



**Management Information System  
to Manage Logistic Operations of  
Sri Lanka Ports Authority -  
Colombo**

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

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## **ABSTRACT**

Sri Lanka Ports Authority (SLPA) provides the best in class maritime logistics services to the country. Port of Colombo, operates with many Container Terminals (CT). Jaya Container Terminal (JCT) is the main gateway for containerized cargo compare to the other container terminals. Operations of Jaya Container Terminal (JCT), primarily characterized into two sections as Container Operation handling process and the Cargo Management logistics process. The Logistics Division of Sri Lanka Ports Authority (SLPA) is responsible to manage all the processes of Cargo and Logistics services including billing systems related to the cargo management operations which is handled by SLPA. The logistics process categorized under main methodologies which are identified as Less Container Load (LCL) operation, Multi-Country Consolidation (MCC) operation, Normal operation, Special operation and Rent operation of empty containers. Other than the Less Container Load (LCL) operation, all the other operations are based under application form called 'Rework Application' and a process called Agent Billings system still handled by manually. Therefore, the objective of this project is to implement a Management Information System that covers all manual logistic operations handled by the JCT of the Sri Lanka Ports Authority.

The Management Information System to manage Logistic Operations of Sri Lanka Ports Authority is providing a secure web-based system to manage existing manual logistic operations to increase the efficiency and effectiveness of the current process. The system is implemented to handle main Logistic Operations such as Multi Country Consolidation (MCC) operation, Normal operation, Special operation and Rent operation of empty containers. The overall system is integrated under the SLPA intranet for security purposes. The SLPA servers will host the system and only authorized people can access the system. Finally, this system facilitates to have automation of the current manual logistic operations while increasing the effectiveness and efficient along with minimizing the human involvement and humankind errors.

## 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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## LIST OF ACRONYMS

AJAX	Asynchronous JavaScript and XML
AUS	Assistant Unit Superintendent
BQ	Bandaranayake Quay
CTIS	Container Terminal Information Systems
FCL	Full Container Load
HPC	Hamburg Port Consulting
IDE	Integrated Development Environment
IIS	Internet Information Server/Service
JCT	Jaya Container Terminal
JSON	JavaScript Object Notation
LCL	Less Container Load
MCC	Multi-Country Consolidation
MIS	Management Information System
MVC	Model View Controller
OOP	Object-Oriented Programming
PHP	PHP:(Personal Home Page) Hypertext Preprocessor
SLPA	Sri Lanka Ports Authority
UI	User Interface

## 1 INTRODUCTION

Sri Lanka Ports Authority, Colombo is primarily a container port and it's located in one of the best strategic locations in the main shipping route connecting Europe, East, and Southeast Asia, North and South continentals of America as well. Comparison with the other ports, this location is more advantageous for us. Port of Colombo presently operates three terminals named Colombo International Container Terminal (CICT), South Asia Gateway Terminal (SAGT) and Jaye Container Terminal (JCT). Hence, to sustain in the trade in the world, the port of Colombo has to improve port operation effectively and increase the productivity in those operations [1].

Those container terminals handle the following operations,

- Loading/Discharging of containers from/to vessels (Ships)
- Stuffing/DE stuffing containers.
- Stacking of containers in the yard
- Gate operations (Manage in and out containers)
- Equipment management

Considering the vessel and cargo operations, the port of Colombo divided into few divisions to easy to manage the cargo operations. The Logistics is one of the main division of the Sri Lanka Ports Authority and Logistic provider of Sri Lanka Ports Authority which offers best in class logistic solutions while fostering a disciplined culture of safety, security and trust [2]. Major operations such as FCL Cargo delivery operations, LCL cargo delivery operations, Multi-country consolidation operation (MCC) and warehousing are handled by Logistics Division.

When considering the Multi-country consolidation (MCC) operation, it is a newly introduced operation in the port of Colombo and it is mainly affected by the annual revenue of the Sri Lanka ports authority. Multi-Country Consolidation (MCC) is a combination of multiple destination transshipment cargoes. MCC cargo comes in a container is transhipped to the desired destination through several containers after Rework Operations at the Port of Colombo. To improve the volume of the MCC cargo handling, the port has to streamline the Rework Operation.

## **1.1 Rework Operation**

When considering the cargo clearance process, after completing the vessel operations (container loading and discharging from the vessel) at a container terminal, the cargo operations are started. When a container comes under the MCC category, the cargo clearance process based under the Rework Operations.

Rework Operation based on a Rework document. This document visualized the full process of the MCC cargo of the corresponding one or many numbers of containers. Rework Operation mainly divided into four categories,

- Multi-Country Consolidation (MCC) operation
- Normal Operation
- Special Operation
- Second De-stuffing

## **1.2 Multi-Country Consolidation (MCC) operation**

Multi-Country Consolidation (MCC) is a combination of multiple destination transshipment cargoes. MCC is the only operation used warehouse facility when transshipment of cargoes. The MCC operation again divided into two categories,

- Full Multi-Country Consolidation (MCC) operation
- Local + Multi-Country Consolidation (MCC) operation

The Full MCC category contains only transshipment cargoes while Local with MCC (Local + MCC) contains both transshipment and local cargoes.

## **1.3 Normal Operation**

When rework request come under the Normal operation category, those containers are not using warehouse facilities but the same time provided stuffing or De-stuffing services and transhipped to the desired destination. So as per the Agents earliest request, these cargoes will tranship to other destination and it will cost more service charge than the Special operation.

## **1.4 Special Operation**

When rework request come under the Special operation category, the operation cost is less than the Normal operation, since this operation category clearly defines what kind of services and facilities they need. Cargo comes under this operation category as containers or as bulks. According to the cargo type, the Special operation is divided into 2 categories,

- One-Way Service

This service describes the process of stuffing or De-stuffing of cargoes from container to bulk or bulk to container.

- Two-Way Service

This service describes the process of stuffing or De-stuffing of cargoes only one-way path from container to container.

### **1.4.1 Second De-stuffing**

When cargo is De-stuffed in two deferent warehouses, it is identified the operation as second De-stuffing.

### **1.4.2 Rent Operation Of Empty Containers**

When Agents do not remove their empty containers from container yards in the Ports authority, a rental will be charged for empty containers by Logistic division. Initially, the first five days are free from charged and thereafter rental will be charged. These dates are mentioned in the Rework document.

## **1.5 Statement of Problem**

A huge number of containers are handled by three main terminals which are identified as JCT, CICT, and SAGT. In one container terminal is approaching its current per annum capacity, 250 000 TEU (twenty-foot equivalent unit steel container). Therefore, all three terminals per annum capacity should be more than three times as 250 000 TEU, but this capacity has been limited due to a manual process of current Rework operation. Hence manual operation leads to less effective and efficient when considering the annum capacity of container operations [2].

The current manual system is based on the Rework application form and a number of steps are depended with human involvements. In view of the current system, humankind errors can be happed, thus it will result in down the whole Rework application process until the problem is identified. Some of the other drawbacks are listed below,

- Duplication of the transaction can happen
- Difficult to track records modifications
- The records are changed by Employees without permission of authorized persons

- Calculate revenue is difficult
- No system to trace history information of Rework operations
- No system to manage Agents information of vessels

More information about drawbacks can be found on *section 2.3.2*.

Therefore, proposing a new solution will be helped to eliminate the drawbacks in the current system.

## **1.6 Motivation**

As described above, major commercial ports in Sri Lanka is handled by the Sri Lanka Ports Authority (SLPA), Colombo. Not like other government sectors, SLPA gives a huge contribution to the national economy by handling domestic and transshipments containers and other services.

Finding anomalies of current SLPA process and giving them solutions by using an information system, will definitely increase the productivity and efficiency of the SLPA.

Also, most of the SLPA back-end operations are hidden from the end-users. Analyzing these operations will be an adventure. Although there are a number of operations are handled by SLPA, among them, Logistic division is one of the main divisions handled a number of operations related to cargo management. Analyzing the current Logistic operations structure and providing IT-based solution for its anomalies will be a great opportunity.

When considering the cargo management, Multi-Country Consolidation (MCC) is identified as one of the main methods handle by Logistic division in SLPA. However, the operation is still functioning as a manual paper-based system. When deeply analyzing the operation, it is found that its tasks can be utilized in an IT-based system and giving such system will overcome many drawbacks under the MCC process. More information about these drawbacks is described in *section 1.5*.

Considering their present situation, introducing a computerized system to manage Rework operation under MCC process is a great opportunity to the staff of Logistic division to plan and anticipate for future demand, in advance they can react immediately for any situation in cargo management.

## 1.7 Objectives

As described above the main objective of this proposed system is to introduce a Management Information System to the Logistic division of SLPA, in order to cover the overall functionalities of Rework operations under the MCC process.

Main objectives of the project are as follows,

- To provide an automated system to track user base roles and tasks.
- To provide an interface to Managers and Directors to track missing billing information and in decision making
- To facilitate to generate reports of monthly revenue.
- To provide an up-to-date current status of the process.
- To increase the efficiency and effectiveness of the process.
- To minimize human involvement and minimize human kind errors
- To give facilities to authorized customers to get real-time information about their billing.
- To provide an efficient and enhanced empty container renting process
- To enhance financial control and improved cash flow

## 1.8 Scope of the Project

The Management Information System (MIS) will be implemented covering the MCC, Normal, Special operations and empty container rent calculate operation based on an application form called “Rework Application”.

More information about these operations can be found on *APPENDIX A*

Functions to be developed,

- Manage Rework operation data
- Manage required documents in the Rework operation
- Print Rework operation card
- Manage Agents
- Bill preparation for particular Agent
- Maintain credit balance account status of Agents
- The report generates (Terminal wise report, Container size report, Cargo Dispatch Note report)
- Calculate and manager the rent for the empty containers
- Manage the confirmation of CDN (Cargo Dispatch Note) return from warehouse
- Manage billing confirmation to check whether Rework/check events are billed



- Manage Document handling
- Manage exchange rate
- Manage Rework registration, modification, and update

## **1.9 Overview of Report**

This report based on an implementation project, therefore first chapter includes the summary with overview of the proposed system. Second chapter describes background of the current process and drawback of the current manual Rework operation system. Third chapter illustrates the methodologies and techniques which have been used to develop the system. Third one is evaluation. It gives the evaluation procedures of different functionalities of the proposed system. Last chapter is conclusion. It emphasizes which objectives that are archived and the future enhancements of the developed system.

## 2 BACKGROUND

### 2.1 Introduction

This chapter mainly concentrates about the background of the current process and drawback of the current system. In this illustration, describe the business background and identify the functional and nonfunctional requirement of the proposed system. In addition, concentrates about the previous studies or the existing systems are how to affect to the proposed system. This chapter consists of several subsections, like business background, the current system, and drawbacks, the existing system, etc.

### 2.2 Business Background

Logistic provider of Sri Lanka Ports Authority which offers best in class logistics solutions while fostering a disciplined culture of safety, security, and trust.

Services Offer,

- FCL/LCL Cargo delivery operations
- LCL cargo delivery operations
- SLPA operates following warehouses to store De-stuffed cargo and provide 24hrs/365days security for cargo in all warehouses until cargo delivery is completed.
- Handling of General cargo and the separate unit/yard is arranged to De-stuff vehicle containers (FCL/LCL) and to park the vehicles securely until delivery.

Sri Lanka Ports Authority has three main terminals to manage cargo transshipment. These terminals are identified as Colombo International Container Terminal (CICT), South Asia Gateway Terminal (SAGT) and Jaye Container Terminal (JCT). As the initial step, vessel operations are started when a particular vessel is arriving at a specific terminal. In this stage, the vessel Agent provides a document called Manifest and this document contains all the details about containers of the vessel. According to the Manifest, document containers are categorized in a specific way which illustrated in the following Figure.

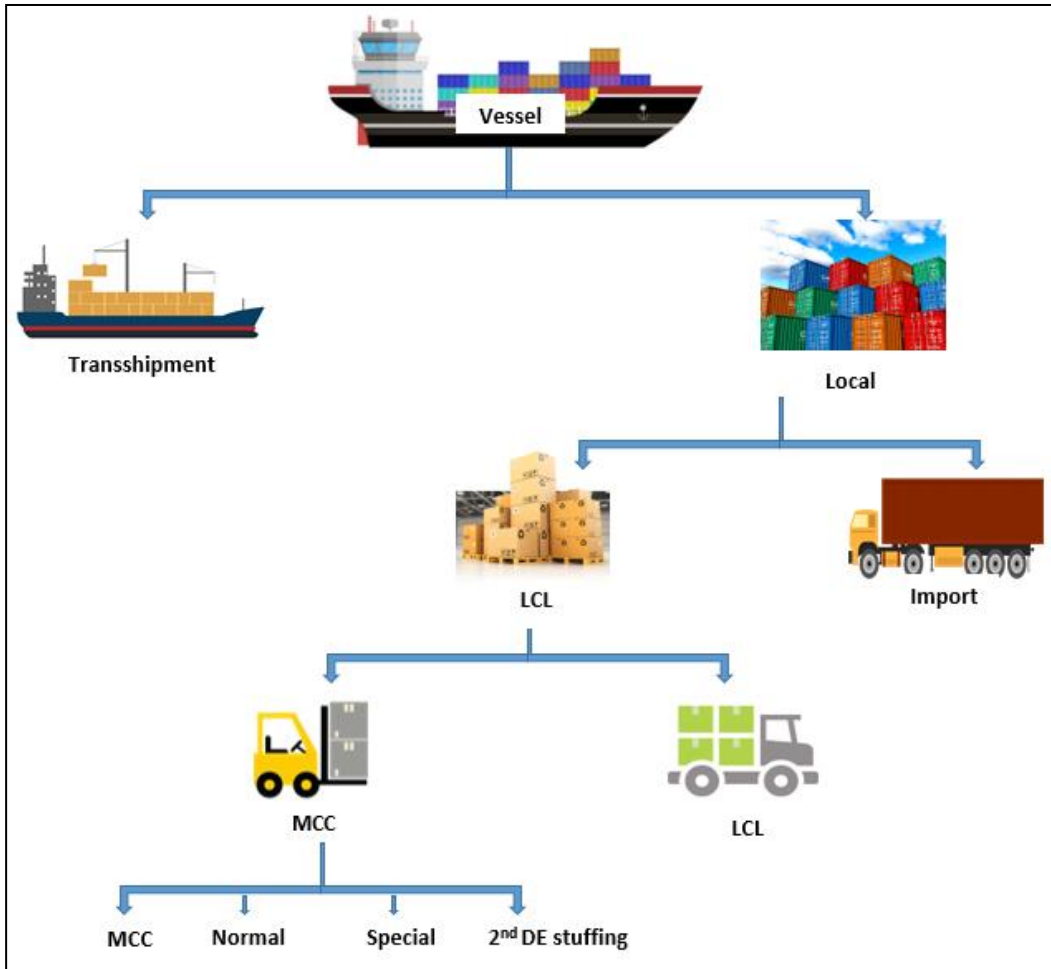


Figure 2.1: Cargo operation in Terminal

As shown in Figure 2.1: Cargo operation in Terminal, containers of a vessel are categorized into two categories. Which called as Transshipment and Local. Transshipment is the shipment of goods or containers to an intermediate destination, then to another destination [7]. Under the transshipment category, no cargo operations are allocated by the SLPA. However, cargo operations are allocated for Local type categories. The Local type categories are again divided into another 2 subcategories named as Less Container Load (LCL) and Import. When the destination of Cargoes belongs to Sri Lanka, these cargo operations are functioning under the Import subcategory. If a shipper does not have enough goods to accommodate in a fully loaded container, he arranges with a consolidator to book his cargo. This type of shipment is called LCL shipment. [8]. The LCL is again categorized into two sub-categories called Multi-Country Consolidation (MCC) and Less Container Load (LCL) under the main LCL.

Multi-Country Consolidation (MCC) is actually a combination of single or multiple transshipments and exports. To consolidate the cargo a Customs bonded warehouse can be used. The whole MCC operation can be handled with the usual transshipment and exporting procedures [9]. The MCC is a type of process for stuffing and De-stuffing of cargoes. When a container comes under the MCC category, the Rework document is based for handle cargoes. The Rework document is used to operate below operations.

- Multi Country Consolidation (MCC) operation
- Special operation
- Normal operation

More details the Rework operations are described in section 1.1.

## **2.3 Overview of the Current System and Drawback**

This topic illustrates the analysing methods and drawbacks of the current system.

### **2.3.1 Analysing the Current System**

Current system solely depends on manual document process and it is not an automated system. The overview of the current manual process and its steps are described in the *Figure 2.2*

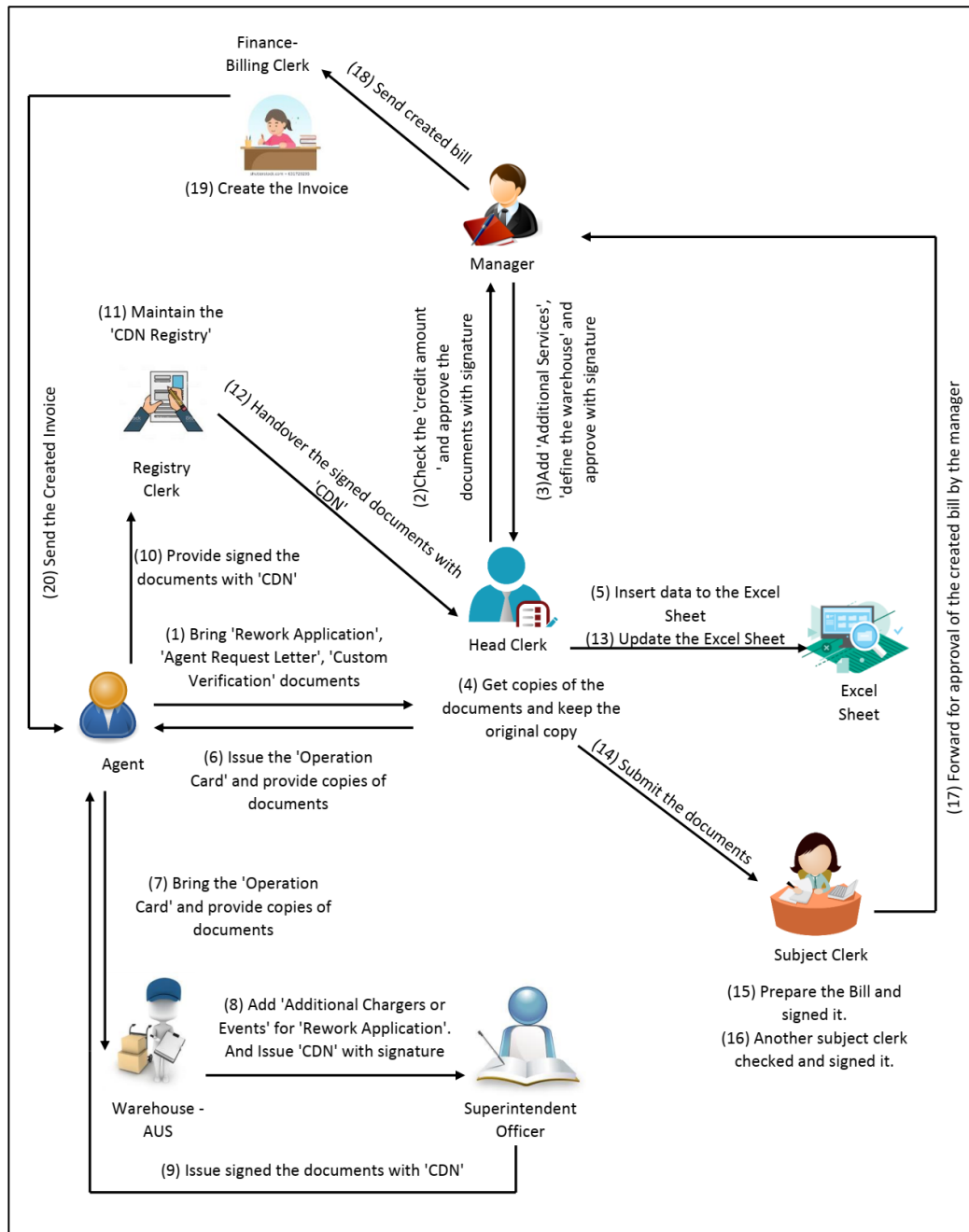


Figure 2.2: Overview of the Current Manual Rework Operation

According to Figure 2.2: Overview of the Current Manual Rework Operation, Rework application is brought by the Agent of a particular vessel to Head clerk. Once documents are analyzed by the Head clerk of the logistic division those are sent to Manager in charge for approval. Once again the documents are received by the Head clerk after approved by Manager. An excel sheet is maintained by Head clerk to insert information about the Rework documents. As described in the step-6 in the above figure, Agent has issued an operation card with copies of the Rework documents. The original documents are kept by the Head clerk. Next, the operation card and rework documents are provided to the Assistant Unit Superintendent (AUS)

who is the responsible person works in the warehouse. The documents are analyzed by the AUS and send to Superintendent Officer for approval. Superintendent Officer works as a head of the warehouse, thus Cargo Dispatch Note (CDN) is checked by him and approved. The approved documents are sent to the Registry clerk (person who manage the CDN records) by Agent. These records are written in a book by Registry clerk for future references. Once more the Rework documents are received by Head clerk, then records are inserted into the excel sheet and submit the documents to Subject clerk. In this step the documents are signed by two Subject clerks and a bill will be created by them in order to create an invoice. This bill is forward to the Manager for approval. Once the documents are approved by Manager those will be sent to the financial division to create the invoice for cargoes.

Please refer the *APPENDIX F* for sample documents.

### **2.3.2 Drawbacks of the Current System**

Drawbacks of the existing system are listed below,

- Difficult to track record modifications of information by user roles. Current manual process has this problem, that employees can easily change the information on 'Rework Sheet' without permission of authorized persons and submit to the managers. Therefore, managers cannot identify employees who change this information.
- Difficult to trace history records of billing Agents since the historical records are kept in manually.
- Duplication of the transaction can happen on the current manual process.
- Calculation of revenue of a particular month is difficult.
- Current empty container renting process is paper-based, therefore calculate renting and modification will take time.
- When managing a particular Agent in the current manual system, lots of information should be considered. So managing this information on a paper-based way may take more time. When Agent requires to modify the information, it is not an easy task to do, since this process involves a number of documents to be considered. These documents are identified as Financial Documents, Logistic documents, Warehouse documents, etc.
- When users do their tasks under the manual paper-based process, sometimes human kind errors can be happed.

## **2.4 Review of Similar Systems**

It is important to understand about the similar systems before the implementation process of the current system and these similar systems are described in the below topics.

### **2.4.1 System for Less Container Load (LCL)**

Less Container Load (LCL) operation is identified as the only operation using a computerized system for its billing services at Sri Lanka Ports Authority.

The LCL operation has a totally different process than others. LCL not using Rework Application form for its billing cycle. But MCC, Normal and Special whole processes depend on Rework Application form. Hence, the LCL system is not applicable to other operations in SLPA [13].

Therefore SLPA is expecting to have a new system to handle MCC, Normal and Special Operations. Also as described in the Project Scope, the MCC, Normal and Special operations are inbuilt with their own unique operation methods. Hence, it is hard to find a similar external system to handle logistic operations which are conducted by SLPA. The new computerized system should be built by analyzing the current manual operations to fulfill the logistic requirements.

### **2.4.2 HPC and CTIS Systems**

System of Hamburg Port Consulting (HPC) and Container Terminal Information Systems (CTIS) administrative work are covered by the Ship or Shore module [4][14]. Vessels are defined, berthing details monitored and work order documents administered. Features of the Vessel Call Administration and Berthing option include:

- Definition of vessel calls
- Monitoring of arrival, berthing, departure details
- Assigning ports of call

This system only facilitates to manager vessels and berthing details of the Ports. Therefore, this system is not applicable to use the logistic requirements.

## 2.5 A Comparison of Alternative Design Strategies

Many alternative design strategies can be found to implement the proposed system. The PHP is selected as the based programming language to develop the system. There is a number of frameworks are available for PHP. Some of them are listed below,

- WordPress
- Joomla
- Drupal
- Magento
- Laravel
- Codeigniter
- CakePHP
- Zend
- Yii

Comparison of the above PHP frameworks is described in the *Table 2.1*.

Table 2.1: Comparison of above PHP frameworks

Features	WordPress	Joomla	Magento, Drupal	Zend	Laravel, Codeigniter, CakePHP, Yii
Programmability	Easy	Intermediate	Intermediate	Complex	Intermediate
Complexity	Less	Intermediate	Intermediate	Intermediate	Intermediate
Adaptability	Easy	Easy	Intermediate	Intermediate	Intermediate
DB support	Intermediate	Intermediate	Intermediate	Intermediate	Intermediate
Web Cache support	Intermediate	Intermediate	Intermediate	Intermediate	Less
OOP support	Yes	Yes	Not support for Drupal	Yes	Yes
Security	Less	Intermediate	Intermediate	Intermediate	Intermediate



Following relational database management systems can be used.

- MySQL
- MSSQL
- MongoDB

The comparison of the above three database systems is described in the *Table 2.2*

Table 2.2: Comparison of Database Management Systems

Features	MySQL	MSSQL	MongoDB
Open source	Yes	No	Yes
Relational database management system	Yes	Yes	No
Easy to adapt	Yes	No	No
PHP Framework support	Most	Less	Less

There are two programming approaches are supported by the PHP

- Object Oriented development
- Procedural development

The proposed system can be hosted on Linux or Windows based operating environments. It can be used WAMP, XAMPP or IIS tools for windows environment web hosting. The LAMP is a tool that can be set up for the Linux web servers to host the system.

Open source based Linux web hosting environments is used by most of the government organizations. Linux operating systems, such as Ubuntu, CentOS are utilized to configure web hosting environments. These Linux operating systems are compatible to host a website with all required features such as,

- Command line access
- Run Cron-job
- Gigabit Ethernet support
- User role-based access to web files

Linux based operating systems are cost-effective than Windows OS but it is difficult to find technical support resources and guidelines when it needed.

## **2.6 Summary**

There are several types of cargo operations are can be identified in the Logistic division of Sri Lanka Ports Authority. Among these types Rework operation play significant role in the cargo process. Identify drawbacks and giving solutions for the manual Rework operation will be a challenged task.

### 3 METHODOLOGY

#### 3.1 Introduction

This chapter illustrates the design of the proposed system. It describes methodologies and techniques, which have been used to develop the system. In addition, it explains all major code and module structures, platform dependencies, selected design approach, Use case and other diagrams. Further, the chapter demonstrates the front-end interfaces and back-end business logic with code segments of the system for the better understand.

#### 3.2 Requirements of the Proposed System

This topic describes the functional and non-functional requirements of the proposed system.

##### 3.2.1 Functional Requirements

The functional requirement is describing the behavior of the system as it relates to the system's functionality [10].

Below listed are the main functional requirements of the proposed system.

- Agent information handling

The System should facilitate to manage Agent details. Here the Agents are the people who represented as owners of the cargo items, which are transshipment by vessels. The Rework application form is brought by Agents to the logistics division for clearance of their goods. According to the Rework application process, billing account has to be maintained by each of Agent and the system should manage this information periodically.

- Manage exchange rate

In view of the cargo clearance process of Agent, the invoice should be generated. The total amount of the invoice to clearance cargo items will be calculated according to the exchange rate and this information will be managed by the system. The exchange rates are daily updated, hence information for daily exchange rates will be inserted into the system by a staff member of the logistics division.

- Handle Agent credit account information

Agent wise credit account is managed by the logistics division of the Ports Authority. Initially, this credit account is started from Rs. 500,000. When Agent is charged, the amount is deducted from Agent's credit account. When the credit level lower to 50,000, the relevant Agent should refill the credit balance amount. This credit balance will be tracked and displayed by the system.

- Handle Rework registration and modification

Considering the rework process, it is categorized into two parts. First is handled Rework registration and the other one has updated the rework services after completing the warehouse operations. Two separate panels will be provided by the system to manage these tasks.

- Agent wise bill creation

Agent bill will be generated by the system. At the moment the present manual system has used a document called billing form to handle this task. The form is filled by the logistic division staff and handover to relevant Agent. In the proposed system billing form will be generated with appropriate details.

- Manage rework or container cancellation

Due to a mistake or any other reasons, the logistics division might receive container cancellation or rework cancellation requests. At this stage cargo may be already billed or maybe not. If it is a billed container, the system has to be revised the billing process and correct the billing amount. Also, the cancellation panel will be provided by the system to proceed with this cancellation process.

- Handle rent calculation of empty container

When considering the cargo De-stuffing operation, empty containers are placed in the Container yards. These empty containers should be removed by Agents. Initial time duration has been given by SLPA for Agents to remove containers. If the time is exceeded from the given time rent will be charged. Therefore, the rent calculates for empty containers should be managed by the system.

- Prepare monthly total revenue

Total revenue of the logistics division for a particular month or year should be calculated by the system.

- Document handling

At the beginning of the Rework registration process, the system should track the documents which are brought by Agents. In order to track the documents, the system should have a section to manage documents. Some of the required documents are mentioned in *APPENDIX E*.

### **3.2.2 Non-Functional Requirements**

The non-functional requirement elaborates a performance characteristic of the system [10]. Typically non-functional requirements fall into areas such as Accessibility, Capacity, current and forecast, Compliance, Documentation, Disaster recovery, etc.

The non-functional requirements of the system are listed below.

- The system should provide a flexible way to access different modules while in the Rework operation
- The system should provide accurate information to users while it's accessed and generating calculate results for a number of modules
- The system should provide a secure way to manage the business data
- The system should be back-up compatible and it should support to take back-ups occasionally
- The system should be reusable and maintainable.
- The system should capable to handle future implementations of modules

### **3.3 Proposed Architecture For The System**

MVC, short for Model View Controller is a design pattern governs the fundamental law that application logic should be separate from presentation. The Controller has direct associations with the View and the Model and so does View over the model. [11]

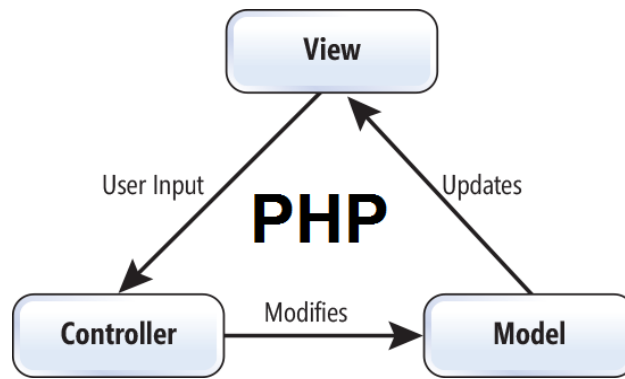


Figure 3.1: Model View Controller Design Pattern

According to the Figure 3.1 detailed description of the MVC is given below.

- **Model:** this part of the application is concerned with the business logic of the system and the application data. It can be used to perform data validations over the user inputs, process data and store it.
- **Views:** This part of the application usually in the form of HTML pages. it presents the data to the user
- **Controller:** users' requests for resources from the server are managed by this part of the application.

The interaction take place as follows,

1. Users interact with "View" – submitting forms or clicking links
2. The controller handles user input by transferring the information to Model
3. Model, in turn, receives this information and add to the database to update itself
4. The View therein checks the update and responds necessarily
5. The View waits for the next interaction from user [11]

Don't Repeat Yourself (DRY) is a software development principle which is aimed at reducing repetition of software patterns or functions during the system development stage. It has been used data normalization to avoid redundancy. This principle is used in the MVC design pattern.

### 3.4 Software Development Life-Cycle

The waterfall model was chosen as the software development model for the system. It illustrates the software development process in a linear sequential flow. It reflects that any phase in the development process begins only if the previous phase is complete. The steps of the waterfall model depict in the Figure 3.2

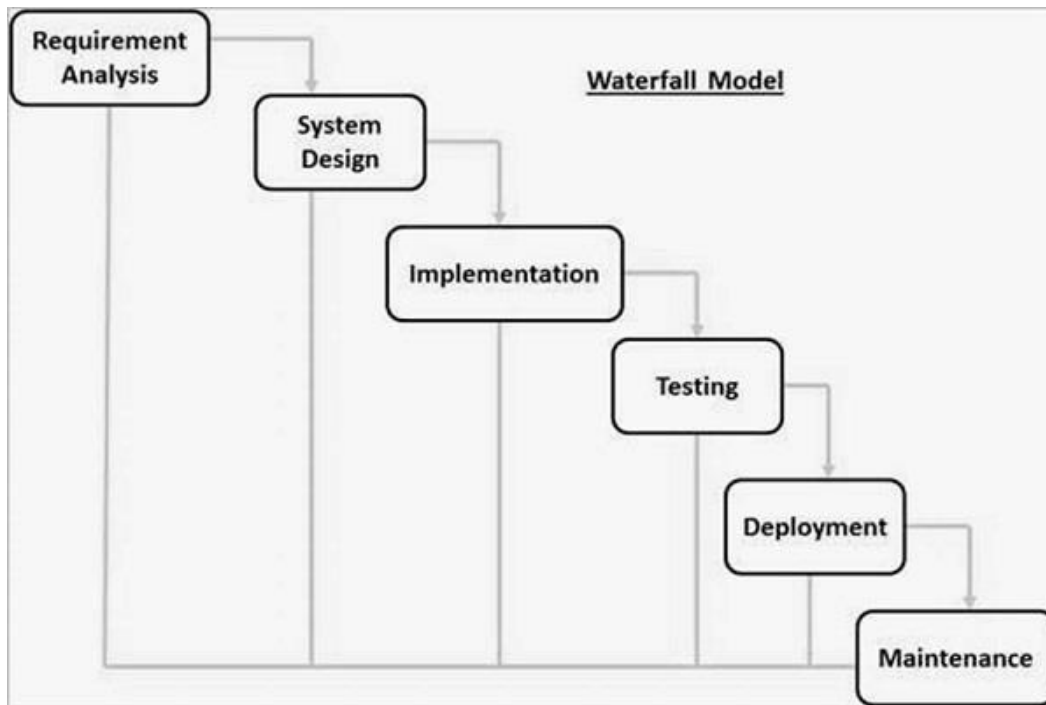


Figure 3.2: Waterfall Model

### 3.5 Design Techniques

Object-oriented analysis and design (OOAD) was chosen as the technical approach to handle the system development task while it does visual modeling throughout the development life-cycle to foster better stakeholder communication and product quality. the OOAD has been evolved by combining the two technical approaches which are identified as Object-oriented design (OOD) and Object-oriented analysis (OOA). The Unified Modelling Language (UML) has been identified as the object-oriented modeling to visualize the objects at the system development stage.

Below diagrams have been prepared during the system development stage.

- ER diagram
- Use Case diagram
- Sequence diagram
- Class diagram

## **3.6 Propose System Design**

This topic illustrates the different types of diagram views of the proposed system.

### **3.6.1 Entity Relationship Diagram**

The below ER diagram has been divided into 3 parts to provide an in-depth view for the readers. Both strong and weak entities in the diagram are listed below.

- Agent
- Rework
- Agent history
- Document
- Card print
- Rework service
- Tariff
- Rework document
- Users
- Users groups
- Warehouse
- User group map
- User history



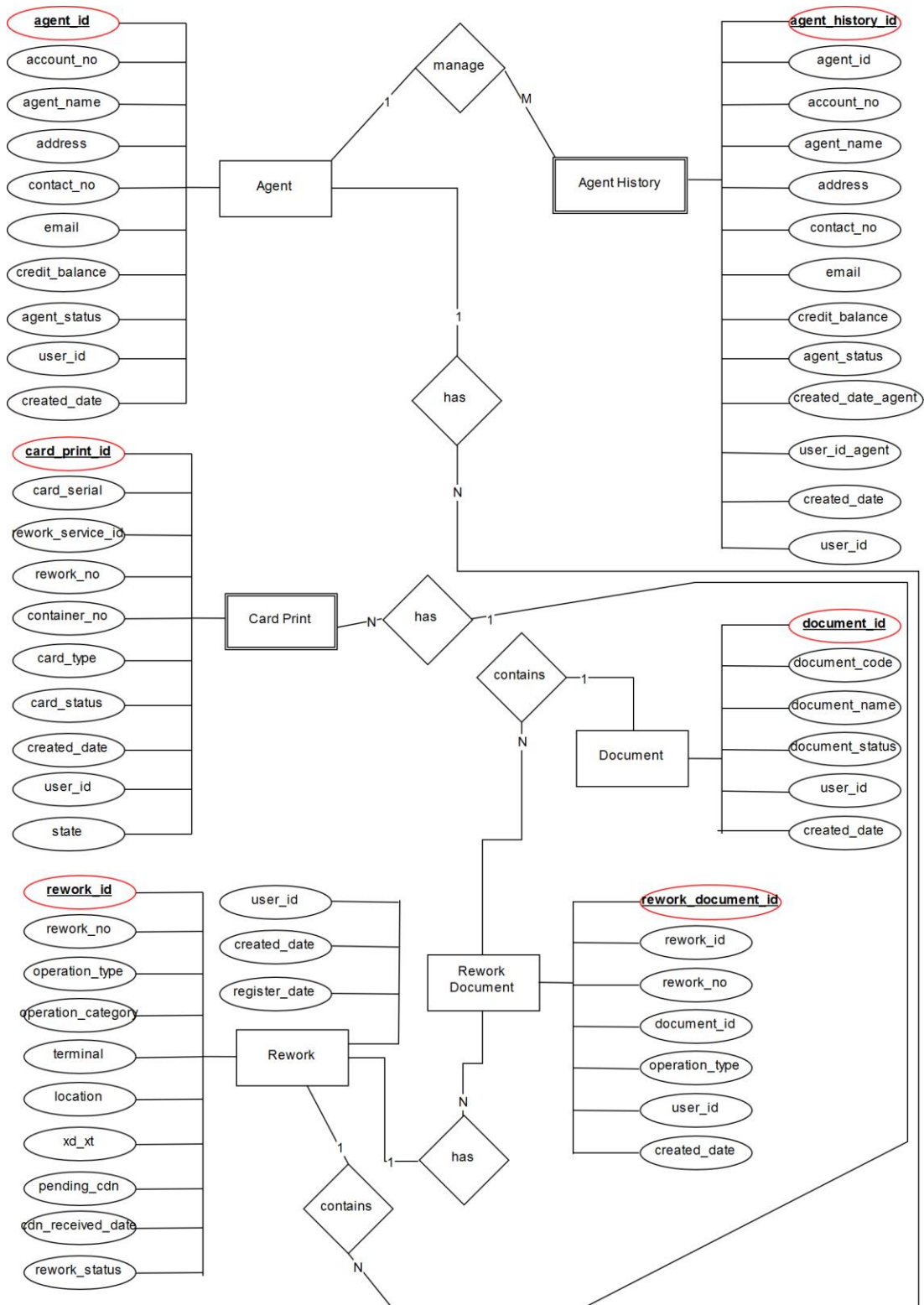


Figure 3.3: ER Diagram of the proposed system (split 1 of 3 parts)

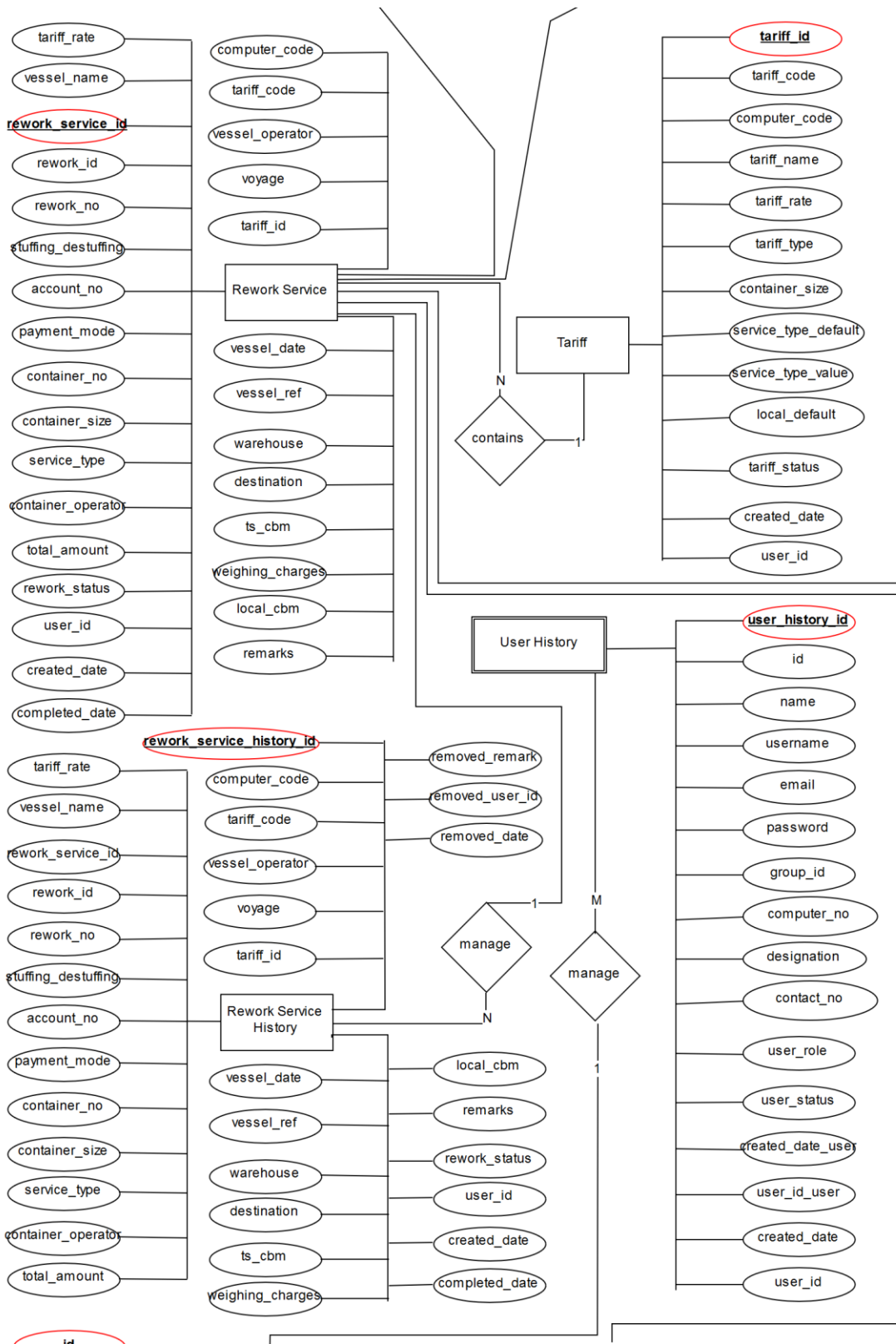


Figure 3.4: ER Diagram of the proposed system (split 2 of 3 parts)

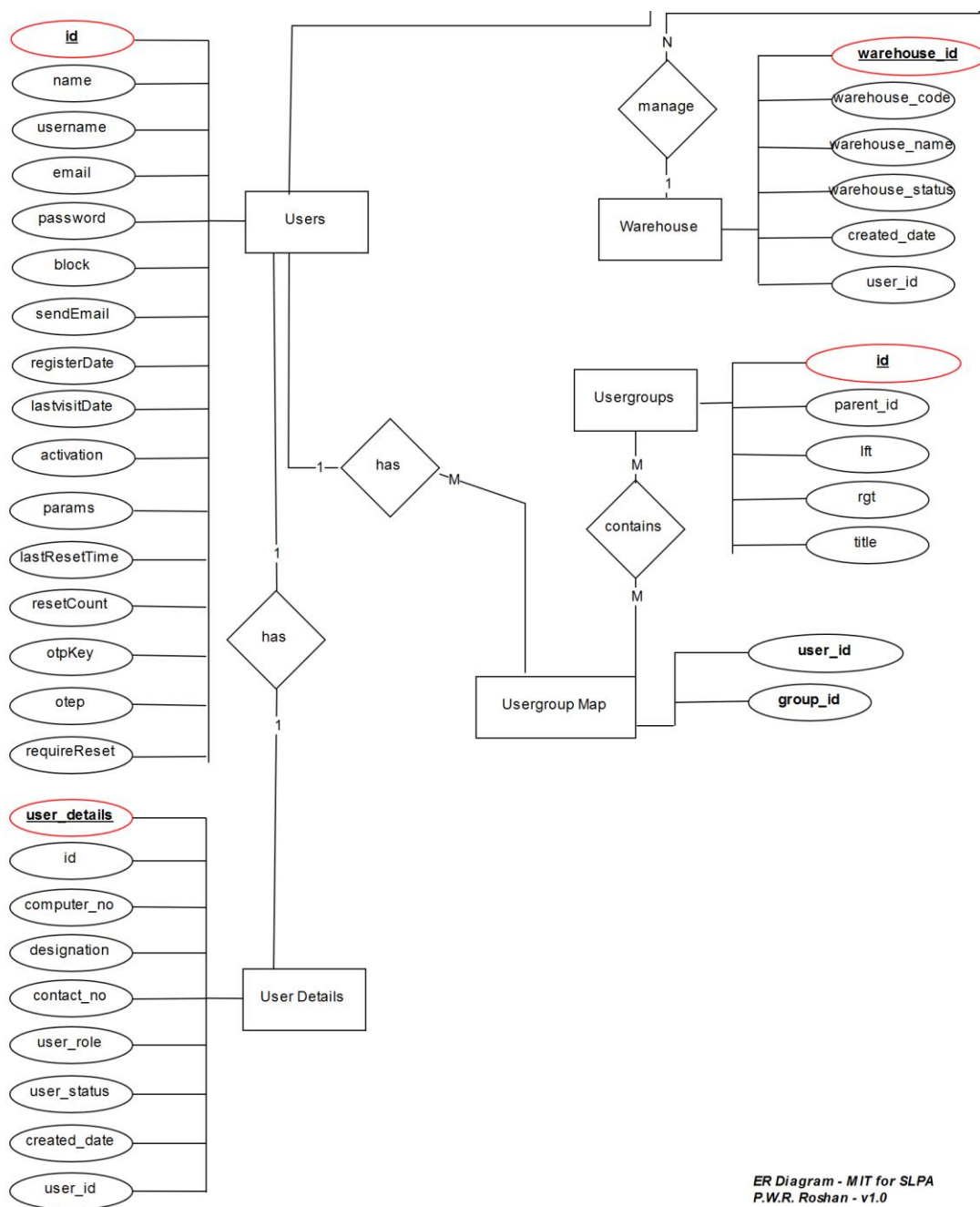


Figure 3.5: ER Diagram of the proposed system (split 3 of 3 parts)

According to the Figure 3.3, Figure 3.4 and Figure 3.4 ER diagrams primary keys are highlighted in the red color with bold text. The proposed system should be capable to manage different user groups with their associative role permissions. Thus, it is important to identify user entities such as Users, User details, User groups, User group ma, etc. the system should cater to manage history records of user activities. Therefore, history entities have been provided in the ER diagram. Further, the system provides the functionality to manage reports, document, and print facility.

### 3.6.2 Use Case Diagram

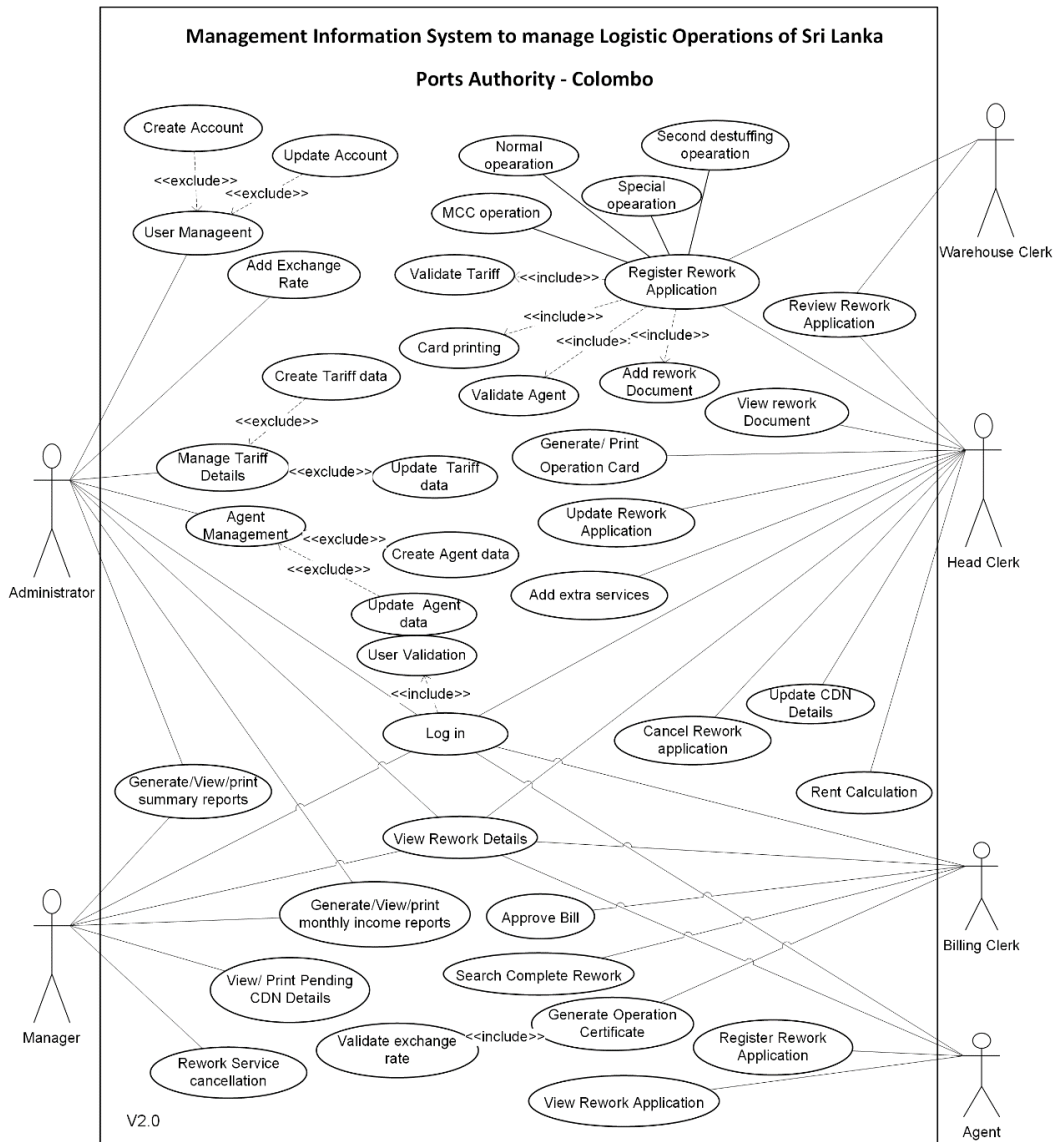


Figure 3.6: Use Case Diagram

As described in figure 3.6: Use-case diagram, the system is developed to manage six actors based on their user roles.

- Administrator
- Head Clerk
- Billing Clerk
- Manager
- Agent
- Warehouse Clerk

The actors such as Administrator, Manager, Head Clerk, Billing Clerk, and Warehouse Clerk are the internal users who are going to access the system over the local network. The agent is an external actor will be accessed the system from outside of the company network. Administrator, Manager and Head Clerk are playing the main user roles in the system. User groups and levels can be created by the System Administrator; hence this actor is considered as the main actor of the system.

Below functions are identified by each of the actors.

- Administrator:
  - Secure login to the system
  - Manage system users
  - Manage Tariff data
  - Agent management
  - Generate, View and print a summary report
  - Generate, view and print monthly income report
  - View rework details
- Head Clerk
  - Rework service cancellation
  - View, print pending CDN details
  - Generate, view and print monthly income report
  - Generate, View and print a summary report
  - Secure login to the system
  - View rework details
- Billing Clerk
  - Secure login to the system
  - View rework details
  - Register rework application
  - View rework application
  - Approve Bill
  - Secure login to the system
- Manager
  - Rework service cancellation
  - View, print pending CDN details
  - Generate, view and print monthly income report
  - View rework details
  - Secure login to the system
  - Generate, View and print a summary report

- Agent
  - View rework details
  - Register Rework application
  - View rework details
  - Secure login to the system
- Warehouse Clerk
  - Rework Registration
  - Review Rework details

The proposed solution of the system has been divided into a few modules in order to make the development and maintenance easier. The modules are as follows,

- User Management module
- Rework operation Management module
- Rework Card Management module
- Payment Management module
- Empty Container Rent calculate module
- Report Management module

A detailed description of the modules is given in the *Table 3.1*

Table 3.1: Description of the Modules

<b>Module Name</b>	<b>Functionalities were Identified</b>
User Management	<ul style="list-style-type: none"> <li>• System Users Management</li> <li>• Agent Management</li> </ul>
Rework operation Management	<ul style="list-style-type: none"> <li>• Document Management</li> <li>• Rework Registration               <ul style="list-style-type: none"> <li>○ Full MCC De-stuffing</li> <li>○ Full MCC Stuffing</li> <li>○ Local + MCC De-stuffing</li> <li>○ Local + MCC Stuffing</li> <li>○ Normal Operation</li> <li>○ One Way Special De-stuffing</li> <li>○ One Way Special Stuffing</li> <li>○ Two Way Special</li> <li>○ Second De-stuffing</li> </ul> </li> <li>• Rework Update</li> <li>• Operation Modification</li> </ul>

	<ul style="list-style-type: none"> <li>• Rework Document</li> <li>• Rework Inquiry</li> <li>• Manage Tariff</li> <li>• Rework Cancellation</li> </ul>
Rework Card Management	<ul style="list-style-type: none"> <li>• Card Print</li> <li>• Card Review</li> </ul>
Payment Management	<ul style="list-style-type: none"> <li>• Cash Payment</li> <li>• Exchange Rate</li> </ul>
Empty Container Rent calculate	<ul style="list-style-type: none"> <li>• Empty Removal</li> </ul>
Report Management	<ul style="list-style-type: none"> <li>• Generate Reports</li> </ul>

Following tables are shown the Use Case descriptions relevant to the Figure 3.6: Use Case diagram

Table 3.2: Use Case - Log in

<b>Use Case:</b> Log in	<b>ID-1</b>
<b>Priority:</b> High	
<b>Brief Description:</b> User Login	
<b>Primary actors:</b> Administrator, Head Clerk, Manager, Billing Clerk, Warehouse Clerk, Agent	
<b>Secondary actors:</b> None	
<b>Pre-conditions:</b> n/a	
<b>Main Flow:</b> <ol style="list-style-type: none"> <li>1. The user enters username and password</li> <li>2. Click Login button</li> <li>3. The system validates the user data</li> <li>4. Redirect to the secure area</li> </ol>	
<b>Post-conditions:</b> <ul style="list-style-type: none"> <li>• If already logged in, then redirect to the system</li> </ul>	

Table 3.2 depicts use case for the login screen of the system. Every primary actor must have valid username and password to authenticate with the system. Once each user group login to the system rework inquiry can be handled by them. The main flow of rework inquiry process depicts in the Table 3.3.

Table 3.3: Use Case - Rework inquiry

<b>Use Case:</b> Rework inquiry	<b>ID-2</b>
<b>Priority:</b> Normal	
<b>Brief Description:</b> Rework inquiry form	
<b>Primary actors:</b> Administrator, Head Clerk, Manager, Billing Clerk, Warehouse Clerk, Agent	
<b>Secondary actors:</b> None	
<b>Pre-conditions:</b> Login to the system	
<b>Main Flow:</b> <ol style="list-style-type: none"> <li>1. Click the rework inquiry button</li> <li>2. Fill the form</li> <li>3. Submit the form</li> </ol>	
<b>Post conditions:</b> n/a	

Table 3.4: Use Case - User Management

<b>Use Case:</b> User Management	<b>ID-3</b>
<b>Priority:</b> Normal	
<b>Brief Description:</b> user management area of the system	
<b>Primary actors:</b> Administrator	
<b>Secondary actors:</b> None	
<b>Pre-conditions:</b> Login to the system	
<b>Main Flow:</b> <ol style="list-style-type: none"> <li>1. Click the user management button</li> <li>2. Go to the page</li> <li>3. Update or insert new records</li> <li>4. Click save</li> </ol>	
<b>Post conditions:</b> n/a	

The system has a section to manage user details. As depicts in Table 3.4 that section can be only visible for system administrators. Also system admin group users are privilege for manage the exchange rate and tariff details of the system. Each flow of these use cases are shown in the Table 3.5 and Table 3.6



Table 3.5: Use Case - Update Exchange Rate

<b>Use Case:</b> Update Exchange Rate	<b>ID-4</b>
<b>Priority:</b> Normal	
<b>Brief Description:</b> exchange rate updating area	
<b>Primary actors:</b> Administrator	
<b>Secondary actors:</b> None	
<b>Pre-conditions:</b> Login to the system	
<b>Main Flow:</b> <ol style="list-style-type: none"> <li>1. Click update exchange rate button</li> <li>2. Navigate to page</li> <li>3. Edit records</li> <li>4. Enter the save button</li> </ol>	
<b>Post conditions:</b> n/a	

Table 3.6: Use Case - Update Tariff Details

<b>Use Case:</b> Update Tariff Details	<b>ID-5</b>
<b>Priority:</b> Normal	
<b>Brief Description:</b> update Tariff details area	
<b>Primary actors:</b> Administrator	
<b>Secondary actors:</b> None	
<b>Pre-conditions:</b> Login to the system	
<b>Main Flow:</b> <ol style="list-style-type: none"> <li>1. Click update tariff button</li> <li>2. Edit records</li> <li>3. Click save button</li> </ol>	
<b>Post conditions:</b> n/a	

Rest of the Use cases available on **APPENDIX B**.

### 3.6.3 Sequence Diagram

Following sequence diagram depicts the Agent role in the proposed system.

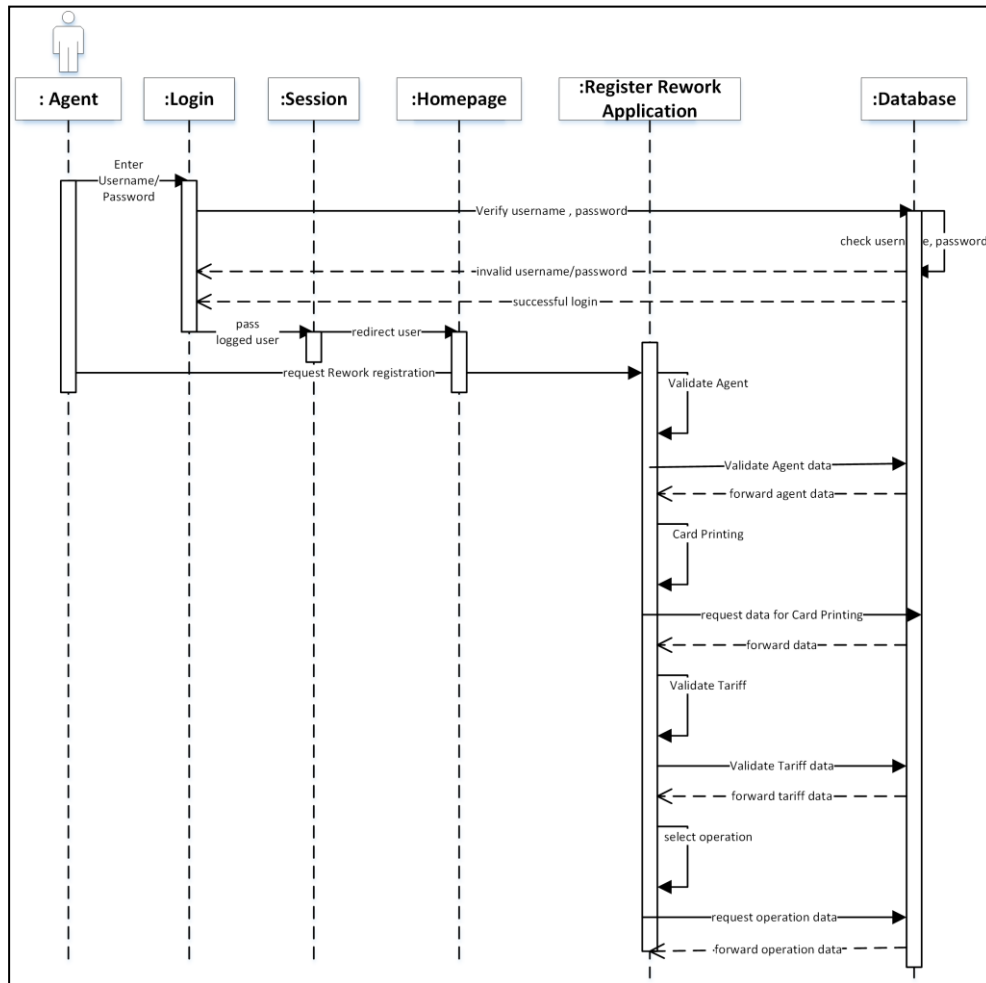


Figure 3.7: Agent Role

When the system has recognized the username and password of an authenticated Agent, it will redirect to the Agent panel of the system.

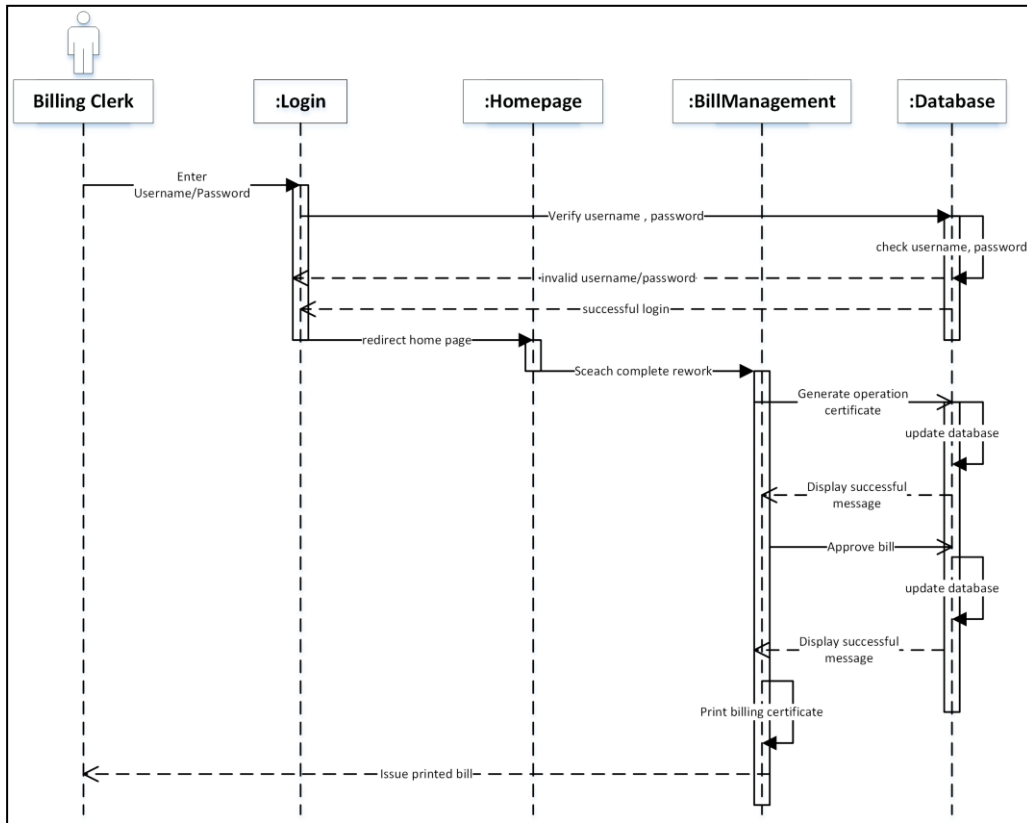


Figure 3.8: Billing Clerk Role

Figure 3.8: Billing Clerk Role depicts the sequence steps of the Billing Clerk. Billing clerk has functionalities such as print billing certificates, generate operation certificate, etc.

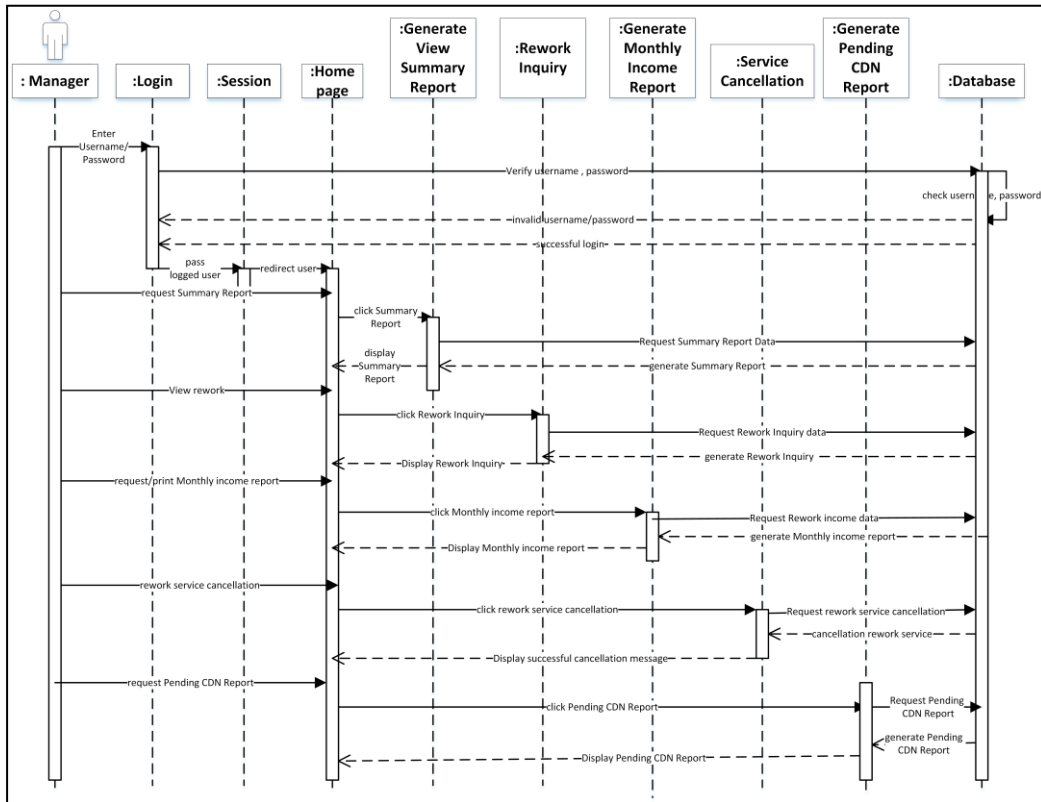


Figure 3.9: Manager Role

According to Figure 3.9: Manager Role, it depicts the Manager role in a sequence diagram. It visualized the Manager functionalities such as generate a summary report, rework inquiry, generate CDN report, etc.

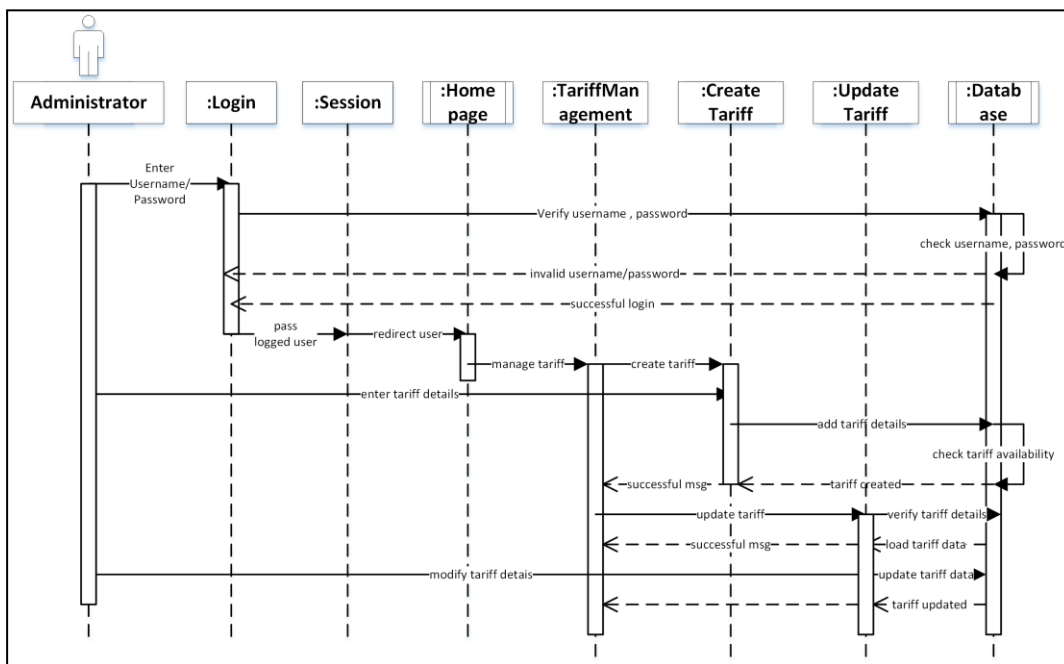


Figure 3.10: Administrator Role

Administrator role in the system has the most power to manage many options in the system. Manage Tariff records is the one option available for the Admin role in the system. *Figure 3.10: Administrator Role* depicts the sequence diagram of the task of Administrator.

For more details about sequence-diagrams, please refer the **APPENDIX H**.

### 3.6.4 Class Diagram with Database Design

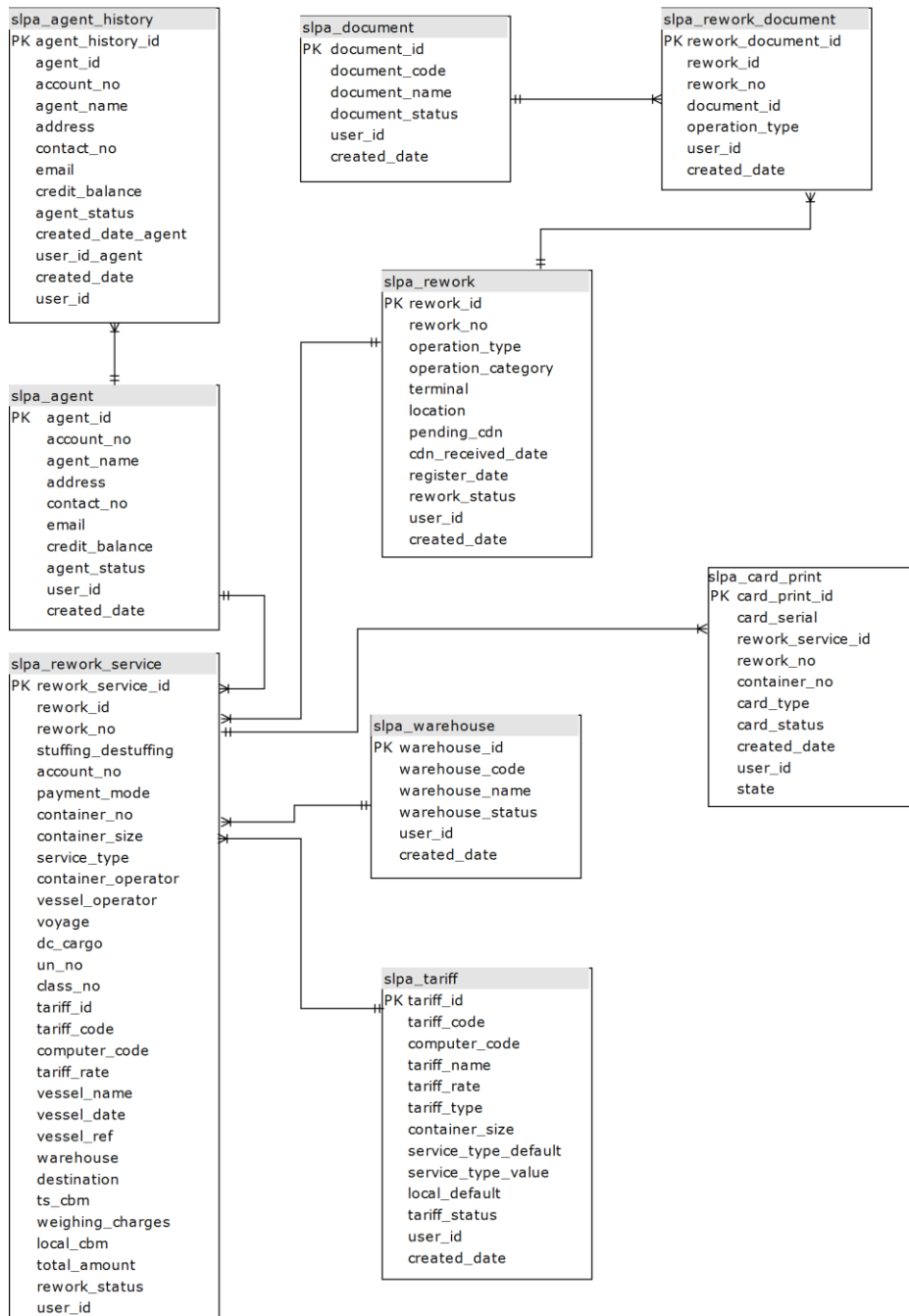


Figure 3.11: Class Diagram of the proposed system (split 1 of 2)

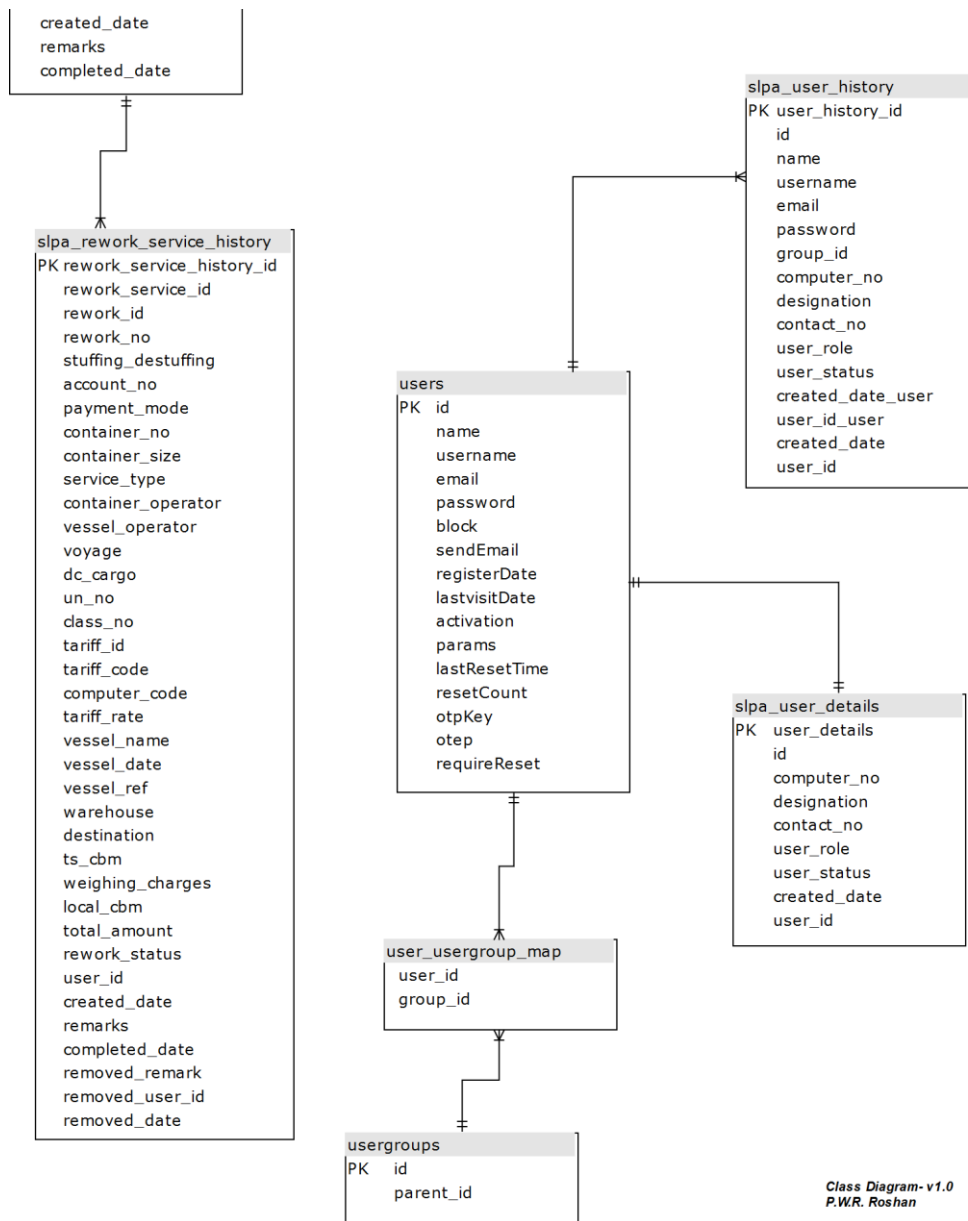


Figure 3.12: Class Diagram of the proposed system (split 2 of 2)

As shown in the Figure 3.11 and Figure 3.12 the system is categorized into many class entities. Among these entities ‘slpa\_rework\_service’ is identified as a significant important class which combined the relationship with other class entities.

## 3.7 Implementation Environment

In this topic illustrates the server and client environments for the system deployment.

### 3.7.1 Server Environment

The web hosting environment has been provided by SLPA. At present, SLPA has inbuilt secure server environment and it consists of high-end web servers which equipped with the following features.

- Windows Server 2016
- Intel Xeon processor
- Two Broadcom integrated gigabit Ethernet controllers
- 16 GB RAM
- 2 TB HDD
- Internet Information Services (IIS) v10
- PHP v7
- MySQL v5

### 3.7.2 Client Environment

Minimum hardware and software requirements are listed in the below table.

Table 3.7: Hardware and software requirements

Software	Hardware
Windows 8.1 or higher operating system	Intel processor 2 GHz
Firefox browser version v50+ (latest is recommended)	200 GB HDD space
Chrome browser version v60+ (latest is recommended)	8 GB Ram
Recommended virus guard	Gigabit Ethernet connection
	Bulk printer for card printing
	17-inch monitor
	Keyboard with numeric keypad
	PC mouse

## 3.8 Development Tools and Techniques

In this topic describes the tools and techniques which are used to implement the system.

### 3.8.1 Tools

- Sublime IDE v3 and Visual Studio code:  
above tools were used to develop the system
- HeidiSQL workbench:  
this was used to handle database related developments
- WAMP v3 development environment  
Use for setup the local development environment
- PhpMyAdmin:  
this was used to handle database related developments
- Adobe Photoshop CC:  
Used for logo and photo editing purposes

### 3.8.2 Technologies

- PHP as a development language
- HTML

HTML was used to build the base Interfaces of the system.

- CSS and Bootstrap framework

CSS Styles was used to making interfaces more user-friendly and attractive. Styles basically decided the look of the system.

- JavaScript

JavaScript was used to code all the client-side validation.

- AJAX

Which is based on JavaScript was used to get data from the server without refreshing it repetitively

- JQuery

Which is also based on JavaScript was used to implement some features such as the precoded time picker module



- JSON

It is an open-standard file format that uses human-readable text to transmit data objects

### 3.8.3 Reusable Components

- jQuery library – it is used to create JS scripts
- Date picker – it is used to select the date from the calendar
- Bootstrap – design interactive user interfaces and front-end elements
- jQuery Validation plug-in: To validate input fields on the forms

### 3.9 Network Architecture

A web server has been set up to host the system and its components. Each PC in the logistics division is connected via Ethernet. The web server is hosted by the SLPA. Some part of the network should be available for public users. Therefore, laptop users should use VPN connections to connect to the internal network and handle the tasks. These VPN connections are filtered by the firewall before reaching the web server. The overall network structure is illustrated in Figure 3.13: Network Diagram of the System.

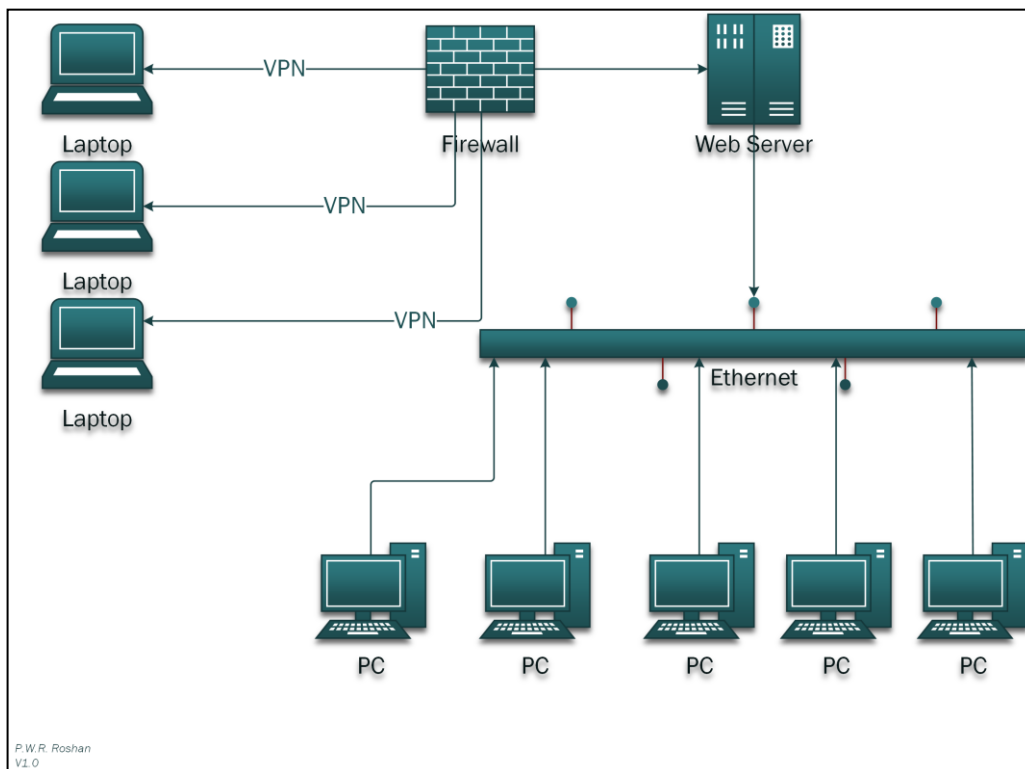


Figure 3.13: Network Diagram of the System

### 3.10 Main User Interfaces

The interaction between a user and the web application on a Web server is conducted by the web interfaces. Good interface design makes the web looks special and make the operations become more simple and comfortable. It can fully display the positioning and elements of the site.

Following principals were used when designing the system interfaces.

- Clarity
- User-Centered Design
- Consistency
- Strong visual hierarchy

The Interfaces of the system has been designed using a tool called Web UI Mock-up Tool. Some of these interfaces are listed below.

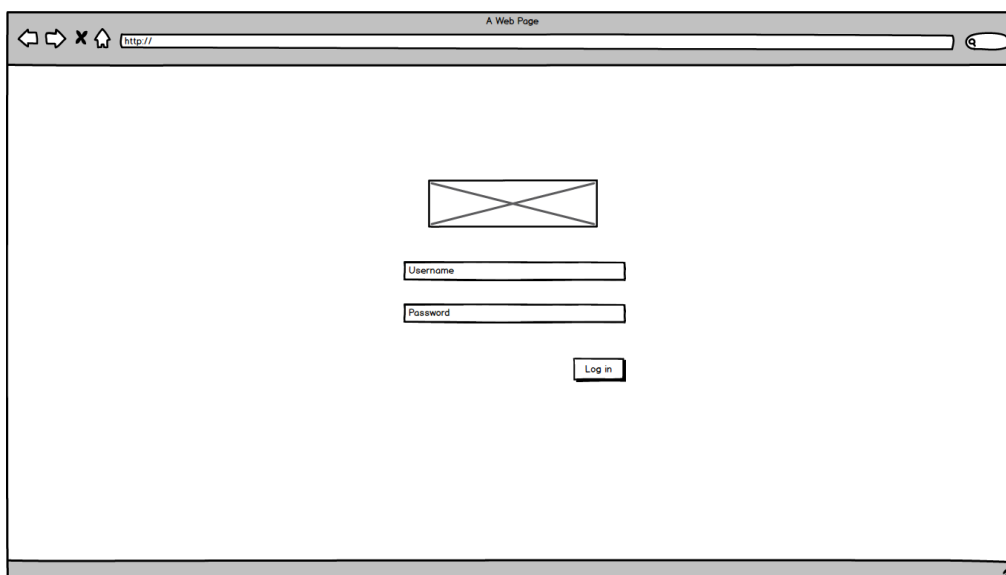


Figure 3.14: Login UI

The above *Figure 3.14: Login UI*, provides the secure login page design of the system. The below one shows to create a new user view of the system. The main navigation buttons are placed on the left side of the layout.

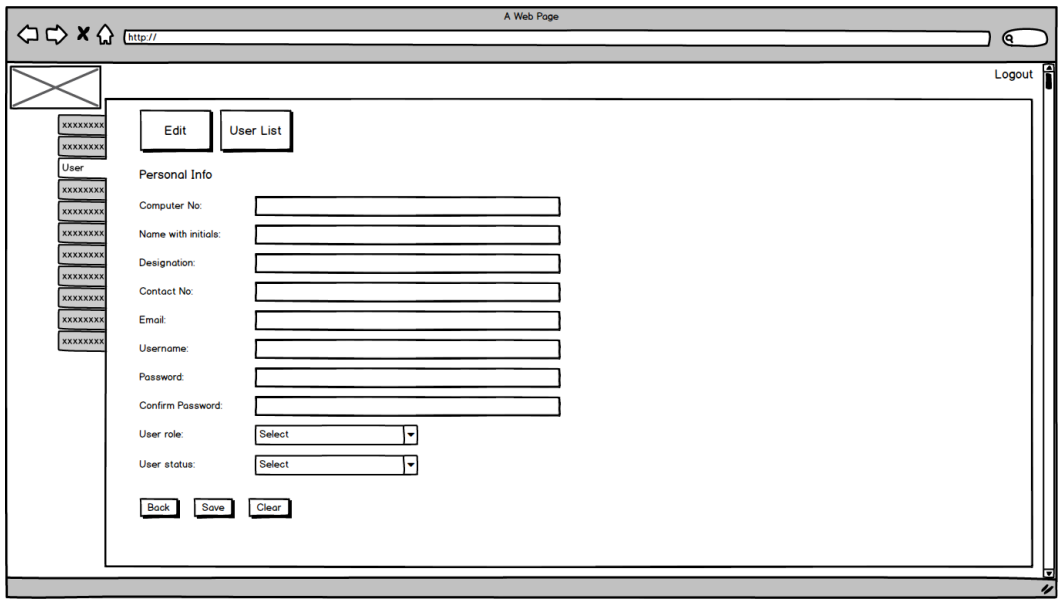


Figure 3.15: Create New User UI

Following mock-up UI is represented by the user update interface.

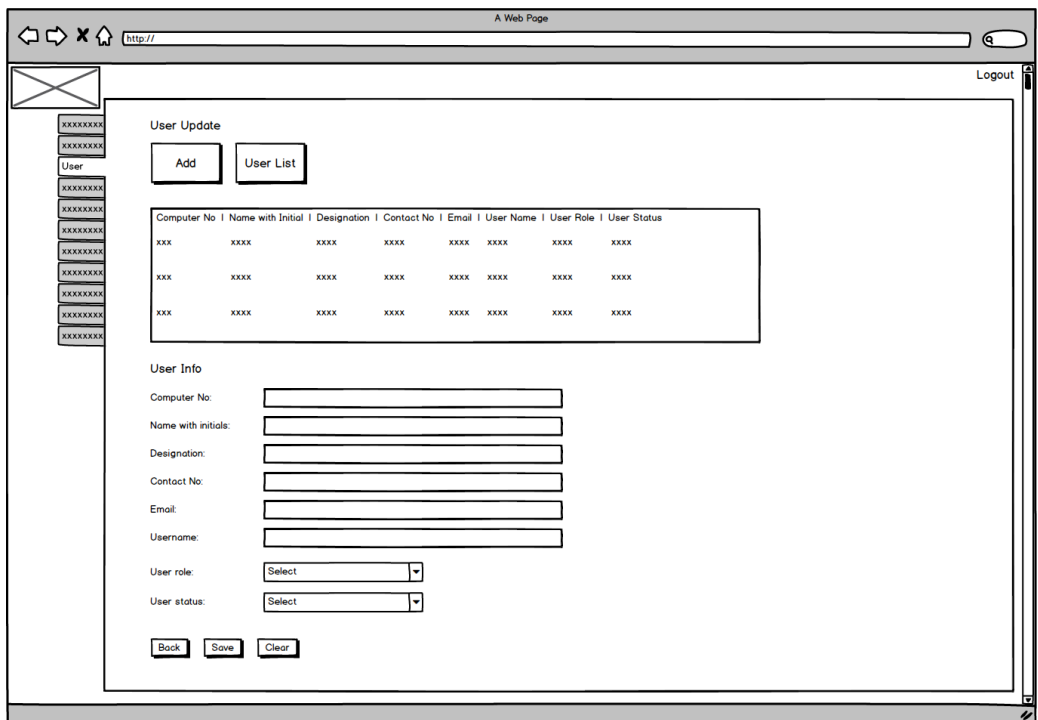


Figure 3.16: User Update UI

Below UI represents the new Agent create view. All-important field elements are designed according to the requirements.

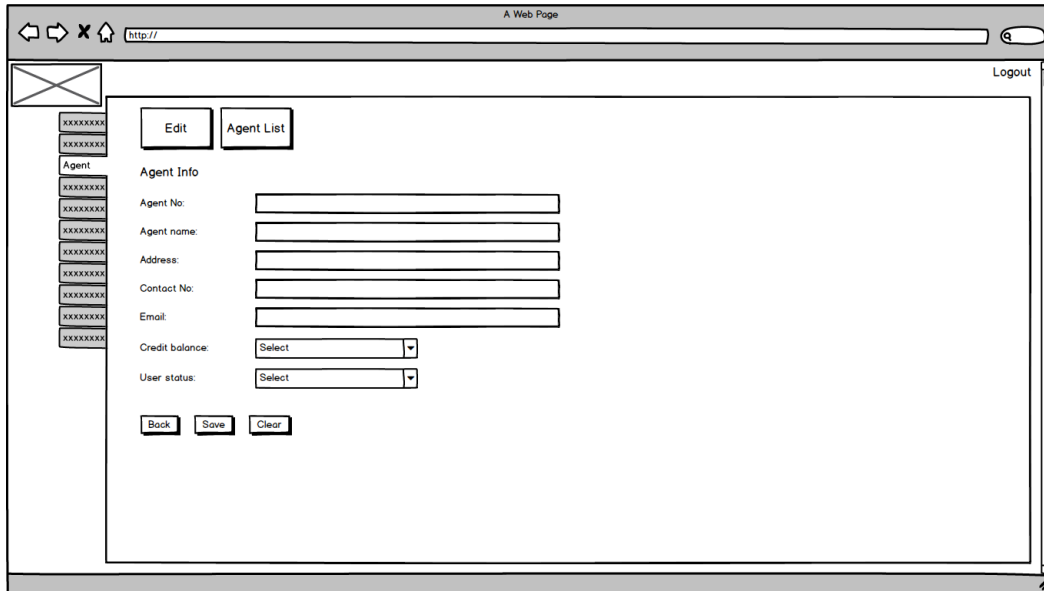


Figure 3.17: Agent Create UI

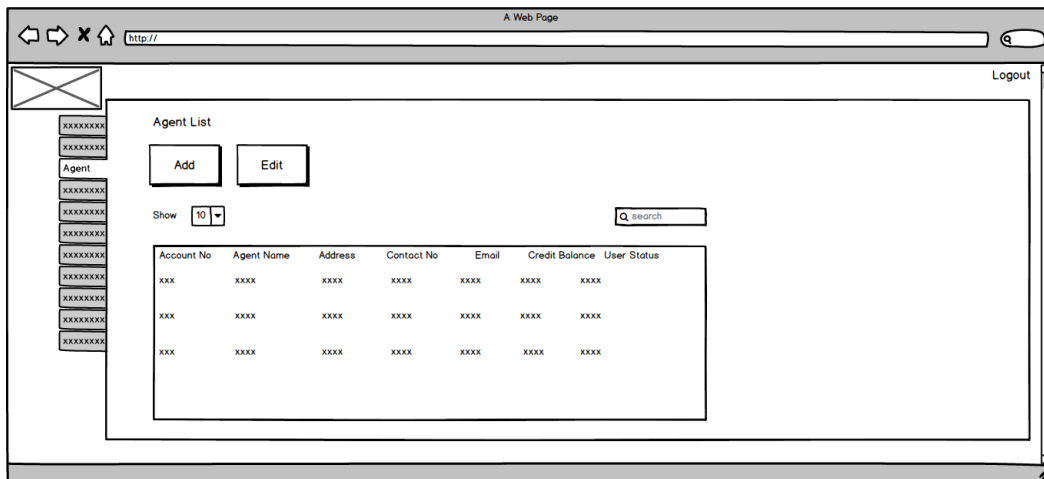


Figure 3.18: Agent List UI

Agent list UI is represented by *Figure 3.18*. It is a grid view that facilitates to filter the number of Agents. Below *Figure 3.19* shows the Agent update view.

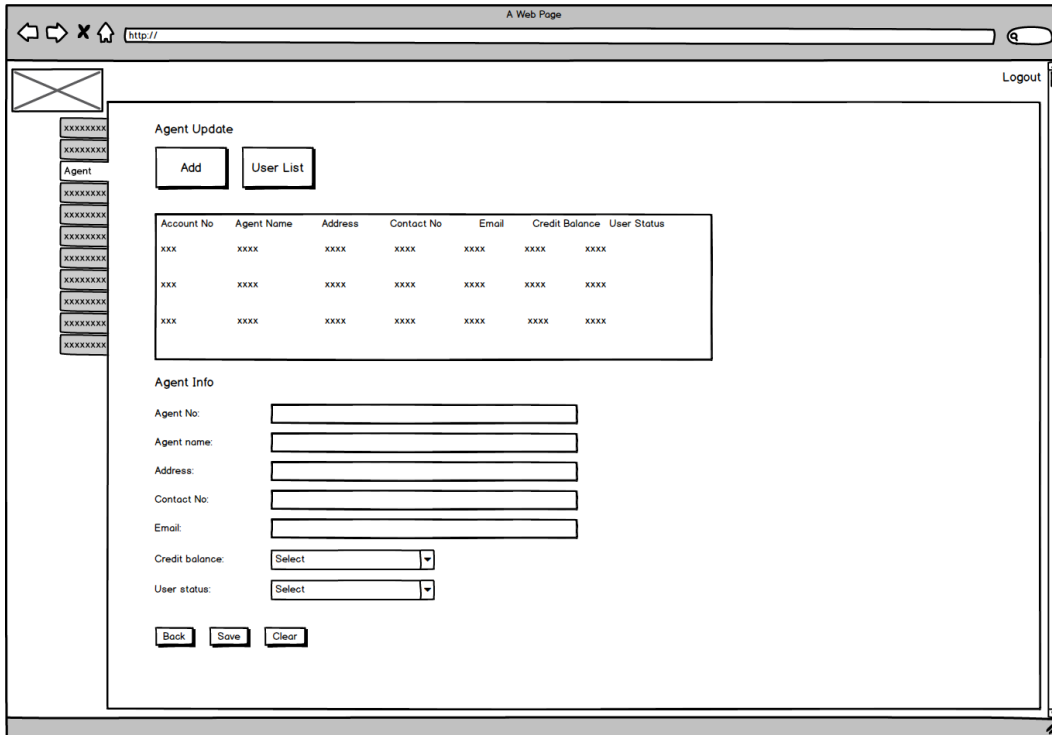


Figure 3.19: Agent Update UI

Manage Rework documents UI is represented by the following *Figure 3.20*. It is a wizard type of user interface. When the system user selects certain values and clicks the proceed button it will be navigated to *Figure 3.21*.

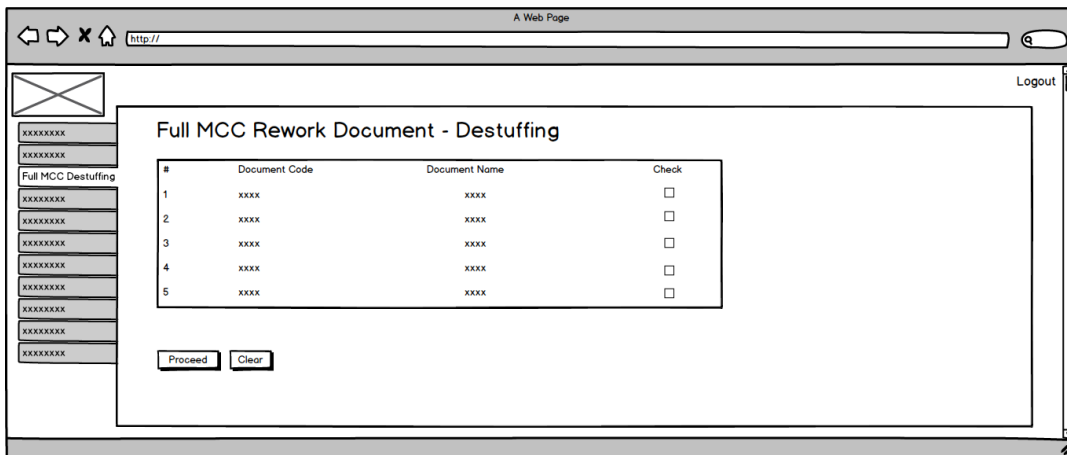


Figure 3.20: Full MCC De-stuffing UI - Step 1

A Web Page

http://

Logout

### Full MCC Rework Document - Destuffing

**Basic-info**

Rework No :

Register Date :  /  /

Terminal :

Location :

**Operation-info**

Payment Mode :

Container No :

Container Size :

Vessel Name :

Vessel Date :  /  /

Services Type :

TS CBM :

Quantity :

**Vessel-info**

Account No :

Agent Name :

Container Operator :

Vessel Operator :

Voyage :

Vessel Ref :

Warehouse :

Action	Account No	Container No	Container Size	Vessel Name	Vessel Date	Service Type	Tariff Code	Tariff Rate	TS CBM	Quantity	Total(\$)
xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx

Figure 3.21: Full MCC De-stuffing UI - Step 2

For more details about other user interfaces of the system, please see the *APPENDIX C*

### 4 IMPLEMENTATION

In this topic describes the file structure, theme and business logics that are used in the system

#### 4.1.1 The Basic File Structure of the System

The base of the system has been developed as a module component. The Model View Controller (MVC) hierarchy is used at this stage and the below figure is shown about the folder structure of the base component of the system.

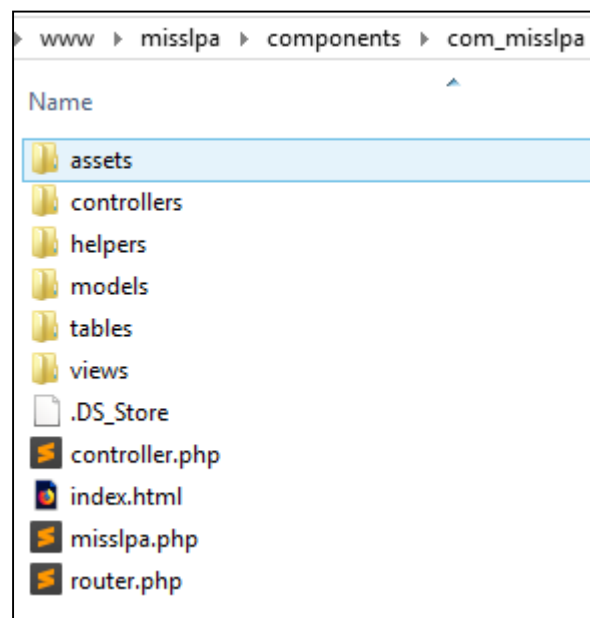


Figure 4.1: Structure of the base Component

The module component was named as com\_misslpa. This is available inside a system folder called components.

Concept wise system functionalities are divided into 6 categories. Each of the categories is represented by the business logic of the system. Therefore, these categorize can be identified as separate business modules.

- User Management module
- Rework operation Management module
- Rework Card Management module

- Payment Management module
- Empty Container Rent calculate module
- Report Management module

As a collectively these modules are working under the com\_misslpa, which is identified as the main component of the system.

#### 4.1.2 The Theme of the System

The Protostar is the customized theme has been used in the system. This theme can be found inside the system template directory. The theme file structure is shown in the following Figure 3.22

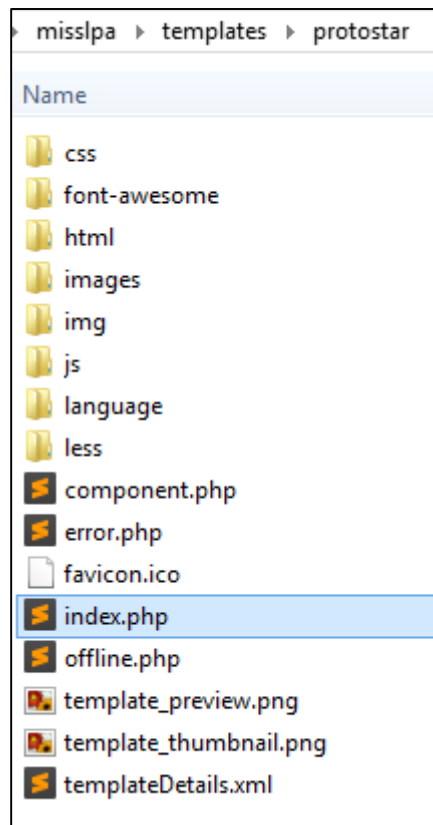


Figure 4.2: Template Folder

When the system was being developed there were some stages that it had to be overridden certain core modules in order to provide layout designs appropriate for the system. These override module components are placed in the HTML folder.



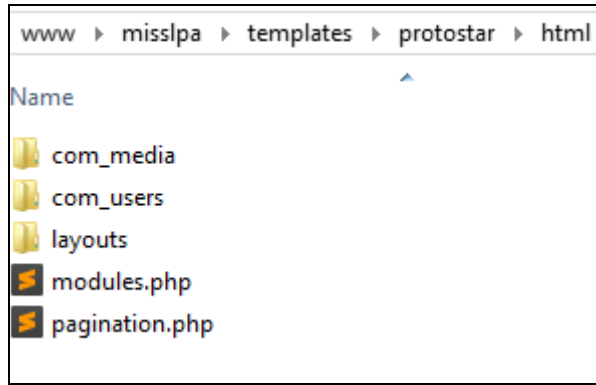


Figure 4.3: Override Core Modules

According to the Table: 4.1 some reusable libraries such as jQuery and Bootstrap have been placed in the separate folders.

Table 4.1: Reusable Libraries

www > misslpa > templates > protostar > css	www > misslpa > templates > protostar > js
Name	Name
bootstrap.min.css	application.js
bootstrap-responsive.min.css	bootstrap.js
bootstrap-wysihtml5.css	bootstrap.min.js
colorpicker.css	bootstrap-colorpicker.js
datepicker.css	bootstrap-datepicker.js
font-awesome.css	bootstrap-wysihtml5.js
fullcalendar.css	classes.js
jquery.easy-pie-chart.css	excanvas.min.js
jquery.gritter.css	fullcalendar.min.js
matrix-login.css	jquery.dataTables.min.js
matrix-media.css	jquery.easy-pie-chart.js
matrix-style.css	jquery.flot.crosshair.js
offline.css	jquery.flot.min.js
select2.css	jquery.flot.pie.js
template.css	jquery.flot.pie.min.js
uniform.css	jquery.flot.resize.min.js

A file Index.php is used to be the main file of the theme, which has been customized. As depicts in the following Figure 4.4, certain style sheets have been attached to the file.

```

index.php x  templateDetails.xml
229  ?>
230
231
232
233
234  <!DOCTYPE html>
235  <html lang="<?php echo $this->language; ?>" dir="<?php echo $this->direction; ?>">
236  <head>
237  <meta name="viewport" content="width=device-width, initial-scale=1.0" />
238  <?php /* <jdoc:include type="head" /> */?>
239  <!-- added -->
240  <link rel="stylesheet" href="<?php echo $this->baseurl; ?>/templates/<?php echo $this->template; ?>/css/boot
241  <link rel="stylesheet" href="<?php echo $this->baseurl; ?>/templates/<?php echo $this->template; ?>/css/boot
242  <link rel="stylesheet" href="<?php echo $this->baseurl; ?>/templates/<?php echo $this->template; ?>/css/matr
243  <link href="<?php echo $this->baseurl; ?>/templates/<?php echo $this->template; ?>/font-awesome/css/font-awe
244  <link href='http://fonts.googleapis.com/css?family=Open+Sans:400,700,800' rel='stylesheet' type='text/css'>
245  <!-- added -->
246  </head>
247  <body class="site <?php echo $option
248  . 'view-' . $view
249  . ($layout ? 'layout-' . $layout : 'no-layout')
250  . ($task ? 'task-' . $task : 'no-task')
251  . ($itemid ? 'itemid-' . $itemid : '')
252  . ($params->get('fluidContainer') ? 'fluid' : '')
253  . ($this->direction === 'rtl' ? 'rtl' : '');
254  ?>>

```

Figure 4.4: Theme - Index.php

### 4.1.3 The Business Logic of the System and Sample Code Snippets

Sample business logic is shown in the below figures. According to Figure 4.5, it depicts the calculation script for Tariff rate of the system under the Rework operation. The result of the Tariff depends on the container size. There are three types of container sizes.

- a) 20 size containers
- b) 40 size containers
- c) 40 plus

Calculate the Tariff rate by a human for a particular container might be a time-consuming task. It may be further difficult if there are multiple containers to be calculated the Tariff rates. Hence, the system facilitates to calculate the multiple results of Tariff rates in a just second.

```

if(rework_no != ""){
  if(ts_cbm>0){
    total_amount = tariff_rate;
  }else if(weighing_charges>0){
    total_amount = tariff_rate * weighing_charges;
  }else if(local_cbm>0){
    if(container_size==20){
      if((local_cbm - 8)>0){
        total_amount = (local_cbm - 8) * tariff_rate;
        local_cbm = local_cbm - 8 ;
      }else{
        total_amount = 0.00;
        local_cbm = 0.00 ;
      }
    }else if(container_size>=40){
      if((local_cbm - 16)>0){
        total_amount = (local_cbm - 16) * tariff_rate;
        local_cbm = local_cbm - 16 ;
      }else{
        total_amount = 0.00;
        local_cbm = 0.00 ;
      }
    }
  }
}
}

```

Figure 4.5: Calculate Tariff Rate

Similar to the Tariff rate, weighing charges for cargoes should be calculated. The following code snippet shows the script used to calculate the weighing charges.

```

if(weighing_charges>0){
  total_amount = tariff_rate * weighing_charges;
}
if(service_type_value == 'T'){
  total_amount = tariff_rate * 1;
  createNewRow(
    lastIndex,
    account_no,
    stuffing_destuffing,
    container_no,
    container_size,
    vessel_name,
    vessel_date,
    service_type,
    tariff_code,
    tariff_rate,
    '1',
    total_amount
  );

  storeVal.push({

```

Figure 4.6: Calculate Weighing Charges

Several types of operations are available in the system. Tariff calculation will differ from one Rework operation type to another. Below Figure 4.7 depicts about the code snippet used under such a scenario.

```

if($pageType == 'LMD'){
    $db = &JFactory::getDbo();
    $query = $db->getQuery(true);
    $query->select(array('A.service_type_default','A.local_default'))
    ->from($db->quoteName('#__slpa_tariff') . ' AS A')
    ->where('A.tariff_id' . '=' . $db->quote($tariff_id));
    $db->setQuery($query);
    $results = $db->loadObjectList();

    $arr2 = array();
    $arr2[0]['id'] = $results[0]->local_default;
    $arr2[0]['val'] = $local_cbm;
    $arr2[0]['typ'] = 'local';

    $arr = array();
    /*$arr[] = $results[0]->service_type_default;*/
    $arr[] = $results[0]->local_default;

    $db1 = &JFactory::getDbo();
    $query1 = $db1->getQuery(true);
    $query1->select(array('A.*'))
    ->from($db1->quoteName('#__slpa_tariff') . ' AS A')
    ->where('A.tariff_id' . ' IN ' . "(" . implode(',', $arr) . ")");
    $db1->setQuery($query1);
    $results1 = $db->loadObjectList();

    foreach ($results1 as $key2 => $value2) {
        foreach ($arr2 as $key3 => $value3) {
            if($value2->tariff_id == $value3['id']){
                $results1[$key2]->val = $value3['val'];
                $results1[$key2]->typ = $value3['typ'];
            }
        }
    }
}

```

Figure 4.7: Operation Type wise Tariff Calculate

Printing the Rework Operation Card used to be one of the most significant tasks that are handled by the system. When considering the manual Rework operation, it relies on this process in less efficient than the proposed system, since Rework card has to be filled by a human. The card will be printed with all the relevant information thus it can be handover to the Agent within a second. Figure 4.8 depicts the Rework operation card printing function.

```

public function getContainerCardPrint_Y_IN($rework_no =null,$container_no=null,$rema
    $app = JFactory::getApplication();
    $user = JFactory::getUser();
    $userId = $user->get('id');
    $name = $user->get('name');
    $cargo_type = $_GET['cargo_type'];
    $now = date('Y-m-d H:i:s');
    $userlogin == false;
    $card_type = '';
    if($userId == '0'){
        $userlogin = true;
    }

    if($operation_type == 'M' && $operation_category=='F'){
        $operation = 'FULL MCC';
        $card_type = 'card_print_Y_IN';
    }else if($operation_type == 'S' && $operation_category=='O'){
        $operation = 'One Way Special';
        $card_type = 'card_print_Y_IN_oneway';
    }
    //var_dump($card_type);die();
    if($userlogin == false){
        $dbs = &JFactory::getDBO();
        $query = 'SELECT MAX(card_serial) as card_serial FROM #__slpa_card_print';
        $dbs->setQuery($query);
        $serial_no_result = $dbs->loadObjectList();
        $card_serial = $serial_no_result[0]->card_serial;
    }

```

Figure 4.8: Container Card Print

Report generating has to be an important feature handled by the system. Reports are generated using a PHP library called PhpSpreadsheet. The following figure is shown the sample code snippet in the system to generate Reports

```

// Create new Spreadsheet object
$spreadsheet = new Spreadsheet();

// Set document properties Maarten Balliauw
$spreadsheet->getProperties()->setCreator('SLPA')
->setLastModifiedBy('SLPA')
->setTitle('Office 2007 XLSX Test Document')
->setSubject('Office 2007 XLSX Test Document')
->setDescription('Test document for Office 2007 XLSX, generated using PHP classes.')
->setKeywords('office 2007 openxml php')
->setCategory('Test result file');

// Add some data
$spreadsheet->setActiveSheetIndex(0)
->setCellValue('A1', 'agent_id')
->setCellValue('B1', 'account_no')
->setCellValue('C1', 'agent_name')
->setCellValue('D1', 'address1')
->setCellValue('E1', 'address2')
->setCellValue('F1', 'address3')
->setCellValue('G1', 'contact_no1')
->setCellValue('H1', 'contact_no2')
->setCellValue('I1', 'fax')
->setCellValue('J1', 'email')
->setCellValue('K1', 'credit_balance')
->setCellValue('L1', 'agent_status')
->setCellValue('M1', 'user_id')
->setCellValue('N1', 'created_date');

```

Figure 4.9: Report Generate

## 4.2 Real System Screenshots

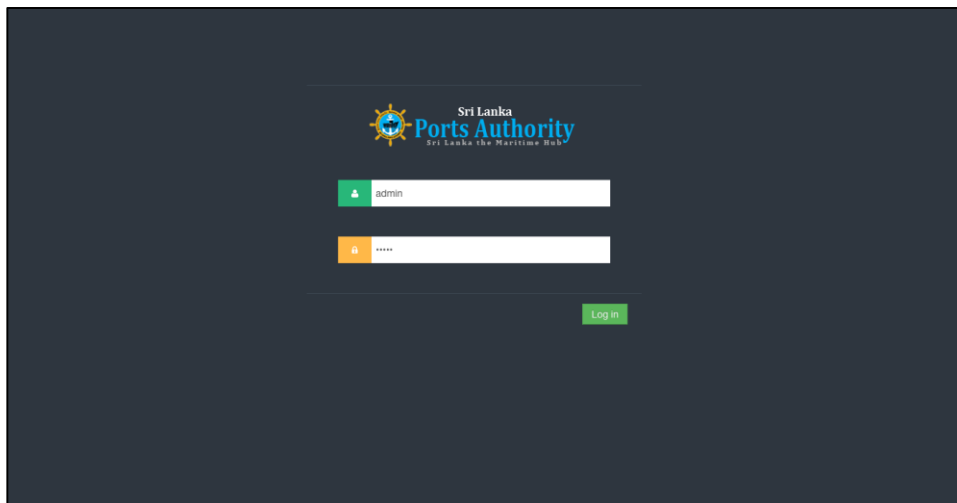


Figure 4.10: Login Page

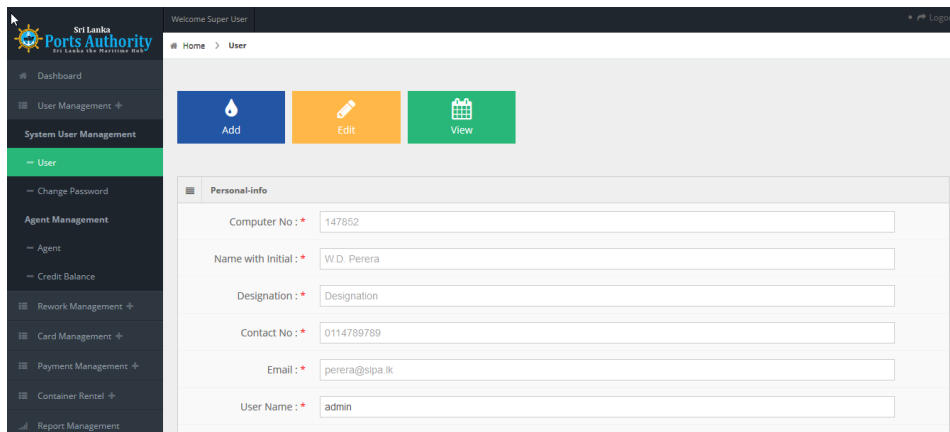


Figure 4.11: New User Registration View

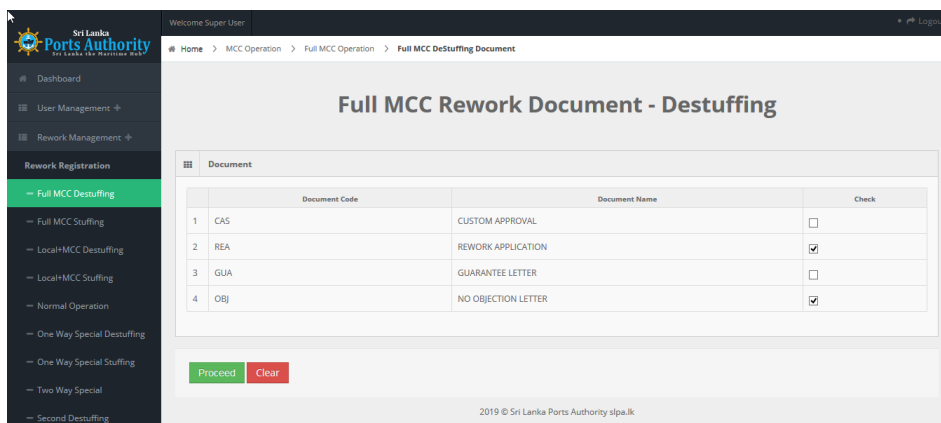


Figure 4.12: Full MCC De-stuffing - Step 1

Figure 4.13: Local MCC Rework Operation - Step 2

For more information, please refer the **APPENDIX G**

### 4.3 Summary

When providing an Information Technology based solution to a manual Rework operation, process under Logistic division is an interested task has been accommodated. Even though there were several approaches are identified to develop the system, PHP based web solution has been recognized as the best solution.

### 5 EVALUATION


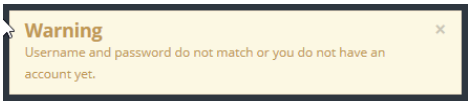
#### 5.1 Introduction

This chapter describes the evaluation procedures of different functionalities of the MIS system. It gives a good understanding of the current status of the system, usability and other functionalities to minimize development errors and bugs, which will help to build the perfect system as the end result.


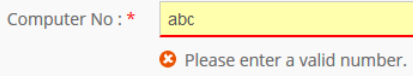
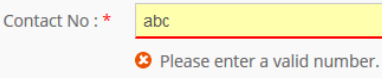
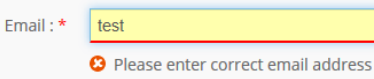
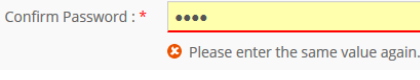
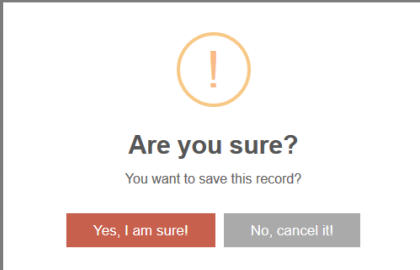
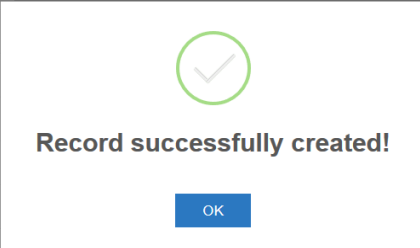
#### 5.2 Evaluation Results of the Web Application

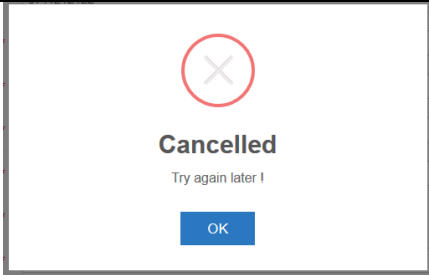
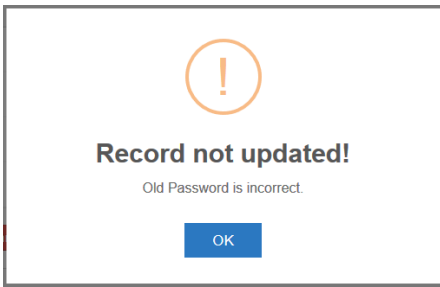
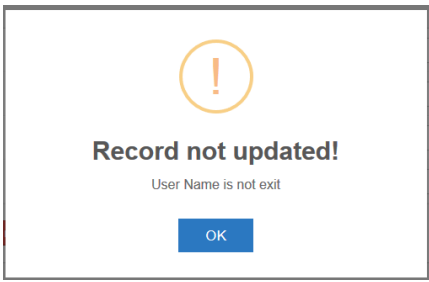
The evaluated functions of the system are as follows,

Table 5.1: Evaluation results

Test case ID	Description of the module	Test Procedure	Expected output	Result
01	User Login of the User Management module	If the password entry field is empty and clicks submit button	Notify Empty password not allowed 	Pass
02		when entering the wrong password and click submit button	Notify Username and password do not match or you do not have an account yet 	Pass
03		when entering the wrong username and click submit button	Notify Username and password do not match or you do not have an account yet	Pass
04		Enter incorrect username and password and click submit button	Notify Username and password do not match or you do not have an account yet	Pass
05		Enter correct username and	Direct to secure area	Pass



		password and click submit button		
06	User registration of the User Management module	If click submit button without filling the form	Notify required fields error message 	Pass
07		If enter text characters on the field name Computer No	Notify enter a valid number 	Pass
08		If enter text characters on the field name Contact No	Notify enter a valid number 	Pass
09		If enter nonstandard email address	Notify enter correct email address 	Pass
10		If password field and Confirm Password fields are not the same	Notify enter the same value again 	Pass
11		If enter correct values on the fields and click submit button	Alert the confirmation dialog box 	Pass
12		If enter correct values on the fields and click submit button and click YES for the confirmation	Notify Record successfully created 	Pass
13		If enter correct values on the	Notify Cancelled. Try again later	Pass

		fields and click submit button and click NO for the confirmation		
14	User password change of the User Management module	If click submit button without filling the form	Notify required fields error message	Pass
15		when entering the incorrect current password and click submit	Notify Old password is incorrect 	Pass
16		when entering incorrect current username and click submit	Notify Username is not exist 	Pass
17		when the new password and confirm password are a mismatch	Notify enter the same value again	Pass
18	Agent registration of the User Management module	If click submit button without filling the form	Notify required fields error message	Pass
19		If enter text characters on the field name Account No	Notify enter a valid number	Pass
20		If enter nonstandard email address	Notify enter correct email address	Pass

21		If enter correct values on the fields and click submit button	Alert the confirmation dialog box	Pass
22		If enter correct values on the fields and click submit button and click YES for the confirmation	Notify Record successfully created	Pass
23		If enter correct values on the fields and click submit button and click NO for the confirmation	Notify Cancelled. Try again later	Pass
24	Credit balance upload form of the User Management module	If select upload document other than excel or CSV	Notify to select upload document only excel or CSV format	Pass
25		When upload document finish	Notify records are updated	Pass
26	Manage documents of the Rework Management module	If click submit button without filling the form	Notify required fields error message	Pass
		If enter correct values on the fields and click submit button	Alert the confirmation dialog box	Pass
27		If enter correct values on the fields and click submit button and click YES for the confirmation	Notify Record successfully created	Pass

28		If enter correct values on the fields and click submit button and click NO for the confirmation	Notify Cancelled. Try again later	Pass
29	Rework Cancellation of the Rework	If click submit button without filling the form	Notify required fields error message	Pass
30	Management module	If enter correct values on the fields and click Proceed button	Go to rework information view	Pass
31		If enter correct values on the fields and click Proceed button and enter a reason and click Cancel rework button	Alert the confirmation dialog box	Pass
32		If enter correct values on the fields and click Proceed button and enter a reason and click Cancel rework button and click NO for the confirmation	Notify Cancelled. Try again later	Pass
33		If enter correct values on the fields and click Proceed button and enter a reason and click Cancel rework	Notify Record successfully created	Pass

		button and click YES for the confirmation	
--	--	---	--

Please refer *APPENDIX E* for more details.

### 5.3 Questionnaires

The Questionnaire has been given to each of the users registered in the system. When analysing the overall results of user feedback, it's easier to identify the user satisfaction levels relevant to the user experience. The template for the user evaluation form is available in APPENDIX D

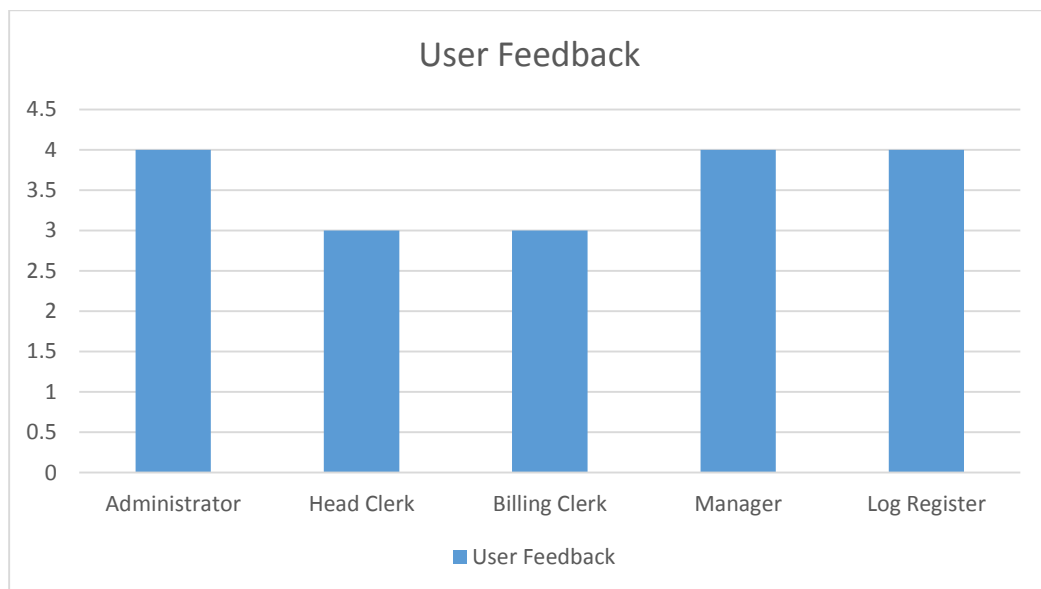


Figure 5.1: User Evaluation Feedbacks

As depicted in the Figure 5.1, user evaluation results are converted into bar chart. The horizontal axis is showing the number of user groups and vertical axis is showing the number of average feedback received from the each user groups.

### 5.4 Summary

During the system evaluation stage, testing of the system functionalities was done by the IT division of Sri Lanka Ports Authority. There are more than hundreds of test cases were created and checked against the system. All the functionalities of the system working steadily as expected according to the results of the test cases. The users of the system can carry out their tasks effectively and productively through the new system. Further, according to the results

obtained by the user feedback forms, overall system user experience and their requirements with the system is successfully achieved.

### 6 CONCLUSION

#### 6.1 Introduction

This chapter discusses the objectives that are archived and the future enhancements of the developed system. Also, it discusses the further modifications that can be done to improve the system functionality under the rework operation workflow.

#### 6.2 Conclusion

In view of the Rework operation that is handled by the Logistic division of SLPA, daily container load or unloads process has been increased. With the growth of the daily coming containers, Logistic division of the SLPA has to be provided with more facility to improve the container stuffing and De-stuffing process. Since one container terminal handle, more than a thousand containers per day and they have to do the Rework operation effectively in order to reduce the time of the stuffing and De-stuffing. As an example, if a vessel has to wait a long time until the stuffing or de-stuffing process is completed it may even delay in reaching the next port as well. So it is advantageous to increase its customer satisfaction in order to gain more profit.

To win the international shipping industry and compete with the other counties, Logistic division of Sri Lankan Ports Authority has to have an efficient workflow of Rework operation with cost-effective techniques.

The main purpose of the currently implemented system is to effectively and efficiently manage different rework application processes. Multiple Rework applications are handled in the proposed system.

- Manage Agents details
- Manage operation cards and facilitate to print or generate cards
- Empty container rent calculating etc.

### **6.3 Further Work**

The report generation section of the system has to be improved furthermore. Although the report generation is important for upper-level managers to make their future decisions and make plans. The implementation process of the system was delayed due to time limitation and requirements were changed occasionally during the development process. It has been prioritized to develop the main functionalities of the system in the first place.

Also, during the Rework registration process, the SMS gateway can be implemented to send SMS for Agents once the registration process will be completed. At the moment SMS gateway sample script is partially implemented, but not integrated any SMS gateway API or service into the system.

When considering the Agent Rework registration, a mobile app can be implemented to give better service for Agents.

### **6.4 Summary**

Implementation of the MIS system for the Logistics operations in SLPA is a very challenging task that has been handled since the current Rework process is bearing with the manual procedures. In addition, it is important to integrate SMS gateway and Report generating facilities for the Rework operation.



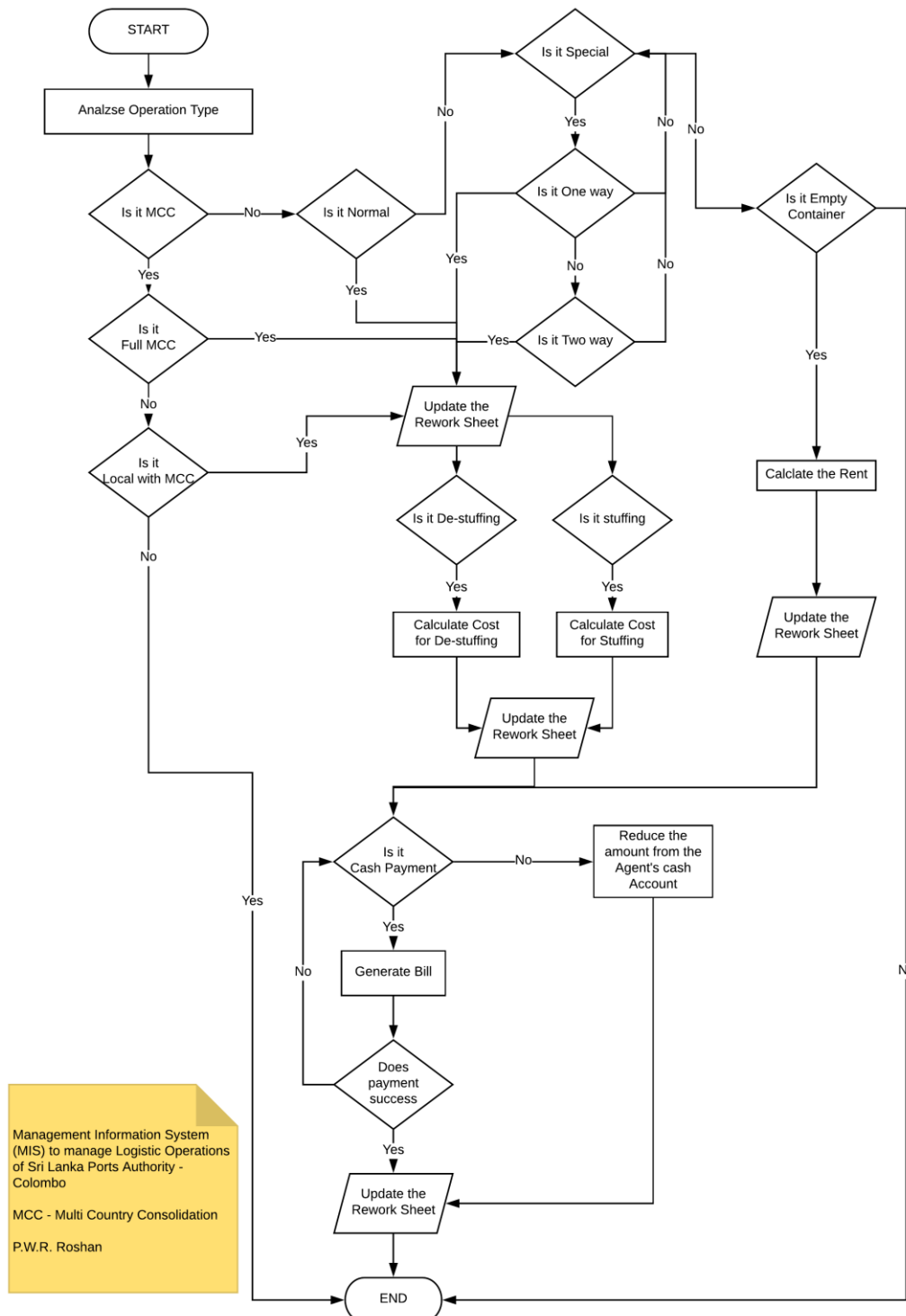
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# APPENDIX A – SYSTEM FLOWCHART

Following Flow Chart has created to visualize the basic flow of the proposed system.



Management Information System (MIS) to manage Logistic Operations of Sri Lanka Ports Authority - Colombo  
 MCC - Multi Country Consolidation  
 P.W.R. Roshan

Figure A 0.1: Basic flow of the proposed system

## APPENDIX B – USE CASES

Use Cases of the system

Table B 0.1: Use Case: Generate/View Summary Reports

<b>Use Case:</b> Generate/View Summary Reports	<b>ID-6</b>
<b>Priority:</b> Normal	
<b>Brief Description:</b> summary report generating area	
<b>Primary actors:</b> Manager	
<b>Secondary actors:</b> None	
<b>Pre-conditions:</b> Login to the system	
<b>Main Flow:</b> <ol style="list-style-type: none"> <li>1. Click view summery button</li> <li>2. Go to report view page</li> <li>3. Generate reports</li> </ol>	
<b>Post conditions:</b> n/a	

Table B 0.2: Use Case: Generate/View Pending CDN Report

<b>Use Case:</b> Generate/View Pending CDN Report	<b>ID-8</b>
<b>Priority:</b> Normal	
<b>Brief Description:</b> pending CDN report generating area	
<b>Primary actors:</b> Manager	
<b>Secondary actors:</b> None	
<b>Pre-conditions:</b> Login to the system	
<b>Main Flow:</b> <ol style="list-style-type: none"> <li>1. Click view pending CDN report button</li> <li>2. Navigate to page</li> <li>3. View the records</li> </ol>	
<b>Post conditions:</b> n/a	

Table B 0.3: Use Case - Register Rework Application

<b>Use Case:</b> Submit Review Document	<b>ID-9</b>
<b>Priority:</b> Normal	
<b>Brief Description:</b> review document submit area	
<b>Primary actors:</b> Head Clerk	
<b>Secondary actors:</b> None	
<b>Pre-conditions:</b> Login to the system	
<b>Main Flow:</b>	

<ol style="list-style-type: none"> <li>1. Click submit rework button</li> <li>2. Navigate to page</li> <li>3. Select rework category</li> <li>4. Enter records</li> <li>5. Click save button</li> </ol>
<b>Post conditions:</b> n/a

Table B 0.4: Use Case: Register Rework Application

<b>Use Case:</b> Register Rework Application	<b>ID-10</b>
<b>Priority:</b> Normal	
<b>Brief Description:</b> register rework application area	
<b>Primary actors:</b> Head Clerk	
<b>Secondary actors:</b> None	
<b>Pre-conditions:</b> Login to the system	
<b>Main Flow:</b>	
<ol style="list-style-type: none"> <li>1. Click register rework application button</li> <li>2. Enter records</li> <li>3. Click save button</li> </ol>	
<b>Post conditions:</b> n/a	

Table B 0.5: Use Case: Generate/Print Card

<b>Use Case:</b> Generate/Print Card	<b>ID-11</b>
<b>Priority:</b> Normal	
<b>Brief Description:</b> generate and print card area	
<b>Primary actors:</b> Head Clerk	
<b>Secondary actors:</b> None	
<b>Pre-conditions:</b> Login to the system	
<b>Main Flow:</b>	
<ol style="list-style-type: none"> <li>1. Click print card button</li> <li>2. Go to page</li> <li>3. Select form</li> <li>4. Click print button</li> </ol>	
<b>Post conditions:</b> n/a	

Table B 0.6: Use Case: Update Rework Application

<b>Use Case:</b> Update Rework Application	<b>ID-12</b>
<b>Priority:</b> Normal	

<b>Brief Description:</b> rework application updating area of the system
<b>Primary actors:</b> Head Clerk
<b>Secondary actors:</b> None
<b>Pre-conditions:</b> Login to the system
<b>Main Flow:</b> <ol style="list-style-type: none"> <li>1. Click update rework application button</li> <li>2. Navigate to page</li> <li>3. Select existing reword application id</li> <li>4. Go to page</li> <li>5. Edit records</li> <li>6. Click save</li> </ol>
<b>Post conditions:</b> n/a

Table B 0.7: Use Case: Add Extra Services

<b>Use Case:</b> Add Extra Services	<b>ID-13</b>
<b>Priority:</b> Normal	
<b>Brief Description:</b> add extra services area of the system	
<b>Primary actors:</b> Head Clerk	
<b>Secondary actors:</b> None	
<b>Pre-conditions:</b> Login to the system	
<b>Main Flow:</b> <ol style="list-style-type: none"> <li>1. Click ad extra button</li> <li>2. Go to page</li> <li>3. Enter details</li> <li>4. Click save button</li> </ol>	
<b>Post conditions:</b> n/a	

Table B 0.8: Use Case: Cancel Rework Application

<b>Use Case:</b> Cancel Rework Application	<b>ID-14</b>
<b>Priority:</b> Normal	
<b>Brief Description:</b> cancel rework application area of the system	
<b>Primary actors:</b> Head Clerk	
<b>Secondary actors:</b> None	
<b>Pre-conditions:</b> Login to the system	
<b>Main Flow:</b>	

<ol style="list-style-type: none"> <li>1. Click cancel rework application</li> <li>2. Select application id</li> <li>3. Click cancel button</li> </ol>
<b>Post conditions:</b> n/a

Table B 0.9: Use Case: Rent Calculation

<b>Use Case:</b> Rent Calculation	<b>ID-16</b>
<b>Priority:</b> Normal	
<b>Brief Description:</b> rent calculating area of the system	
<b>Primary actors:</b> Head Clerk	
<b>Secondary actors:</b> None	
<b>Pre-conditions:</b> Login to the system	
<b>Main Flow:</b> <ol style="list-style-type: none"> <li>1. Click rent calculation button</li> <li>2. Select application form</li> <li>3. System algorithm will generate a calculation</li> <li>4. Display results</li> </ol>	
<b>Post conditions:</b> n/a	

Table B 0.10: Use Case: Generate Operation Certificate

<b>Use Case:</b> Generate Operation Certificate	<b>ID-17</b>
<b>Priority:</b> Normal	
<b>Brief Description:</b> operating certificate generating area of the system	
<b>Primary actors:</b> Billing Clerk	
<b>Secondary actors:</b> None	
<b>Pre-conditions:</b> Login to the system	
<b>Main Flow:</b> <ol style="list-style-type: none"> <li>1. Click operation certificate</li> <li>2. Got to page</li> <li>3. Enter records</li> <li>4. Click generate button</li> </ol>	
<b>Post conditions:</b> n/a	

Table B 0.11: Use Case: Approve Bill

<b>Use Case:</b> Approve Bill	<b>ID-18</b>
<b>Priority:</b> Normal	

<b>Brief Description:</b> bill approval area of the system
<b>Primary actors:</b> Billing Clerk
<b>Secondary actors:</b> None
<b>Pre-conditions:</b> Login to the system
<b>Main Flow:</b> <ol style="list-style-type: none"> <li>1. Click view bill details page</li> <li>2. Go to page</li> <li>3. Click particular bill record to approve</li> </ol>
<b>Post conditions:</b>

Table B 0.12: Use Case: Generate/View Monthly Income Report

<b>Use Case:</b> Generate/View Monthly Income Report	<b>ID-20</b>
<b>Priority:</b> Normal	
<b>Brief Description:</b> view month income generating area of the system	
<b>Primary actors:</b> Manager	
<b>Secondary actors:</b> None	
<b>Pre-conditions:</b> Login to the system	
<b>Main Flow:</b> <ol style="list-style-type: none"> <li>1. Click month report generate button</li> <li>2. Go to page</li> <li>3. Select records and generate reports</li> <li>4. View reports</li> </ol>	
<b>Post conditions:</b> n/a	



# APPENDIX C – USER INTERFACES

Sample User Interface Designs are as follows.

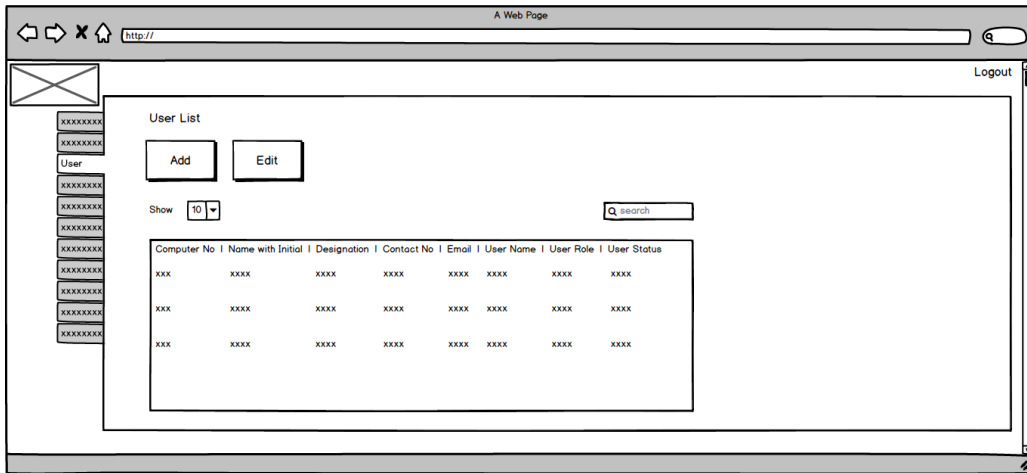


Figure C 0.1: User list

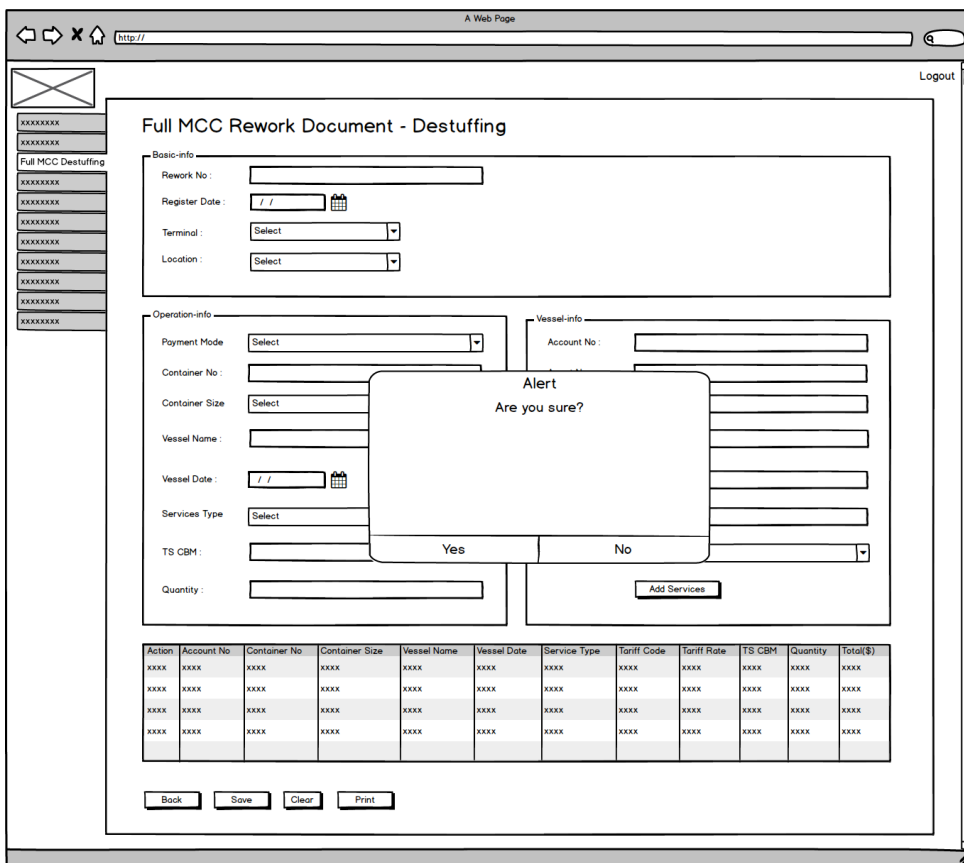


Figure C 0.2: Full MCC Rework document de-stuffing save confirmation UI

## APPENDIX D - USER EVALUATION FORM TEMPLATE

Table D 0.1: User Evaluation Form

<b>User Evaluation Form</b> <b>Management Information System (MIS) to manage Logistic Operations of Sri Lanka Ports Authority</b>						
<b>Date:</b>		<b>Name:</b>			<b>Role:</b>	
* Please fill short answers to below questions. Put "X" to the appropriate column						
No.	Question	Very much satisfactory	Satisfactory	Neural	Unsatisfactory	Very much Unsatisfactory
1	Overall Accessibility					
2	Overall Content					
3	Overall Presentation					
4	Interfaces are simple and understandable					
5	System display information more familiar					
6	Easily navigate through the system					
7	Functions are more reliable					
8	System provide sufficient information					
9	Degree of Information provided in Reports					
10	Ability to maintain data, to keep it up-to-date					
11	Ease of entering/handling form fields, and handle manipulations					
Any other Comment:						

## APPENDIX E – TEST CASES

Test cases of the system are as follow,

Table E 0.1: Test Cases

Test case ID	Description of the module	Test Procedure	Expected output	Result
34	Rework Inquiry of the Rework Management module	If click Proceed button without filling the form	Notify required fields error message	Pass
35		Fill the required fields and click Proceed button	Go to reword detail view	Pass
36	Card Print of the Card Management module	If click Proceed button without filling the form	Notify required fields error message	Pass
37		If enter Rework No and Proceed	Go to card print view	Pass
38		If enter Rework No and Proceed and click Print card	Export pdf of card	Pass
39	Full MCC Rework Document De-stuffing of the Rework Management module	Select relevant checkboxes and click proceed	Go to the registration form	Pass
40		Select relevant checkboxes and click proceed and click the add button	Notify error about to select required fields	Pass
41		Select relevant checkboxes and click proceed and fill required fields and click the add button	Add the records to the service table with default values	Pass
42		If enter correct values on the fields and click submit button	Alert the confirmation dialog box	Pass

43		If enter correct values on the fields and click submit button and click YES for the confirmation	Notify Record successfully created	Pass
44		If enter correct values on the fields and click submit button and click NO for the confirmation	Notify Cancelled. Try again later	Pass
45		In the registration form click the Print button without adding records	The button is not clickable	Pass
46		In the registration form click the Print button after adding records	Export PDF output of the card	Pass
47	Full MCC Stuffing of the Rework Management module	Select relevant checkboxes and click proceed	Go to the registration form	Pass
48		Select relevant checkboxes and click proceed and click the add button	Notify error about to select required fields	Pass
49		Select relevant checkboxes and click proceed and fill required fields and click the add button	Add the records to the service table with default values	Pass
50		If enter correct values on the fields and click submit button	Alert the confirmation dialog box	Pass
51		If enter correct values on the fields and click submit	Notify Record successfully created	Pass

		button and click YES for the confirmation		
52		If enter correct values on the fields and click submit button and click NO for the confirmation	Notify Cancelled. Try again later	Pass
53		In the registration form click the Print button without adding records	The button is not clickable	Pass
54		In the registration form click the Print button after adding records	Export PDF output of the card	Pass
55	Local + MCC De-stuffing of the Rework Management module	Select relevant checkboxes and click proceed	Go to the registration form	Pass
56		Select relevant checkboxes and click proceed and click the add button	Notify error about to select required fields	Pass
57		Select relevant checkboxes and click proceed and fill required fields and click the add button	Add the records to the service table with default values	Pass
58		If enter correct values on the fields and click submit button	Alert the confirmation dialog box	Pass
59		If enter correct values on the fields and click submit button and click YES for the confirmation	Notify Record successfully created	Pass

60		If enter correct values on the fields and click submit button and click NO for the confirmation	Notify Cancelled. Try again later	Pass
61		In the registration form click the Print button without adding records	The button is not clickable	Pass
62		In the registration form click the Print button after adding records	Export PDF output of the card	Pass
63	Local + MCC Stuffing of the Rework Management module	Select relevant checkboxes and click proceed	Go to the registration form	Pass
64		Select relevant checkboxes and click proceed and click the add button	Notify error about to select required fields	Pass
65		Select relevant checkboxes and click proceed and fill required fields and click the add button	Add the records to the service table with default values	Pass
66		If enter correct values on the fields and click submit button	Alert the confirmation dialog box	Pass
67		If enter correct values on the fields and click submit button and click YES for the confirmation	Notify Record successfully created	Pass
68		If enter correct values on the fields and click submit	Notify Cancelled. Try again later	Pass

		button and click NO for the confirmation		
69		In the registration form click a Print button without adding records	The button is not clickable	Pass
70		In the registration form click the Print button after adding records	Export PDF output of the card	Pass
71	Normal Operation of the Rework Management module	Select relevant checkboxes and click proceed	Go to the registration form	Pass
72		Select relevant checkboxes and click proceed and click the add button	Notify error about to select required fields	Pass
73		Select relevant checkboxes and click proceed and fill required fields and click the add button	Add the records to the service table with default values	Pass
74		If enter correct values on the fields and click submit button	Alert the confirmation dialog box	Pass
75		If enter correct values on the fields and click submit button and click YES for the confirmation	Notify Record successfully created	Pass
76		If enter correct values on the fields and click submit button and click NO for the confirmation	Notify Cancelled. Try again later	Pass

77		In the registration form click the Print button without adding records	The button is not clickable	Pass
78		In the registration form click the Print button after adding records	Export PDF output of the card	Pass
79	One Way Special De-stuffing of the Rework Management module	Select relevant checkboxes and click proceed	Go to the registration form	Pass
80		Select relevant checkboxes and click proceed and click the add button	Notify error about to select required fields	Pass
81		Select relevant checkboxes and click proceed and fill required fields and click the add button	Add the records to the service table with default values	Pass
82		If enter correct values on the fields and click submit button	Alert the confirmation dialog box	Pass
83		If enter correct values on the fields and click submit button and click YES for the confirmation	Notify Record successfully created	Pass
84		If enter correct values on the fields and click submit button and click NO for the confirmation	Notify Cancelled. Try again later	Pass
85		In the registration form click the Print	The button is not clickable	Pass



		button without adding records		
86		In the registration form click the Print button after adding records	Export PDF output of the card	Pass
87	One Way Special Stuffing of the Rework	Select relevant checkboxes and click proceed	Go to the registration form	Pass
88	Management module	Select relevant checkboxes and click proceed and click the add button	Notify error about to select required fields	Pass
89		Select relevant checkboxes and click proceed and fill required fields and click the add button	Add the records to the service table with default values	Pass
90		If enter correct values on the fields and click submit button	Alert the confirmation dialog box	Pass
91		If enter correct values on the fields and click submit button and click YES for the confirmation	Notify Record successfully created	Pass
92		If enter correct values on the fields and click submit button and click NO for the confirmation	Notify Cancelled. Try again later	Pass
93		In the registration form click the Print button without adding records	The button is not clickable	Pass

94		In the registration form click the Print button after adding records	Export PDF output of the card	Pass
95	Two Way Special of the Rework Management module	Select relevant checkboxes and click proceed	Go to the registration form	Pass
96		Select relevant checkboxes and click proceed and click the add button	Notify error about to select required fields	Pass
		Select relevant checkboxes and click proceed and fill required fields and click the add button	Add the records to the service table with default values	Pass
97		If enter correct values on the fields and click submit button	Alert the confirmation dialog box	Pass
98		If enter correct values on the fields and click submit button and click YES for the confirmation	Notify Record successfully created	Pass
99		If enter correct values on the fields and click submit button and click NO for the confirmation	Notify Cancelled. Try again later	Pass
100		In the registration form click the Print button without adding records	The button is not clickable	Pass
101		In the registration form click the Print	Export PDF output of the card	Pass

		button after adding records		
102	Second De-stuffing of the Rework Management module	Select relevant checkboxes and click proceed	Go to the registration form	Pass
103		Select relevant checkboxes and click proceed and click the add button	Notify error about to select required fields	Pass
104		Select relevant checkboxes and click proceed and fill required fields and click the add button	Add the records to the service table with default values	Pass
105		If enter correct values on the fields and click submit button	Alert the confirmation dialog box	Pass
106		If enter correct values on the fields and click submit button and click YES for the confirmation	Notify Record successfully created	Pass
107		If enter correct values on the fields and click submit button and click NO for the confirmation	Notify Cancelled. Try again later	Pass
108		In the registration form click the Print button without adding records	The button is not clickable	Pass
109		In the registration form click the Print button after adding records	Export PDF output of the card	Pass

# APPENDIX F – SAMPLE DOCUMENTS

Following documents are used by the Logistic division.

REWORK  
SRI LANKA PORTS AUTHORITY

LOGISTICS DIVISION      SERIAL: NO

CHIEF MANAGER /MANAGER

(1) AGENT: SHIPCO TRANSPORT LANKA PVT LTD 2018.06.02

Request under

(1) SPECIA OPARETION	<input type="checkbox"/>
(2) MCC OPARETION -WP	<input checked="" type="checkbox"/>
(3) NORMAL OPERATION	<input type="checkbox"/>

(2) DE-STUFFING

SAGT

CONTAINER NO	DISCHARGING VSL/DATE	STATUS	CARGO COMPOSITION	
1				
2				
3				
4				

3) STUFFING

	CONTAINER NO /SIZE	LOADING VESSEL/DATE	STATUS	CARGO COMPOSITION		DESTINATION
				LOCAL	TS	
1	MS 4270191 20'	██████████ : 1820 OF 02.06.2018	MCC	CDN	18.472	SALALAH
2						
3						
4						

4) Nature of the operation : UN :                      CLASS :

5) The unit operation to be carried: ...BQ ..... SHIFT ...      SAGT

6) The above particulars are correct and we under take to meet all charges in respect of this operation.

1	2	3	4
---	---	---	---

(AGENT OF THE DISCHARGING VESSEL OR MCC OPSRATOR)

7) we have no objection for the above operation and we guarantee to meet all charges, and confirm loading of these containers on the on crrier vessel declared above

1	2	3	4
---	---	---	---

~~SHIPCO TRANSPORT LANKA (PVT) LTD.~~  
As Agent

(AGENT OF THE LOADING VESSELS OR MCC OPERATCR)

Figure F 0.1: Sample Rework Application - Front

REWORK

) CHECKED AND CERTIFIED AS CORRECT

*OK 28/5/18*

SUBJECT CLERK  
DATE:

*5/28*  
SRI LANKA PORTS AUTHORITY  
LOGISTICS DIVISION  
SUPDT (BILLING)/DUTY OFFICER

APPROVED PLEASE. PREPARE CARDS.

MANAGER / SUPDT. (BQ I / BQ III)

ALL THE ACTIVITIES PERTAINING TO THIS OPERATION SHOULD BE WRITTEN IN THE BELOW TABLE AND RETURN TO THE BILLING SECTION OF LOGISTICS DIVISION ALONG WITH THE OPERATION MOVEMENT CARD

DATE OF OPERATION & SHIFT	CONTAINER NO. DESTUFFED	SIZE	NO. OF PKGS		SIZE	NO. OF PKGS
<i>31/05/2018</i>	-	-	-	<i>M</i>	<i>20'</i>	<i>62</i>
				<i>4290</i>		
				<i>191</i>		

ANY EXTRA MOVEMENTS

DATE OF OPERATION & SHIFT	CONTAINER NO. DESTUFFED	SIZE	NO. OF PKGS		SIZE	NO. OF PKGS

ASS: UNIT SUPERINTENDENT

MANAGER / SUPDT.  
Junior Manager  
Logistics Division  
Sri Lanka Ports Authority

Figure F 0.2: Sample Rework Application - Rear

**PERMIT FOR REMOVAL OF EMPTY CONTAINERS  
(CUSTOMA / SLPA CONTAINER FORM 1)**

5 [REDACTED]

**USE OF APPLICANT AND AGENT OF VESSEL / CONTAINER**

Name of Applicant: [REDACTED] (Pvt) Ltd [REDACTED] / 2, Sri Sangaraja Mawatha Colombo 10.	B/L NO: Port of loading: Removal Agreed To: We Guarantee Payment Of All SLPA Charges  ..... (Signature)
Name & Date Of Vessel: [REDACTED] VOY: 010W	Name & Address Of Agent Of Container: ETA: 30.05.2018 [REDACTED] ANKA (PVT) LTD  ..... (Signature of Agent Of Container)
Name & Address Of Agent Of Vessel	[REDACTED] ANKA (PVT) LTD  ..... (Signature of Agent Of Container)

CONTAINER NO.	SIZE.	CONTAINER NO.	SIZE.
1)	GE [REDACTED] 674-0	40'	11)
2)			12)
3)			13)
4)			14)
5)			15)
6)			16)
7)			17)
8)			19)
9)			20)
10)			

I / We certify that the container is empty.

.....  
(Signature Of Applicant)

**PART (B) FOR AUTHORITY USE**

Container /s Certified Empty / Released subject to Examination at Gate.

[REDACTED]

For Port Authority

Time: [REDACTED]

Date: 08 JUN 2018

JCT / CIOT / SAGT

**PART (C.) FOR CUSTOMS USE**

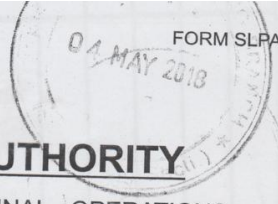
<u>QUAT SIDE</u>	<u>GATE</u>
Removal Of Empty Container Approved	Container Examined & passed
Office In Charge	Tide Surveyor
Container Control	Time:
Time:	Date:
Date:	

LONGROOM

Manifested:

Manifest Clerk:

Figure F 0.3: Empty Container Removal Form



# SRI LANKA PORTS AUTHORITY

## CERTIFICATE FOR CONTAINER TERMINAL - OPERATIONS

VESSEL NO: 1 [redacted] - SAGT

No 2 [redacted]

VESSEL: A [redacted] ✓

SERIAL NO. LD OF 29 May. 18

AGENT: A [redacted] (VT) LTD ✓  
E [redacted] (Taiwan) - 500

TARIFF SECTION III ITEM: De stuffing - 18-02 } tariff code  
MT mounting - 17-02 }

COMPUTER CODE 21-082 ✓ } computer code  
21-082 ✓ }

NO	CONTAINER NOS	SIZE	NO	CONTAINER NOS	SIZE	REMARKS
01	T2 [redacted] 98	20'	01			
02	[01x20']		02			
03			03			
04			04			
05			05			
06			06			
07			07			
08			08			
09			09			
10			10			
11			11			
12			12			
13			13			

Prepared by [signature] 21 subject cl.

Certified Correct

Checked by [signature] 01/05/2018 subject cl.

Executive Officer

LOGISTICS DIVISION  
SRI LANKA PORTS AUTHORITY  
S.B. Printers - Negombo  
Manage approval

### FOR FINANCE DIVISION USE

RATED BY

CHECKED BY


Figure F 0.4: Container Terminal Operation

CARGO DISPATCH NOTE/FCL/LCL/CONTAINER LOAD PLAN - EXP 3b

1.a Shipper (Name and Address) [REDACTED] LTD, NO. 77/3, NEGAMBO ROAD,				7. Lorry/Trailer No. [REDACTED]	8. SN/(B/L) No. [REDACTED] 60
1.b Cusdec Numbers [REDACTED] BE 2018 2018 E53564   CBBE1 2018 E53566   BIBE1				9. Tare Wt. (Kg) [REDACTED]	10. SLPA No. [REDACTED] 6710
2.b Consignee (Name and Address) [REDACTED] FOR M & P [REDACTED] ET NO 24. DOHA STATE OF QATAR				11.a Seal No. 02 [REDACTED]	CDN No. 2018 CBBE [REDACTED] 394
2. B R S L				12. Name of Driver S P W WIJE [REDACTED] 023V	13. Location of Goods SAGT
3.a Voyage No. / Date 1 [REDACTED] Thu May 31 00:				15. Time of Departure from Stores/CFS The container/lorry was stuffed/loaded under strict security conditions & I certify that this container/lorry is safe to be handled in the Port [REDACTED]	
4. Vessel CHI [REDACTED]		3.b Ex Vessel		16. Name of certifying security officer/authorized signatory [REDACTED]	
5. Port of Discharge SALALAH		6. Port of Loading COLOMBO		17. Signature, Designation and Date [REDACTED]	
Vessel Op.Code MKL		Cont. Op.Code MKL			
18. Marks & Numbers Container No. M [REDACTED] 191 20GP SHI [REDACTED] (BQ-01)		19. Number & kind of pkgs. 163 OT		20. Description of Goods GARMENTS & CONSOLE CARGO BOI UPB CONSO OTHER ACKNOWLEDGED ASC	
21. (a) Gross Weight, Kg 931.36		22. Cube m3 12.62		23. Type of container Height.....Lenght.....Type.....	
24. Reefer Temperature Required NIL NIL		25. Place of Delivery CY CFS DOOR Wattala. CFS DOOR		31. Customs Export Office Date Signature Date Signature	
26. Place of Receipt Wattala. CFS DOOR		27. Assistant S Ace Cont. Freight Station Wattala. CFS DOOR		32. SLPA Export Office I certify that the commodities loaded into trailer/lorry mentioned above at our premises were packed in our stores under strict security conditions and is safe handling [REDACTED]	
28. (a) Time of Arrival at Customs Gate		28. (b) Customs Officer		34. Name of Company preparing note [REDACTED]	
29. (a) Time of Arrival Alongside		29. (b) Pier Clerk		35. Name of Declarant [REDACTED]	
30. (a) Time & Date Demounted/Discharged		30. (b) Supervisor/ Pier Clerk		36. Telegraph No. [REDACTED]	
37. Signature of Declarant [REDACTED]					

Figure F 0.5: Cargo Dispatch Note (CDN)



16. TREAT THIS AS 

**Sri Lanka Ports Authority**

CODE NO :- ISFODCT 53306

**CONTAINER TERMINAL OPERATIONS CARD "OUT"**

Container No ..... Weight .....

Size of Container .....

Vessel		Initials	Status		Initials	Port of Destination		Initials
Date			FCL	Laden				
Agent			LCL	T/S		Seal No.		
			MT	Out Port				

DE - MOUNTED						LOCATION						STUFFING		
Date	Time	Status	From	To	Lorry No.	Initials	B.	R.	S.	L.	Initials	Date	Time	Initials

MOUNTED						GATE						LOADING VESSEL			
Date	Time	Status	From	To	Lorry No.	Initials	Date	Time	State	From	To	Lorry No.	Initials	Lorry No.	Date

S.B Printers- Negombo

Figure F 0.6: Container Terminal Operation Card - Out

**Sri Lanka Ports Authority**

CODE NO :- ISFODCT 53306

**CONTAINER TERMINAL OPERATIONS CARD "IN"**

Container No ..... Weight .....

Size of Container .....

Vessel		Initials	Container Discharged		Initials	Status		Initials
Date			Date	Time		FCL	Laden	
Agent			Lorry No.			LCL	T/S	
			Seal No.			MT	Out Port	

DE - MOUNTED						LOCATION						DE - STUFFING				
Date	Time	Status	From	To	Lorry No.	Initials	B.	R.	S.	L.	Initials	Date	Time	W/H	D/D	Initials

MOUNTED						GATE							
Date	Time	Status	From	To	Lorry No.	Initials	Status	Date	Time	From	To	Lorry No.	Initials

Figure F 0.7: Container Terminal Operation Card - In

**SRI LANKA PORTS AUTHORITY**  
CONTAINER TERMINAL  
OPERATIONS CARD " IN " TRANSHIPMENT / OUTPORT

CODE NO. : ISFODCT 54008  
Weight .....  
Size of Container .....

Container No .....

Vessel	Initials	Container Discharged	Initials	Status	Initials
Date		Date	Time	T/S	O/P
Agent		Lorry No.		LADEN	
		Seal No.		MT	

DE - MOUNTED						LOCATION					DE - STUFFED					
Date	Time	Status	CT/CG	To	Lorry No.	Initials	B.	R.	S.	L.	Initials	Date	Time	W / H	D / D	Initials

MOUNTED							GATE						
Date	Time	Status	CT/CG	To	Lorry No.	Initials	Status	Date	Time	From	To	Lorry No.	Initials

Figure F 0.8: Card Transshipment - In

**SRI LANKA PORTS AUTHORITY**  
CONTAINER TERMINAL  
OPERATIONS CARD " OUT " TRANSHIPMENT / OUTPORT

CODE NO. : ISFODCT 54008  
Weight .....  
Size of Container .....

Container No .....

Vessel	Initials	Status	Initials	Port of Destination	Initials
Date		T/S	O/P		
Agent		LADEN		Seal No.	
		MT			

DE - MOUNTED						LOCATION					STUFFED			
Date	Time	Status	CT/CG	To	Lorry No.	Initials	B.	R.	S.	L.	Initials	Date	Time	Initials

MOUNTED							GATE				LOADING VESSEL						
Date	Time	Status	CT/CG	To	Lorry No.	Initials	Date	Time	Status	From	To	Lorry No.	Initials	Lorry No.	Date	Time	Initials

Figure F 0.9: Card Transshipment - Out

# APPENDIX G - REAL SYSTEM SCREENSHOTS

Sample real system screenshots are as follows.

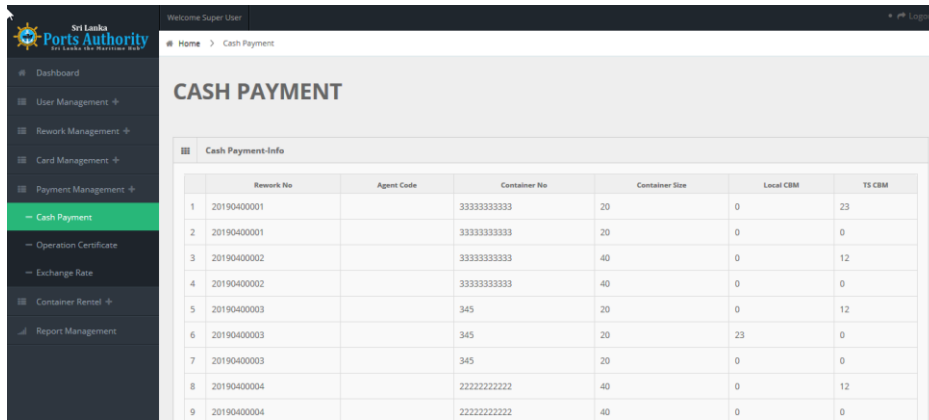


Figure G 0.1: Cash Payment Page

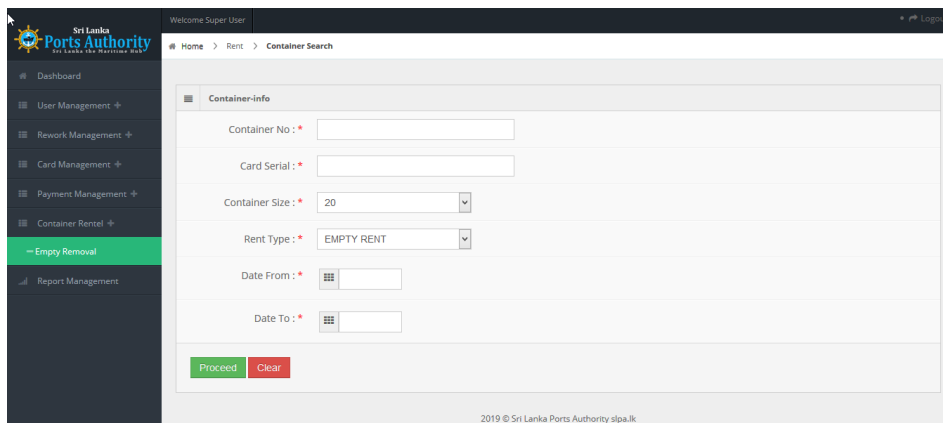


Figure G 0.2: Container Empty Removal

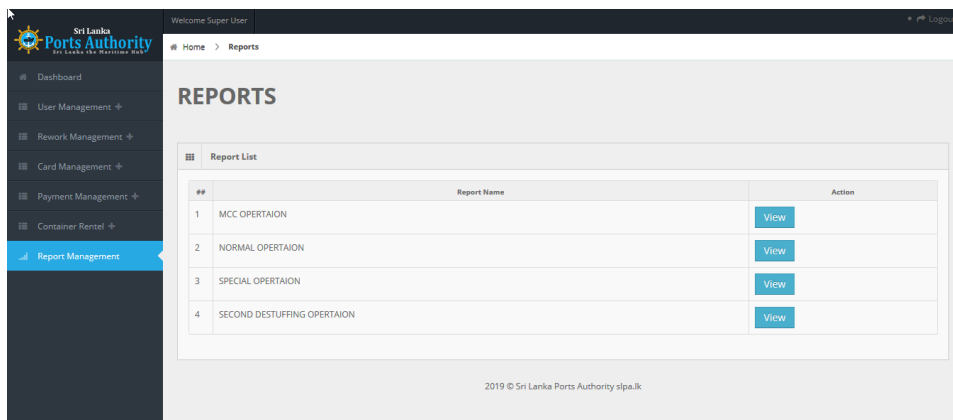


Figure G 0.3: Report Generate Page

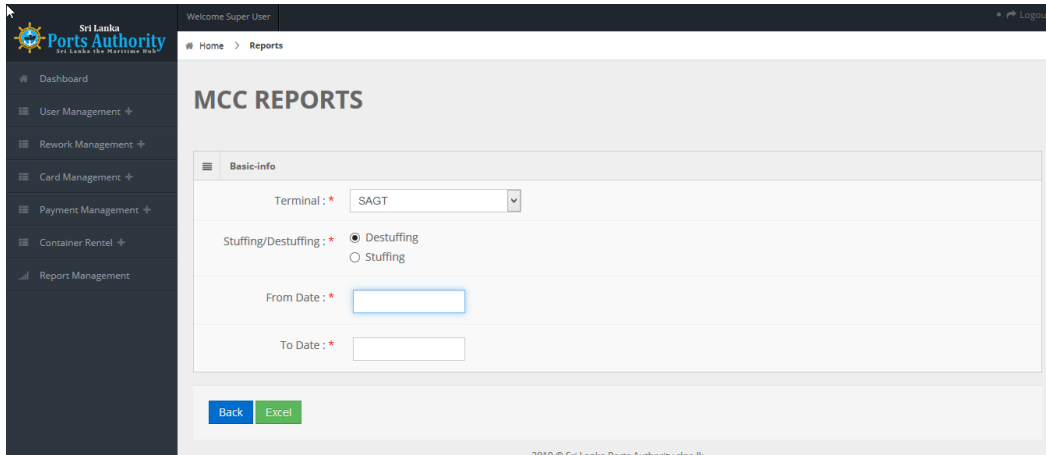


Figure G 0.4: Sample MCC Report

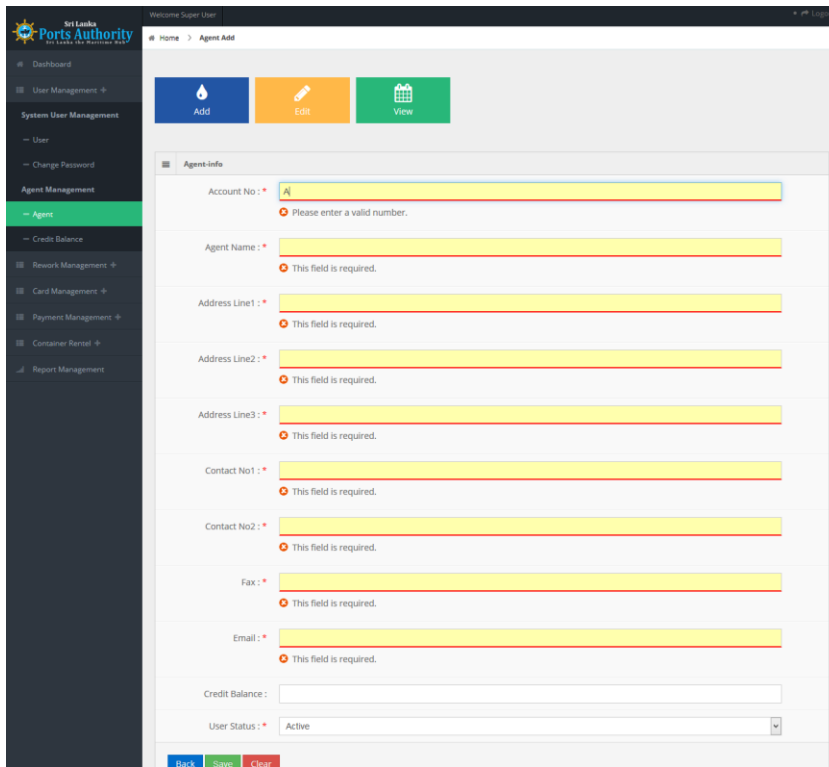


Figure G 0.5: Agent Page

[Home](#) > [Agent Inquiry](#)

## AGENT INQUIRY

Show  entries

Account No	Agent Name	Address Line1	Address Line2	Address Line3	Contact No1	Contact No2	Fax	Email	Credit Balance
1 2001	CL CYNERGY (PVT) LTD	NO. 651/05,	ELVITIGALA MAWATHA,	COLOMBO 05,	5300250	0715555555	5338745	info@ckynergy.com	0
2 2002	F S L LANKA (PVT) LTD	45,	JANADIPATHI MAWATHA,	COLOMBO-01	2472573		2472577	info.lkmb@eight-systems.com	0
3 2003	SEACARE FORWARDERS (PVT)	540E, 2/2,	SRI SANGARAJA MAWATHA,	COLOMBO-10	4723488		4723450	shipcar@sbnet.lk	0
4 2004	C P WORLD LANKA (PVT) LTD	148,FREIGHT HOUSE,	UNION PLACE,	COLOMBO 02	5333913			info@cpworldgroup.com	0
5 2005	CVT GLOBALINK COLOMBO (PVT) LTD	2nd FLOOR, FORBES & WORKERS,	MAIN BUILDING, 46/38, NARAYAN MAWATHA	COLOMBO-02	4723588		4723599	emb@vnglobalink.lk	0
6 2006	FREIGHT LINKS INTERNATIONAL (PVT) L	LEVEL 07,ACCESS TOWERS,	278, UNION PLACE,	COLOMBO-02	2302402		2302412	info@freight-links.com	0
7 2007	SPEIDCON LOGISTICS(PVT) LTD	LANDIAN HOUSE,COMMERCIAL BUILDING,	1ST FLOOR, 8/302 1/1, HAVELOCK ROAD	COLOMBO 03	5649480		5550406	custdesk@spedconlogistics.com	0
8 2009	GP SHIPPING (PVT) LTD	LEVEL 8, WEST WING CEYLINCO HOUSE,	69, JANADIPATHI MAWATHA,	COLOMBO 01	5377388		5379706	info@gpshippingltd.com	0
9 2012	ECU LINE LANKA (PVT) LTD	No-03, Lukshmi Gardens,	Maradana Road,	Colombo 08	4368872		4641081		0
10 2013	MSA SHIPPING (PVT) LTD	P.O. BOX 1843,	121/1, STACE ROAD,	COLOMBO 14	2385289		2445934	msa@msashipping.com	0

Showing 1 to 10 of 80 entries
 [Previous](#) [Next](#)

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Figure G 0.6: View All Agents

[Home](#) > [Agent Update](#)

## AGENT UPDATE

Show  entries

Account No	Agent Name	Address Line1	Address Line2	Address Line3	Contact No1	Contact No2	Fax	Email	Credit Balance	User Status
1 2001	CL CYNERGY (PVT) LTD	NO. 651/05,	ELVITIGALA MAWATHA,	COLOMBO 05,	5300250	0715555555	5338745	info@ckynergy.com	0	A
2 2002	F S L LANKA (PVT) LTD	45,	JANADIPATHI MAWATHA,	COLOMBO-01	2472573		2472577	info.lkmb@eight-systems.com	0	A
3 2003	SEACARE FORWARDERS (PVT)	540E, 2/2,	SRI SANGARAJA MAWATHA,	COLOMBO-10	4723488		4723450	shipcar@sbnet.lk	0	A
4 2004	C P WORLD LANKA (PVT) LTD	148,FREIGHT HOUSE,	UNION PLACE,	COLOMBO 02	5333913			info@cpworldgroup.com	0	A
5 2005	CVT GLOBALINK COLOMBO (PVT) LTD	2nd FLOOR, FORBES & WORKERS,	MAIN BUILDING, 46/38, NARAYAN MAWATHA	COLOMBO-02	4723588		4723599	emb@vnglobalink.lk	0	A
6 2006	FREIGHT LINKS INTERNATIONAL (PVT) L	LEVEL 07,ACCESS TOWERS,	278, UNION PLACE,	COLOMBO-02	2302402		2302412	info@freight-links.com	0	A
7 2007	SPEIDCON LOGISTICS(PVT) LTD	LANDIAN HOUSE,COMMERCIAL BUILDING,	1ST FLOOR, 8/302 1/1, HAVELOCK ROAD	COLOMBO 03	5649480		5550406	custdesk@spedconlogistics.com	0	A

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### Agent Info

Account No:

Agent Name:

Address Line1:

Address Line2:

Address Line3:

Contact No1:

Contact No2:

Fax:

Email:

Credit Balance:

User Status:

[Back](#) [Update](#) [Clear](#)

Figure G 0.7: Agent Update Page

## APPENDIX H – SAMPLE SEQUENCE DIAGRAM

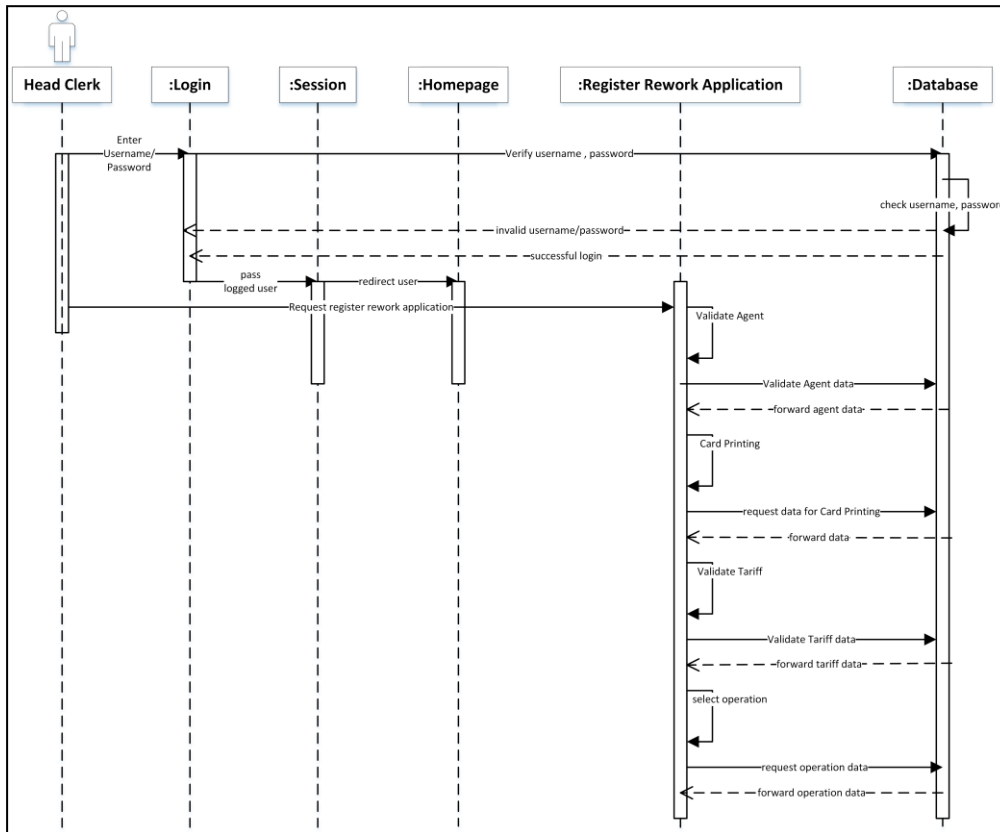


Figure H 0.1: Head Clerk Sequence Diagram

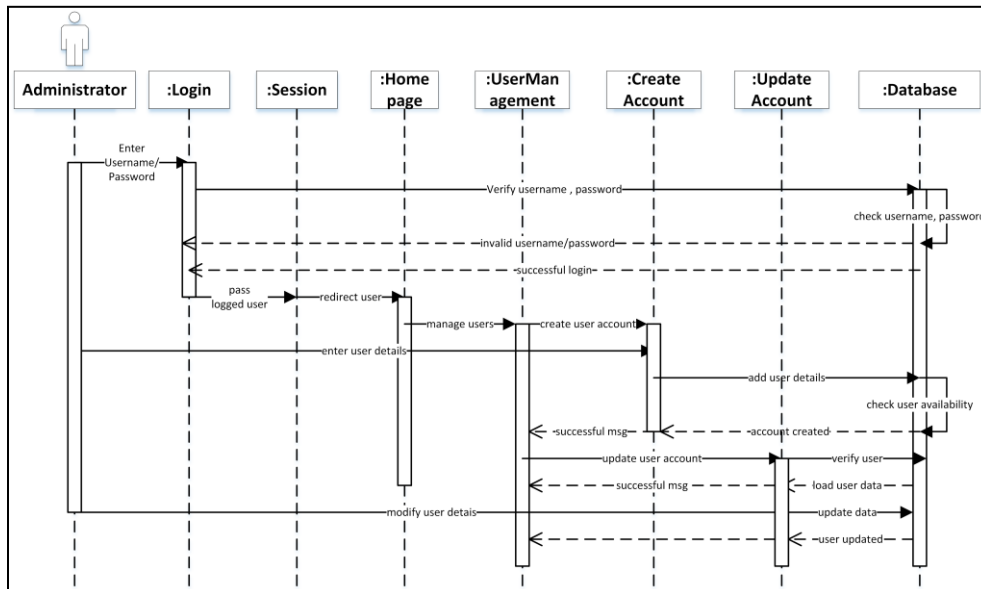


Figure H 0.2: Administrator Sequence Diagram

## GLOSSARY

AJAX	AJAX stands for Asynchronous JavaScript and XML. AJAX is a new technique for creating better, faster, and more interactive web applications with the help of XML, HTML, CSS, and Java Scrip
CSS	CSS stands for Cascading Style Sheets. CSS describes how HTML elements are to be displayed on the screen, paper, or in other media
GIT	Git is a free and open source distributed version control system designed to handle everything from small to very large projects with speed and efficiency
HTTP	The Hypertext Transfer Protocol (HTTP) is an application-level protocol for distributed, collaborative, hypermedia information systems
JavaScript	JavaScript is the Programming Language for the Web. JavaScript can update and change both HTML and CSS
jQuery	jQuery is a JavaScript library designed to simplify HTML DOM tree traversal and manipulation, as well as event handling, CSS animation, and Ajax
JSON	JSON stands for JavaScript Object Notation. JSON is a lightweight format for storing and transporting data. JSON is often used when data is sent from a server to a web page
MySQL	MySQL is an open-source relational database management system
PHP	Server-side dynamic programming language
PHPMysqlAdmin	phpMyAdmin is a free and open source administration tool for MySQL and MariaDB
WAMP	WampServer is a Windows web development environment. It allows you to create web applications with Apache, PHP, and MySQL databases

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