Holiday Bungalow Management System for Sri Lanka Navy

A dissertation submitted for the Degree of Master of Information Technology

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Declaration

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

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

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

Mr./Ms.

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

Certified by:

Supervisor Name: Mr. GKA Dias

_____

Signature: Date:

Abstract

At present, Sri Lanka Navy consist of huge cadre, around 60,000 including Regular and Volunteer Naval forces of both Officers and Sailors. Due to Naval personal's job scope and the stressful working pattern, it has been facilitated 250 naval holiday bungalows all over the country to uplift the life style of them and their family members. This holiday bungalow reservation was a complete manual process which introduced lot of errors and functioned in less effective manner. Manual reservation approval process faced difficulties since it needs to consider complex decision making based on requestor's rank, seniority and few other factors. Also, presenting bungalow information and maintaining a smooth booking operation was a major challenge for the organization.

Implemented web based online system for SLN is an online system which publishes all information of holiday bungalows, nearby attractions and it has automated the manual reservation operations much efficiently and smoothly. This is capable of handling, monitoring and recording reservation requests and approvals between Navy Officers/Sailors and Management. Further it integrates with existing Human resource information system (HRIS) in SL Navy for authentication and decision making. Also, the new system evaluates and presents the complex decision making criteria during reservation approval in a simplified manner to the approver.

Unified Modeling Language (UML) has been used to design the system and developed using PHP, MySQL, CSS, HTML, Java Script other open source tool and technologies. Rational Unified Process (RUP) methodology used to develop this system. The System will be hosting SLN Server room which is located Naval Headquarters and connected to all the areas through virtual private Network. Testing process of the complete system was carried out by SLN staff.

New system has overcome the major disadvantages faced in manual system by reducing the time taken during reservation. But future enhancements are required make this system accessible for public over internet since the retired Navy personals and civilians also needs the reservations. Also crash recovery procedures need to be implemented to minimize the downtime. Finally converting this to a mobile application will be very useful for end users.

Acknowledge

First of all I would like to thank Sri Lanka Navy for gave me this opportunity to followed this master Information Technology course which was conducted by University of Colombo, School of computing during the last two years and offered me to carried out this system to as the final year Implementation project .

Moreover, it was really challenging me to carried out this system and completed the thesis. There for I must express my sincere gratitude to number of parties which gave me the fullest support to achieve this goal.

So I would like to express my deepest appreciations to Mr G.K.A Dias senior lecturer of UCSC and my MIT Project supervisor has done excellent job to guiding me until final stage of this project. It helped me lot to achieve the goal.

I make this opportunity to say thank very much to the staff of the Naval Headquarters and other areas staff members to gather the information related to this system and being participated with the testing activities.

Very special thank should go to Mr Sidah Abesiriwardana and Mr Chaturanga Manemendra for gave me cordial and significant support to achieve this target.

I would like to take this occasion to express my sincere gratitude to my Father and mother for gave me proper guidance and made me an educated educate person.

Finally, the great decision was given me by my beloved wife, son and my sweet little daughter must be specially remembered with special thank.

Thank you.

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List of Abbreviations

HB   -   Holiday Bungalow

HBMS   -   Holiday Bungalow Management System

HRIS   -   Human Resource Information System

NHQ   -   Naval Head Quarters

OHRS   -   Online Hotel Reservation System

SEC   -   Sectary

SLN   -   Sri Lanka Navy

UAT   -   User Acceptance Test

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Chapter 1 Introduction

1.1 Introduction

This chapter provides the introduction of the project, what is it, why is it needed, and who is the client. Going through this chapter, the reader can get a clear understanding about the business background of the client and key modules of the project and its feasibility. Also, this chapter addresses about the problem domain and the criteria of the proposed solution to overcome it.

1.2 The Client

Sri Lanka Navy is a well-balanced and cohesive force, capable of operating in waters around Sri Lanka effectively safeguarding our national interests. Sri Lanka Navy provides assistance to other three forces including Sri Lanka Army, Sri Lanka Air Force and Sri Lanka Police to maintain law and order during operational requirements and other emergencies with the primary responsibility of sea around the country being golden fence. At present, Sri Lanka Navy consist of huge cadre, around 60,000 including Regular and Volunteer Naval forces of both Officers and Sailors.

1.2.1 Mission

To conduct prompt and sustainable combat operations at sea in accordance with the national polices. [1].

1.2.2 Role

Navy is the most vital defense force of an island nation. The maritime role is to conduct operations at sea for the defense of the nation and its interest [2].

1.3 Business Background

Due to Naval personal's job scope and the stressful working pattern, it has been facilitated several types of welfare facilities to uplift the life style of the naval personnel and their family members. Under those facilities there are more than 250 Naval holiday bungalows established all

over the country. Moreover, the Naval retried personals and the civilians also will be able to occupy   above bungalow facilities.
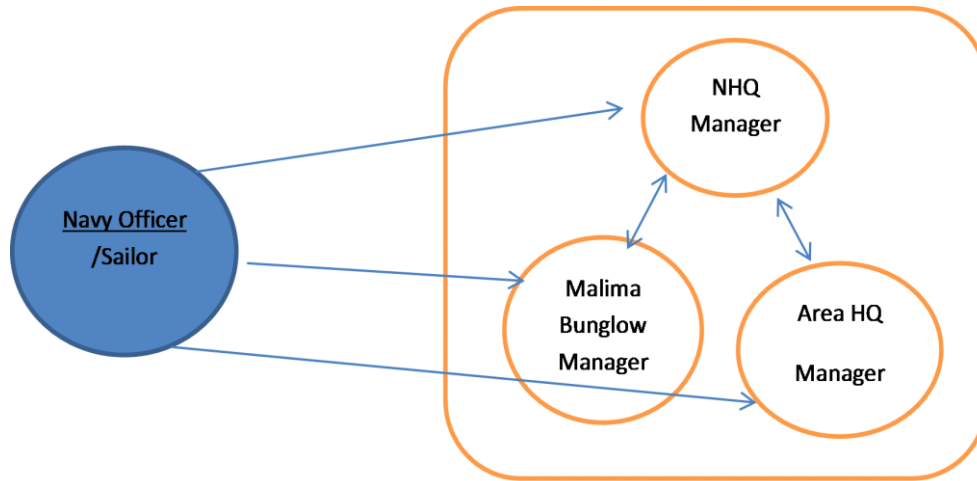
Figure 1.1 Main Actors of the system

As the diagram Figure 1.1 depicts above current Sri Lanka navy Holiday Bungalow Management System is a completely paper based manual system which needs intervention of many people. Sri Lanka Navy has below three types of different holiday bungalows.

- Bungalows maintained by Navy Head Quarters
- Bungalows maintained by Area Head Quarters
- Bungalows maintained by Malima Hospitality Service

1.4   Motivation

Improvements of travelers facilities are not depend only on the circuit bungalows. Same as the bungalows facilities, it is equally important to provide resources to make the things easy. Such as make the reservation from the place where the user resides. System will provide inspiration to the users in many ways. Improve the efficiency, Increase user satisfaction and reduce paper based environment are the main features of this system. In modern environment, every user has access to internet. Thus user will be able to easily access the system. Client satisfaction is the most important thing, which will address very well by this system.

1.5 Problem Domain

Currently there is no online Holiday bungalow booking system or web site in SL Navy. Hence all the booking functions are done by manually. Furthermore, if someone needs to check the bungalow availability, check the facilities or search nearby attractions, its required to give a call or to visit the admin location

All the available bungalows have categorized based on requestor's rank and the seniority. This Bungalow reservation process has a very complex decision making to be happen during the reservations. Currently that decision is taken manually, considering many paper based records. So it's a heavy time-consuming slow process.

Based on the reserved bungalow type, reservation request needs to be submitted for below 3 personal via respective base Commanding Officer. So, it's a time taking chain of processing happens via several parties.

- Navy Head Quarters Manager
- Area Head Quarters Manager
- Malima Bungalows Manager

Finally, the bungalow manager takes the decision to reserve the bungalow based on following criteria through manually paper based work. Each bungalow has its own eligibility criteria and the Manager has to evaluate them before the reservation.

- Availability of the bungalow by reserved date.
- Minimum time limit to reserve the bungalow.
- Seniority of the requestor
- Rank of the requestor
- Active or retired status of the requestor.
- Availability of the bungalow by rank and seniority.
- Requestor's reservation history

1.6 About the Project

Mainly this project focused on the two section which are develop the web site to aware Naval persons about Naval holiday bungalows for encourage to visit and develop fully automation online holiday bungalows reservation system.

1.6.1 Aim

The main aim of this Holiday bungalow management system is to reduce the manual paper work and trim down the repetitive work that carried out by the Naval admin staff and the candidate users.

1.6.2 Objectives

The main objective of this project is to develop an effective web based system for Sri Lanka Navy which replaces the current manual time consuming process. This web site will be a user friendly interactive web application accessible only for Naval personnel internally where they can view and reserve island wide Naval holiday bungalows. Some of other objectives are indicated as follows

- The site provides important information to plan the holiday tour effectively and fruitfully. This site guides to enjoy the facilities of Naval holiday bungalows spread island wide which are eligible to Navy officers and sailors as a privilege.
- The website provides information about Naval holiday bungalows' locations, access roads, facilities available, important places to visit nearby and route to access them from the holiday bungalows.
- The system will help to analyze the historical data, which will be an advantage for decision making process.
- Easy access - To provide a solution, where users can place their reservations online and manage information by their own.
- Increase users' satisfaction and increase the organization image.
- Improve efficiency of reservation processing, so that every request, can be tracked from start to finish. (reservation, cancellation, Allocation)

- Increase process efficiency by removing larceny and favorable.

1.7 Scope

The proposed system will be a comprehensive web based bungalow management solution. This is capable of handling, monitoring and recording reservation request and approvals between Navy Officers/Sailors and Management. Further it integrates with the existing two systems which are Human resource information system (HRIS) and existing E-mail authentication server (LDAP) in SL Navy for decision making and authentication. So it is required to implement two separate third party integration mechanism to create the connectivity to communicate with   proposed system.

Following major features   will be included in to the system

- Mainly there will be two types of admin users. They are, NHQ/Area Sec (Reservation Group), NHQ/Area Manager (Administrator). Reservation group should have the make reservation feature and Administrator will have to authorize the   reservation. Reservation will not complete until administrator do the authorization. Furthermore, admin can add and edit user roles as well. There will be another user group called Malima hotels manager and he performs similar activities of the candidate user but his requests must be given a special priority.
- The candidate users will be able to request reservations, view   HB facilities, nearby attractions and check HB availability.
- The users should be able to request reservations based on their requirement and it should validate for   future days during reservations. System will not allow to enter past dates as reservation dates.
- Users can view all published details in the site and user can add their comments or feedback on HB Through the system.
- There should be a general search criteria which will allow user to search the reservations to modify or cancel   on conditional basis.
- NHQ/Area Sec will be able to view all the reservations and get details. The results can be filtered   for different reservation status.

- Reservation results will be sorted in order to assess the selection criteria such as Rank/Rate and the seniority.

- NHQ/Area Manager will allocate the HB for each reservation request and the related customer will be notified through separate Email

- NHQ/Area Manager will be able to manage the rooms and other resources. And a resources manager can modify any informative pages in the web system at any time.

- There will be various reports on reservations and other details and those can be generated by the administrator.

1.8   Structure of Dissertation

Chapter 1 contains the overview and the objectives of the holiday bungalow management system Chapter 2 describes the background analysis and literature review of the system. Further it describes the functional and nonfunctional requirements of the Holiday bungalow management system. Current system analysis considers the critical point of current knowledge including substantive finding as well as theoretical and methodological contributions to a HBMS. Then Chapter 3 explains designed solution for the implemented system. The design solution contains use case diagram, Use case Narratives, Sequence diagram, Activity diagram and Data base table structure. Chapter 4 has implementation overview. It expresses technical structure of the holiday bungalow management system, with the tools used and system access overview diagram. Furthermore, it elaborates how the modules are categorized. Chapter 5 includes testing techniques, test plan and methodologies used. Final chapter describes the faced challenges, how well the objectives are achieved and the future enhancements for the system.

Chapter 2 – Background/Literature Review

2.1 Background

People gained the knowledge on information Technology since the time when human languages were originated. The computer was introduced in the middle of the 20th century. At present there are special organizations such as Information Technology departments, system and database administrators to manage and maintain computers, data centers, servers, database management systems and specialized software packages.

2.2 Literature Review

The usage of Internet in the business world has become a major trend in practice and generated a hot stream of research in the recent literature. The Internet, as a collection of interconnected computer networks, provides free exchanging of information. Over 400 million of computers or more than 400,000 networks worldwide today are communicating with each other [3].

Online Hotel Reservation Software (OHRS) is an easy to use arrangement that enables agents and guests to reserve rooms directly via the internet once they have confirmed availability of rooms in accordance with the itinerary. OHRS is efficient and brilliant software, yet it is easy and uncomplicated to use. OHRS grants complete authority and power on hotel or motel room booking over the internet. This entails that one can accumulate all guest payments; enter own room descriptions, facilities, rates and allocations into the Reservation System. OHRS also allows to confirm accommodation in real-time at hotel's web site and close the sale without more ado [4].

Online hotel reservations are becoming a very popular method for booking hotel rooms. Travelers can book rooms from home by using online security to protect their privacy and financial information and by using several online travel agents to compare prices and facilities at different hotels. People can book directly on an individual hotel's website. An increasing number of hotels are building their own websites to allow them to market their hotels directly to consumers. Non-franchise chain hotels require a "booking engine" application to be attached to their website to permit people to book rooms in real time. One advantage of booking with the

hotel directly is the use of the hotel's full cancellation policy as well as not needing a deposit in most situations [5].

2.3   Review of Similar Systems

There are various types of reservation systems available in the present market. Most of them are commercial products. There are certain numbers of non-commercial products as well. For instance Holiday bungalow system of Mahawali authority and Forest conservation department are facilitating similar functions to proposed system but there are some drawbacks than the proposed system such as usability due to less information about the bungalows. Moreover, most of the public sector   hotel reservation systems reach usability but not the adoptability as the SLN proposed system.

Although there are   many other bungalow and hotels reservation systems in prevailing industry as indicated in Appendix A, the proposed system requires a complex automated decision making logic to evaluate upon set of eligibility criteria rules during reservations. So this will differ from regular hotel reservation systems and will address a major scope. Since the rules and regulations considered during   bungalow reservation are specific to SL Navy, It will not be able reuse any other   existing hotel reservation systems.

But, there are   some similar components in   other existing systems such as check availability and E-Mail notifications etc… So those components have been almost included into this system too. Also some components of existing systems such as "online payment gateway" will not be able to include in proposed system since the system can be accessed only through Intranet by all service people. All   the reservation charges will be deducted by their own salary at the end of each month.

2.4   Alternative Technologies

There are   various types of online reservation technologies (proprietary and open source) such as online booking engines and content managements systems (CMS).But there are some negative qualities of using those as well. For an example, if we customize CMS more and more. It may

tend to loose certain features as well. What's more likely is that we may not be able to take advantages of any new changes in a new version of the same core components, because of the large number of custom modifications. CMS is a system that needs periodic upgrades such as security patches, upgrades. In that case system has to undergo certain regular maintenance. Hence, the proposed solution will be based PHP, MySQL and with open source extensions that is available. The best free and open source hotel booking engine software solutions and their comparisons are indicated in Appendix A.

2.5   Requirements Gathering

Every system has been designed to fulfill the needs of a client. Those goals are called requirements. To provide the best solution to an identified problem, the analyst must go through every single aspect of the existing system and must collect details from every level of staff in an organization. To get a good idea about the requirements, analyst has to use several requirement gathering methods.

2.5.1 Fact Finding Methods Used

Questionnaires: A collection of questions that helps to identify the functional and nonfunctional requirements of the system has been given to   lower-level staff.

Interviews: By interviewing the middle-level staff and top-level management, author has been able to get a good idea of the system from the view of management .And it has helped to find the special features which needs to be introduced to the system in   future.

Gather data from existing documents: Since there is no existing automated booking system or a bungalow information collection system in SL Navy, there are no any previous documentation to gather specific data. So, analyst has collected a list of all type of bungalows, facilities, attraction places and their distance. By reviewing their existing documents, the structure and the format of the reports to be generated by the proposed system has been defined.

Site visit: Visiting   the sites and locations, analyst has been able to click some photographs for later use.

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Observation: Analyst has visited the bungalow reservations office and observed the work load carried out in each day. In some occasions, analyst also has been taken part of team and has performed the work. This helped the analyst to identify the normal practices of the staff.

Prototyping: By presenting a prototype of proposed system, functional and nonfunctional requirements of the system has been identified by the analyst.

2.5.2 Problems Encountered

Client does not use Information Technology in their day-to-day activities very frequently, because of that some middle-level staff provided false information and showed their unenthusiastic feeling on the proposed system. Because of the lack of IT knowledge in the staff and unavailability of such system in the past, gathering of technical requirements and some functional requirements has been a bit hard task for the analyst.

Since the department is working in a manual way in ages, many people do not like to go for an IT system. Due to that reason, they purposely provided false information on the questionnaires and interviews.

2.6 Identified Requirements

Identification of the requirements and analysis is very important to success the project. The main task was to identify the functional and nonfunctional requirement and breakdown down the processes which can be automated. So there were several meeting with SLN Admin staff to clearly identify the requirements

2.6.1 Functional Requirements

- User can view holiday bungalow facilities
- User can check holiday bungalow availability on required period without Login.
- User can login to system by using their Navy email ID.
- System will interact with the SL Navy E-mail authorization server.

- (Verify the active member by username (Navy e-mail address) by connecting with internal system – There's no member registration).

- System will interact with HRIS system (To check the valid Rank and count the seniority of the users).

- User can add request to reserve the bungalow online.

- User can send request to cancel or amend the reservation.

- Valid reservation requests will be routed to responsible manager.

- Managers can approve / cancel reservation (Only service personal)

- Time to time the reservation status will be notified to user through SMS/Email.

- Approval process helps managers by displaying required decision factors in approval screen.

- (Member seniority /rank will be retrieved by internal HRIS system. Previous reservation history and the bungalow availability will be retrieved from the current system) NHQ Bungalow Manager can view reservations / do direct reservation and generate reports.

- AREA Bungalow Manager can view Area reservation /do direct reservation and generate reports.

- MALIMA Bungalow Manager can view and add reservations for civil people.

- Generate Reservation statistics on bungalow occupation.

- Send Navy Officer's/Sailor's lodging charges to payment recovery system.

- User adds rating and feedback comments on their reservation.

- User can navigate through nearby attractions and check the distance from holiday bungalow (This will be done by using GIS)

2.6.2 Nonfunctional Requirements

Performance: The website should perform well because all the naval personnel being facilitated to view all bungalows without any interruptions and anyone should be able to check the availability of the bungalows without much delay. This will totally depend on the bandwidth of their internet connection.

Appearance and Interactive: Website should be more attractive and interactive. Appearance of the site should be beautiful and the visitors should not feel bored to visit the site.

Availability/Reliability/Security: The website should be operated on 24hours a day. It should available to everyone in intranet. Reliability and Security of the system and intranet should be very high because it handles calculate the returns of the respective Naval personnel and this system interaction with another third party system. There should not be any crashes in the system and should available for anyone when in need.

User-friendly: Since most of the staff is new to an IT system, anyone should be able to easily understand the system and work   without any problem.

Effective/Efficient: Data gathered from the system should not be wasted and the reports generated by the system should be accurate.

Chapter 3 – Analysis and Design / Methodology

3.1   Introduction

This chapter describes the methodology followed to develop proposed system, and consisting techniques that have used to design the system such as use case and use case narratives to illustrate new system. Consequently, design of data base and the user interfaces also describes here.

3.2   Methodologies can be used

There are several methodologies to be used while developing a system. In most cases, if the developers have a clear-cut idea about   the deliverables and if the requirements are not changing in the future, developers can use Waterfall Model to develop the system. If there is a risk of requirement changing throughout the project duration, it is highly recommended that to use the iterative development models. Rational Unified Process model has been the most widely used iterative development model in the field nowadays.

3.2.1 Waterfall Model
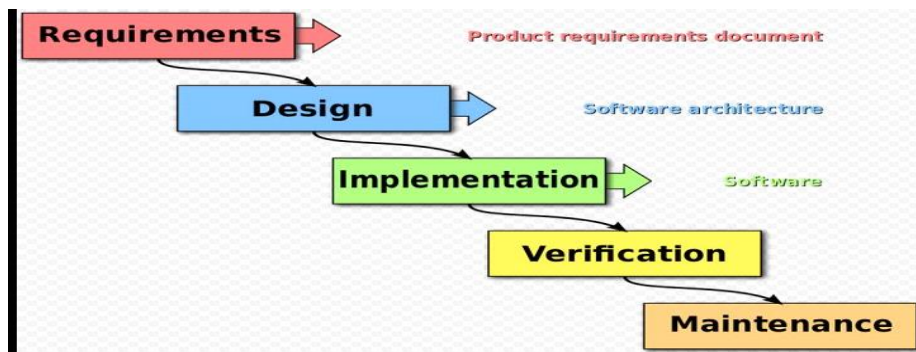
Figure 3.1 Rational Unified Process

The waterfall model is a sequential design process, often used in software development processes, in which progress is seen as flowing steadily downwards (like a waterfall) through the phases of Conception, Initiation, Analysis, Design, Construction, Testing, Production or Implementation and Maintenance. [6]

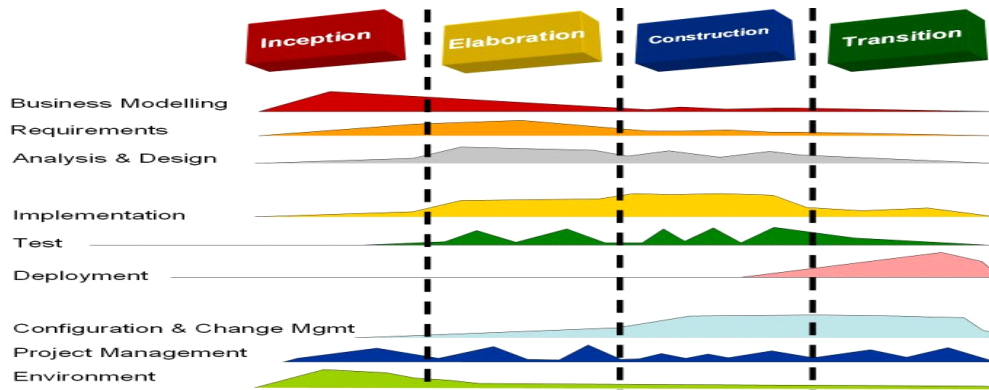### 3.2.2 Rational Unified Process (RUP)

Figure 3.2 Rational Unified Process

The Rational Unified Process (RUP) is an iterative software development process framework created by the Rational Software Corporation, a division of IBM since 2003. RUP is not a single concrete prescriptive process, but rather an adaptable process framework, intended to be tailored by the development [7].

The phases of the RUP are organized and named primarily for what is achieved.

Inception phase: Scope the project, define the business case.

Elaboration phase: Refine the requirements, establish architecture, and mitigate the most technical risk.

Construction phase: Complete the system up to a point where it can be deployed in limited context ("beta version").

Transition phase: Finish the product and reach product final release.

Each phase has zero, one, or more iterations, but generally at least one. The RUP has guidelines and heuristics on how to define phases, iterations, number and duration of iterations, and iteration objectives [8].

3.2.3 Selection of a Suitable Method

After analyzing requirements and making the design, analyst has selected the Rational Unified Process (RUP) as a method to develop the system. Since there are no any existing system in SL Navy, there is a risk of changing the requirements in future, so rather than using the Waterfall Model, using RUP (an iterative development model) will help   developer to give the best solution to SL Navy. Waterfall development completes the project-wide work-products of each discipline in one step before moving on to the next discipline in the next step. Business value is delivered all at once, and only at the very end of the project.

3.3   UML Design

UML is very powerful modeling language. Many diagram can be developed using UML. It provides users with ready-to-use, expressive modeling examples. Moreover the UML gives a standard way to write a system's view, covering conceptual models such as business processes and system functions, as well as classes written in a specific programming language, database schemas, and reusable software components. UML can be applied in many areas like embedded systems, web applications and commercial applications. Some UML tools generate program language codes and produces bug free, deployable applications that run quickly if the code generator incorporates best practice scalable patterns. UML can be used for modeling the whole system independent of platform language. Since UML is graphical language, it facilitates visualizing, specifying, constructing, and documenting information about software-intensive system. In the presence of large community of software developer's it is necessary to understand the importance of modeling, its application and use of UML to make software development process more efficient [9].

3.3.1 Why Modeling with UML is Used

- Modeling provides structure for problem solving
- When system was modeled, multiple solutions may be fined.
- Modeling helps to manage complexity of system before actually starting to work on the system.

- With various diagram from UML, perfect and clear view of system can be shown.
- If we model any problem before its development, there are fewer chances that our development plan will go wrong thus decreasing development costs.
- The risks of mistakes were reduced by modeling.

3.4 Technologies and Architecture Can be Used

The proposed developing system will be a web based system which will use PHP, Apache and MySQL as web technologies. Nowadays, most people have access to internet. So, the system can be used by anyone whenever they want to make a reservation. Hence, there are no boundaries for people to use this service.

This project is a three-tier architecture that consists of client, web server and a database. It will have presentation tier where users access the system via web based GUI. In the application tier it will contains the business logic, where it controls an application's functionality by performing detailed processing. The bottom database layer consists of database server.
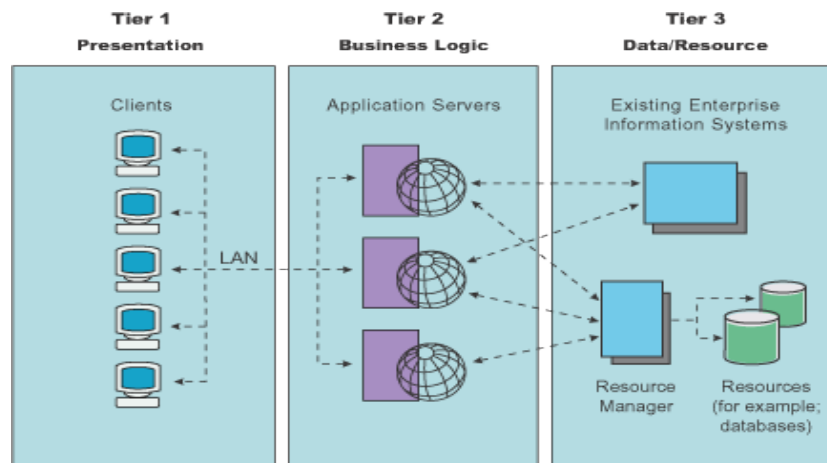
Figure 3.3 Three-Tier Architecture

Here are 5 benefits of separating an application into tiers

- It gives you the ability to update the technology stack of one tier, without impacting other areas of the application.

- It allows for different development teams to each work on their own areas of expertise. Today's developers are more likely to have deep competency in one area, like coding the front end of an application, instead of working on the full stack.

- You are able to scale the application up and out. A separate back-end tier, for example, allows you to deploy to a variety of databases instead of being locked into one particular technology. It also allows you to scale up by adding multiple web servers.

- It adds reliability and more independence of the underlying servers or services.

- It provides an ease of maintenance of the code base, managing presentation code and business logic separately, so that a change to business logic, for example, does not impact the presentation layer [10].

There are many alternative ways of designing and implementing this sort of a project. It can be a web based solution or can develop as a standalone system which accessing through network. Further it is possible to develop from programming languages such as Java, .NET, PHP, C#, C++. In this project, it is developed using PHP programming language.

PHP is one of the most popular server side scripting languages running today. lt is used for creating dynamic webpage that interact with the user offering customized information. It offers many advantages, operating system, supporting multiple database systems, stable and easy to use are some of the benefits that can be gain from using PHP as programming language. Comparisons of the programing languages are indicated in following Table 3.1 [11].

- **Comparisons of the programing languages**

Language	Intended use	Imperative	Object-oriented	Functional	Procedural	Generic	Reflective	Event-driven	Other paradigm(s)	Standardized?
PHP	Server-side, web application, web	Yes	Yes	Yes	Yes		Yes			"De facto" standard via language

										specification and Requests for Comments (RFCs)
C	Application, system, general purpose, low-level operations	Yes			Yes					1989, ANSI C89, ISO C90, ISO C99, ISO C11
C++	Application, system	Yes	Yes	Yes	Yes	Yes				1998, ISO/IEC 1998, ISO/IEC 2003, ISO/IEC 2011,ISO/IEC 2014
C#	Application, RAD, business, client-side, general, server-side, web	Yes	Yes	Yes	Yes	Yes	Yes	Yes	structured, concurrent	2000, ECMA, ISO
Java	Application, business, client-side, general, mobile development, server-side, web	Yes	Yes	Yes	Yes	Yes	Yes	Yes	concurrent	De facto standard via Java Language Specification
JavaSc ript	Client-side, server-side, web	Yes	Yes	Yes			Yes	Yes	prototype-based	1997, ECMA

Table 3.1 Comparison of programming languages

3.5   Use Case Diagram

A use case diagram is a graphical representation of users' interaction with the system in describes the specifications of use case. A use case diagram can provide different type of users of a system and numerous way that they interact with the system. Mainly use case diagram consist of two entities those are Actors and use cases.

3.5.1 Actors

An actor in the use case diagram specifies a role played by a user or any other system that interacts with the subject. Actors may represent roles played by human users, external hardware, or other subject. It is identified five actors associate with the SL Navy HBMS. They are indicated as follows.

- NHQ/AREA Manager (Admin)
- NHQ/AREA Sec(Reservation Group)
- Candidate User
- Mail Server
- HRIS System
- Pay System

3.5.2 Use Case

A use case is a methodology used in system analysis to identify, clarify, and organize system requirements. The use case is made up of a set of possible sequences of interactions between systems and users in a particular environment and related to a particular goal [12]. In order to SL Navy HBMS there are having many use cases. In order to entire HBMS project it is divided four use cases by collet all the use cases and the actors. Those are indicated from Figure 3.4 to Figure 3.7.

Following are the Use cases diagrams related to major functionalities performed by main actors

- **Use case diagram for System Administrator**

  (Figure 3.4 depicts the major functionalities performed System Administrator)
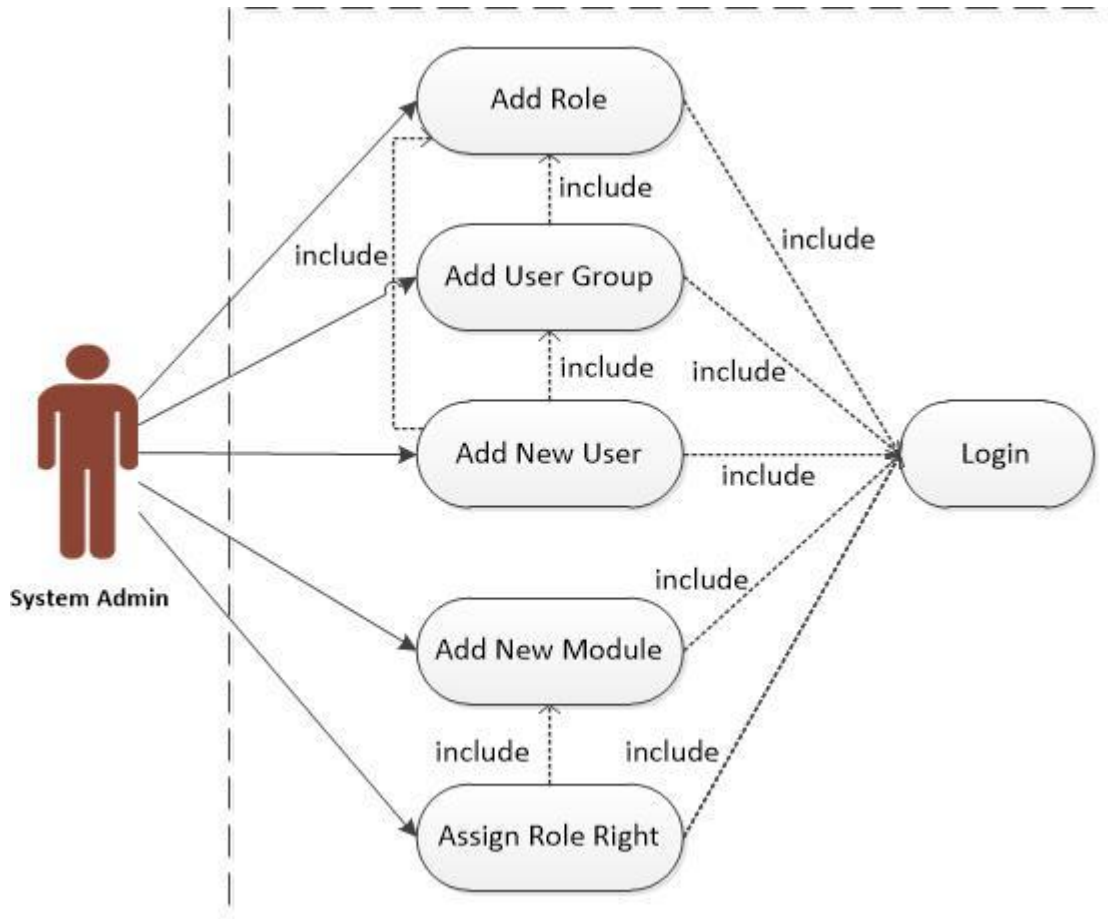
Figure 3.4 Use case diagram for System Administrator

- **Use case diagram for Area/NHQ Manager**

(Figure 3.5 depicts the major functionalities performed Area/NHQ Manager

Figure 3.5 Use case diagram for Area/NHQ Manager

- **Use case diagram for Area/NHQ SEC**

  (Figure 3.6 depicts the major functionalities performed Area/NHQ Sec
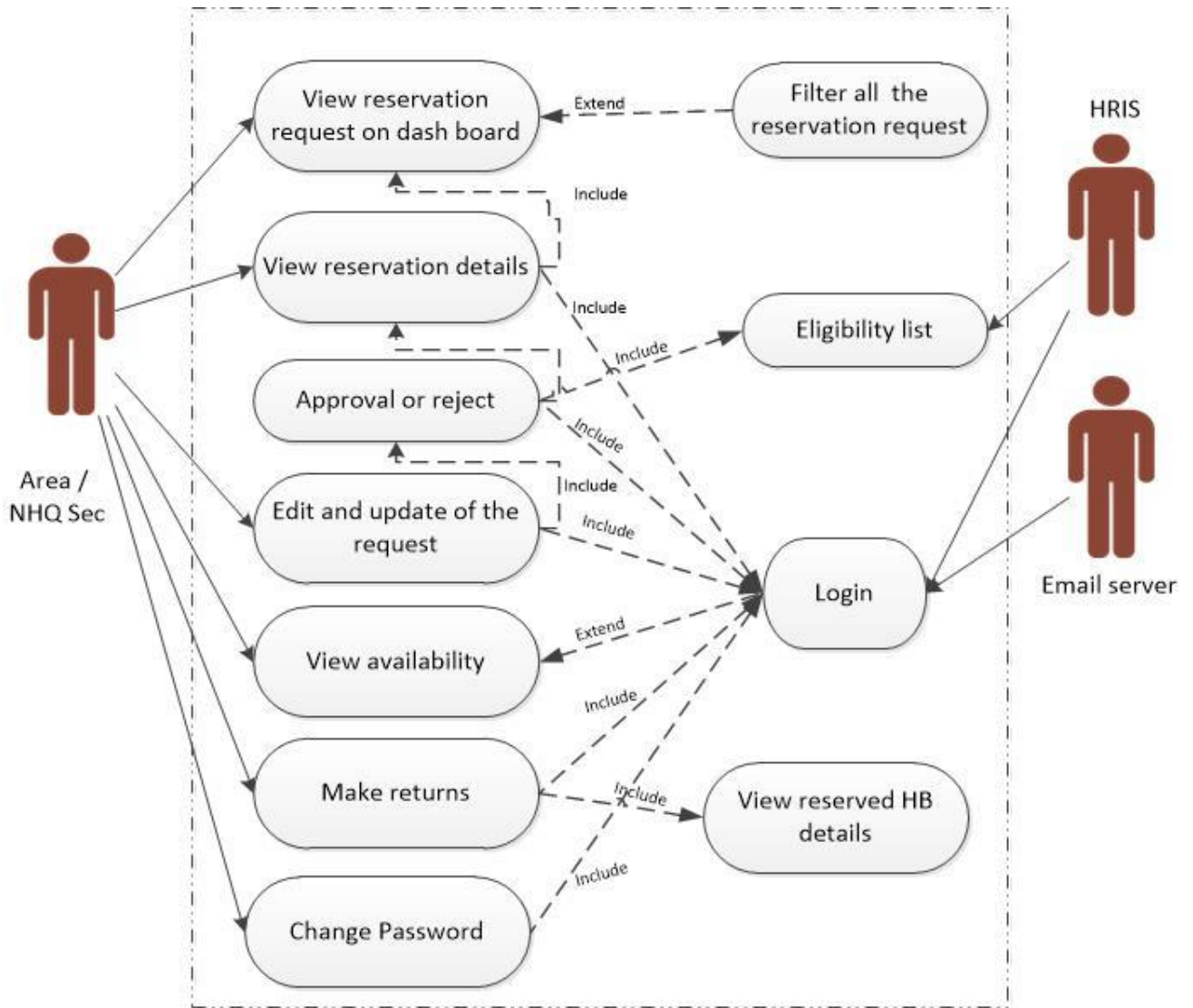
Figure 3.6 Use case diagram for Area/NHQ Sec

- **Use case diagram for Candidate User**

(Figure 3.7 depicts the major functionalities performed Candidate User
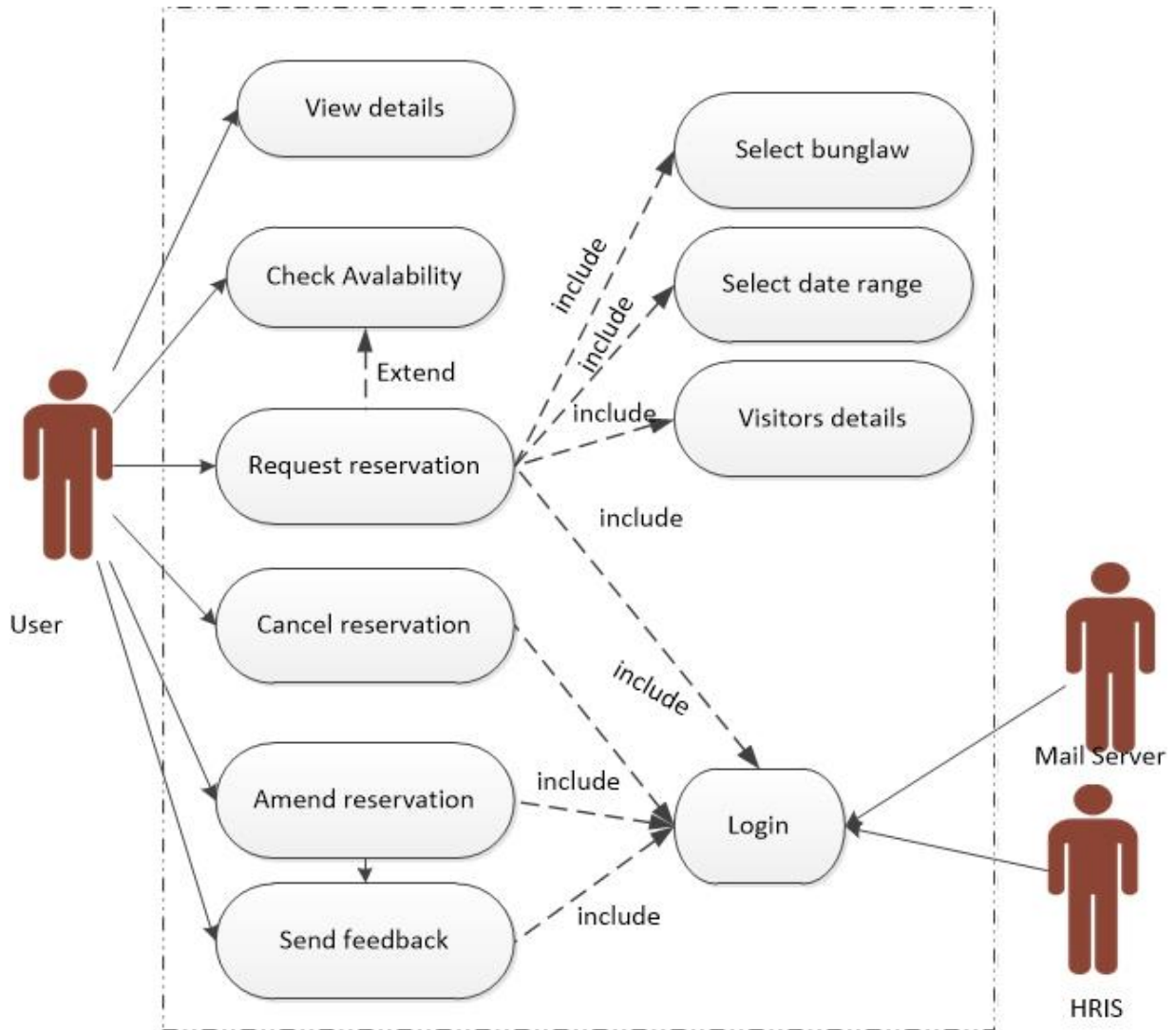
Figure 3.7 Use case diagram for site Candidate User

3.5.3 Use Case Narratives

A use case narrative is a largely text-based description of a use case that could be supplemented with decision trees or other easily understood notations. The description should be written in the user's language, and thus provides an important communication tool between developers of systems and the intended users. Narratives follow a structured format. One of crucial use case narratives is indicated in below Table 3.2 and rest are indicated is Appendix B.

Use Case narratives- Admin Reservation

Use Case Name :	Admin Reservation
Use Case ID :	UC 04
Objective :	Take the decision to perform Approve or reject the reservation
Pre-Conditions	NHQ/Area Sec required to login in to the system before perform the reservation.
Success End Condition	Display successfully send message and generate reservation reference number
Fail End Condition	Not relevant
Actors	NHQ/ Area Sec HRIS System
Main Scenario	Once logging to the system and press the HB reservation button
	Display all the reservation requests of all HBs as count on the Dash board according to the type of HB
	Further it is displayed total HB reservation request count at top of the reservation page.
	Select the one HB which is received the reservation request from the dash board.
	Display all the requester list as sorted their seniority order according to respective HB
	Select the top most requester then again display the overlapped date requester list as sorted their seniority order according to respective HB if it is having overlapped date request.
	Again select the top most requester then display his reservation details and previous reservation details too on that web page.
	Click on the Approve button or reject button.

	If click approve button the request goes to authorization level. Then other request which was overlapped with the approved request will be rejected. Non overlapped request again goes to reservation queue.

Table 3.2 Use Case narratives- Admin Reservation

3.6   Database Design

A database is a set of logically related files that are organized to facilitate the access through one or more applications programs. It is essential to normalize the database to minimize the redundancy. The created database structure is indicated as Figure 3.7.
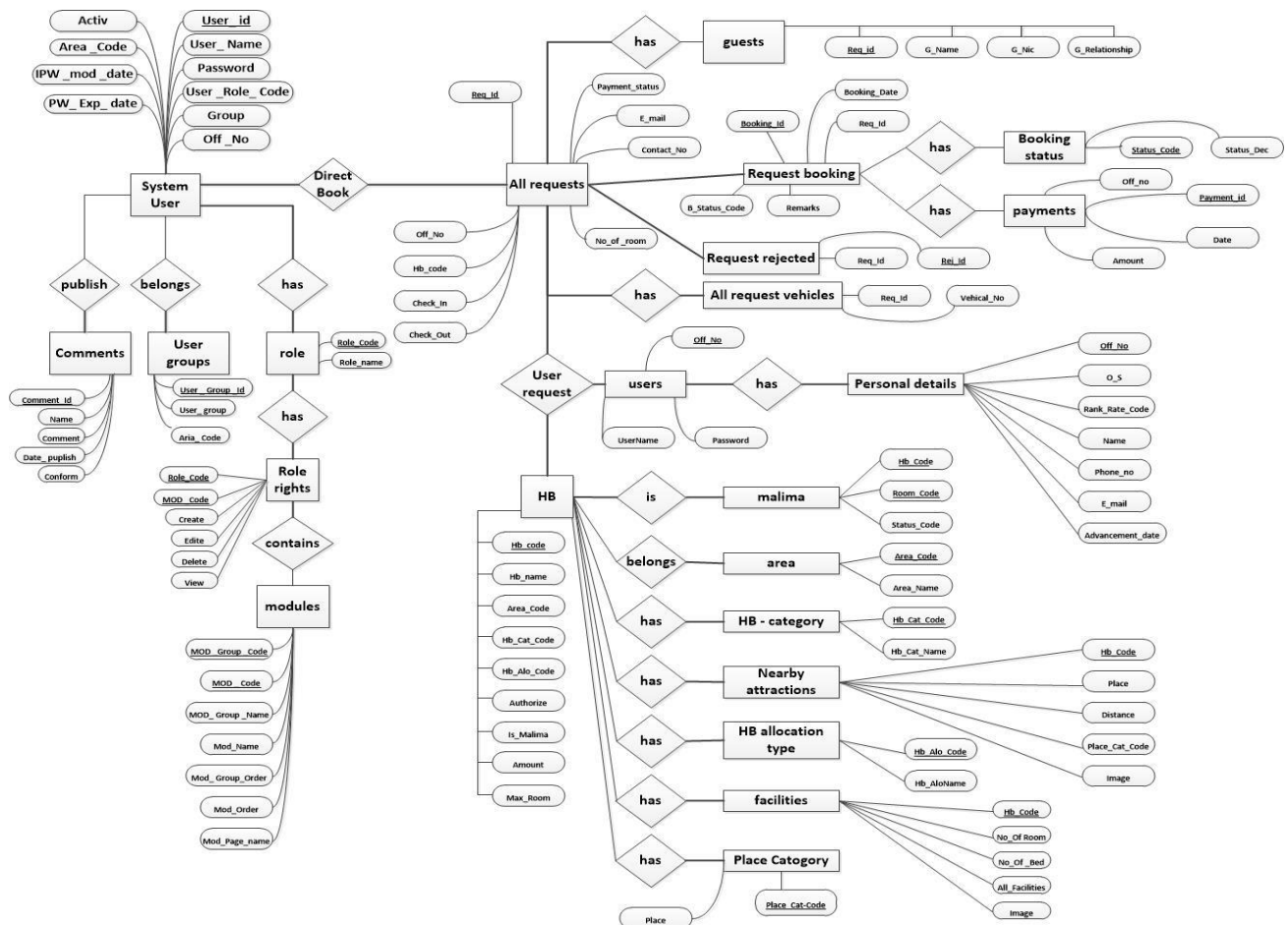
Figure 3.7 Data Base Structure

3.7   Sequence Diagram

The Figure 3.8 depicts the sequence of the reservation and reject process. It shows the overall system level sequence diagram. After successful login to the system all the users will be able to search the bungalows depending on their preferences. After that they will be able to perform the reservation.
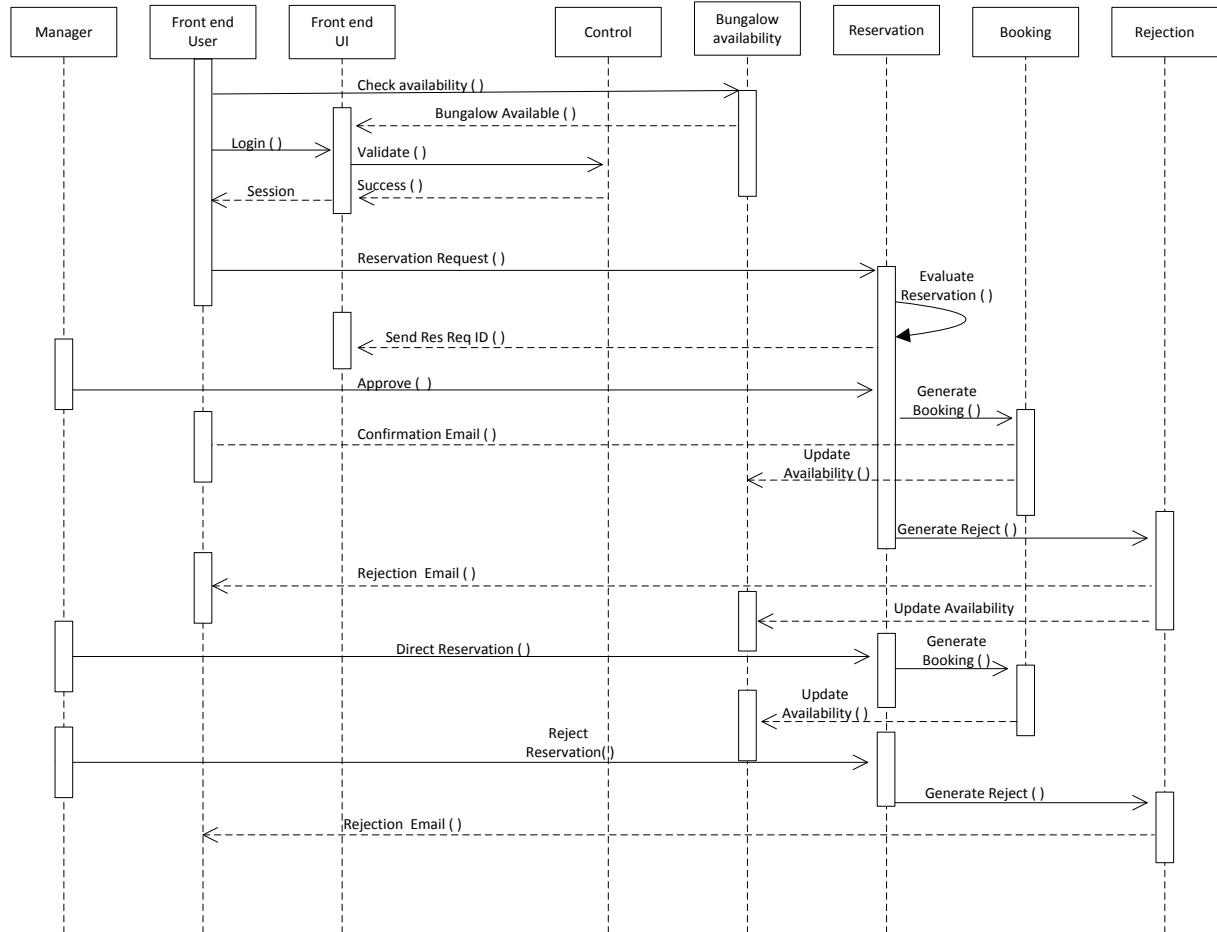
Figure 3.8 Sequence Diagram

3.8   Activity Diagram

An activity diagram visually presents a series of actions or flow of control in a system similar to a flowchart or a data flow diagram. Activity diagrams are often used in business process modeling. They can also describe the steps in a use case diagram. Activities modeled can be sequential and concurrent [13]. According this HBRS system the activity diagrams would be benefited to identify the general overview the entire system. Hence, the most important activity diagrams are indicated in Appendix C.

3.9   Interface Design

To smooth work with a system, users have to be able to control and assess the system very interactive and easy manner. To make the system interactive it should be designed to support the way humans interact with the all function and information [14].

3.9.1 Home Page

The home page is designed to increase user attraction and with more informative data. It contains a slide show with lot of image which presents the natural beauty of Sri Lanka. It provides list of the services like plan the tour all around Sri Lanka, facilities of the HBs, nearby attractions, Alternative routes to reaches the places etc.

It was decided to include a slideshow of Images since it is the best presenting mechanism used in most web applications. It was major important to display more images as much as possible. So the decision taken to include a slide show is important. Figure 3.9 shows a screen shot of home page of HBMS.
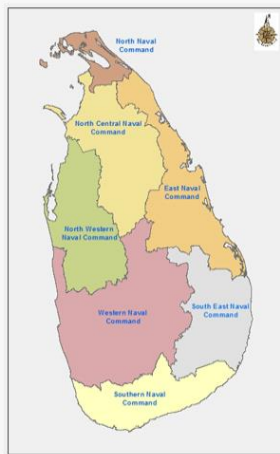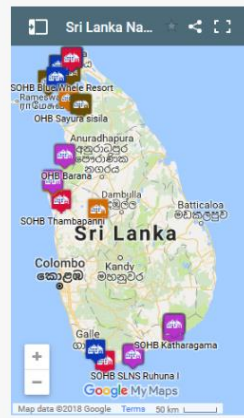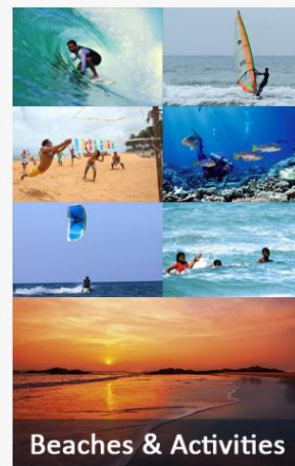
Figure 3.9 Home Page

3.9.2 HB Refervation Request Form

Figure 3.10 shows the reservation request form which is filled by the candidate user. Once submit the form it will be display status of the request below the form until confirm the reservation.

Figure 3.10 HB Reservation Request Form

3.9.3 Check Availability Form

Providing the date range selectable calendar made easy for the user to view and select reservation dates and check availability in order to figure 3.11 it display the availability of the selected HB dates during the month of March.

Figure 3.11 HB Availability

3.9.4 HB Details Page

Figure 3.12 depicts the Holiday Bungalow details page which presents holiday bungalows categorized by the availability for officer rank.
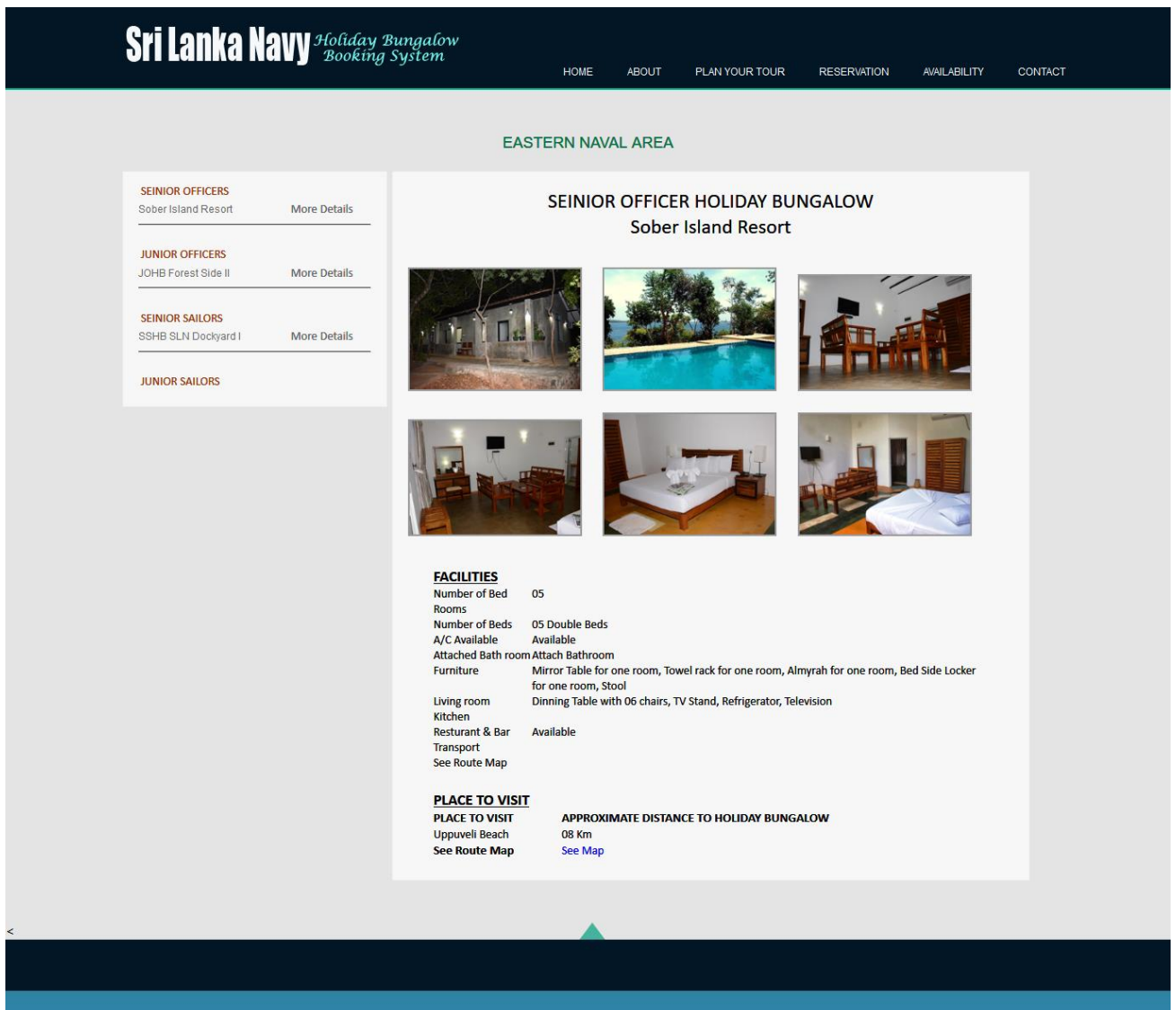
Figure 3.12 HB Details Page

3.9.5 Admin Panel Page

Below figure 3.13 is the Admin Panel. Super Admin can access all the admin operations .But other admins will get only the assigned admin features.
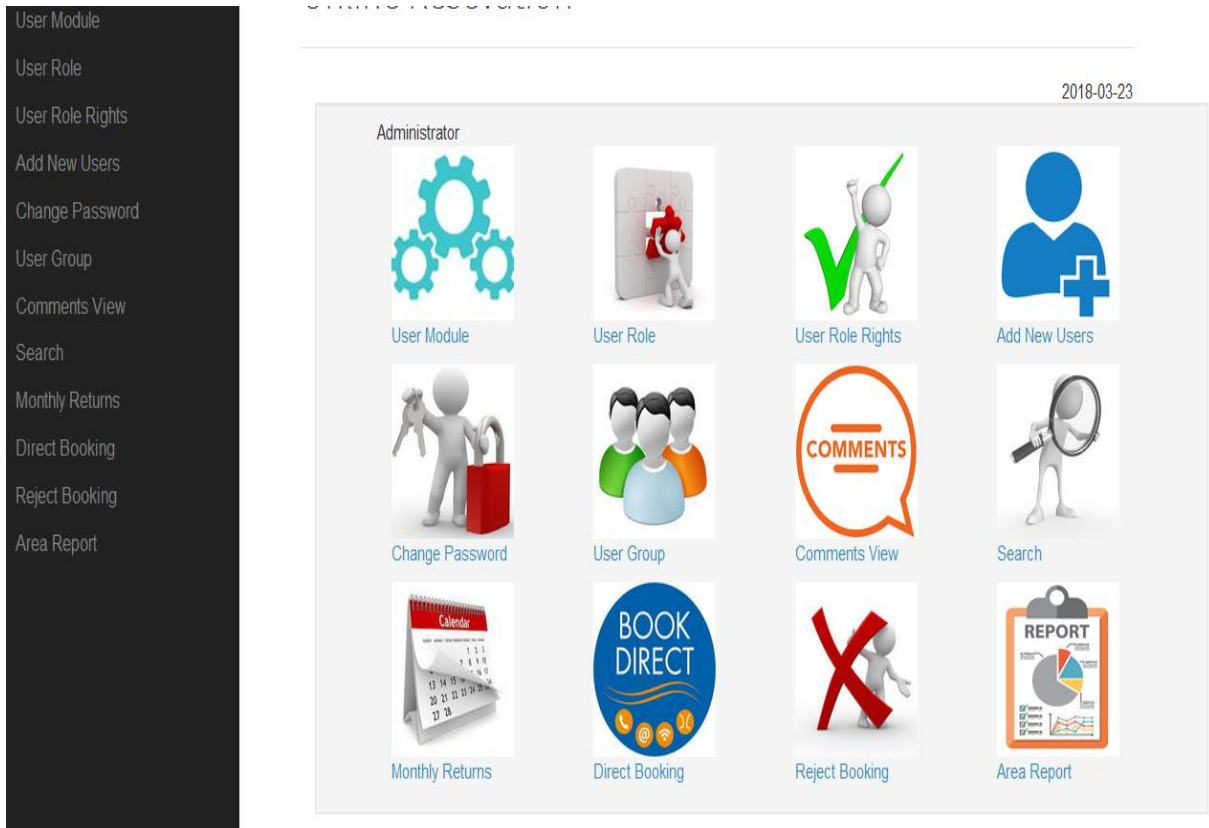
Figure 3.13 Admin Panel

Chapter 4 – Implementation

4.1   Introduction

This chapter gives an overview   about the implementation tools and the technical details to develop holiday bungalow management system. The required infrastructure of hardware and software details and how they are integrated with the other systems are graphically indicated. Moreover it has been described on URLs for the accessibility for   candidate users and the admin users. The server is expected to remain in functioning status on all the time (24 * 7).

4.2   Implementation Tools

Here are the implementation tools used to develop SL Navy Holiday Bungalow Management System

Operating System	Window 10
Web Server	Apache (App Server)
Hosting Provider	SL Navy
Database	MySQl
Development Language	PHP
Diagram Design Tool	MS Visio
Development Tool	Brackets, Notpad ++
Client Script	Javascript, JQuery
UI Design Tool	Adobe Photoshop
Development Method	Rational Unified Process(RUP)

Table 4.1 Implementation Tools

4.3   Hardware and Software Requirements

Following Hardware and software requirements were used to set up SL Navy HBMS.

Minimum Server Hardware Requirements	Server software Requirement
Core2duo server 2.8 GHz or higher	Windows 2008 / any major Linux distribution
4GB RAM	Apache web Server Version 2.4.25 (Win32) OpenSSL/1.0.2j PHP/5.6.30
1TB Disk space	PHP Script Language Version 5.2.6
2 Network interface card with 10/100 Mb/s (To have public IP & privet IP)	My SQL Database Version 5.7.17-log
USB port – (Backups to an external USB drive)	php MyAdmin Database Manager Version 3.4.4
Redundant power supply units (PSUs)	
CD/DVD Drive – 52x	
CD/DVD Drive – 52x	
Other relevant hardware (USB mouse and keyboard)	

Table 4.2 Hardware Software Requirements

4.4   Implementation Environment

The entire Holiday Bungalow Management System (HBMS) is based on PHP programming language. Most of the code segments have been developed from scratch and same time it uses some predefined code segments. Further, the system is integrated with Google maps. It is a web mapping service application and technology provided by Google. The mapping service will be helpful to locate the holiday bungalow locations.

4.4.1 Backend of the Application

Database of HBMS used MySQL. It is widely used in internet application since it's recognized as a very fast database and it is the most popular open source database. It is easy to install, maintain and work with HBMS.

4.4.2 Frontend of the Application

It has been paid more attention to while designing user interface and web pages. It was focused on the easy to navigate, efficient to used and more pleasurable experience user through the interfaces. It was used tool to design HTML, CSS and Adobe Photoshop,

4.4.3 PHP

PHP is a powerful server-side scripting language for creating interactive web sites. In web development PHP code can be easily embedded into HTML code. PHP is often used with apache in various operating system [15].

4.4.4 Apache

The Apache HTTP Server Project is an effort to develop and maintain an open-source HTTP server for modern operating systems including UNIX and Windows [16]. It provides a secure, efficient and extensible server that provides HTTP services in sync with the current HTTP standards.

4.5   Modules Structure

Figure 4.1 depicts the module architecture of the system. By using the reservation module users will be able to handle the reservation requests. They will be able to make, modify and cancel the reservations. The bungalow Web site module user can be browsed the details of HB and view the check availability too. Further user can be send the comments through website by the comments module. In order to admin handle web site, will handle the add, modify and removal of HBs. Admin users are authorizing to handling those reservation process.   More over admin can be perform direct reservation and reject activates. All the users' controls will be handing by the User control module.
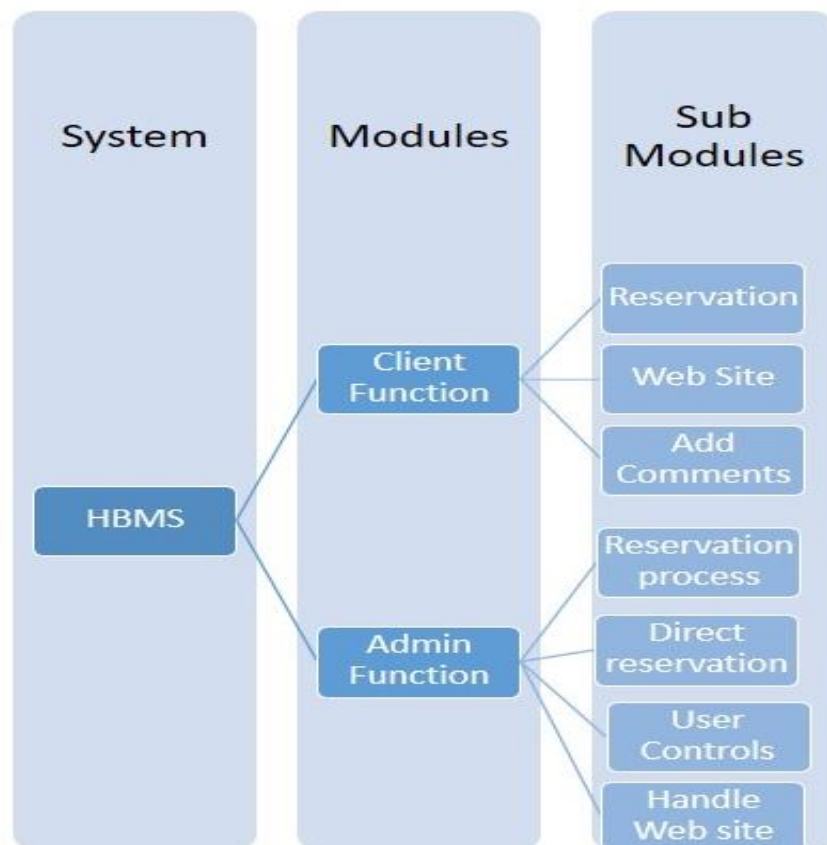
Figure 4.1 HBMS Modules

4.6   Overview Diagram

Following overview diagram in Figure 4.2 depicts the physical manner of how the system is implemented in the hospital network.
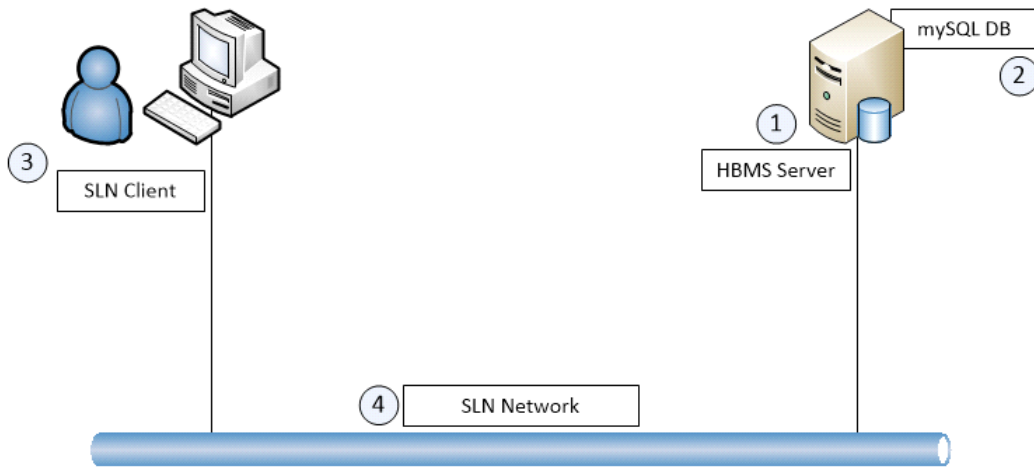
Figure 4.2 Overview Diagram

1.   Holiday Bungalow Management System (HBMS) is installed on a server which can be either a Linux flavor or Windows based.

2.   Both Application and MySQL database runs in the same server with business rules and support for queries.

3.   SLN candidate users will request for data from server.

4.   HBMS server is also connected to the main SLN network as the client.

4.6.1 Network Diagram

The Network diagram of this system in Figure 4.3 graphically shows how the HBMS system is implemented in   SLN. It depicts the physical components or the hardware that has been used for the system to interconnect HBMS server with the all kind of users.
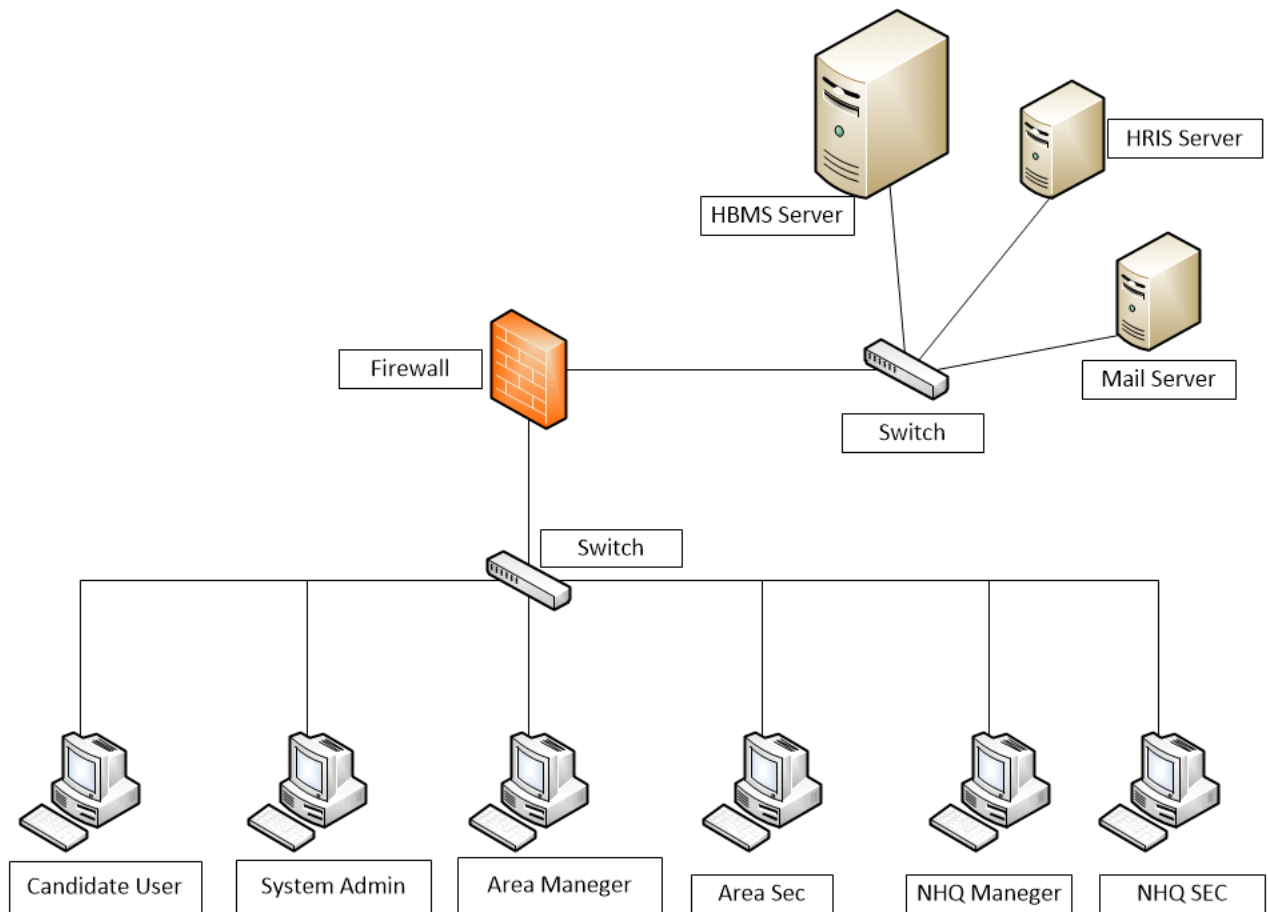
Figure 4.3 Network Diagram

4.6.2 Web URL Details

The entire web base system will be hosted in a shared web server which is located in SLN server room. But candidate users and the admin staff members should have the access the system through the different URL which indicated respectively as hbms.navy.lk and hbms.navy.lk/admin

Chapter 5 – Testing and Evaluation

5.1   Testing

The testing of software is an important means of assessing the software to determine its quality. Software testing typically consumes 40% to 50% development efforts and consumes more effort for systems that require higher levels of reliability, it is a significant part of the software engineering. Despite advances in formal methods and verification techniques, the Holiday Bungalow Management System needs to be tested before it is used. The general aim of software testing is to confirm the quality of systems by systematically exercising the software in carefully controlled circumstances. There are many software testing methods exists in the software industry. Testing is involved in every stage of the software life cycle, even though the testing done at each level of software development is different in nature and has different objectives.

5.2   Test Plan

The test plan is started during the early stage of the software development process and carried through out as parallel activity. The components of the system are tested with respect to Windows environment. Further it is tested on widely used web browsers, such as Firefox, IE and Chrome. The test plan is prepared to endure that the system archives the expected output. The objectives of the test plan are to confirm that systems provide the maximum benefits, required features and to ensure it work as expected. Sample set of test data is used to illustrate the test cases and results are identified to verify the testing scenarios. In a software system there are many features and functions to be tested.

Furthermore it tested the non-functional requirements as well. User interfaces are tested for user interactivity and flow of event to give smooth user friendly to the end users. Security testing is carried out to check whether any security issues are there with the system. The recovery testing is performed to ensure to in case of a failure or crash of a failure or crash system can be recovered, from the last successfully backup.

5.3 Scope of Testing

The scope of testing for the system will be limited to the items listed under the following three sections and crucial functionalities and the test layout are being indicated below Figure 5.1. The testing layout will be   carried out during the test cycles.

- Functional testing
- UI/Navigation testing
- Non Functional testing
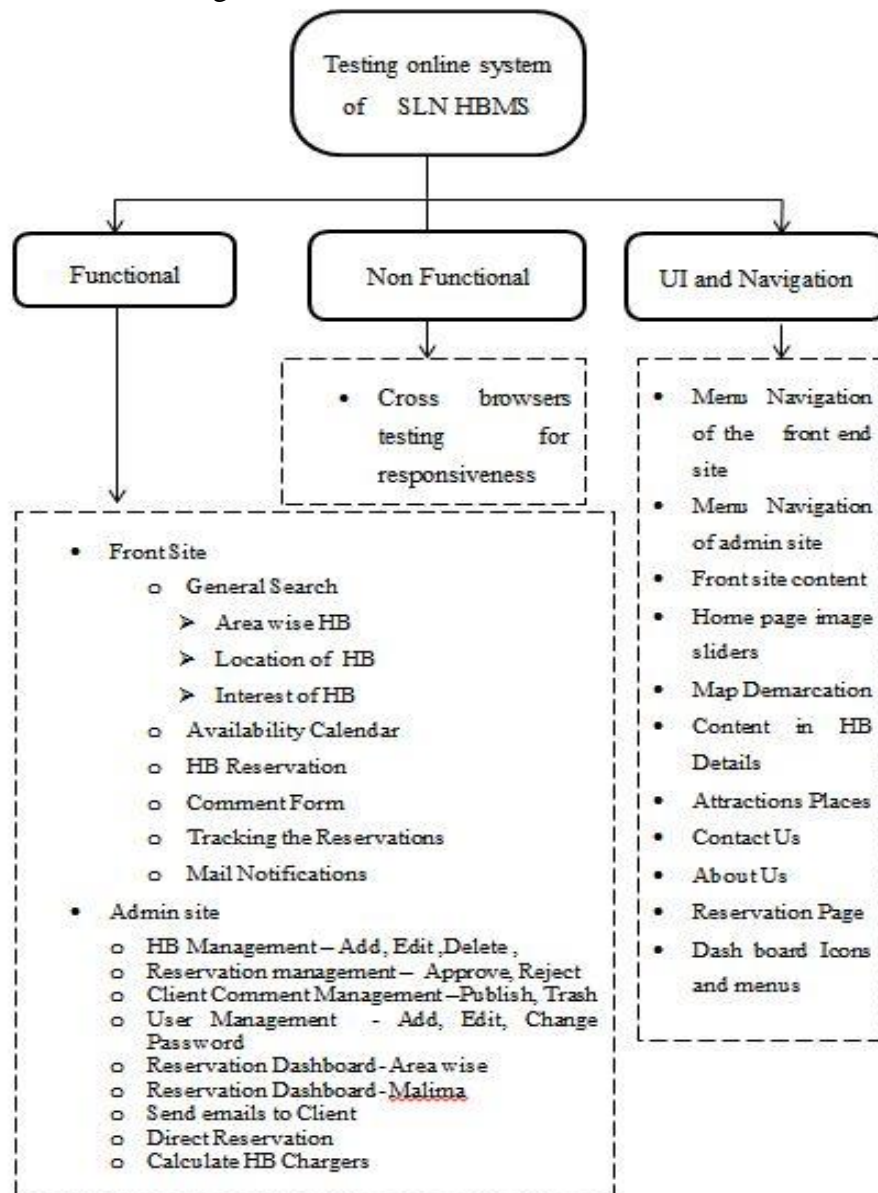
Figure 5.1 Testing Layout

5.4   Test Deliverable

The following table lists all the major deliverables that are planned to deliver during the testing phase.

Deliverable	Description	Delivery Date
Quality Assurance plan (QATP)	This describes the overall test approach and strategy.	15/03/2018
Quality Assurance test Cases (QATC)	The quality assurance test cases (QATC) document lists all the test cases which are used during QA testing. The QATC is not intended for unit test cases	05/03/2018
User Acceptance test Cases	Test cases to be used for UAT testing.	20/03/2018
Test Results	This summarizes the result of test case execution. it is used to understand progress of testing and the quality of the system	Produced at the end of system implementation.

Table 5.1 Test Deliverable and Delivery Dates

5.5   Test Strategy

Performed the manual testing on   whole Holiday bungalow management system. It is one of the oldest and very hard methods of software testing. But this testing strategy gives the best opportunity to check every page thoroughly and make sure it works in the expected manner. Due to the complexity of the various automation tools and the available time frame for testing, selected the manual testing strategy considering the fact that it is one of the best methods of testing suggested for a beginner.

5.6   Test Approach

This section describes the testing approach that was taken to test the whole Holiday bungalow management system. Following sections details the various testing approaches for each

functional and non – functional testing area. The whole web application will be tested under following criteria.

- Unit testing
- Integration Testing
- Smoke Testing
- System Functional Testing
- Regression Testing
- User Acceptance Testing

5.6.1 Unit Testing

Unit testing is done at the lowest level. It tests the basic units of software, which is the smallest testable piece of software, and it is often called "unit", "module", or "component" interchangeably. Unit testing refers to tests that verify the functionality of a specific section of code, at the beginning of function levels.

5.6.2 Integration Testing

Integration testing is any type of software testing that seeks to verify the interfaces between components against a software design. Normally the former is considered a better practice since it allows interface issues to be localized more quickly and fixed [17]. HBMS is tested with test data that made expected results.

5.6.3 Smoke Testing

The smoke testing is "Build Verification Testing", a type of software testing that comprises of a non-exhaustive set of *tests* that aim at ensuring that the most important functions work. The results of this testin*g* is used to decide if a build is stable enough to proceed with further testing [18].

The smoke testing validates below points.

- The database is properly configured for the system to function.
- Major functionalities are working as expected.

- System is ready for further functional testing.

5.6.4 System Functional Testing

The System functional testing commences upon satisfactory completion of the smoke test and it is the entry criteria for functional testing. Functional testing is done by creating and documenting the functional test cases to evaluate the correctness of the application. It is designed to ensure that all the functional requirements of the application are covered.

5.6.5 Regression Testing

A regression testing is performed in order to confirm that the changes and defect fixes do not adversely impact previously released versions of the application.

5.6.6 UI / Navigation Testing

UI and navigation testing assessed the User interface for adherence to requirements.

5.6.7 Browser Compatibility Testing

All the test cases documented in the test case document will execute only in Internet Explorer 10. 25% of the test cases which cover the smoke and the UI / navigation test cases will be executed in Google Chrome.

5.6.8 User Acceptance Testing

User Acceptance testing will commence on the successful completion of all the above tests. This testing is generally performed when the project is nearing its end. This test mainly qualifies the project and decides if it will be accepted by the users of the system. The users or the client of the project are responsible for the test. The following Table 5.2 checklist will be done during the system testing.

No	Functionalities	UAT
1	Validations	Yes
2	Error messages	Yes
3	Click on	Yes
4	Key press	Yes
5	Data filtering	Yes
6	Calculations on reservation request	Yes
7	Boundary values on reservation request	Yes
8	Login & Logout Admin and Candidate Users	Yes
9	Manage Admin user > User-Create, Update, Delete	Yes
10	Manage admin user > Change Password	Yes
11	Manage Content > HB Pages – Create, Update, Delete	Yes
12	Manage Content > Attractions Places – Add, Update, Delete	Yes
13	Manage Content > Image gallery – Create, Update, Delete	Yes
14	Manage Content > Comments – Publish, Trash	Yes
15	Reservation > Eligible List – Display	Yes
16	Reservation > Eligible List – Verification (in order to seniority)	Yes
17	Reservation > General Reservation – Approve, Reject	Yes
18	Reservation > Malima Reservation – Approve, Reject	Yes
19	Reservation > Direct Reservation – Approve, Reject	Yes
20	Reservation > Change Reservation – Approve, Reject	Yes
21	Reservation > Reservation summary	Yes
22	Reservation > Calculate HB Chargers	Yes
23	Reservation > Display the history of the previous reservations	Yes
24	Front Site > Sri Lanka Map> Area wise demarcation	Yes

25	Front Site > HB and Nearby Attraction (vice versa)	Yes
26	Front Site > Reservation request	Yes
27	Front Site > Availability Display on the Calendar	Yes
28	Front Site > Send comments	Yes
29	Front Site > Search contents	Yes
30	Admin > Create Users/Roles/Groups - Add, Update, Delete	Yes
31	Admin > Assign role rights/Modules - Add, Update, Delete	Yes

Table 5.2 Testing Results

5.7   Test Cases

Test cases were developed using various level of technology to achieve more effective and accurate testing. Software's can be tested in two ways, in another words, one can distinguish two different testing methods. Basically the system is tested with black box and while box testing methods Software faults can occur through many processes. If this defect is executed in certain software the system will produce wrong results. Therefor software testing plays a major role in any development. The results of this systems testing are displayed in a tabulate formed in Table 5.3 to Table 5.12. Also it describes the how test cases were generated, steps followed and the results of the test cases.

No: 01	**Test Case:** Front Site Client Login	
Test	Steps to follow	Expected Results
Successful login verification	Enter correct username and correct password	Display particular client profile page.
	Enter incorrect username or incorrect password	Error message and redirect to login page
	Attempt to login without user name or password	Error message and redirect to login page

Table 5.3 Client Login Screen Validation

45

No: 02	Test Case: Admin Login	
Test	Steps to follow	Expected Results
Successful login verification	Enter correct username and correct password	Display the main page according to user type
	Enter incorrect username or incorrect password	Error message and redirect to login page
	Attempt to login without user name or password	Error message and redirect to login page

Table 5.4 Admin Login Screen Validation

No: 03	**Test Case:** Admin manage>Create, Update, Delete user	
Test	Steps to follow	Expected Results
Add new user	Admin Create for new user with valid information	Successful massage and redirect to main page
	Admin Create for existing user with valid information	Error message and redirect to create user page
	Admin create with empty fields	Error message and redirect to create user page
Reset Password	Admin insert existing off no and then insert common password	Successful massage and redirect to main page
	Admin insert not existing Off no	Error message as" User is not exist" and redirect to update user page
	Admin create with empty password field	Error message and redirect to update user page
Delete user	Admin insert existing off no and delete existing user	Successful massage and redirect to main user page
	Admin insert not existing Off no	Error message as" User is not exist" and redirect to Delete user page

Table 5.5 Admin Manage Users

No: 04	Test Case: Admin user change password	
Test	Steps to follow	Expected Results
Change password	User change password with valid information	Shows successful massage and redirects to main page
	User change password with mismatch password	Shows error message and redirect to change password page
	User change password with empty fields	Error message and redirect to change password page

Table 5.6 Admin User change password

No: 05	Test Case: Admin user Add new HB	
Test	Steps to follow	Expected Results
Adding a new HB to the system	Enter new HB name have to fill the remaining details such as HB facility at the HB Form. Once crate the new HB page it should have to applied the nearby attraction places in order to particular HB by click the add places button. Then the distance should indicate in the text box which related to the HB	HB is added to the system. Display HB Successfully add Message and it appears on the web site too with indicate all facilities and nearby attraction places. Once click the particular place it is displayed the description of the place and the all the nearby HBs too on the web page.
	Enter existed HB name	Display error message "HB with <name> already exists" and redirect to HB Add page

Table 5.7 Admin User Add New HB

No: 06	**Test Case:** Admin user Add Nearby Attraction Places	
Test	Steps to follow	Expected Results
Adding a new Places to the system	Enter new place name into text box and sect the particular category which is belong to the places Once crate the new HB page it should have applied the nearby attraction places in order to particular HB from the add places button.	HB is added to the system. Display HB Successfully add Message and it appears on the web site too with indicate all facilities and nearby attraction places.
	Enter existed Place name	Display error message "The place <name> already exists" and redirect to Place Add page

Table 5.8 Admin User Add New Places

No: 07	**Test Case:** Front site Client Reservation Request	
Test	Steps to follow	Expected Results
Enter reservation dates (Check-in date / check out date)	Select appropriate HB by selecting proper Check-in date and check out date Enter Check-in date, 3 day's ahead on current date and check out date 4day's ahead on current date. (The HB must be available) (If particular HB has reserved in previously the Check-in date should be exceeded 30 days in order to particular HB) (Gap between Check-in date and check out date less than or equal 4 days.) (Check-in date should be less than or equal 30 days ahead on the current date)	Display successful message and the reservation request will be sent to particular admin to process. Further reservation status will be up dated in particular client profile.
	Select appropriate HB by selecting proper Check-in date and check out date Enter Check-in date, 3 day's ahead on current date and check out date 4day's ahead on current date. (But HB not available situation)	Display error message "You are unable to make reservation the HB due to already reserved"
	Enter Check-in date or check out date as past date on the both fields	Display error message "Enter proper date figures"
	Enter Check-in date as future date and enter check out date as Past date	Display error message "check out date must be greater than Check-in date "
	Keep the mandatory field in blank and proceed to next step	Highlight the mandatory fields

	Select Same HB check in date With in range of 30 days	Display error message "You are not entitle to reserved the HB Until-----(due date) "
	Enter Check-in date, 3 day's below on current the date and check out date 4day's below on the current date.	Display error message "You are unable to make the reservation during the your enter period. Please enter Check-in date 3 day's ahead on current the date and check out date 4day's ahead on the current date "

Table 5.9 Client Reservation Validation

No: 08	**Test Case:** Front site Client Check availability	
Test	Steps to follow	Expected Results
Check availability	Select relevant details from the three drop down boxes and press search button	Display allocation type at the text box and availability of the HB is displaying on the calendar
	Press the search button unless select the drop down boxes	Display error messages and highlighted the drop down boxes in red color

Table 5.10 Check availability

No: 09		Test Case: Front Site Add comment
Test	Steps to follow	Expected Results
Send the comments	Do a request with proper data filled in the form	Message display as "Successfully send the message" redirect the comment page
	Keep the blank field and press submit button	Highlighted the mandatory field and the form does not submit

Table 5.11 Add comment

No: 10		Test Case: NHQ Manager/ Area Manager HB Reservation
Test	Steps to follow	Expected Results
Preform Reservation	1. Once login to the system and click on the Booking approval tab.	Display the all pending approval list
	2. Click the Authorize button one of the pending approval	Display the message Successfully made the reservation and generate the booking ID. And system will send confirmation email to particular candidate.
	Click on the decline button with justify the reason	The approval again redirect to Sec page.
	Click on view button on each pending approval.	Display the all the rejected requester list belong the particular HB.

Table 5.12 NHQ Manager/ Area Manager HB Reservation

No: 11	**Test Case:** NHQ Sec/ Area Sec HB Reservation	
Test	Steps to follow	Expected Results
Preform Reservation	1. On reservation Dash board click the HB which is having the reservation request.	Display the request list sorted by the seniority order with the candidate user name and his duration (Check in date and check out date)
	2. Click on the top most requester.	Display the again requester list, if received another requests which are having overlap dates with the top most requester.
	3. Again click on the top most request	Display the requester reservation details. And his previous reservation details on the page. And display approval button and Reject button
	4. Press approval button	The top most request send for authorization to the Area Manager. And the overlap requests will be rejected by the system and update the status too. Non overlapped request which was along with the approved request will redirect to the reservation queue until the request count becomes the zero on particular HB. Once approve and reject the request HB reservation, the request counter will be updated.
	Unless reject the top most requester click the another request	Error message will display as "Pleas take action for the above request"

Table 5.13 NHQ Sec/ Area Sec HB Reservation

5.8   Evaluation of Work

User evaluation was carried out mainly to identify how much users are satisfied with the system. Deciding whether to go ahead with the project or not was depend on critical evaluation. Heuristic evaluation is an informal method of identifying the problems associated with the user interface. [19]. Jacob Nielsen's Heuristic Evaluation would be the based on   usability evaluation which will carry out with a sample of users by means of a carefully designed questionnaire which can be found in Appendix B. The sample size will be determined to evaluate the system. The evaluators have been provided to five levels of ratings as shown in Table 5.13.

Description	Ratings
Poor	1
Fair	2
Average	3
Good	4
Excellent	5

Table 5.14 Ratings

5.8.1 Determining the Sample Size

The Sample size to carry out this questionnaire will be determined by the expected response rate. The value will be assigned for each answer of the questioner. The questioner forms will distribute among 65 Naval personal as following Table 5.14.

SR	Users		Count
1	All the area commanders sectaries of Each Naval command (People who approve the reservation)	08x01	08
2	All the area admin of Each Naval command (People who manage users)	08x01	08
3	5 Nos client of each Naval commands to request the reservation and browse the web site	05 x08	40
4	5 Nos system users of Naval headquarters	05x 01	05
5	10 board of directors	10 x1	10
	Total		65

Table 5.15 Distribution list of Questioner

5.8.2 Analysis of the Feedback

All the feedback from the user evaluation questionnaire was entered into SPSS software to analyze results as indicated figure 5.2. Pie charts were used to summaries of the data to observe in pictorial form by to clearly distinguish between user responses each category which is represented in Appendix D. There are three main areas of the system studied out of above eight categories which are user friendliness, error handling and overall system feedback. Those three results are represented by the following bar chars from figure 5.3 to figure 5.5.

5.8.2.1 Sample date set in SPSS data sheet

Figure 5.2 SPSS Data Sheet

5.8.2.2 User friendleness of the system

In order to identify the user friendliness of the system four features were included in the questionnaire. Whether the system is easy to use, easy to navigate, usability of the interfaces and easy to learn the system. Figure 5.3 clearly shows more than 50 % of user have indicated above average level. Hence the user friendliness of the system can be assumed good level and individual result of the four independent variables results are indicated in Appendix D.
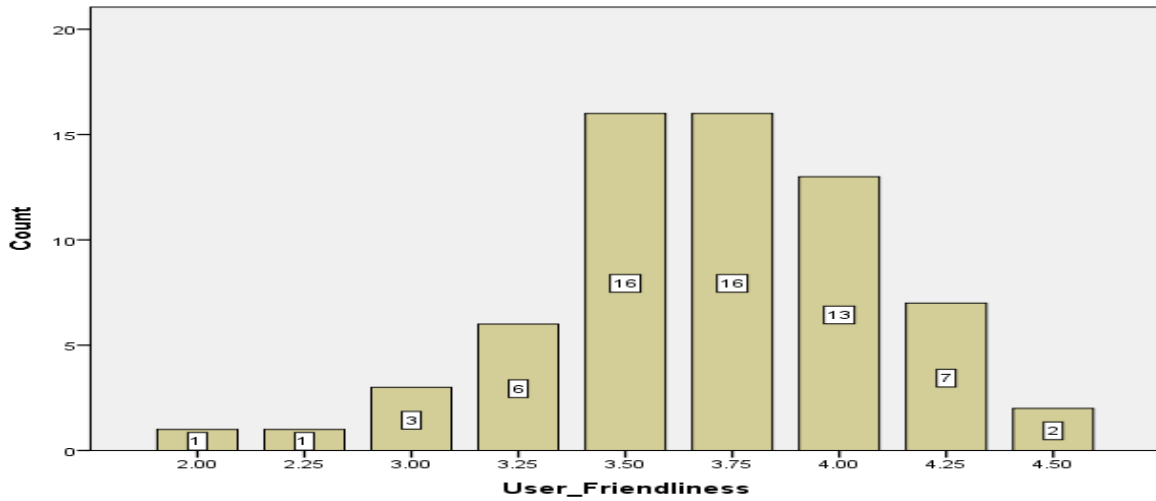
Figure 5.3 User Friendly

5.8.2.3   Error handling of the system

There are four indipendent veriables are used which is indicated in Figure 5.4 to get the mean values of the error handling results. It shows more than 75% of users have indicated above average level. Hence, it is assumed the errore handing level is sucessess.
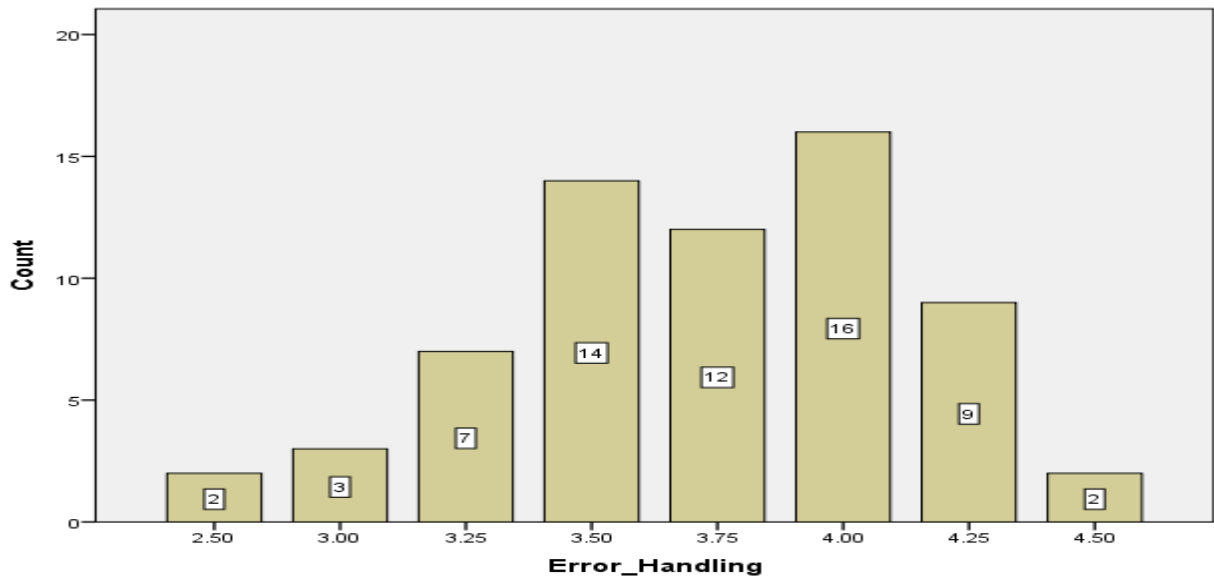
Figure 5.4 Error Handling

5.8.2.4   Assessment of the overall system

In order to mean values of the user friendliness of the system and error handling level of the system, overall system assessment are done from the combination of those two variables. The bar chart display more than 90% of users have indicated more than average level. Hence, it is assumed the entire system has achieved god level.
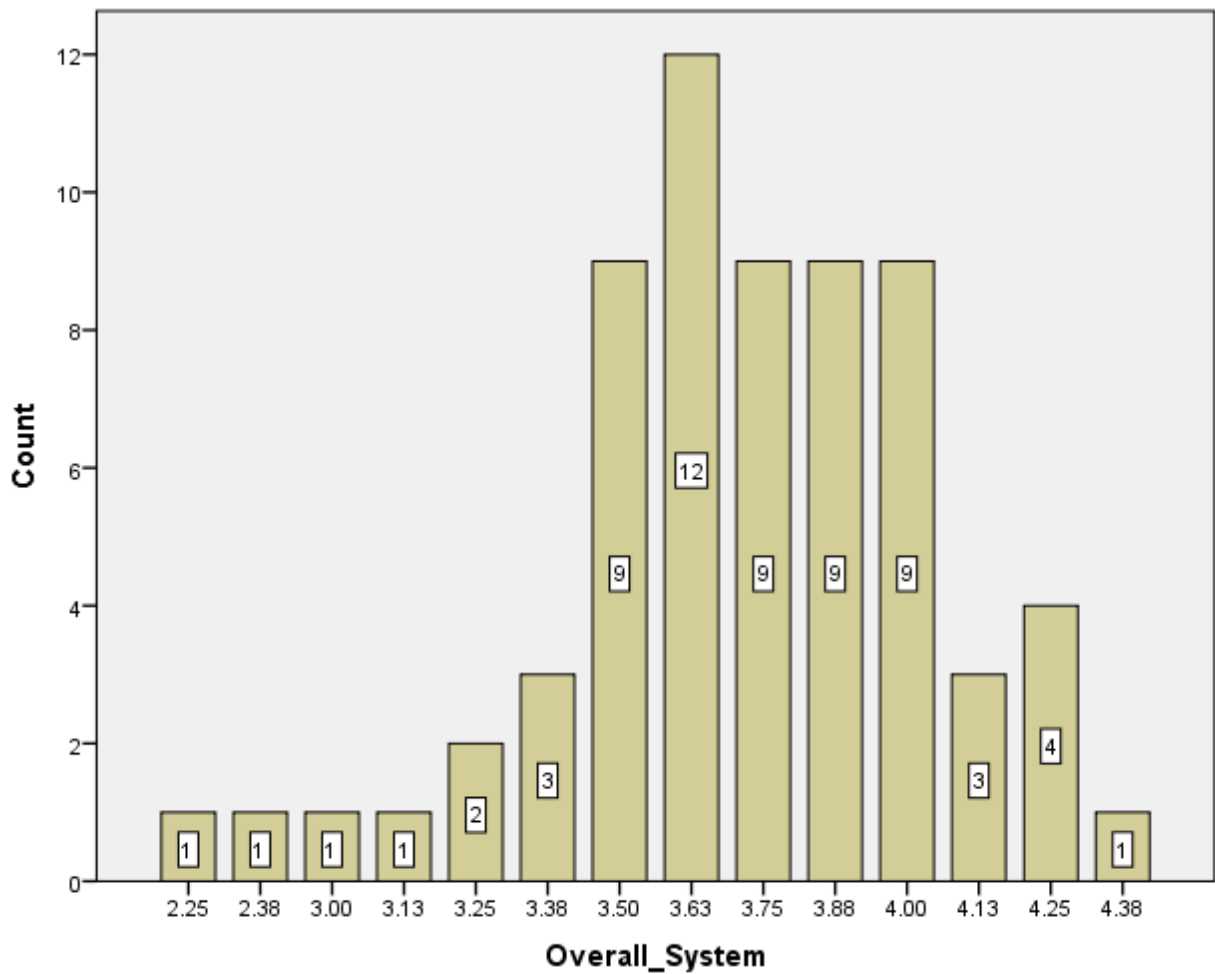
Figure 5.5 Overall System

Chapter 6 – Conclusion & Future Work

6.1   Conclusion

The goal of this project is to build a web based Holiday Bungalow Management System for Sri Lanka Navy, which will be installing on SL Navy Headquarters data center premises. It enables users to make the reservation from their work location through the SL Navy intranet connection. Further, this project is to aware the Naval personnel about Naval holiday bungalows and encourage them to visit those places. In order to establish the system successfully it requires having proper infrastructure in each areas and Naval Head Office. Internet   connection, dedicated server, power supply, computer with accessories and a resource person is mandatory to operate this system. Currently all these locations are being interconnected via SLT VPN.

The dissertation discussed the design and implementation of this system by using conceptual methodology. During the design and implementation of this system had to undergo many challenges. Dealing and understanding the end user requirements was a major concern. Time to time they tends to change their requirements. Even though there are many existing components available in the market they do have lots of restrictions in those modules. As mentioned in the literature reviews there are some open source components available for this type of reservation systems, it is unable to apply the end user requirements, due to the complexity of reservation criteria.   Therefore system was developed from the scratch according to the requirements by using web programming languages. So, had to go through a detailed learning of PHP, java Scripts, Ajax, Html & My SQL databases.

The system was unit tested properly during the development stages. It helped to reduce the number of defects in the final product. However while the implementation was in progress, errors that were not anticipated in the testing plan cropped up. Those errors would have to fix   when emerged in the system.

6.2   Future Work

Reservation and browse from internet is more beneficiary to the client, so that it will make the task easy. But presently this holiday bungalow management system will be running only through SLN VPN. It is proposed to develop the system even accessible to the public   by applying the security measures. Further due to policy decisions, Malima Holiday bungalows have not been allowed   perform   online reservations by the civilians though it has been allowed for manual reservations. It is better to develop the current system   accessible to   public civilians making online reservations to Malima holiday bungalows by implementing payment gateway

Up to now, there is no redundant server available. Therefore in case of a crash, it requires system down time. The system backups can be used to recover the system. But to minimize the downtime it is possible to host the system in some other server as well. Create mobile application for this reservation system is another aspect that developers can work on. In modern era mobile applications are very common and most of the users prefer to use smart phones. So developing a mobile application will definitely beneficiary for the users.

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         side+scripting+language+for+creating+interactive+web+sites.+In+web+development+PH
         P+code+can+be+easily+embedded+into+HTML+code.+PHP+is+often+used+with+apache
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Appendix A – Comparisons of Simmiler Systems and Alternative Technologies

Name	Description	Pros	Cons
QLO	This booking engine enables hotel owners to create their own booking site with a variety of features to help differentiate your hotel from the rest of the pack.	This solution can translate your site into multiple languages so you can reach and advertise your property to international guests.	there is no security component to the software
Soldiers	designed for Joomla and WordPress users, and promises the advantages of customizability, interoperability, and flexibility.	ability to support multiple currencies, Google Maps integration so guests can be easily directed to your location	only works for Joomla and WordPress users

Upbooking	upbooking is a sub-brand of Ma-No Web Design & Development, a website design, development, and internet marketing agency with 15 years of experience in the industry.	users can also define conditions for room cancellations and view site-visit stats and reservations made with conversion rates	only goes up to three hotel properties and three different types of rooms, unique hotels with varying room types may have to find a solution with more customization
Sagenda	free WordPress plugin great for the small hospitality business working with a suite of low-cost products. The developers make their profit off of customizable versions of the plugin for larger businesses	includes a dashboard and personalized emails so if WordPress is your thing, this is perfect	However it has garnered some great reviews on WordPress' plugin directory and is still being updated frequently

Freetobook	freetobook not only has online booking features, but also some nice extras like special offers, customer reviews, and SEO. The prices come in when you're looking at add-on features like integration with Booking.com and a mobile website.	definitely designed with hospitality in mind, and the add-on features are very attractive, besides making it a scalable solution	It looks like the site hasn't been updated in awhile and online payment is one of the "Plus+" features
Skedda	this is good for small hospitality businesses. Online support is offered through their knowledge base and email.	Skedda looks very easy to pick up and use, and the ability for customers to login with a social account is awesome	The lack of online payment features

Appendix B - Questioner form

Ratings

1. Poor   ★

2. Fair   ★★

3. Average   ★★★

4. Good   ★★★★

5. Excellent   ★★★★★

Description	Ratings (Fill with the number)
Easy to Use	
Errors Clearly Described	
Easy to Navigate	
Response Time	
User Interfaces	
Security	
Maintenance	
Easy to Learn	
Comments	
Name (Optional)	
Contact No – (Optional)	

Appendix C – Use case Narratives

1.   Use Case narratives -Login

Use Case Name :	Login
Use Case ID :	UC 01
Objective :	Logging to the system
Pre Conditions	User must have username and password to login the system
Success End Condition	System will create user interface and stores all relevant user details in that user instance.
	User name and user type is saved in the session
Fail End Condition	System given error message
Actors	All Users, Mail Server, HRIS System
Main Scenario	This use case starts when all users going to login to the system
	System displays a form to enter User name and Password
	Mail server will verify the user's credentials
	Once Mail server verified the user then obtains his details and display in interface through the HRIS System.
	User name and user type is saved in the session.

Use Case narratives -Login

2. Use Case Narratives – View Available bungalow

Use Case Name :	View Available bungalow
Use Case ID :	UC 02
Objective :	Check the availability of HBs
Pre-Conditions	User required to login in to the system
Success End Condition	Display the successfully send message
Fail End Condition	Not relevant
Actors	All Users
Main Scenario	Select the HB type
	Select the HB area
	Select the Bungalow
	Display the availability of the HB on Calendar

Use Case narratives - View Available bungalow

3. Use Case Narratives- Request Reservation

Use Case Name :	Request Reservation
Use Case ID :	UC 03
Objective :	User send the HB reservation request to the system
Pre-Conditions	User required to login in to the system before perform the reservation request.
Success End Condition	Display successfully send message and create booking reference number
Fail End Condition	Max Allocation days less than or equal 4 days
	Availability of the HB
Actors	Candidate User, Mail Server, HRIS System
Main Scenario	Once logged in to the system display the user profile
	Select the HB area on drop down list
	Select the Bungalow on drop down list
	User has to enter the all the required details on provided web form
	Press submit button.

Use Case narratives- Request Reservation

4.   Use Case Narratives- Eligibility List

Use Case Name :	Eligibility List
Use Case ID :	UC 05
Objective :	Sort all the requests in order to applicant's Seniority
Pre-Conditions	NHQ/Area Sec is required select the particular HB
Success End Condition	Sort the applicant's list and display on the form
Fail End Condition	1. Not selected user requests list will keep on the queue until the selected user cancel or amend his request. 2. All not selected user requests list will delete from the queue when exceed the request date.
Actors	NHQ/ Area Sec, HRIS System
Main Scenario	NHQ/ Area Sec click the particular HB on the dash board All request with respective the HB interact with the HRIS system. The HBMS generate the sorted list in order to requester seniority The Sorted list display the reservation form

Use Case narratives- Eligibility List

5.   Use Case Narratives- Authorize all the type of request

Use Case Name :	Authorize all the type of request
Use Case ID :	UC 06
Objective :	Perform the all the allocation authorization of the HBs
Pre-Conditions	NHQ/Area Sec required completed the all approve or decline of requests
Success End Condition	System will generate the HB allocation reference number and send Email to that particular user to say confirm the reservation
Fail End Condition	Not agree with the previous level decision
Actors	NHQ/ Area Manager(Administrator)
Main Scenario	Logged in to the system and press the reservation request button
	Display all the pending authorization requests list on the Dash board
	View the details of the request.
	If manager agree with the previous level decision authorize it or decline the request with comments.
	All the statuses are informed to the users via Email through the system

Use Case narratives- Authorize all the type of request

6.   Use Case Narratives- Add New User

Use Case Name :	Add New User
Use Case ID :	UC 07
Objective :	Create all type of users
Pre-Conditions	System admin should have successfully logged in to the system and has added the user role and user group to the system
Success End Condition	System will generate the new user account
Fail End Condition	If entered existing user name
Actors	System Administrator
Main Scenario	Once logged in to the system it required to enter new user name and password for the new user account
	Then should have to select the particular role and the group from the drop down boxes.
	Finally add the related users' official number and his particular area.

Use Case narratives- Add New User

7. Use Case Narratives- Assign Roles and Rights

Use Case Name :	Assign Roles and Rights
Use Case ID :	UC 08
Objective :	Assign the roles and rights to user accounts
Pre-Conditions	System admin should have successfully logged in to the system and has created new user account
Success End Condition	System will provide to access the privileges by new user account
Fail End Condition	If a user account has given same roles and rights
Actors	System Administrator
Main Scenario	Once logged in to the system it required to enter new user name and password for the new user account. Then have to select the particular role and the group from the drop down boxes. Finally add the particular user's official number and his particular area.

Use Case narratives- Assign Roles and Rights

8.   Use Case Narratives- Add/Edit/Delete HB

Use Case Name :	Add/Edit/Delete HB
Use Case ID :	UC 09
Objective :	Add, Edit, and Delete the Holiday bungalows and enter details of the facilities and nearby attraction places.
Pre-Conditions	User has to login to the system and the nearby attraction places should be entered in order to
Success End Condition	The entered HB and its facilities/nearby attractions display on the website.
Fail End Condition	If entered the same name of the existing HB
Actors	NHQ/ Area Manager(Administrator)
Main Scenario	Once logging to the system, it is required to press the "Add & Edit HB" menu at left side of the page.
	Then blank HB details form will appear.
	Once successfully fill the HB details form the submit button should have press.
	The entered HB name with add place button will display in a below section of same page.
	Once press the add place button and have to select nearby attraction places will enter the distance between HB and the place.
	Press Submit button.

Use Case narratives- Add/Edit/Delete HB

9.   Use Case Narratives- Add/Edit/Delete Places

Use Case Name :	Add/Edit/Delete Places
Use Case ID :	UC 10
Objective :	Add, Edit, and Delete the nearby attractions places
Pre-Conditions	User has to login to the system
Success End Condition	The entered nearby attractions will display under relevant category. Once click the link on the attraction place then nearby HB are displayed with the distances
Fail End Condition	If entered the same places
Actors	NHQ/ Area Manager(Administrator)
Main Scenario	Once logging to the system, it is required to press the "Add Places" menu at left side of the interface. Then appeared two blank text boxes appear to enter the place and description. Further, it requires to select the category of places and the related image of it . Finally press the submit button.

Use Case narratives- Add/Edit/Delete Places

Appendix D – Activity Diagram

1.   User Management

1.1   Activity Diagram for Login
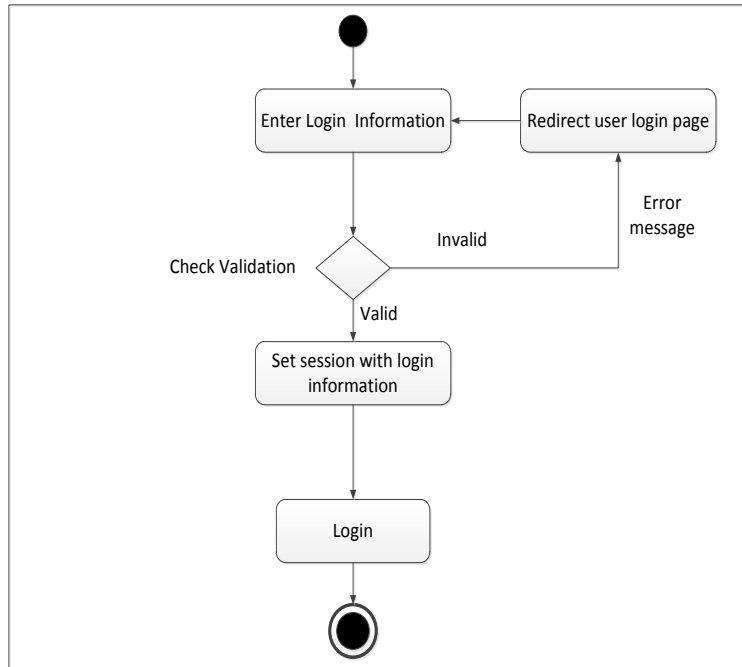
1.2   Activity Diagram for logout
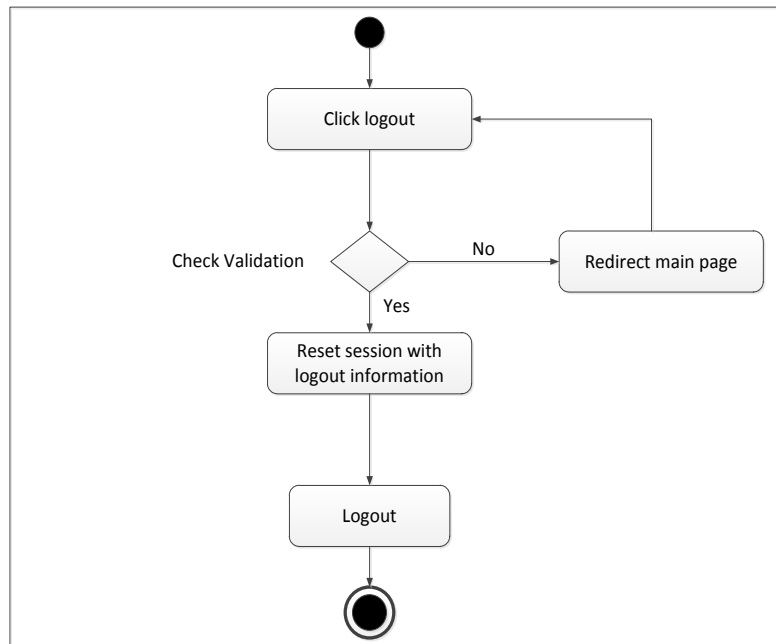
1.3   Activity Diagram for create user
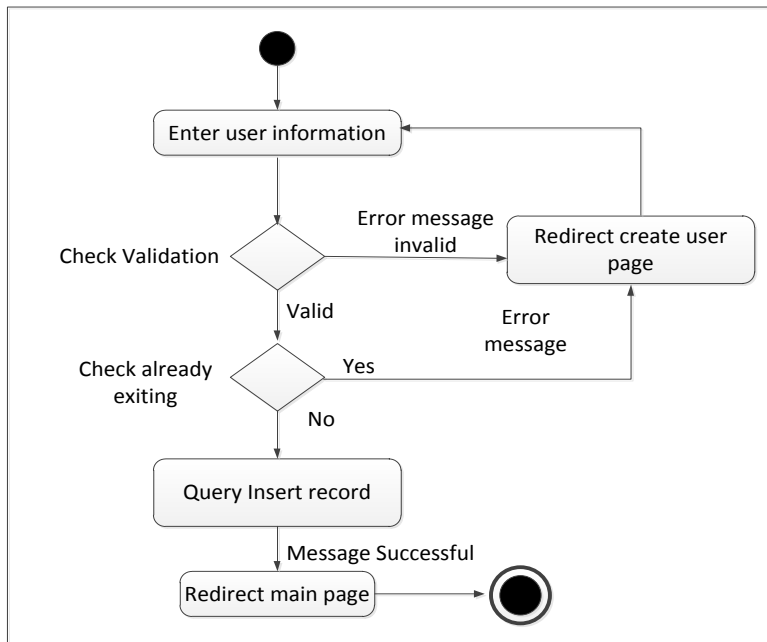
1.4   Activity Diagram for Edit a user
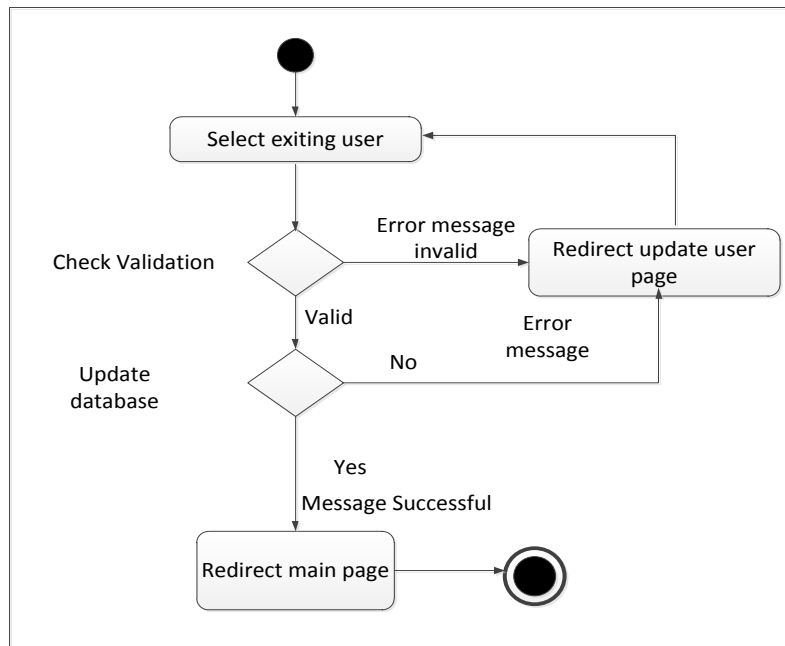
1.5 Activity Diagram for Delete user
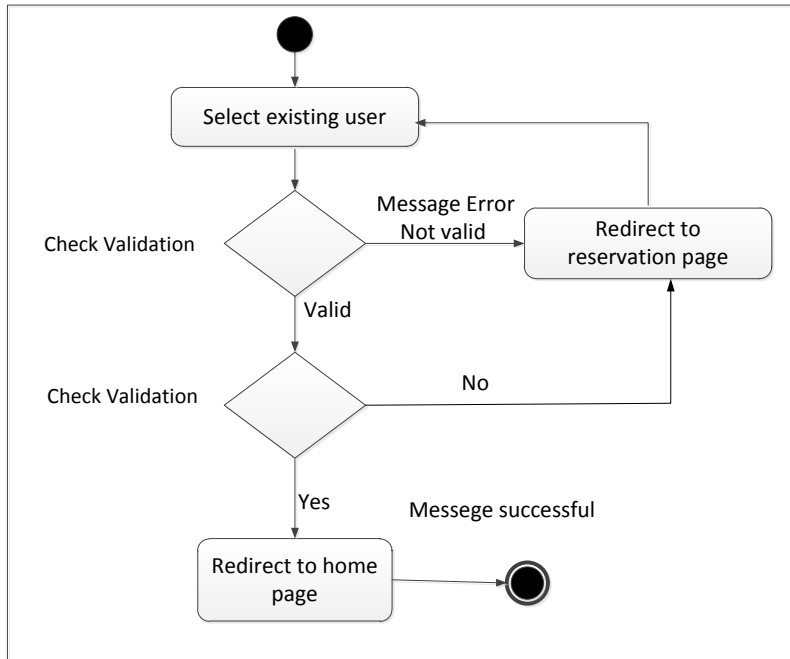
1.6 Activity Diagram- Change password
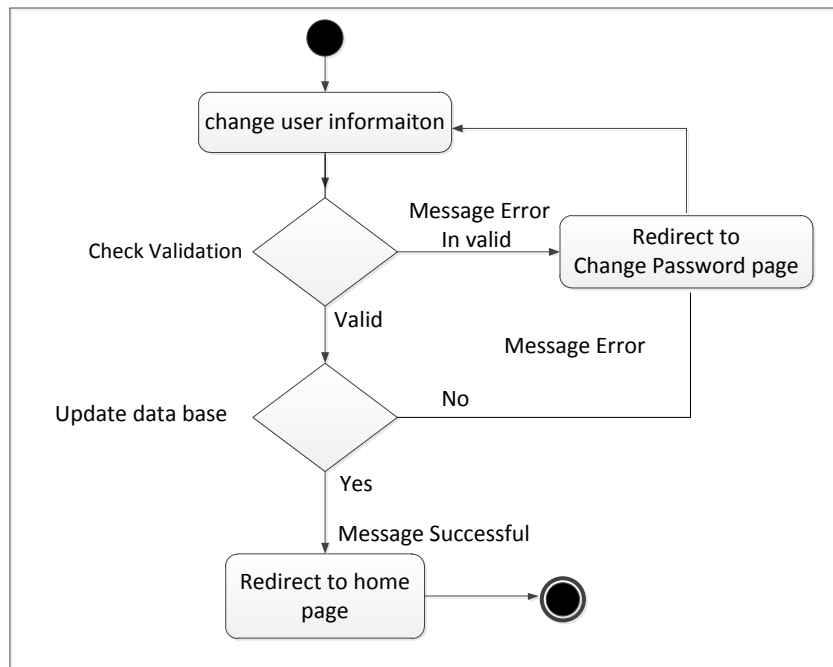
2. Holiday Bungalow Management

2.1 Activity Diagram for Add Holiday bungalow
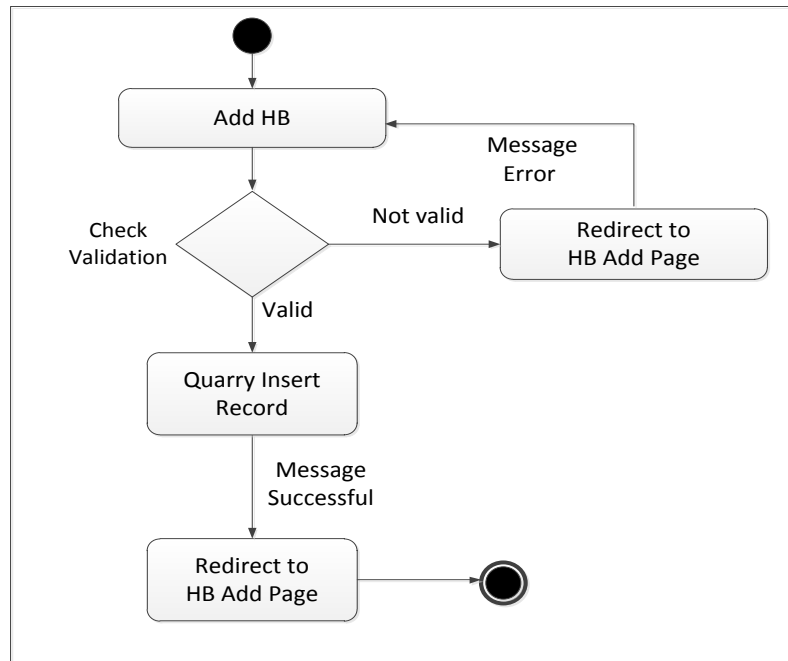
2.2 Activity Diagram for Edit Holiday bungalow
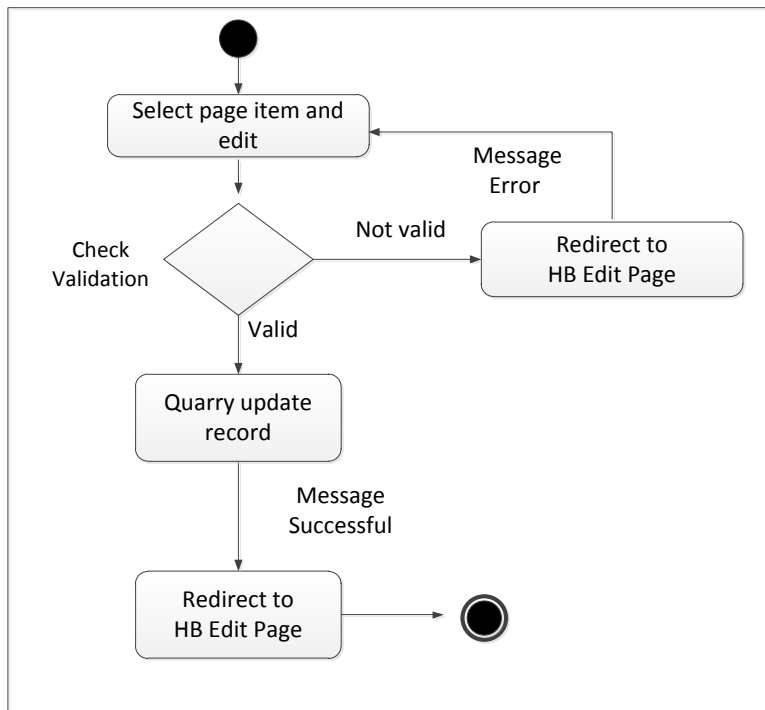
2.3 Activity Diagram for delete HB page
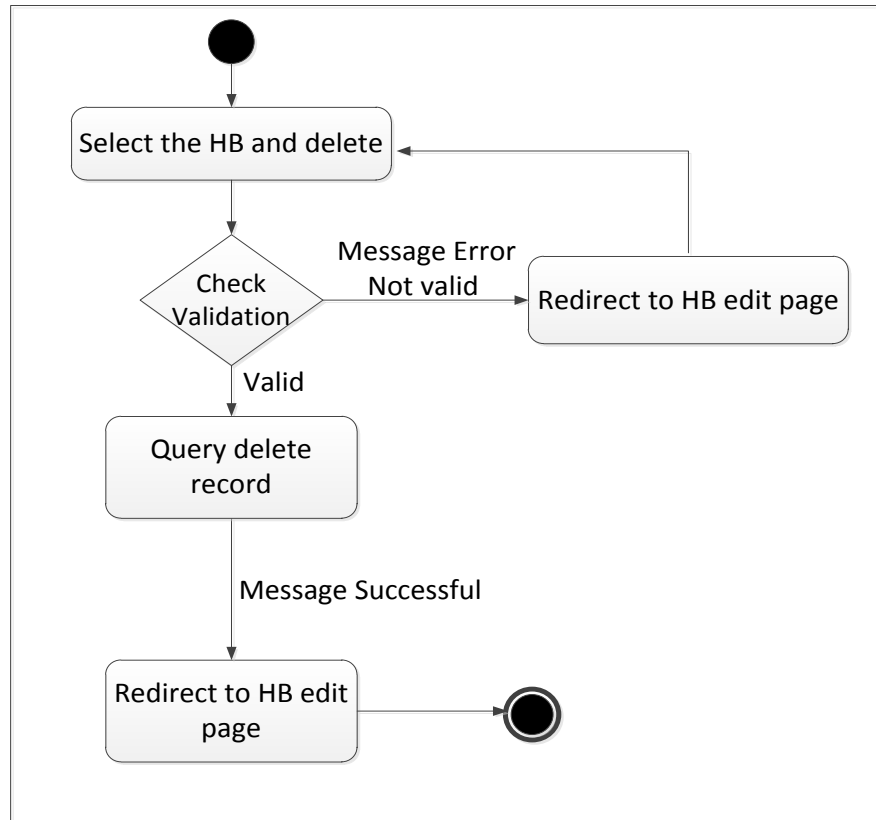
3. Reservation Management

3.1 Make reservation by candidate user
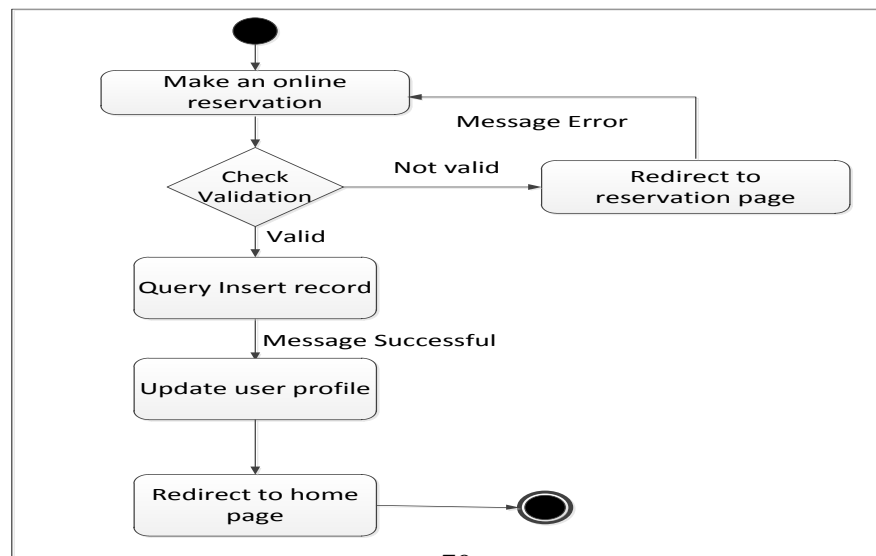
3.2 Activity Diagram – General reservation
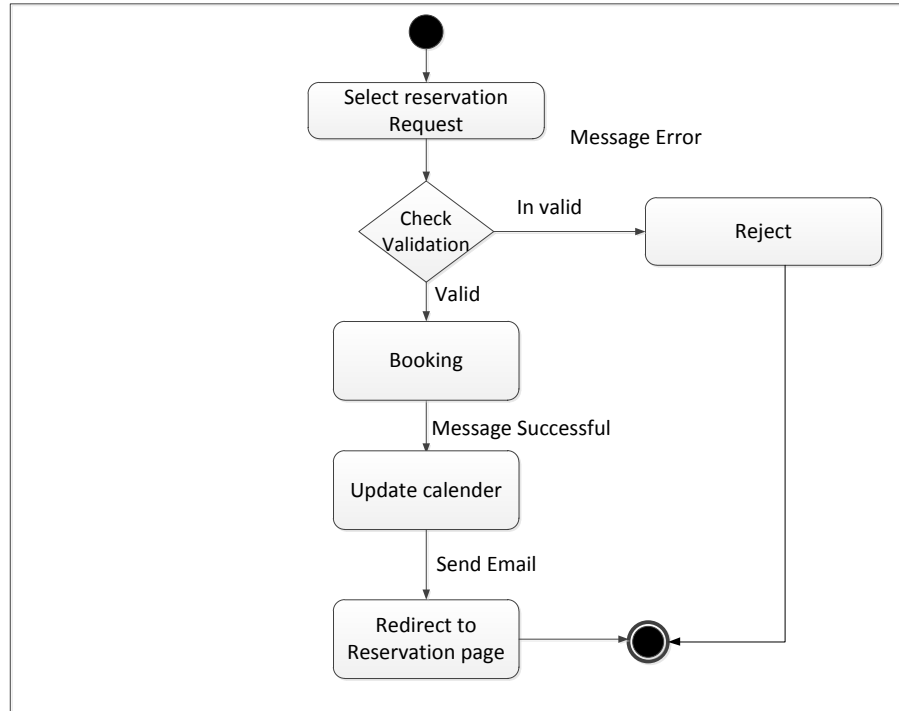
3.3 Activity Diagram for Edit General Reservation
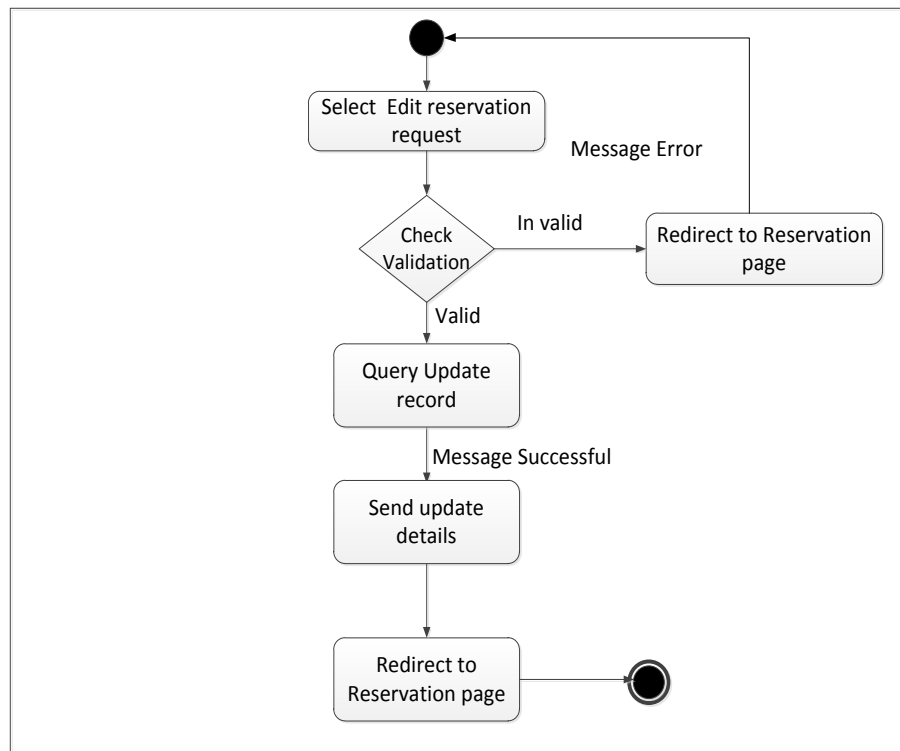
3.4 Activity Diagram for reject reservation
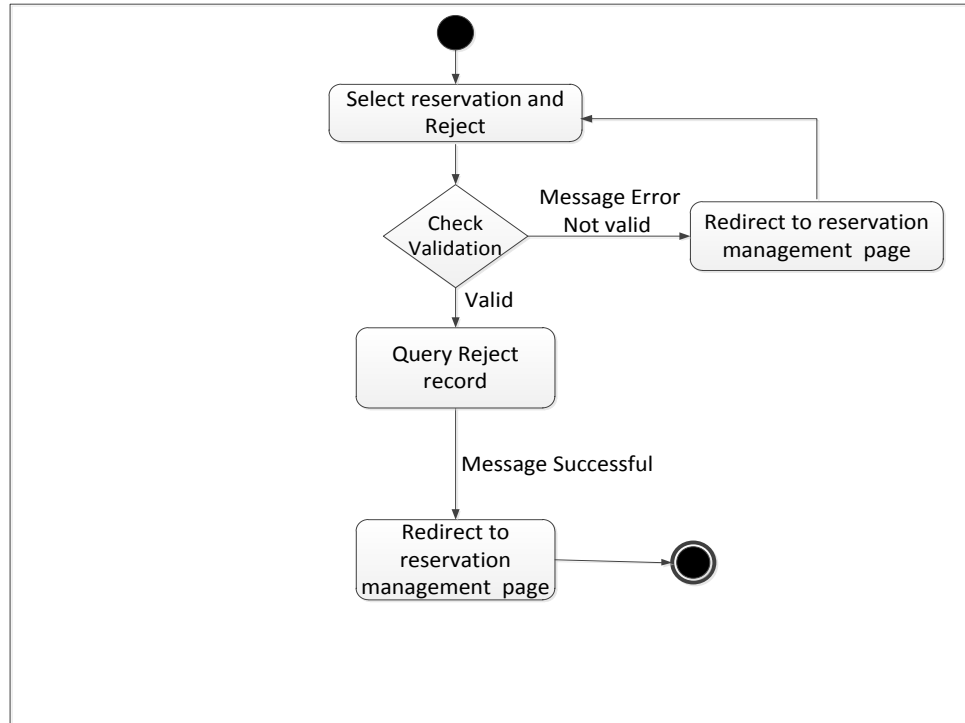
3.5 Activity Diagram for Direct Reservation
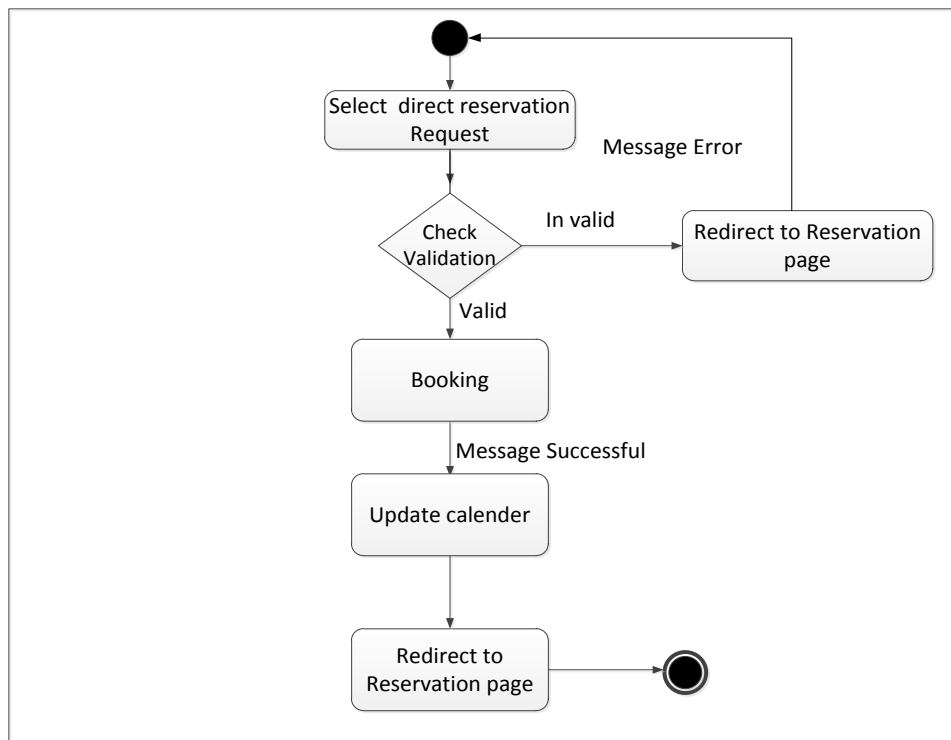
Appendix E – Individual results of respective questions

1.   The System is easy to use
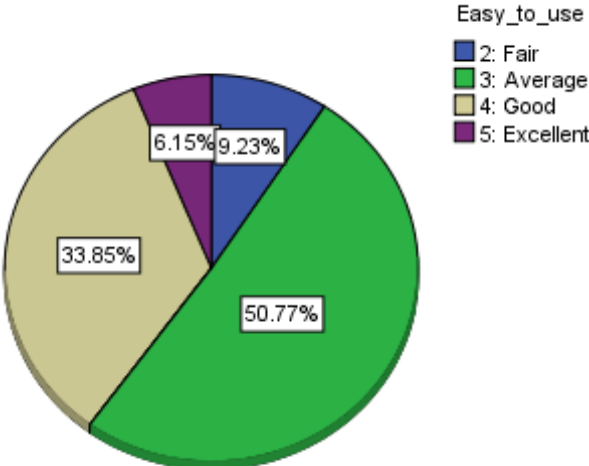
2.   The System pages are easy to navigate
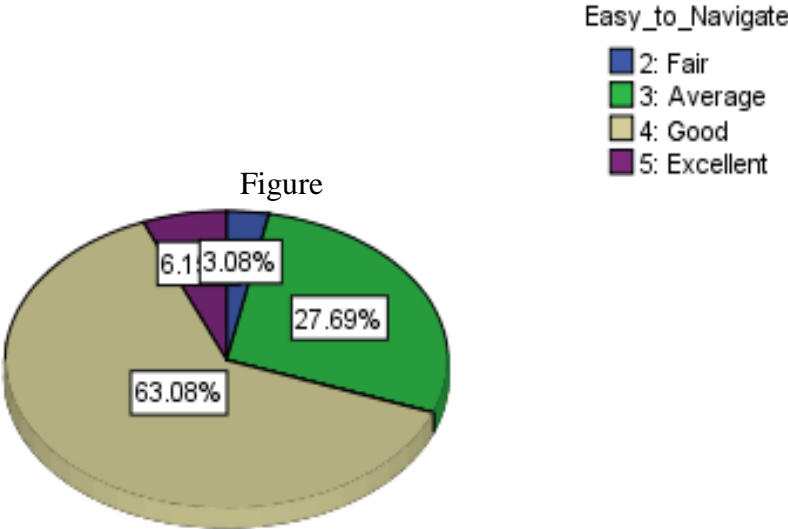
3. The System errors are clearly describe
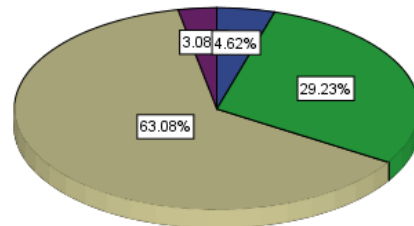
3.08 4.62%

29.23%

63.08%

4. Usability of the Interfaces

3.08%

23.08%

32.31%

41.54%
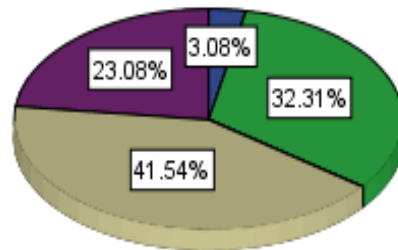
5. The error response time of the system

6. The Security of the system

84

7. Maintenance of the system

Maintenance
- 2: Fair
- 3: Average
- 4: Good
- 5: Excellent

9.23% 4.62%

23.08%

63.08%
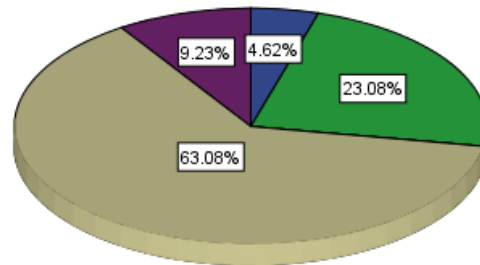
8. Easy to learn the system

Easy_to_Learn
- 2: Fair
- 3: Average
- 4: Good
- 5: Excellent

16.92% 4.62%

27.69%

50.77%
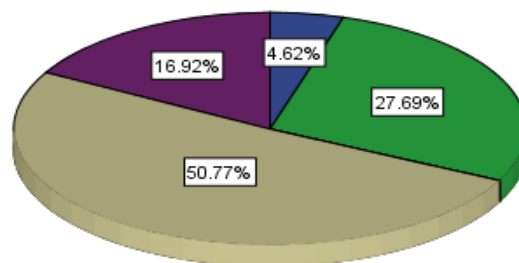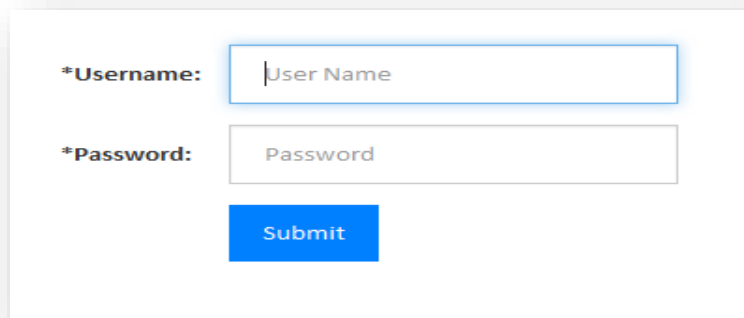
Appendix F – User Training Guide

This user guide contains instrctions how to do operation with this system. It has designed to improve the qulity of a task performing. After following this guide user will be able to gain the hands on experience with this system.

1. Admin users Operations.

To perfome the administrative activites it is required to use "**hbms.navy.lk/admin"** URL to login as admin. Pre define usename and password has been provided by the system adminstrator. Once login the admin paneel by given credintilas then the admin users can change their password   as they wish.

1.1 Login Form

Once sucessefully logged in to the system following Admin pannel display
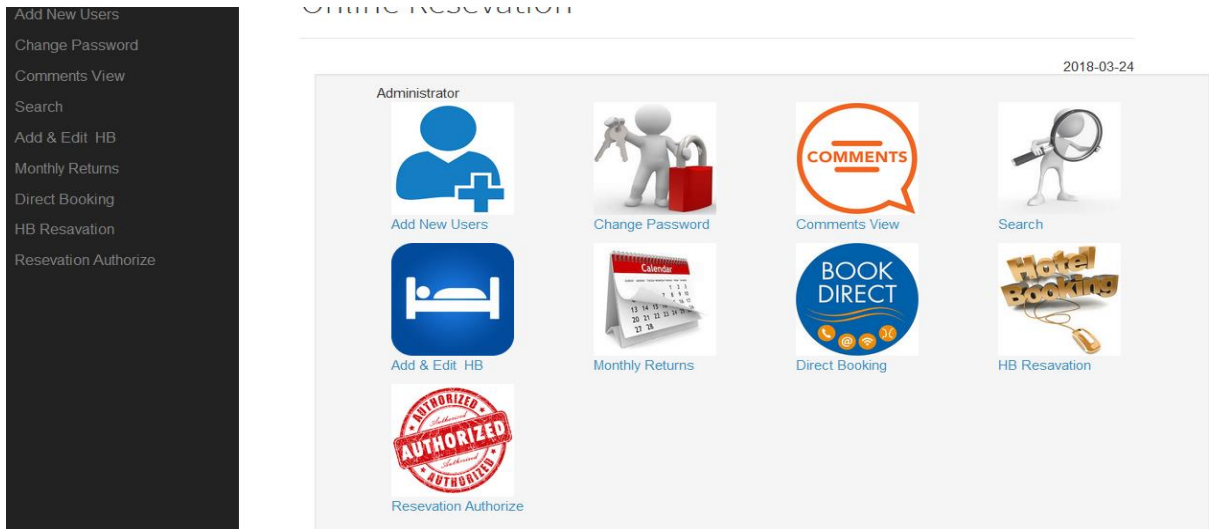
1.2 Change Paasword

Click on Chang password icon or left side menu in User admin pannel folloing form will display.

1.3 **Add New User**

Click on Add New User icon or left side menu in User admin pannel folloing form will

display

1.4 **Edit User Account**

Go to Add New User page click on Edit button in exsisting user pannel as indicated below

Update following form and click on the Update User button

1.5 **Add and Edit HB**

Click on Add and Edit HB icon or left side menu in User admin pannel follwing form will display.

HOTEL ALLOCATION DETAILS

HB Name: *

HB Area : Select Area

HB Type : Select HB Type   Malima :

Authorizes By : Select Area   Max Rooms : Max Rooms

Allocation : Select Allocation   Amount : Amount

HOTEL FACILITIES DETAILS

Number of Bed Rooms :

Number of Beds :

A/C Available : --Select--

Attached Bath room :

Furniture :

Living room :

Kitchen :

Resturant & Bar : --Select--

Transport :

Map Code :

Images : Browse... No files selected.

Type Bungalow details and facilities

Select the HB Images (max 6) nos Images name has to rename as 1,2,3,4,5,6

Click submit

Submit

1.5.1 Link Nearby Attraction places to the related HB

    i.   Select Place category on Drop down box
    ii.   In place visit drop down box will be selected in order to selected place category
    iii.   Type approximate distance which related to HB on the text box
    iv.   Click Add Rows button to add more places
    v.   Click Submit button.

1.5.2 Add Rooms for the Malima HB
It has to complete following three steps to add rooms for Malima HB

Add Rooms - 100/SOHB/1

Hb Code	Room Code	Room Charg	Status Code		
100/SOHB/1	100/SOHB/1/101	4		✏	✕
100/SOHB/1	100/SOHB/1/102	4		✏	✕
100/SOHB/1	100/SOHB/1/103	2		✏	✕
100/SOHB/1	100/SOHB/1/104	2		✏	✕
100/SOHB/1	100/SOHB/1/105	2		✏	✕

Click on add room link to add new room details

Click on Icon to Edit

Delete room

Once click on the Add Room link on above form then following form will display.
It is required to fill the room no and the room charges.

back to main page

100/JOHB/1

100/JOHB/1/(Room Number)

Room Charg

SAVE

Click save new room details

On completion of the add HB activates on the above forms, following web page would be displayed.

1.6   Add Nearby Attaction Places to the web page
Click on Add Places icon or left side menu in User admin pannel follwing form will display

    i.   Type the Place Name on text box
    ii.   Type the Description related the Place on text box
    iii.   Select Place category on Drop down box
    iv.   Select the area which related to the place on Drop down box
    v.   Click Browse button and add the Image.
    vi.   Click Add Rows button to add more places
    vii.   Click Submit button.

On completion of the above task the web site would be updated as follows

Click on Your interesting area

If select the beaches and the activites the web page will display all the beaches and activies of all areas as shown on the below Imege.
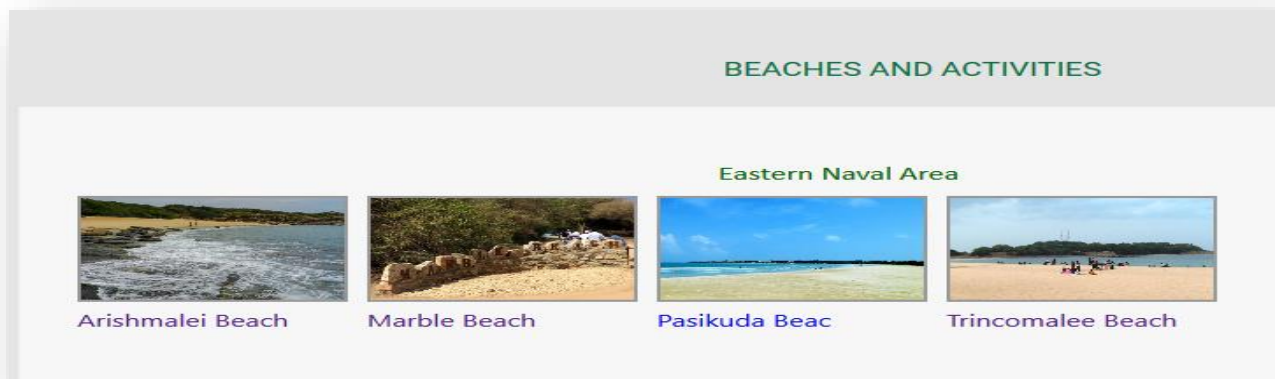
1.7 HB Resevation

i.   Suppose user has logged in as NHQ Sec and click on HB Reservation Icon on his admin Panel following admin reservation page will display
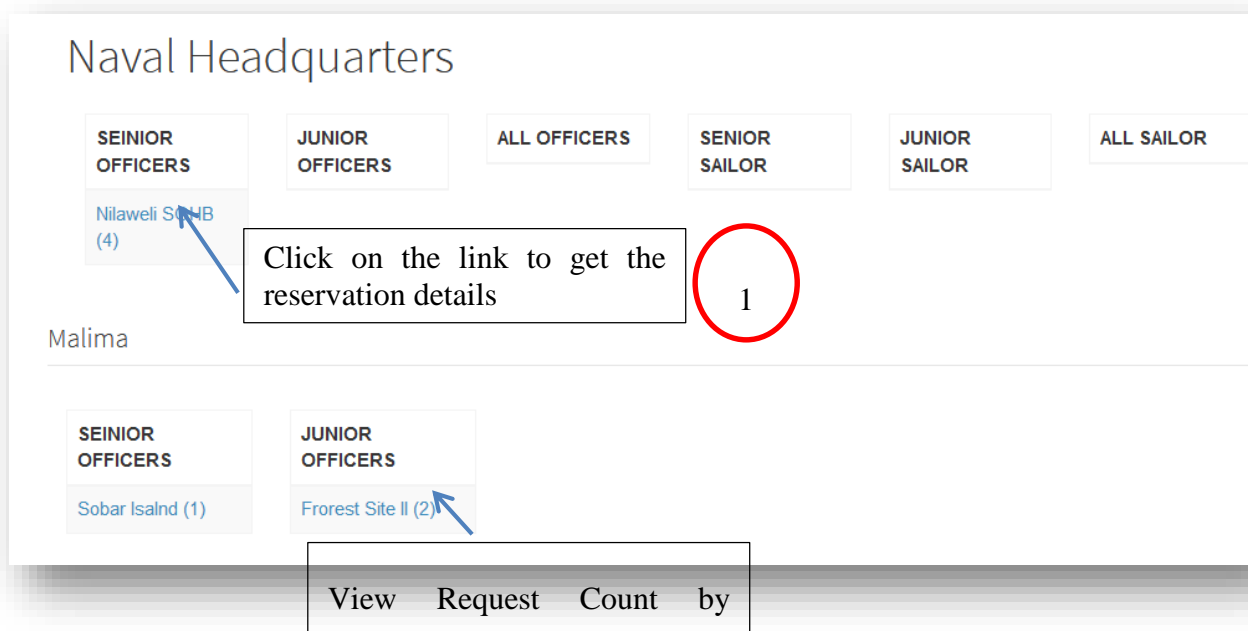
ii   Once Click on the Nilaweli HB on above reservation page, Following Candidates list will   display as sorted in order to seniority of the requesters

Capt TGM Weerarathne (2018-03-22/ 2018-03-23)
Capt MHCJ Silva (2018-03-18/ 2018-03-21)
Cdr TP Deegala (2018-03-21/ 2018-03-23)
Cdr EKUK Indika (2018-03-24/ 2018-03-25)

2

iii   Has to click top most requester, then following list will display as sorted requesters who are having overlapping date in order to same HB

Capt TGM Weerarathne
Cdr TP Deegala

3

iv.   Click on Top most requester again and following Details will display. Once click the approval the request goes to authorization level at manger login.

Request Id: REQID/O/201803191037

Official No.: 585

Name: Capt TGM Weerarathne

E-mail: tgm-weerarathne@navy.lk

Contact No: 114941246

Check In: 2018-03-22 Check Out: 2018-03-23

History Guest
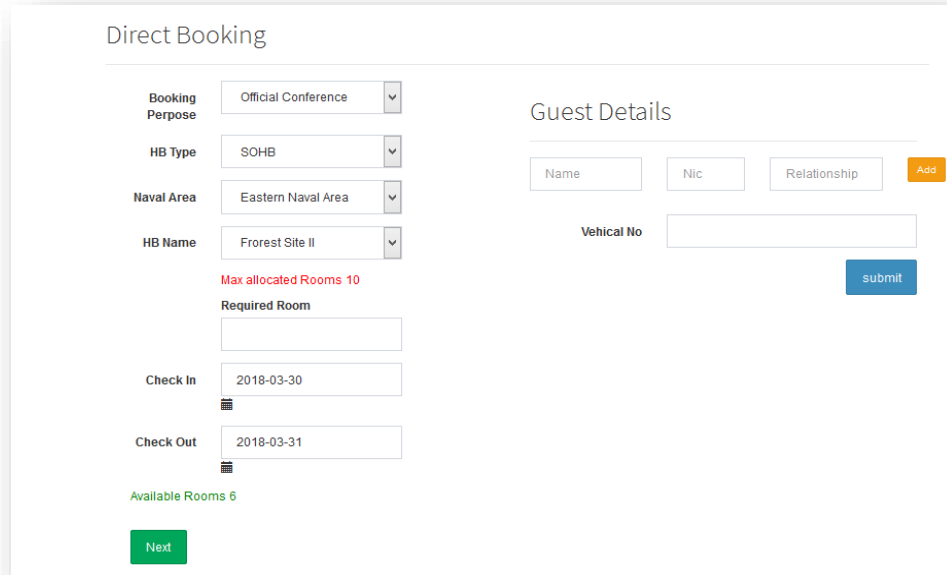
Approved

View gest details and View   Applicant History

4

1.8 Direct Resevation

Click on Direct Resevation icon or left side menu in User admin pannel follwing form will display

1.9 Search HBs list(reserved and Vacant)

Click on Search HB icon or left side menu in User admin pannel follwing form will display

Select the drop down boxes and file the duration then prticuler result wil display as follows

1.10 Direct Cancelation

Click on Direct Reject icon or left side menu in User admin pannel follwing form will display

Search request

HB Type — SOHB

Naval Area — Eastern Naval

HB Name — Frorest Site II

HB Allocation — CAPT and A
Max allocated Rooms 10

Required Room

Check In — 2018-03-16

Check Out — 2018-03-18
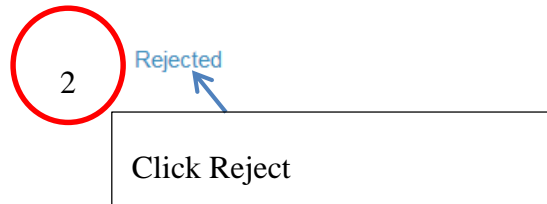
Request Id: REQID/O/20180316343

Official No.: 5652

Name: LT MDS Janapriya

E-mail: mds-janapriya@navy.lk

Contact No: 718673908

Check In: 2018-03-16 Check Out: 2018-03-18

2 — Rejected

Click Reject

request_id	off_no	e_mail
REQID/O /20180316343	5652	mds-janapriya@navy.lk

Display the requested list by the given criteria

1 — Click link to get request details
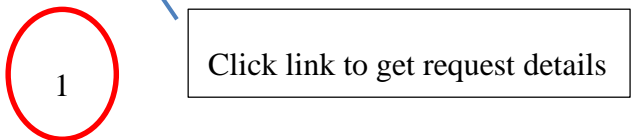
1.11 Comment Manegment

Click on Comment View icon or left side menu in User admin pannel follwing form will display.

Comments view

DELETE
CONFIRM
kamal
2018-01-18 09:58:54

Dear Guest, Thank you very much for taking the time to review our Savoy Hotel Berlin. We constantly work on improving our guests' satisfaction; therefore, your feedback, positive or negative,
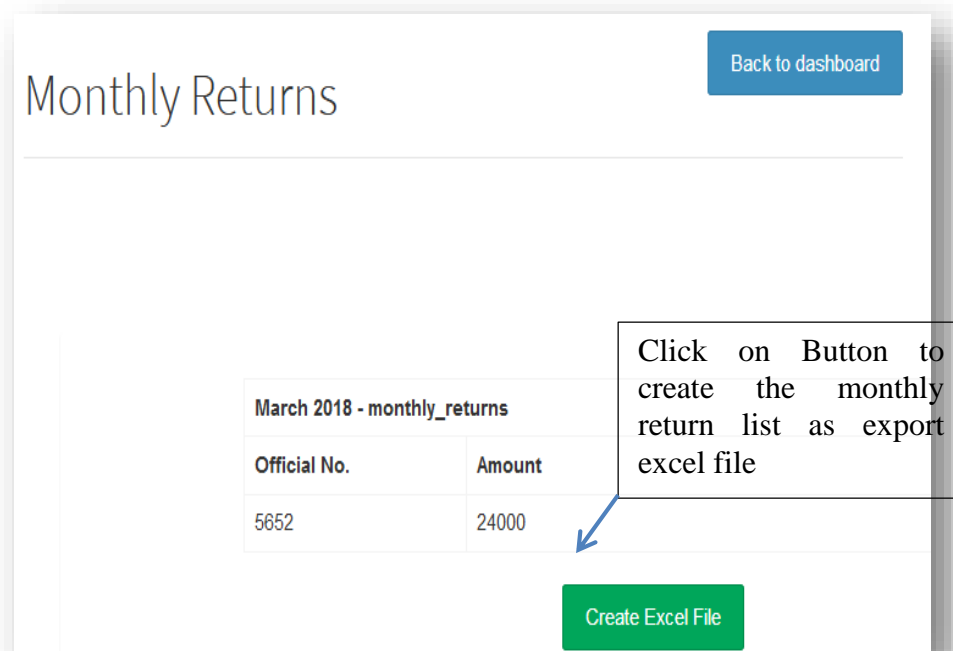
DELETE
CONFIRM
Mahesh
2018-01-18 11:11:31

Dear Guest, Thank you very much for choosing our Savoy Hotel for your recent stay in Berlin and for taking the time to write a feedback. We are truly sorry, that you were disappointed about the experience with our front desk staff. Please be assured that this does not reflect our service standards and that we will follow up the situation with our entire team.

1.12   **Generate Monthly Return of HB Charges**

Click on Monthly Return icon or left side menu in User admin pannel follwing form will

display.

Monthly Returns

Back to dashboard

March 2018 - monthly_returns

Official No.	Amount
5652	24000

Click on Button to create the monthly return list as export excel file

Create Excel File

2. **Reservation Authorize**

i. Suppose user has logged in as Manager Level and click on HB Reservation Authorize Icon on his admin Panel following admin reservation authorize page will display.
ii. Click Authorize button to confirm the reservation
iii. Click Decline button to reconsider the reservation from below level

Authorize reservation

Back to dashboard

Request Id	HB Name	Check In	Check Out	E mail	Contact No		
REQID/O /20180316343	Frorest Site II	2018-03-16	2018-03-18	mds-janapriya@navy.lk	718673908	Authorize	Decline
REQID/O /20180316345	Frorest Site II	2018-03-17	2018-03-17	usyams-yapa@navy.lk	702585675	Authorize	Decline

3. Online Request Reservation (by Candidate user)

To perfome the candidate user activites it is required to use "**hbms.navy.lk"** URL to login as admin. User should have pre define usename and password of his mail account to login to the system.

3.1 Check availability

    I.   Select HB type , naval Area and HB name

   II.   Select date range as required

After select the holyday bungalow type and area you

   III.   Click on check button to view date calendar
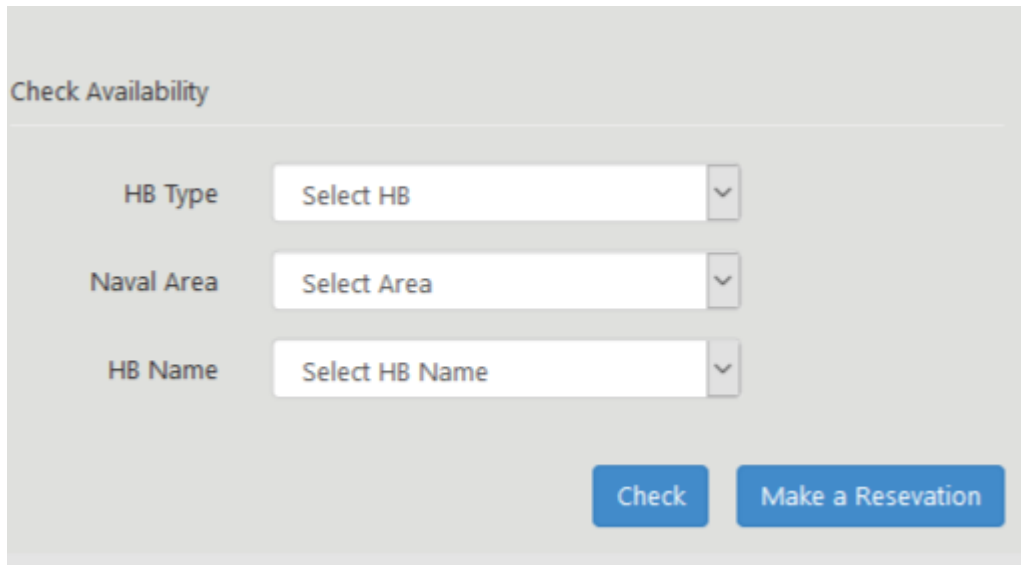
Click on the date you can see available rooms of Malima hotel only
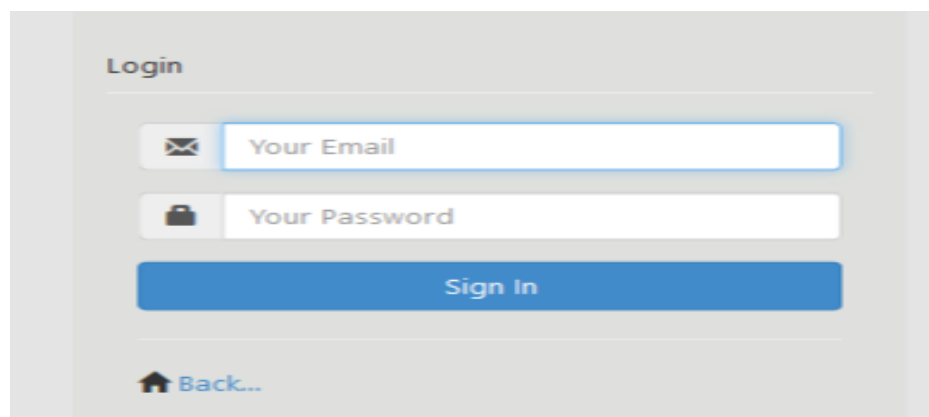
3.2   Candidate user login to the system

I.   Click on Make Reservation button

II.   Give your e-mail address and password and click sign in

III.   Once successfully login to the system following Web page will be displayed, then it is required to follow the following 1, 2, and 3 steps to send the reservation request

Information Details

Booking Details

Offical No

Cmde KG Paul

Select your bungalow, required rooms and data range

HB Type	SOHB
Naval Area	Eastern Naval
HB Name	Sobar Isalnd

Autorized By Naval Headquarters

HB Allocation CMDE and A

Max allocated Rooms 3

Required Room

2

Contact No	714931200
Email	kg-paul@navy.lk

Comfirm   Reset

Confirm your details if correct

1

Check In 2018-03-26

Check Out 2018-03-25

Available Rooms 0

You are not entitle to reserved the HB

Next

Click next

2

Guest Details

Name	Nic	Relationship
Enter guest name	Enter nic	Enter relationship

Add

Vehical No

Submit

Fill the guest details and click

3

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3.3 Candidate user Check his reservation Status

User has to login to the system and view his profile

Information Details

Offical No
LCdr ERPK Udakumbura

| Contact No | 372295259 |
| Email | erpk-udakumbura@navy.lk |

Comfirm   Reset

Check_IN	Check_Out	HB Name	Booking_Status	Request Id		
2018-03-25	2018-03-28	SOHB Ruhuna II	Pending Approval	REQID/O/201803231143	Edit	View