Project Log Book

Group Members:

Entry Date	Work Done
January 7th, 2021	Discussed the basic plan to build the prototype for RCM in class, noting down all constraints to be taken care of. Furthermore, we decided our next group meeting would be on January 15th, 2022 (Friday) at 5:30, meeting place: Saad Haleem' House.
January 15th, 2022	Meeting at Saad Haleem's Place: We discussed about the project objective. Using the Software Management Plan template printed from the web site, we stepped through each section and discussed what was required and what resources were available to us. We also discussed how this prototype should be flexible for other countries. There was constant reference to the "Rental Car System" and other related articles.
January 16th, 2022	Finished a rough draft prototype and set it up on the online account.
January 19th, 2000	Saad checked the document of the Software Project Management Plan, and he made some correction marking the corrections in red.
January 20th, 2022	The mistakes were corrected on the web site, and email was sent to Saad to check the document for any more mistakes
January 20th, 2022	The document was checked by Saad and few more mistakes were found. These mistakes were corrected and put on the web.
January 22th, 2022	Meeting at Saad's Place: We discussed the Rental System in more detail and added more information to the SPMP document.
January 25th, 2022	Saad's checked the document of the Software Project Management Plan, and he made some corrections.
January 27th, 2022	The mistakes were corrected on the web site, and email was sent to Saad to check the document for any more mistakes.
January 29th, 2022	Meeting at Saad's Place: We discussed parts 4 and 5 of the Software Project Management Plan in more detail and decided to update some information in the SPMP document. The different parts of the document were divided between the team for updates.
February 3th, 2022	Finished updating the rough draft prototype and set it up on the online account. Sent all team members email with link to latest copy of the document.
Februray 4th, 2022	Saad checked the document of the Software Project Management Plan. The mistakes were corrected on the web site. The latest version of the document is available online.

Last Updated on March 14th, 2022

Software Requirements Specification

for

Rental Car System

M. Saad Haleem
Sameed Ahmed
Hafiz Hibbar

March 14, 2022

Version	Changes Made	Date
1.0	First Pass for Review	1/24/2022
1.2	Second Pass for Review	2/07/2022
1.3	Third Pass for Review	2/28/2022
1.4	RCM Review Version	3/04/2022

Table of Contents

1. Introduction

1.1 Purpose

This document describes the software requirements for the Automated Rental System built for Rental Car Management(RCM).

1.2 Scope In

The RCM is requesting proposals to build a prototype of an for Rental Car Management(RCM) for their current system. This new needs to be scalable enough so that it can accommodate the increase in Rental caused.

The system will be designed to provide an electronic version of the rental reservation system in China. The system will have a user-friendly graphical interface and will be more cost effective compared to the current non-electronic version of the reservation system.

The objectives of this development effort are:

1. To provide existing clerks with a new environment in which to make reservations for rent.
2. To provide an avenue for customers to get their car in a more convenient way.
3. To implement a prototype of a scaled down version of the final system to test the solution and further develop requirements.
4. To collect statistics in a more efficient manner for future rental system
5. To increase efficiency of reservation.

1.3 Scope Out

The following features will not be the part of this Project:

1.

1.3 Definitions, Acronyms, and Abbreviations.

APPM – AsiaPac Marketing Manager
CASE – Computer Aided Software Engineering
PP - Project Plan
SDD - Software Design Description
SRS - Software Requirement Specification
SDS – Software Design Specification
SPMP - Software Project Management Plan
GUI – Graphical User Interface
QAM – Quality Assurance Manager
PDM – Project Development Manager
PMP – Project Management Professional

TBD – To be determined
UML – Unified Modeling Language

1.4 References

- Situation Update – Rental Car Reservation System
  http://rentalcar.com
- Pressman, Roger S., *Software Engineering: A Practitioner's Approach*, McGraw-Hill Companies, Inc., 1997.

1.5 Overview

Chapter 2 of the SRS is a brief description of the characteristics of the software to be built, its functions, its users, its constraints and its dependencies.

Chapter 3 is about specific requirements, such as functional requirements, external interface requirements, performance requirements, and also design constraints and quality characteristics.

Finally, chapter 4 includes all the supporting information, such as the Table of Contents, the Appendices, and the Index.

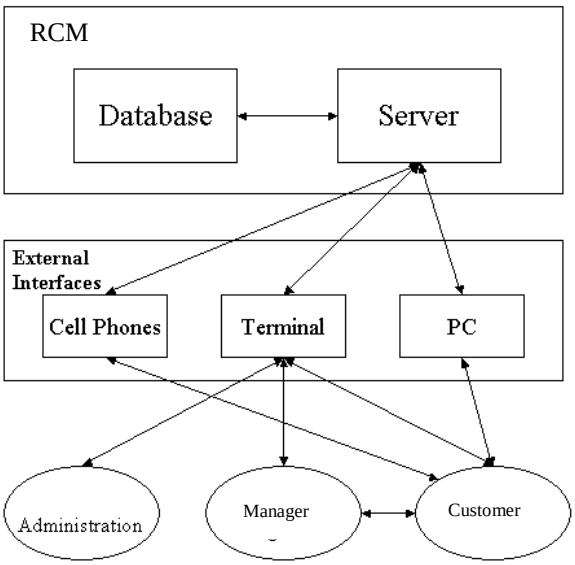
2. The General Description

This section describes the general factors that affect the product and its requirements. This section consists of five subsections that follow. This section does not state specific requirements. Each of the subsections makes those requirements easier to understand, it does not specify design or express specific requirements. Such detail is provided in section 3.

2.1 Product Perspective

The Automated Railway Reservation System diagram showing the overview of the system's modules and the relationship of the system to external interfaces is presented in Figure 2.1.

Figure 2.1 Overview/Architecture Diagram of the RCM



Functions of System Components:

Database:

- Stores data
- Creates reports
- Provides access to data
- Updates information

Server:

- Provides access to the database
- Authenticates users
- Processes reservations
- Performs backups
- Produces reports

External Interfaces:

Personal Computers

- Users (Customers, managers, and administration) may use personal computers to obtain a remote access to the server and the reservation database via the Internet.

Cell Phones

- Serve as a medium of accessing the server and the reservation database.
- Customer may use cell phones and the latest telecommunication technologies to access the server and the reservation database via Internet, or they may use cell phones to call manager to inquire information.

Computer Hardware and Peripheral Equipment to be used:

- 30 workstations, which include CPUs, monitors, keyboards, and mice
- Printers
- Network
- Terminals
- Cell phones to test connection to the server via remote access

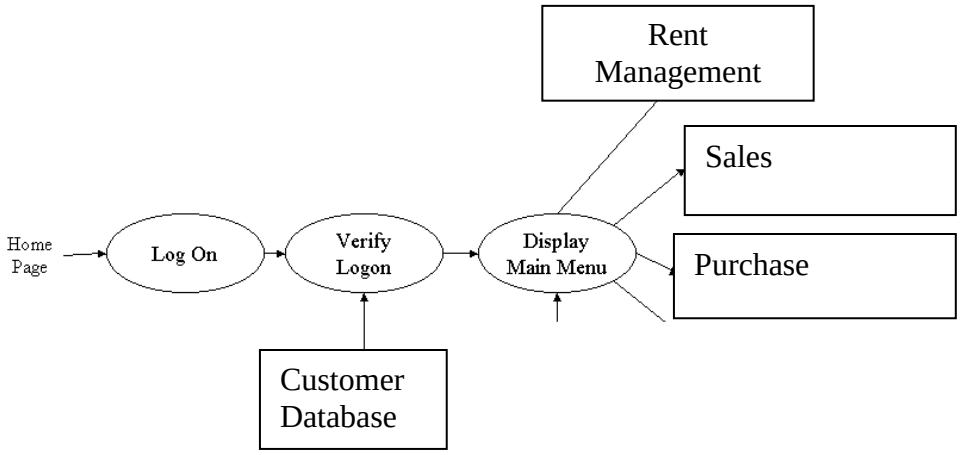
2.2 Product Functions

This section provides a summary of the functions that the software will perform.

2.2.1 Function Relationships

Figure 2.2 to 2.6 depict the relationships among the functions to be implemented by the system.

Figure 2.2 RCM General Function Relationship/**Higher Level Usecase** Diagram



2.2.2 Function Descriptions (Functional Requirement Listings)

2.2.2.1 Log In Function

Description: This function ensures that only authorized users gain access to the Reservation databases. An authorized user is a user who has an account on the system. Users include customer, , and RCM officials. The user must type a valid username and password to gain access.

2.2.2 Module 1: Make–Rent Management (M. Saad Haleem)

Description: This function allows the user to [Make | Drop | View | Update] a reservation for a particular train on a particular date for a certain number of tickets.

If the user does not already have a reservation, then all reservations are dropped. If the user already has a previous reservation, a chosen reservation is dropped from the list of current reservations, and the passenger account balance gets updated.

2.2.3 Module 2:

Description: This function

2.2.4 Module 3:

Description: This function

2.3 User Characteristics

The main users of the system will be the customer buying cars, the managers that process reservations for customer, and the RCM administration that access the reports generated by the system. The users are not required to have knowledge in the computer field. The graphical interface provides an easy way of using the RCM system with minimum of training.

2.4 General Constraints

The constraints for the project are:

- The functional prototype should be available after 30 days upon the arrival of the management team. This may prove to be a serious time constraint on the development of a successful prototype.
- Communication with the Chinese team members may prove to be difficult since some Chinese developers do not speak English and the management team does not speak Chinese. Even with the presence of a translator, communication may be difficult. Absence of the translator may severely affect project development.
- Team members are restricted from bringing their own equipment, and insufficient equipment supply may hinder project development.
- Team members are restricted to bringing only the analysts of the team. This might affect the project development if more people are needed or the required skills are not available.
- The majority of the population does not have or have a limited access to the Internet.

2.5 Assumptions and Dependencies or Business Logic

The assumptions for the project are:

- Ten Orders I first half of the day from Karachi. These order then will be dispatched according to their turns

- Reservation can be made up to one week before.

- cars are assigned during reservation.
- Phone reservation involves being purchased within 24 hours after making the reservation. Otherwise, the reservation will be cancelled.
- No reservations can be made 48 hours prior to the car. Rather, it will be done on a first come first serve basis from that point on.
- customer lists will be provided for conductors at each stop.
- The expected reservations during test period may amount to approximately 25,000 per day. This volume varies by hour, day, and season.

- Network connection will always remain established.
-

<ADD OOAD REPORT DIAGRAMS HERE>

3. Specific Requirements

This section of the SRS contains design requirements for the Automated Rental Car System.

3.1 Functional Requirements

3.1.1 Log In Function

a) ***Description:*** This function ensures that only authorized users gain access to the Reservation databases. An authorized user is a user who has an account on the system. Users include passengers, train officials, and CRM ministry officials. The user must type a valid username and password to gain access.

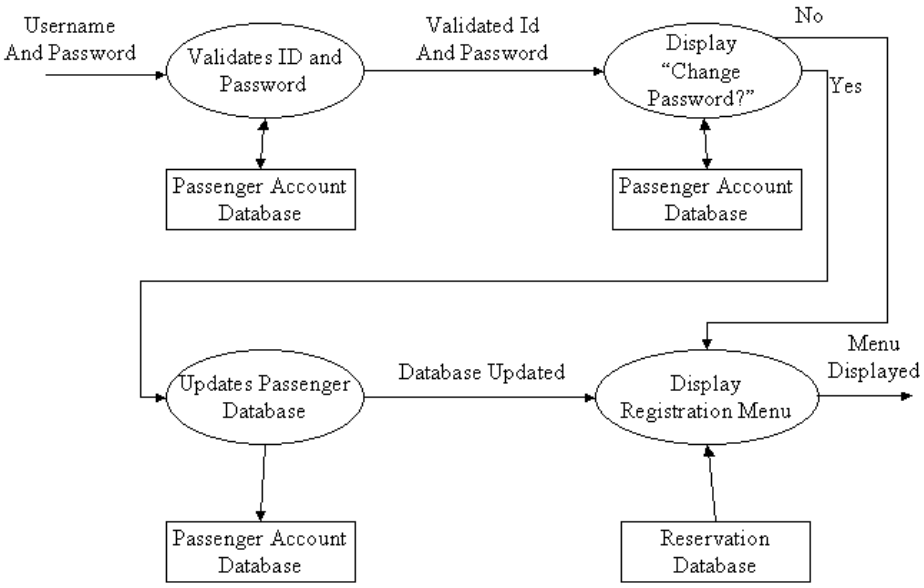
b) ***Usage Scenario/ Use case Description/ Specification:***

Description	Allows access to online ARRS
Inputs	Username, password
Source	1. User inputs username and password 2. Press Login Button
Alternate case	
Outputs	Successful login; unsuccessful login
Destination	None
Precondition	Authorized User
Post Condition	No change to customer Accounts Database
Side Effects	Failures and successful logins are sent to Reservation Database

c) Detailed Use case Diagram for Login: optional

d) Use case Realization for Login: optional

e) Flow of Event or Data Flow Diagram for Login: optional



f) ***Sequence Diagram for Login: optional***

g) Collaboration Diagram for Login: optional

h) Activity Diagram for Login: optional

i) Class Diagram for Login: optional

j) State Chart Diagram for Login: optional

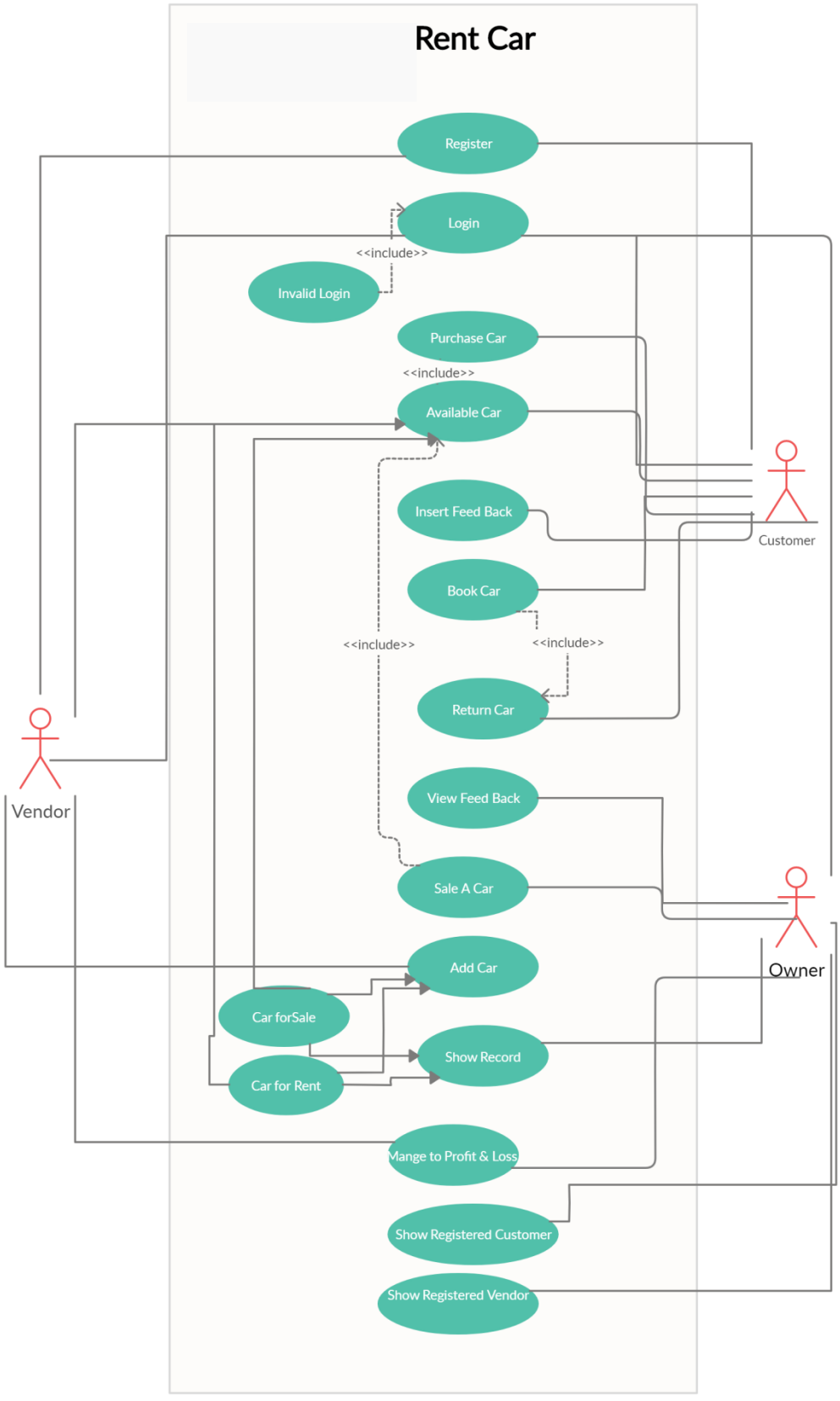
3.1.2 Module 1 complete CRUD Make a Rent Management Function (M. Saad Haleem)

a) ***Description:*** This function allows the user to [make | drop | view | update] a reservation for a particular on a particular date for a certain number of tickets. If the user does not already have a reservation, then a new reservation is created. If the user already has a previous reservation, a new reservation is added to the list of current reservations, and the customer account balance gets updated.

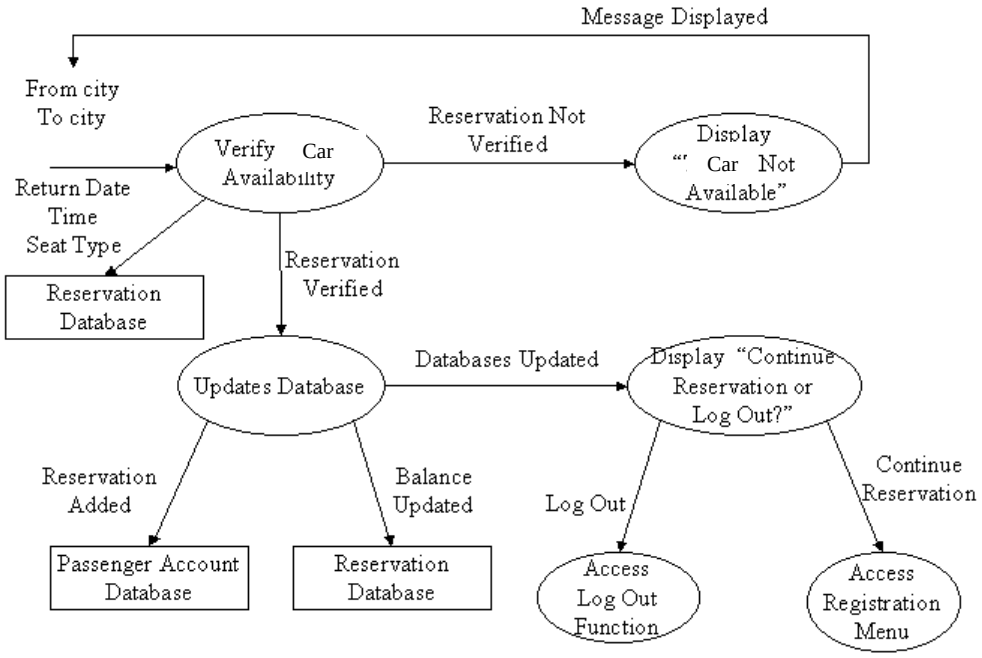
b) ***Usage Scenario/ Use case Description/ Specification:***

Description	[make | drop | view | update] a reservation to the user's account
Inputs	From city, to city, seat type, date, return date and time
Source	1. User inputs from city, to city, type, date, return date and time 2. Press Button …
Alternate Case	
Outputs	Added | Deleted | Viewed | Modified reservation
Destination	Computer screen Reservation database customer Account database
Precondition	Valid information; and car available; user does not have another reservation at the same time
Post Condition	Reservation added to customer account
Side Effects	User's current reservations adjusted Balance due adjusted

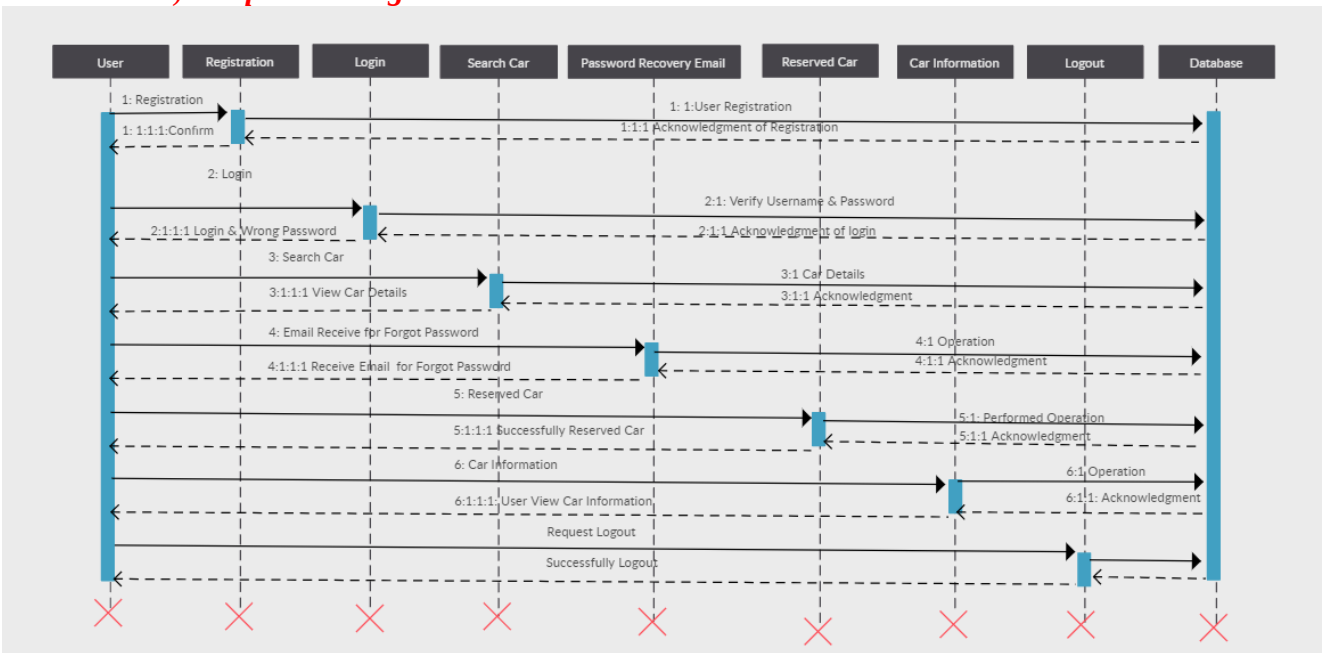
c) Use case Diagram:


Rent Car
Register
Login
<<include>>
Invalid Login
Purchase Car
<<include>>
Available Car
Insert Feed Back
Book Car
<<include>>
<<include>>
Return Car
View Feed Back
Sale A Car
Add Car
Car forSale
Car for Rent
Show Record
Mange to Profit & Loss
Show Registered Customer
Show Registered Vendor
Customer
Vendor
Owner

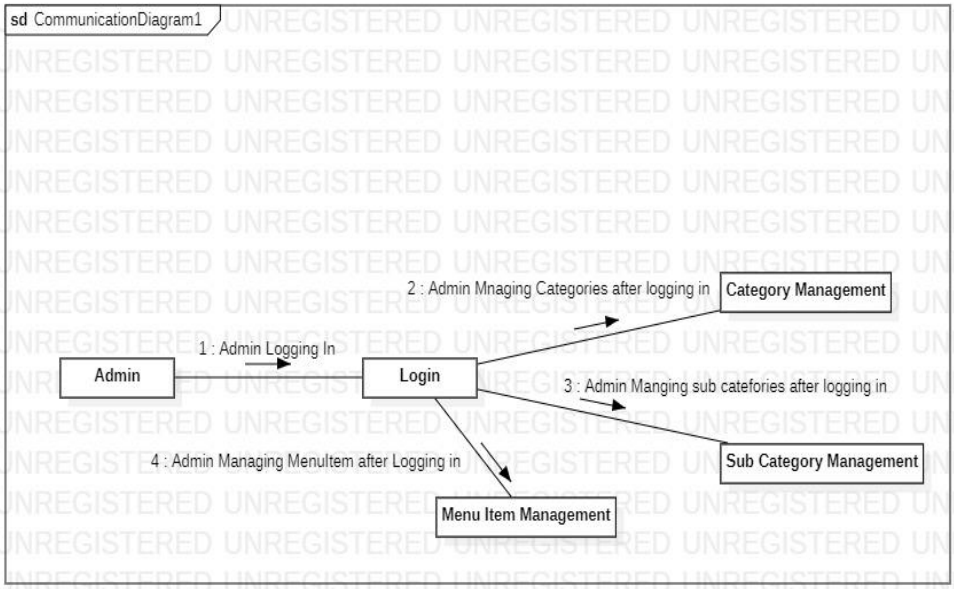
d) *Flow of Event or Data Flow Diagram:*



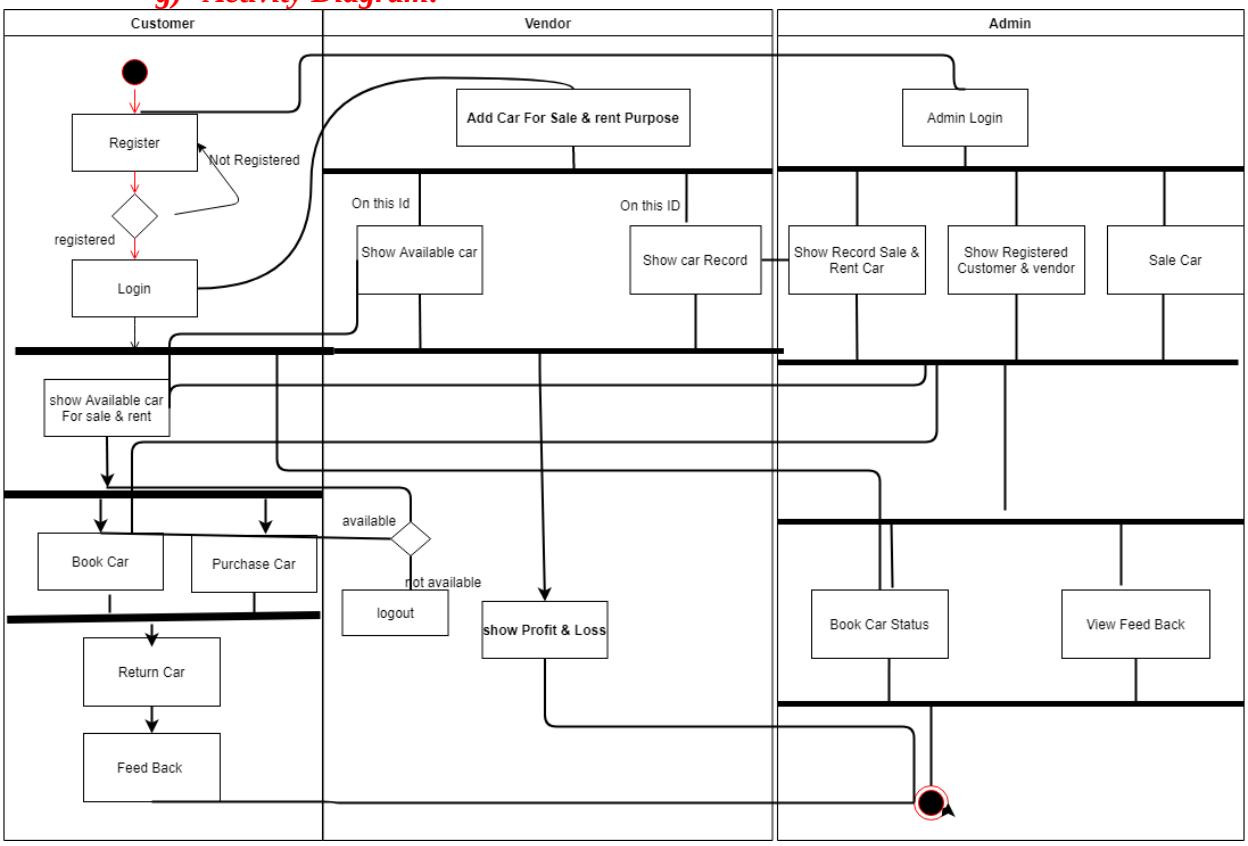
e) *Sequence Diagram:*



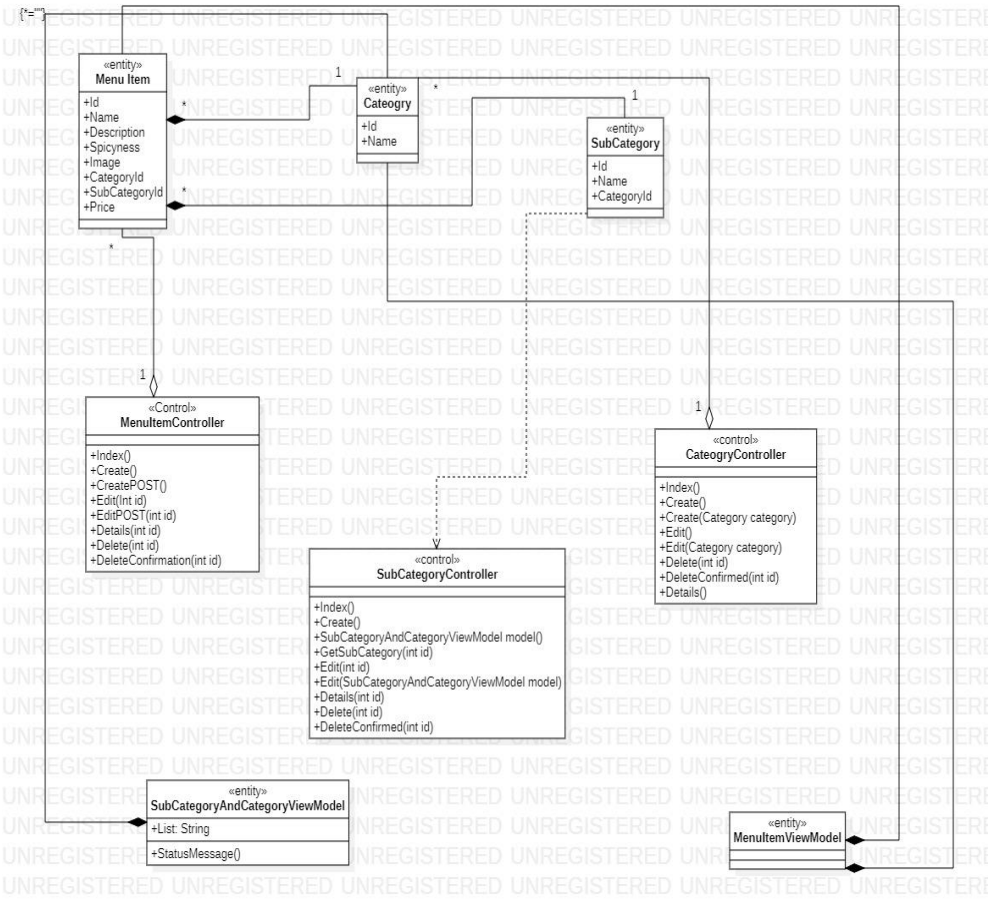
f) Collaboration Diagram:



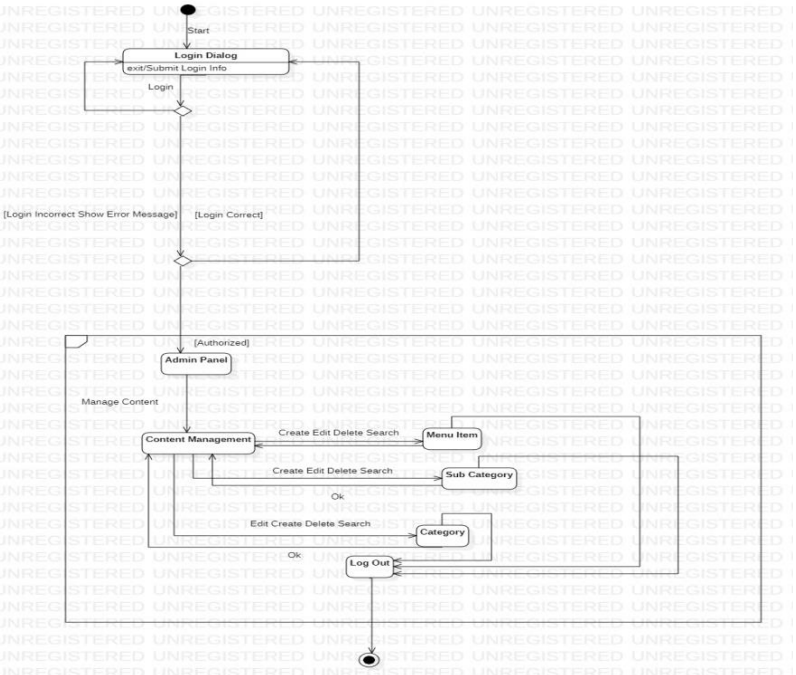
g) Activity Diagram:



h) Class Diagram:



i) State Chart Diagram:



3.1.3 Module 3 complete CRUD Make a Sales Function (Sameed Ahmed)

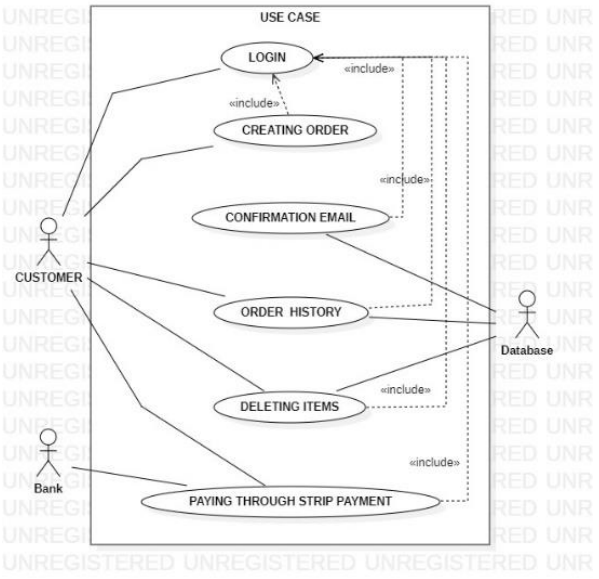
a) Description: This function allows the user to

- Creating Order
- Reviewing Order Confirmation Email
- Searching Order History
- Paying Through Stripe Payment
- Social Login
- Order Confirmation

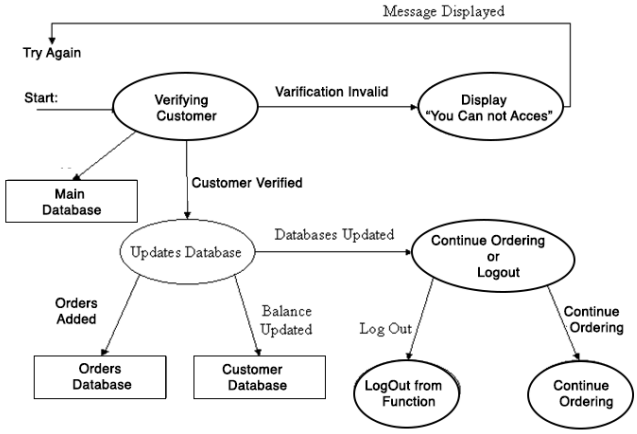
a) Usage Scenario/ Use case Description/ Specification:

Description	[make | drop | view | update] a sale to the user's account
Inputs	From city, to city, car type, date, return date and time
Source	3. User inputs from city, to city, type, date, return date and time 4. Press Button …
Alternate Case	
Outputs	Added | Deleted | Viewed | Modified Sale
Destination	Computer screen sale database customer Account database
Precondition	Valid information; and car available; user does not have another sale at the same time
Post Condition	Sale added to customer account
Side Effects	User's current reservations adjusted Balance due adjusted

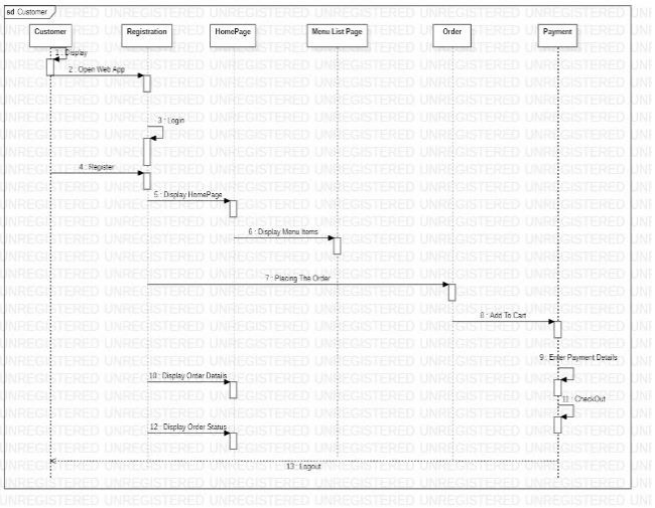
b) Use case Diagram:



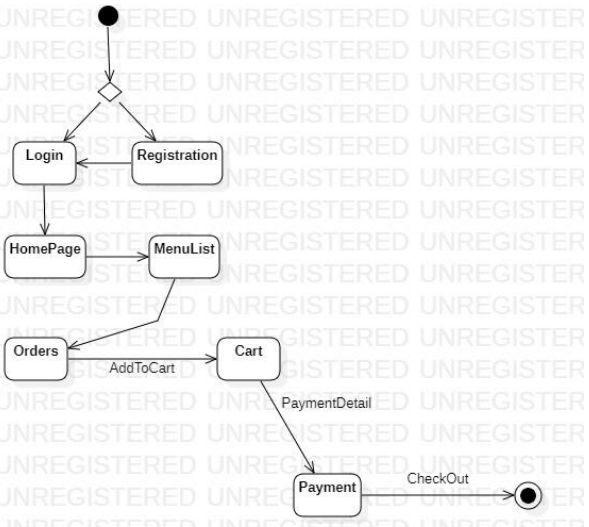
c) Flow of Event or Data Flow Diagram:



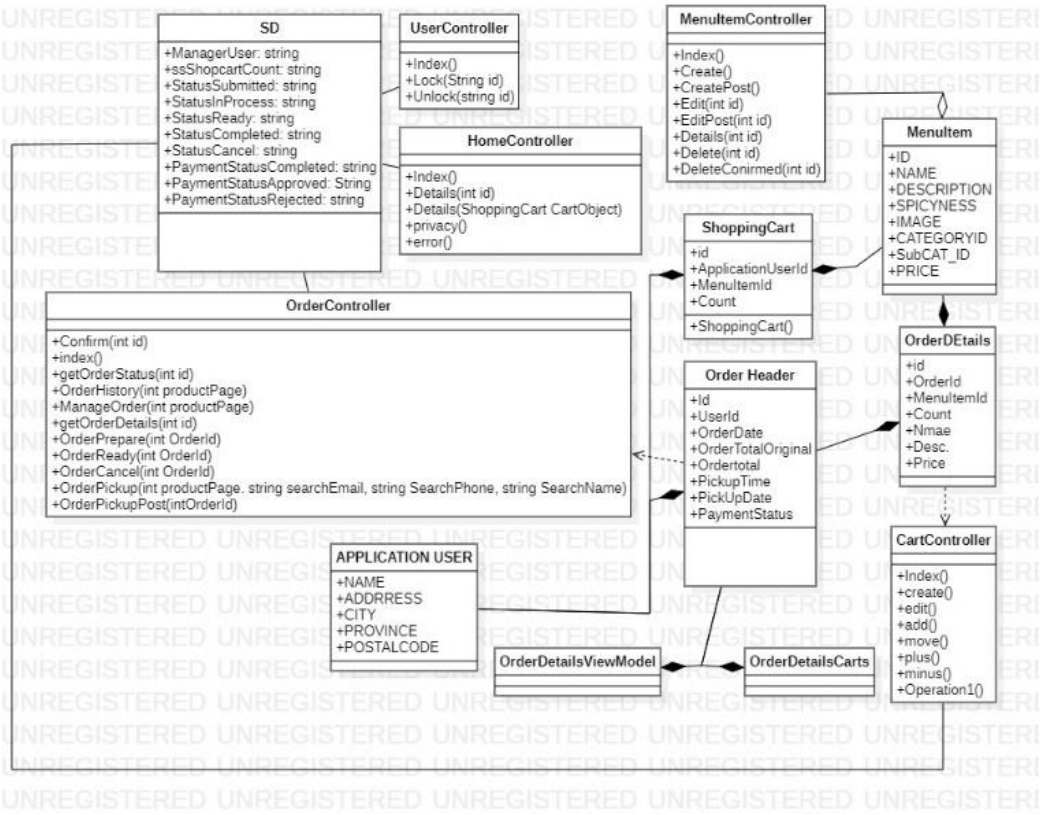
d) Sequence Diagram:



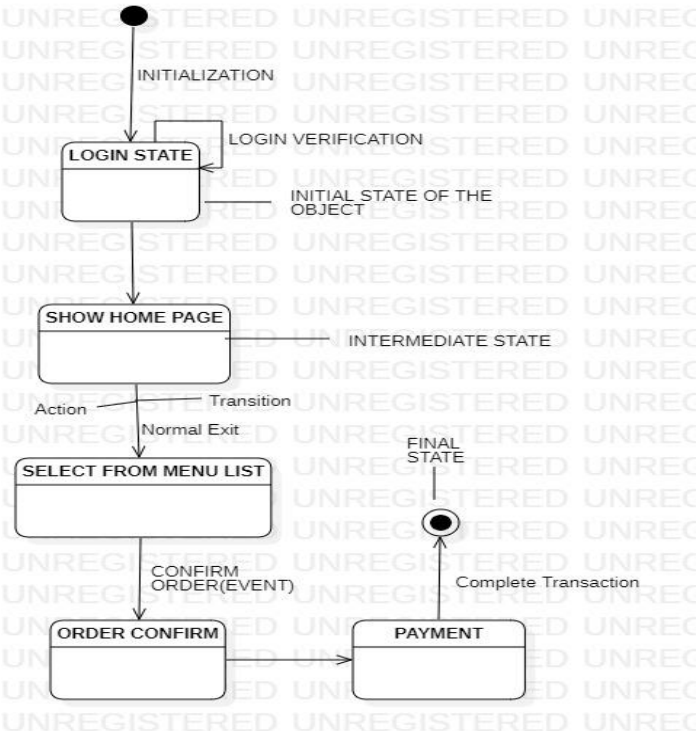
e) Activity Diagram:



f) Class Diagram:



g) State Chart Diagram:



3.1.4 Module 4 complete CRUD Make a Purchase Function (Hafiz Hibbar)

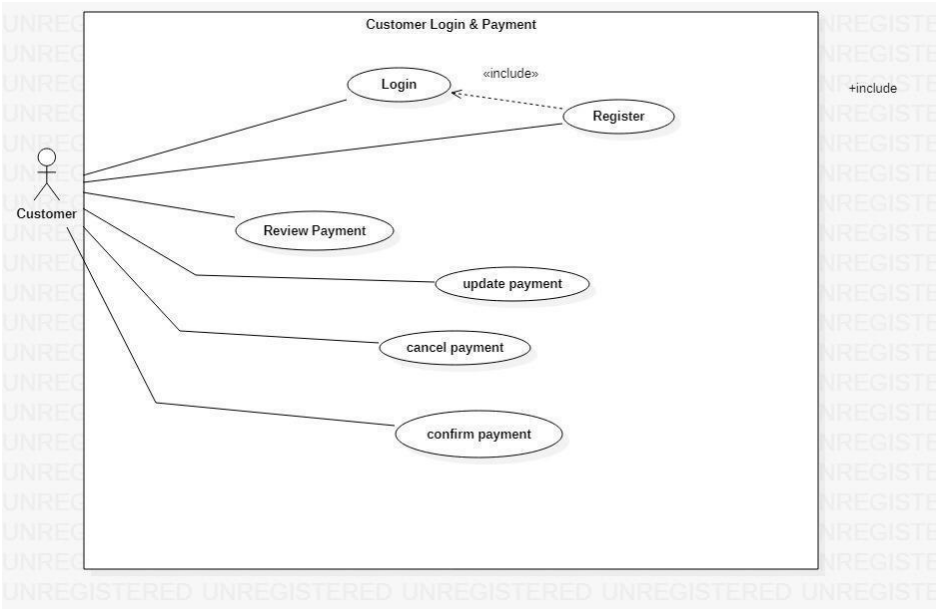
a) Description: This function allows the user to

- Confirming Orders Payments
- Updating Orders Payments
- Reviewing Orders Payments
- Deleting Orders Payments
- Searching Orders Payments

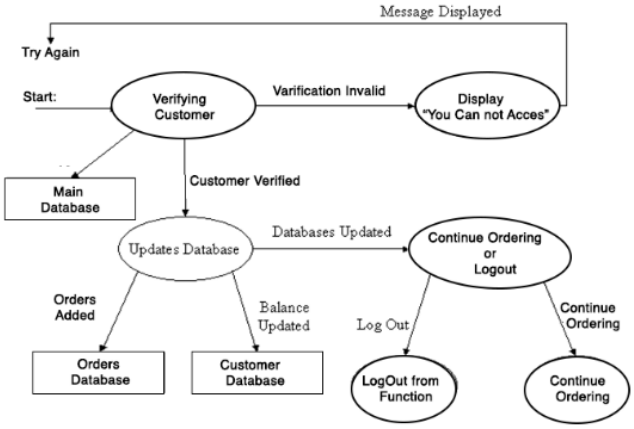
b) Usage Scenario/ Use case Description/ Specification:

Description	Customer order profile to the user's account
Inputs	From Cart To Payment Method
Source	5. Stripe Payment Gateway 6. Press Button …
Alternate Case	
Outputs	Added | Deleted | Viewed | Modified payment
Destination	Computer screen main database customer database
Precondition	Valid information: user login verified
Post Condition	Can not
Side Effects	User's current Payment adjusted Balance due adjusted

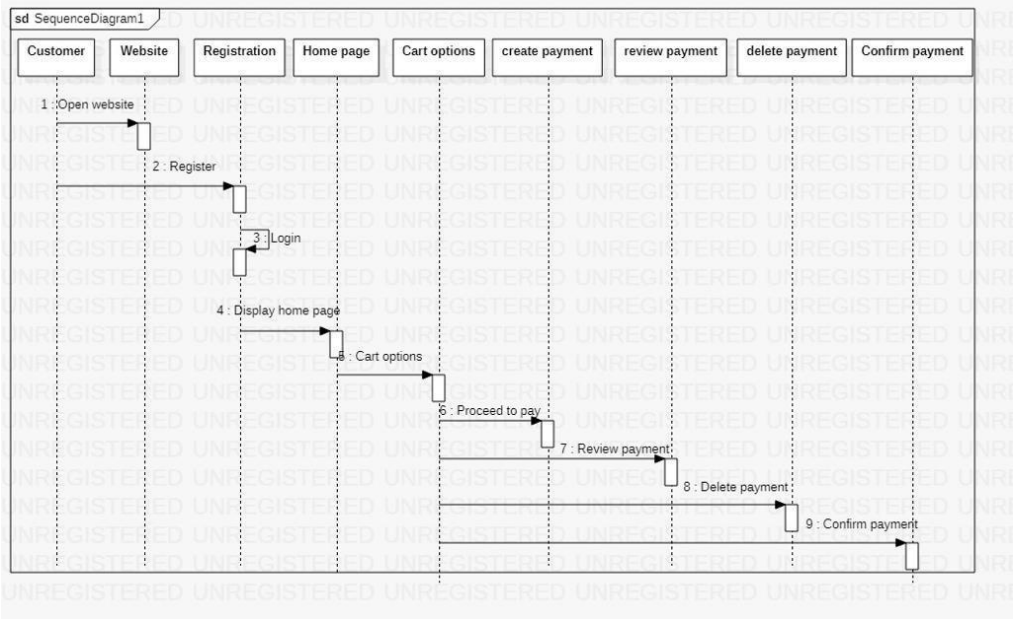
c) Use case Diagram:



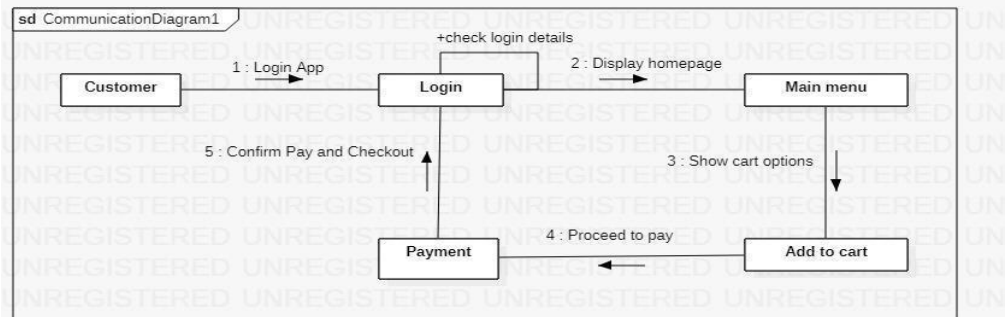
d) Flow of Event or Data Flow Diagram:



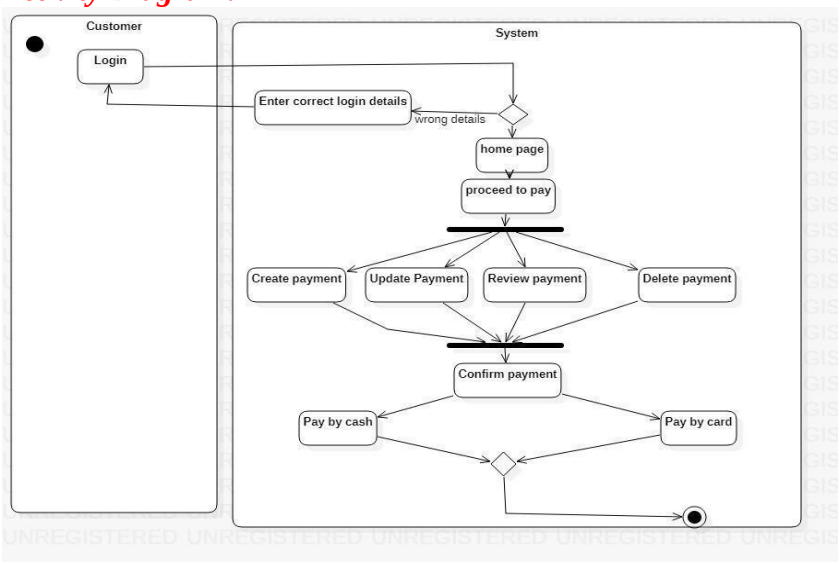
e) Sequence Diagram:



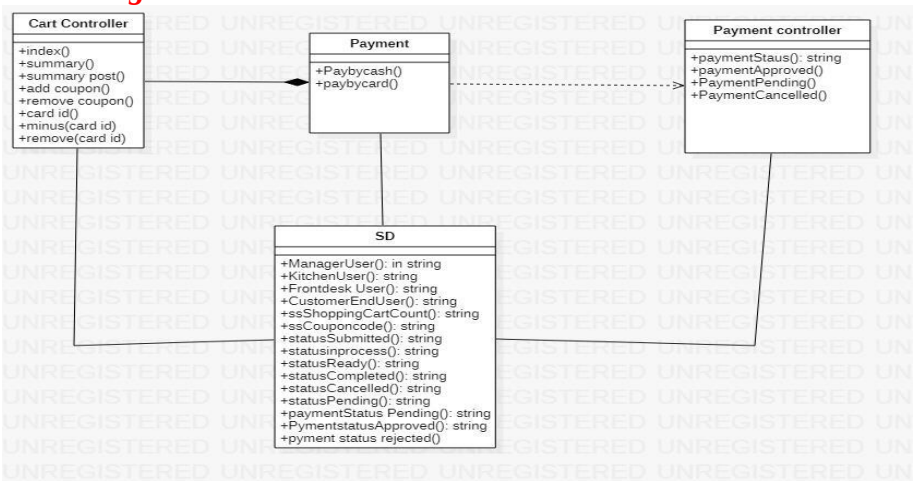
f) Collaboration Diagram:



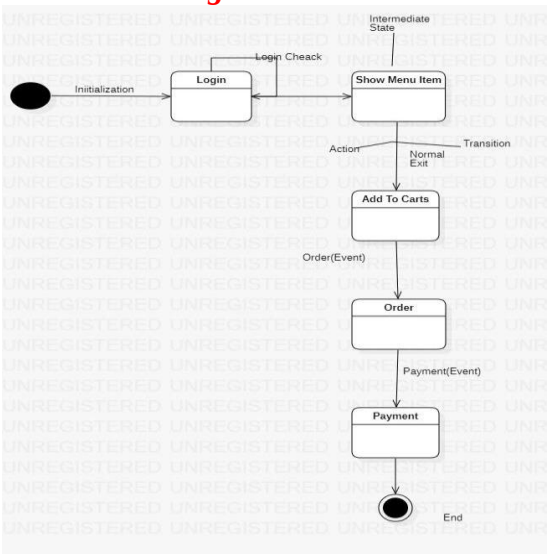
g) Activity Diagram:



h) Class Diagram:



i) State Chart Diagram:



3.2. External Interface Requirements

3.2.1 User Interfaces

The user interfaces are divided into two major components. One part includes the user accessing the system using a cell phone. The other portion involves accessing the system through a remote site or at a particular location specifically designed to access the system. For instance, the clerks and the CRM access the reservation system from the reservation or CRM office.

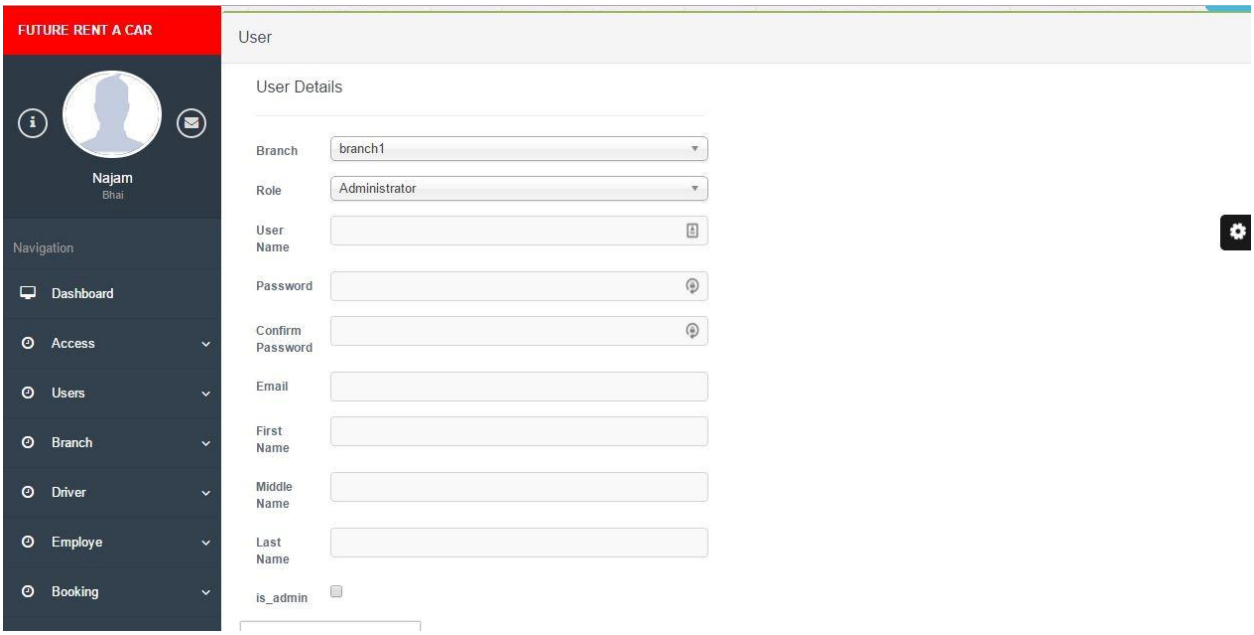
The diagrams and explanations below demonstrate the major transition from one user interface to another. This is a brief description. However, a more detailed demonstration is done in the prototype. The purpose of this interaction is to illustrate the overall view of the ARRS.

The diagram below illustrates the four **major functionalities or modules** . These functionalities will be displayed depending on the user. For instance, the will see all four functionalities while the normal user and the clerks will only see.

Selecting one of these functions will take the user to a different user interface. For instance, choosing will display the following web page. The title of this page is consistent with the function selected, and since the Ticket Reservation was selected, the title displays. The purpose of this is to allow the user know what part of the system they are accessing. Furthermore, the user can select any of the four functions.

The user can select any of the four functionalities. For the sake of this demonstration, if the user clicks on the Make Reservation function the diagram below is displayed. Once again the title is the same as the main function and a subtitle indicates the second function selected. In addition, the person can fill up the following information and the date of or return if he/she wishes. The three buttons allow the user to navigate through the interfaces. For instance, the back button will take the user to the above page, and the clear button will clear the form of any selection he/she made before. The Display Available displays the available cars, and what city they want to. However, before we get to the next page when clicking Display Available the picture below illustrates the Make Reservation function.

The Display Available function displays all the from one city to another and the seats available on that train. Furthermore, the last list displays the number of tickets available for the particular car on the selected route. The back button will take the user to the above picture, and the confirm button takes the person to the payment page.



The following page allows the user to pay for the as appropriate. Now, this page is part of the customer Account function, and it is used here to make payment for the selected. This makes it easier for the user since they do not have to go back to the main menu and to access their account.

Finally, the submit button displays the appreciation page as shown below with a button to go to the main menu.

The above illustration has shown a brief overview of the user interfaces involved for the normal and clerk users. However, the RCM have specifically requested a number of reports, and they must be able to adjust their train schedule as the trains become unavailable. Therefore, the RCM interface is able to access all four functionalities as shown in the main menu (first diagram). Once the CRM selects the Reports function, a list of five reports is displayed as linked list. This is shown in the diagram below:

The report selected here shows the number of reservation for each departure. This report indicates the major traffic flow, and what trains are needed where during varying time and season. The diagram below shows the report format to be displayed.

As mentioned earlier, the system can also be accessed through the wireless phones. In that case, the overall system will be the same as the above presentation except that the format will be simplified, since the phones do not have graphic support. The phones will have access to the Make Reservation and Passenger Account, however it is difficult to display the reports and trains information on a small screen for the CRM.

3.2.2 Hardware Interfaces

The RCM includes two major hardware components: cellular phones and regular PC's. The cell phones require WAP (wireless application protocol) network protocol, which is already programmed in the latest phones.

The second component involves the regular PC’s, which communicate with the server. The server then communicates with the database. The protocol involved between the PC's and the server is the HTTP protocol, which allows communication between the PC's and the Server. The remote PC's, such as

someone accessing the RCM from home using the Internet, are able access the information through the CGI. The requests come in through the HTTP protocol, and using an ODBC the database results are returned and processed using Perl to give an HTML web page. The format of the output is displayed as web pages.

3.2.3 Software Interfaces

An DBMS will be used to manage the database and any changes made to it. Furthermore, the DBMS will make regular backups of the database and generate reports regularly so that they can be accessed by the CRM. The Apache server between the client and the database will handle all communication, and the server will run on a Linux operating system. Furthermore, the HTML pages must be implemented such that they can be displayed on two common browsers: Netscape and Internet Explorer.

Information about the products used for the RCM:

(1) Name: Oracle
(2) Mnemonic: Oracle
(3) Version Number: ?
(4) Source: Oracle

(1) Name: Linux
(2) Mnemonic: Linux
(3) Version Number: 6.2
(4) Source: Unix

(1) Name: Internet Explorer
(2) Mnemonic: IE
(3) Version Number: 5.00
(4) Source: Microsoft

(1) Name: Apache
(2) Mnemonic: Apache
(3) Version Number: 1.3.14
(4) Source: Apache Software Foundation

3.3 Performance Requirements

The following sections list the performance requirements for the system.

3.3.1 User Requirements

User Requirements	**Description of Requirement For Design Environment**
Location(s) and Number(s) of Users	Karachi, Hyderabad
Expected Growth in Number of Users	
After 1 Year	50%

After 2 Years	TBD
After 3 Years	TBD
User Expectation	
Interactivity	User expect that it provides a very easy to use graphical user interface
Reliability	For some applications, reliability must be 100% during the application session
Adaptability	Network must adapt to user additions, deletions and changes
Security	Encryption software would be used for Credit Card transactions
Cost / Funding	Less than $250K

3.3.2 Application Requirements

Since no specified service is indicated, then we have listed the applications as best – efforts. This may change as we learn more about the application.

The communication package is determined to be bursty in nature, with small data sizes and frequent transmissions. We can consider this application to be interactive-burst, while the database transaction-processing application is described by the RCM as transferring large amounts of data (initial estimates are 1 MB/transaction), we have listed this application as interactive-bulk.

Categorizing Applications	Best-Efforts	Application Locations
Communication	100 Kb/s	Karachi and Hyderabad
Database Access	400 Kb/s	All Locations
Database Transaction processing	1.5 Mb/s	All Locations

3.3.3 Host Requirements

	Type of Host or Equipment	Numbers and Locations
Host A	PC	Karachi (10), Hyderabad(7),
Host B	Database Server	Karachi
Host C	Application Server	Karachi

3.4.1 Standards Compliance

There are no design constraints that can be imposed by other standards limitations.

3.4.2 Software Limitations

- must be able to run Internet Explorer or Netscape Communicator web browsers to access the system.

3.4.3 Hardware Limitations

- Input/Output: One or two-button mouse, keyboard, cell-phone, or touch screen required.
- Network card required at thin-client terminals to make communication with server possible.

3.5 Quality Characteristics

There are a number of quality characteristics that apply to the RCM software system.

3.5.1 Portability

The RCM system will be developed using MVC so that it can be accessed from any type of system using just a regular web browser.

be tested on all types of hardware before being released to ensure that is it compliant with this requirement.

3.5.2 Reliability

The system should be capable of processing a given number of reservations within a give time frame with no errors and the system should be available and operational all the time. During the development of the prototype for the 3 cities, the system will be tested in its actual environment to ensure that it can handle the load of reservations that occur during a regular workday.

3.5.3 Usability

The RCM system will be developed so that it is an easy to use system that requires the least amount of user input possible. Every input will be validated. The user should only have general computer use knowledge. Error messages will be displayed if the user enters an invalid value or tries to access a function without the required permissions. An easy and well-structured user manual will be provided to the RCM and the system will include descriptive help for all operations allowed.

3.5.4 Correctness

The RCM system will be considered correct when the RCM approves the prototype presented and agrees that all the functions they require are implemented as stated in the Software Requirements Specification.

3.5.5 Flexibility

The RCM system should be developed in such a way that it is easily customizable. If new functions are required by RCM, there will be little effort required to update the system to support new cities or new transactions.

3.5.6 Security

The RCM system should not compromise the customer information at any time. The user information will never be sold to other parties and will be kept secure at all times. Users will be authenticated to ensure that no unauthorized users gain access to private information.

3.5.7 Maintainability

The RCM source code will be kept well structure and documented so that it is easier to maintain and extend the system. All changes to the system shall be documented.

3.6 Other Requirements

Certain requirements may, due to the nature of the software, the user organization, etc., be placed in separate categories such as those below.

3.6.1 Data Base

The Rental Car System will have one main database .The database will be created on SQL server. The following are the requirements for the database that is to be developed as part of the product. They include:

Reservation Database

Types of information	Schedule information for the trains, including date, time, departure city, destination city, ticket cost and ticket availability for a particular train
Frequency of use	Depends on the passenger demand, which may reach 25,000 per day during peak periods
Accessing capabilities	The database should allow access to at least 1,000 people at once; the users will have a general access to the information about the train schedule, and a secure access to the reports (available only to RCM officials) using a username and a password
Data element and file descriptions	To be determined
Relationship of data elements, records and files	To be determined
Static and dynamic	To be determined

organization	
Retention requirements for data	information will be available as long as the for a particular customer is in use and at least one year after the train has been cancelled. The reports information will be available at least for 5 years

Customer Account Database

Types of information	customer account information including their name, address, phone numbers, last reservations, balance owed, credit card number (if they paid by a credit card)
Frequency of use	Depends on the passenger demand, which may reach 5,000 per day during peak periods
Accessing capabilities	The database should allow access to at least 500 people at once; the users will have a secure access to the database using a username and a password
Data element and file descriptions	To be determined
Relationship of data elements, records and files	To be determined
Static and dynamic organization	To be determined
Retention requirements for data	customer account will be available for as long as a customer is using the account, and at least for 6 month since the passenger logged on last time.

3.6.2 Operations

The normal operations required by the user can be viewed as the following:

User-initiated Operations:

These operations include the login operation, which is initiated by the users. Also, the process of becoming a new user is in this category. Building, changing, and viewing itineraries, as well as paying for the itinerary are all initiated by the users. The user initiates the report generation activity, as well as changing train schedules.

Interactive Operations and Unattended Operations:

The users initiate all the operations mentioned above, and almost all of them are somehow interactive. Displaying the train schedule is non-interactive. The report

display is a non-interactive operation, although selecting the desired reports will require user input.

Data Processing Support Functions:

The user account data is used to create new accounts, as well as to validate user id's during login functions. For building itineraries, user input, user account data, and train schedule data are used, and processed. User data along with final results of user interaction (whether the user purchased a trip, number of tickets bought, etc.) are collected, and used for report generation purposes. Administrative users' inputs are collected in order to modify and present schedules.

Backup and Recovery Operations:

Both databases used (passenger account database and reservations database) are production databases. The main operation used for the backup and recovery is Oracle's built-in cold backup, which is also known as the "archive mode". Depending on the customer's needs and budget, additional redundancy can be added using systems like RAID 5 and tape backup.

3.6.3 Site Adaptation Requirent

There are no site adaptation requirements for this project.

4. Supporting Information.

There is no supporting information required for this project.