Chapter 4

Analysis and Design

4.1 Introduction

This chapter will describe problem domain for the project and the requirement elicitation. The analysis begins with a problem statement. The statement might be incomplete or informal and the analysis makes it more precise and exposes ambiguities and inconsistencies. It is important to specify the problem domain and determine the characteristics to deliver better product.

4.2 Problem domain

The problem of	Non-availability of a mobile based restaurant reservation application for customers and restaurant order and customer management system for restaurant staff.
Affects	All customers and restaurant staff
A successful solution would be	Provide mobile based restaurant reservation system for customers. Provide cost effective restaurant order and customer management system for restaurant staff. They can access information in short time A user friendly system

Table 4.1 – Problem domain

In present, people spend very busy life style. Hence there is very limited time to supply their day to day necessities. The food is one of their main necessities. It is very convenient, if they have method to make order through the online. Sometimes, order may be request in none computerize situations. The GSM network is spread significantly all over the country. Because of mobile phones and other hand held devices are very popular

in these days. The mobile based order reservation system is better solution to overcome this issue. It does not require much time and it is not an arduous task to access it. Hence any WAP enabled mobile device can access to the world wide web at anytime of the day.

4.3 Overview of the system

Scope of the project

An overview of the proposed system is depicted in figure 4.1.

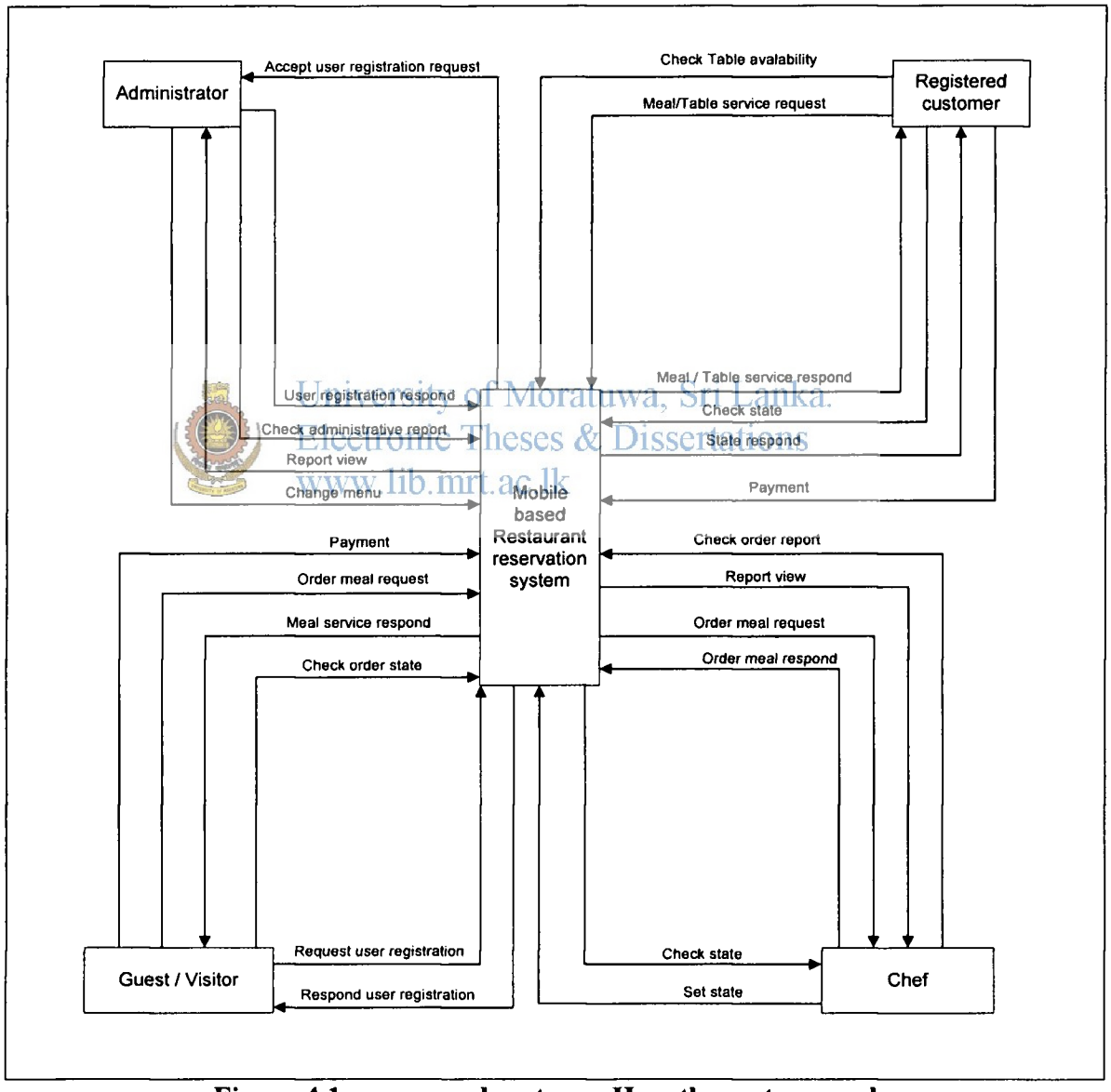

Figure 4.1 – proposed system – How the system works

As shown in the figure, the proposed system will consist of a web server which is connected to the Internet. Subscriber can browse the system via mobile or PDA which is configured to access the Internet.

4.4 Functional requirement

The followings are functional requirements for Mobile based users. The mobile based users may be register customer or visitor (Guest).

- System should provide facility to customer validation
- System should allow the user to select restaurant and select menus from catalog
- System should provide facility to check table availability and reserve table
- System should provide facility to request new registration for guest
- System should provide a method to make payment though credit cards
- System should provide facility to check order state

Manager/ Administrator and chef are internal users and as well as the web based users. The following are the functional requirements for web based users.

- System should provide facility to maintenance of user log
- System should provide facility to maintenance of web site
- System should provide facility to order handling

4.5 Flow of general process

Following are the main functions for WAP enabled web based application.

- Subscriber validate

  The subscriber can register to the system by him or herself. It will validate the subscriber, when he or she tries to logging to the system. It will be allowed to navigate into the system, if subscriber is an authenticated person. If subscriber is visitor (guest), then he or she can request to new registration to the system.

- Selected meal

  Register customer and guest can visit to the web site and choose a restaurant and menu. The menu is number of meal items. There are several menus such as menu1, menu2... etc. Its price can be varying according to the type and number of items in the meal. Customer can order number of meals according to the number of persons.

- Table reservation

  Tables can be reserved according to the no of persons, if the user is registered customer who orders the meal. Table reservation is not allowed for Guest users and they can only get meal and take a way. Table reservation is an additional facility for registered customers. Registered customers can take a way or get meal at there according to their preferences.

- Payment through credit card

  The payment can be done by credit card. If the order is rejected by chef payment is automatically canceled by the system.

- Check state of the order

  Subscriber can check state of their order. There are six states pending, processing, delaying, reject, close and ready in this system. These states are set by chef.

- Administrator's functions contain followings

  Subscriber registration

  Update and add menus to the system

  Monitor orders and customer's detail

- Chefs application contain the followings

  Accept orders

  Set order state

  Monitor orders

Product perspective

The project is based on a simple and a user-friendly graphical user interfaces that provides easy access to information. This proposed project can be easily expanded to a large system and can be provided customer care services through the mobile technology. This project can also be extended as a mobile knowledge database, which will be hold large amount of information.

Product functionalities

The system is capable to accepting user requests via GPRS enabled connection and sends result through a WAP gateway. To accomplish the task, the application will perform data manipulation on database, and transmits that data to the requested subscriber to accomplish the task. The system provides the facilities such as reservation, check states and credit card payment.

User characteristics

Users are not expected to be an expert of navigating WAP sites and who are familiar with mobile technology. The subscribers can use links on the pages and easily works.

Constraints

When developing the proposed system, the following constraints are identified.

- The user interfaces of the proposed application with related to other desktop or web based applications are being low in quality.
- The text should be understandable and less scrolling

4.6 Non functional requirements

Performance

Server requests should be minimized as much as possible to get maximum performance.

Availability

Because customers access the WAP Web site across the world, it needs to be available 24 hours a day, 7 days a week.

Reliability

Because of the need for 24*7 availability, automatic disaster recovery, backup plans and procedures must be introduced.

Setup/ installation

Setup and installation must be complete and automated so that the developers can easily deploy it on web server for development and testing.

4.7 Use case analysis

Use case model is a dialogue between an actor and the system, they represent the functionality provided by the system; that is, what capabilities will be provided to an actor by the system [14]. The collections of use cases for a system constitute all the defined ways the system may be used. The most critical part is the identification of Use cases and Actors in the system.

Actor	Description
Administrator	System Administrator/ Manager
Chef	Chef who desired order accept
Registered Customer	Registered customer who is registered in the system
Guest	Non registered customer

Table 4.2 – Main actors of the system

Use cases

- WAP application use case

  This will describe the Mobile application use case and its main processes and communication with them.

- Web application use case

  Mobile based restaurant reservation system process is described in this use case.

Identified use case

Use Case	Function
 New registration	New registration request by guest
 Login	User login process
 Validation	Validation user against the database
 View menu	View menu to select menu item. This done by registered customer/ guest
 Order meal	Order meal from selected menu
 Tables reservation	This is separate process which can be accessed after login and done by registered customers
 Payment	Credit card payment process is done by all customers

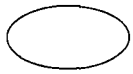 Check state	Checking state of the process is done by all customers
 Add menu	Add menus to system is done by administrator
 Customer registration	New customer registration is done by administrator
 Monitor orders	Monitor order reservation is done by administrator or chef
 Order accept	Order accept process is done by chef
 Set order state	Set order state process is done by chef

Table 4.3 – Main processes of the system

WAP application use case

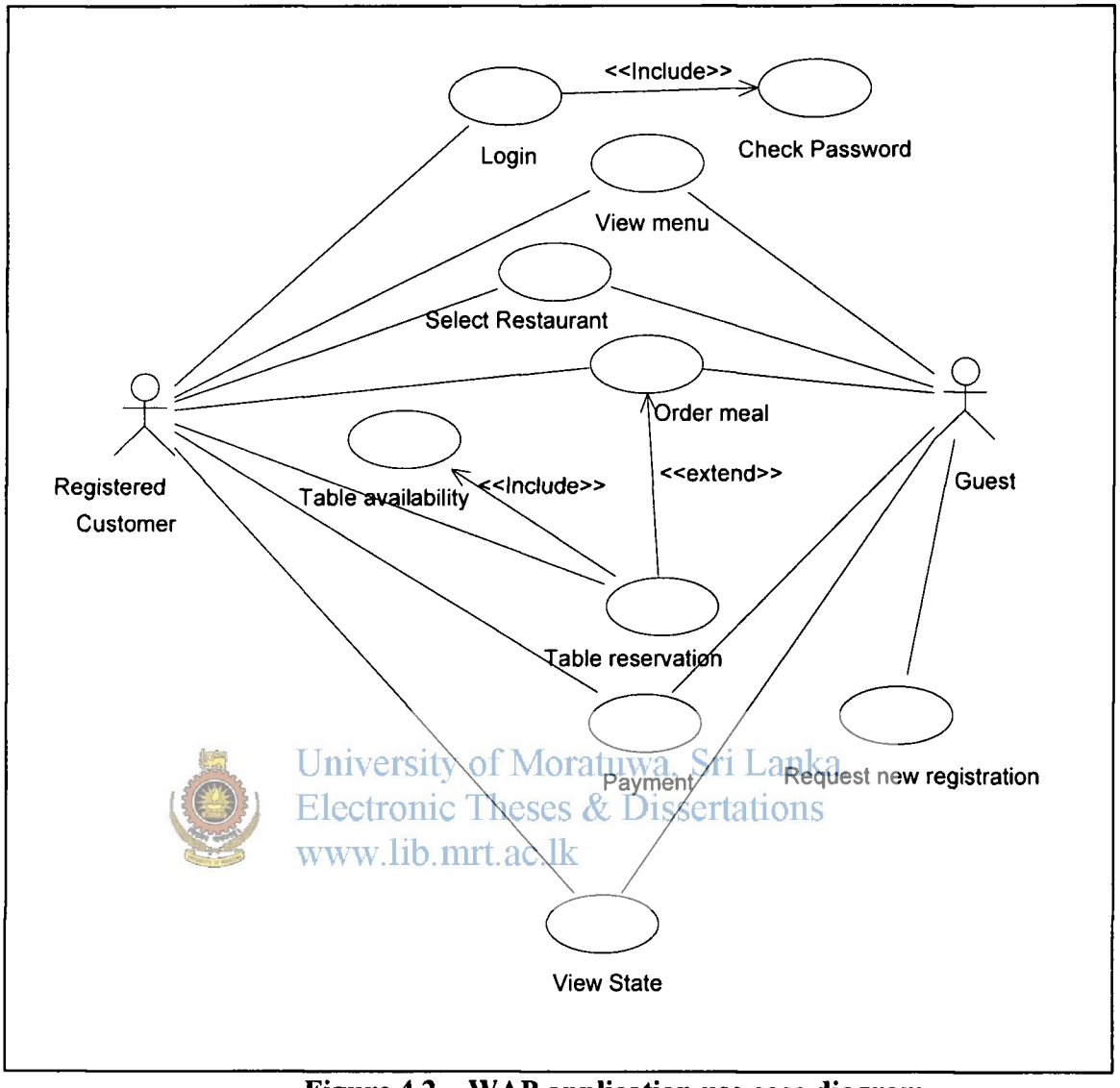

Figure 4.2 – WAP application use case diagram

- Customer must follow the login process and it included the user validation process against database except guest.
- Guest can request new registration to system.
- All customers can view menus, select restaurant, payment, select menu and check order state.
- Registered customer can view table availability and table reservation.
- Registered customer can order meal and either take a way or get meal there.

Web application use case

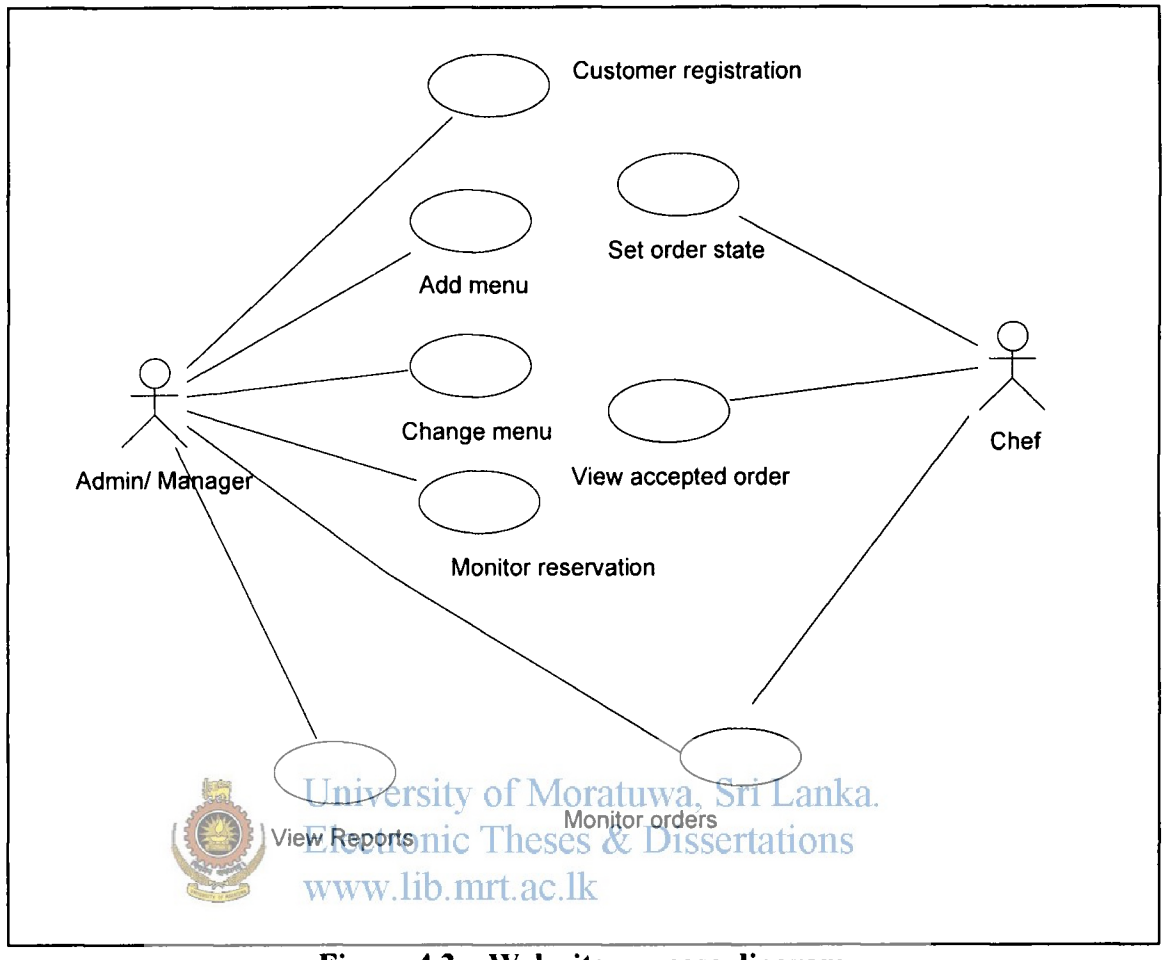

Figure 4.3 – Web site use case diagram

- New customer registration set state done by system administrator.
- Administrator can add menu and change menu.
- Administrator can monitor orders and reservations.
- Administrator must go through backup procedure, security procedure and other relevant procedure to maintain site on 24*365 hours.
- Chef can accept or reject order.
- Chef set the order state.

Class diagram

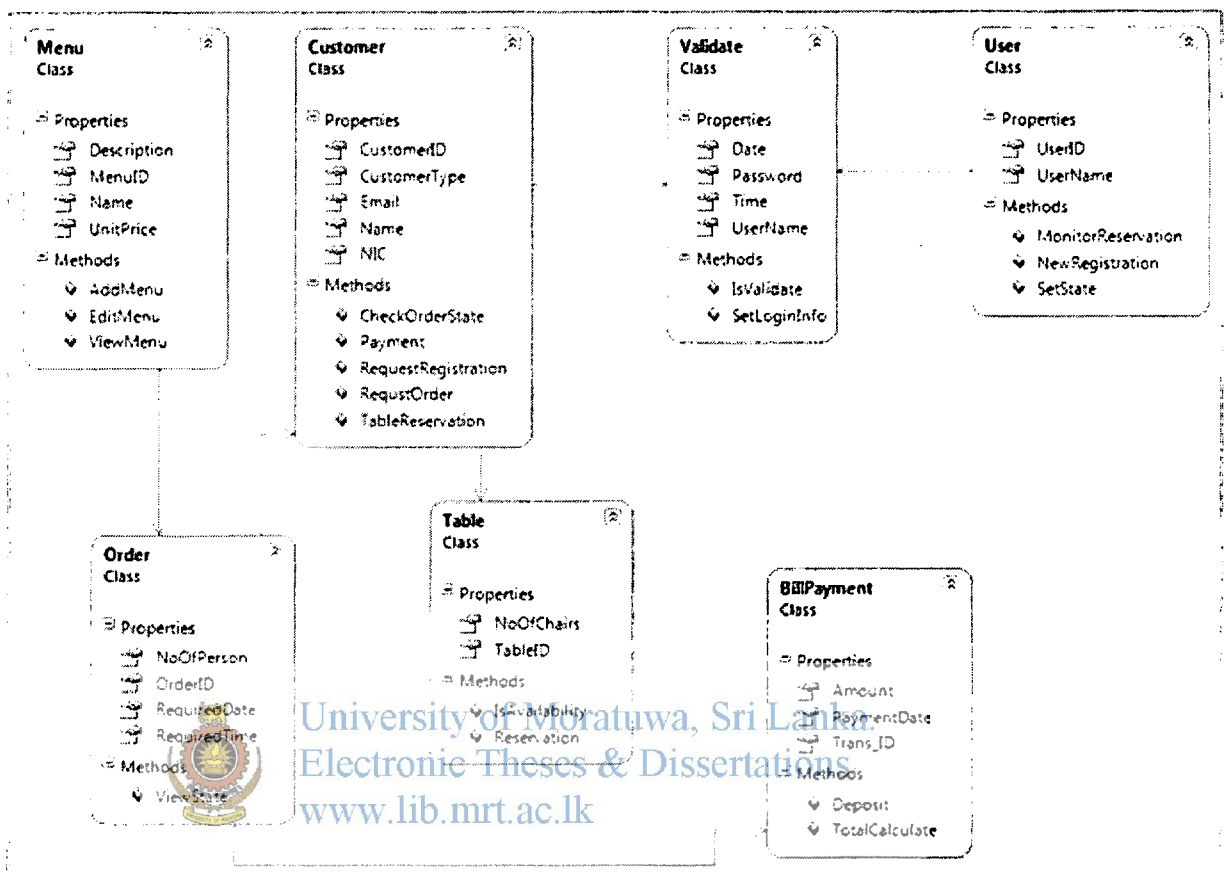

Figure 4.4 – Class diagram

A class is a description of a group of objects with common properties (attributes), common behavior (operations), common relationship to other objects, and common semantics. Thus, a class is a template to create objects. Each object is an instance of some class and objects cannot be instances of more than one class. This system will contain above properties and methods inside the identified classes.

WAP enabled process activity diagram

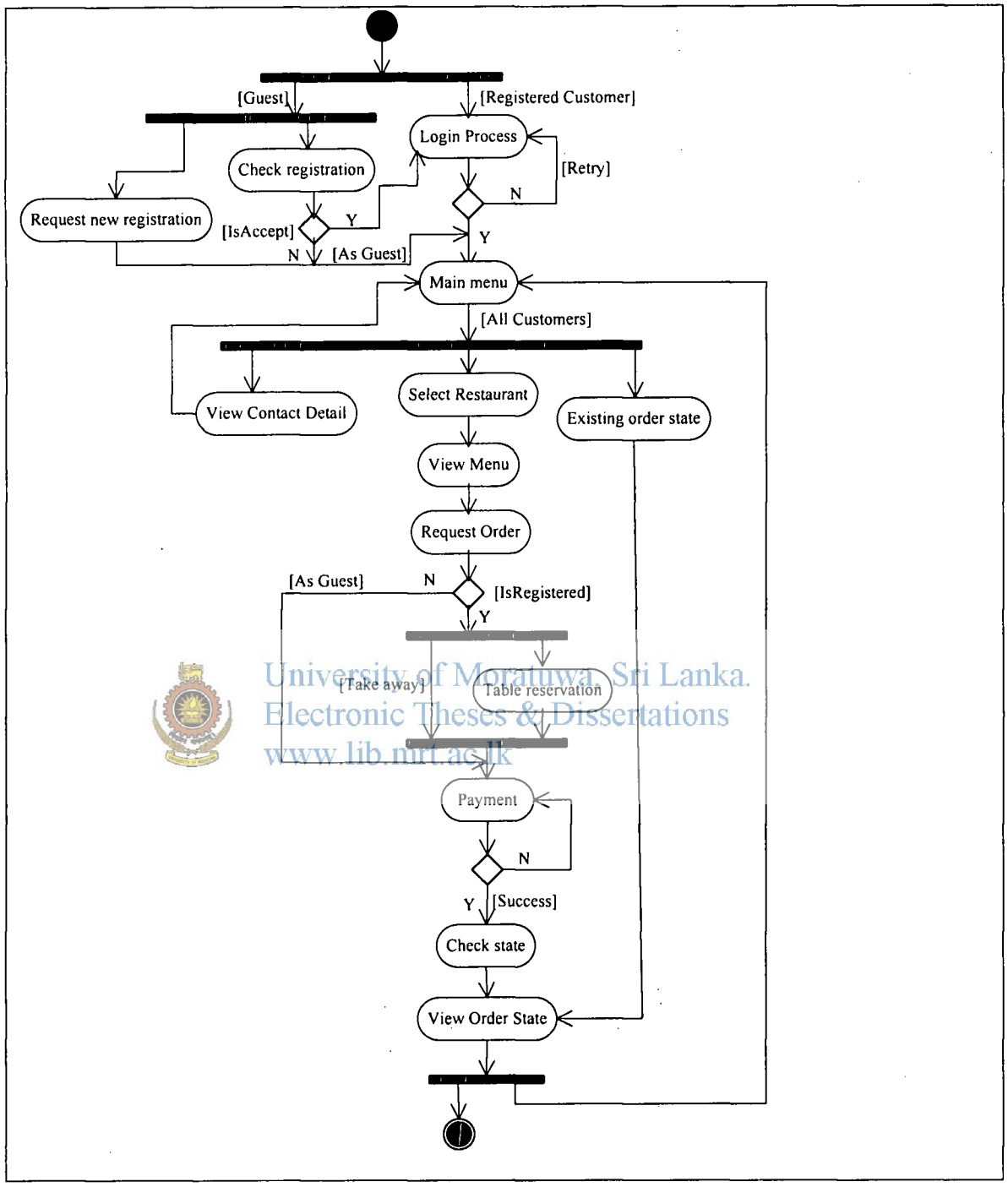

Figure 4.5 – WAP enabled process activity diagram

ER diagram

Database is developed using Entity Relationship technique and it designed in such a way that it is easy to maintain and has the facility to dynamic grow. Primary keys are defined as shown in the diagram and it will ensure the relation of the tables and consistency of data. After creating those relations the ER diagram can be expressed as in figure 4.6. Administrator has the facility to backup the database and all data handling transactions such as data user and managing users.

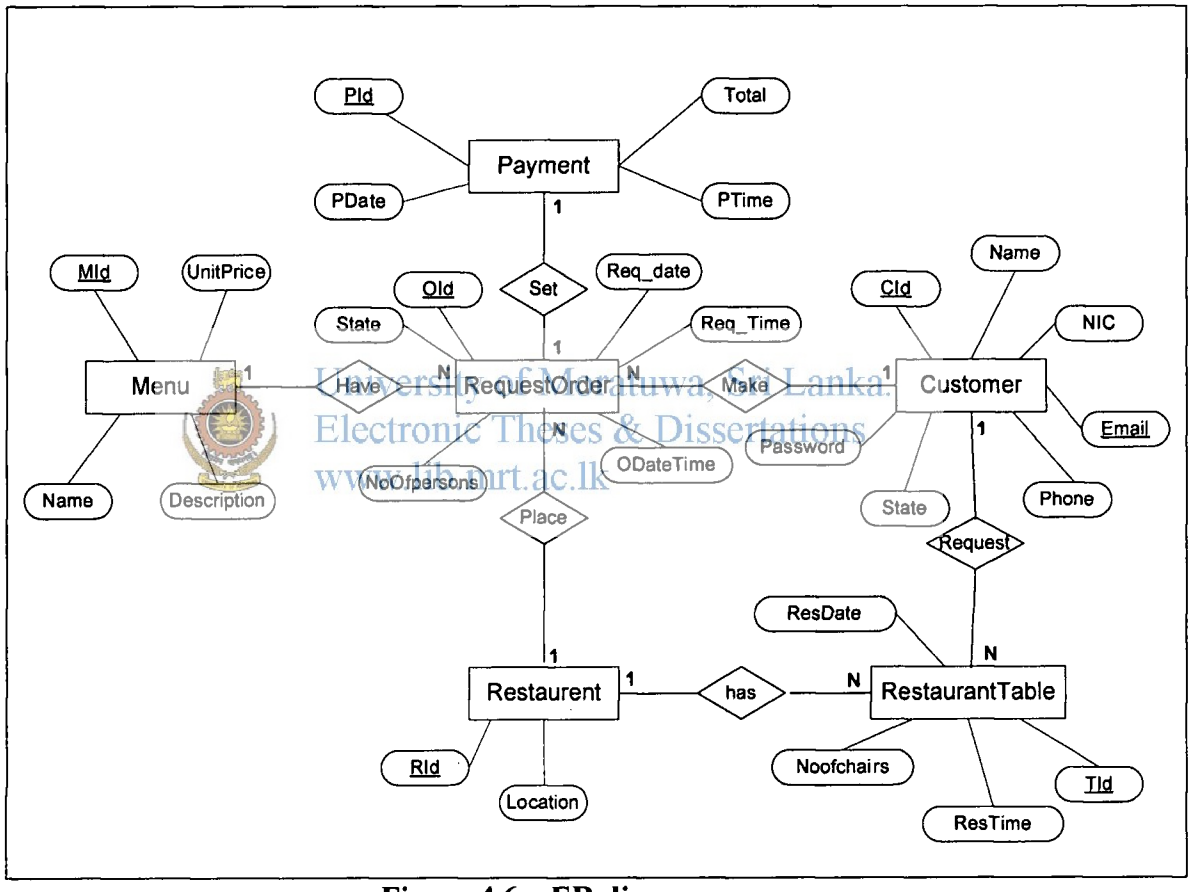

Figure 4.6 – ER diagram

4.8 Interface requirements

This is one of another important area of the project; since this is the layer communicating with the users. If it is not properly deliberated the entire project can be a mess. Because of that importance, the interface requirements were carefully analyzed under the following main categories.

Consistency

Fonts, color schema, button, wording of labels and the message are consistent throughout the system. This will help the user to use the application easily and efficiently.

Standards

Controls are used such as menus and combo boxes, check box and radio buttons in the application. Adopting these industry standards took the advantage of look and feel like approach of other application. Hence the usability of the system is improved.

Support both novices and experts

Since the messages and the wordings are simple and consistent throughout the system it is very easy for anyone to use the system.

Alignment and fields

Editing fields of the screens are left justified and the corresponding labels are right justified and placed immediately beside the field. This presents a pleasing outlook and efficient use of the screen.

Screen display

Application screens are not complex. It provides the easy accessibility and ease of use.

4.9 System design

This section provides a high-level overview of the system. System design, decisions are made about how the problem will be solved in design, the software requirements are analyzed are planned the subsequent development activities. The design of input screens and the result screens, the data storage and the process are mainly concern in this section. Selection of the software to develop the proposed system will also decide the design phase.

4.10 Input design

The design of the input mechanism is important and must be simple and easy steps to the subscriber. Carefully designed user interface will avoid the mess-ups by the subscriber and errors in processing leading to useless outputs. The objectives of input design focused are,

- Efficiency and effectiveness of input
- Reducing input volume
- Reducing input errors
- User-friendly human computer interface

4.11 Output design – Visual design

The design of the outputs is important because this is what interests the user most. They are unlikely to remember hoe elegant the input interfaces was or how quickly the system responded. What they will perceive is whether the outputs produces by the system met their requirement or not. If a system is incapable of meeting user output expectations the system is deemed be failed to meet one of its basic requirement.

4.12 Data storage design

The use case diagram and the Entity relationship diagram developed in the analysis stage identified the data elements of the system would have to deal with. In dealing with this, the efficiency of database storage design has become a key factor. The primary purpose of hardware design is to gain maximum speed to queries and take the advantage of backing up the data. Select data storage software is a vital to success of this proposed project while there are many products in the software arena such as mysql database 5.1.

Advantage of using a DBMS

- Many infrastructure feature, such as crash recovery, sharing between multiple users sharing between multiple applications, data distribution, integrity, extendibility and transaction support have already been programmed by the DBMS vendor.
- A standard access language. The structured query language (SQL) is supported by most commercial and open source RDBMS.

4.13 Process design

The processing design should be done carefully with processing productivity (Efficiency and Effectiveness) as a primary objective. The efficiency with which system resources are used and effectiveness with which the software is written to achieve this efficiency one important consideration. The methodology of the design is "Evolutionary software engineering" as indicated in chapter 1, and the process depicted in figure 4.7 [13]. These are the guiding principles followed in the design of the internal data processing of the captured data and discussed in greater detail in chapter 5 dealing with implementation.

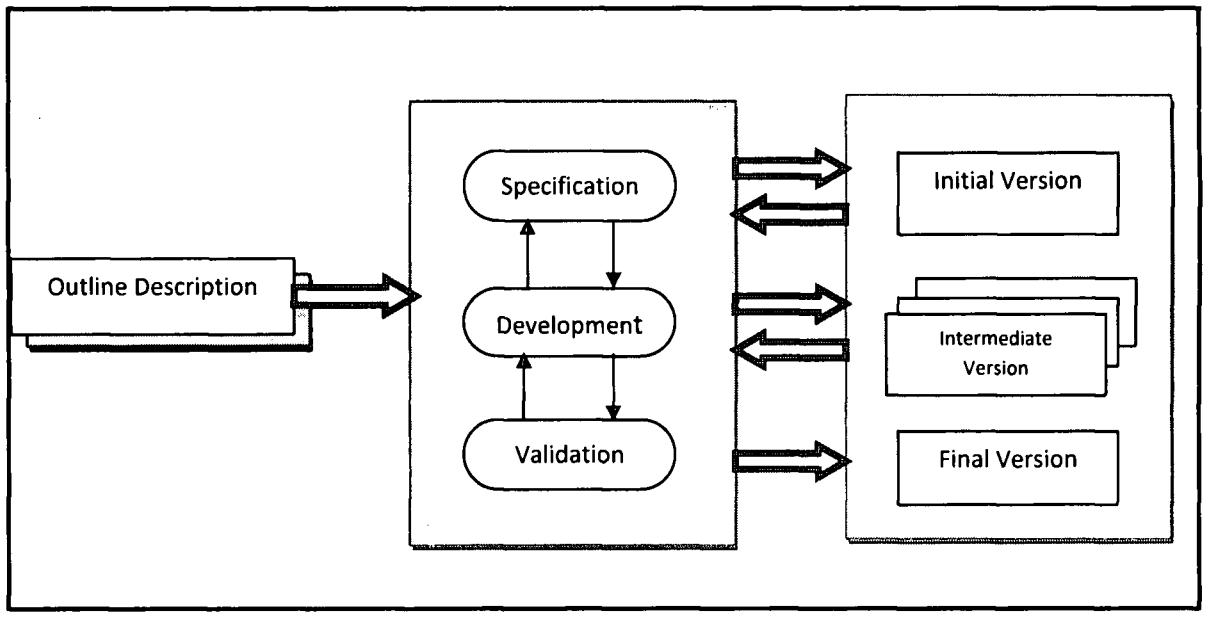

Figure 4.7 – Evolutionary software process

Figure 4.7 depicted total software implementation life cycle. It generates three versions during the software implementation process such as initial version, intermediate version and final version respectively. The initial version is comprised with software specification part as preparing interim report with system analysis and designing. The software development is undertaken for intermediate version. At this stage, designed system is translated into the source code level. The validation part is the final version of a software implementation. Here, the testing, evaluation and deployment processes are carried out.

Architecture

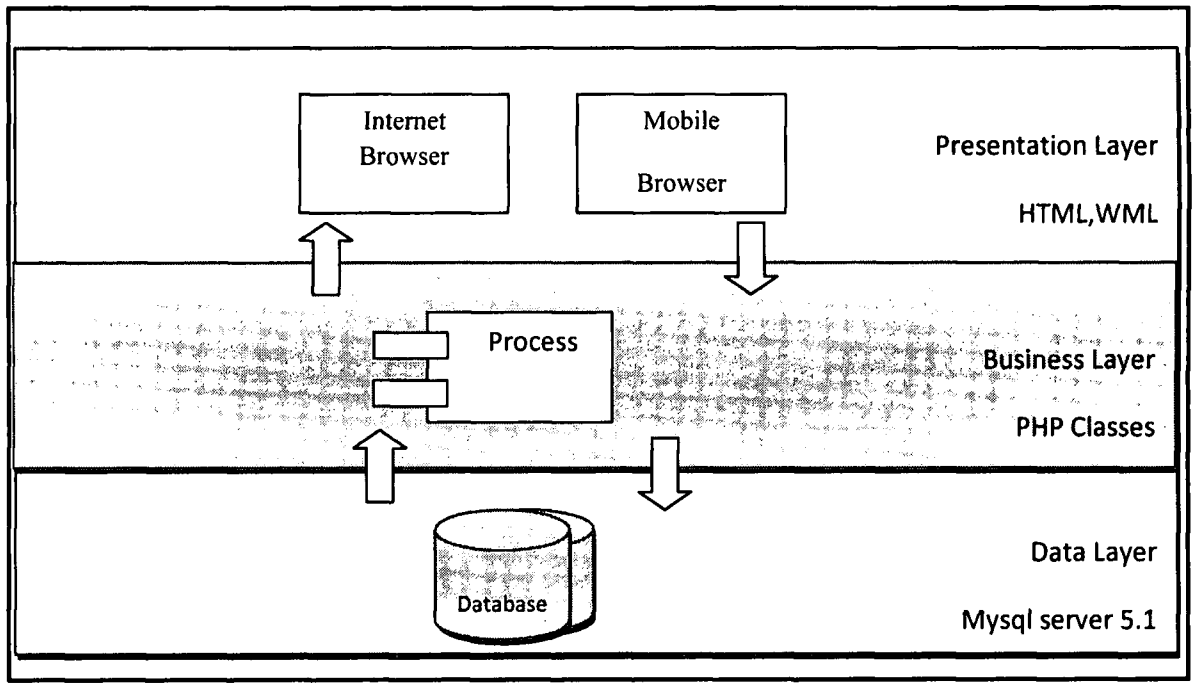

Figure 4.8 – System architecture

Figure 4.8 depicted system architecture. That contains three layers presentation layer, business layer and data access layer respectively. The presentation layer is an intimidator for system and the user. Users are able to interact with system via the internet browser on personal computer or the mobile web browser. All the system processers and logics are comprised in business layer such as calculations, validations and etc. The database is taken into the data access layer. That uses to store information according to the relational manner.

System will be built based on a three-tire software architecture where in interface/ presentation layer is consisting of three components as indicated above.

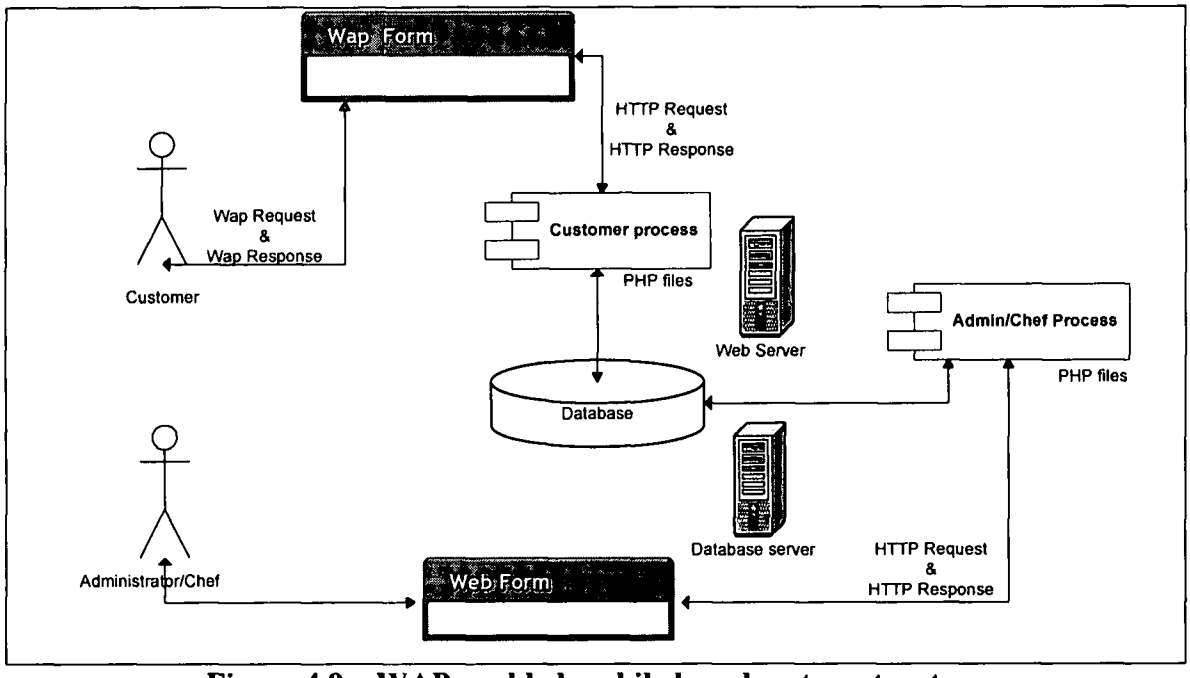

Figure 4.9 – WAP enabled mobile based system structure

As shown in the above diagram, the application consist of

- WAP enabled web based module

Registered customers can logon through his/ her mobile or PDA and the request send to a WAP Gateway. The WAP Gateway is a communication provider who can handle the WAP requests and convert in to HTTP requests. The web server takes these requests and passes them on to the database as SQL queries. The mysql processes the queries and send the results set back to the web server. This data is processed as WML/ HTML pages for display depending on the client's web browser in the device.

- Web based admin module

Web based admin module is a standard web based application. Admin module developed in such a way that he/ she can add customers to system, edit customer profile and delete customer. Admin can view reports such as orders and customers detail. Admin has the facility to add new menu and edit existing menus to the system.

- Web based chef module

Chef module is a standard web based application. Chef module developed in such a way that he/ she can accept or reject customer's orders and set order states. Chef can view reports such as accepted/rejected orders.

4.14 Summary

This chapter discussed about what was the problem and the analysis and design for the mobile based restaurant reservation system. This chapter designed part of the project and technical analysis such as Unified Modeling Language (UML) diagrams.

Also discussed system design and the inner architecture of it. Actual design of user interface and the neatness of it are the most significant functions in design of interfaces. Design of database and process is discussed more detail in chapter – 5 under implementation.