FC6P01- Final Project

Cloud based Property Management

with Face Recognition System

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Abstract

This is a final report for the project to design and implement a centralized Cloud based Property Management with Face Recognition System. Hotel Industry is one of the main compartments in Sri Lanka since it made a huge impact on the economy. Nowadays, having multiple hotels under one ownership is a strategy of successful businessmen. Yet, there is a less of interaction between all hotels and the management. Owner and the management have a huge challenge when it comes to manage the hotel chain. Management use the manual system for all the hotels and it occurred a huge problem of gathering information under one specific way. It is much time consuming and management need more staff and regular system for this purpose. When paying the attention on these several matters, suggesting a Property Management System is a great solution for this issue. This Property Management System supports to gather the information under one centralized cloud base with identification of Loyal Customers Face Recognition System. Through the FRS, management can easily continue a great connection between the hotel and the client as it easily identifies the customer and the given information of customers in cloud base. Author examined the existing system of the hotel and listed the advantages and disadvantages of it. Analyzed the drawbacks and author suggested to create a Cloud based Property Management with Face Recognition System. Since this system is a cloud-based software system, it can make a huge impact in the hotel field. With this new loyalty customer face recognition system hotel owners can widen their businesses and attract the customers towards their hotels since they served a better service. This will be a huge change to a modern technology system to explore the hotel field. From this system, it can centralize data and information securely and have the ability to customize efficiently.

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Abbreviations

AWS- Amazon Web Services

CSS- Cascading Style Sheets

FRS- Face Recognition System

HMS - Hotel Management System

HTML - Hypertext Markup Language

JS - JavaScript

JSP- JavaServer Pages

JSTL- JavaServer Pages Standard Tag Library

LBPH - Local Binary Patterns Histogram

MVC- Model, View, Controller

MYSQL - Its name is a combination of "My", the name of co-founder Michael Wideness's daughter, and "SQL", the abbreviation for Structured Query Language.

OpenCV- Open source computer vision

XML - Extensible Markup Language

1 Chapter 1 Introduction

Sri Lanka’s hotel industry is a key driver of economy in growth in the island nation.it has witnessed unprecedented economic growth over the past 15 years. The tourism sector has emerged as frontrunner in Sri Lanka's economic activities.

The use of information technology in hotel management heading to a great contribution towards the hotel industry. Under this sector hotel chains appear to be as an emerging business by now. Though some are not recognized as hotel chains in Sri Lanka, people are more toward to expand their business with at least few small hotels in several places. Nowadays, the trend is having some number of hotels under a one ownership. A lot of benefits may be owned to the stakeholders of these hotels, but a critical situation may be also created within the hotels. The problem is “how to manage all of those hotels? "since they are under a one ownership there should be a interaction between all hotels and the management should be done properly.

With the progression of information technology, hotel industry plays a vital role due to the huge competition and the requirements of customers. Under this kind of circumstance, it is not rational to have a manual system in the hotel process. This situation mainly leads to reduction of customer base and miscommunication between hotels systems. This affects to a great loss within the group of hotels as well. So, it is really important to concentrate on these matters and conduct the companies to the next level with the technology.

1.1 Goals

- Identifying the Issues.
- Observe the Following Systems and explore about the competitive hotel systems.
- Creating a Cloud Based Property Management System.
- Creating the Loyal Customer Identify Face Recognition System.

1.2 Motivation

The main purpose of this project is to create a centralized cloud-based system with loyalty customer face recognition as to assist the management to administer their processes

and maintain the good name in the hotel field. Given below are some behooves that users can achieve through this system.

- Creating a cloud-based system led the users to function the system each time they required in anywhere they ambitious.
- Ability of controlling the multiple hotels, furthermore to collect and centralized the data from one main point to the system.
- Using the face recognition system, hotel management can effortlessly recognize the loyal customers and review their requirements and treat them well. This will please the clients and visit the hotel over again.

1.3 Method

Cloud based Property Management with Face Recognition System is a software system that custom to achieve the daily activities in the hotel, moreover it has an additional module of identifying the loyal customers of their hotel through face recognition. To progress this system, it was essential to study the up-to-date technical extents. Cloud based Property Management with Face Recognition System used the Java Spring framework to develop. Bootstrap, Data Table, Js Grid libraries used to create the user friendly front-end. OpenCV library has used to create the Face Recognition system. An extensive summary of the technologies is given below.

Spring

Spring MVC is a Java framework which used to build the web applications. It use the Model-View-Controller design pattern. It carries out all the elementary appearances of a core spring framework similarly Inversion of Control, Dependency Injection. There are numerous advantages of spring frameworks such as, Separate roles, Light-weight, Powerful Configuration, Rapid development, Reusable business code, Easy to test and Flexible Mapping. A Spring MVC delivers a dainty resolution to custom MVC in spring framework by the assistance of DispatcherServlet. Here, DispatcherServlet is a session that

obtains the incoming request and maps it to the right resources such as controllers, models, and views.

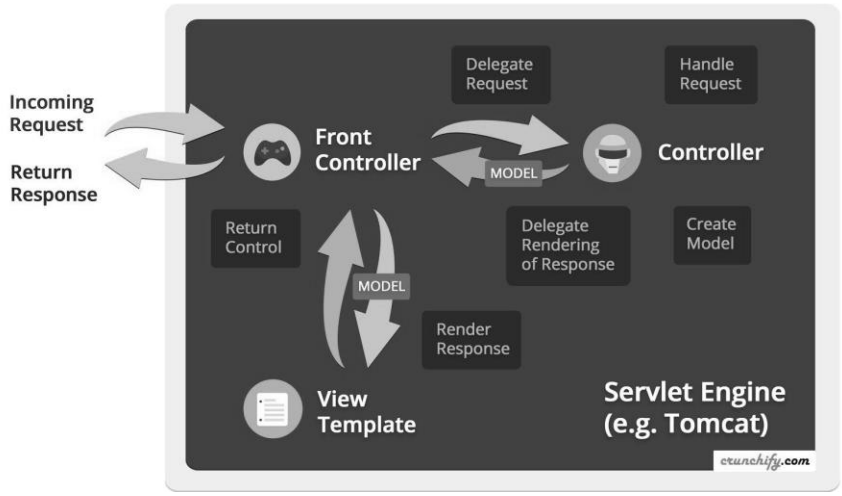


Figure 1: Spring MVC Design

- **Model** - A model comprises the data of the application. A data can be a solitary entity or a collection of entities
- **Controller** - A controller contains the business logic of an application. Here, the @Controller explanation is used to spot the period as the controller.
- **View** - A view represents the delivered information in a specific format. Usually, JSP+JSTL are used to generate a view page. Although spring also ropes other view technologies such as Apache Velocity, Thymeleaf and FreeMarker.

Bootstrap

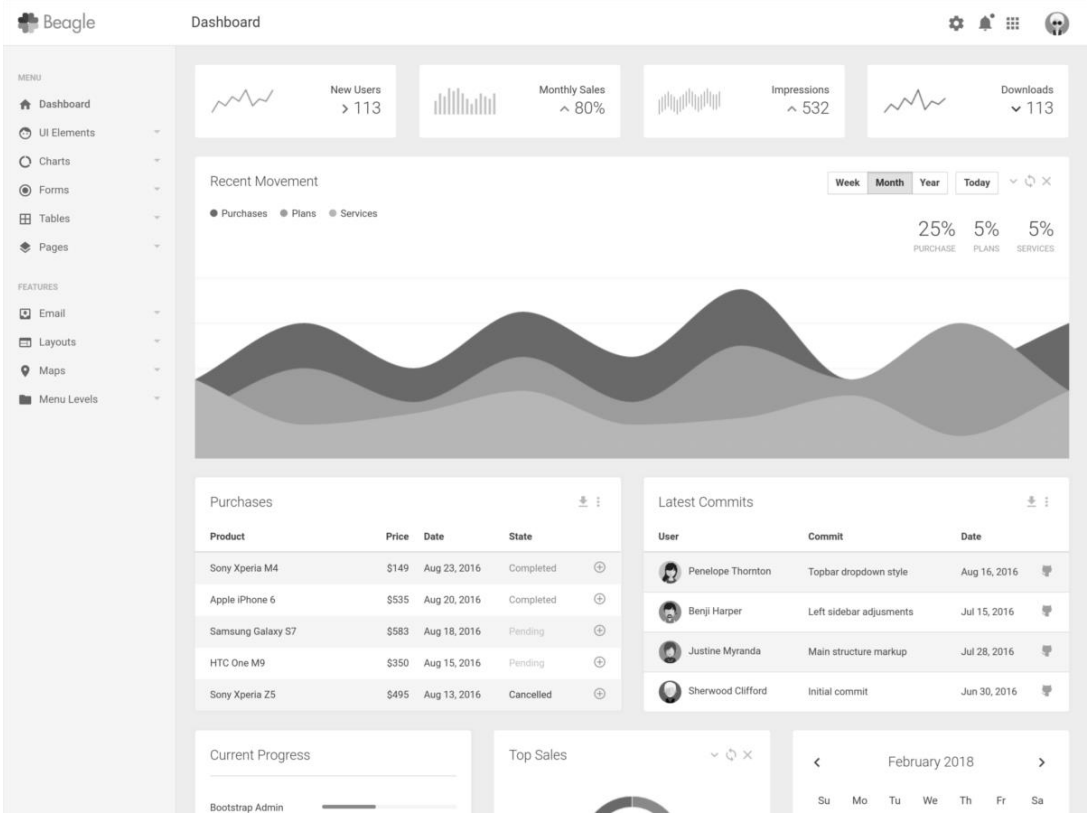


Figure 2: Bootstrap

Bootstrap is the most popular HTML, CSS, and JavaScript framework for developing responsive, Web System. It has many benefits from scratch for every web development project, and one such reason is the huge number of resources accessible for Bootstrap. It supports the responsive web design and dynamically adjusts the layout of web pages by considering the characteristics of the device used. There are several reasons helped in using Bootstrap such as: Easy to Use , Responsiveness, The Speed of the Development, Customizable, Consistency, Simple Integration, Pre-styled Components.

Data Table

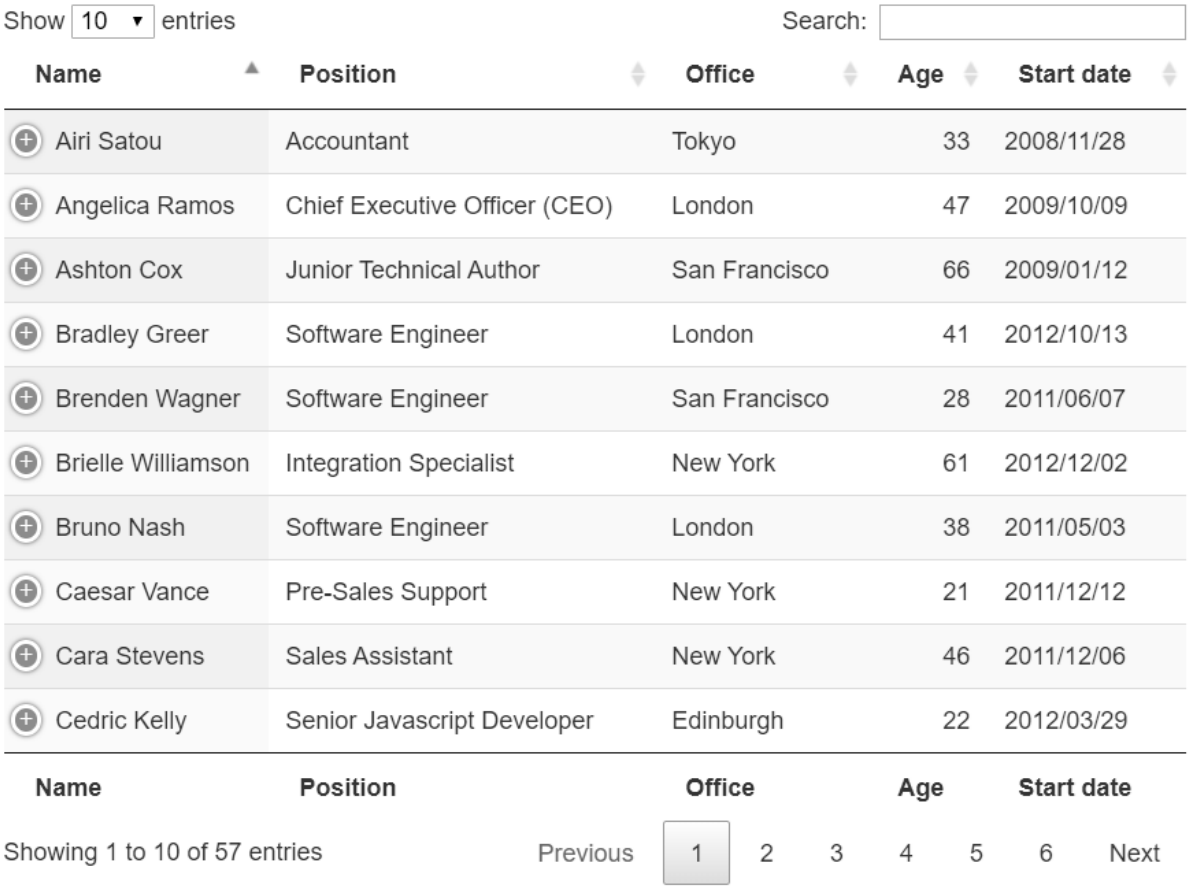
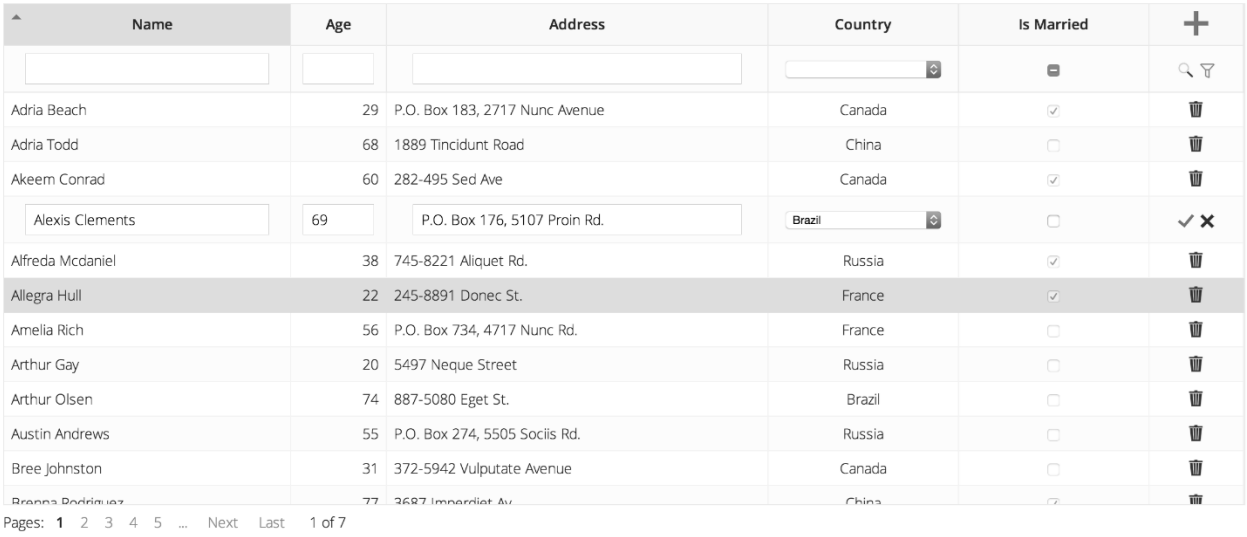


Figure 3: Data Table

Data Tables is a plug-in for the jQuery JavaScript library. It is an extremely flexible implement, based upon the fundamentals of progressive improvement, which will enhance progressive collaboration controls to any HTML table. End users need to be able to gain beneficial information from the table as hastily as possible and for this Data Tables has built in features such as ordering, searching and paging. Even though the end user incompetent to comprehend the guidance given to use the documentation, it can effortlessly manage by doing a self-study.

Js Grid



Name	Age	Address	Country	Is Married
Adria Beach	29	P.O. Box 183, 2717 Nunc Avenue	Canada	
Adria Todd	68	1889 Tincidunt Road	China	
Akeem Conrad	60	282-495 Sed Ave	Canada	
Alexis Clements	69	P.O. Box 176, 5107 Proin Rd.	Brazil	
Alfreda Mcdaniel	38	745-8221 Aliquet Rd.	Russia	
Allegra Hull	22	245-8891 Donec St.	France	
Amelia Rich	56	P.O. Box 734, 4717 Nunc Rd.	France	
Arthur Gay	20	5497 Neque Street	Russia	
Arthur Olsen	74	887-5080 Eget St.	Brazil	
Austin Andrews	55	P.O. Box 274, 5505 Sociis Rd.	Russia	
Bree Johnston	31	372-5942 Vulputate Avenue	Canada	
Brenna Rodriguez	77	3687 Imperdiet Av	China	

Pages: 1 2 3 4 5 ... Next Last 1 of 7

Figure 4: Js Grid

JsGrid is a lightweight client-side data grid regulate based on jQuery. It supports elementary grid processes like inserting, editing, filtering, deleting, sorting, and paging. The JsGrid module allows modifying its form and its subcomponents.

- Filtering: supports data filtering by different criteria.
- Data Editing: allows to add new records, update, and remove data rows.
- Paging: has a flexible pager allowing to paginate data on the client and on the server side.
- Fields: provides different column types: text, numeric, select, checkbox and more.
- Data Sources: works with any type of data source from static javascript array to REST-service.
- Sorting: supports sorting with user interaction and with API
- Validation: allows to validate inserting and editing data.
- Callbacks: provides plenty of callbacks to control and customize behavior.

Open CV

The face recognition is customized in this project as the biometric method to recognize the guests by their face. It is capable of classifying the exclusive or confirming the guests by associating shapes based on the guest's facial curves. A guest's face shapes guides in helping the uniqueness and verifying. In order, this face recognition is consummate various valuable procedures. It can detect the guest's face and have the capability of analyzing the previous records of the guests. Face recognition configuration can be shown in the below.

As per this project, it has used Java open source libraries for face detection purpose. The most general Java library that is used is OpenCV. Basically, OpenCV is an open source library that has many modules like object detection, face recognition and amplified authenticity. Face detecting can be acknowledged by using OpenCV library. LBPH algorithm used to spot the variations amid faces. LBPH algorithm recognizes both front and side face. This LBPH algorithm is used to face recognition in this system.

AWS Cloud Computing

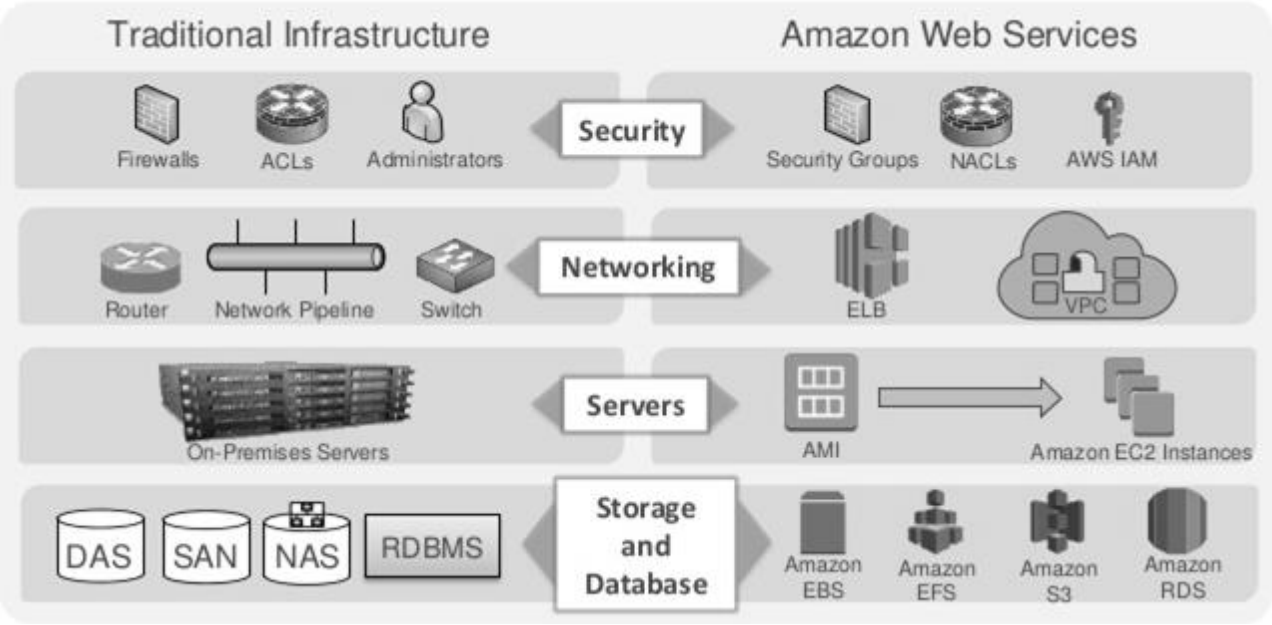


Figure 5: AWS Core Infrastructure and Services

Cloud based Property Management System used AWS Clod Computing. Essentially, cloud computing is a kind of outsourcing of software, data storage, and processing. Users access applications and files by logging in from any device that has an internet connection. Information and programs are hosted by outside parties and reside on a global network of secure data centers instead of on the user's hard drive. This frees up processing power, facilitates sharing and collaboration, and allows secure mobile access regardless of where the user is or what device is being used.

1.4 Overview

When creating this system, it has used the latest technology. Cloud technology used for the Property Management System and biometric has used for face recognition technology. For cloud technology, it selected the AWS windows cloud service and installed the MySQL database and the wildly server to run the required configurations. To improve the quality of the system, the most appropriate spring framework for enterprise application is used. It uses the Model-View-Controller design pattern. Bootstraps are used to create a user-friendly interface. Datatable and Jsgrid have been used to further enhance it. For face recognition, it used the openCV source library. To identify the guest's face the LBPH been used and moreover it easily recognizes the faces accurately.

2 Chapter 2 Background and Problem Statement

In small hotels, all the information is recorded in a file manually. They are stored in a special specific record within those folders. As a result of that, there is a higher percentage to damage those files. When the guests visit the hotel again and again, a new file is created for each time he visited. It effects for increasing of files and wastage of physical space. When a top-level person of the management asks for specific details such as number of tourists visit their hotel last year, staff will face massive issues. It may take hours to get through file and to gather the required detail. This is time consuming and can't assure the accuracy of the calculations. Mainly, it was referred some two similar hotel management systems and one face recognition system. Analyzing those systems led towards of creating the Cloud based Property Management with Face Recognition System.

2.1 Introduction

The current system is presently being an undeveloped form and the manual procedure of the overall system is too clumsy and complicated. The clients in the real time consultancy system can be too thick and may need many capitals to be used upon the system. There is no computerized system to manage all systems of the small hotels and the main hotel. It is much more difficult to do those by a manual system besides there is no specific way to identify the loyalty customers of the hotels. It reveals the weakness of defensive mechanism in these hotels.

2.2 Literature Review

Author has to refer the domain in different ways to create the system. To create the Cloud based Property Management with Face Recognition System, author studied about hotel industries and referred the daily management activities in the hotel chain. Author had to concern about different paths to select the most appropriate biometric technology to create the identification of loyal customer face recognition.

2.2.1 Similar Project

Hotelogix HMS

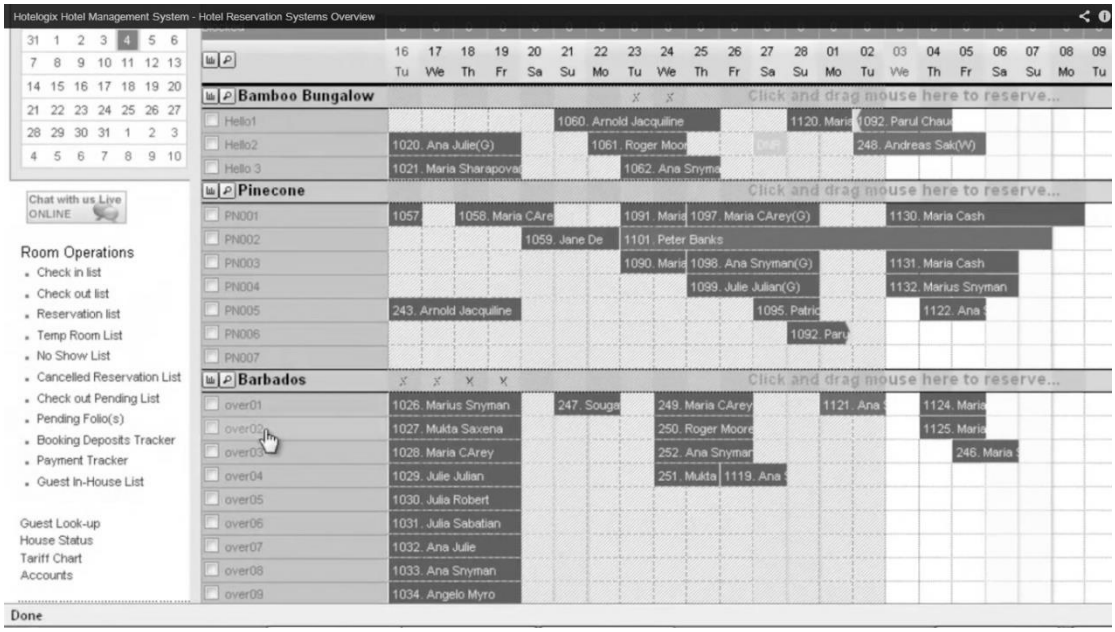


Figure 6: Hotelogix HMS Screen

Hotelogix- In HMS infoTech is a flexible, instinctive hotel management solution that incorporate every application a small or medium-sized hospitality business want to be victorious in today's competitive market. This robust, cloud-based solution is ideally suited for growing individualistic hotels, lodges, resorts and other property types that are seeking cost effective system that can be setup swiftly and effortlessly, without any large upfront investment

Censorious applications contain robust front desk operations, housekeeping, point of sale and more. Sketched using the latest web-based technologies, the system's friendly and graphical user interface clarify the streamlines common quotidian task. It's also exceptionally user friendly, so hotel management staff can be up and running rapidly with little or no free time

At the core of the system is a comprehensive Property Management System (PMS) that supports for both multiple properties and currencies, making this a prominent fit for business with various geographical footprints. With the help of this centralized hub users

can then effortlessly access the other modules, reservations or dining services, and also the hotel website, all from a single merged platform.

Features

- Involvement in the power and simplicity centralized dashboards for theThe inventory sales through all the accessible mediums of sales and distribution.
- Generate rates centrally through a Powerful Rate Manager and vend across distributing networks with rate equally.
- Sell across all sources of distributing without blocking the room-night. Obtain real time updates across all channels, at front desk.
- Organize all hotel operations (i.e-check-ins, checkouts etc.) seamlessly through a comprehensive property management system at the core.

HoteloPro HMS

Figure 7: HoteloPro HMS Screen

HotelPro Company comes with an eventual transformation in Hotel Management; to control more than one construction from the same application with multi-property management. This online web-based solution is not only a tool for superior online reservations, it is an application which supply some features, including invoices, accessible

reports of accommodation's unit and the chance of advertising hotel services through various channels like SMS, Facebook, Twitter etc..

Features

- Direct access to all reservations through a robust reservations dashboards.
- Comprehensive reports that give an understandable clear picture of "what's going on with the properties".
- Online widget that permit the clients to make reservations through company websites.
- Create invoices and receipts for clients.
- Explain and control services and products like restaurant, mini bar, spa, travel etc...
- Marketing tools permit easily to issue promotions and marketing messages, so it can comfortably obtain new clients and buil the existing ones in return.
- Flexible pricing management (i.e-setup room prices in advance either modify them on the fly.)

Allgovision - Face Recognition System

Figure 8: Allgovision - Face Recognition System

Face Detection/Face Capture

Notice and track the human face in the camera view. Beside, captures the face image and stores it in database for upcoming references. Example: initiation of alarms or systems (to be integrated) which require operation on appearances of any person. This detected and capture faces are utilized for evidence/observing.

Face Recognition & Face Verification

Matches the Face detected in the camera view with the registered faces in the database and sends alarms corresponding to match or mismatch. Example: Face recognition & verification is used in multiple applications such as VIP identification, Black List alarm, Forensic Face Search, People Authentication, Attendance Recording & Reporting, and can be integrated with Access Control.

Face Frequency Face Frequency

Detects how frequently any recognized face appeared in the camera and provides the plot of frequency distribution for recognized persons. Example: Customer Retention information by analyzing the frequency of visit by VIP Guests / Loyalty Customers etc.

Features

- People face should be visible in front of the camera. The people who are walking towards camera are recognized.
- The recognized person details are displayed in real time.
- The detection time is 1-3 sec.
- The face registration is done with 1-10 face images per person.
- Works simultaneously with video analytics for other cameras.
- Application can run as a service.
- Black Listed People Recognition
- VIP Identification or White list people identification
- Facial Recognition based automatic Attendance System

2.3 The Intention Is Very Clear

It is very necessary to continue the cordiality between the management and the clients. From cloud base system, it is easily centralized the database and systems in multiple organizations under one management system. This process will lead the management to conduct the relationship and goodwill among clients.

In face recognition system, management notice and track the human face in the camera view. So, it saves in the database for future references. This system can use for VIP identification. FRS accomplish the management to serve a better service and customer satisfaction.

2.4 Problem Statement

The current system is in an undeveloped form and the manual process of the overall system is too clumsy and complicated to maintain. Accordingly, it is much time consuming to update the records daily and at times client's faces more uncomfortable as it takes much time to verify the details. Sometimes clients will not be satisfied with the service they have been experiencing. Management needs to take a huge process to gather all records into one main center. Moreover, it has no way to identify loyal customers in their hotel chain. It reveals the weakness of defensive mechanism in these hotels. By studying these issues in the current system, the main intention of this project is to provide a mechanism which will help to the management of this hotel by managing all hotels in a computerized cloud system. In addition, assist management to discover their loyalty customers by owning a face recognition system.

3 Chapter 5 design

Design is one of the main key facts to consider when creating a system. Network system design used to display the working process of the system. There is a clear list of software and hardware used to develop the system. In this chapter the system has been evaluated.

3.1 Introduction your choice of proposed network system

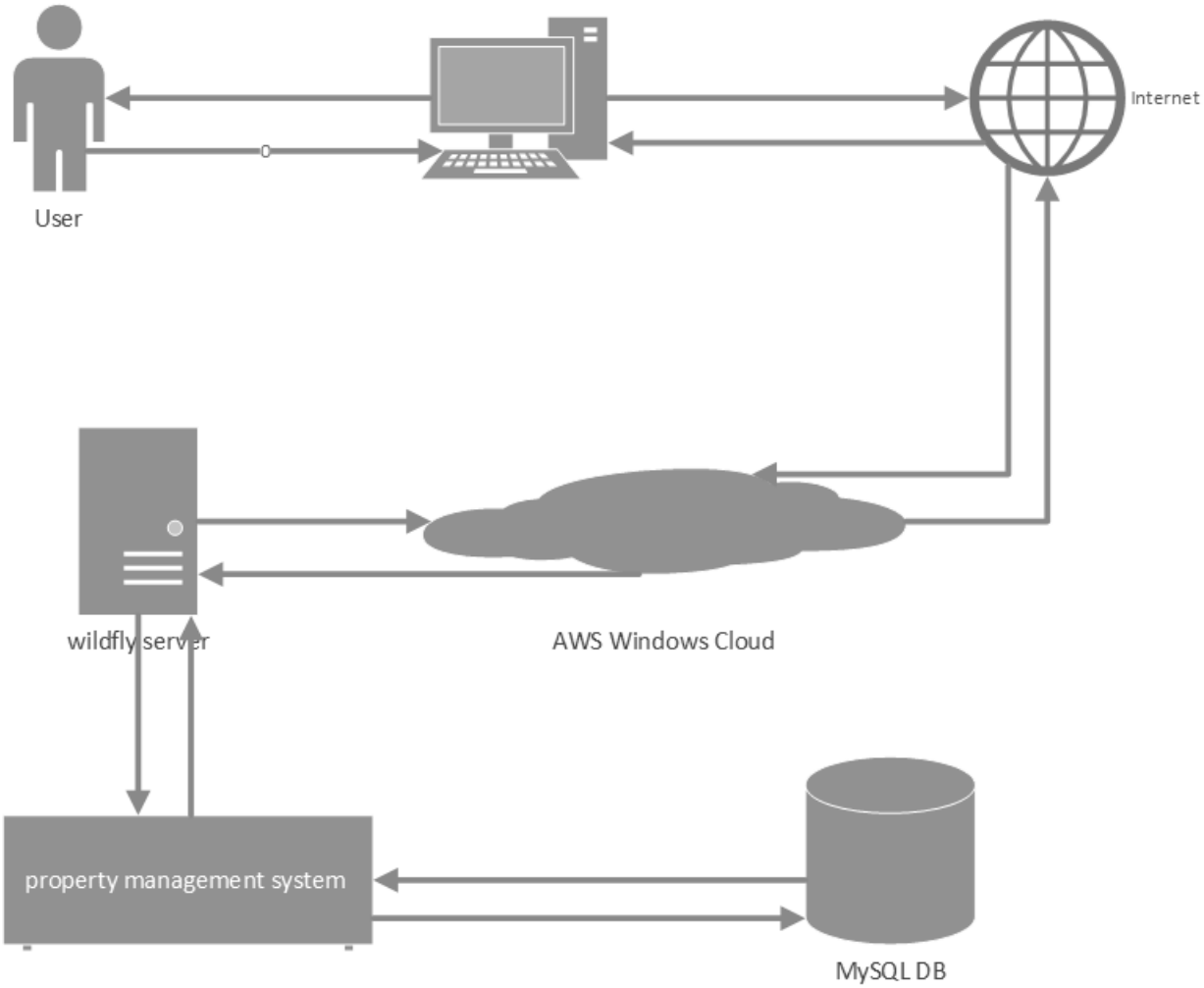


Figure 9: Network system

3.2 ER Diagram – Master File

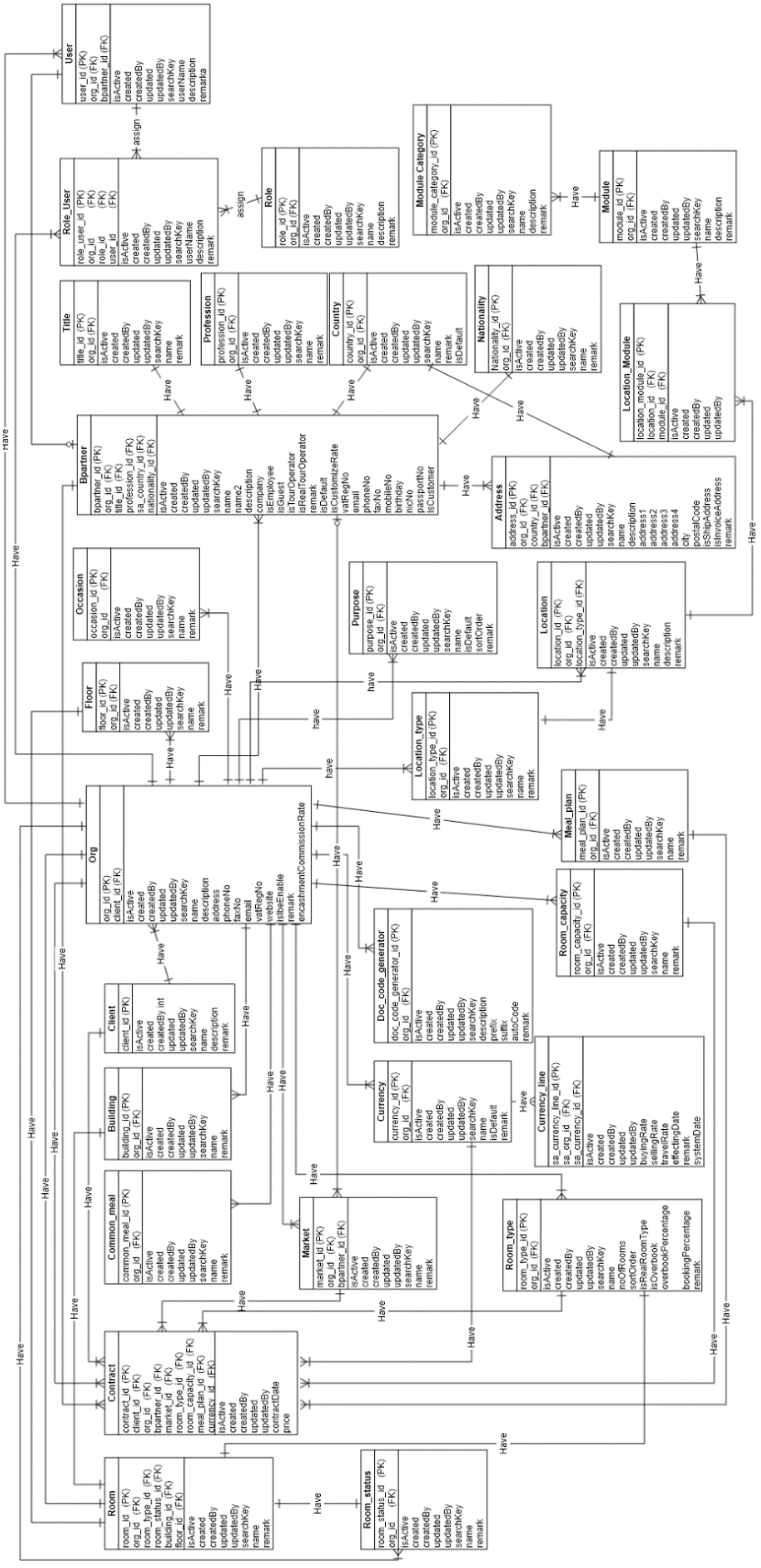


Figure 10: ER Diagram - Master File

3.3 User Interface - Face Recognition Module

Login Page - Face Recognition Module

This is the Login for the Loyalty Customer Identification System.

Figure 11: UI- Login Page - Face Recognition Module

Dashboard

Dashboard ables to navigate the system

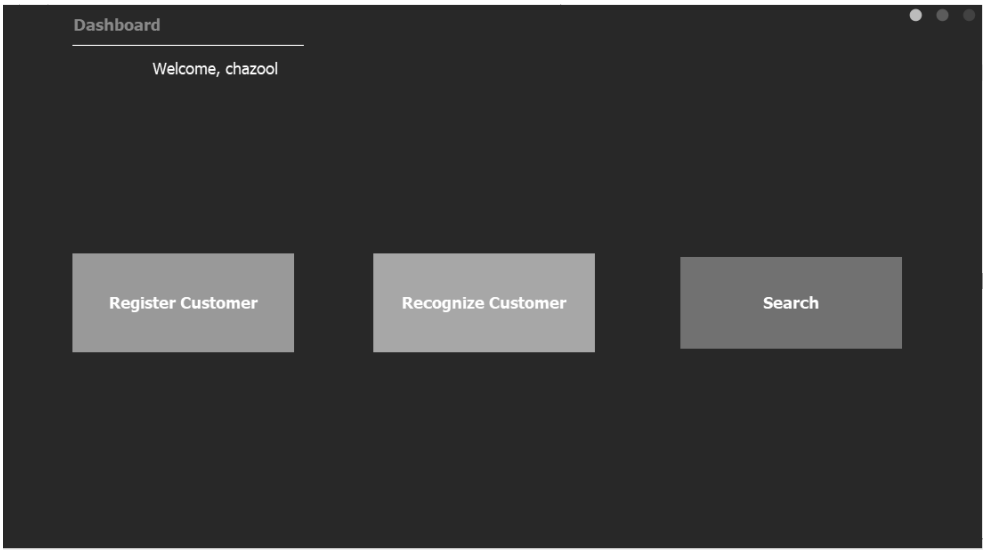


Figure 12: UI- Face Recognition Module Dashboard

Restaurant Customer Registration

In this, it saves the details of customers, preferences and photos to the system

Figure 13: UI - Restaurant Customer Registration

Recognize Face

Using Face Recognition technology can identify the customer and view the details of past records.

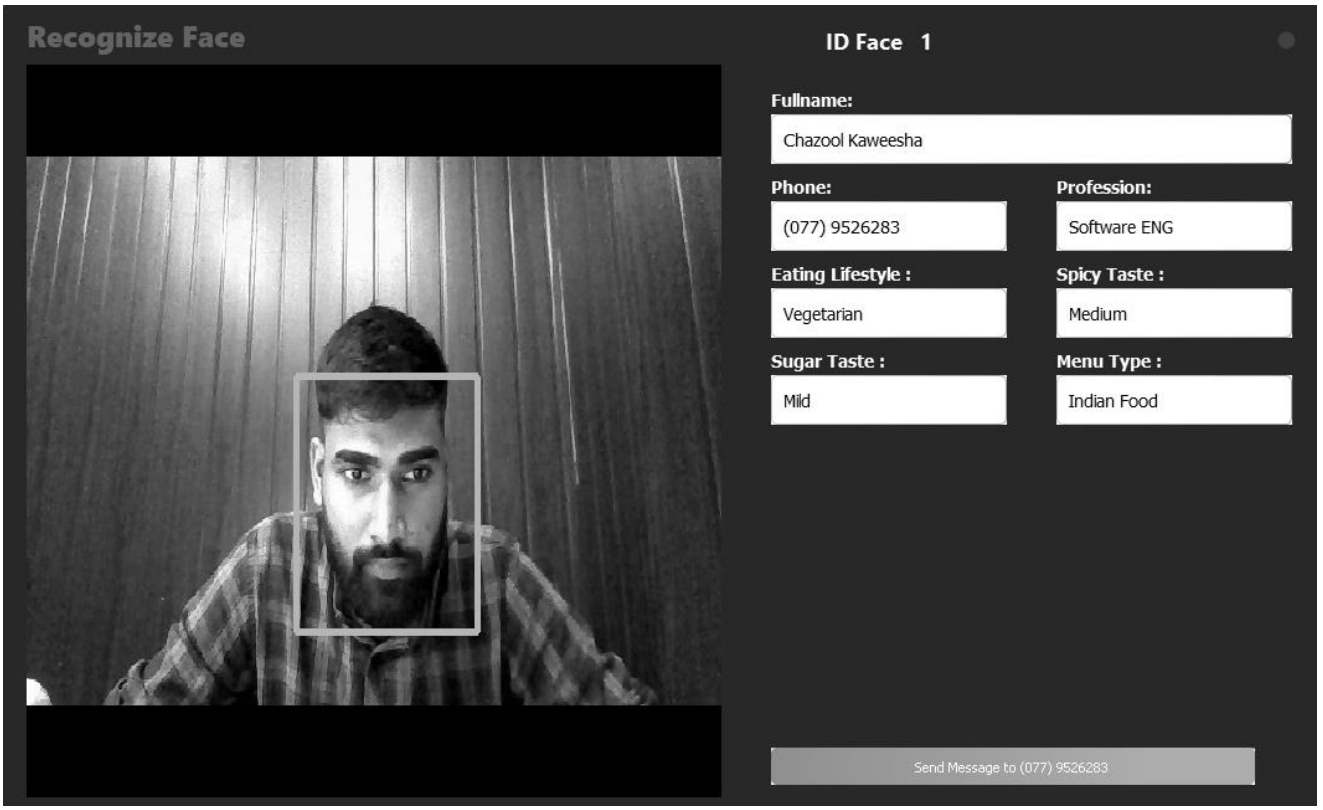


Figure 14: UI- Recognize Face

Send Whatsapp Message

Able to send messages through whatsapp for customers.

Figure 15: UI - Send Whatsapp Message

Search Records

This can search the details of the customers in the system and able to update if required.

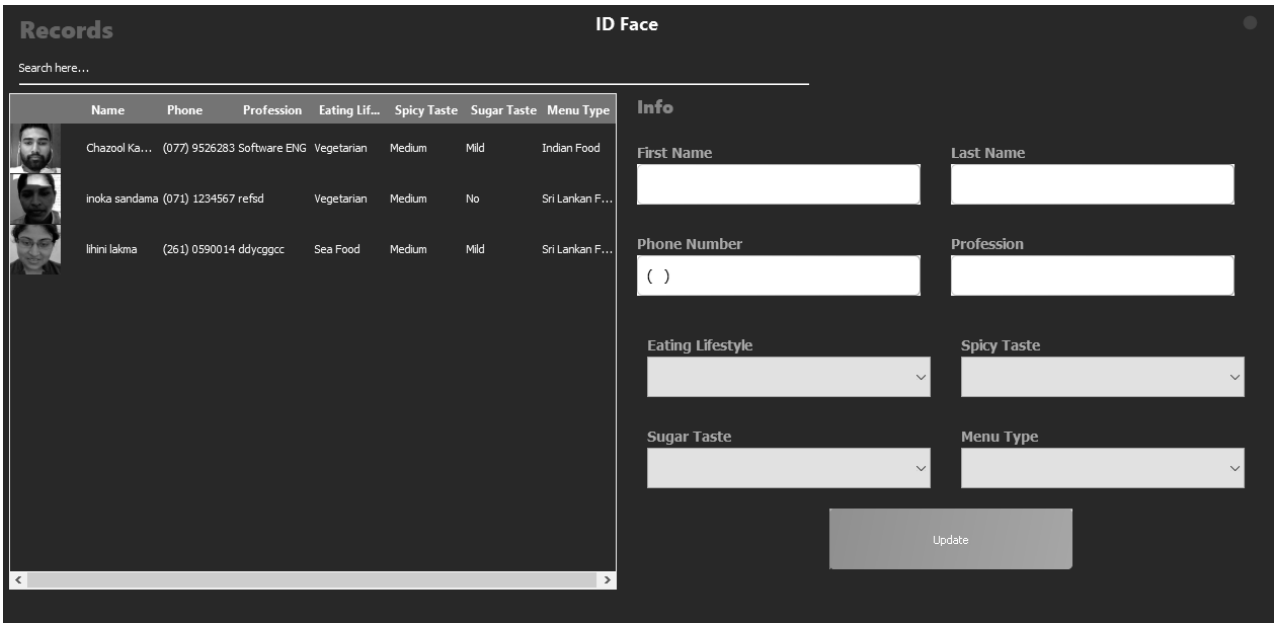


Figure 16: UI- Search Record

3.4 User Interface – Property Management Module

Common Meal: kinds of meal plan preferences offered to guests at Checked in.

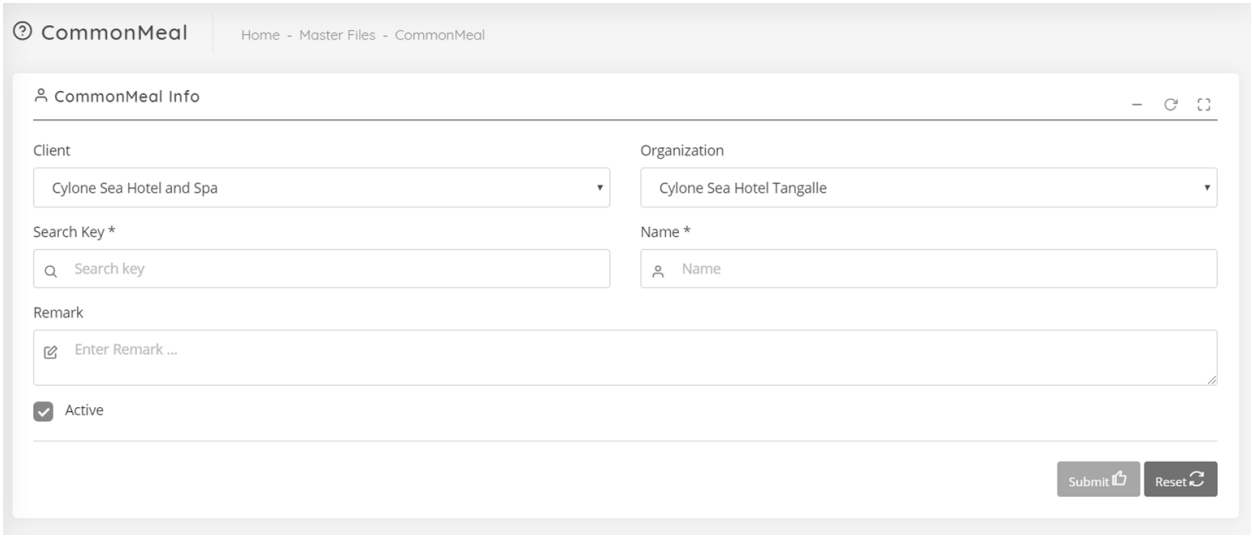


Figure 17: UI- Common Meal

Country: It can insert all countries and the country which use this system can set as default.If management need,they can set the countries active either deactivate to visible

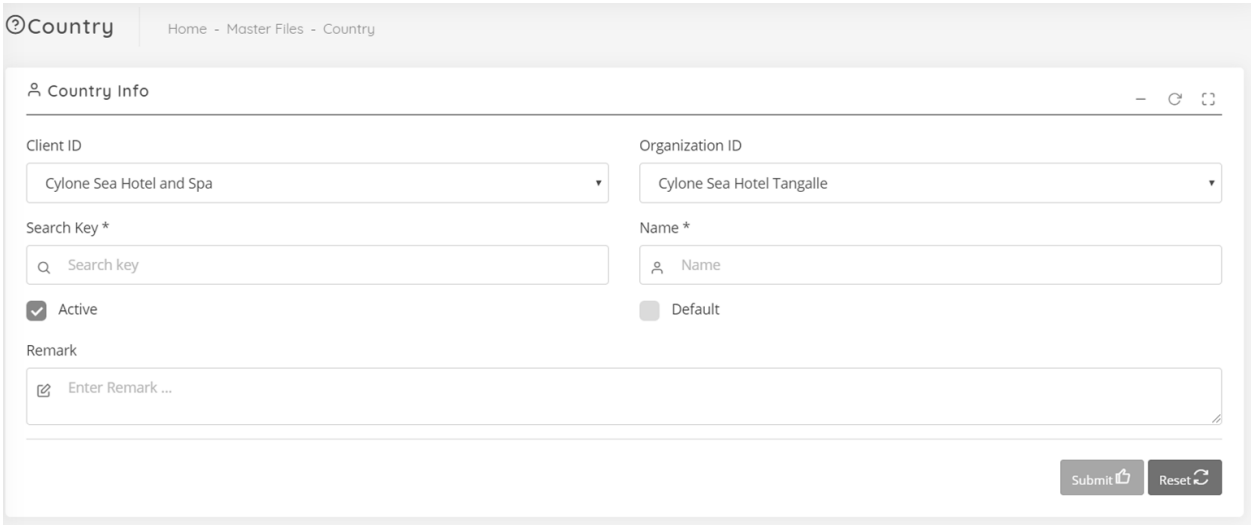


Figure 18: UI- Country

Currency: What type of currency is guest using for transaction in the hotel premises.

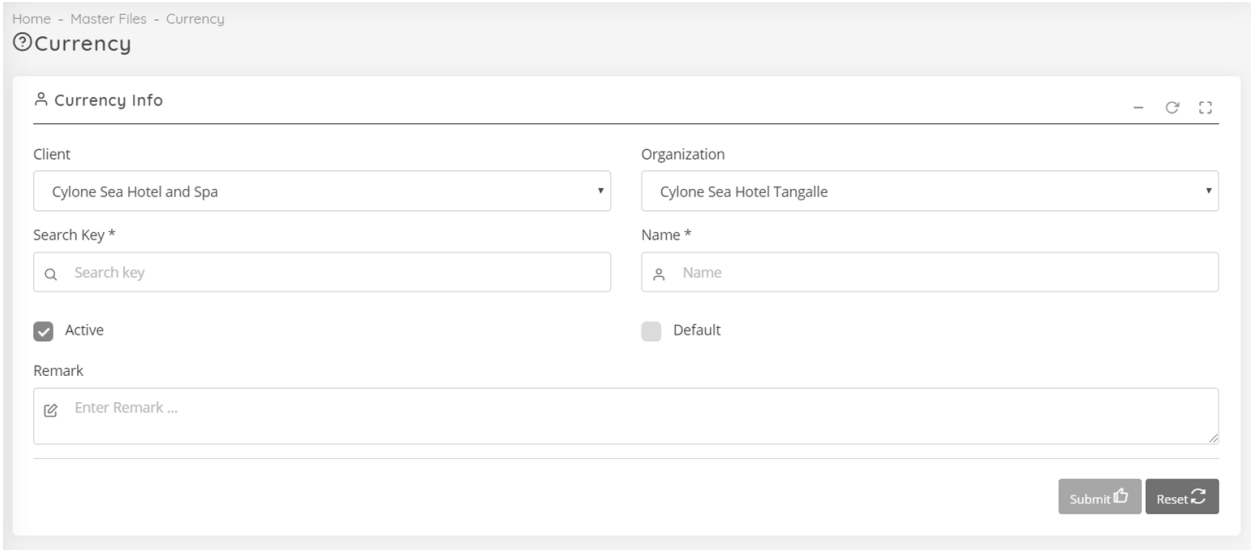


Figure 19: UI- Currency

Currency Line: Currency rates can be changed and currency line is used for calculating the changing rates according to the particular currency.

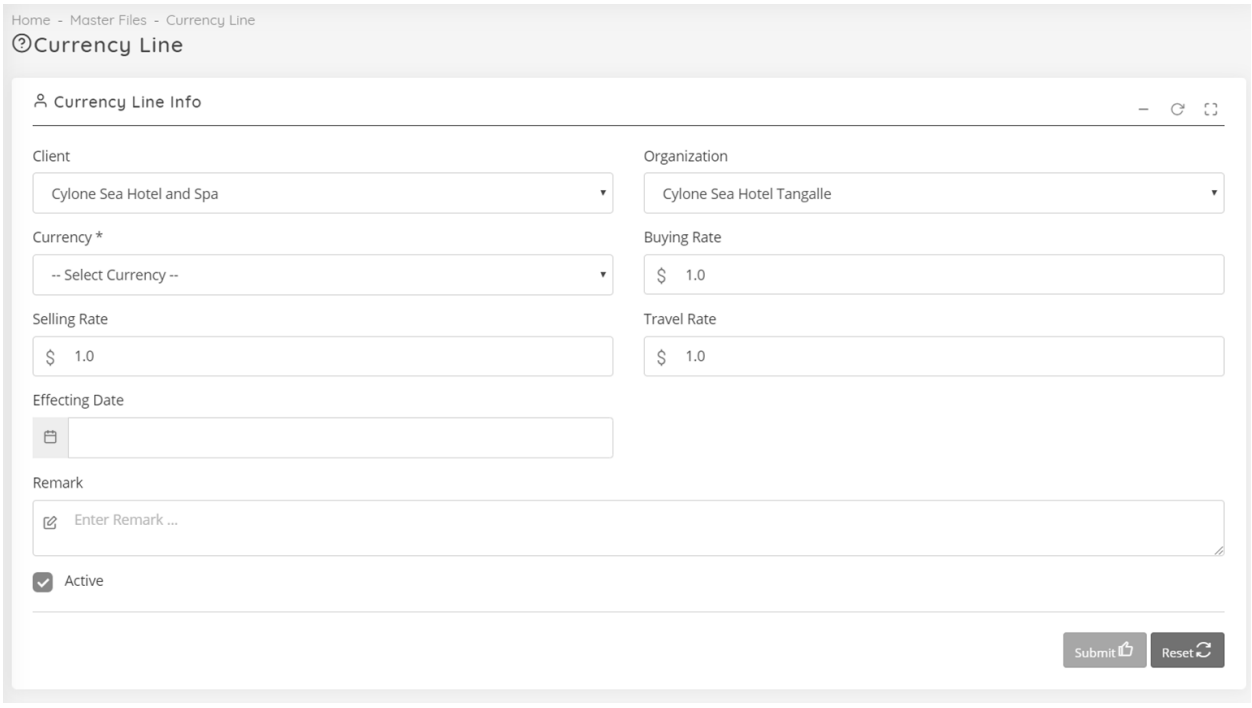


Figure 20: UI- Currency Line

Doc Code Generator: Doc Code Generator can be generated as there are so many unique identities for processes to identify each processes one by one.

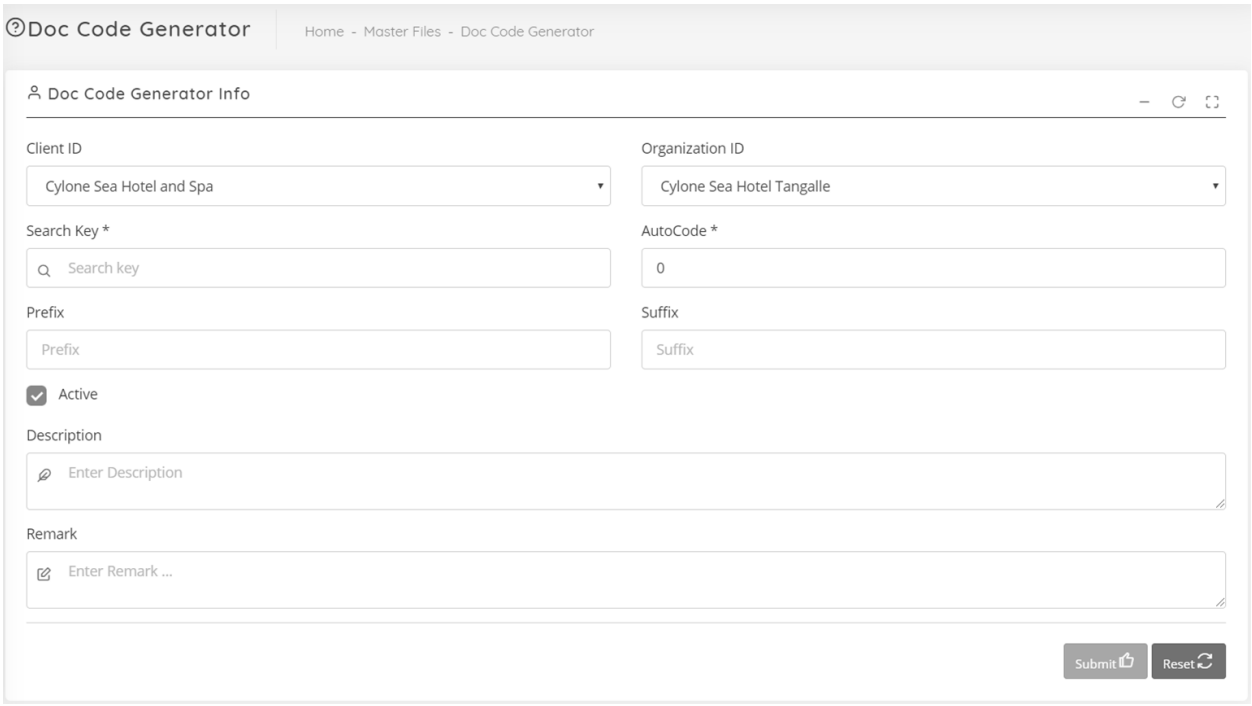


Figure 21: UI- Doc Code Generator

Floor: It contains all the floors of buildings in the hotel.

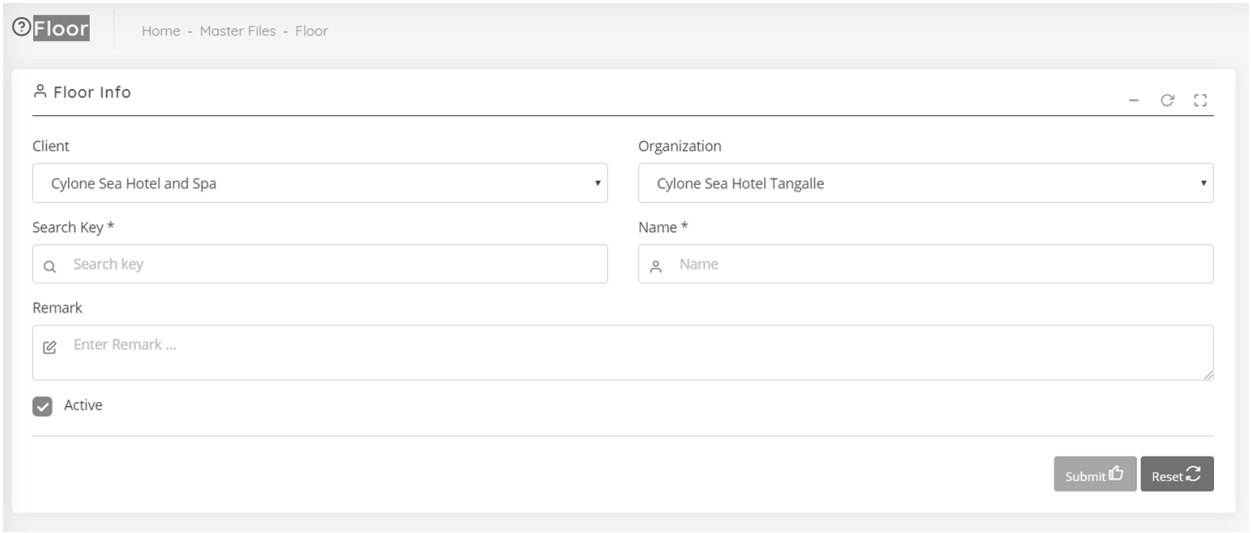


Figure 22: UI- Floor

Location: There are some departments of the hotel can be identified as locations.

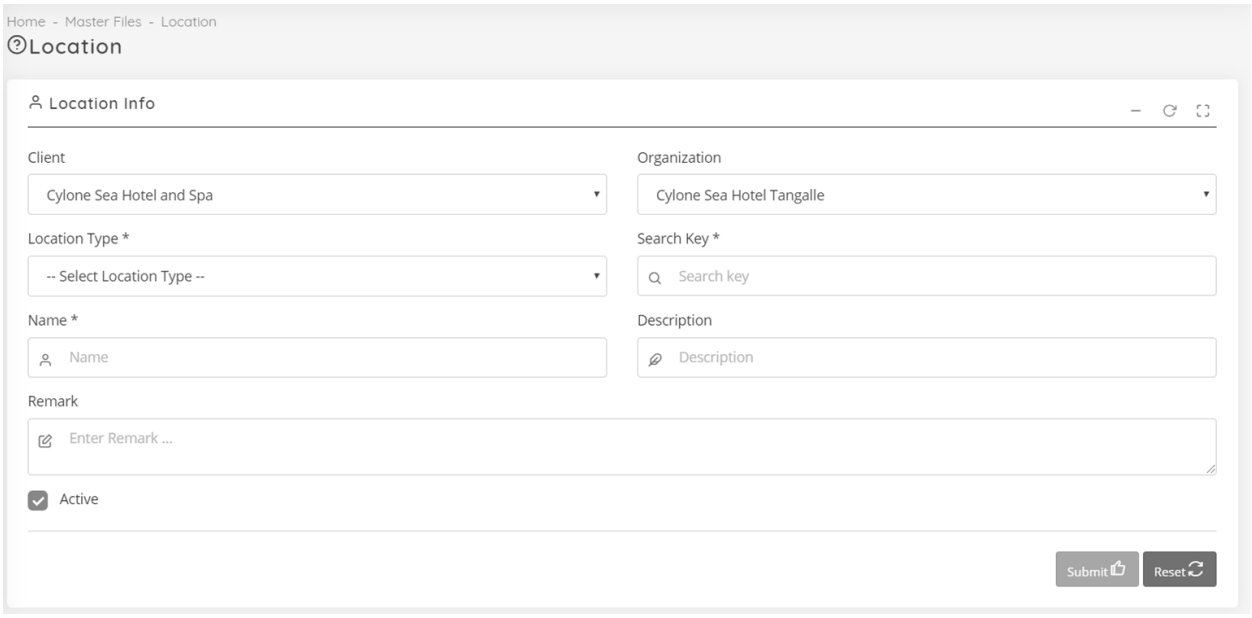


Figure 23: UI- Location

Location Type: All the Locations Categorized In To Several Types And Each And Every Location Is Linked With Each Other

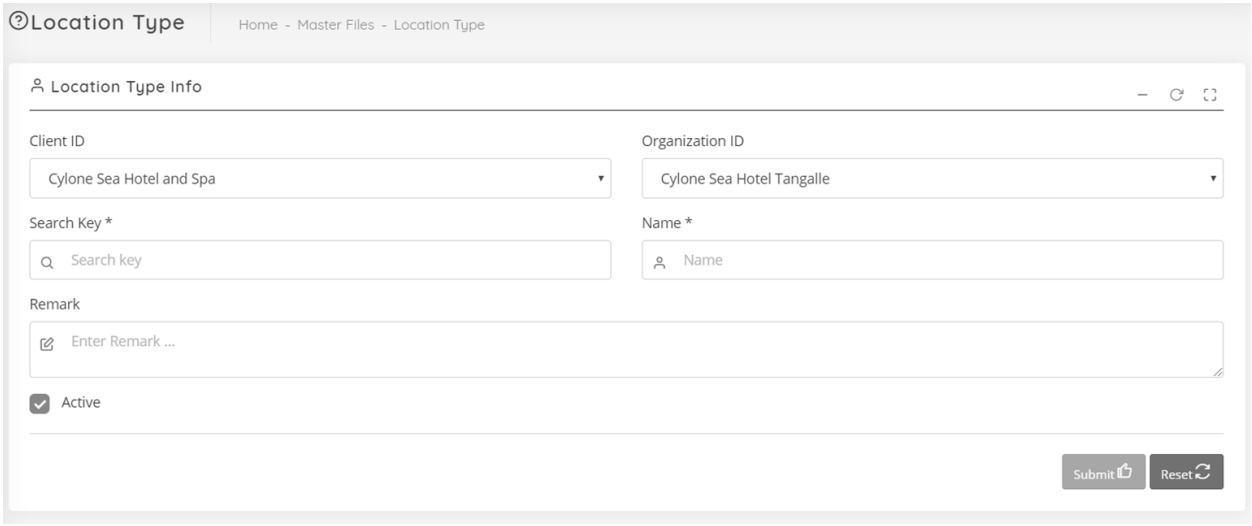


Figure 24: UI- Location Type

Market: This contains according to the tour operator of other countries.

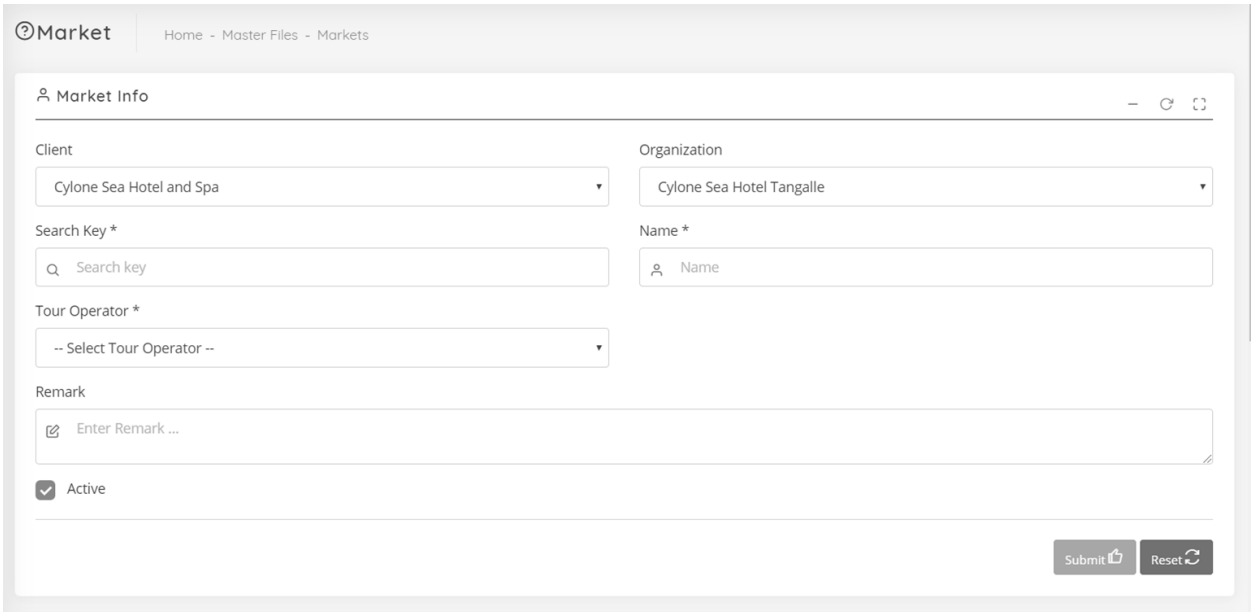


Figure 25: UI-Market

Nationality: Nationality of the client is added in this.

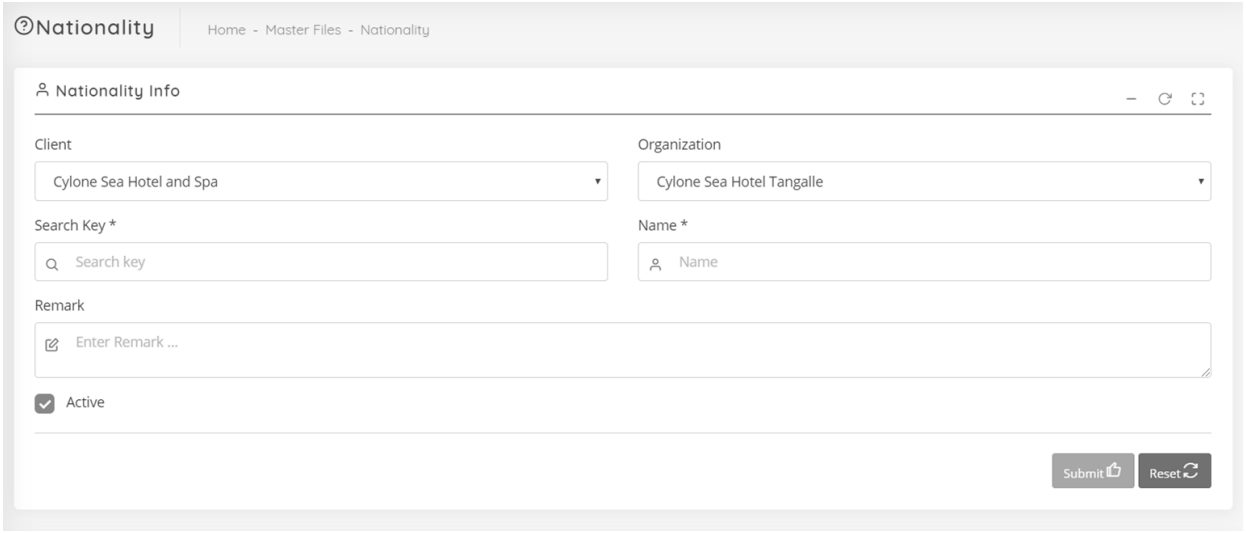


Figure 26: UI- Nationality

Meal Price: Prices for the preference meal plans client selected during the check-in.

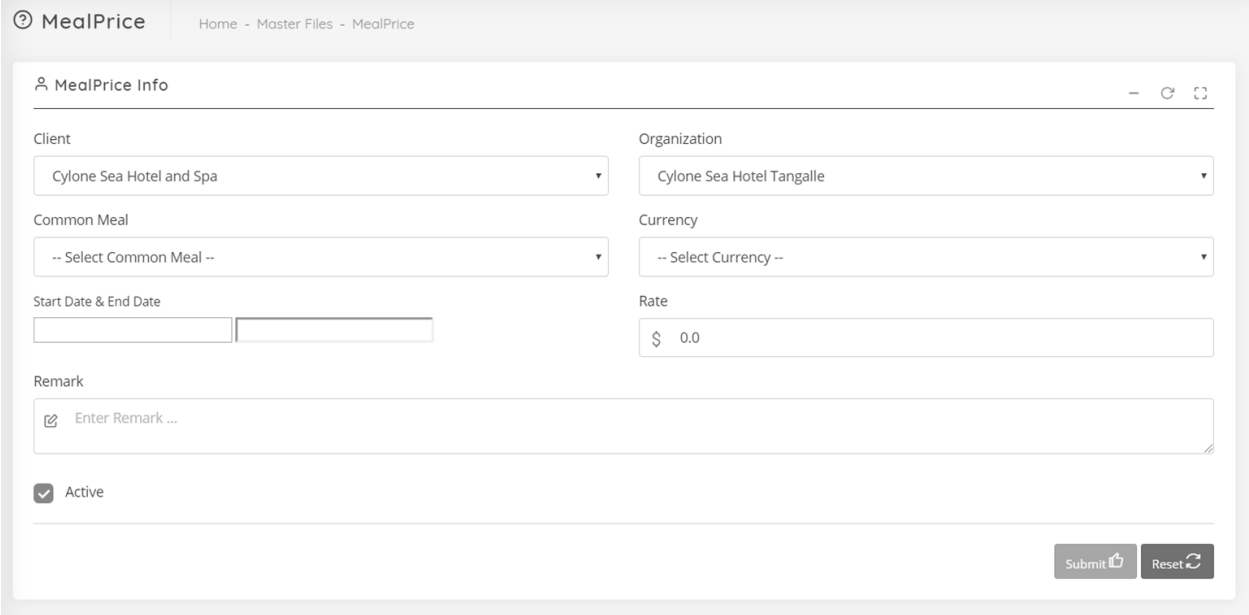


Figure 27: UI- Meal Price

Offer: In here, management can include the offers and promotions that hotel gives to the clients.

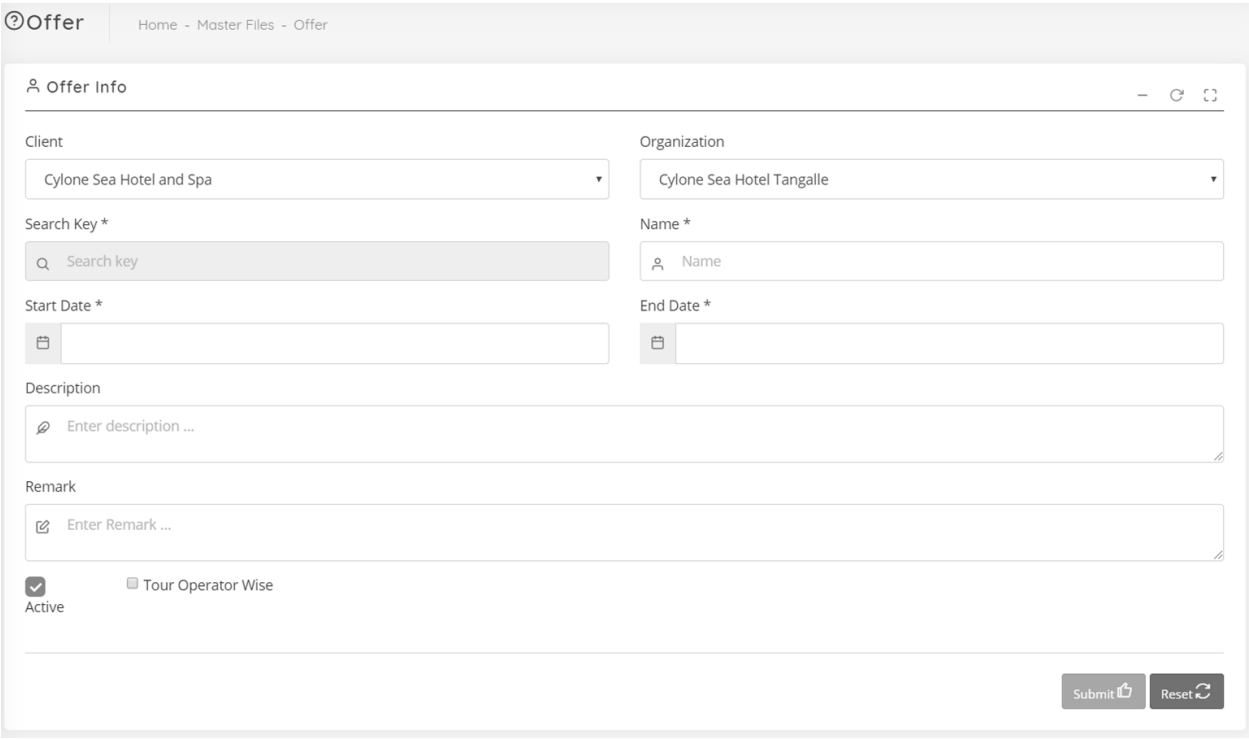


Figure 28: UI- Offer

Client: Should define new client in the system. The client is the highest level of an independent business entity. Each client will have, one or more organizations

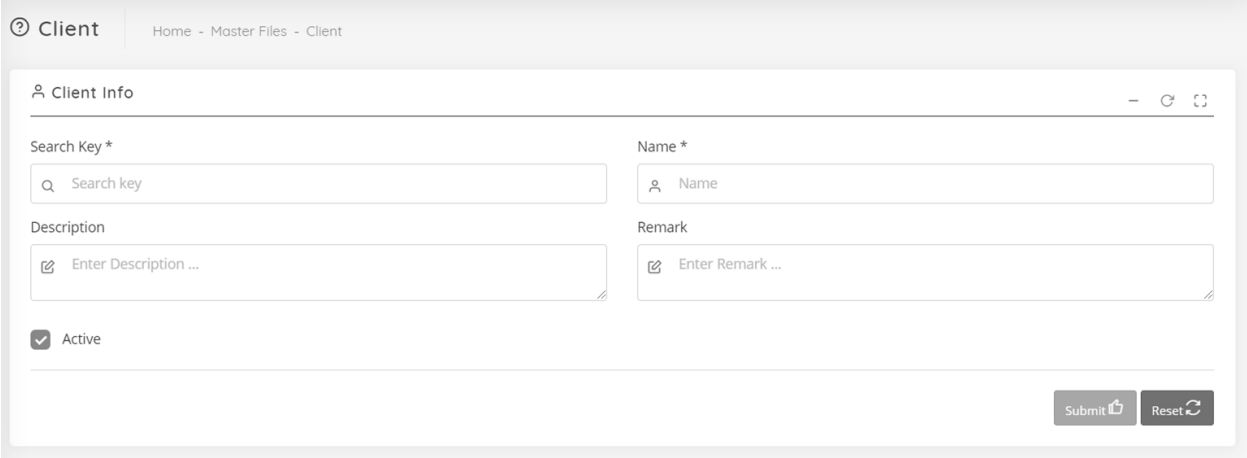


Figure 29: UI- Client

Supplement: This contains when guest wants other required items.

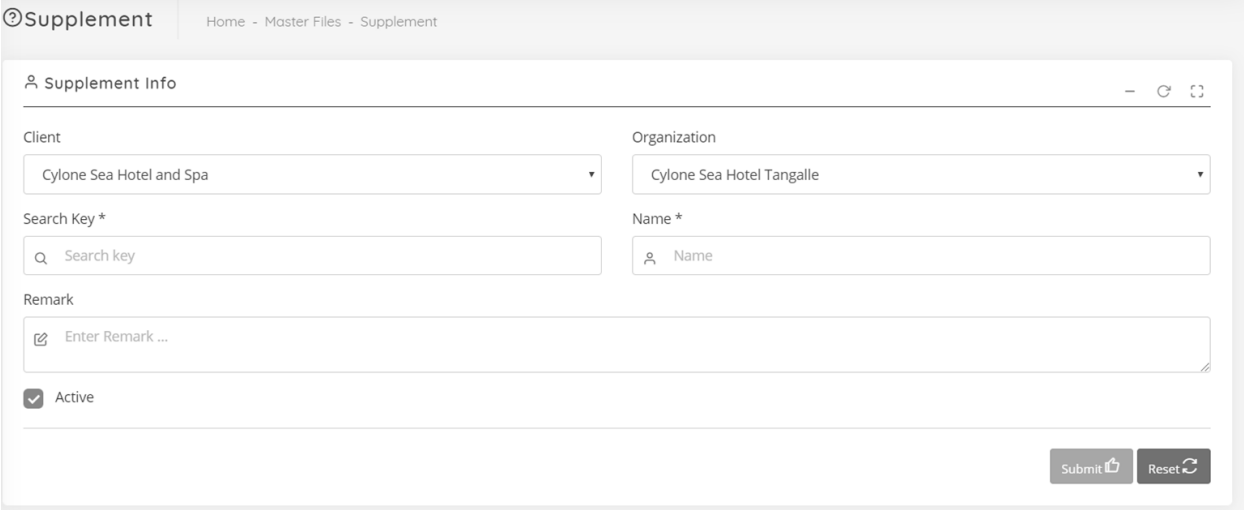


Figure 30: UI- Supplement

Organization: It is only part of the client one or more.

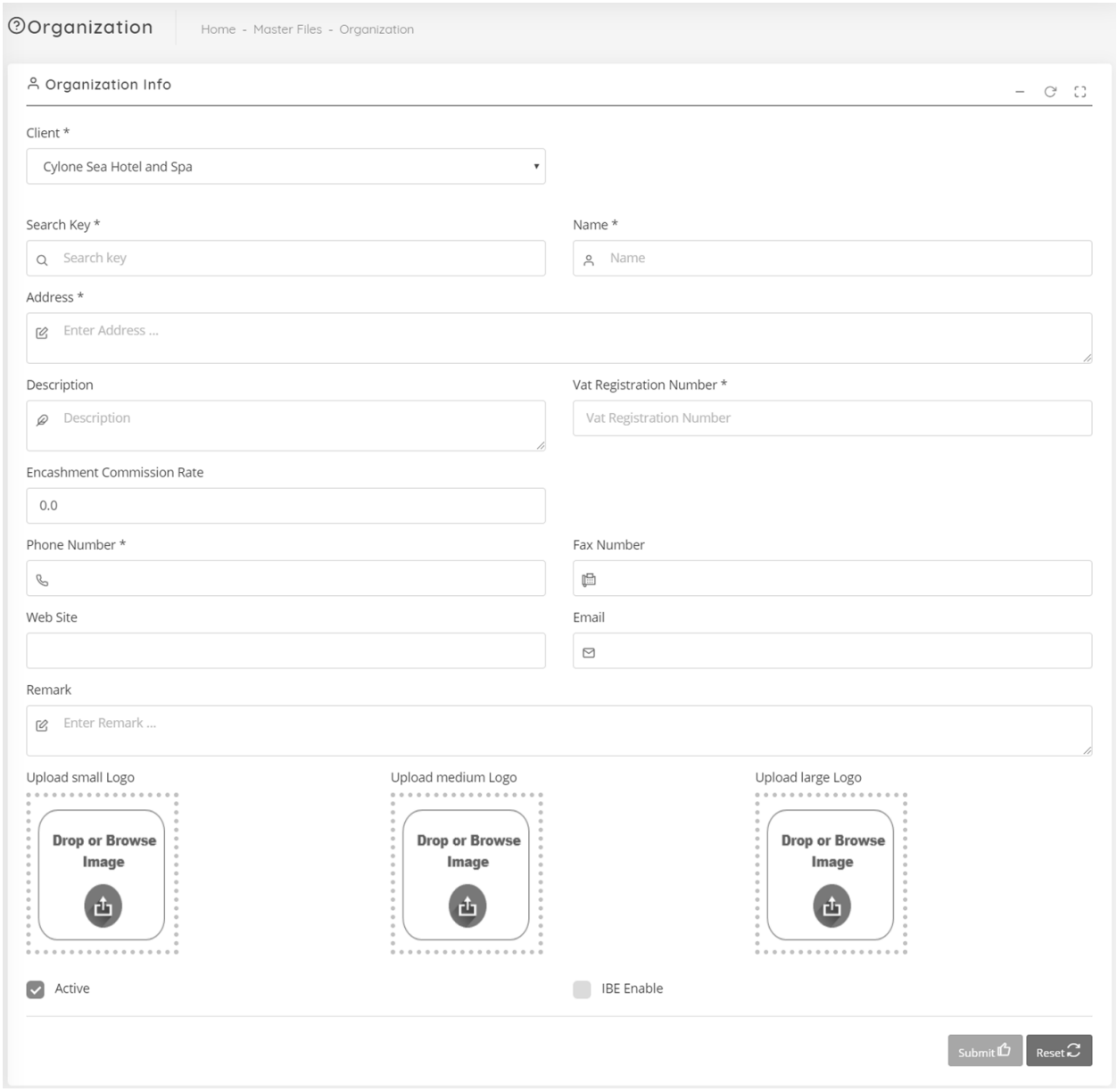


Figure 31: UI- Organization

Payment Mode: Can select the payment methods through this.

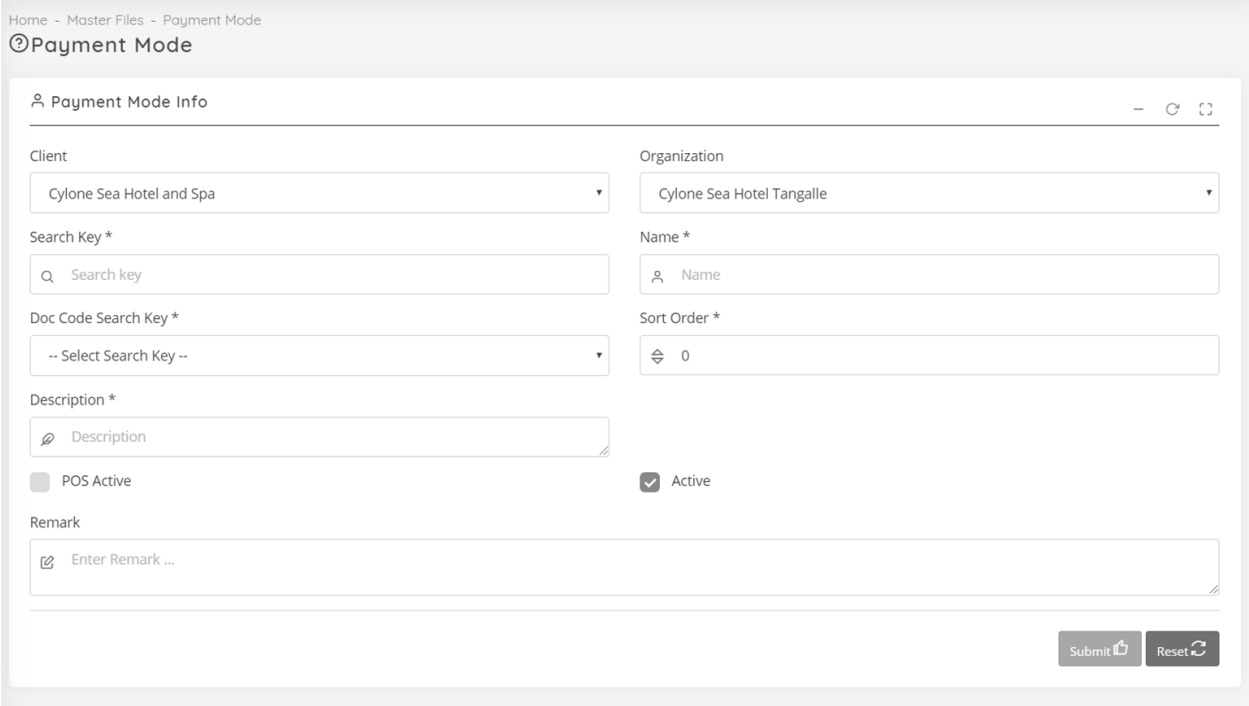


Figure 32: UI- Payment Mode

Pickup Method: Can get an idea about the pick-up details of the guest.

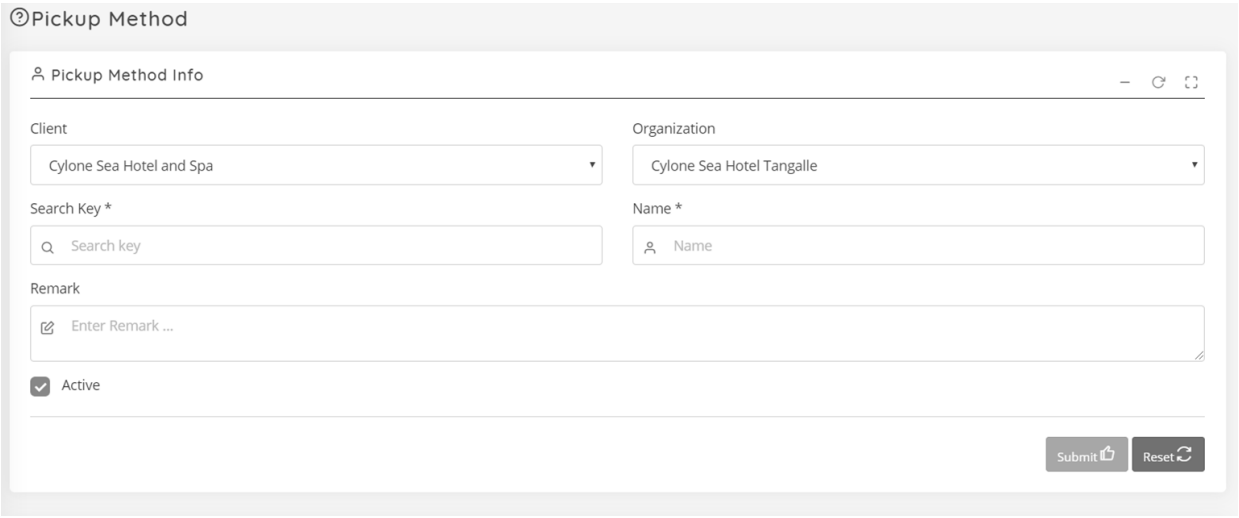


Figure 33: UI- Pickup Method

Profession: This can get an image of guest's professional background.

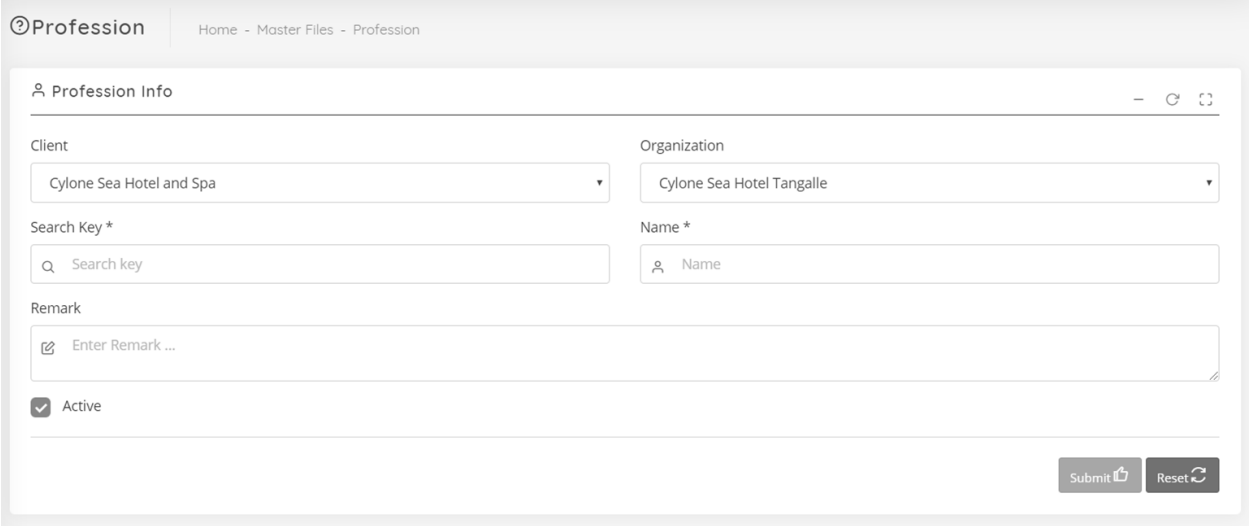


Figure 34: UI- Profession

Purpose: It is easy to know the reasons of staying the guests.

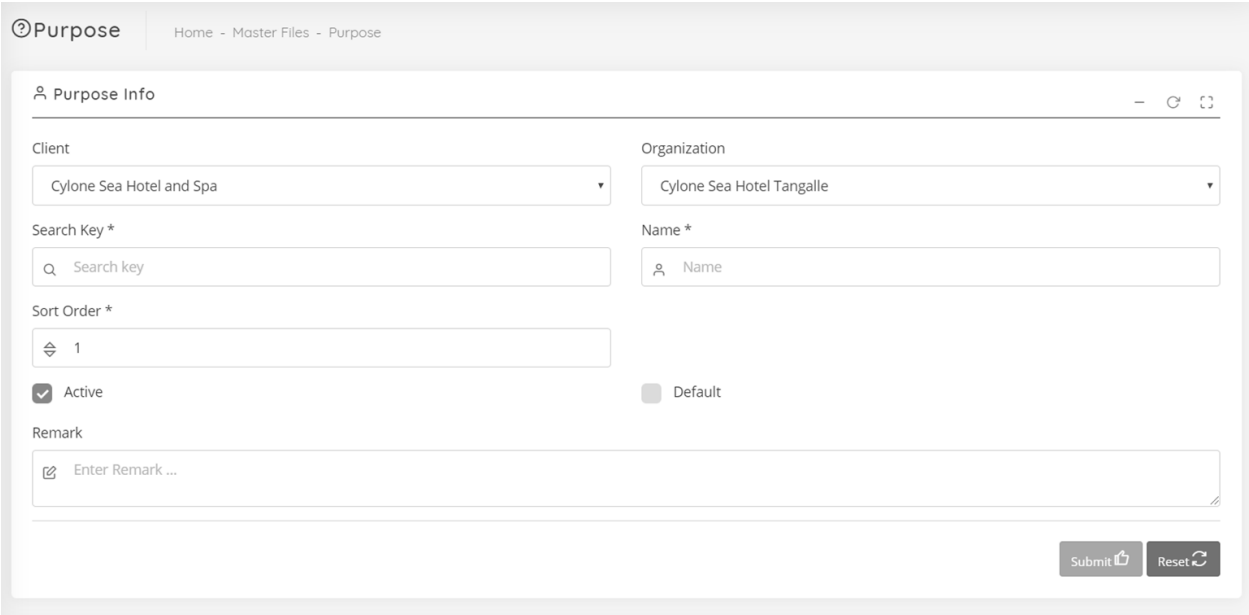


Figure 35: UI- Purpose

Room Capacity: Number of guests can stay in that particular room.

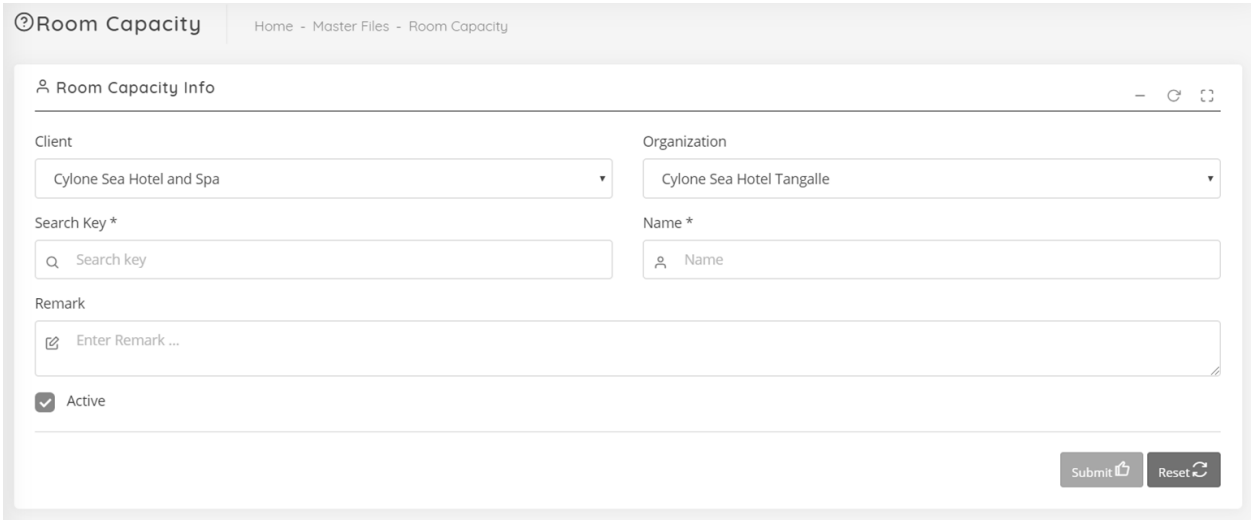


Figure 36: UI- Room Capacity

Room: This can easily identify the preferences of the guest's requirement.

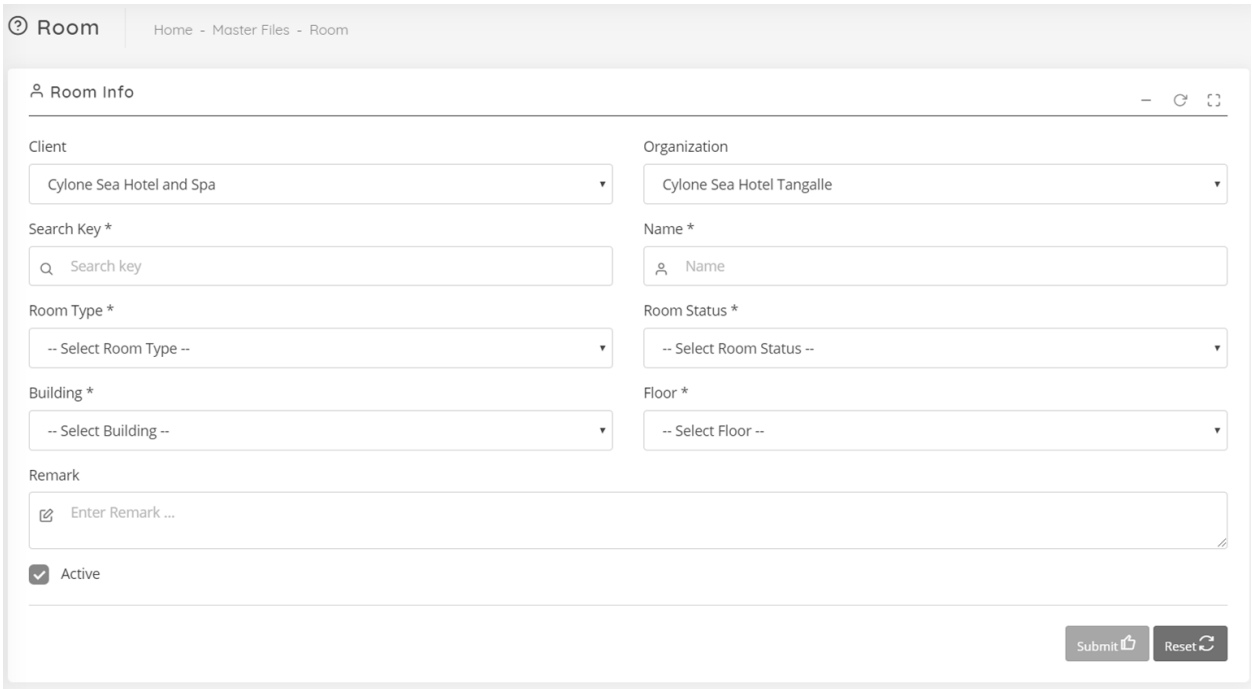


Figure 37: UI- Room

Supplement Line: Issues the duration of the requested supplement.

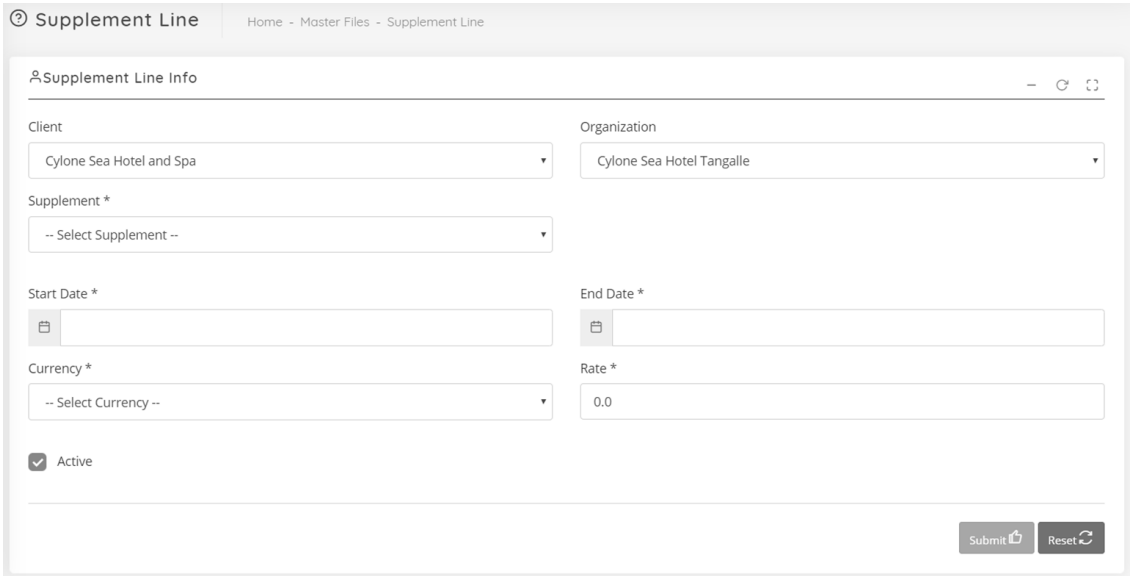


Figure 38: UI- Supplement Line

User: System Admin can create a new user account for employees to access the system.

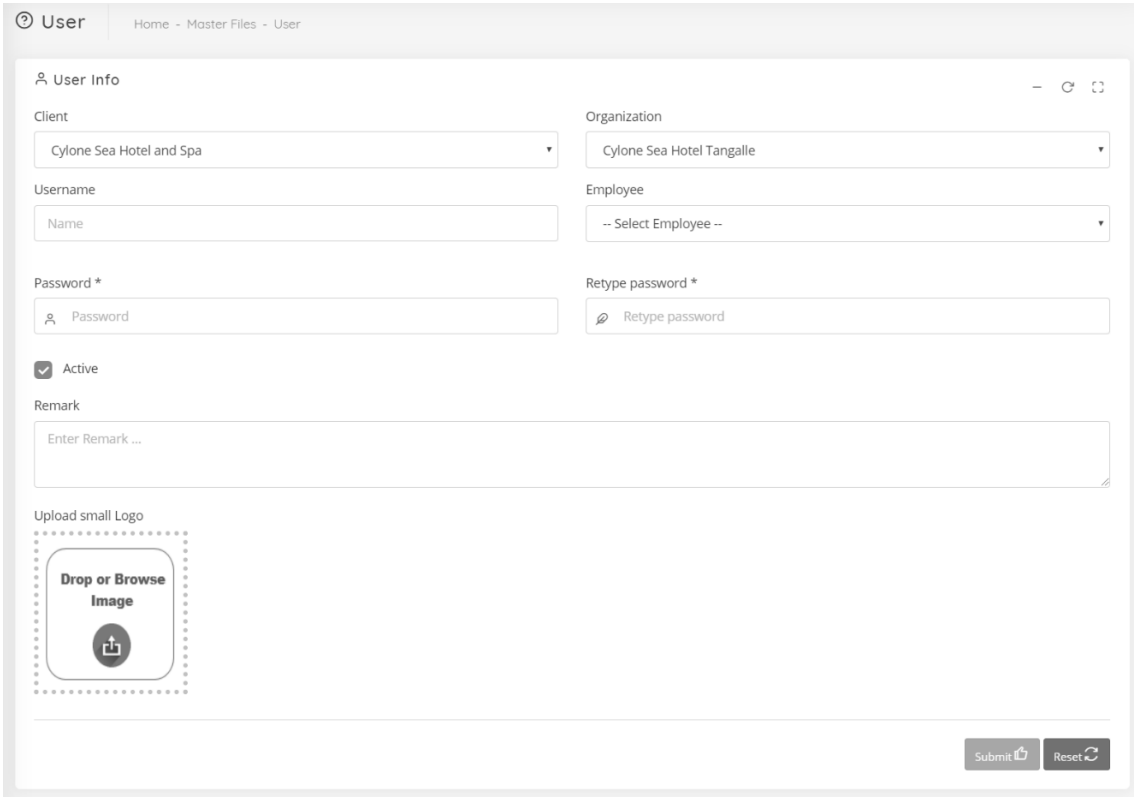


Figure 39: UI- User

Tour Operator: A company that makes arrangements for travel and places to stay, often selling these together as package holidays.

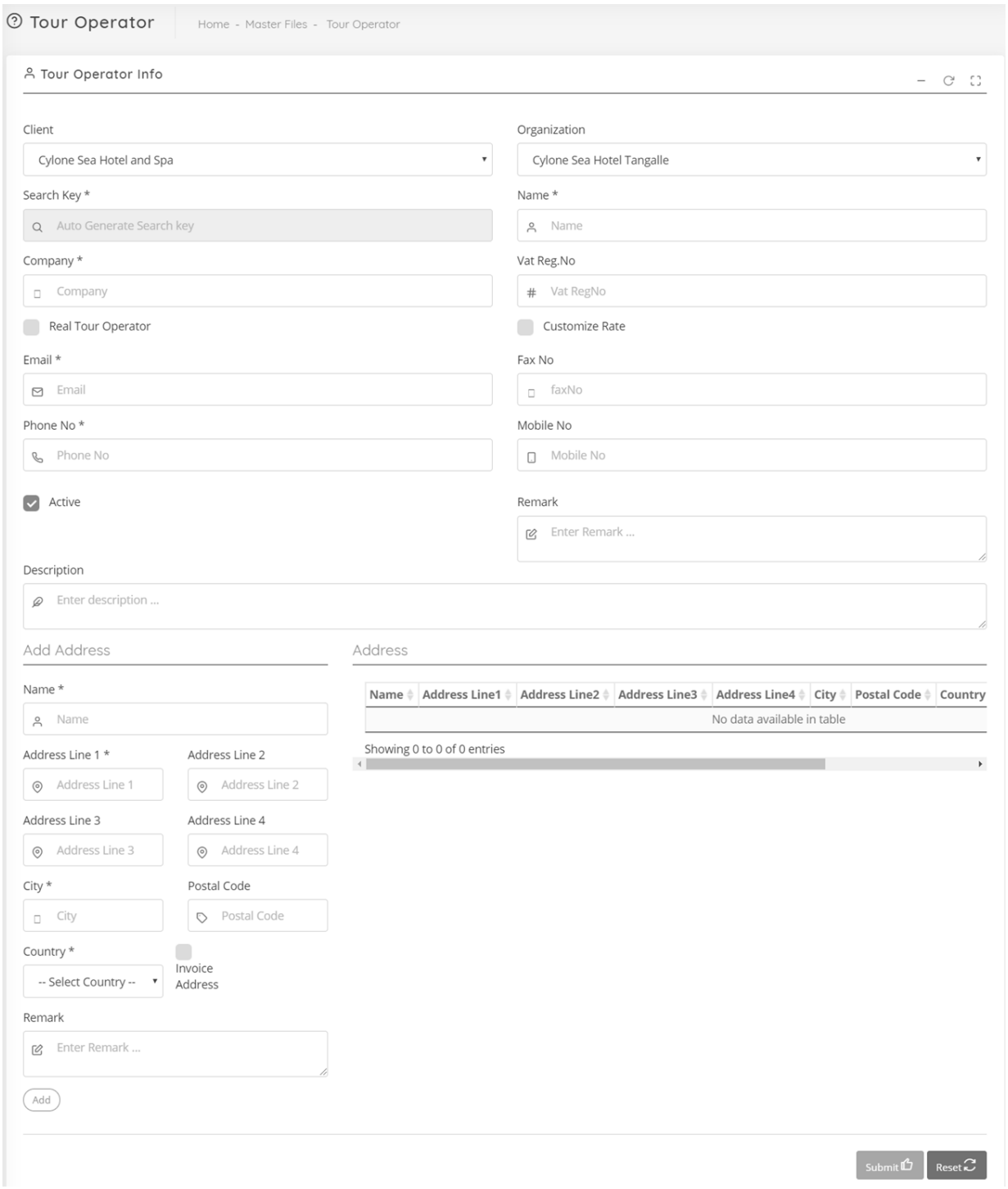
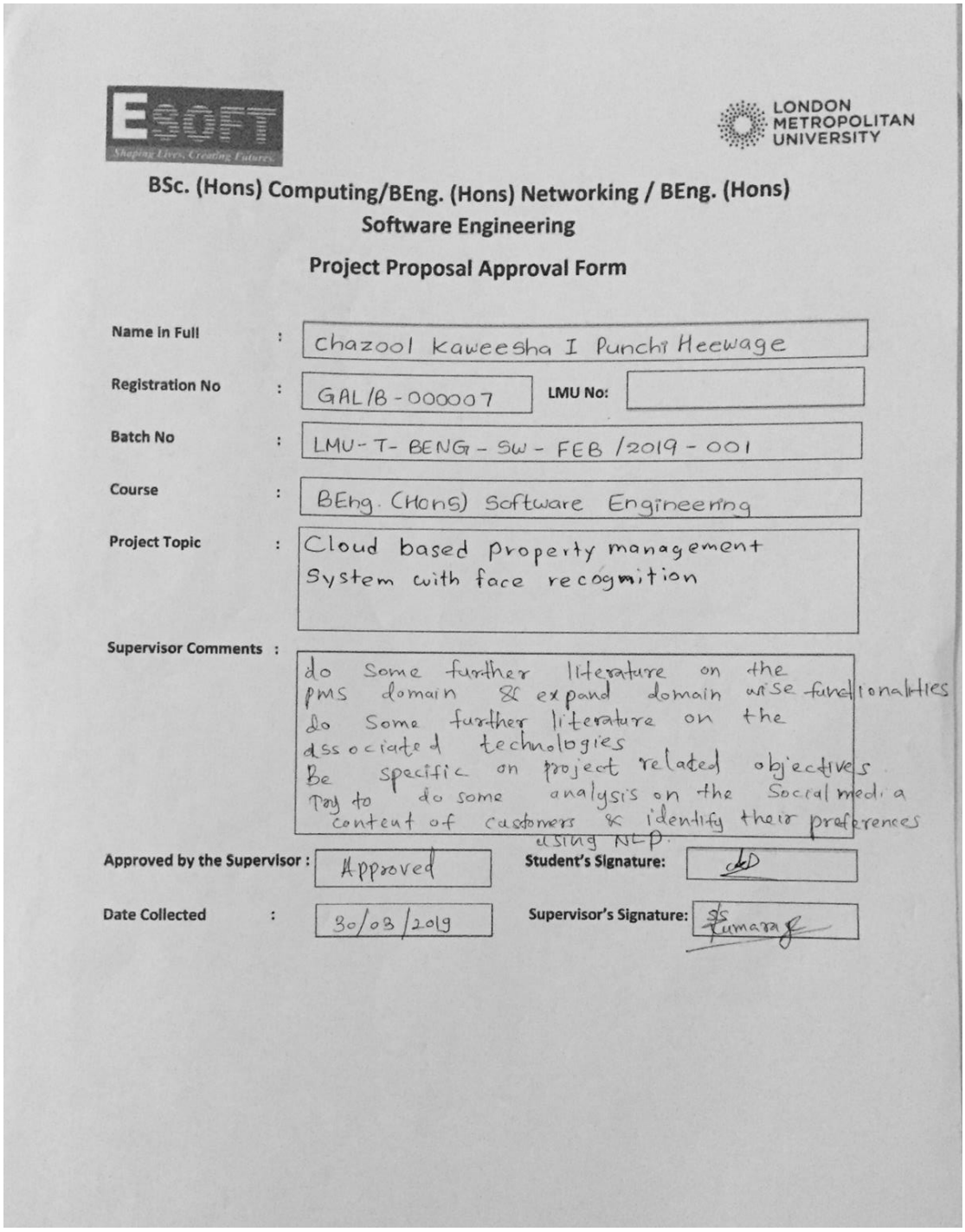


Figure 40: UI- Tour Operator

4 References

1. Allgovision.com. (2019). *Facial Recognition Software with High Accuracy -AllGoVision.com*. [online] Available at: https://www.allgovision.com/facerecognition.php [Accessed 28 Jun. 2019].
2. Bayometric. (2019). *Face Recognition System Project: Capture & Detection*. [online] Available at: https://www.bayometric.com/face-recognition-system-project/ [Accessed 25 Jun. 2019].
3. Hotelogix.com. (2019). *Hotel Management Software Features, Benefits of Hotel PMS System*. [online] Available at: https://www.hotelogix.com/all-feature-list.php [Accessed 19 Jun. 2019].
4. Hotelopro.com. (2019). *Reservations management system for small hotels, inns, B&Bs, guest houses, and apartments*. [online] Available at: https://www.hotelopro.com/reservations-management.html [Accessed 14 Jun. 2019].
5. Instructables. (2019). *Real-time Face Recognition: an End-to-end Project*. [online] Available at: https://www.instructables.com/id/Real-time-Face-Recognition-an-Endto-end-Project/ [Accessed 24 Jun. 2019].
6. Oracle.com. (2019). *What is Hotel PMS? Hotel Property Management System | Oracle*. [online] Available at: https://www.oracle.com/industries/hospitality/what-is-hotelpms.html [Accessed 30 Jun. 2019].
7. Docs.opencv.org. (2019). *Face Recognition with OpenCV — OpenCV 2.4.13.7 documentation*. [online] Available at: https://docs.opencv.org/2.4/modules/contrib/doc/facerec/facerec_tutorial.html [Accessed 27 Jul. 2019].
8. Tutorialspoint.com. (2019). *OpenCV Tutorial - Tutorialspoint*. [online] Available at: https://www.tutorialspoint.com/opencv/index.htm [Accessed 17 Jul. 2019].

5 Appendices



BSc. (Hons) Computing/BEng. (Hons) Networking / BEng. (Hons) Software Engineering

Project Proposal Approval Form

Name in Full : Chazool Kaweesha I Punchi Heewage

Registration No : GAL/B-000007 LMU No:

Batch No : LMU-T-BENG-SW-FEB/2019-001

Course : BEng. (Hons) Software Engineering

Project Topic : Cloud based property management System with face recogmition

Supervisor Comments :

do Some further literature on the pms domain & expand domain wise functionalities
do Some further literature on the associated technologies
Be specific on project related objectives.
Try to do some analysis on the Social media content of customers & identify their preferences using NLP.

Approved by the Supervisor : Approved Student's Signature:

Date Collected : 30/03/2019 Supervisor's Signature:

Figure 41:Project Proposal Approval From

Meeting	Criteria	Suggestions	Actions	Date	Signature
Proposal Stage					
1.	Project topic approval	Project topic is suggested to refined in order to describe the tools & technologies used.	Project topic is refined as follows cloud based property management system with face recognition	30/03/2013	
2.	Project proposal approval	Project proposal approved with the Supervisor comments mentioned in the proposal approval form.	Further literature done	30/03/2013	
Interim & Final Stage					
3.	Literature review (Gathered resource documents)	Literature review has to be further extended. And presented in a document format.	Working existing systems & Special functionalities, drawbacks, further improvements making more interactive system.		

Figure 42: Supervisor Log

4.	Literature review (Report)	facts were not collected using reliable sources.	advised to read journal articles, white papers & ~~literature review~~ research papers.		ss ramanga
5.	Approach (Users, Input, Output, Technologies Used)	only the ~~da~~ front end, & business process & backend is implemented	Suggested to use cloud technologies or docker based deplogment		ss ramanga
6.	Project Design	~~fauctions~~. project design is not complete & comprehensive.	project design has to be extended according to the suggested fauctions & deplogment methods.		ss ramanga
7.	Implementation (Algorithms, Flow charts, System, etc.)	has to be adhered to the java coding standards define proper algorithms & flow charts for	follow java coding standards.		ss ramanga
8.		the proposed fauctions.			

9.					
10.	Evaluation (Testing evidence)	proper Test plans were not prepared. proper Test cases were not prepared. (cover all test cases)	~~follow the~~ prepare proper Test plans & Test cases.		Sumarage
11.	Conclusion (Result interpretation, Achievement of objectives, Limitations) & Further work	cloud deployment was not done. nothing innovative is incorporated to the project	deploy the project in the cloud & incorporate ~~some~~ something innovative to the project		Sumarage
12.	Guidance for the final viva	~~prepare the~~ complete the promised functionalities in the proposal. ~~pre~~ do proper documentation in the source code (comments) ~~incto~~ should be able to explain all the source codes	explain main functionalities promised in the proposal explain the data structures & algorithms used explain the tools & technologies used.		Sumarage

3