# Online Restaurant Management and Food Ordering System for ORMFOS

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.

Student Name: U.S.Weerasekara

Signature Date: 04/07/2018

This is to certify that this thesis is based on the work of Mrs. U.S.Weerasekara, under my supervision. The thesis has been prepared according to the format stipulated and is of acceptable standard.

Certified by:

Supervisor Name: Dr. S.T. Nandasara

Signature Date: 04/07/2018

# Abstract

"Online Restaurant Management and Food Ordering System (ORMFOS)" is web application to restaurant management. This system wakes to provide service facility to restaurant and also to the customer. The service that are provided is food ordering and reservation table management by the customer through the system online, customer information management and waiter information management, menu information management and report. Main objective build the system this is to provide ordering and reservation service by online to the customer. With this system online, ordering and reservation management will become easier and systematic to replace traditional system where are still using paper. Furthermore, this system is applicable anytime and where also customer.

The problem identified that current process of customer service is the inefficient, time wasting and use more cost. Procedures and mechanisms used to handle customer services are different from location to location. There is no exact method to use all customer service providing offices of ORMFOS. Hence ORMFOS needs to develop and maintain a better system to provide high quality services for customers.

To overcome the above issues and to increase the productivity of providing customer services detailed study of the manual service process was performed and a system to automated and on lined. Proposed system will integrate with ordering food and ordering tables and other connection services.

In this dissertation, we describe Online Restaurant Management and Food Ordering System to address the above problems. The system facilitates the customer to make an online service request for ordering food, ordering tables and payments services and other connection services. i.e. All services provide by ORMFOS is bring to customer fingertips saving their valuable time and money. All Customer submission of request system generates SMS/email notification messages.

This online system was done adhering to the Rapid Application Development approach which was well suited for this project. The online system was developed by AppServ, Macromedia, Dreamweaver 8, Microsoft Visio 2003, Apache server, MySQL database, JQuery and JavaScript. Object oriented concepts have been used to build the throughout the entire development process.

Finally, the system performance was tested and evaluated by obtaining feedback from sector experts whom were comprised with domain experts and software development experts. A specific questionnaire was developed for this purpose to identify the feedback in a likert scale, under 05 main parameters comprised with 15 variable parameters. The feedback was quantified by using a measurement scale introducing a weightage to each identified parameter Evaluation and testing of the software was done to validate and verify the system both from engineering and user points of view. The user feedbacks were positive. The system was found to be easy to use and extremely helpful and saving consumer’s valuable time and money over the previously used manual systems.

# Acknowledgment

I would like to thank all those who gave me the possibility to complete this thesis. First of all I am indented to my supervisor Dr. S. T. Nandasara, who helped with stimulating suggestions, guidance and encouragement during the completion of the project especially in research area and writing of this thesis.

Also I would like to thank all the members of the academic and non-academic staff at UCSC for the support that was given.

I would also like to express my thanks to my friends for their valuable guidance and support that I will never forget.

Finally I wish to thank my family for giving me support and helping me in many ways to complete my project successfully and on schedule.

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# List of Abbreviations

| | |
|---|---|
| ORMFOS | Online Restaurant Management and Food Ordering System |
| CO | Administrator Officer |
| OSMS | Online Service Management System |
| SO | System Operator |
| SMS | Short Message Service |
| MIS | Management Information System |
| IDE | Integrate Development Environment |
| GB | Gigabyte |
| GHz | Gigahertz |
| RAM | Random Access Memory |
| RAD | Rapid Application Development |
| UML | Unified Modeling Language |
| WCF | Windows Communication Foundation |

# Chapter 1: Introduction

This report is an outcome of the thesis study of the Master of Information Technology program being held by University of Colombo School of Computing. Writer is attached to Online Restaurant Management and Food Ordering System (ORMFOS) and by identifying a current requirement at the workplace, in connection to the academic knowledge gained during the said Master's Degree program; this "Online Restaurant Management and Food Ordering System" was formulated.

## 1.1 About ORMFOS

This case study looks at the problem of setting up a fast food restaurant. The basic problem in the food service industry is that restaurants are not realizing efficiencies that would result from better applications of technology in their daily operations. Every fast food has counter where you can place your order and then make the payment. So every fast food needs an employee for taking the order and processing the payment. Labor rates are increasing every now and then and it is difficult to find employees in the middle of the highway, hence to solve this problem we plan to design a "Self Served Fast Food System."

This self-service fast food restaurant will be equipped with a user-friendly touch screen, a credit/debit card reader, and software for completing the process at the backend. For this system there will be a system administrator who will have the rights to enter the menu with their current prevailing prices. He/she can enter anytime in the system by a secured system password to change the menu contents by adding or deleting an item or changing its price.

Now when the customer enters the restaurant, he will place his order with the help of the touch screen using the intuitive graphical user interface, right from the selection of language till the payment confirmation. He will select from the food options according to his choice and the system will display the payment amount he has to make once he has finished with his order. He will have the option of paying the bill by cash, debit card or a credit card. The user will slide his card and the system will check for the validity of the card and the payment will be made. A receipt will be printed containing the order number and the order will be sent in the kitchen for processing. The ORMFOS has a customer base of more than 1 million in all categories, i.e. domestic, commercial, and etc.

## 1.1 Background of Existing System

Currently, ORMFOS has manual system for provide customer services. It is wasting customer's valuable time and money. And customers faced difficulties unnecessary visits to busy offices.

The current process of Billing, Payment and Other Service, has found that following issues in manual process.

- Inconsistency in data entry, room for errors, miskeying information.
- Large ongoing staff training cost.
- System is dependent on good individuals.
- Reduction in sharing information and customer services.
- Time consuming and costly to produce reports.
- Lack of security and Duplication of data
- Lack of paper work
- Lack of Update a system
- Lack of search information
- Lack of effectiveness

## 1.4 Aim and Objectives of Proposed System

The overall aim of the project was to gather information regarding the current system and formulate a solution. Following this, design and implement a web-based order processing system that makes daily operations for orders more time and error-efficient for Sansation7. The overall objectives are to use appropriate tools to design and implement the system, in addition to an appropriate methodology selection. The new system should also mirror the existing paper based system with additional features.

## 1.5 Objectives of Proposed System

Following are the objectives of the proposed system:

- Minimize the number of employees at the back of the counter.
- Reduce labor cost involved, less probable to make mistake, since it's a machine, food wastage.
- Avoid long queues at the counter due to the speed of execution and number of optimum screens to accommodate the maximum throughput.
- To enable customers to order custom meals that aren't in the menu.
- To enable customers to know food ingredients before ordering
- To ensure correct placement of orders through visual confirmation.
- To design a system able to accommodate huge amount of orders at a time.
- To evaluate its performance and acceptability in terms of security, user-friendliness, accuracy and reliability.
- To improve the communication between the client and the server and minimize the time of ordering.
- To automatically compute the bills and generate reports.
- All customers requested services have provided feedback through email and SMS notifications.
- Centralized database provide accurate and fast information to the management.
- Implement systematic workflow for new connection process.
- New system is an enterprise-wide, web based online application software system there will not be any special client software requirement to access the system.

i.e., user agents like Internet Explorer, Mozilla, or any other web browser is enough.

- Administration and maintenance is easy because application is hosted in central server.

## 1.6 Minimum Requirements

The minimum requirements aim to construct dependable foundations, in order to cater for extensions that can be added later. Therefore, the minimum requirements must be able to solve the problem. The following requirements are considered fundamental for meeting the aims and objectives:

- Summarize the current corporate ordering systems and business.
- Perform a feasibility study of the proposed solution.
- Produce a database solution incorporating web-based access.
- Compose a User Manual to compliment the solution.
- Perform a basic evaluation of the new system.

## 1.7 Deliverables

In order to achieve the requirements and extensions, a set of goals have been devised. The following list defines the deliverables for the project:

- A Web-based order processing system for Sansation7.
- User and Administration Operating Manuals
- HTMLdoc Documentation
- The Project Report

## 1.8 Project Relevance

The project draws skills gained from a wide range of taught modules. Information Systems and Human-Computer Interaction allowed the application of appropriate methodologies and usability consideration. OO Programming and OO Analysis and design applied concepts learnt for solution implementation and design modeling respectively. Advanced Databases and Distributed Systems helped define sound database design and the web-based solution respectively.

## 1.9 Report Outline

The project report follows an acute variation of the Systems Development Life Cycle. Chapter two details the technologies and methodology chosen, in addition to the reasons they were chosen for. Chapter three conducts a feasibility study into the proposed system, in addition to forming requirements for the proposed system based on current systems and processes analysis. Chapter four defines the design detail concerning database, framework and front-end interface based on the requirements gathered in chapter three. Chapter four details the implementation for the presentation, application and data layers of the solution. Chapter five describes the testing strategies imposed on the solution and the outcomes of those tests performed, in order to determine if those requirements stated in chapter three have been met. Chapter six evaluates the finished solution, of tools chosen and methodology use effectiveness in the project.

# Chapter 2: Background

## 2.1 Requirements Analysis

When online service management system is developed, systems analysis would represent the following steps:

- Conducting fact-gathering, designed to find out the requirements of the system's end-users.
- The development of a feasibility study, involving determining whether a project is economically, socially, technologically and organizationally feasible.
- Determining how the end-users would operate the system and what the system would be used to full fill current requesting services.

### 2.1.1 Fact Gathering Techniques

I have selected Maharagama branch to gather information for proposed system.

#### 2.1.1.1 Interviews

Interviews allow getting an instant feedback and allow clarifying any doubts immediately. Further, during an interview an indirect observation also can be done. Prepared questionnaire, the time scheduled to interview customers those who came Maharagama branch to get services. This was caused to gather most important information, to identify their requirements, duties and responsibilities, to understand the work flow of the process and to know what they expected from the proposed system.

#### 2.1.1.2 Observation

Observing the users in the working environment is another most resourceful way to gather system requirement. However, certain things were necessary to observe in addition to their explanation and complaints. At Interview session what they explained was not clear and correct.
Observations were done at Maharagama branch on how customer manually requesting their services, what information is taken from them, how they submit request and do payments for some services and what are the issues.

#### 2.1.1.3 Prototyping

In requirement gathering of proposed system, prototyping was used to clarify the unclear areas and making sure the requirements were correctly identified. This research shows how to use paper prototype to clear the requirement. Using paper prototype explained the work flow of the new system. Having requirement review meeting, this research confirmed the requirement analysis stage. Finally, this research shows how could categorize requirements needed to be met in the new system design as follows.

## 2.2 User Classes and Characteristics

**Primary User** - The primary user of the proposed system is the customer. Therefore the user needs basic knowledge of the basic English knowledge and computer literacy and working in internet environment. The user should know how to fill the request application form and submission it. Also need to know how to make credit card payment, etc.

**Secondary User** - Secondary users will be Administration officers like Receptionist, Managers, Event Coordinator, Food and Beverage Coordinator, System Operator and Database Administrator.

## 2.3 Technical Constraints – Design and Implementation

- The proposed system is developed using the Dreamviver.
- The database is Microsoft SQL server 2012. The relevant version of the MS SQL server must be installed.
- The online management system's user interfaces were developed using only English language.
- By considering uniformity all user interfaces used the same theme throughout the system.
- Security and safety of the system like database security, effects of power failure; database backup procedure etc. will be the IT Division's responsibility.

## 2.4 Assumptions and Dependencies

- Full working of the system is dependent on the availability of 24 hour Internet connection.
- The users should know the English language, as the user interface will be provided in English.
- The Administration officer will maintain customer profiles, payment details as well as connection details.
- The customer database will be accessible in real time through the online management system when transitioning.

## 2.5 Literature Review

In the pass decades, the rapid growing of network and wireless technology did a great impact for how people communicate with each and other remotely. At the same time, this technology also leads different kind industries to change their entire management aspect. F&B industry is one of the industries in the market that apply these technologies into their business processes that assist them to be much more convenience and efficient. [1].

From the message above, Online Food Ordering System is a system that integrated both concept of intranet and wireless technology. This system provide user to access the data, information and services from a remote server, which enable user to access the central databases distributed across the restaurant network. Most of the handheld devices have implemented and support wireless technology and thus mobile devices is an ideal hardware device that use to support this system in order to allow user remote access to the database for data retrieval.

The system requires the user to build an intranet network within the restaurant and there will be a central database server resides in the network and the client can perform data retrieval by using the mobile devices such as PDA (Personal Digital Assistant) connect to the wireless access point.

Wireless food ordering system is a solution that can help the restaurant to expedite their customer services as well as management aspect. After the system has been implemented in the restaurant, the flow food ordering process will be changed to computerize. Waiters have to take orders by choose the food that wish to order from the menu on the mobile devices as the input and the data will be send to the central database, after that the computer reside in kitchen will retrieve the data from the central database and display on the computer screen. After the food is being cooked, the employee in kitchen can confirm the food order and update to the database. This will signal the waiter mobile device to acknowledge the waiter the food is ready to serve the food to respective customers.

## 2.6 Similar Systems

Proposed system is an online web based Service Management System that will facilitate to customer to order food items online and get other services online, and also gets billing and payment service, make payment through credit card etc. without visiting to any regional office.

As per the result of my survey thought internet, I found some similar systems for the proposed system. They are,

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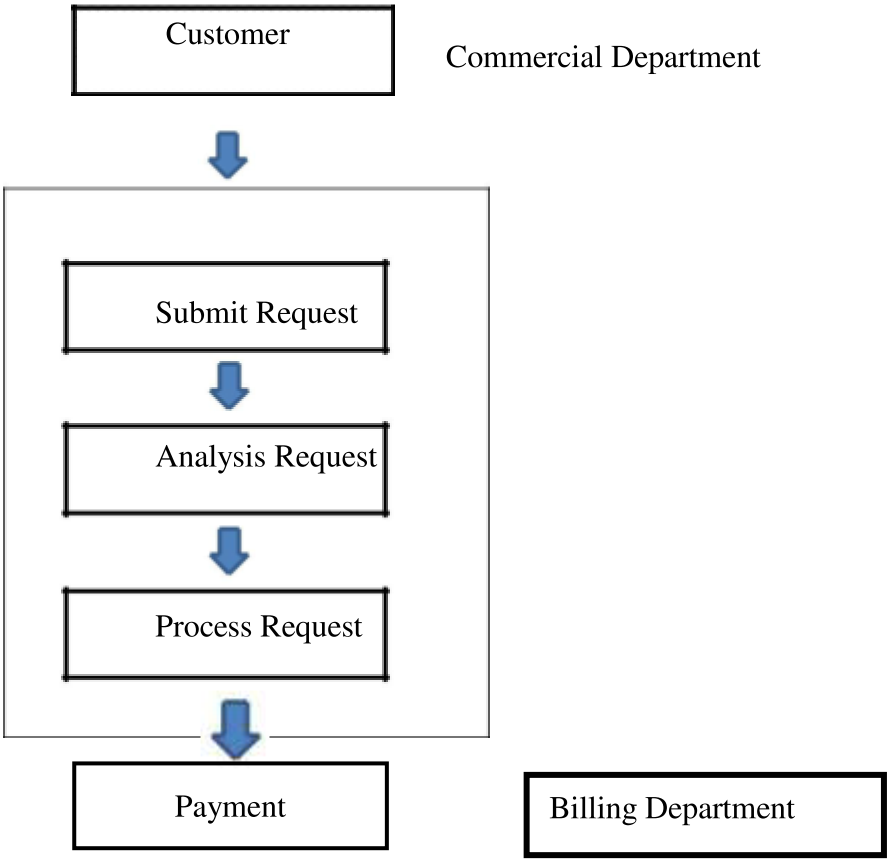
# Chapter 3: System Design

## 3.1 Existing System

A good design is prerequisite for a successful system implementation. This chapter documents the design considerations which attempt to link the findings of the analysis with the final system implementation.



The figure 3.1 Workflow of the existing system

According to the above workflow diagram, the current system can be described sub processes. These include,

- Submit Request - Any type of request comes from customer will assign to the nearest queue.
- Analysis Request - Customer can order items which they can see on the shelves.
- Process Request - The cashier will heck the availability and pack all items in separate packets

- The cashier makes the bill for the relevant customer and handed over to the parcel with the bill at once. - The customer settle the payment either card or through cash and receive a copy of receipt or balance.

### 3.1.1 Functional Requirements

Following are the list of functional requirements which have identified during the requirement analysis:

- Facility for customer to make online payment.
- View order items information online,
- Facility to view and get duplicate print out of current order.
- Connect to other site for online payment gateways using Credit cards
- Facility for customer to make an online request for a new event.
- Facility to online customer to change request.
- High mobile responsiveness.
- Online table Request submission.
- Online change table Request submission.
- Facility to view currently logged in users in the system.
- Facility to view current menus and edit menu items in the system.
- Facility to view banners in the system.
- Facility to make charts of all users for decisions.

- System generates SMS and Emails feedback messages for submitted request.

### 3.1.2 Non-Functional Requirements

Following are the non-functional requirements in the system:

**Performance** - System should respond quickly for the requests made by the user. The data will be readily available as soon as the request is made and the information requests from the system will be readily accessible at a single click. Screens should load quickly.

**Reliability** Online order processing system will be completely tested at the time of delivery. No computational error should occur. The proposed system will be written in a client server environment and used web methods to implement all services then it make easy to modifications when required.

**Availability** - The system will be available to the user on the internet for 24 hours a day, 7 days a week. If there is a down time and if pre-planned then that need to be informed early, so data lost and inconveniences will be minimized

**Security** - Consumer should register the online management system first. Then the system asks username and password to login and use the available service of the system. User can change password and user profile as required. All information notified to user by SMS. Data validation of all screen prevent unauthorized access to the customer's personal details and system login The database will be protected and encrypted by standard practice as well as measures. Periodic backups of system will be scheduled.

**Maintainability** - System will be maintained by the IT division. And also system and software documentation will be provided and that will give instruction about use and maintenance of the system.

## 3.2 Proposed System

To overcome the above short listed issues and to increase the productivity of providing customer services detailed study of the manual service process was performed and a system to automated and onlined. Proposed system will integrate with billing and payment services and other services. Therefore new system brings you our services to your fingertips saving your valuable time and money. Enjoy the benefits of innovative technology based on e-Government concepts to achieve your requirements from home avoiding the need for unnecessary visits to our busy offices or branches in island wide.

### 3.2.1 Choice of Methodology

Methodology is generally a guideline system for solving a problem, with specific components such as phases, tasks, methods, techniques and tools. Every methodology consists of a process model and modeling language. The process model is a collection of stages, which may further have a set of activities. The Modeling Language consists of several modeling techniques, which are further supported by a set of diagrams.

### 3.2.2 Selection of an Appropriate Process Model

In selecting a suitable development approach some of the widely used development approaches were evaluated. The main software development process models can be listed out as follows:

- Waterfall Model
- Spiral Model
- V Model

#### 3.2.2.1 Waterfall Model

The System Development Life Cycle (SDLC) is one of the more traditional approaches to software project management. As implied by Avgerou and Cornford [2] the concept is to advance the project systematically through each of the phases with a standard set of outputs at each phase. Although Hughes and Cottrell [3] criticise this particular model for lack of iteration, the methodology can be useful when the production of deliverables are an end result. Hughes and Cottrell [3] also explains that if a particular phase needs to be refined, the traditional SDLC methodology is unaccommodating.

Furthermore, as time is consumed defining requirements, the methodology jeopardises the project as producing a solution could take longer than expected. The company has a firm idea of what the solution should perform and the fact that Sensation7 wants the solution to emulate the paper system, the requirements would seem fairly set in stone. However, depending on the scale of the project, a pure linear SDLC approach might create a situation where the solution exhausts time allocated and goes over budget.

#### 3.2.2.2 Spiral Model

Avison and Fitzgerald [1] explain the spiral model as a means to help mitigate risks. The model implies the use of the waterfall model for each step. Only the most important requirements are defined and implemented first. After feedback with the client more sophisticated functionality is implemented. However an immediate problem with this approach is that if the client has unintentionally missed an important requirement late into the development process, such changes could prove very costly. This can occur easily if client, developer or even both parties misunderstand the requirements specification.

Avison & Fitzgerald [1] however, do explain that providing risk assessment and reduction occurs during the project, reduces the uncertainty concerning the overall outcome of the solution. However this would rely heavily on the assumption that all staff are knowledgeable enough to alert developers of potential risks. In addition this methodology is said to be more geared to large scale projects and therefore is unlikely to be an appropriate course of actions with Sansation7.

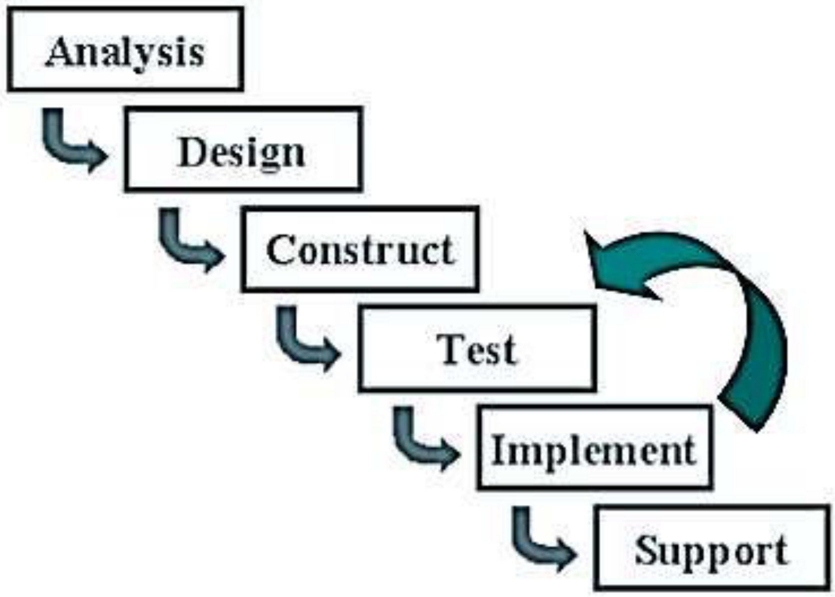
#### 3.2.2.3 V Model

The V-Model aims to confront the limitations imposed by the traditional SDLC approach and the more accommodating spiral model. Referred to as the V-Process Model by Hughes & Cottrell [3] this model adheres to an SDLC approach until such time that the Implementation phase has been reached. At this point the methodology shifts to become flexible, allowing developers to follow an iterative approach by revisiting the subsequent phases. However this approach may not be suitable to the project as it requires an excessive amount of time to revisit the requirements. Given the limited time span of the project this approach would not be ideal.

#### 3.2.2.4 Final Methodology Choice

It has been decided to adopt an approach of the SDLC while incorporating an iterative approach over the implementation and testing phases. As mentioned above the client remains firm about what the system must and must not do, and therefore excessively revisiting analysis and design phases of the project consumes valuable project time. Furthermore, in order to ensure that the implementation provides a working solution for the client, an iterative approach for those phases will occur as depicted. This ensures that the software is completed within the given time frame and ample time is provided for potential user evaluations and user acceptance testing, labelled in Figure 3.2.2.4 as support.

The methodology for the proposed system is given in figure 3.2.2.4



The methodology for the proposed system is given in figure 3.2.2.4

## 3.3 Selection of appropriate Modeling Language

Unified Modeling Language (UML) was selected as modeling language for the design of the proposed solution. UML has an industry wide recognition as the best modeling language for software development.

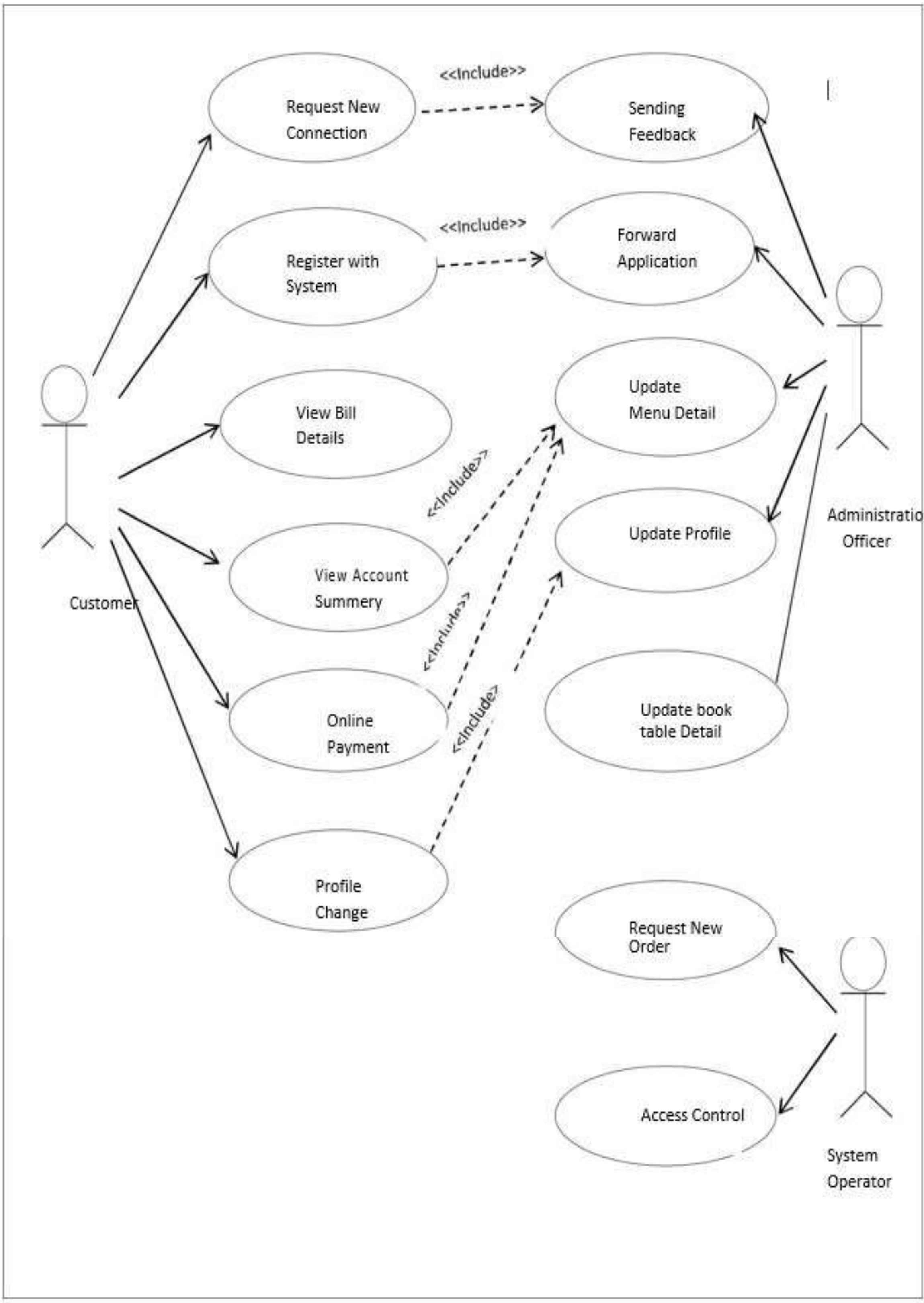
The following reasons could be given for the selection of the UML:

- A comprehensive support is provided by UML for a use case approach and meets the requirements of incremental development, allowing visual modeling of software.
- The language focuses on visualizing the software that will help to manage complex system development efficiently.
- It supports to model just about any type of application, running on any type and combination of hardware, operating system, programming language, and network.
- It can specify systems in an implementation-independent manner.
- Even though there are many types of diagrams to represent various modeling view points, only three of them have been used for the design of this online service management system. They are,
    - ❖ Use Case Diagram - represent the functions of a system from the users' point of view.
    - ❖ Class Diagram - represent the static structure in terms of classes and relationships.
    - ❖ Sequence Diagram - temporal representation of objects and their interactions.
    - ❖ Activity Diagram - graphical representation of workflows of stepwise activities and actions

### 3.3.1 Use Case Diagram

Typically define interactions between an actor and a system, to achieve a goal. The actor can be a human or an external system. The figure 3.3.1 is the use case diagram that depicts different scenarios in which different actors interact and collaborate in the proposed system.

The Use Case diagram for the proposed system is given in figure 3.3.1



The Use Case diagram for the proposed system is given in figure 3.3.1

### 3.3.2 Class Diagram

The class diagram for the proposed system is given in figure 3.3.2.

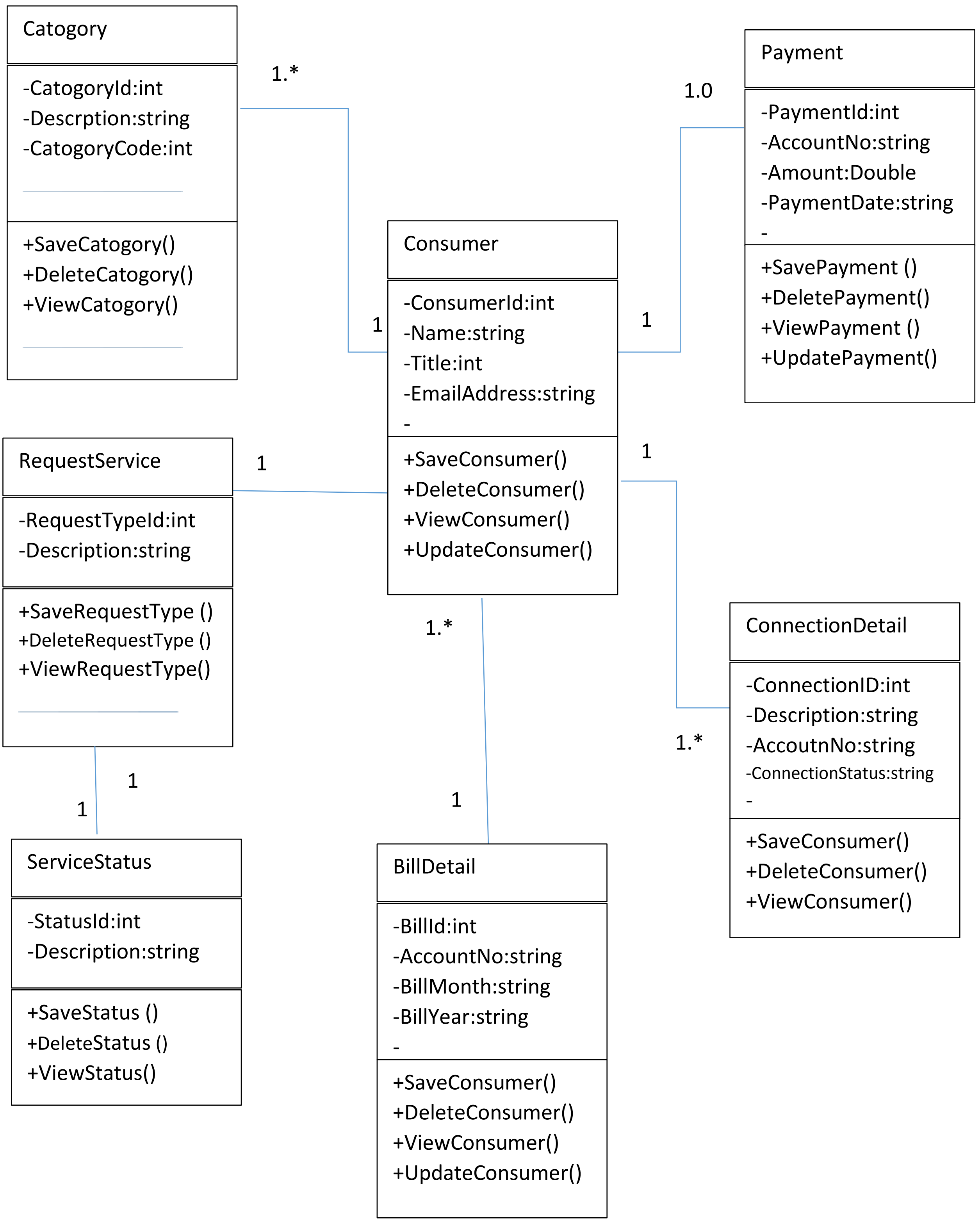


Figure 3.3.2 Class Diagram for Proposed System

## 3.4 Database Design

For this project relational database concepts were used to design the database and normalization was used to restructure the logical data model of a database to eliminate redundancy, organize data efficiently and to avoid data anomalies such as insert anomaly, update anomaly and delete anomaly.

Figure 3.4.1 is the database diagram that depicts the entities and attributes of the proposed system and also relationships among entities.

The Database Diagram for Proposed System is given in Figure 3.4.1

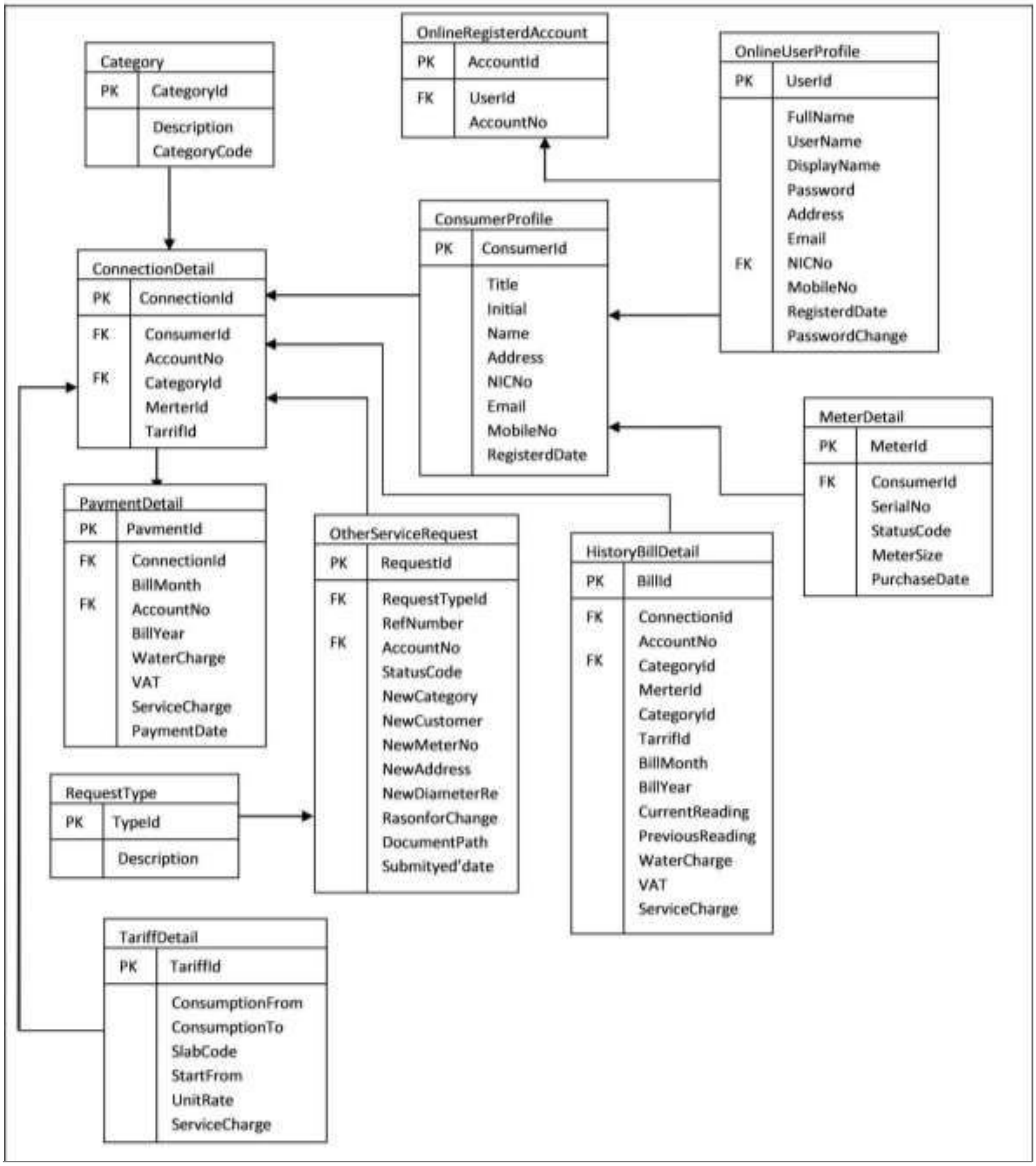


Figure 3.4.1 Database Diagram for Proposed System

## 3.5 Architecture Design

The Online Service Management System is web based and the centralized server will be located at the Head Office. Client computers located at all over the world and will be connected to the server though Internet. Customers will be accessed the application through Internet using web browser. Figure 3.5.1 is the architecture diagram for the proposed system.

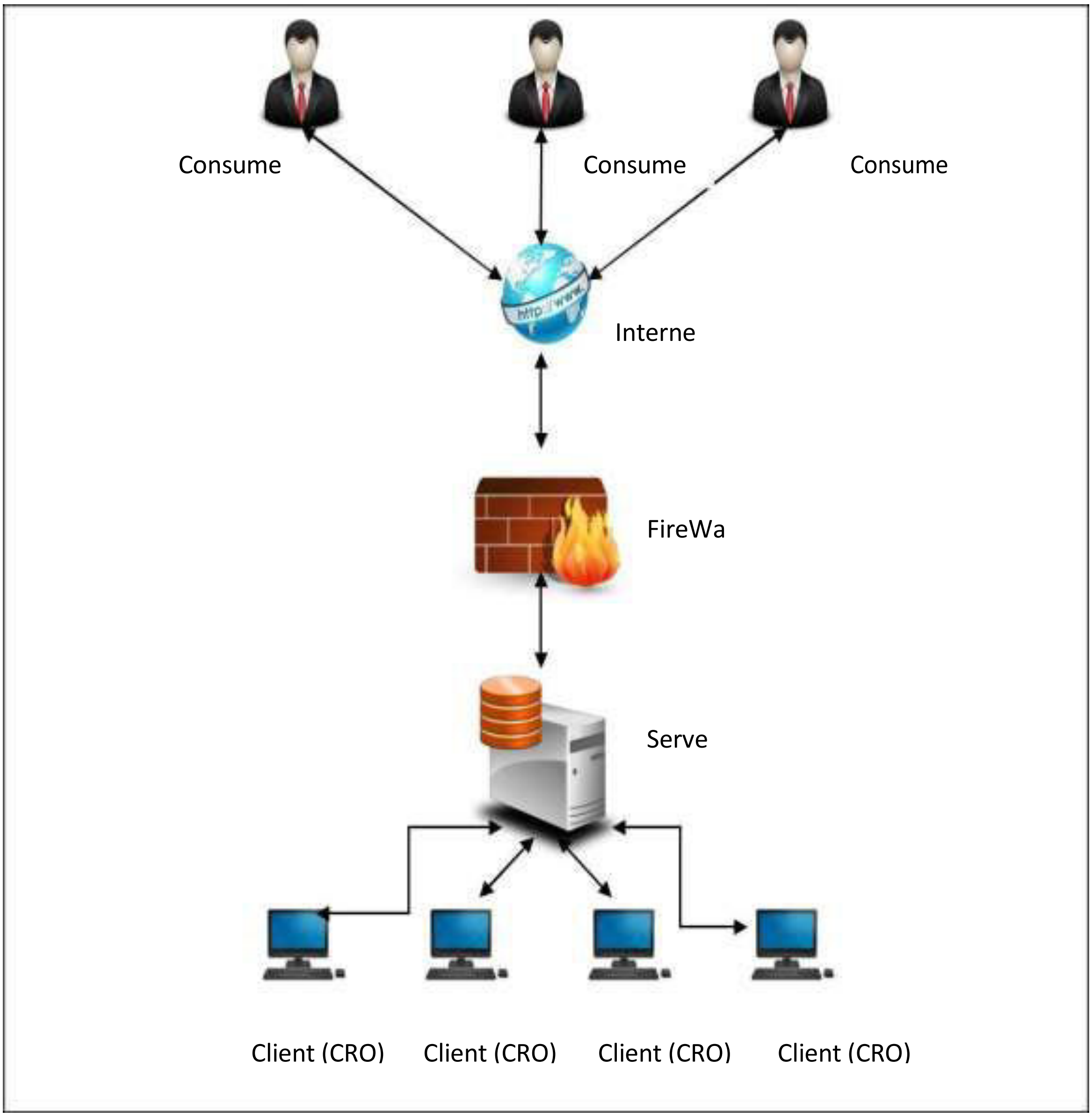


Figure 3.5.1 Architecture Diagram

# Chapter 4: Implementation

## 4.1 Implementation

This is the phase at which the actual software is being developed. It include all the tools and techniques that are used to implement the system like the programming languages, scripting languages, frameworks, designing tools and techniques, database management systems, etc. Implementation stage also consists of system installation, providing technical support, user training etc.

### 4.1.1 Tools used in Development

It is important that select software tools and technologies should be compatible with current systems. Because this system is modules that will be integrate to the existing other system, therefore following software have been selected without any choice.

#### 4.1.1.1 Database System Selection

A database is defined by Elmasri and Navathe [5], as a collection of related data. A relational database system would be needed in order to successfully model the relationships and entities identified for the client. In addition, a database system would resolve the inconsistency and information integrity issues and reduce the need to unnecessarily duplicate data. A number of databases are available to use for the application. However, the database systems most appropriate to the problem are MS SQL Server and MySQL.

#### 4.1.1.2 MS SQL Server

SQL Server has been developed by Microsoft Corporation. It is considered to be extremely powerful, in addition to offering features such as trigger management, as explained by Harrington [9]. However, such software packages are excessively expensive to purchase, at least for small businesses, as implied by Microsoft themselves[10], and therefore considering the company wish to keep expenses low, is not deemed appropriate for the solution. In addition, SQL Server is limited solely to the use off Microsoft own Internet Information Server (IIS) which means that the company would not have the flexibility to change their web server should their requirements change. Furthermore, although not an issue at present as the company uses Microsoft Windows as their primary platform, choosing SQL Server may prove problematic should the company not wish to be tied down to a particular Operating System Platform in the future.

#### 4.1.1.3 MySQL

MySQL was originally developed as a database for open source platforms, and is commonly used with Linux servers. According to Sklar [11], MySQL has the benefit of very small amount of unnecessary coding. The rapid increase in connectivity between MySQL and PHP (discussed later), will have to be taken into consideration, when also determining Server-Side Scripting. Some disadvantages of such an implementation include the fact that MySQL is not able to implement triggers and be efficiently supportive, where the database can have many front-ends, as suggested by Wiley [8]. Although MySQL does possess some shortfalls as shown when compared to PostgreSQL earlier, it has proven itself in database robustness and reliability according to db-review.com [7]. In addition, MySQL is entirely platform independent and open source. This means flexibility and cost savings for the customer. In addition, the companys in-house support staff will be able to remotely support the database on a webhosting companys set of machines. Db-review also [7] favours MySQL for its excellent scalability, which implies that the client will be running a database that will still function efficiently as the order intake increases. For such reasons, MySQL has been chosen for the database server of the system.

### 4.1.2 Web Server Selection

According to Tanenbaum [12], a web server is defined as a server that supplies the requested web pages by the user to their client software. The company plan on hosting the system over the Internet and therefore, the choices made regarding a web server may tie the company down to a narrower range of ISPs. Microsofts Internet Information Services (IIS) and Apache Tomcat will be considered for the company.

#### 4.1.2.1 Microsoft Internet Information Services (IIS)

Internet Information Services (IIS) is a web server application which is incorporated into some versions of the Microsoft Windows Operating System, Microsoft [13]. From a support point of view the system is easy to install and configure. Microsoft aim for this software to be user friendly and as expected allows integration with other Microsoft products. However, as much as Microsoft boast benefits of considerably unparallel reliability and security strengths, they have also been releasing a number of security patches and enhancements from time to time regarding this product.

### 4.1.3 System Architecture Selection

As the system will be deployed over the Internet, some form of client-server architecture would match the characteristics of the planned system most appropriately. Tanembaum [12] identifies three layers at which different components are split at different ratios between the client and server side.

The presentation layer is concerned with the display of information on the clients machine. The data layer normally looks after the physical records that are stored in the database sitting on this layer. This layer is normally deployed on the server side, as a method to ensure data integrity and consistency. The application layer somewhat sits between the data and presentation layers. This layer is responsible for gathering users information inserted at the presentation layer to populate the data store at the data layer. The reverse is true when information is being retrieved. For example data will go to the presentation layer after being fetched from the data layer but business rules as defined in the requirements will define what operations are performed before the data gets to the view.

Considering that sales persons will require to access information when out of the office, the system will represent some form of 3-tier client architecture as described immediately above. Such an architecture where the processing occurs all at the server side will maintain data integrity. In addition, by placing all processing logic server side, the system will ensure that no extra components would be required to be installed on the client machine, wherever the client machine happens to be. Three-tier architecture will also cater for the flexibility and scalability requirements that the company have foreseen.

### 4.1.4 Scripting Language Selection

Scripting Languages are such that they are interpreted at run time rather than compiled beforehand, as with traditional programming languages. Scripting languages can manipulate data, as well as influence how the user sees the information.

#### 4.1.4.1 Practical Extraction and Report Language

Practical Extraction and Report Language (PERL), is an open source scripting language. As it is open source, it has the advantage to be available to a variety of platforms, in addition to being reputably reliable, according to Quigley [16]. PERLs strengths lie in comprehensive database connectivity. Unfortunately, PERL is also renowned for being a language with awkward syntax and therefore can be very difficult to both learn and understand. In addition, HTML code cannot be embedded into PERL coding. For such reasons, it was deemed unsuitable for the project. The web based system will be required to consequently display web pages. PERL does not be feasible to implement, due to time constraints and its limitations in terms of operability with HTML syntax.

#### 4.1.4.2 Active Server Pages

Active Server Pages (ASP) is another development from the Microsoft Corporation. It too, is not platform independent and therefore, ties users down to the Windows operating system, according to Gray [17], who argues that ASPs syntax is not easy to comprehend and fails to handle text based information as well as some of its competitors. Another shortcoming is that this scripting language would not perform without the implementation of IIS, which has already been ruled out by the findings. Therefore, such an approach is unlikely to be successful, given the time constraints of the project. Although the limitations to the Windows operating system are not significant, the potential problems of using ASP may become more apparent once sales persons attempt to use the system away from the office. In conclusion, ASP would not be suitable due to its limitation for sole use with IIS, the Windows operating system, and cost of purchasing the software.

#### 4.1.4.3 Hypertext Pre-Processor

Hypertext Pre-Processor (PHP) has a distinct immediate advantage, created primarily for internet software deployments. PHP is also considered to enhance rapid product development, due to its subtle learning curve in comparison with other competing scripting technologies, according to Gutmans [18]. PHP also has the advantage of being open sourced and comes with a hefty library, increasing its application power. PHP has also been linked with MySQL, allowing more productive connectivity between the two mediums, according to Greenspan and Bulger, [19]. PHPs rapid application turnaround and easy learning curve, as well as requirement relevance might be suited to this project. Finally, PHP and MySQL would perform together as an effective implementation according to db-review, [7]. However, while PHP has been mentioned for its rapid application turnaround, Gutmans [18] implies that as there is no distinction between the three tiers of a client-server architecture represented within a PHP page. This means that the more complex the requirements and larger the system the more difficult the pages are to construct and maintain. It was therefore decided that in order to ensure that the requirements have been met, the system should consider the deployment of a server-side scripting language which can differentiate itself from the rest of the three tier client-server architecture.

## 4.2 Software Requirements

- Development - Microsoft Windows 10 ,Dreamwevear, IIS Web Server, MS SQL 2012 database , jQuery, Java Script, Adobe Photo Shop.
- Client - Microsoft Windows 2000 and above, Internet Explorer 8.0 and above, Mozilla Firefox, Google Chrome.

## 4.3 Hardware Requirements

- Development – Core i5 4 GHz, 4 GB of RAM, 500 GB storage
- Client - P IV processor 2.0 GHz, 512MB of RAM, 40GB storage
- Server – Windows 2008 R2, processor 2.0 GHz, 8 GB RAM, 500GB storage

## 4.4 Methods used to enhance Coding Quality

In this system following methods are used to increase the quality and human computer interaction to performance of system coding allowing more productive connectivity between the two mediums, according to Greenspan and Bulger, [19]. PHPs rapid application turnaround and easy learning curve, as well as requirement relevance might be suited to this project. Finally, PHP and MySQL would perform together as an effective implementation according to db-review, [7]. However, while PHP has been mentioned for its rapid application turnaround, Gutmans [18] implies that as there is no distinction between the three tiers of a client-server architecture represented within a PHP page. This means that the more complex the requirements and larger the system the more difficult the pages are to construct and maintain. It was therefore decided that in order to ensure that the requirements have been met, the system should consider the deployment of a server-side scripting language which can differentiate itself from the rest of the three tier client-server architecture.

## 4.4 Methods used to enhance Coding Quality

In this system following methods are used to increase the quality and human computer interaction to performance of system coding.

- **Classes objects** - When developing a system there can be lots of same coding which can be applied in several forms. If we have such coding or same variables which need to be re-use in several forms we can put them into common classes based on namespaces.

- **Data validation and Error Handling Techniques -** Each and every method, function, event, etc have been covered with the error handling functionality and if an error occurs, system will automatically call the Error Handling object and provide a meaningful error message to the user and also it will log the error details into a separate error handling log file for further reference.

## 4.5 Installation Procedure

### 4.5.1 Server Installation

This system was developed using .NET Frame Work 4.6 using C# object Oriented

Programming , and back end developed MS SQL Server 2012 and jQuey, Java Scripts. The systems was designed and implemented by considering the portability as well. Hence the installation is straight forward in any compatible environment. This system runs on both Windows and Linux environments and uses Apache IIS web server. Since the client had his own hosting server with the operating system and other applications, only the application software installation was needed.

### 4.5.2 Client Installation

For the end users Internet Explorer is usually available in windows operating system. Mozilla Firefox browser can be freely downloaded from [Online]. http://www.mozilla.org/en- US/products/download.html. Google Chrome is available in [Online]. https://www.google.com/intl/en/chrome/browser. [Online]. https://www.doordash.com/

# Chapter 5: Testing and Evaluation

Software testing is a process used to identify the correctness, completeness and quality of developed computer software. It includes a set of activities conducted with the intent of finding errors in software. So that it could be corrected before the product is released to the end users. In simple words, software testing is an activity to check whether the actual results match the expected results and to ensure that the software system is defect free.

Software testing, depending on the testing method employed, can be implemented at any time in the development process. However, most of the test effort occurs after the requirements have been defined and the coding process has been completed but in the RAD approaches most of the test effort is on-going.

The purpose of project evaluation is to assess the software development methodology that was used throughout the development of the framework, assess the usefulness of the technologies and tools, the accuracy of the estimations and the usefulness of the reviews. The solution will be reviewed and evaluated to decide whether it accomplishes the ideas presented in the initial overview and for the quality of the product.

Since the software engineering model used in this project was as incremental model, the evaluation for each delivery was obtained by the client at the time the components were delivered. They were mainly review meetings and the feedback obtained was used in corrective maintenance and/or change management. The architecture diagram for the proposed system in Figure 5.1 in given bellow.

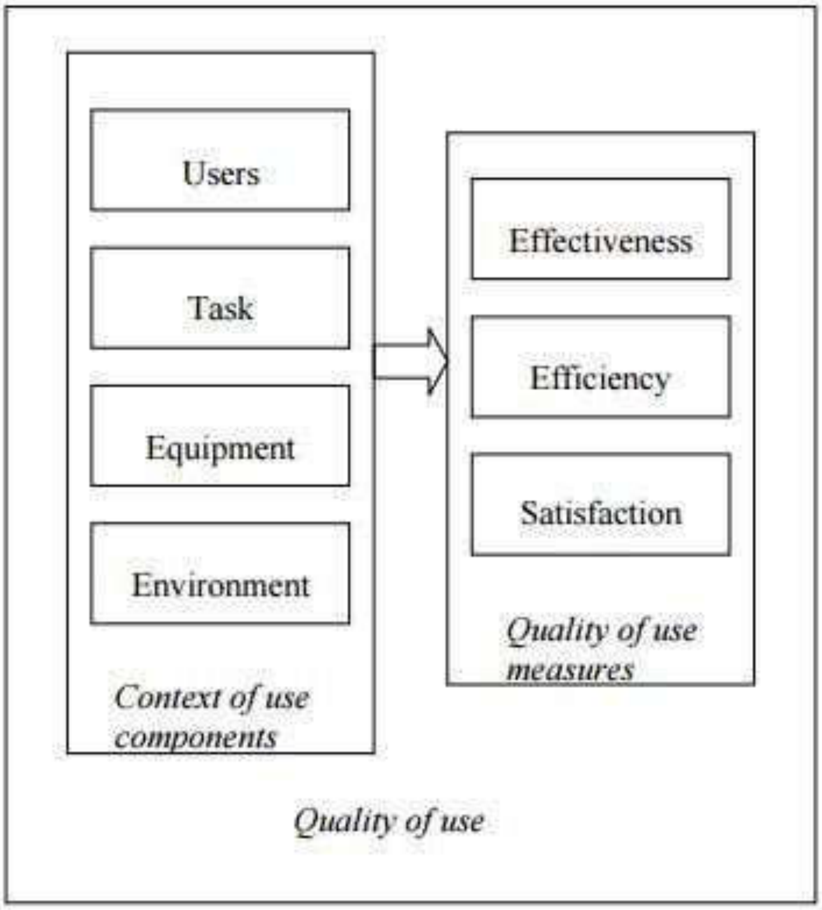


Figure 5.1 : Software Evaluation

Based on a prepared list of criteria along with some practical experimentation, a software evaluation makes it possible to check whether the project objectives were satisfied. Table 5.1 was designed to collect feedback from the end users of the system. This was distributed among the users to get their feedback anonymously. The evaluator assessed the returned forms in order to obtain the actual feedback of the users and to assess that the project objectives have been met.

The evaluation of OSMS in terms of their ability to inform users, including the following aspects:

- Measures for the effectiveness of the system
- Technological measures for evaluating the system
- User-oriented measures
- Feedback

## 5.1 Testing

There are many approaches to software testing:

Static testing includes reviews, walkthroughs, or inspections and this can be omitted, and unfortunately in practice often is.

Dynamic testing includes actually executing programmed code with a given set of test cases. It takes place when the program itself is used. Dynamic testing may begin before the program is 100% complete in order to test particular sections of code and are applied to discrete functions or modules.

### 5.1.1 Testing Levels

Testing can also be grouped by where they are added in the software development process, or by the level of specificity of the test. The main levels of testing during the development process can be mainly identified as unit testing, integration testing, system testing and acceptance testing.

#### 5.1.1.1 Unit Testing

The purpose of Unit Testing is to ensure that each unit in the system functions properly. This testing strategy was applied to each object in the system. A Java test class containing methods to assess objects, calling each method with an assortment of parameters to test whether the values returned were appropriate. These test classes ensured that valid input data was accepted and invalid data was rejected. Each unit within the application was tested to verify that all links and buttons navigated as expected. Usability testing has also been incorporated to examine whether error messages are clear and understood. The database schema was also monitored to ensure insertions, updates and deletes were occurring and with the expected changes. All the tests have proved successful. For those tests which failed initially, the causing factor was identified and remedial action was taken in order to pass the test concerned. The detail of remedial action taken has been documented. Security testing has been incorporated to verify that the expected result is in face, the actual result.

#### 5.1.1.2 Black Box Testing

The purpose of Black Box or functional testing is to assess the systems internal workings. However the overall aim of this test strategy is to examine results without knowing how the system arrived at that result. In effect, a tester only requires knowledge of the system specification rather than underlying architecture. This caters for such testing to be performed from an end users perspective rather than a designer perspective. Furthermore, any ambiguities that may exist between the Black Box test results and the original specification are easily detectable, as an unexpected output would occur. The tests performed here are based around users input and actions. The expected and actual system output for each test case has been documented.

#### 5.1.1.3 White Box Testing

The purpose of White Box testing is to certify that the underlying system architecture functions correctly. This contrasts to Black Box testing which examines system output from knowledge about the systems use of syntax. White Box testing has been undertaken for this system, in order to examine the changes of state for each of the database tables within the system. White Box testing has two immediate benefits. Firstly, by examining the table states during update, create and delete processes for example, the developer is able to verify that the right tables are being queried or affected. Furthermore, the developer can query the record contents, to ensure the correct and relevant fields in one or more tables have been correctly queried or affected, as appropriate. The second benefit is more aimed at the client; as such testing can simulate system stress that it may endure once deployed to see how it reacts. The results of the White Box testing can be found in figure 5.2.

| Test Case | Tables Affected | Expected Result | Actual Result | Success? |
|---|---|---|---|---|
| System Login | User | Query of user's username and password in user table where | Query of user's username and password in user table where | Test Success ful. |
| View all Companies | Company | Query of company | Query of company | Test Success |
| Create Company | Company | Insert into company table | Insert into company table | Test Success |
| View Company | Company | Query of company table for a particular id | Query of company table for a particular id | Test Success ful. |
| Update Company | Company | Update certain company fields for a particular id | Update certain company fields for a particular id | Test Success ful. |
| Delete Company | Company | Update deleted field of company table to 1 | Update deleted field of company table to 1 | Test Success ful. |
| Automatic Company Deletion | Company, Orders, Orderlines | Query of orders and orderlines for a particular company_id and deleted = 1. | Query of orders and orderlines for a particular company_id and deleted =1. | Test Success ful. |
| View all Users | User | Query of users | Query of users | Test Success |
| Create User | User | Insert into user table | Insert into user table | Test Success |
| View User | User | Query of user table for a | Query of user table for a | Test Success |

| | | | | |
|---|---|---|---|---|
| Update User | User | Update certain user fields for a particular id value | Update certain user fields for a particular id value | Test Success ful. |
| Delete User | User | Update deleted | Update deleted | Test |

Table 5.2 Test Cases for whitebox testing to the eService portal

### 5.1.1.1 Integration Testing

The purpose of performing Integration Testing is to ensure that the different portions that make up the system function correctly, when combined to form a single working application. Integration Testing was performed at the end of each phase to prove that the system still maintained functionality. The benefits become more apparent as the system increases in size and functionality. For example, at the completion of phase two, Companies and Users were two separate system entities (at that point in development). However, the addition of Access Controls in phase three relies on successful integration with the Users entity, for login and customisable access rights to be successful in their operations. For such reasons, testing occurred at each phase completion to verify that new additions have not affected existing functionality. Navigation from one part of the system to another was also examined, by testing the links within the systems sidebar menu. As mentioned in Section 5, the implementation of CSS helps to uphold a consistent layout format for each page in the system. This was also examined. The outcome of Integration Testing for each phase of the system is shown in table 5.3 This phase was executed until no international errors were found.

| **Phase** | Test Case | Successful |
|---|---|---|
| 1 | No other phases to test any impact for. | N/A |
| | No other phases to test any consistency against. | N/A |
| | Sidebar links to phase one entity works correctly. | Test Successful |
| 2 | Addition of Phase 2 has no impact on existing Phase 1 | Test Successful |
| | Addition of Phase 2 does not cause any inconsistencies. All Phases are functioning appropriately. | Test Successful |

| | | |
|---|---|---|
| | Sidebar links to phase 1 and 2 entities work correctly. | Test Successful |
| 3 | Addition of Phase 3 has no impact on existing Phases 1 and 2. | Test Successful |
| | Addition of Phase 3 does not cause any inconsistencies. All Phases are functioning appropriately. | Test Successful |
| | Sidebar links to phases 1, 2, and 3 entities work correctly | Test Successful |
| 4 | Addition of Phase 4 has no impact on existing Phases 1 - 3 | Test Successful |
| | Addition of Phase 4 does not cause any inconsistencies. All Phases are functioning appropriately. | Test Successful |
| | Sidebar links to phases 1, 2, 3 and 4 entities work correctly. | Test Successful |
| 5 | Addition of Phase 5 has no impact on existing Phases 1  4 | Test Successful |
| | Addition of Phase 5 does not cause any inconsistencies. All Phases are functioning appropriately. | Test Successful |
| | Sidebar links to phase 1, 2, 3, 4 and 5 entities work correctly. | Test Successful |
| 6 | Addition of Phase 6 has no impact on existing Phases 1  5. | Test Successful |
| | Addition of Phase 6 does not cause any inconsistencies. All Phases are functioning appropriately | Test Successful |
| | Sidebar links to phase 1, 2, 3, 4, 5 and 6 entities work correctly | Test Successful |

Table 5.3 Test Cases for integrated testing to the eService portal

#### 5.1.1.1 Acceptance Testing

User Acceptance Testing In order to determine that the system had met the requirements defined in Section 3, the user and developer had arranged to meet at the end of March 2017. This involved the developer demonstrating the software and the directors using it briefly. User acceptance testing was done at the end of the implementation the developer provided a form which stated the original requirements. The results of this testing strategy can be found in Table 5.3. As this does not provide a robust conclusion to whether the software was still potentially usable, Section 9 discusses User evaluations that were also performed.

#### 5.1.1.1 Test Cases

Test case is a set of actions with expected results based on requirements for the system. It contains of outputs and procedures, follows when doing the testing process. There are two types of test cases as positive test case and negative test case.

A test case includes these elements:

- The purpose of the test or description of what requirement is being tested.
- Test data - Test data is a specification of the data elements, values or set that define how to satisfy the test intent.
- The setup to test - Version of application, hardware, software, operating system, access level, logical or physical date and any other setup information being tested.
- Actions and expected results.
- To use the data to analyze rework process and to make changes to prevent defects occurring in the system.

Following are the sample test cases which were used to run unit and integration tests

Test case for the registration to the eService portal - Table 5.3

| No | Test Case | Expected Result |
|---|---|---|
| 3.1 | Enter invalid email address or leave it blank | Pop up Error message of "Please enter valid email address." |
| 3.2 | Enter invalid mobile phone number or leave it blank | Error message of "Please enter valid phone number." |
| 3.3 | Enter invalid account number | Error message Pop up<br>Invalid Account No!. |

Table 5.3 Test Cases for registration to the eService portal

Test case for login to the eService portal Table - 5.4

| No | Test Case | Expected Result |
|---|---|---|
| 3.4 | Enter invalid username and/or password and clicks on Login button. | Pop up error massage<br>"Login Fail!.<br>You have entered Invalid User Name / |

Table 5.4 Test Cases for Login to the eService portal

### 5.1.1.2 Test Reporting

Immediate Purpose:

Provide information to the users of the software system, so that they can determine whether the system is ready for production. It will help to show the progress of testing to clients when they have doubts.

Long Term Purpose:

- To trace problems in the event application of the main functions.

## 5.2 Evaluation

The purpose of project evaluation is to assess the software development methodology that was used throughout the development of the framework, assess the usefulness of the technologies and tools, the accuracy of the estimations and the usefulness of the reviews. The solution will be reviewed and evaluated to decide whether it accomplishes the ideas presented in the initial overview and for the quality of the product.

Since the software engineering model used in this project was as RAD model, the evaluation for each delivery was obtained by the client at the time the components were delivered. They were mainly review meetings and the feedback obtained was used in corrective maintenance and/or change management.

Based on a prepared list of criteria along with some practical experimentation, a software evaluation makes it possible to check whether the project objectives were satisfied.

Table 5.5 was designed to collect feedback from the end users of the system. This was distributed among the users to get their feedback anonymously. The evaluator assessed the returned forms in order to obtain the actual feedback of the users and to assess that the project objectives have been met. In analyzing, a measurement against likert scale was used to quantify the feedback and the values assigned parameters were as follows;

## 5.3 Evaluation Results

### Evaluation Result for Appearance

According to the results of the feedback following graphs have been generated and analyzed. Special scenarios have been described below with the graphical results of the feedback.

Table 5.5 shows evaluation results for the criteria of Appearance related to User Interfaces are attractive of eService portal

| Likert Option | Result | Percentage (%) |
|---|---|---|
| 1 - Excellent | 9 | 30 |
| 2 - Good | 13 | 43 |
| 3 - Satisfactory | 6 | 20 |
| 4 - Fair | 2 | 7 |
| 5 - Poor | 0 | 0 |

Table 5.5 Evaluation Results for Appearance

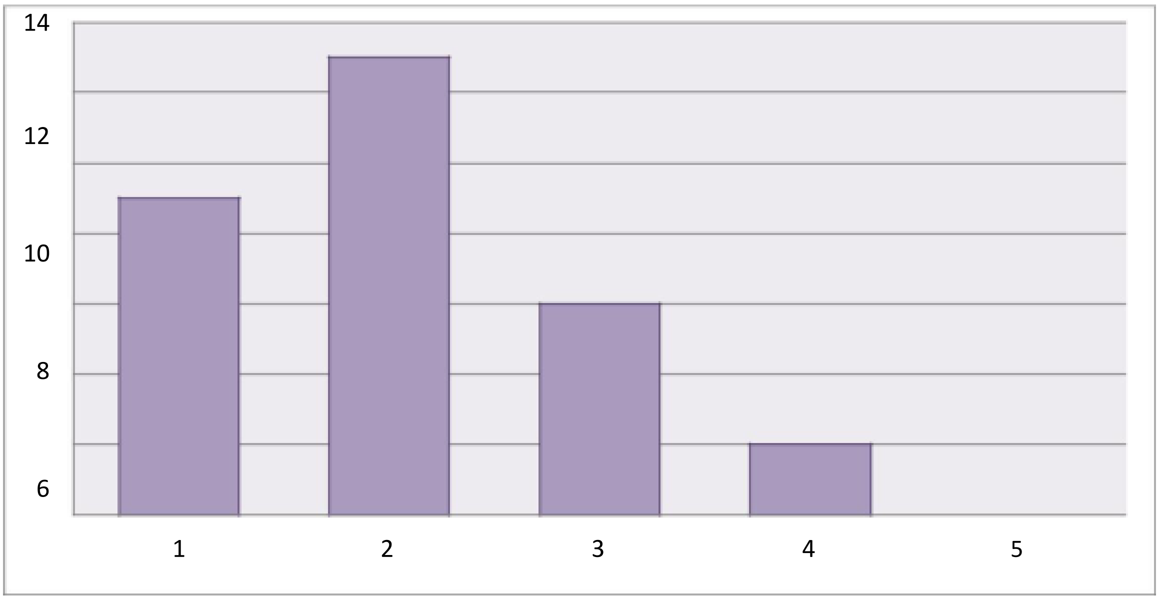


Figure 5.6 graphical representations of Evaluation Results for Appearance

According to the Graphical representation most of the users have agreed with the User Interfaces are attractive of the system. Overall Appearance of the web site is not excellent but it was not bad according to the results of the feedback. 43% of the results are “Good” while 30% results are “Excellent”.

### Evaluation Result for Usability

Following Table 5.4 shows evaluation results for the criteria of **Usability** related to "Data validation are satisfied" of the system. The online system provide Data validation for every client's input data.

| Likert Option | Result | Percentage (%) |
|---|---|---|
| 1 - Excellent | 8 | 27 |
| 2 - Good | 12 | 40 |
| 3 - Satisfactory | 5 | 17 |
| 4 - Fair | 3 | 10 |
| 5 - Poor | 1 | 3 |

Table 5.6 Evaluation Result for Usability

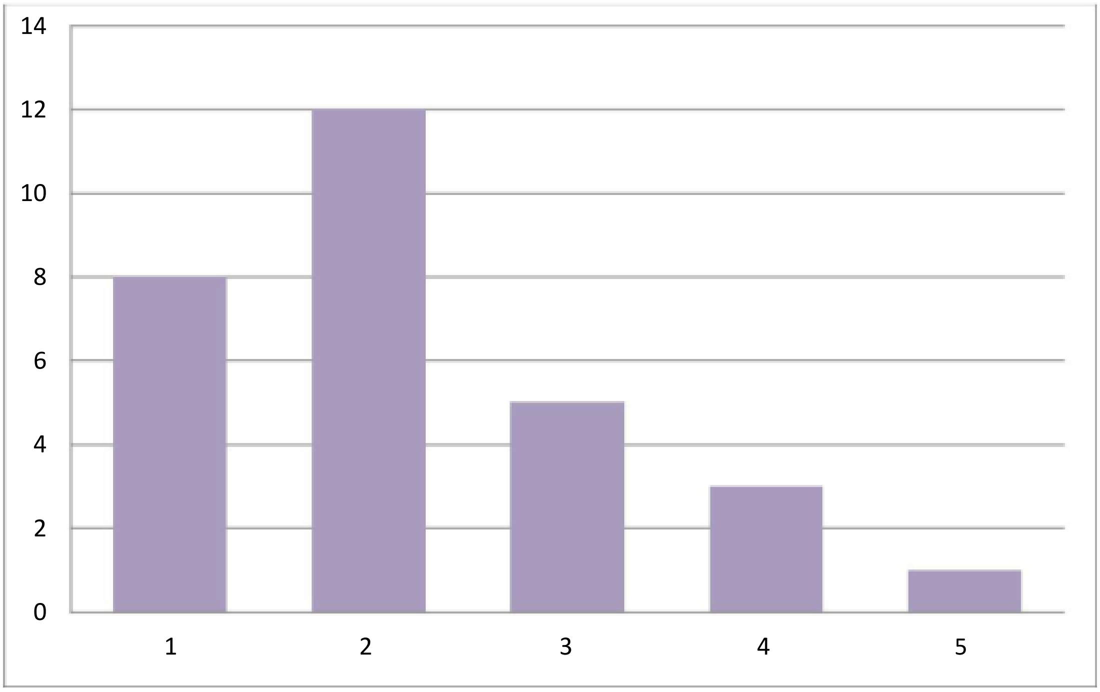


Figure 5.7 Graphical representation of Evaluation Results for Usability

Comparatively less result for the "Poor" option and the majority of 40% have voted for "Good" option. 27% of the users selected as "Excellent".

**Evaluation Result for Functionality**

Following Table 5.7 shows the evaluation results on Functionality of Accuracy of online bill calculation. User have done this with comparing manual bill calculations.

| Likert Option | Result | Percentage (%) |
|---|---|---|
| 1 - Excellent | 7 | 23 |
| 2 - Good | 12 | 40 |
| 3 - Satisfactory | 5 | 17 |
| 4 - Fair | 4 | 13 |
| 5 - Poor | 2 | 7 |

Table 5.7 Graphical representation of Evaluation Results for Functionality

In generally most of the users are satisfied with the accuracy of the online bill calculation function Overall results of the evaluation accuracy of the bill calculation function 40% are "Good" while 23% results are "Excellent".

**Evaluation Result for Performance**

Table 5.8 shows evaluation results for the criteria of Performance related to Response time for request's events of the web pages. While developing the system response time of the activities were mainly considered, i.e, inserted few images for web sites because customers don't wait long time for web page load.

| Likert Option | Result | Percentage (%) |
|---|---|---|
| 1 - Excellent | 8 | 27 |
| 2 - Good | 10 | 33 |
| 3 - Satisfactory | 6 | 20 |
| 4 - Fair | 5 | 17 |
| 5 - Poor | 1 | 3 |

Table 5.8 Evaluation Result for Performance

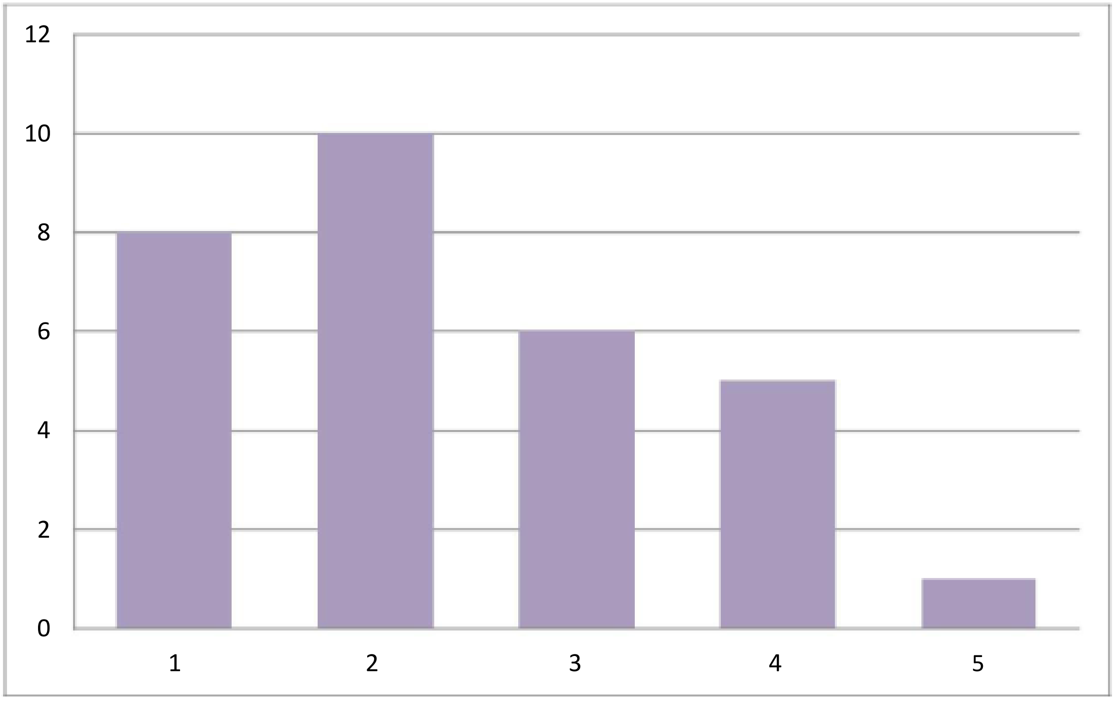


Figure 5.9 Graphical representations of Evaluation Results for Performance

Overall results of the evaluation for response time are excellent and more than 20% of users were satisfied with this criterion. 33% of the results are “Good” while 27% results are “Excellent”.

# Chapter 6: Conclusion

Conclusion phase is the phase where project is officially concluded and the outcome of the whole project is reviewed. This chapter documents the work during this phase.

According to the evaluation identified following area should be improved. As per the feedback received from the evaluation of eService portal

- The "**Appearance**" has **overall 43% "good"** evaluation. Therefore User Interfaces are attractive.
- **Usability** has 40% "good" evaluation. Therefor "Data validation is satisfied" some extend but have to improve of the system.
- **Functionality** has 40% "good" evaluation. Therefor accuracy of online bill calculation should improve.
- The Performance has 33% "good" evaluation. Therefor Response time for request's events should be minimized.

The system evaluation was successfully completed with the end users rating the system as being satisfactory.

The website has been developed as a public site and anyone could access it via web. Getting the look and feel according to satisfaction of all the customers was another challenge successfully faced during design of the layouts and themes of the website.

## 6.1 Problems Encountered and Lesson learned

Every project encounters problems along the way of its execution. The following problems were encountered during system implementation process

- There was not standard procedure for order Payment services provide from Administration offices and they use different application format and processes in island wide

- Most of customer refused to give their information during requirement gathering process.
- The research shows WCF technology and web method of Dot Net frame work version 4. That was new section therefore, I have to learn and complete the project within given time frame
- The research shows how to study to sending SMS and email massage to mobile phone and Internet from the system.

The following lessons were learnt during the projects work.

- Prepared standard procedure to Billing and Payment services with discussing process champions
- Through the interviewing process it was easy to get necessary details from consumers.
- I have used prototype to show the process flow to user, to obtain billing information and customer history bill detail.
- Fast learnt WFC technology, web method, sending SMS, Email messages and related sample code using Google search.

The importance of planning and finishing work as early as possible was the most important lesson. Initially defined timeline for developing a software project is supposed to be a guideline, deviations from the guideline occur from time to time. It is important to make changes to the work and the guideline to stay on course for meeting the deadline set for the project. Reviewing project work often is necessary to ensure that effort is translated in to meaningful work.

## 6.2 Critical Evaluation of the System

OSMS is an online web based Service Management System that will facilitate to customer to apply for new water connection online and get other services online, and also gets billing and payment service, make payment through credit card etc. without visiting to any regional office.

During my survey though internet, found some similar systems for the OSMS. In most of the countries all over the world publish online services for water management. The main responsibilities of these organizations include: laying pipelines, distributing good quality water to community, maintaining water reservoirs, billing and payment collection using standardized tariff setting, providing consumer services, giving new water connections to the requested consumers, etc. Most of similar system provide integrated service and provide full customer requirement. i.e they provide maintenance other service in same system as module basis and all services were integrated with store management, financial management and procumbent management.

When compare this OSMS and other similar sites, this OSMS is at very initial stage.

This wasn't integrating with other module. Therefore it will develop other services as module and integrate in future work.

## 6.3 Future Enhancements

We use this Online Service Management System (OSMS) to bring services to customer fingertips saving their valuable time and money. Enjoy the benefits of innovative technology based on eGovernment concepts to achieve customers' requirements from home avoiding the need for unnecessary visits to NWSDB busy offices.

There for OSMS is need for ORMFOS, it facilitates customer services, and also this system is future investment for Water Board that can increase the new water connection also provide quality and efficient service to the Sri Lankan.

Online Restaurant Management and Food Ordering System (ORMFOS) facilitate with other service ( which are already developed) and Other Service.

Other Service include following online request submissions

- New Connection Request
- Name Change Request

- Category Change Request
- Table Booking Request
- Event Booking Request
- Event Change Request

For the time being I have developed above request submission process and customer gets acknowledgement through SMS and Email. Every requisition has business process to complete the services. In My future work I have to complete each process as modules.
Finally customer can get result final output through online and they don't need to visit offices.
Also Online Service Management System (OSMS) can integrate with other operation done in Water Board i. e.

i. Water leak detection process.
ii. Pipe and other service break down and repairer process
iii. Water Quality detection and maintenance
iv. Ground water detection and deep well excavation process
v. Water purify and transportation
vi. Public grievances and complain system
vii. Legal Module

All above function operate in water board can integrate with online service management system as module wise.

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# Appendix A: ER Diagram for proposed Solution

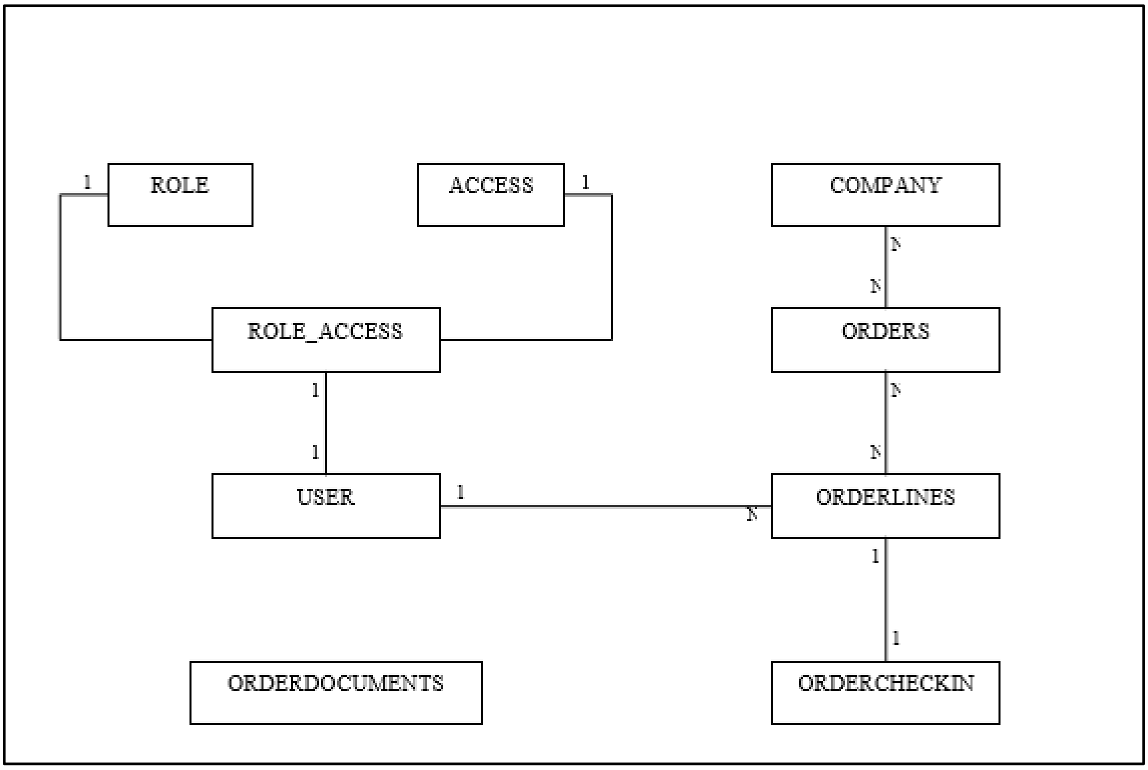


Figure A.1 shows the ER.

# Appendix B: Activity diagram for place an Order

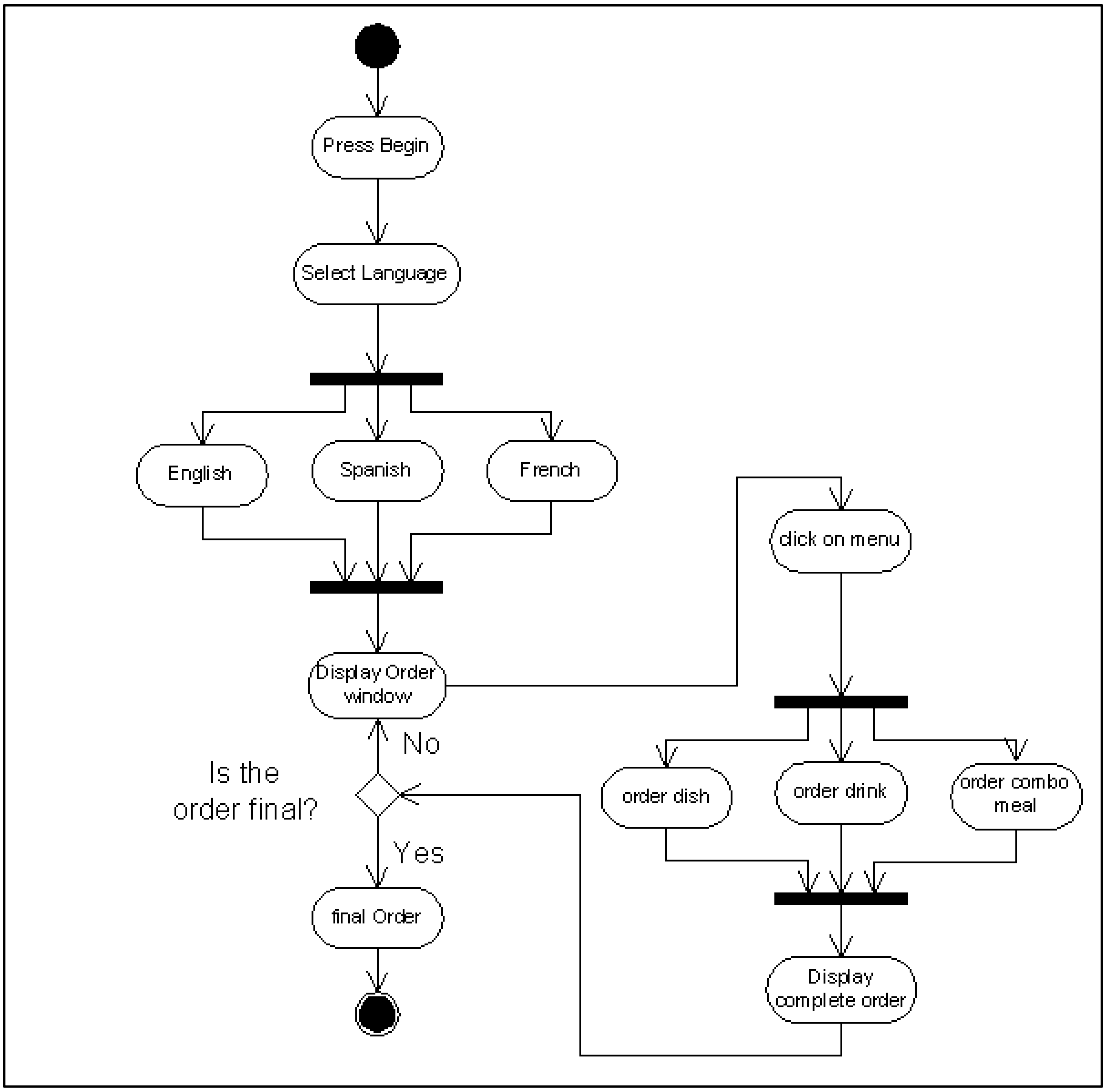
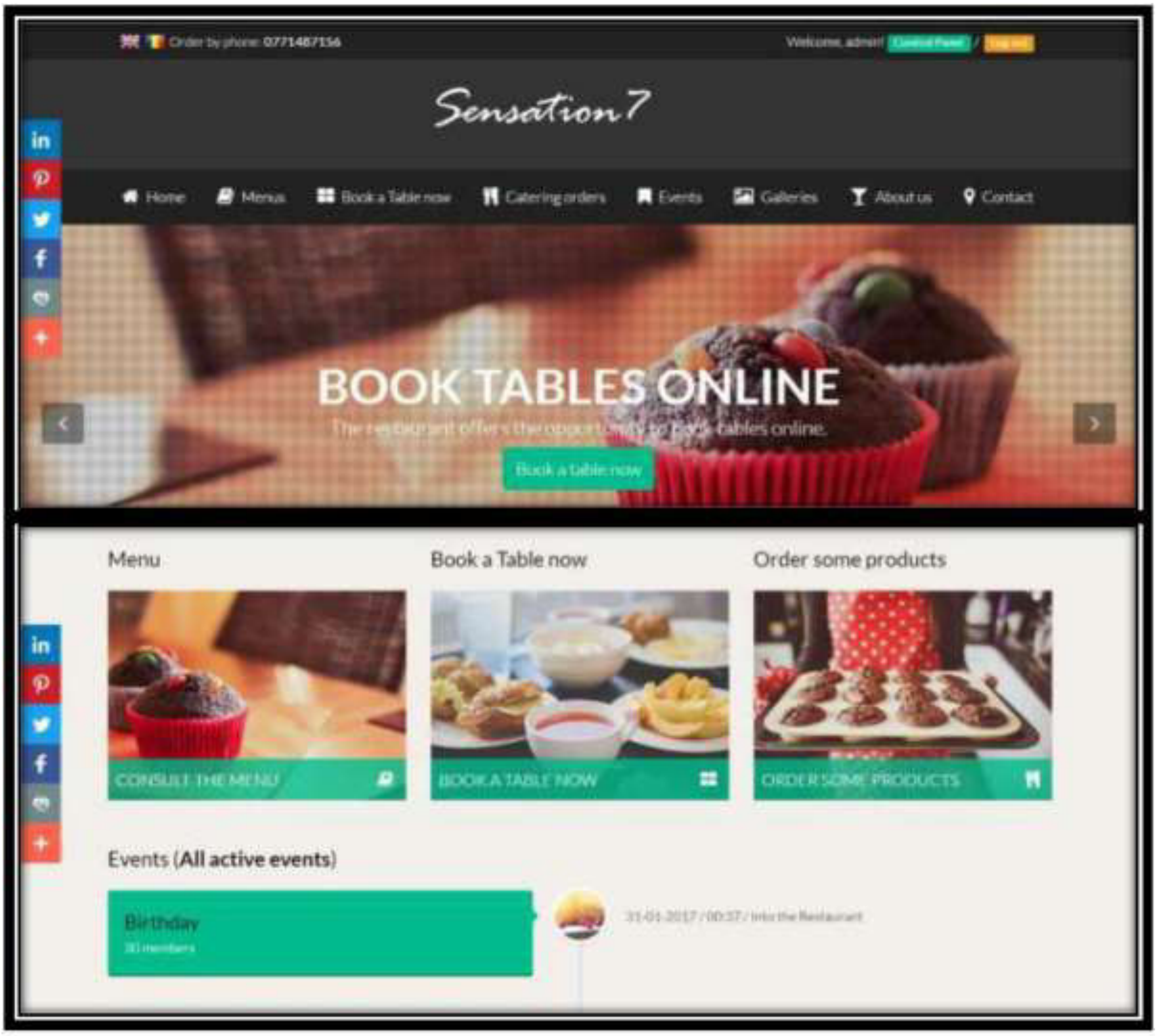


Figure B.1 shows the Activity diagram.

# Appendix C: User Manual

## Home page



Order by phone: 0771487156

Welcome, admin!

The restaurant offers the opportunity to book tables online.

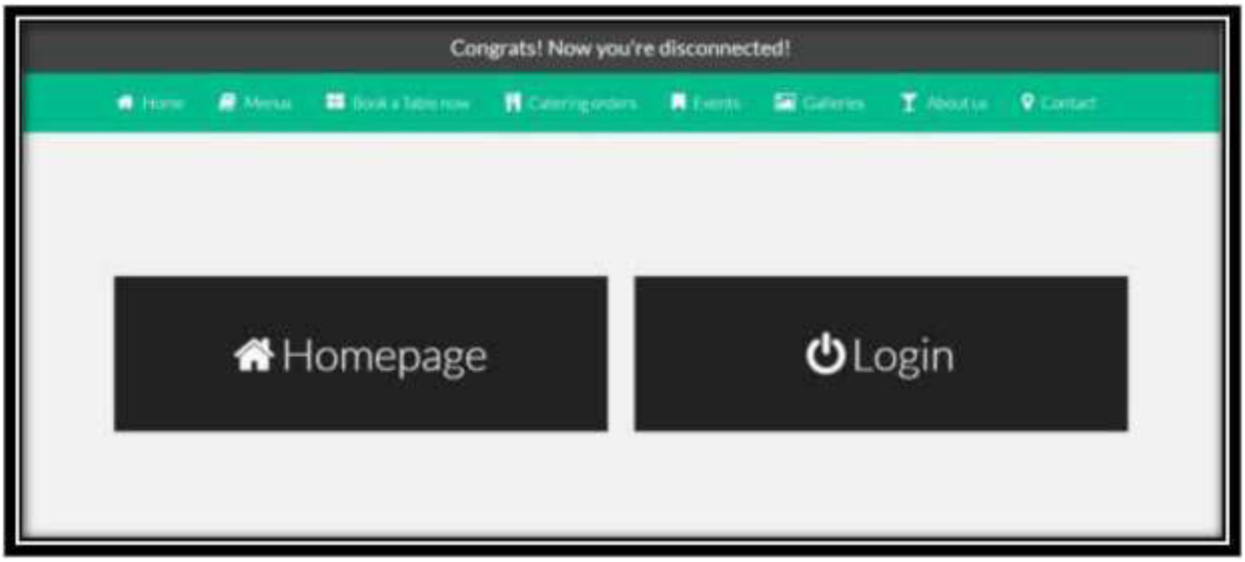
Birthday
30 members

31-01-2017 / 00:37 / Into the Restaurant

Figure C.1: Home page

For registered customer click the “Login” button. Then the system  load login page

## Login Page

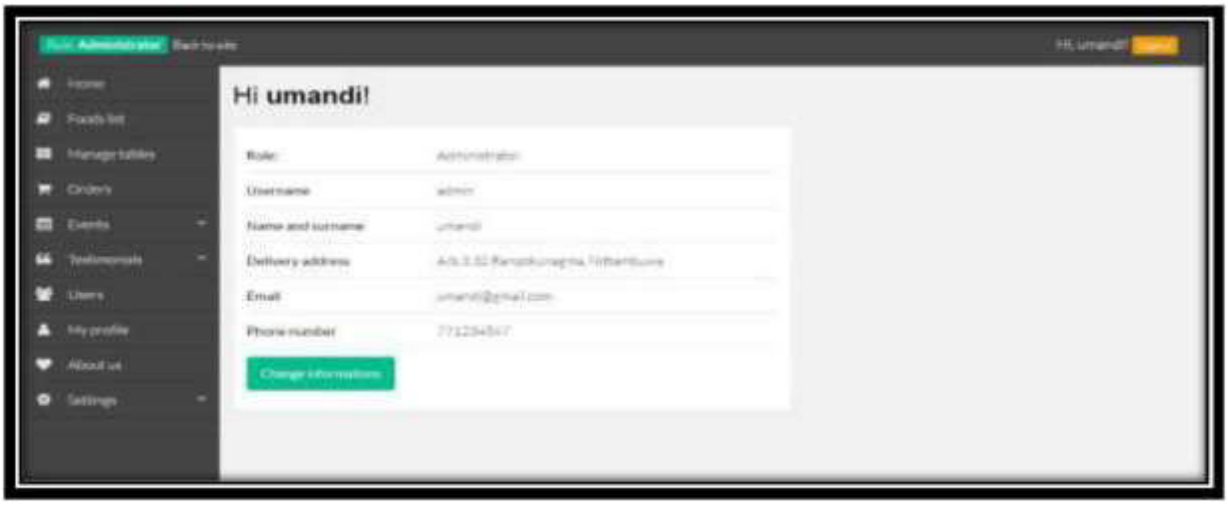


Congrats! Now you're disconnected!

Figure C.2: Login page

## User Registration

For new user have to register this portal.



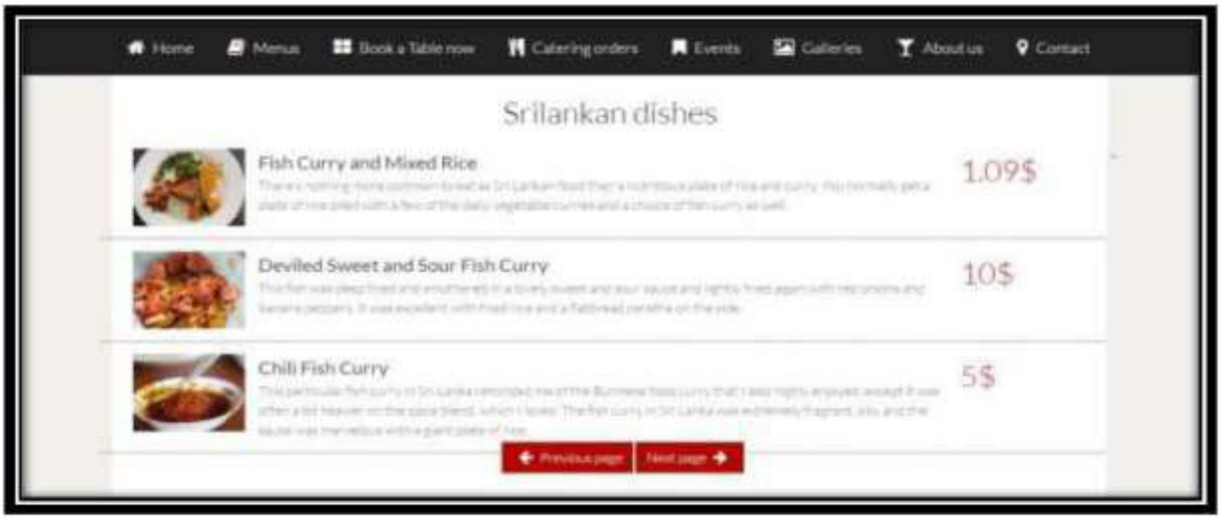
Hi umandi!

| | |
|---|---|
| Role: | Administrator |
| Username | admin |
| Name and surname | umandi |
| Delivery address | A/L 3.32 Ranpokunagma, Nittambuwa |
| Email | umandi@gmail.com |
| Phone number | 771234567 |

Figure C.3: Registration page

## Menu list

Can view all the current menu items.



Srilankan dishes

Fish Curry and Mixed Rice
There is nothing more common to eat as Sri Lankan food than a nutritious plate of rice and curry. You normally get a plate of rice piled with a few of the daily vegetable curries and a choice of fish curry as well.
1.09$

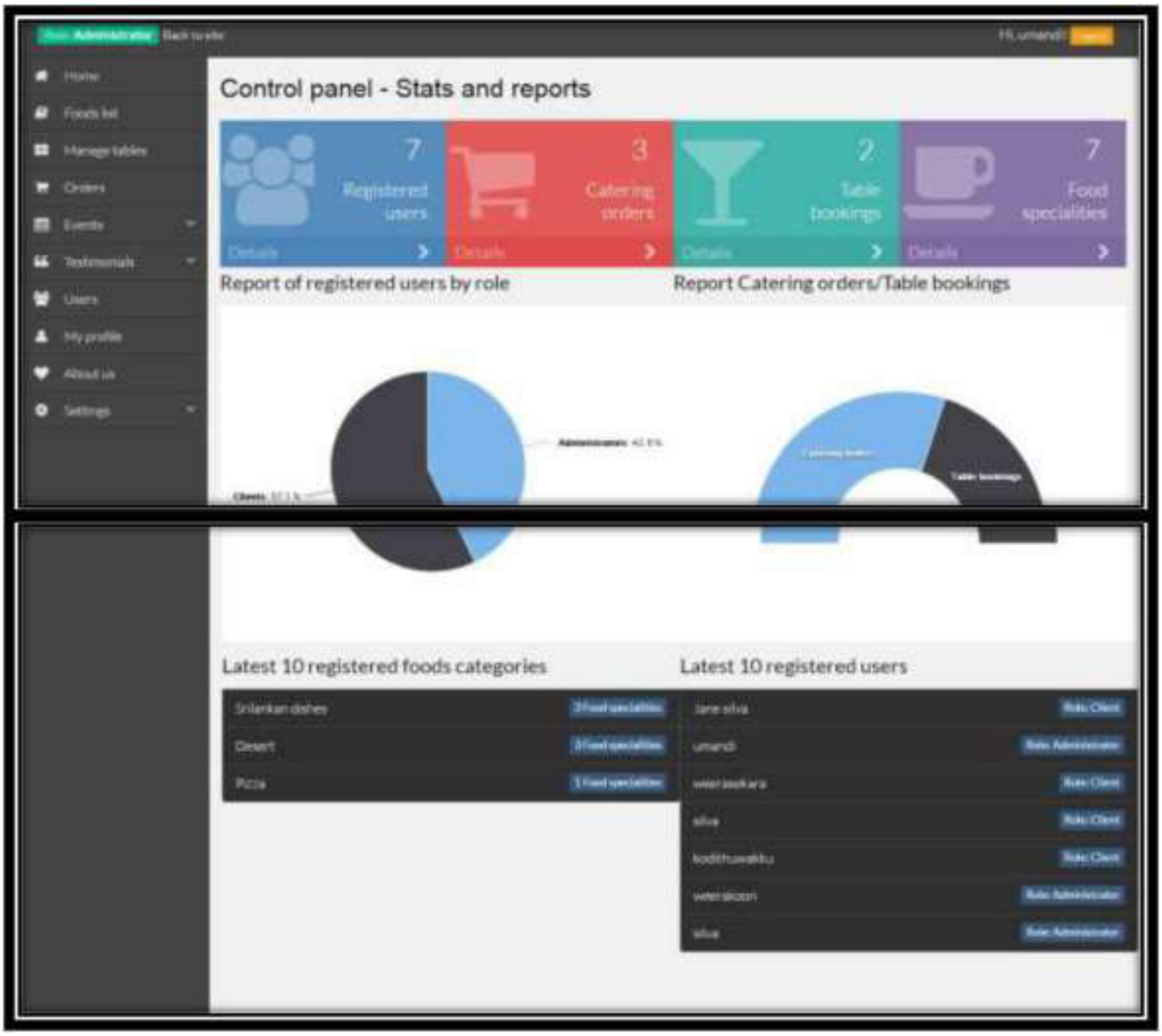
Deviled Sweet and Sour Fish Curry
This fish was deep fried and smothered in a lovely sweet and sour sauce and lightly fried again with red onions and banana peppers. It was excellent with fried rice and a flatbread paratha on the side.
10$

Chili Fish Curry
This particular fish curry in Sri Lanka reminded me of the Burmese fish curry that I also highly enjoyed, except it was often a lot heavier on the spice blend, which I loved. The fish curry in Sri Lanka was extremely fragrant, oily, and the sauce was marvelous with a giant plate of rice.
5$

The figure C.4 Menu List

## Control Panel

Can check all the relevant information in a summarized charts.



Control panel - Stats and reports

7 Registered users

3 Catering orders

2 Table bookings

7 Food specialities

Report of registered users by role

Report Catering orders/Table bookings

Latest 10 registered foods categories

| | |
|---|---|
| Srilankan dishes | 3 Food specialities |
| Desert | 3 Food specialities |
| Pizza | 1 Food specialities |

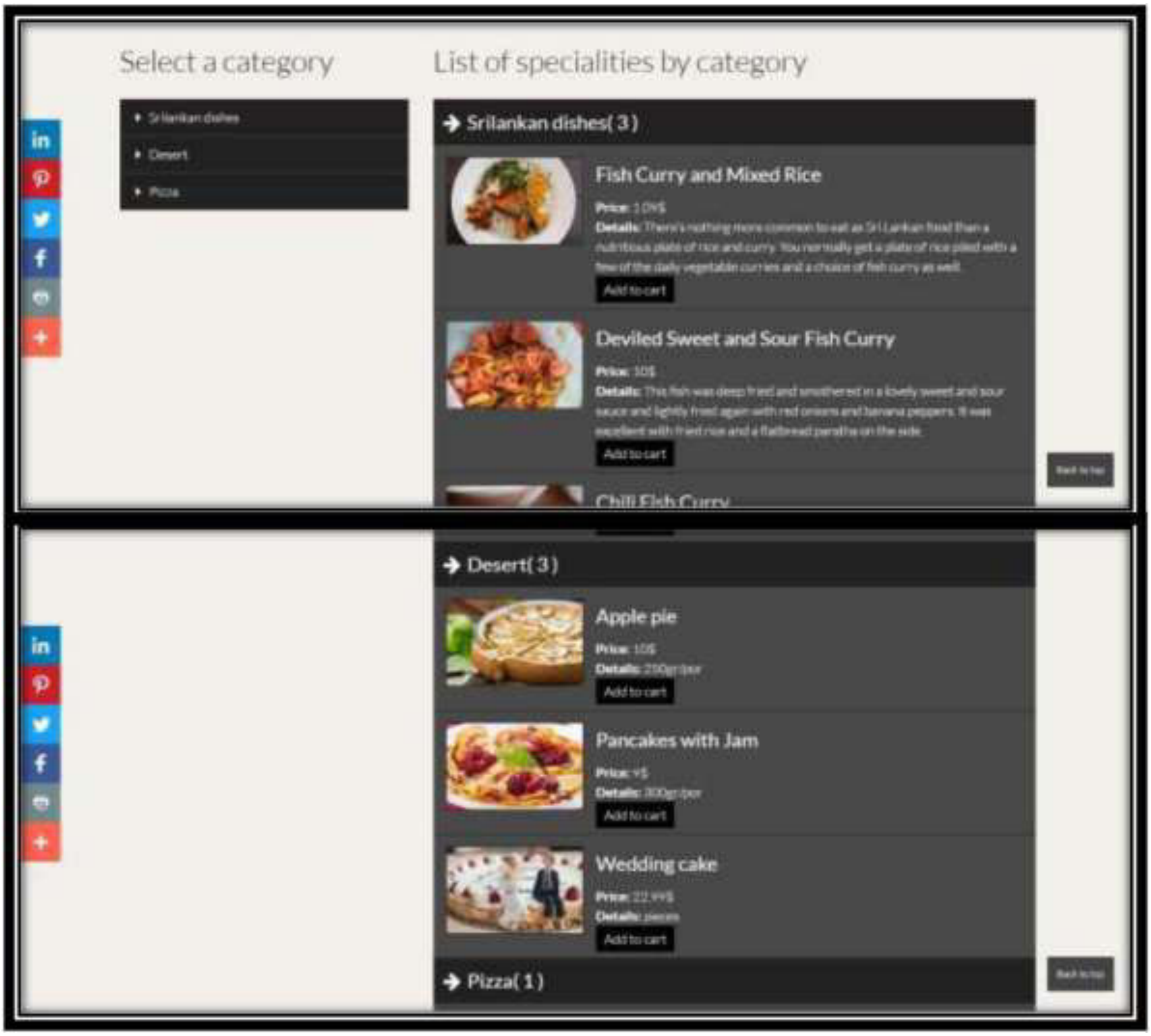
Latest 10 registered users

| | |
|---|---|
| Jane silva | Role: Client |
| umandi | Role: Administrator |
| weerasekara | Role: Client |
| silva | Role: Client |
| kodithuwakku | Role: Client |
| weerakoon | Role: Administrator |
| silva | Role: Administrator |

The figure C.5 Control Panel

## Menu Category

User can check all information of Srilanka dishes, Deserts, and Pizza.



Select a category

- Srilankan dishes
- Desert
- Pizza

List of specialities by category

→ Srilankan dishes( 3 )

Fish Curry and Mixed Rice

**Price:** 10.9$

**Details:** There's nothing more common to eat as Sri Lankan food than a nutritious plate of rice and curry. You normally get a plate of rice piled with a few of the daily vegetable curries and a choice of fish curry as well.

Deviled Sweet and Sour Fish Curry

**Price:** 10$

**Details:** This fish was deep fried and smothered in a lovely sweet and sour sauce and lightly fried again with red onions and banana peppers. It was excellent with fried rice and a flatbread paratha on the side.

Chili Fish Curry

→ Desert( 3 )

Apple pie

**Price:** 10$

**Details:** 250gr/por

Pancakes with Jam

**Price:** 9$

**Details:** 300gr/por

Wedding cake

**Price:** 22.99$

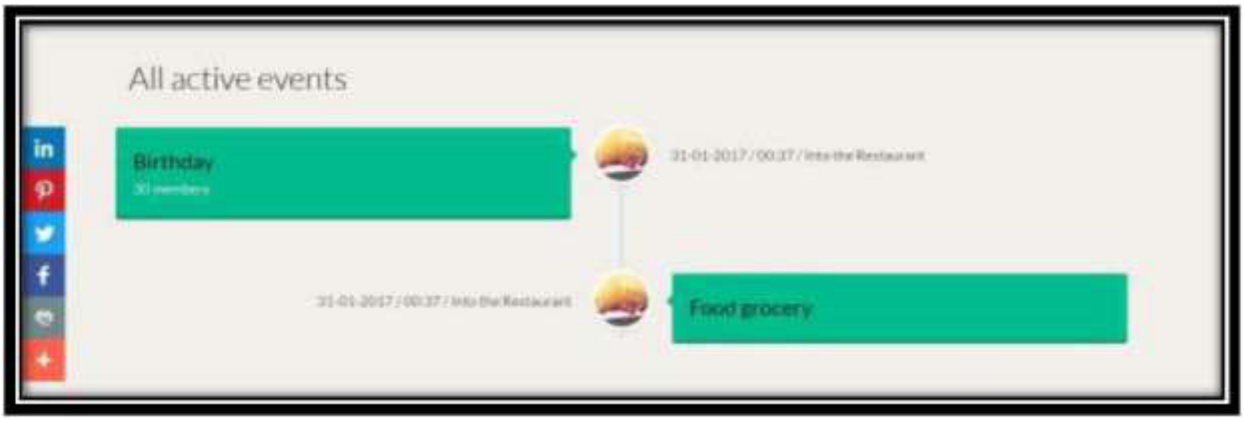
**Details:** pieces

→ Pizza( 1 )

The figure C.6 Menu Categor

## Event

User can add or remove future events and old events are automatically remove from the system.



All active events

Birthday
30 members

31-01-2017 / 00:37 / Into the Restaurant

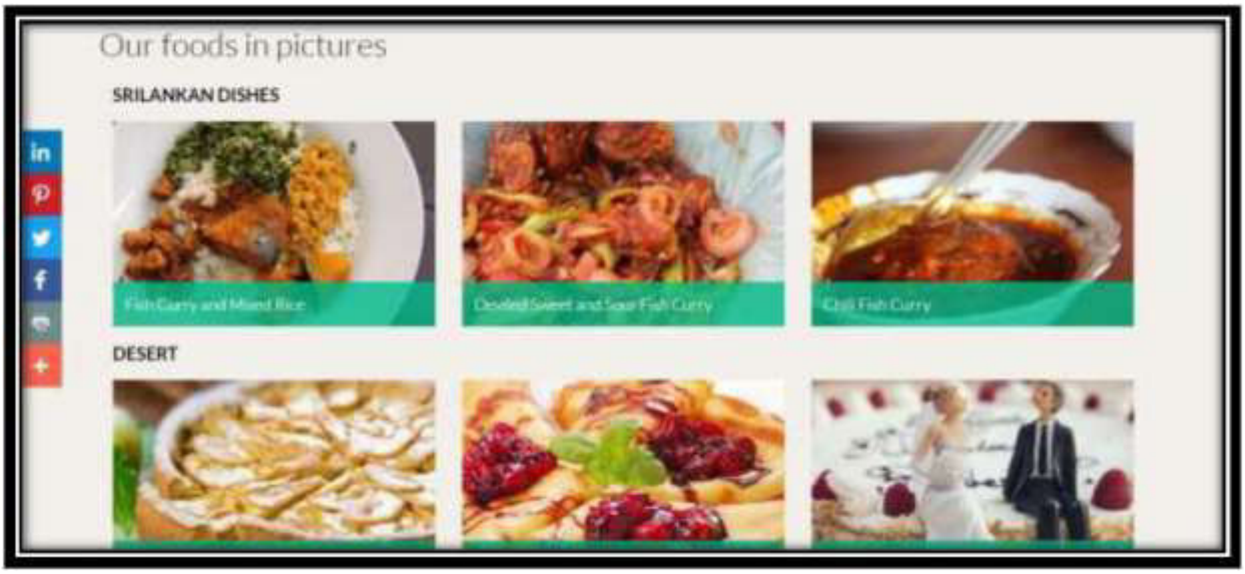
31-01-2017 / 00:37 / Into the Restaurant

Food grocery

The figure C.7 Event

## Food Summery

Can view all food dishes and deserts with their relevant pictures.



Our foods in pictures

SRILANKAN DISHES

Fish Curry and Mixed Rice

Devilled Sweet and Sour Fish Curry

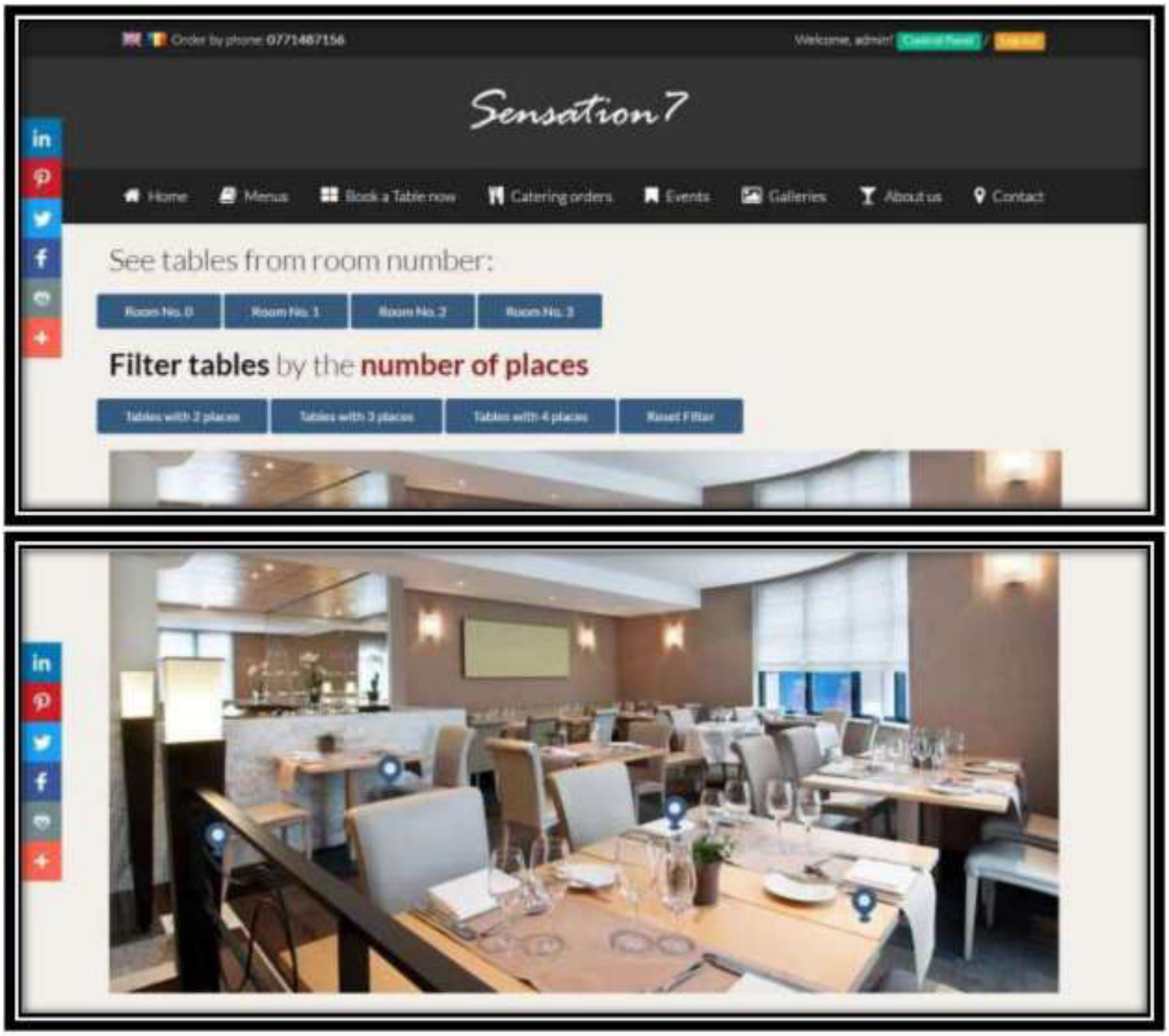
Chili Fish Curry

DESERT

The figure C.8 Food summery

## Table Booking

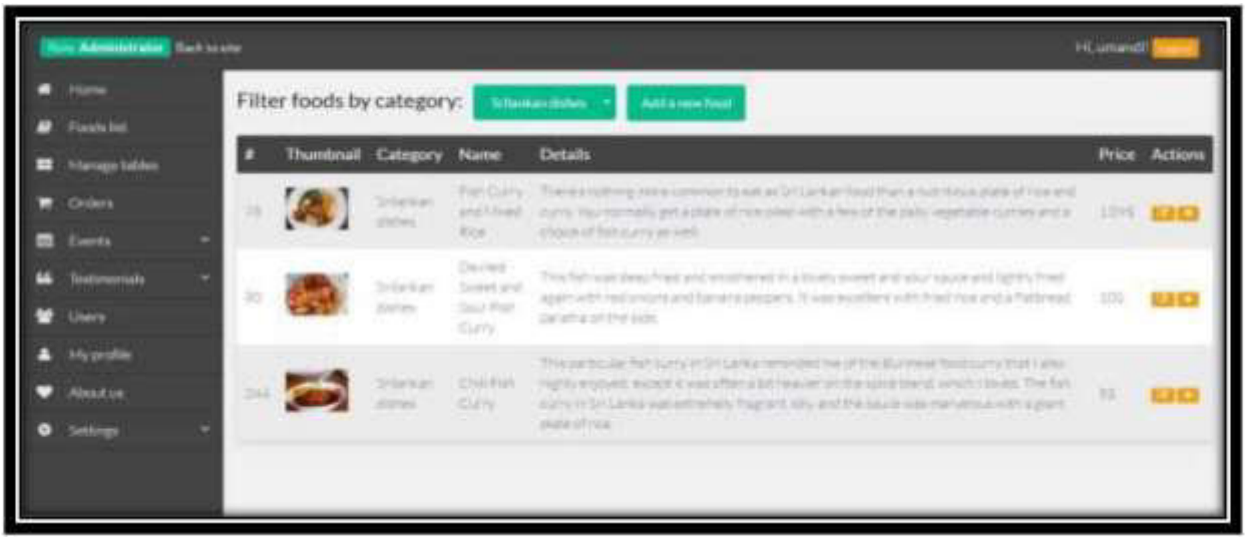
User can book an event and the table or room user wish to celebrate in the premises.



The figure C.9 Table Booking

## Food Category

User can visit selected food dishes.



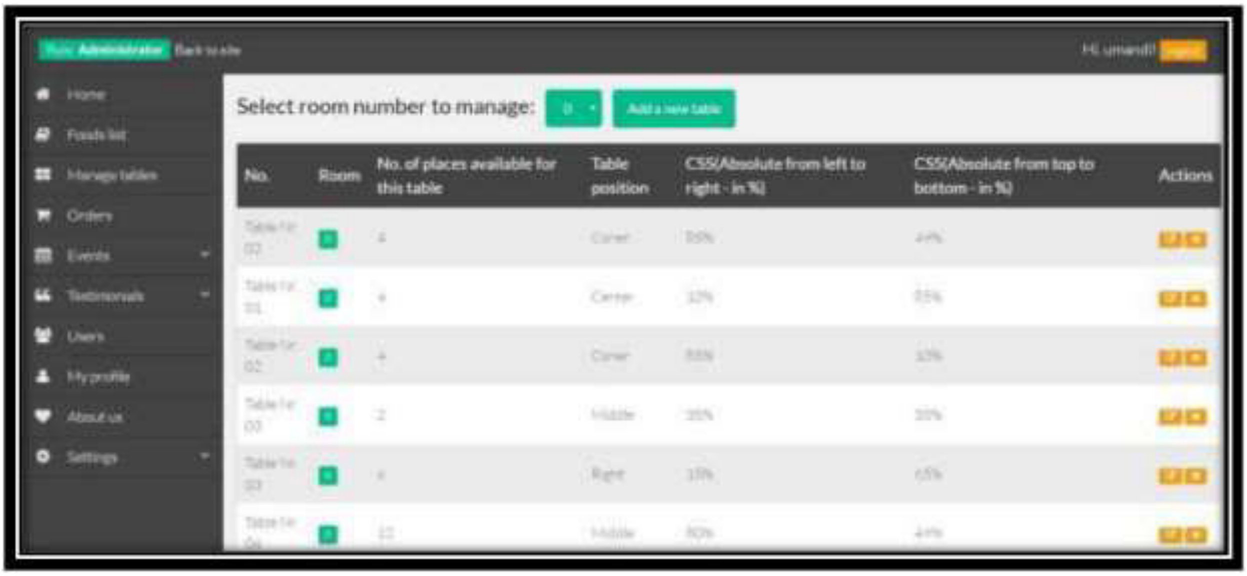
Filter foods by category:

| # | Thumbnail | Category | Name | Details | Price | Actions |
|---|---|---|---|---|---|---|
| 78 | | Srilankan dishes | Fish Curry and Mixed Rice | There is nothing more common to eat as Sri Lankan food than a nutritious plate of rice and curry. You normally get a plate of rice piled with a few of the daily vegetable curries and a choice of fish curry as well. | 1395 | |
| 80 | | Srilankan dishes | Devilled Sweet and Sour Fish Curry | This fish was deep fried and smothered in a lovely sweet and sour sauce and lightly fried again with red onions and banana peppers. It was excellent with fried rice and a flatbread paratha on the side. | 100 | |
| 244 | | Srilankan dishes | Chili Fish Curry | This particular fish curry in Sri Lanka reminded me of the Burmese fish curry that I also highly enjoyed, except it was often a bit heavier on the spice blend, which I loved. The fish curry in Sri Lanka was extremely fragrant, oily, and the sauce was marvelous with a giant plate of rice. | 93 | |

The figure C.10 Food Category

## Table Booking Summary

User can filter tables by the room numbers.



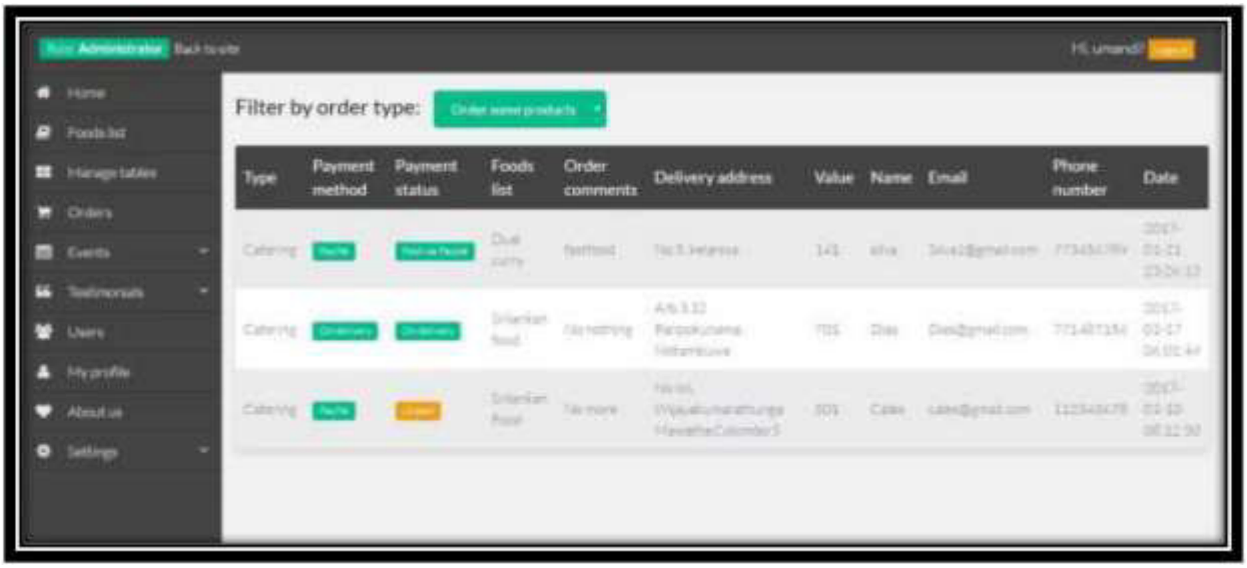
Select room number to manage:

| No. | Room | No. of places available for this table | Table position | CSS(Absolute from left to right - in %) | CSS(Absolute from top to bottom - in %) | Actions |
|---|---|---|---|---|---|---|
| Table for 02 | 0 | 4 | Corner | 55% | 44% | |
| Table for 01 | 0 | 4 | Center | 12% | 55% | |
| Table for 02 | 0 | 4 | Corner | 85% | 12% | |
| Table for 03 | 0 | 2 | Middle | 35% | 20% | |
| Table for 03 | 0 | 6 | Right | 15% | 65% | |
| Table for 04 | 0 | 12 | Middle | 80% | 44% | |

The figure C.11 Table Booking Summary

## Food Order Summary

User can visit daily ordered summary details with the payment method.



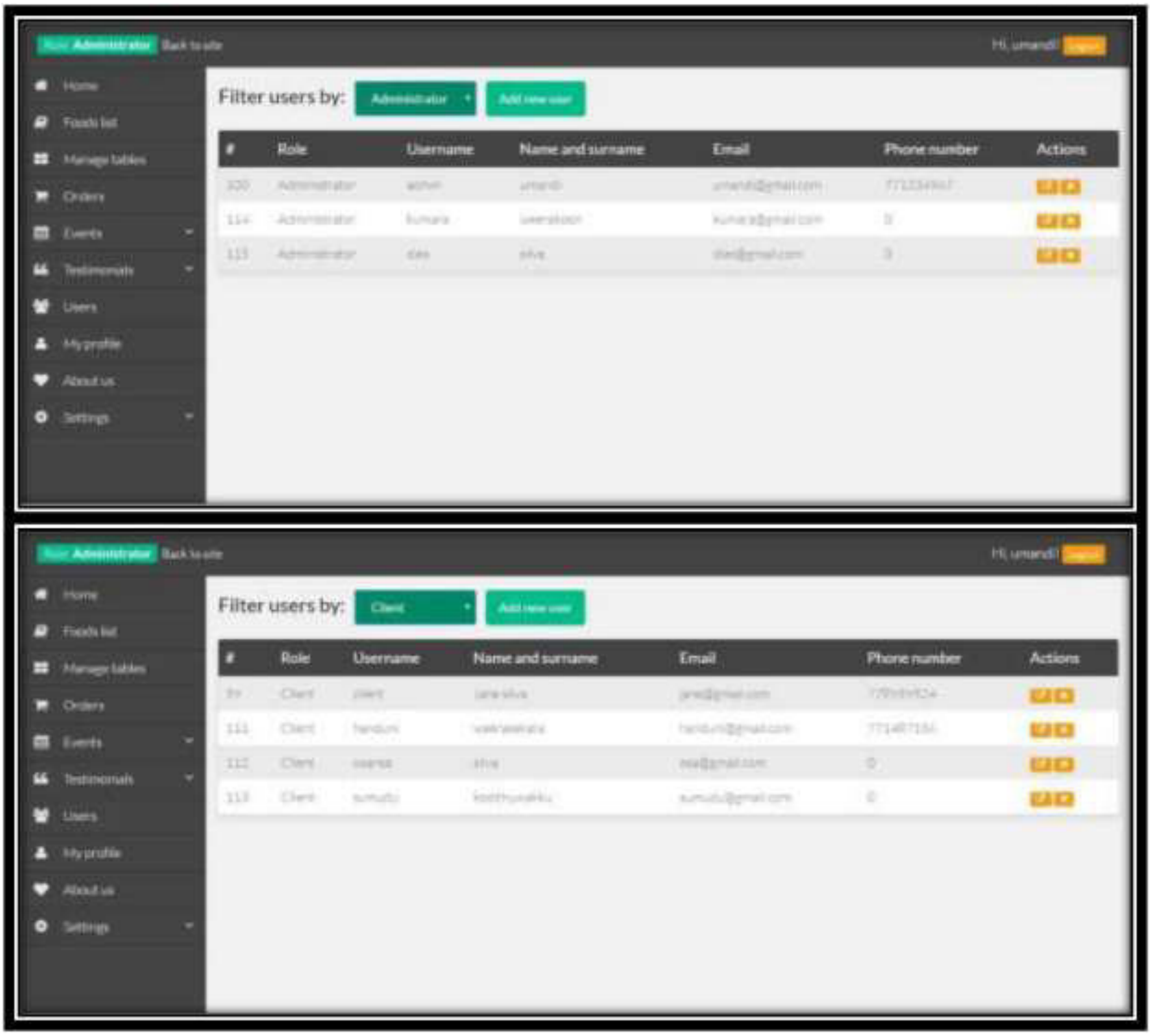
Filter by order type: Order some products

| Type | Payment method | Payment status | Foods list | Order comments | Delivery address | Value | Name | Email | Phone number | Date |
|---|---|---|---|---|---|---|---|---|---|---|
| Catering | PayPal | Paid via Paypal | Dal curry | fastfood | No 5 Kelaniya | 141 | silva | Silva1@gmail.com | 773456789V | 2017-01-21 23:24:13 |
| Catering | On delivery | On delivery | Srilankan food | No nothing | A/b 3.12 Parppukulama Hettankuwa | 705 | Dias | Dias@gmail.com | 771487134 | 2017-03-17 04:01:44 |
| Catering | PayPal | [illegible] | Srilankan Food | No more | No 66, Wijayakumaratunga MawatheColombo5 | 301 | Cake | cake@gmail.com | 112345678 | 2017-03-10 08:12:50 |

The figure C.12 Food Order Summary

## User Account Summary

User can filter no of Administrators currently logging to the system and no of clients have  logging to the system currently.



Filter users by: Administrator

| # | Role | Username | Name and surname | Email | Phone number | Actions |
|---|---|---|---|---|---|---|
| 100 | Administrator | admin | umandi | umandi@gmail.com | 771234567 | |
| 114 | Administrator | kumara | weerakoon | kumara@gmail.com | 0 | |
| 115 | Administrator | dias | silva | dias@gmail.com | 0 | |

Filter users by: Client

| # | Role | Username | Name and surname | Email | Phone number | Actions |
|---|---|---|---|---|---|---|
| 99 | Client | client | jane silva | jane@gmail.com | [illegible] | |
| 111 | Client | handuni | weerawaka | handuni@gmail.com | 771487156 | |
| 112 | Client | isanka | silva | isa@gmail.com | 0 | |
| 113 | Client | sumudu | kodithuwakku | sumudu@gmail.com | 0 | |

The figure C.13 User Account Summary