Chapter 5

Analysis & Design

5.1 Introduction

This chapter contains the analysis and design of the Activity Management and Monitoring System. Problems in problem domain and software solutions given for those problems are described in detail.

5.2 System Analysis

As described in the book Software Engineering by Prof. Ian Sommerville "Requirements of a system are the description of the services provided by the system itself. These requirements reflect the need of solutions to a problem that occurred among the stake holders when performing their expected work" [5].

I was benefited being the actor of this system to understand this system easily. Clerk of product certification was interviewed to get idea about the application receiving process. Then I discussed with the director of product certification to understand the requirement related to nomination of project officers, scheduling of audits and generating of reports. Also project officers, auditors were interviewed and listed their problems related to the project file handling, annual fee recovering and audits arranging. Also interactions each processes document which are used to pass the information were studied thoroughly. Based on those interviews, discussion use case diagrams were developed and functional and non functional requirements were written. a clear knowledge regarding the Software Requirements of the existing system as well as proposed system Future their processes were closely investigated so that it can be able understands how personnel data and information are passed around the institute. Thereby all the information and data were collected. Hence, I was able to identify all the existing requirements and finally Software Requirement Specification (SRS) was prepared.

5.2.1 Existing System Use Case Diagrams

Main objective of use case diagram is to see the main process and sub process under main functions in graphical way. As an example overall view of the existing is shown in following use case diagram.
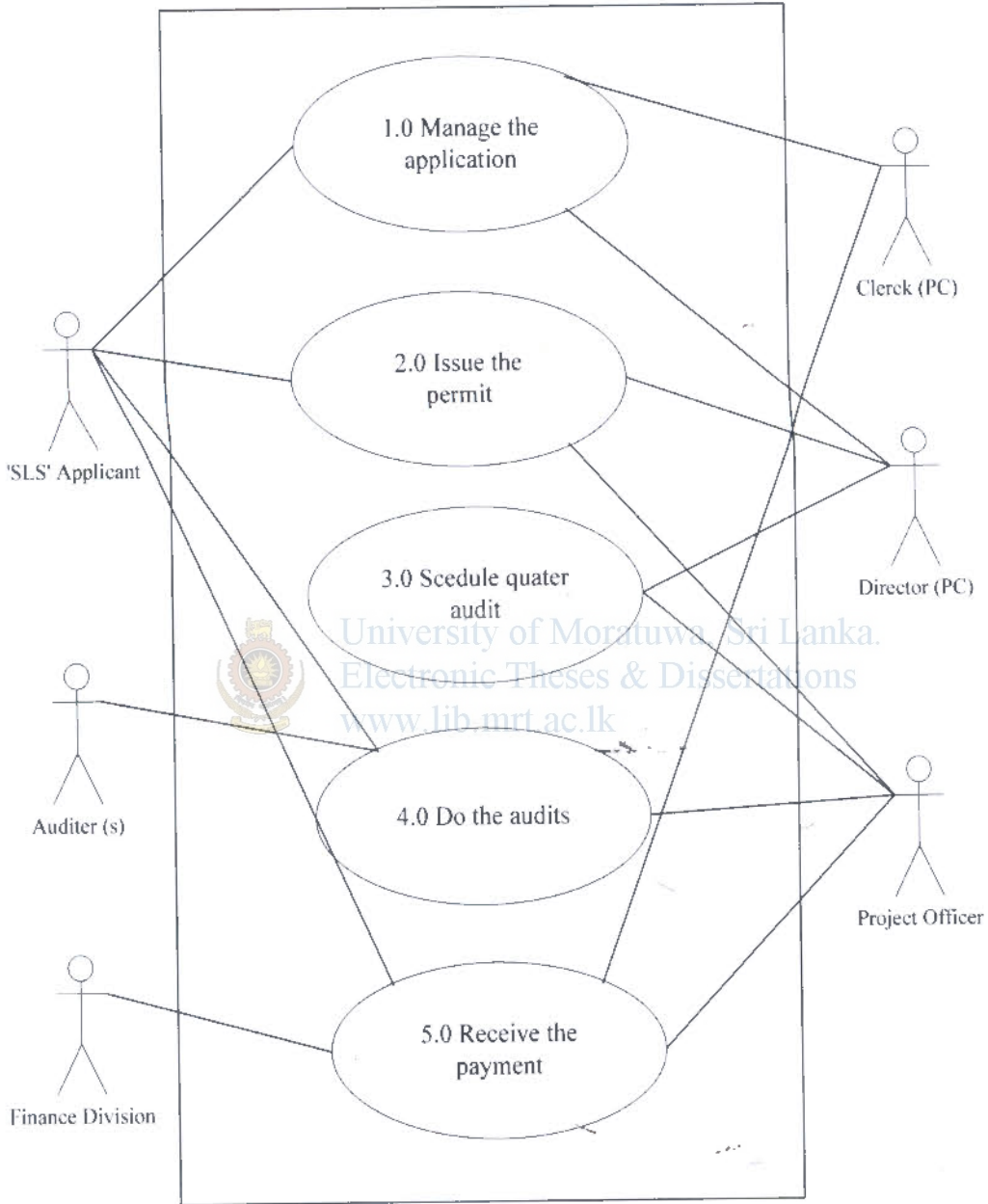

Figure 5.1- Existing System Overview of Proposed System

Relevant to the main use cases of manage application and issue permits, sub use cases are shown in following figures.
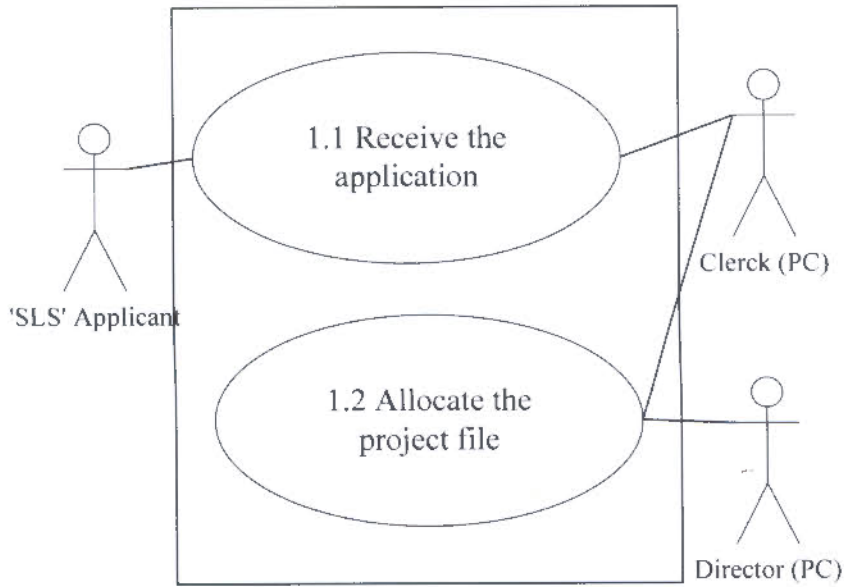

Figure 5.2- Existing system - Use Case diagram 1.0- Manage SLS' Mark Application
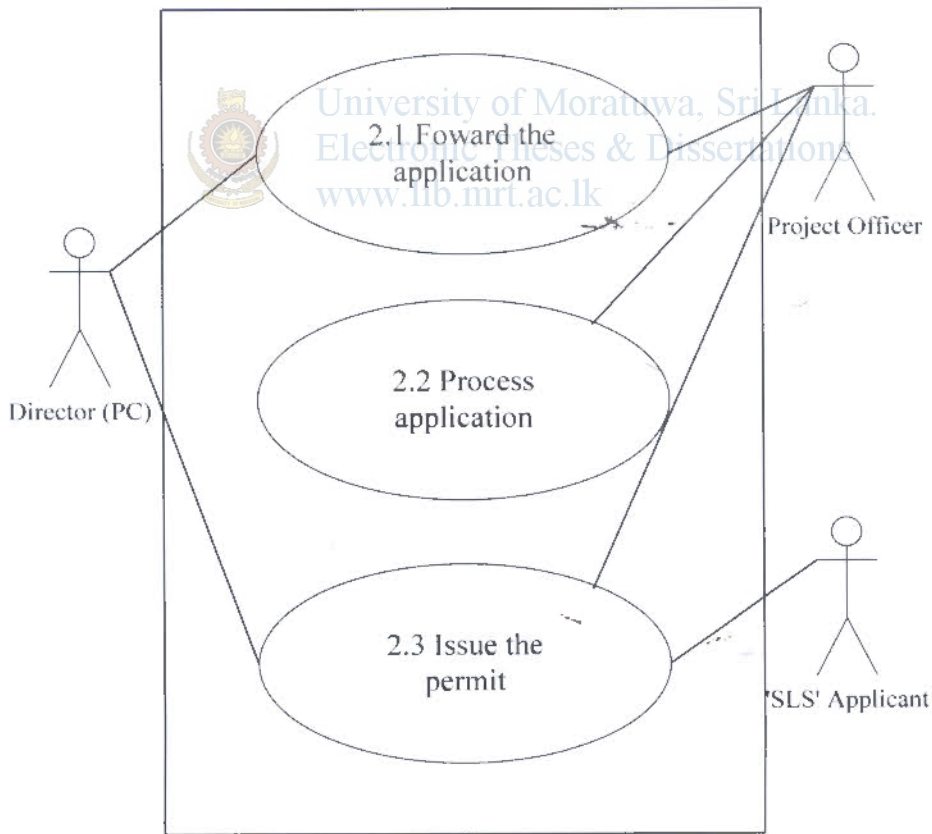

Figure 5.3- Existing system - Use Case diagram 2.0 - Issue the 'SLS' Permit

32

5.2.2 Existing System Activity Diagrams

Activity diagrams give the work- flow of processes and interactions of actors to perform the tasks in each process.
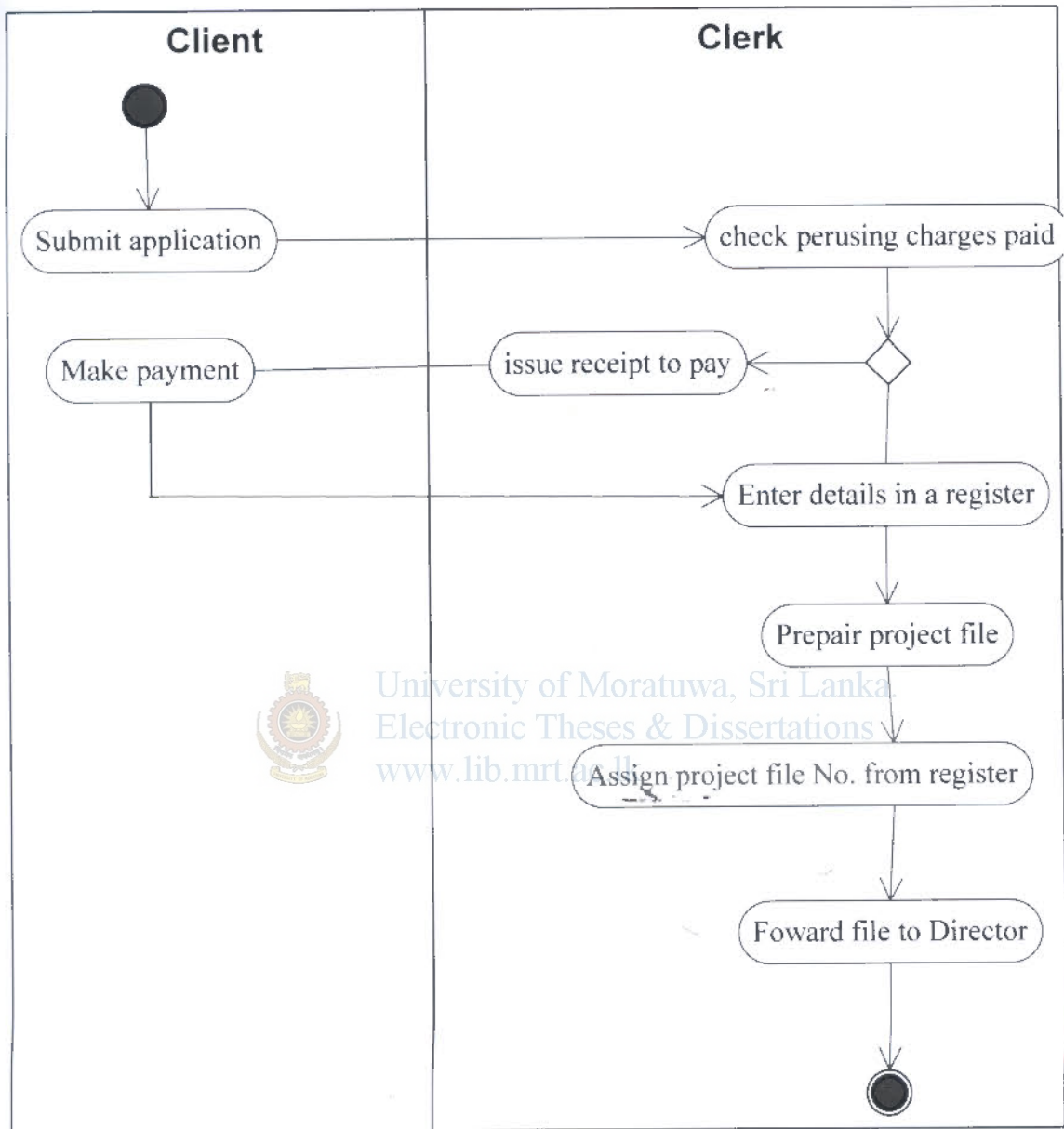

Figure 5.4- Existing System - Activity diagram 1.1– Receive the application

Only some of the use case diagrams and activity diagrams are shown in this chapter. For other use cases and activity diagrams Appendix B can be referred.

5.2.3 Use Case Descriptions for the Existing System

Use case description gives the actors involvement, pre conditions, post condition and flow of event in each process represented in a use case.

Table 5.1- Existing system – Use Case description for Application Receiving

Use Case Name	Receive the application
Description	This use case detail the steps required to advertising of vacancies once vacancies have been identified.
Actors	Clerk of product certification division and SLS Mark applicant.
Pre-Conditions	Filled application should be submitted for the product covered by the Sri Lanka standards.
Post-Conditions	Project file should be prepared for the application giving file a number.
Flow of Events	✓ Receive the application from client. ✓ Check whether the application perusing charges has been paid. ✓ If not paid, issue a bill to make the payment. ✓ Enter the client details in a register. ✓ Take a file number from a register ✓ Forward file to director nominate a project officer.
Exceptions	✓ If application is not prepared properly or product for which SLS mark is required is not covered by Sri Lanka Standard.

Above table has been given only to understand concept of use case description. Other Use Case Descriptions for the existing system are given under Appendix B.

5.2.4 Existing System Requirements

Identified functional and non functional requirement are listed below.

Req. Id   Requirements

01   Manage application

1.01   The system shall be able to receive the application from clients.

1.02   The system shall be able to obtain application perusing charges.

1.03   The system shall be able to enter the application details in a register.

1.04   The system shall be able to nominate a project officer for the file.

1.05   The system shall be able to see the post SLS (SLS mark given) files.

1.06   The system shall able to see the Pre SLS (SLS mark not issued) files.

1.07   The system shall be able to get the clients contact details when necessary.

1.08   The system shall be able to see how many applicants are available for the particular project.

1.09   The system shall be able to take the project officers' details.

1.10   The system shall be able to take how many files are handled by particular officer.

02   Issue SLS Permit

2.01   The system shall be able to peruse the application and to get corrected if there are mistakes identified.

2.02   The system shall to recover the preliminary inspection charges.

2.03   The system shall be able to arrange first visit to take samples.

2.04   If first sample passed, The system shall allow to take the second sample.

2.05   System shall be able to prepare the audit summery

2.06   System shall be able to prepare final assessment audit reports and submit to director product certification with audit summery.

2.07   If two consecutive samples are passed, the system shall be able to arrange the final assessment audits.

2.08   System shall be able to nominate the final assessment audit team.

2.09   System shall be able to submit the recommendation of final assessment audit

teams to the Permit committee approval.

2.10   System shall be able to issue the SLS mark after permit committee approval.

03   Schedule Quarter Audits

3.01   System shall be able to request the quarter audits from project officers.

3.02   System shall be able to nominate auditors for quarter audits.

3.03   The system shall be able to take the auditors information to nominate for the quarter audits.

3.04   The system should keep a record of quarter audits after arranging the audits

04   Recover the annual payment

4.01   System shall be able to raise the Performa invoice at beginning of each year.

4.02   System shall be able recover the annual payment in quarter basis or annual basis.

4.03   The system shall keep the records of annual payment after receiving.

5.2.5 System Architectural Design

Analysis of existing helps to develop the propose system. Having the thorough knowledge about existing system, following architectural design and its modules are developed for the proposed system.
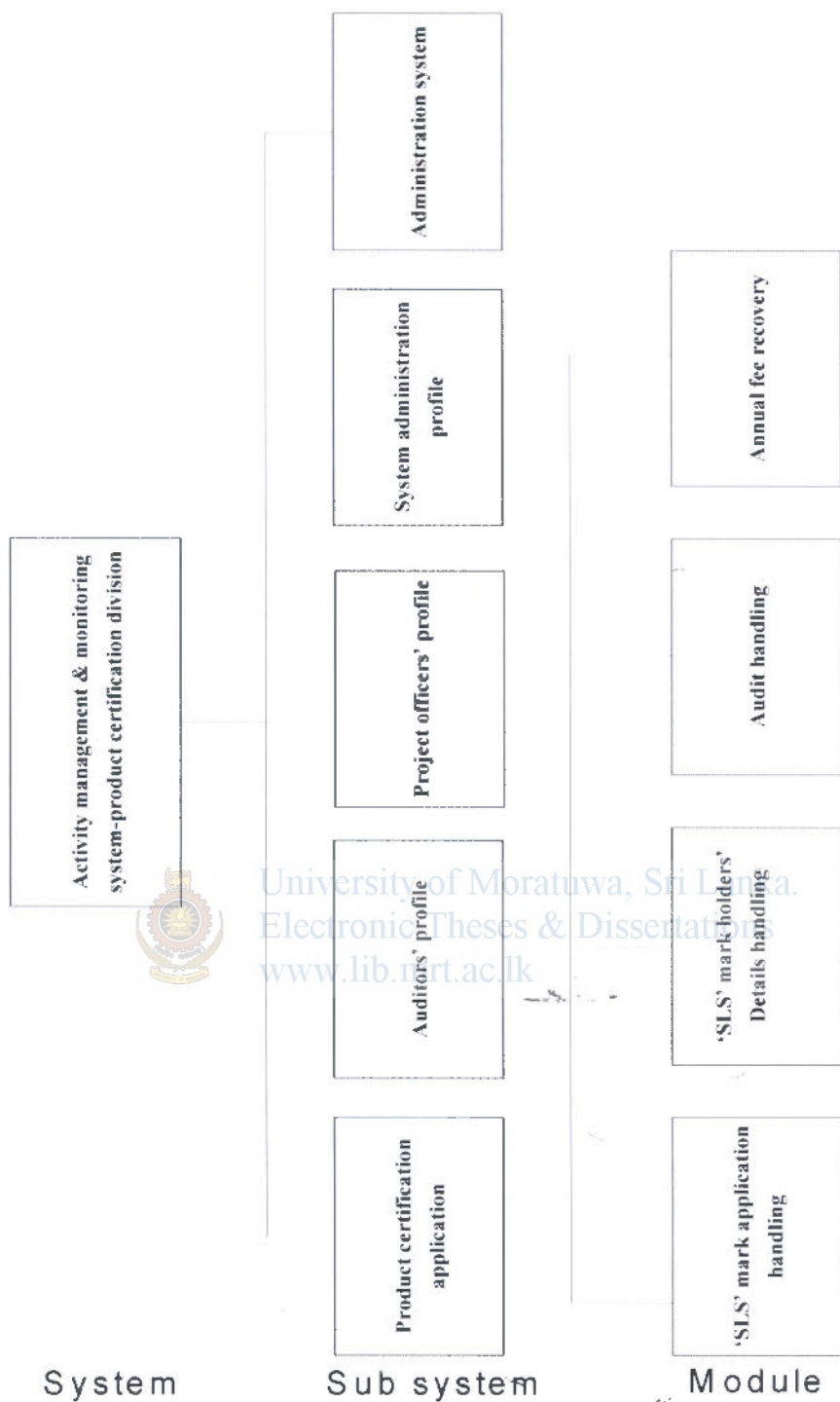
Figure 5.5- Architectural Design

5.2.6 Software Requirements Specifications

Software requirement specifications are identified based on the client's requirement and initial form of specifications were modified several times taking into consideration of suggestions made by client later.

5.2.6.1 Functional Requirements

Req. Id   **Requirements**

01   Manage application

1.01   System shall be able to generate project file number.

1.02   System shall be able to keep the application details such as; applicant name, address, contact numbers, product and relevant standard number.

1.03   System shall provide facility to edit the application details.

1.04   System shall provide facility to delete the application details.

1.05   System shall provide facility to delete the application details.

1.06   The system shall provide a facility to take the print from application details

1.07   The system shall provide facility to take the project officers' details from Administration software system.

1.08   The system shall provide facility to nominate a project officer.

02   Manage 'SLS' mark holders, details

2.01   The system shall keep the of SLS mark holders' details.

2.02   The system shall provide facility to add SLS mark holder details.

2.03   The system shall provide facility to edit SLS mark holder details.

2.04   The system shall provide facility to delete SLS mark holder details.

2.05   The system should provide a facility to view/print 'SLS' mark holder details

03   Manage audits

3.01   The system shall provide a facility to take auditors details from administration system

3.02   The system shall provide a facility to keep records for audits.

3.03   The system shall provide a facility to view/print audits details

3.04   The system shall provide facility add audits details

3.05   The system shall provide a facility to edit audit details

3.06   The system shall provide a facility to delete audit details

04   Recover annual fee

4.01   System shall be able to keep the records for annual payment details.

4.02   System shall provide facility to add annual payment details.

4.03   System shall provide facility to edit annual payment details.

4.04   System shall provide facility to delete annual payment details.

05   System administration

5.01   The system should provide a facility to add new system user account details by the system administrator.

5.02   The system should provide a facility to edit existing system user account details by the system administrator.

5.03   The system should provide a facility to delete existing system user account by the system administrator.

04.04   The system should provide a facility to keep the users' details

5.2.6.2 Non-functional Requirements

Req.   Requirements

Id

01   The system shall not allow accessing unauthorized users to use the system facilities.

02   The experienced users of the systems should be able to use the system after giving training. Once this training is completed, he/she should not exceed ten errors per day.

03   Rate of system failure should not exceed 5 times per year.

5.3 System Design

Proposed system was designed based on the analysis of existing system and client's requirements. Following system overview, use case diagram, activity diagram, sequence diagram, are given to take basic knowledge about the system design. Appendix C is given more diagrams for proposed system design.
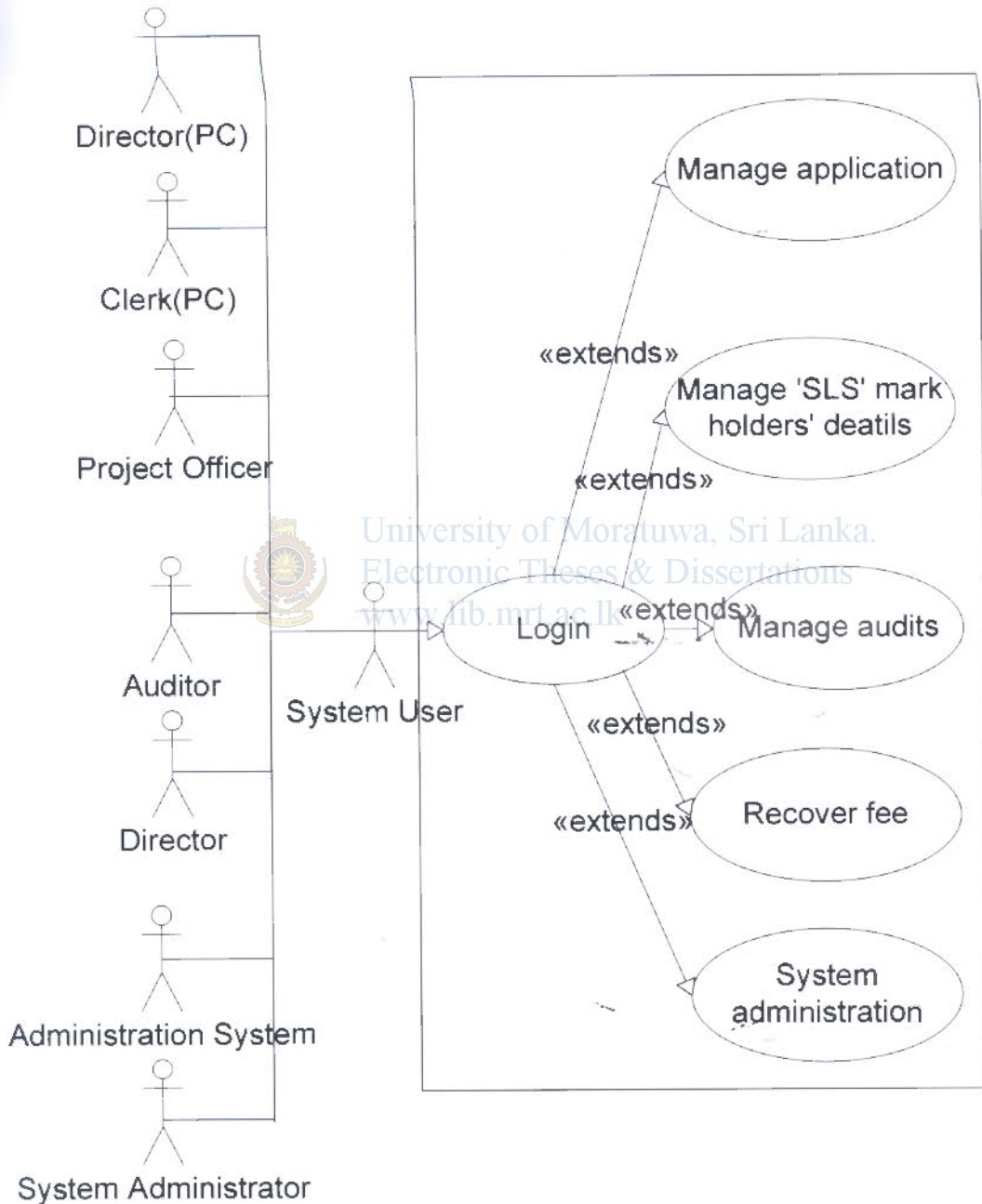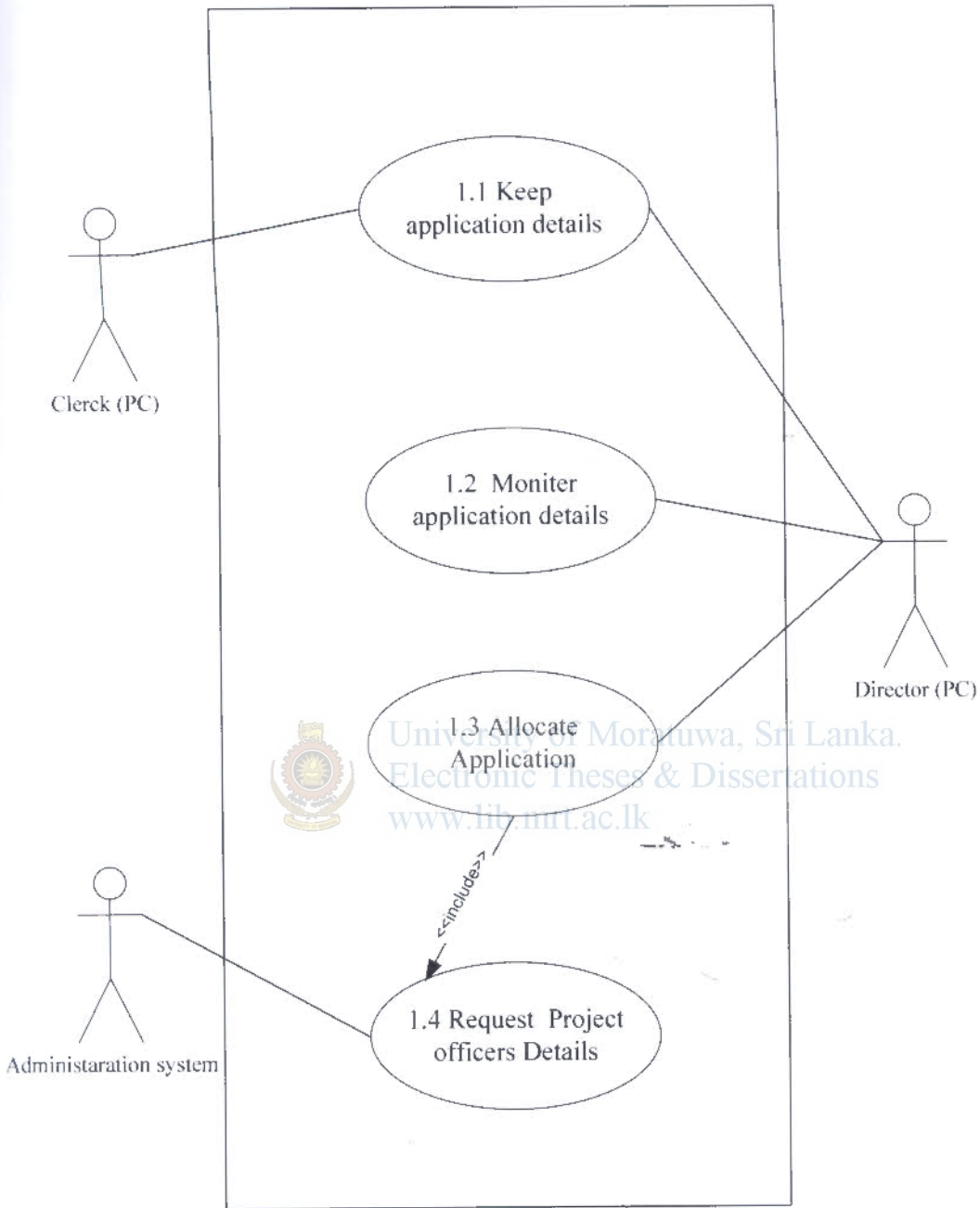

Figure 5.6- Proposed System – System Overview

Figure 5.7- Proposed System – Use Case Diagram for Manage Application
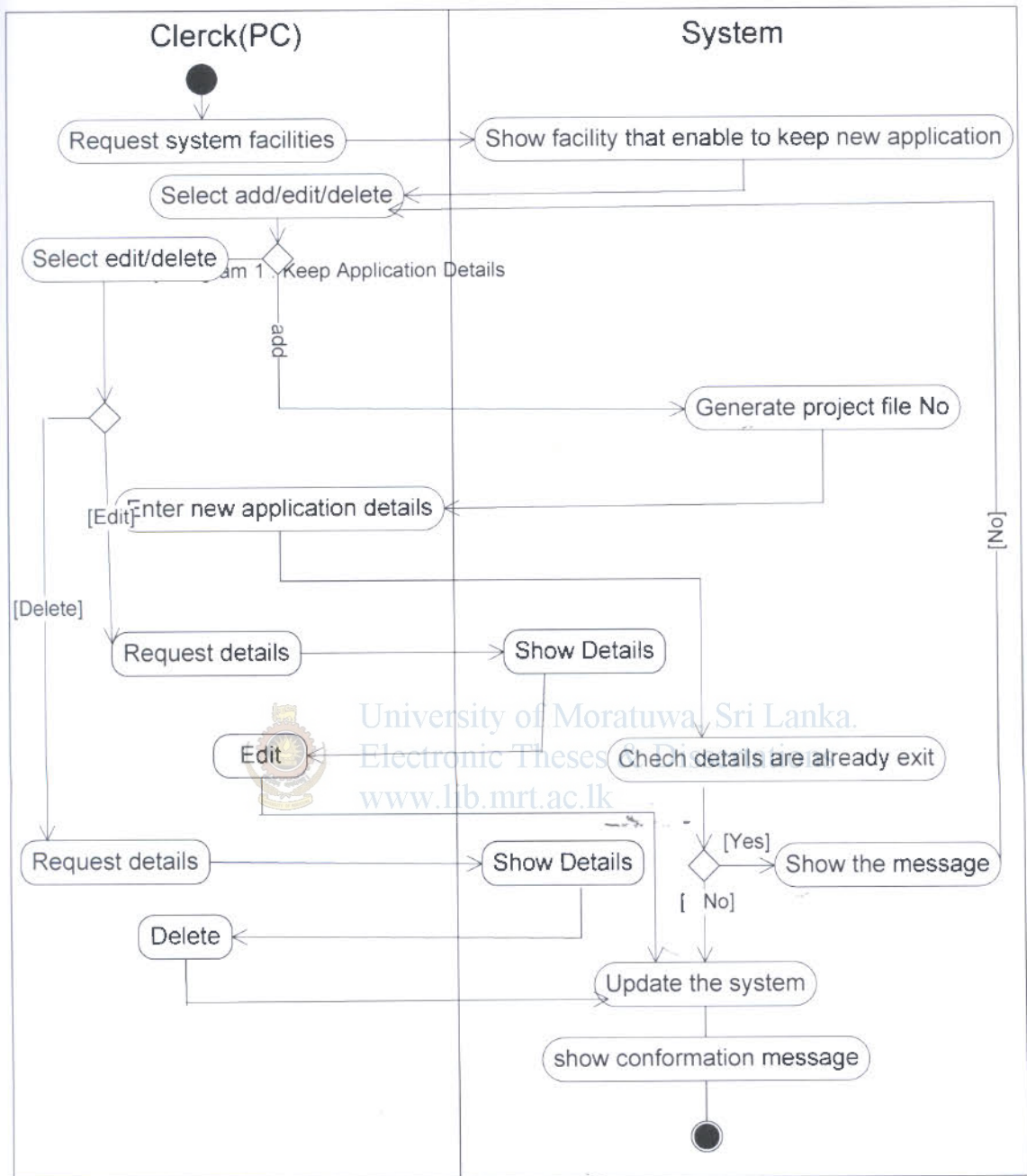
Figure 5.8- Proposed System – Activity Diagram for keep application details
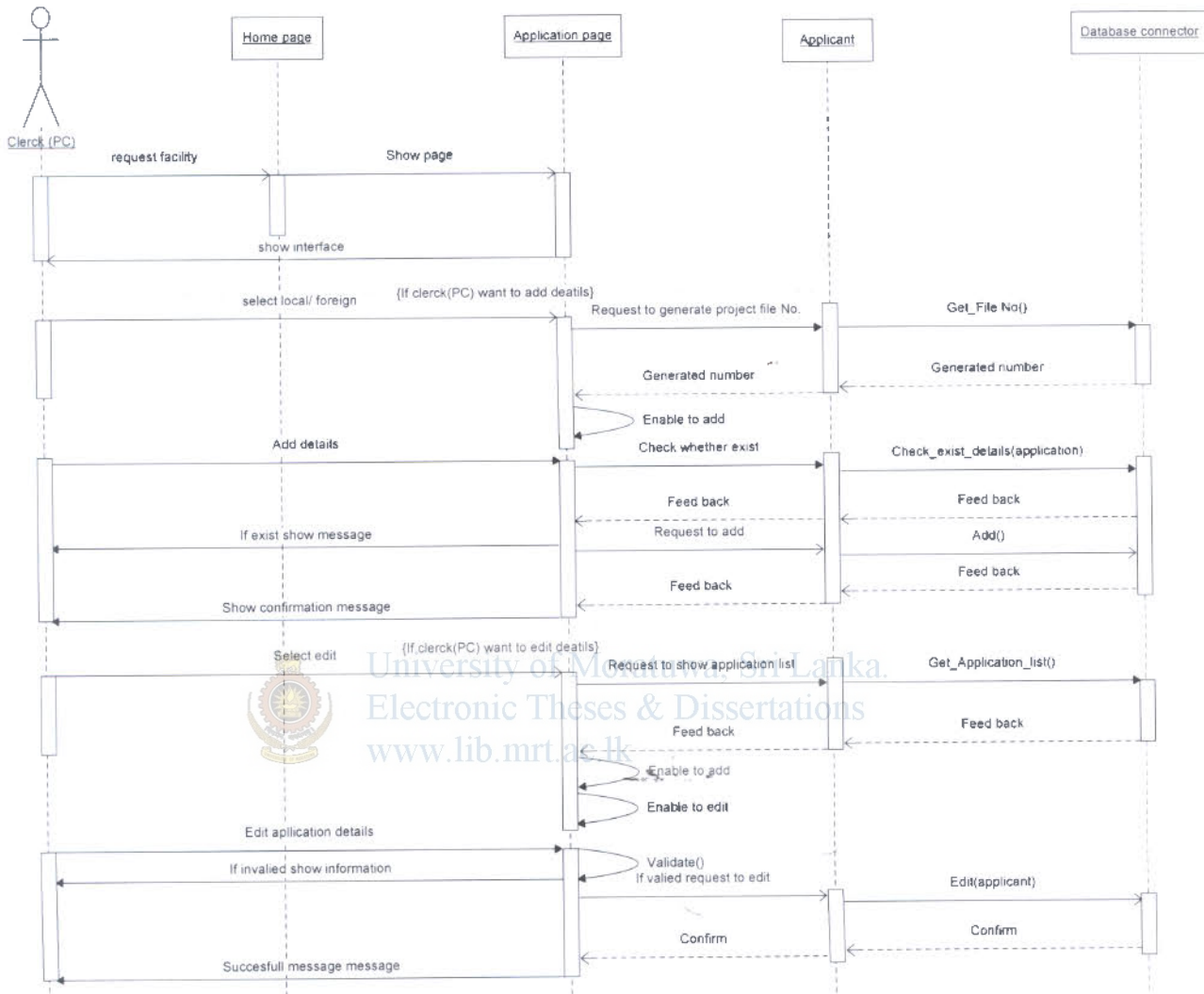
Figure 5.9- Proposed System – Sequence Diagram for keep application details

5.3.1 Class Diagram

Considering the use case descriptions of the proposed uses cases, a grammatical analysis was carried out. Hence I was able to identify all the classes with their attributes and methods. Please refer to the Appendix E – Class Diagram.

5.3.2 Database Design

This is the process of producing a detailed data model of a database. When designing the database, I determined the data to be stored and the relationships between the different data elements, and designed a logical structure upon the data on the basis of these relationships.

Entity Relationship Model (ERM) was created as the first step of database design stage. This model is an abstract conceptual representation of structured data for PIMS. Please refer to the Appendix F – Entity Relationship Diagram, Relational Database Schema and Relational Table design.

5.3.2.1 Relational Database Modeling

Having identified entities and the relationship among them, as the second step, relational database was defined. Please refer to the Appendix G - Entity Relationship Diagram, Relational Database Schema and Relational Table design.

The database was designed using MySQL 5.0.5. The name of the database is 'PIMS'. All the tables, their fields, data types and relevant constrains are listed in Appendix G - Entity Relationship Diagram, Relational Database Schema and Relational Table design.

5.4 Summery

It has been described in this chapter how system has analyzed to succeed the design. Software specification requirements, architectural design, use case diagrams, activity diagrams, sequence diagrams, class diagrams and entity relationship diagram have been used for the design purpose and have been described here.