery screen.</p> <ul style="list-style-type: none"> • If the next execution date is greater than the process date (today) system will display a message , “ Cannot execute the recovery process “ and user will be blocked from processing further . • If the process executes successfully user will get a success message while the records will get updated in the RENTAL_RECEIVABLE table with the due amount and the same time new due date will be extended by another one year for rental recoveries. • If there are no records system will output “No records for processing “ . <p><u>Selected function is Finacle File Creation</u></p> <ul style="list-style-type: none"> • If the process is already executed on the same date , system will pop a message , “ File Creation Already done “ and break the process without proceeding further . • All the records with due amount greater than zero will process and write to a text file in the FINACLE/OUT folder to be executed in the Core banking server <p><u>Selected function is Finacle File Upload</u></p> <ul style="list-style-type: none"> • If user clicks the file upload with the file name field is blank system will generate message “File name Cannot Be Blank” and user will not be allowed to proceed further . • If the Finacle Recovered text file does not exists in the FINACLE/IN folder system will display message saying that “ File Does Not Exist” • If the recovered file exists locker system will read the text file and update the due amount of RECEIVABLES table and output a success message. | | |
| 17 | Manual Recovery | User will recover the rental arrears and other special charges through | <ul style="list-style-type: none"> • If user work class is over 160 , system will pop up an error displaying “User work class is insufficient” | As Expected | Pass |

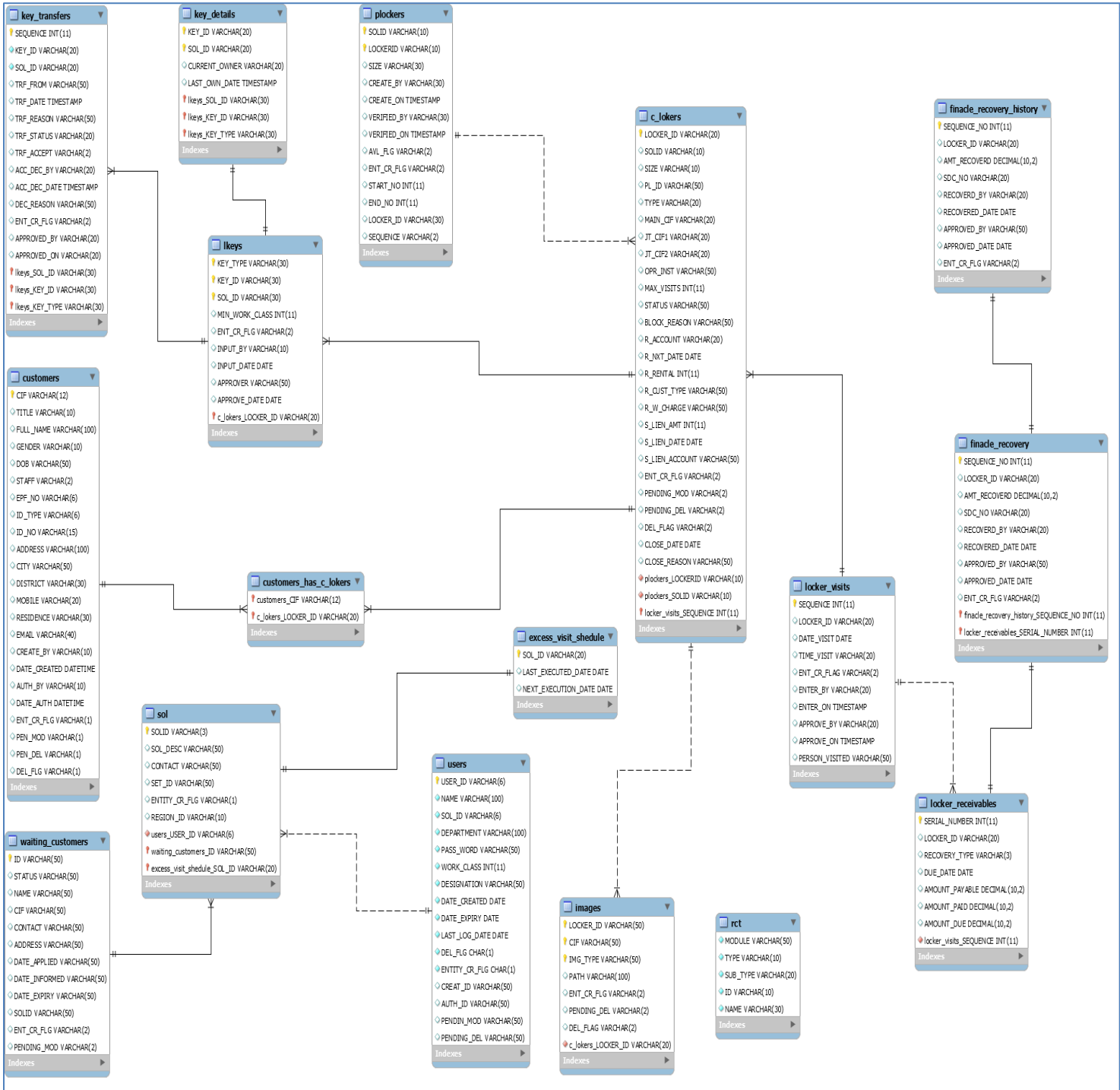
| | | | | | |
|----|------------------|---|---|-------------|------|
| | | <p>this option</p> | <ul style="list-style-type: none"> All the arrears details will be loaded to the screen after user inputs the LIC in the locker id field <p><u>Selected Recovery is Normal</u></p> <ul style="list-style-type: none"> All the arrears detail should be loaded and special charges fields will be disabled. If user input the value which is greater than the arrears amount system will raise an exception displaying an error message and stop processing the recovery If input values are non numeric system will raise an error message If unapproved recoveries exist system will raise an exception message and stop processing After successful recovery system will display successful message. <p><u>Selected Recovery is Special</u></p> <ul style="list-style-type: none"> All the fields in the recovery section will be disabled If input values are non numeric system will raise an error message If unapproved recoveries exists system will raise an exception message and stop processing After clicking the submit and if the data are in order system will display successful message. | | |
| 18 | Approve Recovery | <p>User will approve the recoveries which had been done through the Manual Recovery process in the system</p> | <ul style="list-style-type: none"> If user work class is below 160 ,system will pop up an error displaying “User work class is insufficient” When loading the manual recovery screen pending locker recoveries which belong to the approve user’s SOL will populated in the the drop down Locker Id. When user selects the Locker id from the drop down from the list details which are related to the locker details will populate After submitting all the LOCKER RECEIVABLE table will update and user will be shown a successful message. | As Expected | Pass |

| Admin | | | | | |
|-------|---------------|---|--|-------------|------|
| 20 | Create user | Administrator will create the system users | <ul style="list-style-type: none"> • If user work class is below 300, system will pop up an error displaying "User work class is insufficient" • After selecting the sol id from the list sol description will automatically populate. • If user selects the Approve Or Delete all the fields except the user id will be disabled from the screen. • User will get an exception if he tries to modify the user data if there are any pending modifications. • If user submits the form without filling all the mandatory fields, the system will generate an exception message and block users from processing further. • If the same user tries to approve the modification or adding system will throw an exception with an error message and block user from processing further, • If all the data which was submitted through the button click is in order, user will get a successful message. | As Expected | Pass |
| 21 | Edit Password | This is used to edit user password of the system users | <ul style="list-style-type: none"> • When user inputs the EPF number in the input field all the user related information's will populate in the form • If input password is a mismatch with the old password, system will raise an error and stop user from submitting the form. • If new password is null and user tries to submit system will give an error message and stop process. • If all the details match with the given criteria and user submits system will output success message | As Expected | Pass |
| 22 | Add Locker | This is used by the users to create lockers when opening new branches | <ul style="list-style-type: none"> • If user work class is below 300 system will pop up an error displaying "User work class is insufficient" • After input the sol id from the list sol description will automatically populate. • If user tries to create the locker numbers which already exist system will generate an error message and stop processing further. • If user clicks the submit button without filling all the mandatory fields system | As Expected | Pass |

| | | | | | |
|----|----------|--|---|-------------|------|
| | | | <p>will issue an error message and stop processing forward</p> <ul style="list-style-type: none"> • If the same user tries to approve the modification or adding system will throw an exception with an error message and block user from processing further • If all the data which were submitted through the button click is in order user will get a successful message. | | |
| 23 | Add Keys | Administrator use this menu to add / Modify keys in the system | <ul style="list-style-type: none"> • After user selects the key type system will populate key ids in the Key Id dropdown menu • After selecting the key id and the SOL id description of both will be update in the form itself. • If user doesn't input minimum work class in the system will pop an error message • If the minimum work class is non numeric ,system will throw an exception and user will not be able to submit the form. • If the same user tries to approve the modification or adding system will throw an exception with an error message and block user from processing further • If all the data which were submitted through the button click is in order user will get a successful message. | As Expected | Pass |

Appendix E – Data Model Mapping (Tables)

Following diagram shows the database tables of LC&KM database layer and its respective mapping model.



Appendix F – Sequence Diagrams

Appendix F describes the sequence diagrams for the Recovery module in Safety Lockers & the Key Management system

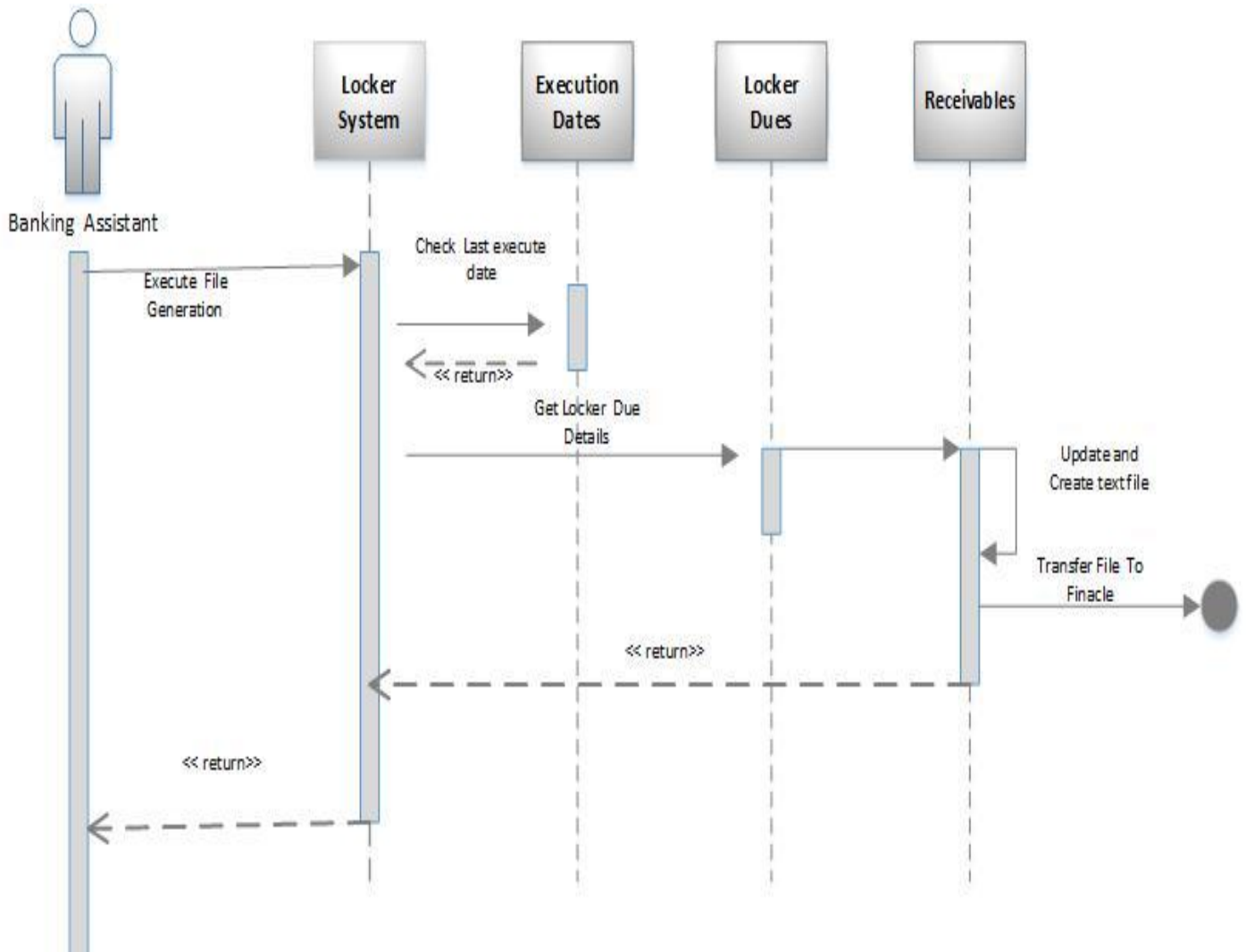


Figure F-1 - Sequence Diagram of Recovery File Generation

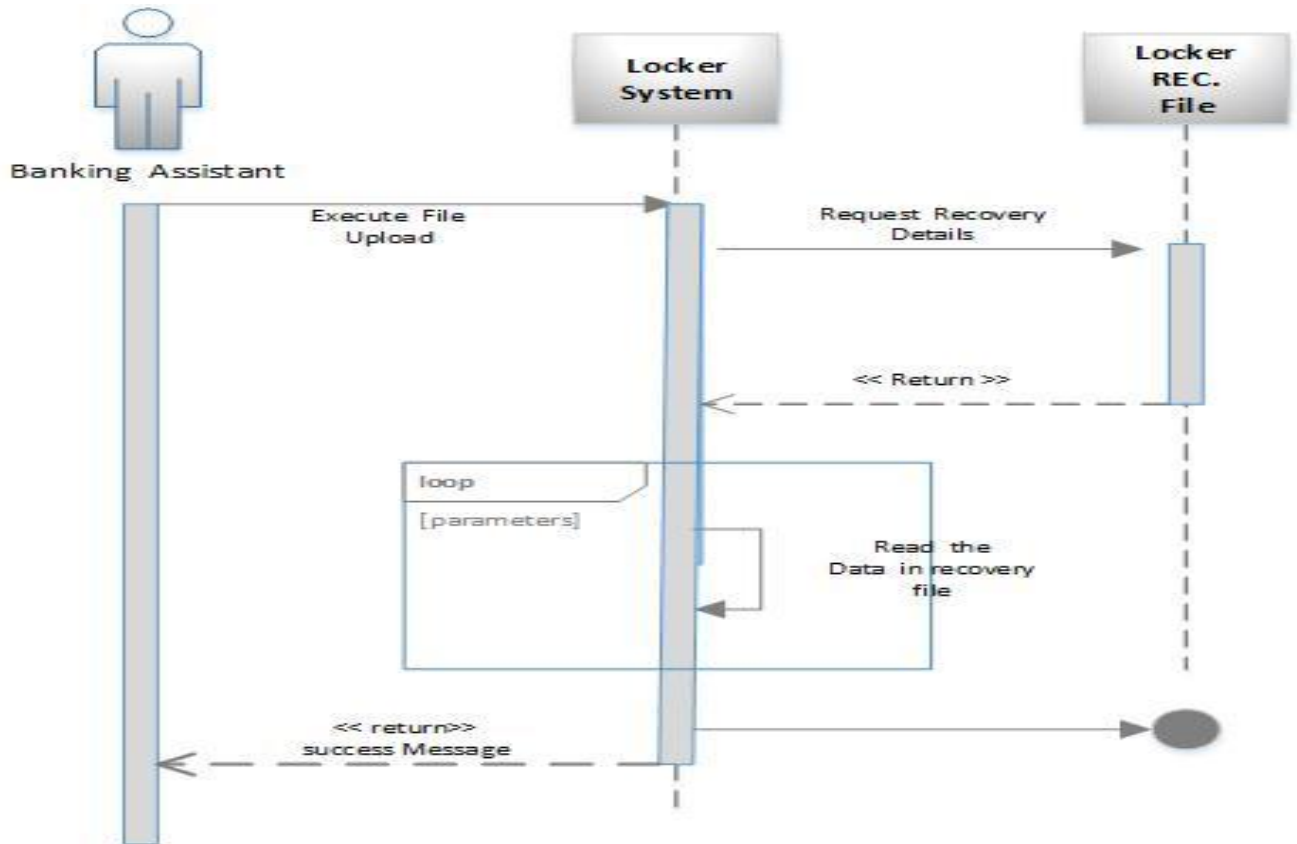


Figure F-2 - Sequence Diagram for Recovery file Upload in locker system

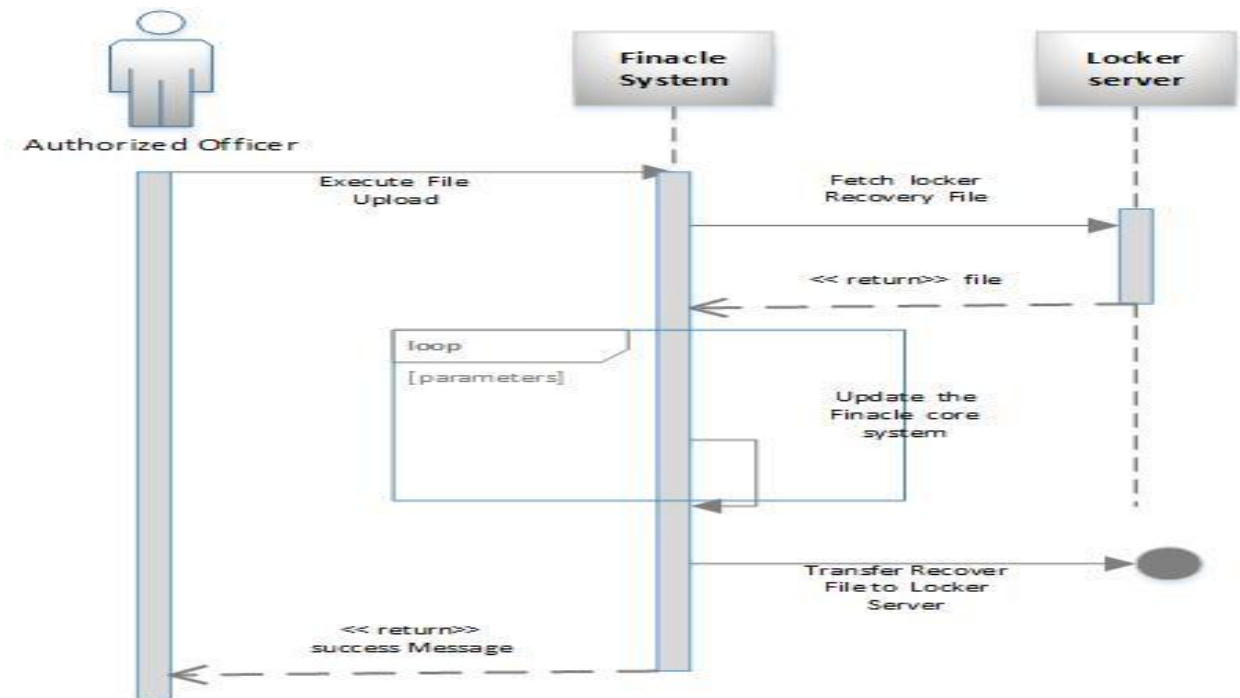


Figure F-3 - Sequence Diagram for Recovery file transfer to Core Banking System

Appendix G – System User Manual



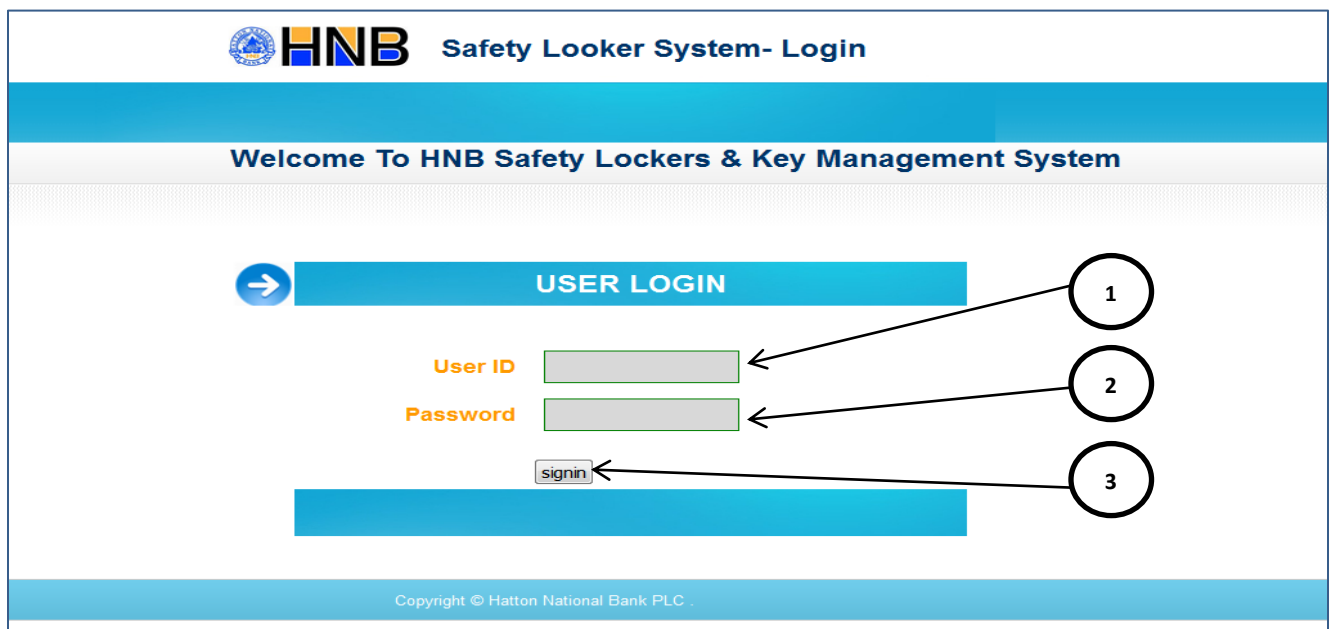
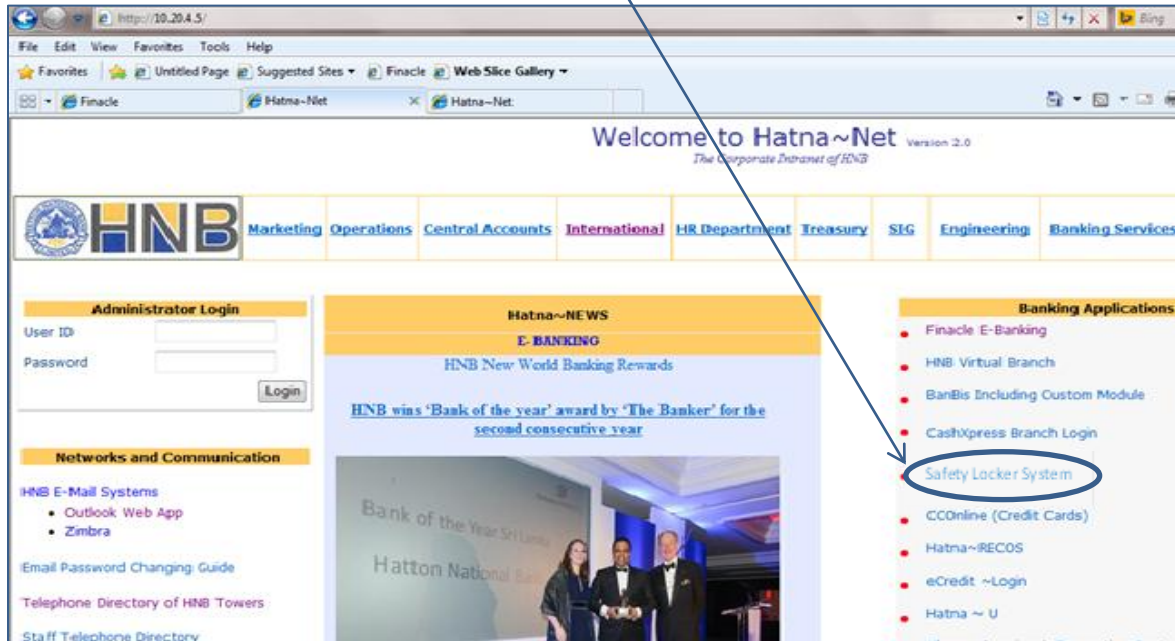
USER MANUAL

**SAFETY LOCKERS & KEY
MANAGEMENT SYSTEM**



1 Login To the System

- Go to Hatna Net ---> Click On Locker System ----> Enter User Name & Password (Main Page of Locker system will loaded)



- 1 User ID :- Enter The User's EPF number
- 2 Password :- This is the password of the User
- 3 Click on Signing

2 Customer Module

2.1 Add Customers (Main Menu → CUSTOMERS → ADD)

- Login user : Banking Assistant
- Type : ADD/ CANCEL customers to the system

HNB Safety Locker System - Customer Details Add

TYPE: **ADD** * CIF: _____ DATE: 08/03/2017

PERSONAL DETAILS

TITLE: * Mr
FULL NAME: * _____
GENDER: * Male
DATE OF BIRTH: * _____ (MM/DD/YYYY)
STAFF: YES NO EPF NUMBER: _____
IDENTIFICATION: NIC P/P D/L NUMBER: * _____

COMMUNICATION DETAILS

ADDRESS LINE 1: * _____
CITY: * _____
DISTRICT: * Ampara
CONTACT NUMBER: _____ RESIDENCE: _____ * MOBILE: _____
E MAIL ADDRESS: _____

SUBMIT RESET

➤ Following Details Are Mandatory Inputs

- CIF : Customer Identification Number , should obtain from the Finacle Core System
- Title : Select from The dropdown list (Mr / Mrs/ Dr/Rev....)
- Full Name : Customer’s full name
- Gender : Male/Female
- Date of Birth : Date of birth
- Identification : NIC –National ID , P/P - Passport , D/L – Driving License
- Staff : If the customer is a staff member their EPF number should be entered
- Address line1 : Customer Communication address
- City : city where customer lives
- District : select from the drop down
- Mobile : contact mobile number

➤ After input the data click “SUBMIT” To Proceed

- Customer Modifications menu (**Main Menu → CUSTOMERS → MODIFY**) operates in the Same way , where when user input the user ID user details will auto populate and user can modify the data

2.2 Verify Customers (Main Menu → CUSTOMERS → VERIFY)

- Login user : Authorized Officer or Above Work Class
- Type : Verify the Customer details that already Input

The screenshot shows the HNB Safety Locker System interface for Customer Details Verification. The form is titled "Safety Locker System - Customer Details Verification" and features the HNB logo. The form is divided into several sections: "PERSONAL DETAILS" and "COMMUNICATION DETAILS".

Form Fields:

- TYPE:** VERIFY (dropdown menu)
- CIF:** 000766709
- DATE:** 08/03/2017
- PERSONAL DETAILS:**
 - TITLE:** * Mr (dropdown menu)
 - FULL NAME:** * kanishka muthu
 - GENDER:** * Female (dropdown menu)
 - DATE OF BIRTH:** * 02/09/2017
 - STAFF:** YES (radio), NO (radio, selected)
 - EPF NUMBER:** 5757
 - IDENTIFICATION:** NIC (radio, selected), P/P (radio), D/L (radio)
 - NUMBER:** * 843662722v
- COMMUNICATION DETAILS:**
 - ADDRESS LINE 1:** * bcvb
 - CITY:** * bcvb
 - DISTRICT:** * Matara
 - CONTACT NUMBER:** * bcv
 - RESIDENCE:** * bcv
 - MOBILE:** 071555555
 - E MAIL ADDRESS:** gdfg@123

Buttons: VERIFY, CANCEL

- Inputs (Mandatory)
 - CIF : Customer Identification number which input by the user in the locker system
- User only can view where it is not possible to make any modifications on this screen
- After the verification of the data click “VERIFY” to verify the user data.

2.3 Pending Customers (Main Menu → CUSTOMERS → PENDING LIST)

- Login user : Authorized Officer or Above Work Class
- Function : Add /Modify /Cancel /Approve

The screenshot shows a web form titled "Safety Locker System - Maintaining Pending Customers" with the HNB logo. The form has a light blue background and contains the following fields:

- Function: * ADD (dropdown menu)
- Status: * Informed (dropdown menu)
- ID Number: * (text input)
- Customer Name: * (text input)
- Contact Number: * (text input)
- Address: * (text input)
- Date Requested: * (text input)
- Date Informed: (text input)
- Date Expire: (text input)
- CIF: * (text input)

At the bottom of the form are two buttons: "ADD" and "Cancel". The footer of the page reads "Copyright © Hatton National Bank PLC".

➤ Inputs (Mandatory)

- Status : Pending (When User request for lockers) , Informed (After the bank inform to the customer) , Deleted (User request expire or deleted from the system)
- ID Number : Customers National Identity Card Number
- Customer name : Customer' s name
- Contact Number : Customer's Contact number
- Address : Customer's Address
- Date Requested : The date which customer made the request for the locker
- CIF : Finacle Customer Identification Number

➤ Inputs (Non Mandatory)

- Date Informed : The date that bank has informed the customer for their request
- Date Expiry : The expiry date of the customer requested

- Click on "Add " to add data to the system
- Click on "Cancel" to Clear the data from the form

3. Locker Module

3.1 Add Lockers (Main Menu → LOCKERS → ADD)

- Login user : Banking Assistant
- Type : Add / Cancel

HNB Safety Locker System - Locker Details Add

Type: ADD

LOCKER DETAILS

Locker Id: Sol Id: 009

Size: * Parent Locker Id: *

Locker Type: * Individual Main CIF: *

Join CIF1: Join CIF2:

Operating Instructions: Any One Max. Visits: 3

Locker Status: Active Block Reson Code:

RECOVERY DETAILS

Recovery Account: * Next Recovery Date: *

Locker Rental: * Customer Type: * Regular

Waive Charges: Yes No

SECURITY DETAILS

Amount Lien: * Date Lien: *

Account Lien: *

Submit Clear

➤ Inputs (Mandatory)

- Size : Size Of the Locker (Small / Medium /Large)
- Parent Locker : Available lockers in the branch (this will populate after selecting the size)
- Locker Type : Type of the locker (Joint or Individual)
- Main CIF : Locker Main holders CIF
- Operating Instructions : Instructions on how the locker should operate (Any one , Any Two , All The parties , Only Main Holder , Main Holder with Any One)
- Recovery Account : Account which locker recoveries will be carried on
- Next recovery date : Date which the recovery will be carried on
- Locker Rental : Locker rental amount (annual Fee)
- Customer type : Type of the customer (Regular Customer Or Crystal Customer)
- Amount Lien : Amount Block for the locker in the core banking system
- Account Lien : Account which block for the lien in core banking system
- Date Lien : date which lien has entered in the core banking system

➤ Lien account should be a savings account

➤ Click “Submit” to Submit data

3.2 EDIT / CLOSE Lockers (Main Menu → LOCKERS → EDIT/CLOSE)

- Login user : Banking Assistant
- Type : Edit /Close

 **Safety Locker System - Locker Details Edit/Close**

Type CLOSE ▾

LOCKER DETAILS

| | | | |
|------------------------|---|------------------|---|
| Locker Id | <input type="text" value="009S000021"/> | Sol Id | <input type="text" value="009"/> |
| Size | <input type="text" value="Small"/> | Parent Locker Id | <input type="text" value="009S00002"/> |
| Locker Type | * <input type="text" value="Individual"/> | Main CIF | * <input type="text" value="000766709"/> |
| Join CIF1 | <input type="text" value="000511788"/> | Join CIF2 | <input type="text" value="001245"/> |
| Operating Instructions | <input type="text" value="Any One"/> | Max. Visits | <input type="text" value="3"/> |
| Locker Status | <input type="text" value="ACTIVE"/> | Block Reson Code | <input type="text"/> |
| Close Date | <input type="text" value="03/08/2017"/> | Close Reason | <input type="text" value="customer Request"/> |

RECOVERY DETAILS

| | | | |
|------------------|---|--------------------|---|
| Recovery Account | * <input type="text" value="009020410951"/> | Next Recovery Date | * <input type="text" value="2018-02-18"/> |
| Locker Rental | * <input type="text" value="5000"/> | Customer Type | * <input type="text" value="Regular"/> |
| Waive Charges | Yes <input type="radio"/> No <input checked="" type="radio"/> | | |

SECURITY DETAILS

| | | | |
|--------------|--|-----------|---|
| Amount Lien | * <input type="text" value="10000"/> | Date Lien | * <input type="text" value="2017-02-28"/> |
| Account Lien | * <input type="text" value="0090204109512"/> | | |

- If the selected option is EDIT then the mandatory inputs are same as locker “ADD” function
- If Selected option is “CLOSE” then CLOSE DATE and the CLOSE REASON is mandatory

3.3 AUTHORIZE Lockers (Main Menu → LOCKERS → AUTHORIZE)

- Login user : Authorized Officer or Above Work Class
- Type : Verify

The screenshot shows the 'Safety Locker System - Locker Details Authorize' interface. At the top, there is a header with the HNB logo and the title. Below the header, there is a 'Type' dropdown menu set to 'VERIFY'. The form is organized into three main sections:

- LOCKER DETAILS:** This section contains fields for Locker Id (dropdown menu with '0095000021' selected), Size (Small), Locker Type (Individual), Join CIF1 (000511788), Operating Instructions (Any One), Locker Status (Restricted), Close Date, Sol Id (009), Parent Locker Id (009500002), Main CIF (000766709), Join CIF2 (001245), Max. Visits (3), Block Reson Code, and Close Reason.
- RECOVERY DETAILS:** This section contains fields for Recovery Account (009020410951), Locker Rental (5000), Waive Charges (Yes/No radio buttons), Next Recovery Date (2018-02-18), and Customer Type (Regular).
- SECURITY DETAILS:** This section contains fields for Amount Lien (10000), Account Lien (0090204109512), and Date Lien (2017-02-28).

At the bottom of the form, there are two buttons: 'VERIFY' and 'CANCEL'. The footer of the page reads 'Copyright © Hatton National Bank PLC'.

- Inputs
Locker Id : User has to select the locker number from the drop down menu
- If there aren't any pending authorizations locker id dropdown will be empty
- Click "VERIFY" button to verify the locker entry

3.4 SIGNATURE UPLOADS (Main Menu → LOCKERS → SIGN.ADD)

- Login user : Banking Assistant
- Function : ADD / DELETE / CANCEL

The screenshot shows the 'Safety Locker System - Customer Signature Upload' interface. It features a light blue header with the HNB logo and title. The main form area is light green and contains the following fields:

- Function**: * ADD (dropdown)
- Type**: * SIGNATURE (dropdown)
- Locker Id**: * 009S000021 (text input)
- CIF**: * 000766709 (dropdown)
- Customer Name**: kanishka muthu (text input)
- Identity Number**: 843662722v (text input)
- Image**: * (text input) with a 'Choose file' button

At the bottom of the form are 'Upload' and 'Clear' buttons. The footer contains the text 'Copyright © Hatton National Bank PLC'.

- Inputs (Mandatory)
 - Type : Type of the image that going to upload (SIGNATURE /IDENTITY)
 - Locker ID : Locker Id that image
 - CIF : Customer's CIF which the image belongs to
 - Image file : Image file that going to upload (only JPG or PNG are allowed formats)
- CIF's will auto populate when the user input the locker id , Therefore user has to selet the CIF from the drop down
- Click "Upload" Button to upload the image to the system
- Image cancellation and deletion both has to do in the same way.

3.4 SIGNATURE VERIFY (Main Menu → LOCKERS → SIGN.VERIFY)

- Login user : Authorized Officer or Above Work Class
- Function : VERIFY

The screenshot shows the 'Safety Locker System - Customer Signature Verify' interface. It features a teal header with the HNB logo and title. Below the header, there is a form with the following fields and values:

| | |
|-----------------|----------------|
| Function | VERIFY |
| Approval Option | DELETE |
| Type | IDENTITY |
| Locker Id | 009S000021 |
| CIF | 000766709 |
| Customer Name | kanishka muthu |
| Identity Number | 843662722v |

On the right side of the form, there is a photo of a man with the number '843662722 V' above it. An arrow points to this photo. Below the form are two buttons: 'Verify' and 'Clear'. At the bottom of the page, there is a copyright notice: 'Copyright © Hatton National Bank PLC'.

➤ Inputs (Mandatory)

- Approval Option : Unapproved upload image function (ADD /DELETE)
 - Type : Image type that have been uploaded (IDENTITY/SIGNATURE)
 - Locker ID : Locker Id that the images upload
 - CIF : Customer's CIF which the
-
- CIF's will auto populate when the user input the locker id , Therefore user has to select the CIF from the drop down
 - If the unauthorized data are correct the relevant image will be displayed on the screen
 - Click the "VERIFY" button to verify the signature

3.4 Locker Visit Update (Main Menu → LOCKERS → VISIT UPDATE)

- Login user : Banking Assistant
- Function : ADD / CANCEL

- Inputs (Mandatory)
 - Locker ID : Locker Id number that customer expects to visit
- After input the locker id all the locker related details will load to the screen
- By clicking the “VIEW IMAGE” button user can view both identity and signature image
- Check the users who sign the locker access form _____
- Click the “SUBMIT” button to add the locker visit entry to the system
- Locker visit approval is a similar operation to locker visit which only can execute by a person whose work class is over 160
 - Main Menu → LOCKERS → VISIT UPDATE is the path to approve the locker visits

4. Recovery Module

4.1 Recoveries Auto Upload (**Main Menu** → **RECOVERIES** → **DAILY. REC**)

- Login user : Banking Assistant
- Function : Entries Generation / Finacle File Creation / Entries Upload

The screenshot shows a web application interface for HNB Safety Locker System. The title bar reads "HNB Safety Locker System - Recoveries Auto Upload". The main content area has a light purple background and contains a form with the following fields:

| | |
|-----------|--------------------|
| Function | Entries Generation |
| File Type | Daily Recovery |
| File Name | |
| Sol Id | 009 |
| Date | 09/03/2017 |
| User Id | 08837 |

Below the form are two buttons: "Generate" and "Cancel". At the bottom of the page, there is a copyright notice: "Copyright © Hatton National Bank PLC". A black arrow points from the right side of the form area towards the File Name field.

- Inputs
 - File Type : Valid inputs are Daily Recovery / Excess visits
 - File Name : Text file which transfer from Finacle Core banking server
- Daily recovery and Excess Visits are only allowed with Entries Generation where daily recovery has to perform daily and Excess visits has to perform on 1st working day of the each month. These processes cannot be duplicate after executed once
- Each time user executes the recovery process user has to perform Finacle File creation so the system will transfer the text file to core banking server to charge the customer accounts in core banking system.
- After executing the recovery run in the core banking system it will generate a file which contains details of recovered transactions and the file name will be in following format "FIN_DATE.txt" eg :- FIN_20170301.txt
- After selecting entries upload and input the text file name user can upload the Finacle recovery file to the locker systems
- Since this is an automated recovery process no need to approve any records where system it self approved when the run is executed

4.2 Manual Recoveries (Main Menu → RECOVERIES → MANUAL. REC)

- Login user : Banking Assistant
- Function : Recovery /Cancel

HNB Safety Locker System - Manual Recoveries

Function: RECOVER
Locker Id:
Recovery Type:
Date: 09/03/2017

| Arrears Details | |
|----------------------|-----------------------|
| Rental Arrears | Recovery Amount: 0.00 |
| Excess Visit Arrears | Recovery Amount: 0.00 |
| Total Arrears | Total |

Special Charges Recovery

Type: Issuing Duplicate Key
Amount: 0.00
Special Remarks:

RECOVER CLEAR

- Inputs
 - Locker Id : Locker id of the user that the recovery will be carried done
 - Recovery Type : Normal (for normal rental or excess visit charges) Special- for special recoveries
- If the user select normal recoveries the arrears details will be loaded to the system and the recovery amount should be enter in the “RECOVERY AMOUNT” fields and the total will auto adjusted by the system according to the recovery amounts
- For Special recoveries User has to select the recovery “TYPE” from the dropdown and the amount in the AMOUNT field and if there any remarks user can use SPECIAL REMARKS fields for that
- By Clicking on the “RECOVER” button can upload recovery data to the system
- APRPROVING the unauthorized recovery data as same as the above where it has to be done by a higher work class than 160 (Main Menu → RECOVERIES → APPROVE)

5. Key Transfers

5.1 Add Key Transfers (Main Menu → TRANSFERS → ADD)

- Login user : Users who has already been assigned a key
- Function : ADD /CANCEL

The screenshot displays the 'HNB Safety Locker System - Key Transfers' interface. At the top, there is a header with the HNB logo and the system name. Below the header, the form is organized into several sections. The first section contains input fields for 'Function', 'Sol Id' (with the value '009'), 'Key Id', 'Date' (with the value '09/03/2017'), 'Key Name', and 'Time' (with the value '11:11'). Below this is a section titled 'Current Key Details' which contains a table with four columns: 'User ID', 'Name', 'Designation', and 'Last Date Transferred'. Underneath this table is a 'Receiver ID' dropdown menu currently showing '08837'. Below that is a section titled 'Receiver Details' which contains a table with three columns: 'User ID', 'Name', and 'Designation'. At the bottom of the form is a 'Reason For Transfer' text input field, followed by 'Add' and 'Clear' buttons. The footer of the page contains the text 'Copyright © Hatton National Bank PLC'. Two black arrows point from the text below to the 'Current Key Details' table and the 'Reason For Transfer' field.

- Inputs
 - Key Id : Id of the key that is already own by the user will populate in the KEY ID drop down where user can select key
 - Reason For Transfer : Transfer Reason
- After selecting the key current key details will display in the “CURRENT KEY DETAILS” table
- “Receiver ID” dropdown will automatically populate according to the possible user who have the minimum work class to handle the key
- After selecting the user if Receiver’s details will be populated in the RECEIVER DETAILS table
- By clicking on the “ADD” button user can update key transfer to the system in unapproved status

5.2 Add Key Transfers (Main Menu → TRANSFERS → ACCEPT/DECLINE)

- Login user : Users who has pending key transfer to ACCEPT
- Function : ACCEPT /REJECT

The screenshot displays the HNB Safety Locker System interface for key transfers. At the top, the HNB logo and the title "Safety Locker System - Key Transfers Accept/ Decline" are visible. Below the title, there is a form with the following fields:

- Key Id**: MVKEY1 (dropdown)
- Function**: ACCEPT (dropdown)
- Sol Id**: 009 (text input)
- Status**: TRANSFERRED (text input)
- TRF Id**: 5 (text input)
- Key Name**: MAIN_VAULT (text input)
- Date**: 09/03/2017 (text input)
- Time**: 11:46 (text input)

Below the form, there is a section titled "Transfer Details" containing a table with the following data:

| User ID | Name | Transfer Reason | Transfer Date |
|---------|--------------|-----------------|---------------------|
| 08835 | R S Fernando | testin | 2017-03-09 11:46:08 |

Below the table, there is a "Reson For Decline" text input field and two buttons: "Accept" and "Cancel". At the bottom of the page, the copyright notice "Copyright © Hatton National Bank PLC" is displayed.

- Inputs
 - Key Id : Id of the key that has assigned to the user will populate in the KEY ID drop down where user can select key
- After selecting the key ID transfer details will be shown in the TRANSFER DETAILS table
- User can select ACCEPT/ DECLINE from the drop down where is decline is selected reason for decline should be entered and click the button "ACCEPT"
- If the key transfer is decline then input user has to enter another entry to new user where as if the key transfer is accepted status will be transferred to ACCEPT and user work class over 300 should approve the transaction.

5.3 Approve Key Transfers (Main Menu → TRANSFERS → APPROVE)

- Login user : User whose work class over 300
- Function : APPROVE

HNB Safety Locker System - Key Transfers Verify

Function Approve ▾ **Key Id** MVKEY14 ▾
Sol Id 009 **TRF Id** 4
Status ACCEPT **Key Name** MAIN_VAULT
Date 09/03/2017 **Time** 12:00

Transferor Details

| User ID | Name | Date | Time |
|---------|-------------------|------------|----------|
| 08837 | PKM MUTHUKUMARANA | 2017-02-20 | 00:00:01 |

Transferee Details

| User ID | Name | Date | Time |
|---------|--------------|------------|----------|
| 08835 | R S Fernando | 2017-03-03 | 19:28:40 |

Reason For Transfer testing 1

Verify Cancel

Copyright © Hatton National Bank PLC

- **Inputs**
 - Key Id : Key id that is already been transferred and in the acceptance status.
- If there are any key transfers which are in accepted status those key id's will populate in the KEY ID field where user has to select the relevant id
- After selecting the key ID TRANSFER DETAIL table will populate transferor details where as TRANSFEREE DETAIL table will display transferee details .
- After click on the VERIFY button the key transfer will approved and the new key ownership will be changed

