

Project Report for CICS520 and CICS507 – SuperRent System Design and Implementation

Prepared by

Ping Xiang
Sreenamitha Varthakavi
Dongsheng Shen
Nakisa Abbasi
Yu Yan
Manisha Sharma

April 17, 2015

Table of Contents

CHAPTER 1 INTRODUCTION.....	3
CHAPTER 2 PROJECT MANAGEMENT.....	4
CHAPTER 3 REFINED REQUIREMENTS ANALYSIS.....	6
CHAPTER 4 DESIGN	10
CHAPTER 5 TEST AND SCREENSHOTS RESULTS.....	24
CHAPTER 6 CONCLUSION	30

Chapter 1 Introduction

The purpose of this project is to develop an application for a Car Renting Company called SuperRent. Since the SuperRent is a typical car renting company, its major business is about renting its vehicles to customers, processing returned vehicles, managing reservations, processing customer registration and membership, etc. To fulfill these requirements, the application should be able to provide a framework that can organize and assist the activities performed by the company. Different menus and functions will be displayed to different users by identifying their login ID and password. Based on that, the users can work through the system with different interfaces; in this way, part of the work can be performed by the system. Considering that, the application can simplify the manual transactions performed by the Clerk or manager by automating some activities, which thereby reduces the complexity or improves time efficiency of the company's operation. For example, the clerk just needs to provide relative information, and the renting cost will be calculated automatically.

The system is designed for all branches of the SuperRent Company. It should support four kinds of users that are customer, clerk, manager and system administrator. Each type of user can access different menu and functions, so they can perform their own activities through the system. The customer can access the system through the workstations or PCs located in different SuperRent branches. Currently, web application is not considered yet, but it can be the next phase of the project. Major functions performed by this system are rent, return, payment, reservation, registration, membership, login, and so on. Even though the credit card payment is discussed in this project, the card verification system is not in the scope. Except for the major function requirements, some other requirements should be also considered. However, most of the non-functional requirements are still not solved yet. Based on this, this document is to identify the status of the project and get the first release of the software.

Chapter 2 Project Management

2.1 Agile Project Management

The management of this project is in the form of agile project management, and the Scrum approach is adopted. Considering this, we focused on the iterative development of the software rather than specific plans. Basically, there are three phases for this project. First, a general outline plan is done through several kick-off meetings. With these meetings, a project backlog of the requirements identification process is done from the stakeholders. During this process, a requirements analysis document is done to provide specific requirements as well as functions specification. Since the application is not quite complicated, the requirements are classified into several categories based on the stakeholders.

Then, it takes several sprint planning meetings to achieve some general agreements on the basic design of the entire application such as the interface and other prioritized features. Hence, the features identified are distributed to the team. Team members communicate through short daily Scrum meetings to share information, identify problems, and describe their progresses. Ping Xiang serves as the Scrum master to arrange the meeting and provide help to other team members. Since, the specific requirements are illustrated specifically in the requirements document as well as the functions. Issues for each sprint cycle are identified for each team member. Finally, the sprint review meeting is undertaken when all members give their deliverables. A final report document is written to identify the current status of the project.

Since all team members have visibility of the whole project, efficient team communication can be achieved easily. Team members can work on some common functions or methods through communication. Moreover, new requirements can be identified and added to the development process.

2.2 Milestones

Most of the milestones are identified during the sprint planning meetings at the beginning. However, the planned dates are not identified at that time because they are identified through the communication among the team members. Table

1 is a specification of the major milestones. These are achieved through the communication of the team members.

Milestone	Description	Milestone Criteria	Planned Date
M0	Start Project	Team construction	Jan 20, 2015
M1	Start Planning		Jan 25th, 2015
	Project scope and specification	ER Diagram, User case diagram	Feb 10th, 2015
	Requirements and functions specification	Requirements analysis document	
M2	Start Execution		Feb 17th, 2015
	Product separation into manageable parts	Job assigned team members	Feb 20th, 2015
	System Architecture and configuration	Tools and development environment agreement	Feb 22th, 2015
	Database construction	Tables creation and samples insertion	Feb 24th, 2015
	Major functions development	Coding of functionalities	April 2nd, 2015
M3	Confirm Execution		April 3nd, 2015
	System test	Coding of new functionalities, final database tables agreement and draft documentations	April 12nd, 2015
M4	Release Product	Final project report review and Demo presentation	April 17nd, 2015
M5	Close Project		April 18nd, 2015

Table 1 Milestones of the project

Chapter 3 Refined Requirements Analysis

3.1 Modified Use Case Diagrams

Since major functions have been modified through the communication among team members, the use case diagrams are quite different from those before. This section is to show some updates to the use case diagrams. Currently, 12 use causes are identified in this project including both top-level and sub-level cases. Figure 1 shows the top-level use case, and major functions as well as the actors are included in the diagram. Another example is a sub-level use case shown in Figure 2 for returning vehicle. The top-level returnVehicle function is specified into some detailed functions including calculate cost, process payment, handle membership and so on. Some of them are not considered in the previous requirements analysis document and are refined by the team.

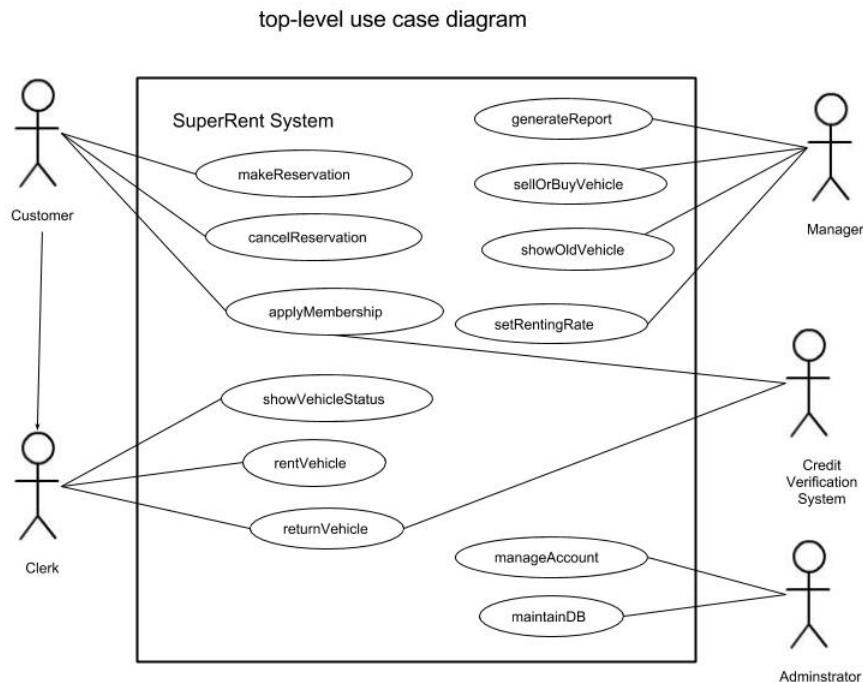


Figure 1 Top-level Use Case Diagram

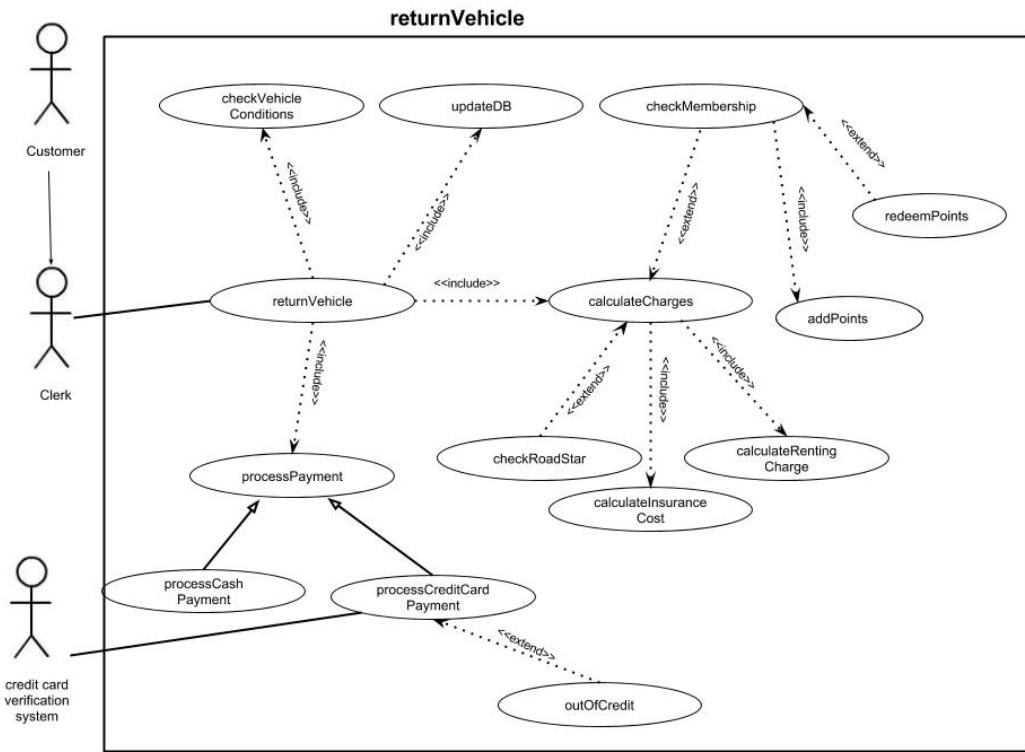


Figure 2 Sub-level Use Case Diagram for return vehicle

3.2 Refined Functional Requirements

For the functional requirements, the major functions are previously identified in the Requirements Analysis Documents. The specifications for each major function is also illustrated including entry condition, exit condition, exceptions and the flows of events. These are actually the major tasks for the team to fulfill by coding. Not all functions in the application are perfectly done since this is the first release of the application. Hence, by refining the requirements, better performance can be achieved.

For customer, previously identified functions are login as a customer, manage reservation, make a payment, apply for the Club membership, and check for points accumulated. By communicating with the users, the functions are further refined to make/check/cancel reservations, pay for or cancel membership, and edit profile information. Customer can also query the database for available vehicles to make the reservation. Some details are that the customer can get an estimation of the rental cost by identifying vehicle and time period.

For clerk, previously defined functions are login as a clerk, rent vehicles for customers, process the return of the rented vehicles, process payments of customers, and check the status of vehicles (availability, overdue). By further refinement, the major functions are classified into four categories that are reserve, rent, return and search vehicles. Functions such as payment and get status of vehicle are embedded in the four categories.

For manager, the previously defined functions are login as a manager, query the database for old vehicles, sell old vehicles and buy new vehicles, and set rates and costs. These functions are actually embedded in four categories that are manage vehicle, find vehicle, set price and generate reports by further refining the requirements with the users. While, for administrator, the previous functions such as add/remove/edit user information are done, but new functions

can be added since admin can access and manipulate the database directly such as modify the quantity of some equipment or add new columns to some tables.

3.3 Unachieved Non-Functional Requirements

The team also identifies major non-functional requirements; however, some of them are still not achieved yet. Future work should include these considerations into coding. The following are some examples of the non-functional requirements that we need to test or code in future. These are not included in the test design of this document because we only test the major functions in the application currently.

Usability

- The Clerk and Manager should be able to use the system with 4-hours of training.
- The Customer should be able to manage his/her reservation without any training.
- The system should also provide a user manual for different users.

Reliability

- The system should maintain all the customer information in encrypted form and should not keep the credit card details of the customer once he/she has returned the vehicle.
- The system shall automatically logout all customers after a period of inactivity.
- The system shall not leave any cookies on the customer's computer containing the user's password.
- The system should not lose data in case of power failure.

Performance

- The system retrieves data in less than a minute.
- The system should handle 1000 users at the same time.

Chapter 4 Design

4.1 Database Design

The entity-relational diagram below represents one single ER diagram; however, it is too large so we have to separate it into 4 parts that are displayed in the following four figures. Based on the design, 18 tables are added to the database.

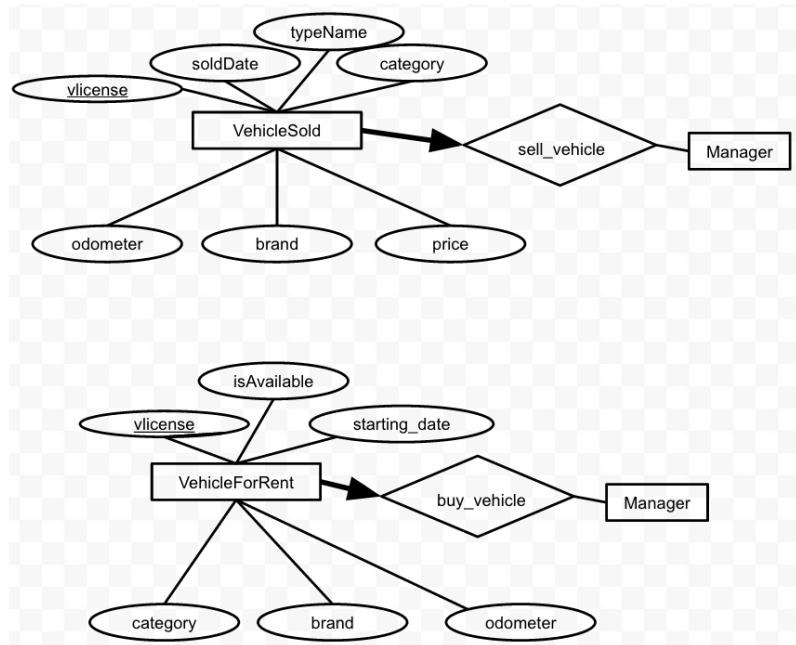


Figure 3 ER Diagram Part1

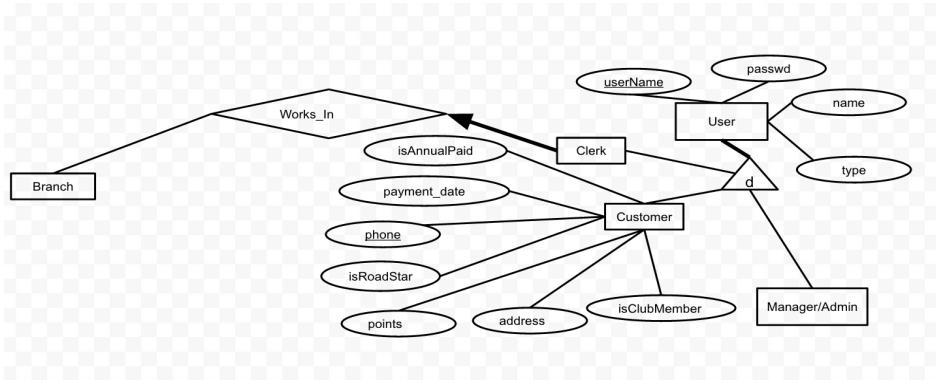


Figure 4 ER Diagram Part2

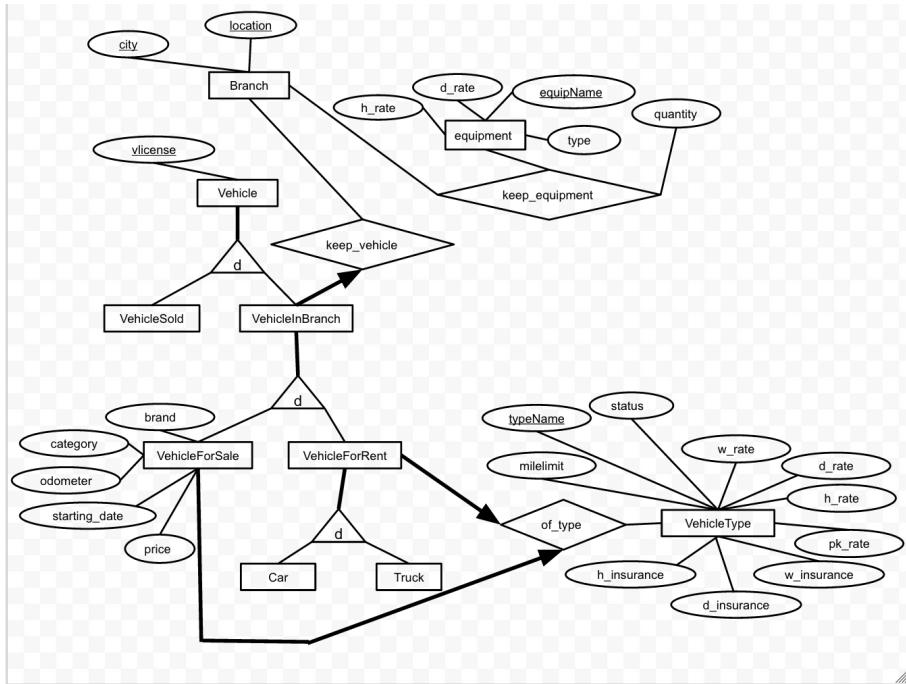


Figure 5 ER Diagram Part3

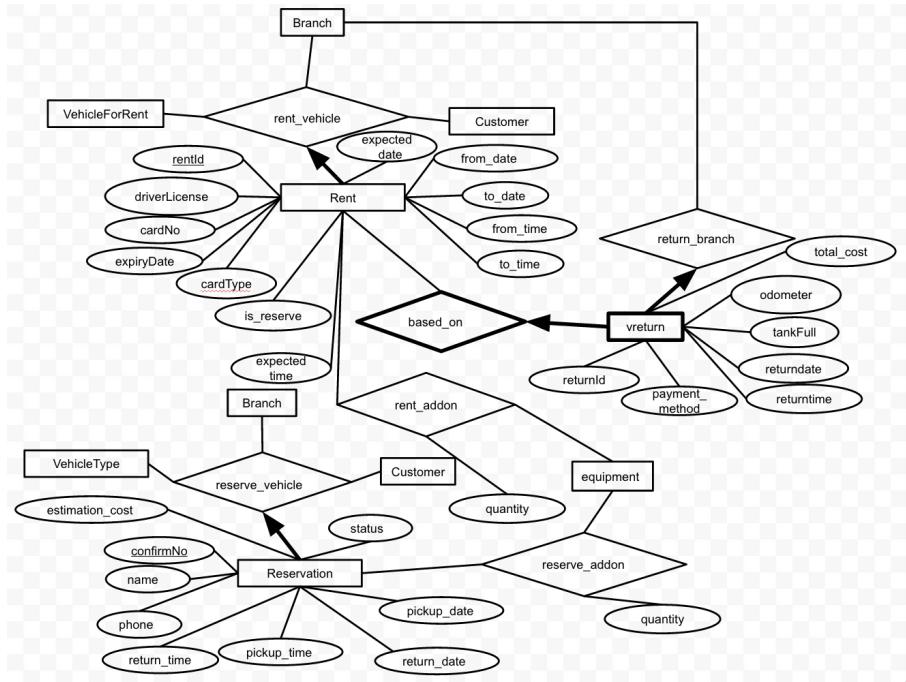


Figure 6 ER Diagram Part4

Based on the ER diagrams, the schemas for the tables are obtained as follows:

VehicleType (typeName, w_rate, d_rate, h_rate, pk_rate, w_insurance, d_insurance, h_insurance, milelimit)

Branch (city, location)

User(username, password, name, type)

Constraints: 1. Type can be clerk, customer or manager.

2. Each user has at least one type.

Customer (username, phone, address, IsRoadStar, isClubMember, point, IsAnnualPaid, payment_date)

Clerk (username, branch_city, branch_location)

Constraints: Every clerk works in exactly one branch

Manager (username)

Admin (username)

Equipment (equipName, type, d_rate, h_rate)

Vehiclesold (vlicense, price, solddate, typeName, category, brand, manager, odometer)

Constraints: Every vehiclesold has exactly one related manager.

VehicleForRent (vlicense, isAvailable, starting_date, category, vehicleType, brand, manager, type)

Constraints: 1. Every VehicleForRent has at least one related vehicleType.

2. Type can be car or truck.
3. Every VehicleForRent has exactly one related manager.

VehicleForSale (vlicense, price, starting_date, category, brand, VehicleType, odometer)

Constraints: Every VehicleForSale has exactly one related VehicleType.

Vehicleinbranch (vlicense, city, location, type)

Constraints: 1. Every vehiclebranch keeps vehicles in exactly one related branch.

2. Type can be VehicleForSale or VehicleForRent.
3. Each vehicleinbranch has at least one type.

Keep_equipment (equipName, city, location, quantity)

Reservation (confirmation_number, pickup_date, pickup_time, return_date, return_time, estimation_cost, branch_city, branch_location, customer_username, status, vehicleType)

Constraints: Every reservation has exactly one related branch, one related customer, and one related vehicle type.

Rent (rentid, driver_license, vlicense, branch_city, branch_location, customer_username, card_type, card_no, expiry_date, from_date, from_time, expected_return_date, expected_return_time)

Constraints: Every rent has exactly one related branch, one related customer, and one related vehicle.

Vreturn (returnid, rent_id, return_date, return_time, branch_city, branch_location, tank_full, odometer, total_cost, payment_method)

Constraints: 1. Every vreturn has exactly one branch to return vehicle.

2. Every vreturn has exactly one related rent.

Rent_addon (rentid, quantity, equipName)

Reserve_addon (confirmNo, quantity, equipName)

4.2 Application Design

UML diagrams are used to design the entire system including class diagram, state machine diagram, sequence diagram, components diagram, and activity diagram. These diagrams are important tools to show the application design of the project.

Class diagram:

Below are the class diagrams (Figure 7 to Figure 13). The class diagram is the main building block of object oriented modeling. It is used both for general conceptual modeling of the systematics of the application, and for detailed modeling translating the models into programming code. Class diagrams can also be used for data modeling. The classes in a class diagram represent both the main objects, interactions in the application and the classes to be programmed.

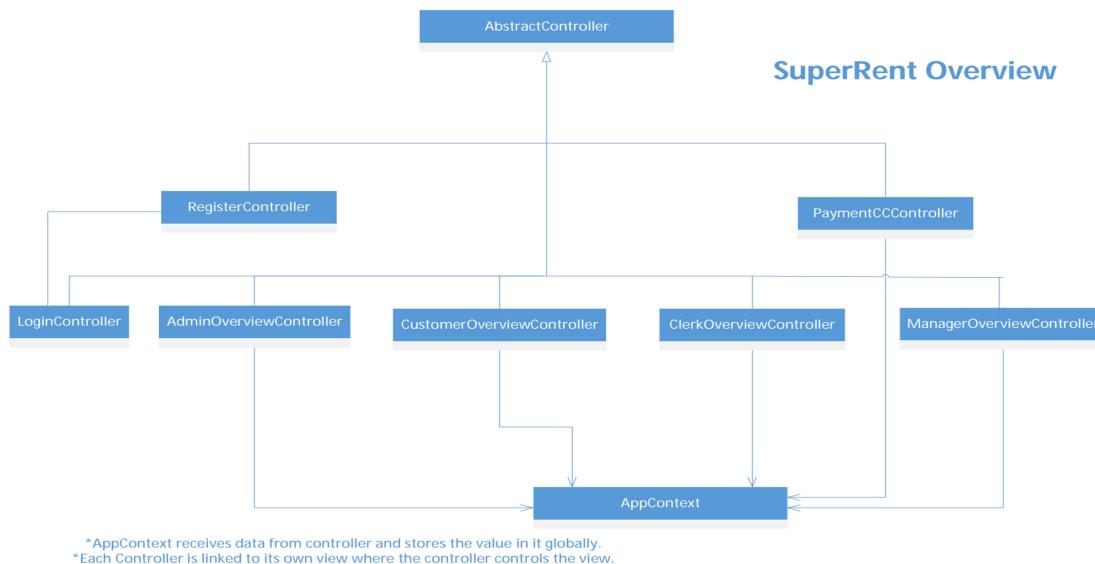


Figure 7 Class Diagram - SuperRent Overview

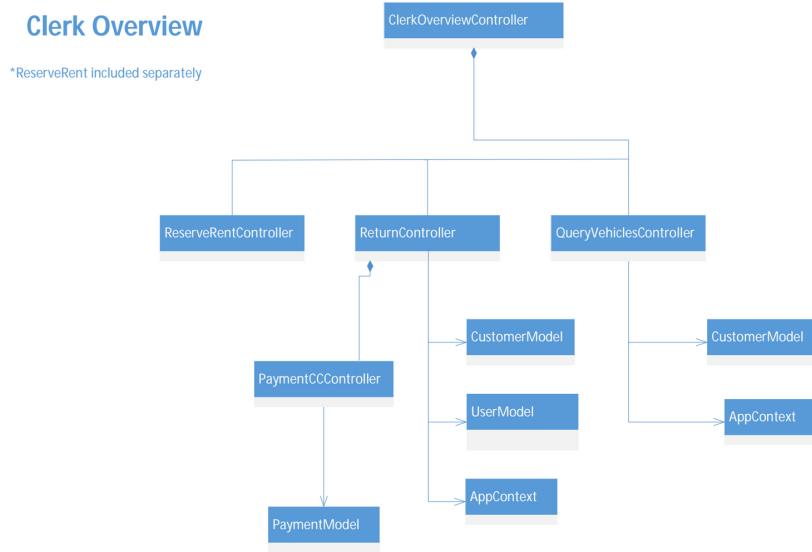


Figure 8 Class Diagram - Clerk Overview

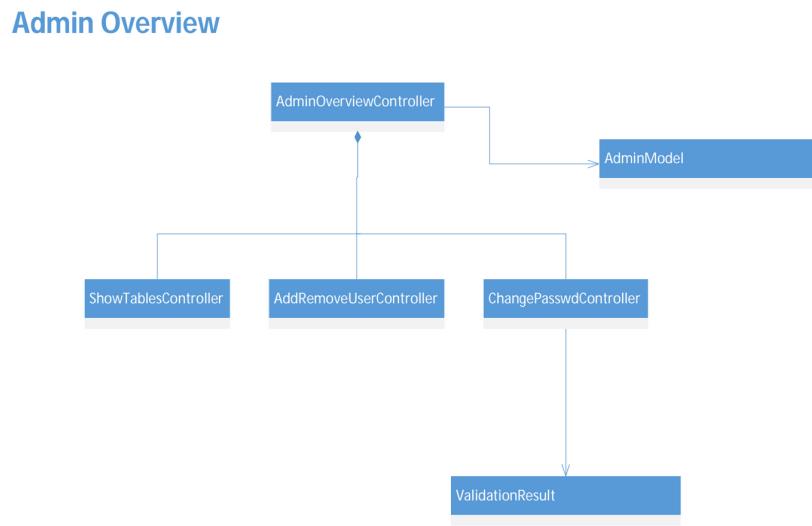


Figure 9 Class Diagram - Admin Overview

Manager Overview

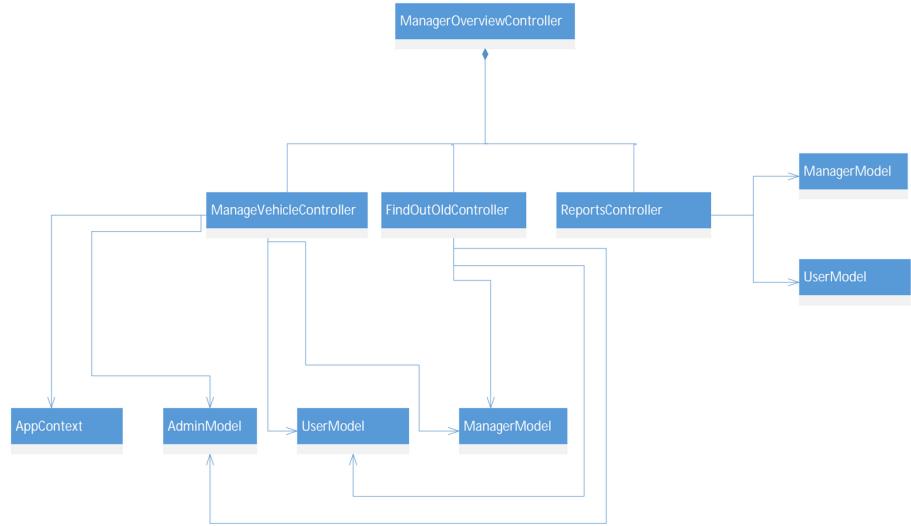


Figure 10 Class Diagram - Manager Overview

Model Overview

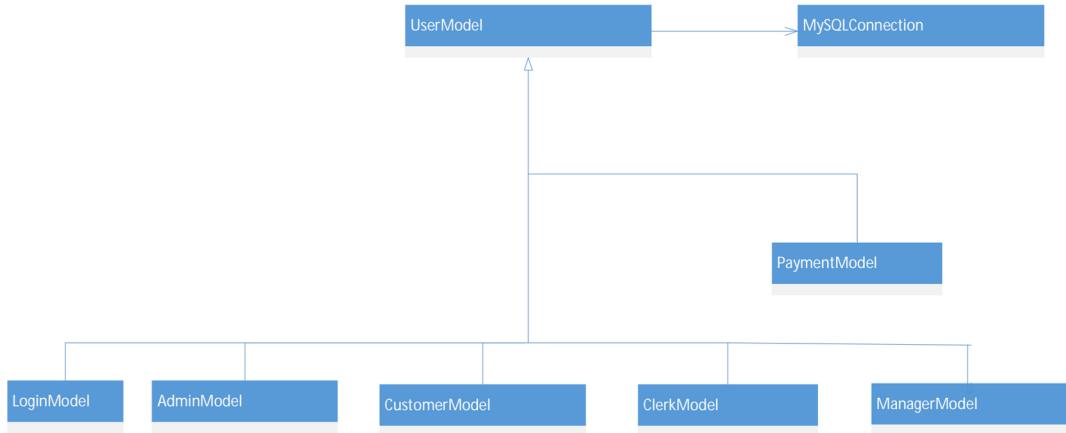


Figure 11 Class Diagram - Model Overview

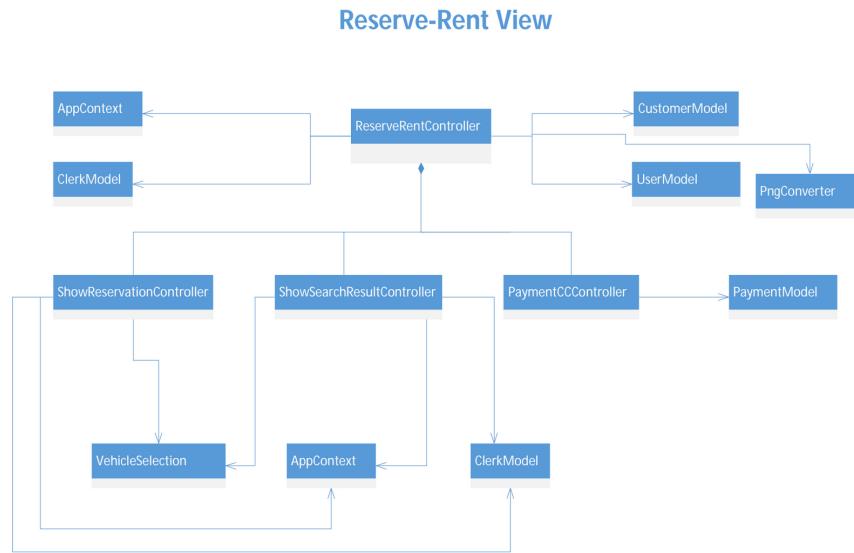


Figure 12 Class Diagram - Reserve Rent Overview

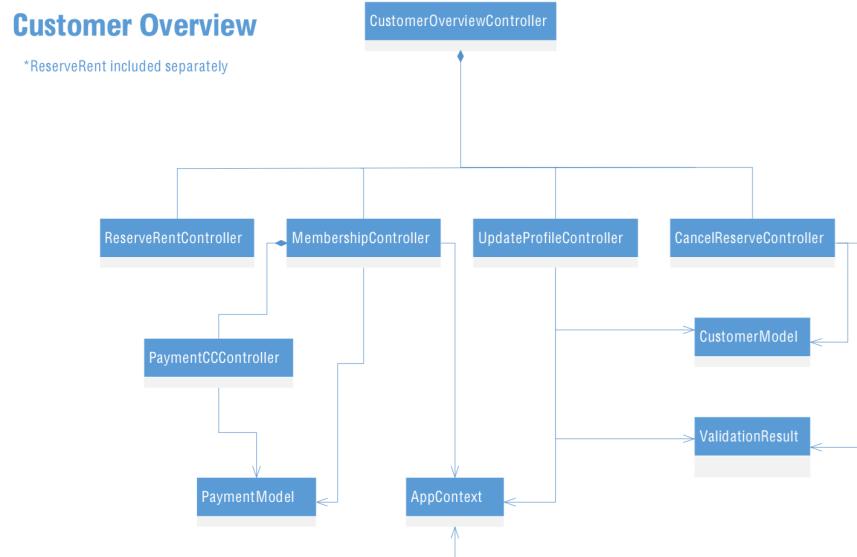


Figure 13 Class Diagram - Customer Overview

Sequence diagram:

In Figure 14, we use UML sequence diagrams to model the flow of logic within our system in a visual manner, enabling both document validate our logic, and are commonly used for both analysis and design purposes. The diagram shows the rent and reservation process. From the message arrow we can logically find the relation between the four objects. The clerk sends different messages to ReserveRent View, and then the view sends related message to ReserveRentController. The Controller gives some feedback messages to view and also sends main message to UserModel and gets some feedback. In the whole process, the alternative and option means the internal logical relation in the diagram. In our design, the opt means the choices the clerk should make. The different choices mean the different logic flow in the diagram.

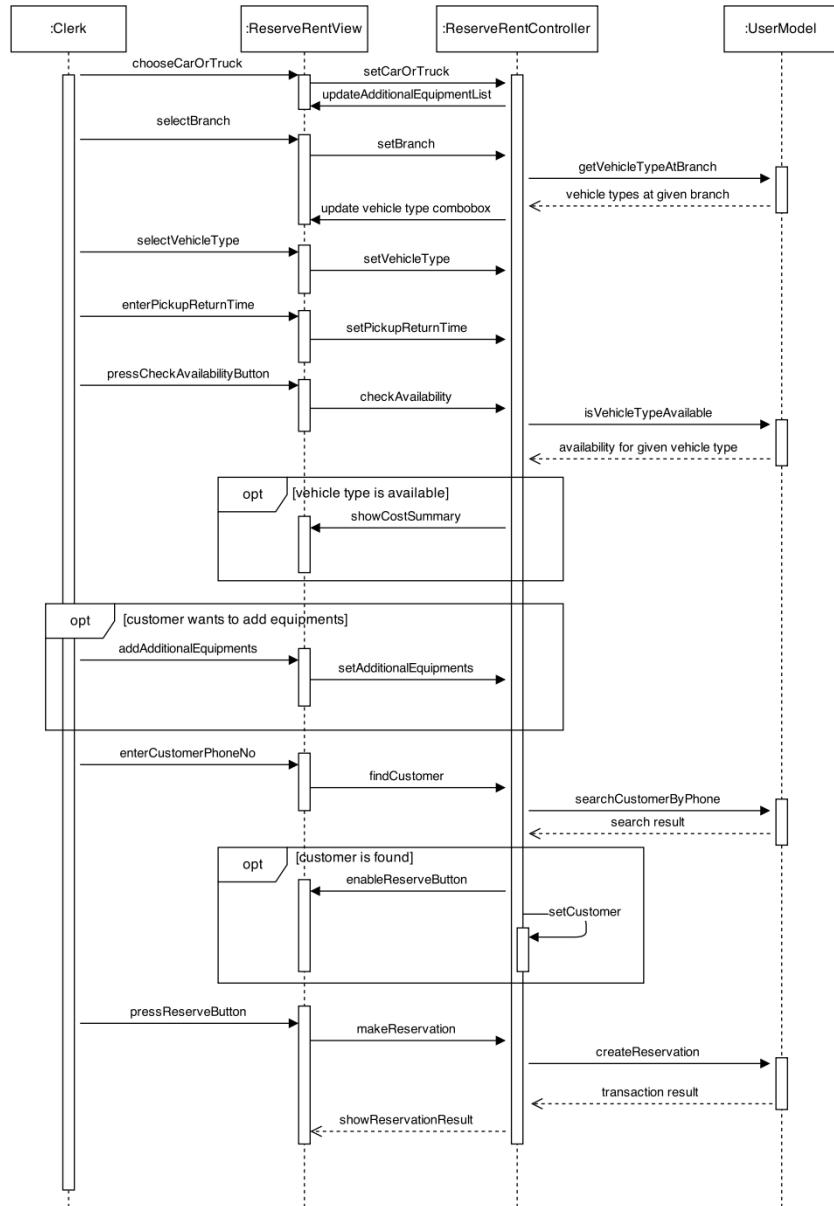


Figure 14 Sequence Diagram

Component diagram:

Component diagrams illustrate the pieces of software, embedded controllers, etc., which will make up a system. A component diagram has a higher level of abstraction than a Class Diagram, so a component is implemented by one or more classes (or objects) at runtime. They are building blocks so a component can eventually encompass a large portion of a system. The diagram shows the top level view of 5 components in our design: View , Controller, Model, DataBase, UTIL. From Figure 15, it can be seen that all of them have services exchange by provided interface and required interface.

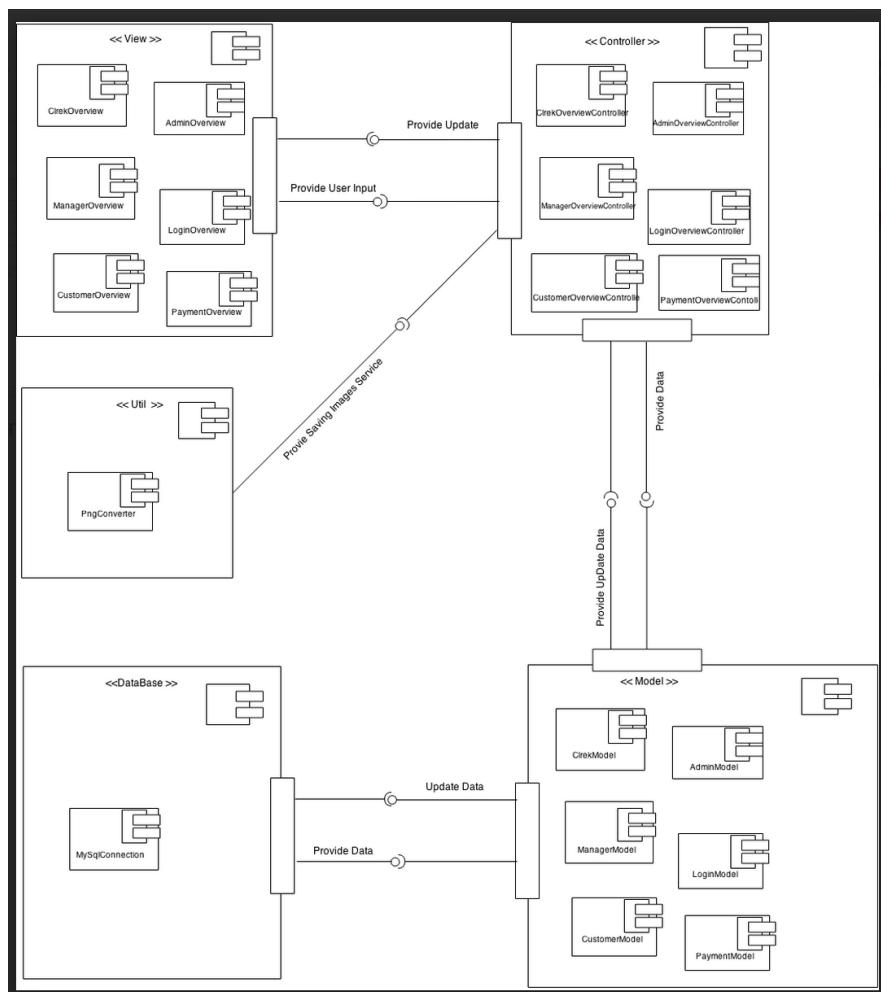


Figure 15 Components Diagram

State-machine diagram:

State-machine diagram specifies the sequence of events that an object goes through during its lifetime in response to events. This diagram indicates the

transition between log in and log out of four different kinds of users in our design that is shown in Figure 16.

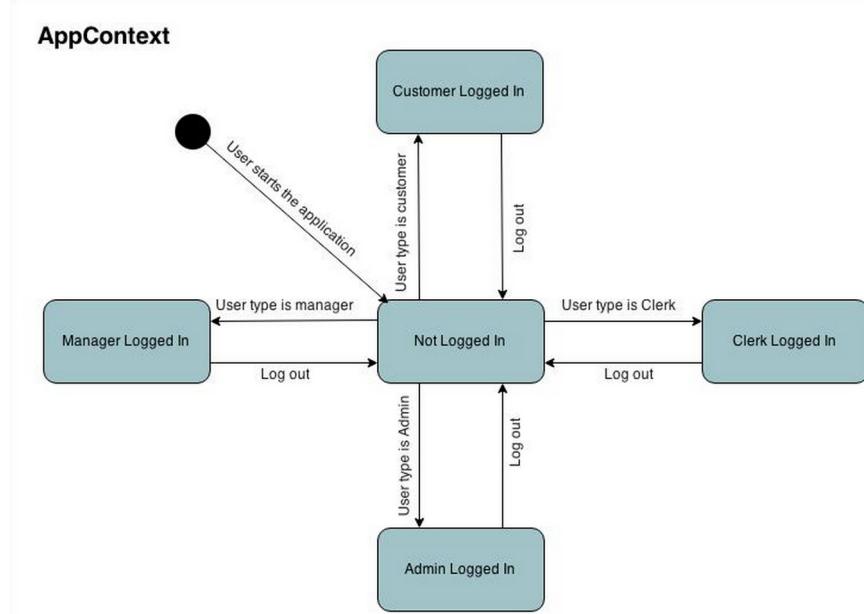


Figure 16 State Machine Diagram

Deployment diagram:

The Deployment Diagram in Figure 17 helps to model the physical aspect of an Object-Oriented software system. It models the run-time configuration in a static view and visualizes the distribution of components in an application. In

most cases, it involves modeling the hardware configurations together with the software components that lived on. In our design, this diagram shows the relationship in hardware level. User Interface Layer, Business Logic Layer, and Data Access Layer are in the Application Server. The Application Server is also in SuperRent. The SuperRent connects with PC and DB Sever. In DB Sever, we use our own MSS DB.

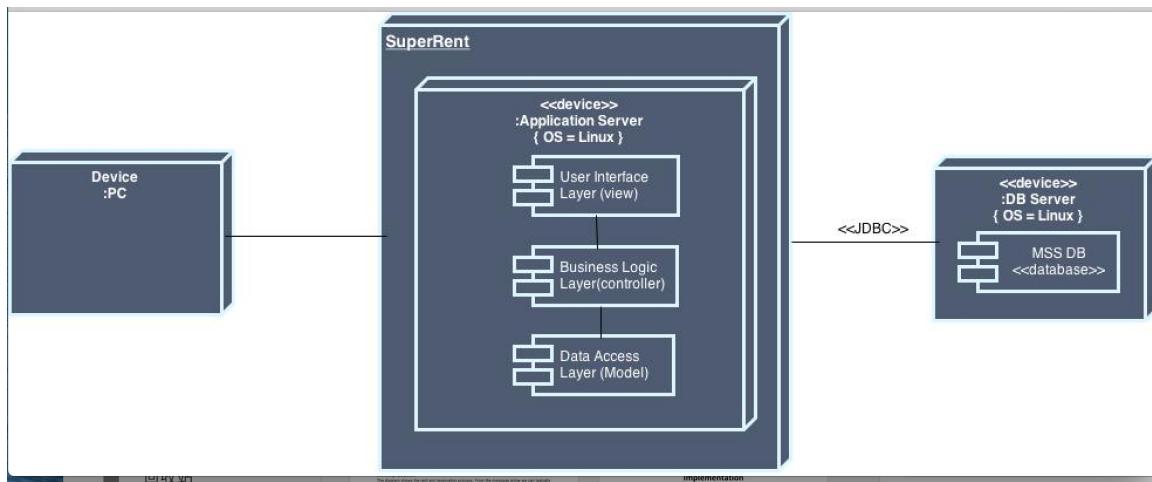


Figure 17 Deployment diagram

Activity diagram:

Activity diagrams in Figure 18 show the workflow from a start point to the finish point detailing the many decision paths that exist in the progression of events contained in the activity. They may be used to detail situations where parallel processing may occur in the execution of some activities. In our design, this diagram shows the rent process activities. When a customer rents a car, the

clerk will first check the customer's reservation and make his first choice. Then the clerk will make other choices about the storage capacity issues as well as verifying issues. In the whole work flow, the customer also should make some choices to determine his renting process.

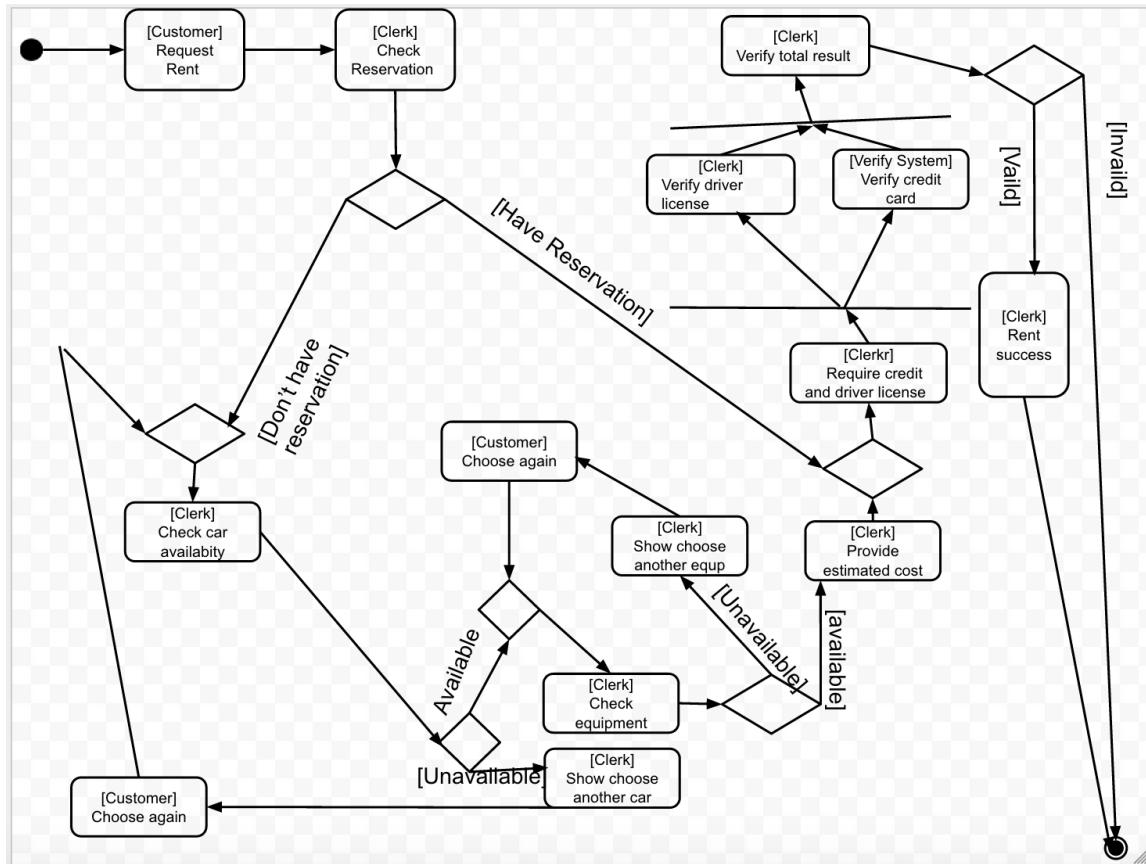


Figure 18 Activity diagram

Chapter 5 Test and Screenshots Results

5.1 Black-Box Test

Black Box Test method is used in this project which is shown in Figure 19. A package named Test Packages is provided to serve as automatic test scripts. For the sake of time limit, only major methods of Admin model and User Model

are tested, while the others are tested manually by taking screenshots of the database updates caused by the application. JavaNG test approach is adopted by giving some test cases, and the updates caused by the test cases will be printed out from the database to compare with the expected outputs. Four major functions tested are Reserve, Rent, Add and Remove clerk, and all the tests passed. The following figure is the screenshot of the JavaNG test of the Reserve and Rent functions, and the test results are printed out to the console. Also, since frequent Scrum meetings are adopted, team members have the chance to do code reviews with each other, which reduces the bugs in our project.

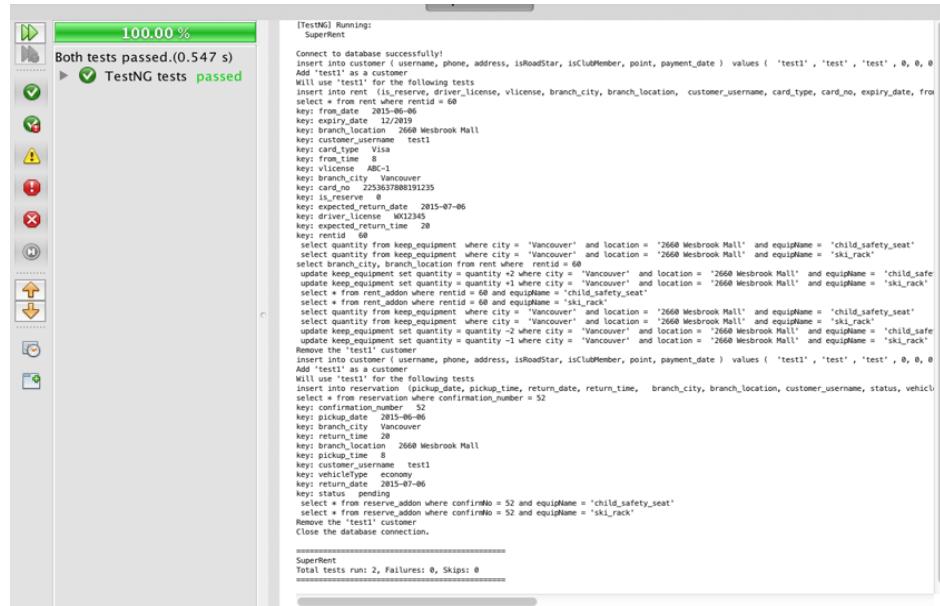


Figure 19 JavaNG test for Reserve&Rent functions

5.2 Manual Test Screenshots

Screenshots are used to test the functionalities of the application. Most of the Test Cases are included in the Appendix A: Test Cases, while some typical ones serve as examples to show the test process. For example, the test case screenshots for Generating Reports is shown below. The entire process is from Figure 20 to Figure 25. The figures are also the guideline to show the operations of generating different types of reports. This function does not do any update to the database, so only data queries are shown under different conditions. Figure 2

to Figure 5 show different types of report contents, and Figure 6 shows how to export the report. The results are compared with the database manually, and the results match the database records. Based on this, the test passes.

The screenshot shows the Super Rent rental & logistics software interface. The top navigation bar includes 'super rent' logo, 'Username: frank1', 'Type: MANAGER', and 'Log out'. Below the header are tabs: 'Manage Vehicle', 'Find Vehicle', 'Set Price', and 'Reports'. The 'Reports' tab is selected. On the left, there are dropdown menus for 'Branch' (set to '300 Regina Street') and 'Date' (set to '08/04/2015'). Below these are two buttons: 'Show Daily Rental' and 'Show Daily Return'. The main area contains two tables. The first table lists vehicle types and their counts and costs for the specified branch and date. The second table lists vehicle types and their counts and costs for all branches, with totals for each. A 'Print' button is located at the bottom right.

license	branch_location	branch_city	vehicleType	from_date
QMAZON	300 Regina Street	Toronto	economy	2015-04-08
IGOORAR	300 Regina Street	Toronto	foot12	2015-04-08
BMAZON	300 Regina Street	Toronto	foot24	2015-04-08

TYPE	NUMBER	COST	BRANCH	NUMBER
boxtrucks:	0	\$ 0	2660 Wesbrook Mall:	-
cargovans:	0	\$ 0	300 Regina Street:	-
foot12:	1	\$ 0	Total:	3
foot15:	0	\$ 0		
foot24:	1	\$ 0	BRANCH	COST
standard:	0	\$ 0	2660 Wesbrook Mall:	-
van:	0	\$ 0	300 Regina Street:	-
			Total:	\$ 0

Figure 20 Getting the reports for specific branch for the Daily Rental

This screenshot is similar to Figure 20 but shows reports for all branches. The 'Branch' dropdown is set to 'Unspecified' and the 'Date' is '08/04/2015'. The 'Show Daily Rental' and 'Show Daily Return' buttons are present. The main area displays two tables. The first table lists vehicle types and their counts and costs for all branches. The second table lists vehicle types and their counts and costs for all branches, with totals for each. A 'Print' button is at the bottom right.

license	branch_location	branch_city	vehicleType	from_date
HOW DOO	2660 Wesbrook Mall	Vancouver	economy	2015-04-08
4U 2NRY	2660 Wesbrook Mall	Vancouver	foot15	2015-04-08
IGOCAR	2660 Wesbrook Mall	Vancouver	midsized	2015-04-08
QMAZON	300 Regina Street	Toronto	economy	2015-04-08
IGOORAR	300 Regina Street	Toronto	foot12	2015-04-08
BMAZON	300 Regina Street	Toronto	foot24	2015-04-08

TYPE	NUMBER	COST	BRANCH	NUMBER
boxtrucks:	0	\$ 0	2660 Wesbrook Mall:	3
cargovans:	0	\$ 0	300 Regina Street:	3
foot12:	1	\$ 0	Total:	6
foot15:	1	\$ 0		
foot24:	1	\$ 0	BRANCH	COST
standard:	0	\$ 0	2660 Wesbrook Mall:	\$ 0
van:	0	\$ 0	300 Regina Street:	\$ 0
			Total:	\$ 0

Figure 21 Getting the reports for Daily Rental for all the branches

The screenshot shows the Super Rent software interface with the following details:

- Header:** Username: frank1, Type: MANAGER, Log out.
- Navigation:** Manage Vehicle, Find Vehicle, Set Price, Reports.
- Branch Selection:** Branch: Unspecified, Date: 08/04/2015.
- Report Buttons:** Show Daily Rental, Show Daily Return.
- Report Table Headers:** vlicense, branch_location, branch_city, vehicleType, return_date.
- Report Data:**

vlicense	branch_location	branch_city	vehicleType	return_date
HOW DOO	2660 Wesbrook Mall	Vancouver	economy	2015-04-09
IGOAR	300 Regina Street	Toronto	foot12	2015-04-09
- Summary Table Headers:** TYPE, NUMBER, COST, BRANCH, NUMBER.
- Summary Data:**

TYPE	NUMBER	COST	BRANCH	NUMBER
boxtrucks:	0	\$ 0	2660 Wesbrook Mall:	1
cargovans:	0	\$ 0	300 Regina Street:	1
foot12:	1	\$ 93	Total:	2
foot15:	0	\$ 0		
foot24:	0	\$ 0	BRANCH	COST
standard:	0	\$ 0	2660 Wesbrook Mall:	\$ 23
van:	0	\$ 0	300 Regina Street:	\$ 93
			Total:	\$ 116
- Print Button:** Print.

Figure 22 Getting the reports for Daily Return for all the branches

The screenshot shows the Super Rent software interface with the following details:

- Header:** Username: frank1, Type: MANAGER, Log out.
- Navigation:** Manage Vehicle, Find Vehicle, Set Price, Reports.
- Branch Selection:** Branch: 2660 Wesbrook ..., Date: 08/04/2015.
- Report Buttons:** Show Daily Rental, Show Daily Return.
- Report Table Headers:** vlicense, branch_location, branch_city, vehicleType, return_date.
- Report Data:**

vlicense	branch_location	branch_city	vehicleType	return_date
HOW DOO	2660 Wesbrook Mall	Vancouver	economy	2015-04-09
- Summary Table Headers:** TYPE, NUMBER, COST, BRANCH, NUMBER.
- Summary Data:**

TYPE	NUMBER	COST	BRANCH	NUMBER
boxtrucks:	0	\$ 0	2660 Wesbrook Mall:	-
cargovans:	0	\$ 0	300 Regina Street:	-
foot12:	0	\$ 0	Total:	1
foot15:	0	\$ 0		
foot24:	0	\$ 0	BRANCH	COST
standard:	0	\$ 0	2660 Wesbrook Mall:	-
van:	0	\$ 0	300 Regina Street:	-
			Total:	\$ 23
- Print Button:** Print.

Figure 23 Getting the reports for Daily Return for specific branch

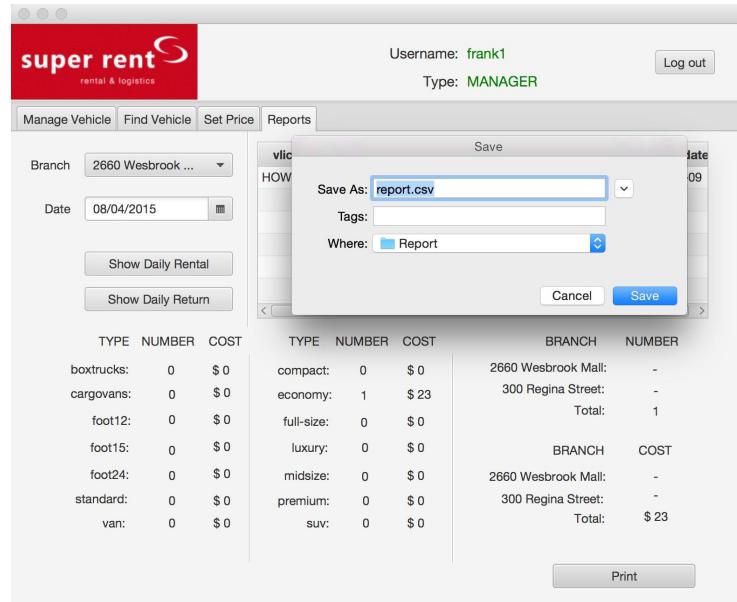


Figure 24 Save the Report as a CSV file for printing

License	Location	City	Type	Date
HOW DOO	2660 Wesbrook Mall	Vancouv	economy	2015-04-09
IGONAR	2660 Wesbrook Mall	Vancouv	van	2015-04-09
IGOOR	300 Regina Street	Toronto	foot12	2015-04-09
Type	Number	Cost		
boxtrucks	0	\$0		
cargovans	0	\$0		
foot12	1	\$93		
foot15	0	\$0		
foot24	0	\$0		
standard	0	\$0		
van	1	\$23		
compact	0	\$0		
economy	1	\$23		
full-size	0	\$0		
luxury	0	\$0		
midsize	0	\$0		
premium	0	\$0		
suv	0	\$0		
Subtotal for Westbrook Branch	2	\$46		
Subtotal for 300 Regina Street Branch	1	\$93		
Total Numbers	3	\$139		

Figure 25 A sample of CSV file for the daily print

Another example is setting the price used by manager. Figure 26 to Figure 29 shows the process for manager to set the new price for different types of vehicles. For here, the foot15 truck is selected, and the new rates are shown in Figure 9. The unit used in database is cent, so the new values match the input. The test passes.

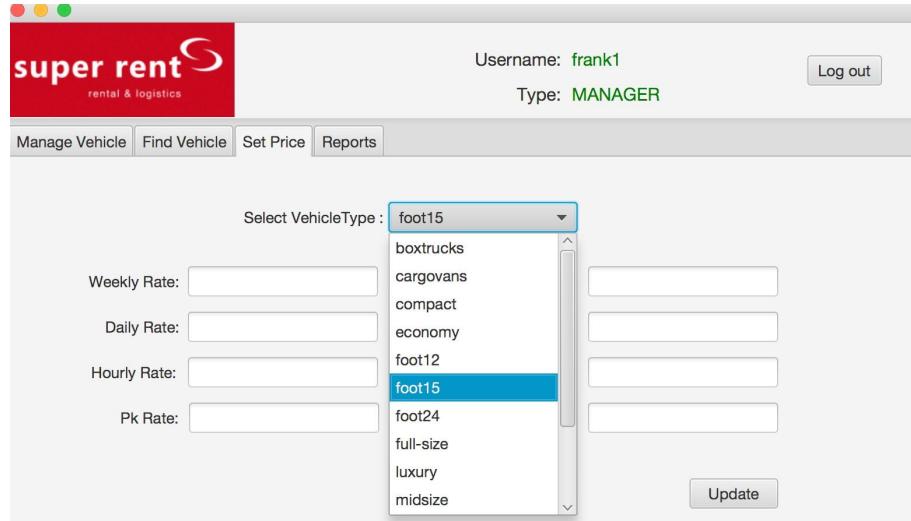


Figure 26 Manager selects different car types and set different rates

This screenshot shows the same software interface as Figure 26, but with the vehicle type 'foot15' selected in the dropdown. The rates for 'foot15' are displayed in the input fields: Weekly Rate: 500, Daily Rate: 55, Hourly Rate: 12, Pk Rate: 2, Weekly Insurance: 280, Daily Insurance: 10, Hourly Insurance: 2, and Mile Limit: 40. At the bottom right, there is a green 'Updated!' message and a blue 'Update' button.

Figure 27 Manager has selected vehicle type and set the new rate

foot12	55000	8000	1500	200	28000	1000	200	40
foot15	70000	95000	17000	300	29000	200	1100	5000
foot24	60000	8000	1700	200	28000	1000	200	40

Figure 28 Database records before updating

compact	40000	5500	1100	200	28000	1000	200	40
economy	35000	5000	1000	200	28000	1000	200	40
foot12	55000	8000	1500	200	28000	1000	200	40
foot15	50000	5500	1200	200	28000	200	1000	40
foot24	60000	8000	1700	200	28000	1000	200	40
full-size	49000	7000	1400	200	28000	1000	200	40

Figure 29 Database records after setting the new prices

Chapter 6 Conclusion

The objective of this project is to design and implement a car rental application named SuperRent to a vehicle renting company. The key functions for the application are Reserve, Rent or Return vehicles and generate reports. Other important functions include some database management functions such as add/remove users, add/remove vehicles, membership and so on. These major functions are completed; moreover, system tests are also done to test the performance of them. Currently, the version of the application can work well but more tests and refinements of the functions are needed. Bugs cannot be avoided, and the interface is not quite user-friendly. Other limitations are that some non-functional requirements are not considered yet. Some constraints of the database are not added such as the valid time of the membership and validation of the reservation status.

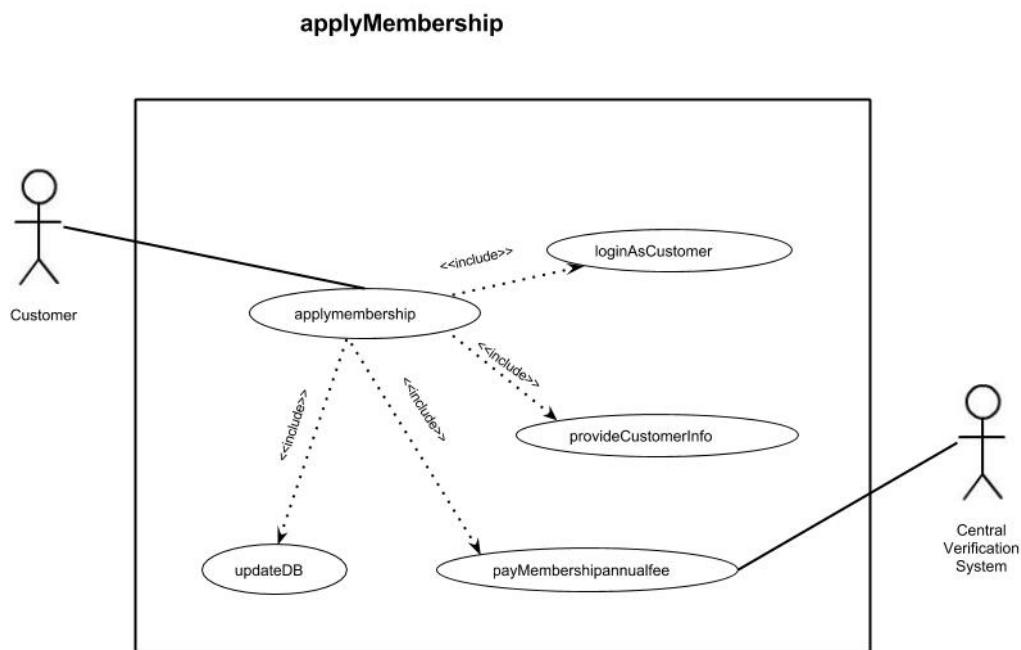
Acknowledgement

We would like to give our deepest appreciation to Dr. Liu and Dr. Wu to help us complete the project.

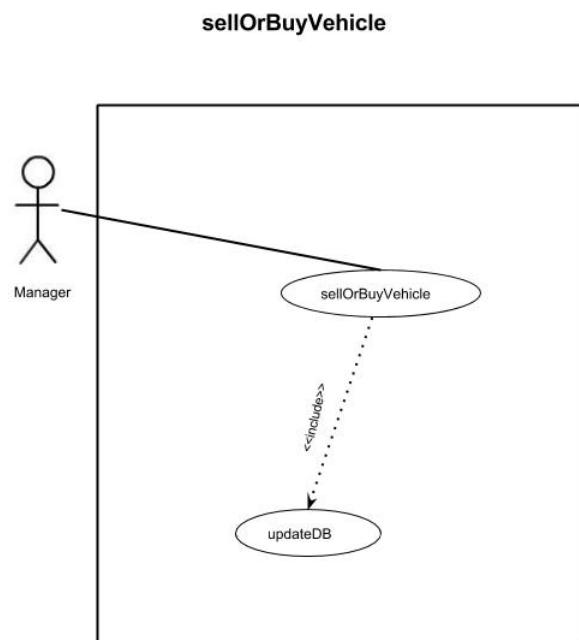
Appendix A: Use Case Diagrams

Appendix A-1 Use Case Diagram (Apply membership)

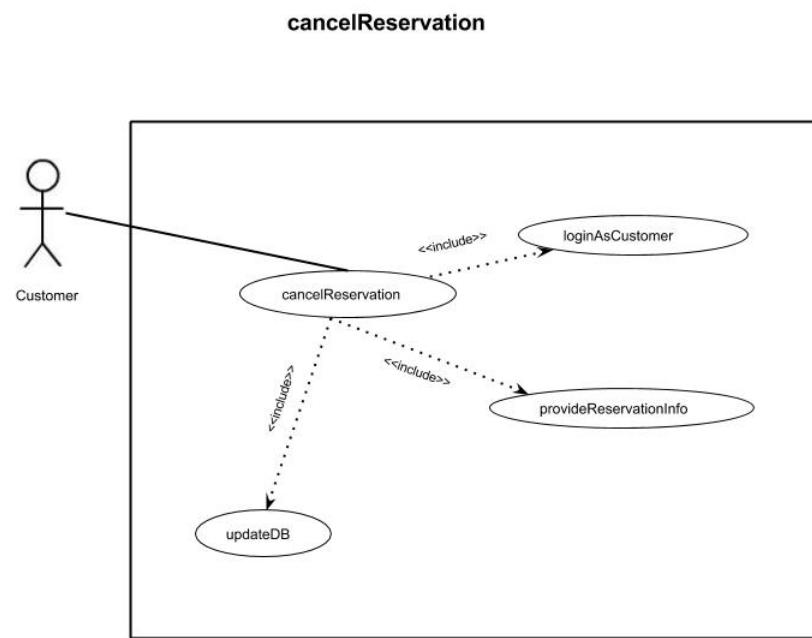
Description: Customer can apply for membership, login in as customer, query his information, and pay annual fees.



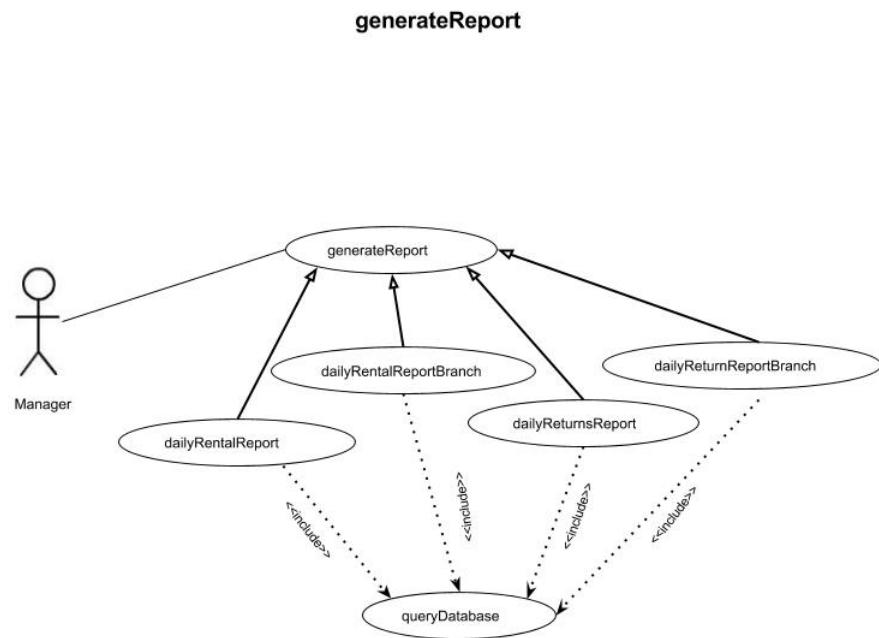
Appendix A-2 Use Case Diagram (Buy or sell vehicle)



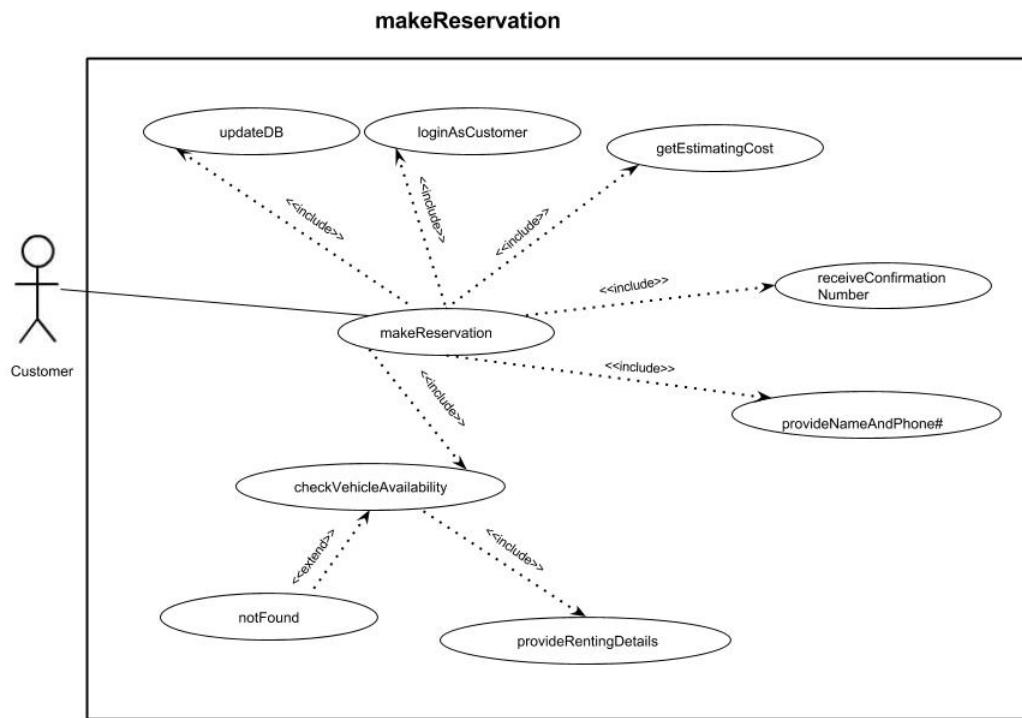
Appendix A-3 Use Case Diagram (Cancel Reservation)



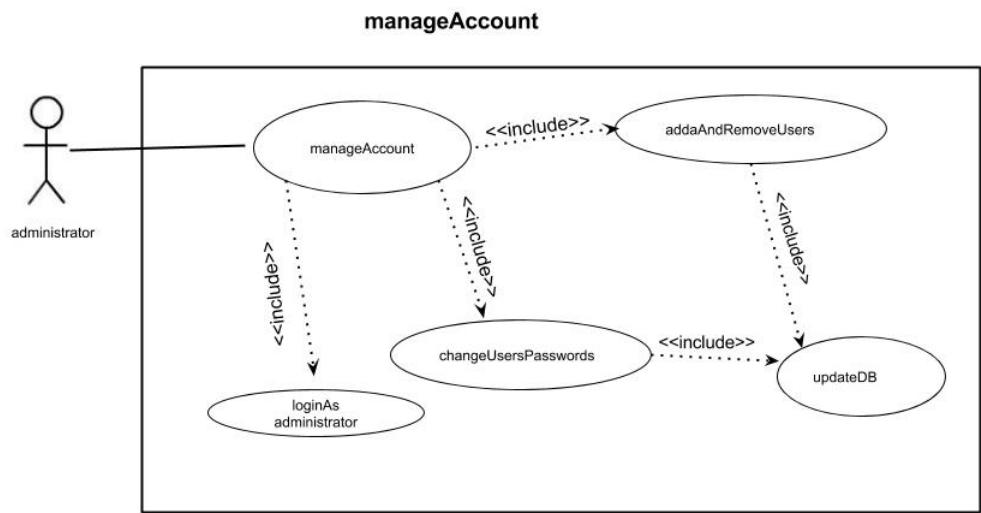
Appendix A-4 Use Case Diagram (Generate Report)



Appendix A-5 Use Case Diagram (Make Reservation)

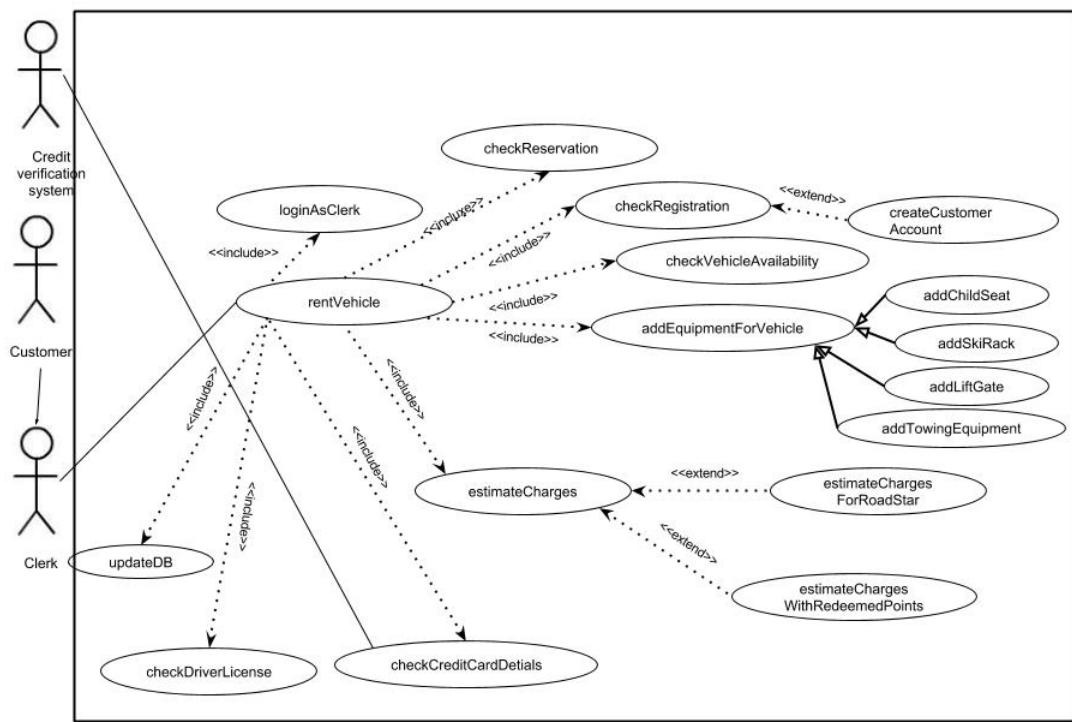


Appendix A-6 Use Case Diagram (Manage Account)

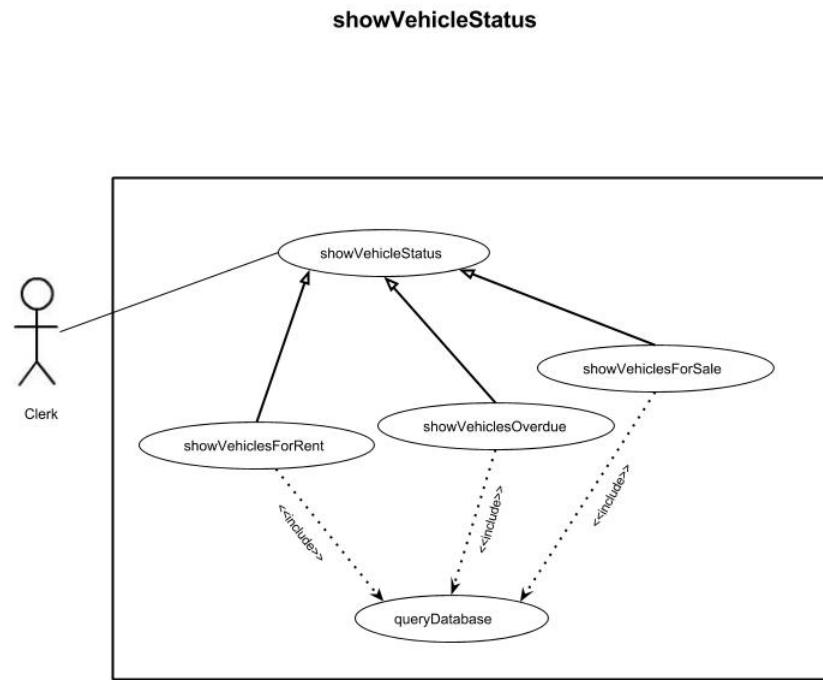


Appendix A-7 Use Case Diagram (Rent Vehicle)

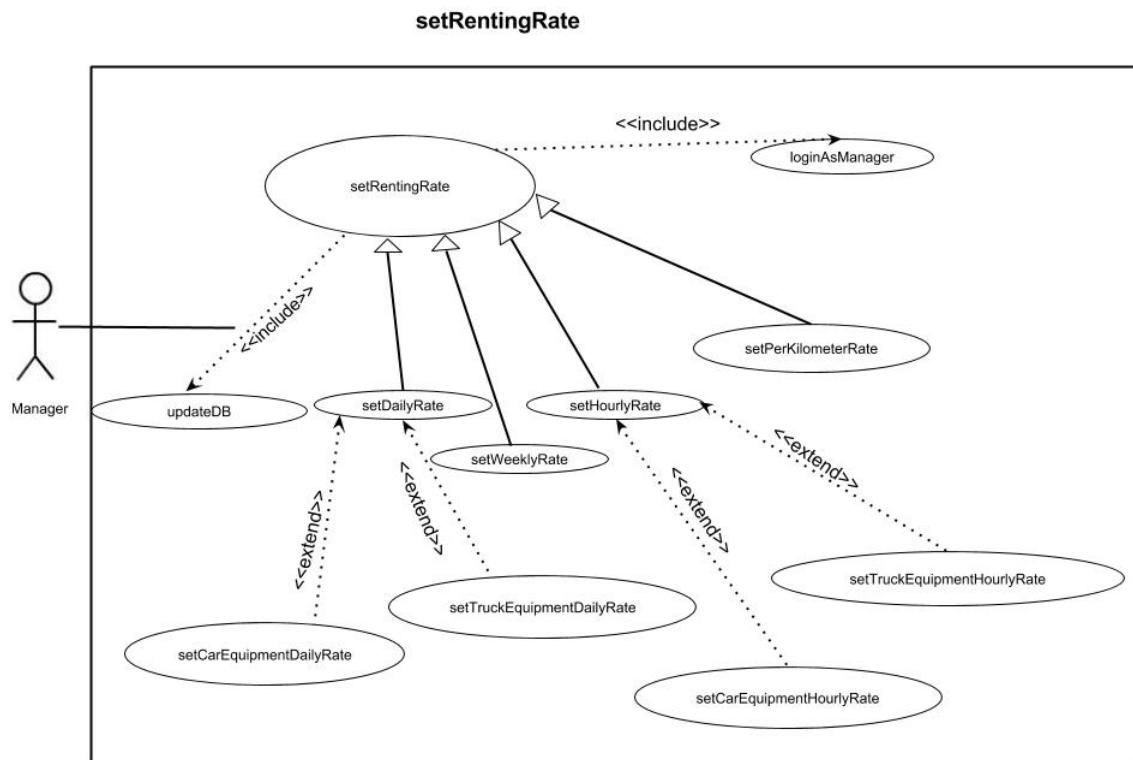
rentVehicle



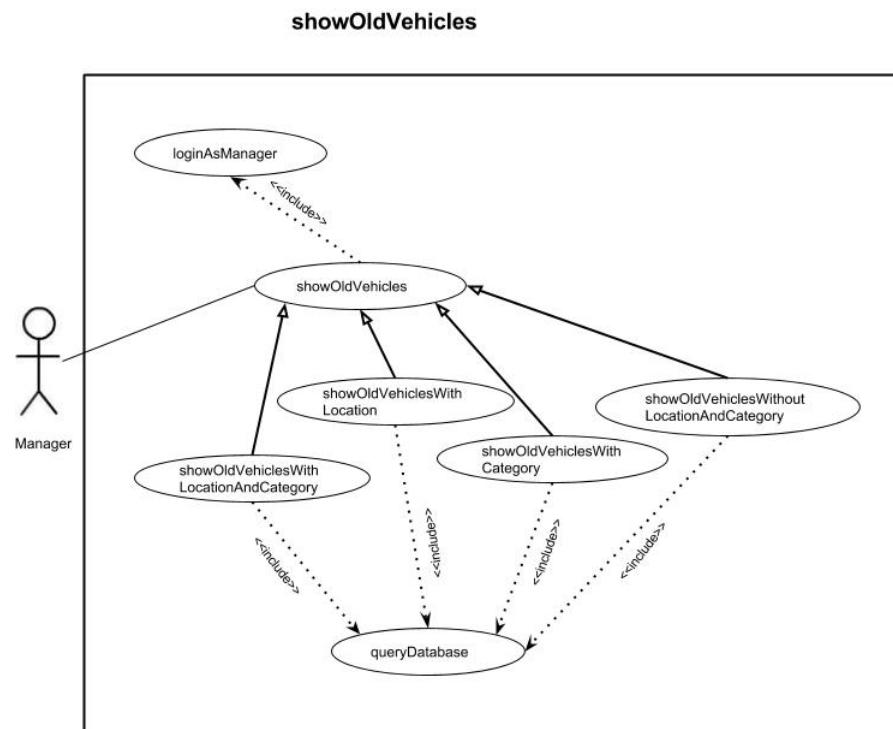
Appendix A-8 Use Case Diagram (Show Vehicle Status)



Appendix A-9 Use Case Diagram (Set Renting Rate)



Appendix A-10 Use Case Diagram (Show Old Vehicles)



Appendix B: Test Cases

Appendix B-1: Test Case (Admin: Manage Accounts: Add user)

Before clicking add button, the user information is shown as follows:

super rent
rental & logistics

Username: admin Type: ADMIN

Show tables Manage Accounts Change user password

Add user

Name:	Nakisa
User type:	Customer
Branch (for clerk):	(dropdown)
Phone (for customer):	7789942425
Address (for customer):	928 Beatty
Username:	nakisa6
Password:	*****
Re-type password:	*****

Add

After clicking add button, the user information should be added to the database, and an indicator is shown to tell the user that the operation is completed.

super rent
rental & logistics

Username: admin Type: ADMIN

Show tables Manage Accounts Change user password

Add user

An user has been added.

Name:	(empty)
User type:	Customer
Branch (for clerk):	(dropdown)
Phone (for customer):	(empty)
Address (for customer):	(empty)
Username:	(empty)
Password:	(empty)
Re-type password:	(empty)

Add

Test passed: user has been added to the customer table in the database.

Result Grid Filter Rows: Search Edit: Export/Import: Apply

username	password	name	type
manisha18	12345	manisha	customer
► nakisa6	12345	nakisa	customer
namitha	12345	Nami	customer
user 1	12345		

Appendix B-2: Test Case (Admin: Manage Accounts: Remove User)

Before clicking remove button, the username to be removed is shown as follows:

Remove user

Username:

After clicking remove button, an indicator is used to show the user has been successfully removed.

Remove user

An user has been removed.

Username:

Test passed: user has been removed from the database.

manisha18	12345	manisha	customer
namitha	12345	Nami	customer

Appendix B-3: Test Case (Admin: Show table)

Test passed: when user clicks the Show Tables tab, all tables in the database are shown.

The screenshot shows a MySQL database interface with the following details:

- Header:** Username: admin, Type: ADMIN, Log out.
- Navigation:** Show tables, Manage Accounts, Change user password.
- Table List:** A list of tables including admin, branch, clerk, customer, equipment, keep_equipment, manager, rent, rentAddon, reservation, reserveAddon, user, vehicleForrent, vehicleforsale, vehicleInbranch, vehiclesold, and vehicleType. The 'keep_equipment' table is currently selected and highlighted in blue.
- Table content:** A table showing data from the 'keep_equipment' table. The columns are equipName, city, location, and quantity. The data is as follows:

equipName	city	location	quantity
car_towing	Toronto	300 Regina Street	10
car_towing	Vancouver	2660 Wesbrook Mall	10
child_safety_seat	Toronto	300 Regina Street	17
child_safety_seat	Vancouver	2660 Wesbrook Mall	10
lift_gate	Toronto	300 Regina Street	10
lift_gate	Vancouver	2660 Wesbrook Mall	10
ski_rack	Toronto	300 Regina Street	10
ski_rack	Vancouver	2660 Wesbrook Mall	10

Appendix B-4: Test Case (Admin: Change User Password)

Before clicking change button, the information is shown as follows:

super rent
rental & logistics

Username: admin
Type: ADMIN

Show tables | Manage Accounts | Change user password

Change password

Username: nakisa6

New password: •••••

Re-type new password: •••••

Change

After clicking change button, database has been updated.

Result Grid				Filter Rows:	Search	Edit:	Export/Import:	Apply
username	password	name	type					
manisha18	12345	manisha	customer					
► nakisa6	12345	nakisa	customer					
namitha	12345	Nami	customer					
user 1								

Test Passed (Password has been changed)

Appendix B-5: Test Case (Clerk: Reservation and Rent: Check Availability)

User first inputs the following information and selects the Location, Type and Date. After clicking Check availability button, the input information will be shown on the right, and the estimation cost is also displayed.

The screenshot shows the 'super rent' rental & logistics software interface. At the top, it displays the logo 'super rent' with 'rental & logistics' underneath. On the right side, the username 'frank2' and user type 'CLERK' are shown, along with a 'Log out' button. The main area is divided into two sections: a left sidebar and a right content area.

Left Sidebar:

- Buttons: Reserve&Rent, Return, Search vehicles.
- Radio buttons: Car (selected) and Truck.
- Location: A dropdown menu showing '300 Regina Street, Tor...'. Below it is a 'Vehicle type' dropdown set to 'economy'.
- From time: A dropdown menu showing '16/04/2015' and a time selector set to '7:00'.
- To time: A dropdown menu showing '17/04/2015' and a time selector set to '10:00'.
- A blue 'Check availability' button.

Right Content Area:

- Customer: [empty field]
- Phone: [empty field]
- Type: economy
- Plate No: [empty field]
- From: 2015-04-16, 7:00
- To: 2015-04-17, 10:00
- Pickup: 300 Regina Street, Toronto
- Driver license: [empty field]
- Checkboxes:
 - Road Star
 - Redeem 1000 points
 - Redeem 1500 points
- Table showing the breakdown of costs:

Type	Time	Renting fee	Insurance	subtotal
economy	1 day(s) 3 hour(s)	1 x 50.00 3 x 10.00	1 x 10.00 3 x 2.00	60.00 36.00

				total: 96.00

Test Passed

Appendix B-6: Test Case (Clerk: Reservation and Rent: Retrieve Reservation status by confirmation number)

Before clicking submit button, the confirmation no is as follows:

The screenshot shows the 'super rent' rental & logistics software interface. On the left, there's a form for reserving a vehicle. It includes fields for location ('300 Regina Street, Tor...'), vehicle type ('economy'), and rental dates/times ('From time: 16/04/2015 7:00', 'To time: 17/04/2015 10:00'). There are buttons for 'Check availability' and 'Add equipments' (with dropdowns for 'child_safety_seat' and 'ski_rack'). Below these are sections for 'Retrieve customer information' (with fields for 'by confirmation No.' containing '32' and 'by phone No.'), 'Check Customer' button, and 'Register customer' link. On the right, customer details are displayed: name ('namitha'), phone ('604-360-5492'), type ('luxury'), pickup ('2660 Wesbrook Mall, Vancouver'), and driver license. A table shows the breakdown of costs: luxury car for 1 week(s) at 1 day(s) with a 1x3200.00 fee, 1x280.00 insurance, and 1x10.00 subtotal, totaling 4290.00. There are also checkboxes for 'Road Star', 'Redeem 1000 points', and 'Redeem 1500 points'. At the bottom are buttons for 'Reserve', 'Select vehicle', 'Rent', and 'Print'.

After clicking submit button, the information of the customer is also shown on the right.

After the customer reserve the vehicle, the status of the vehicle will be changed to pending.

31	2015-04-23	6	2015-04-29	11	Vancouver	2660 Wesbrook Mall	namitha	rented	f
► 32	2015-04-15	6	2015-04-23	6	Vancouver	2660 Wesbrook Mall	namitha	pending	l
48	2015-04-16	6	2015-04-21	12	Vancouver	2660 Wesbrook Mall	customer	pending	s
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL

reservation 1

Apply F

Test Passed.

Appendix B-7: Test Case (Clerk: Reservation and Rent: Show estimation cost)

Check whether the Customer is a Road star:

Customer: namitha	Phone:	604-360-5492																				
Type: luxury	Plate No:																					
From: 2015-04-15, 6:00	To:	2015-04-23, 6:00																				
Pickup: 2660 Wesbrook Mall, Vancouver	Driver license:																					
<input checked="" type="checkbox"/> Road Star <input type="checkbox"/> Redeem 1000 points <input type="checkbox"/> Redeem 1500 points																						
<table border="1"> <thead> <tr> <th>Type</th> <th>Time</th> <th>Renting fee</th> <th>Insurance</th> <th>subtotal</th> </tr> </thead> <tbody> <tr> <td>luxury</td> <td>1 week(s) 1 day(s)</td> <td>1 x 3200.00 1 x 800.00</td> <td>1 x 280.00 1 x 10.00</td> <td>3480.00 810.00</td> </tr> <tr> <td>Road Star reduction</td> <td>1 week(s) 1 day(s)</td> <td></td> <td>1 x 280.00/2 1 x 10.00/2</td> <td>-140.00 -5.00</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>total: 4145.00</td> </tr> </tbody> </table>			Type	Time	Renting fee	Insurance	subtotal	luxury	1 week(s) 1 day(s)	1 x 3200.00 1 x 800.00	1 x 280.00 1 x 10.00	3480.00 810.00	Road Star reduction	1 week(s) 1 day(s)		1 x 280.00/2 1 x 10.00/2	-140.00 -5.00					total: 4145.00
Type	Time	Renting fee	Insurance	subtotal																		
luxury	1 week(s) 1 day(s)	1 x 3200.00 1 x 800.00	1 x 280.00 1 x 10.00	3480.00 810.00																		
Road Star reduction	1 week(s) 1 day(s)		1 x 280.00/2 1 x 10.00/2	-140.00 -5.00																		
				total: 4145.00																		

Check whether the customer is a club member:

The screenshot shows the 'super rent' rental & logistics software interface. On the left, there's a form for reserving a vehicle, including fields for location (300 Regina Street, Tor...), vehicle type (economy), and rental dates (from 16/04/2015 to 17/04/2015). On the right, the reservation details are shown for customer namitha, who is a 'luxury' type from 2015-04-15 to 2015-04-23 at 2660 Wesbrook Mall, Vancouver. The total cost is 4145.00. A modal dialog box titled 'Input Error' is overlaid, displaying the message 'namitha is not a Club member!'.

Test Passed (All displayed information agree with those in database).

Appendix B-8: Test Case (Clerk: Select and Rent)

User input the driver's license for selecting the vehicle:

Search results

Enter driver's license: ABCJ-19087 confirm

Plate No.	Category	Vehicle Type	Brand	Odometer(km)	
ABC-7	car	luxury	BMW	12.0	
ASD-63	car	luxury	BMW	0.0	
ASD-64	car	luxury	BMW	0.0	
ASD-65	car	luxury	BMW	0.0	
ASD-66	car	luxury	BMW	0.0	
ASD-67	car	luxury	BMW	0.0	
ASD-7	car	luxury	BMW	0.0	
IGOAR	car	luxury	BMW	60.0	
IGOBAR	car	luxury	BMW	60.0	
OUR EC	car	luxury	BMW	60.0	

User can click rent button after selection:

Username: frank2

Type: CLERK

Customer: namitha Phone: 604-360-5492

Type: Message

From: Message

To: ABC-7

Date: 2015-04-23, 6:00

License Plate: ABCJ-19...

Rent is successful! The rent id is 56. Please make a note of it!

points		Insurance	subtotal
1 x 280.00		3480.00	
1 x 10.00		810.00	

Road Star reduction	1 week(s)	1 x 280.00/2	-140.00
	1 day(s)	1 x 10.00/2	-5.00

			total: 4145.00

Database has been updated: After the vehicle has been selected, it is added to the renting table.

45	1	M1234	ASD-29	Toronto	300 Regina Street	namitha	MasterC...	5415935026170659	03/2019	2015-04-17	6
46	1	v1234	ASD-75	Vancouver	2660 Wesbrook Mall	namitha	null	null	null	2015-04-17	6
47	1	C1234	ASD-6	Vancouver	2660 Wesbrook Mall	namitha	MasterC...	5415935026170659	09/2020	2015-04-23	6
56	1	ABCJ-19087	ABC-7	Vancouver	2660 Wesbrook Mall	namitha	Visa	4507556798979872	03/2017	2015-04-15	6
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

rent 1

Test Passed.

Appendix B-9: Test Case (Clerk: Return: Getting the Rent summary by entering the Plate No)

Information about the vehicle to be returned is shown as follows, and the rent cost is displayed on the right when confirm button is pressed.

The screenshot shows the Super Rent rental & logistics software. At the top, it displays the logo "super rent" and "rental & logistics". The top right corner shows the username "frank2" and type "CLERK", with a "Log out" button. Below the header, there are three tabs: "Reserve&Rent", "Return", and "Search vehicles". The "Return" tab is selected.

Return Details

- *Please check the plate number first
- Plate No.: ABC-7
- *Please fill the following return information
- Return Date: 17/04/2015
- Odometer: 700000
- Tank Full: No
- Equipments returned: No equipment!

Rent Summary

Customer: namitha Vehicle plate No: ABC-7

Pickup: 2660 Wesbrook Mall, Vancouver at 6:00 in 2015-04-15

Return: 2660 Wesbrook Mall, Vancouver at 6:00 in 2015-04-17

Rented Equipment: No equipments rented

Cost Summary

Type	Time	Renting fee	Insurance	subtotal
luxury	2 day(s)	2 x 800.00	2 x 10.00	1620.00
Exceed mile limit by 687 km		687 x 2.00		1374.00
				total: 2994.00

Buttons: Confirm, Return

After the return button is clicked, the payment interface is shown as follows:

The screenshot shows a payment interface titled "Payment". At the top, there is a "CheckOut" button. Below it, two radio buttons are shown: "By Credit Card" (unchecked) and "By Cash" (checked). The "By Cash" option is highlighted with a blue border.

Payment Information

Amount: 2994.00

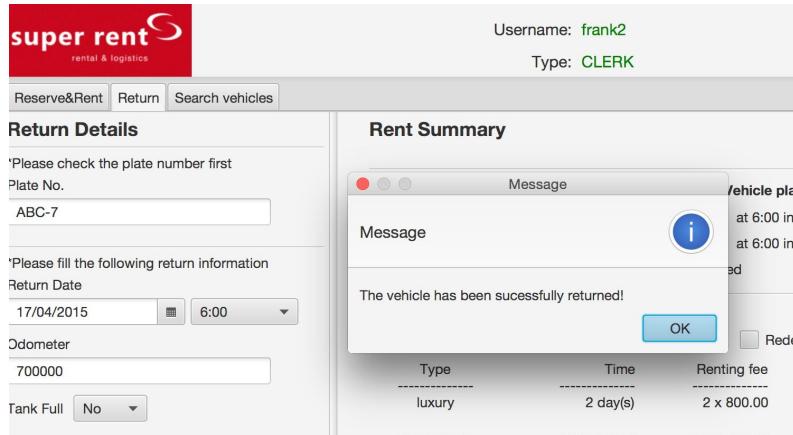
Card type: Card Type

Card number: (empty input field)

Expiry time (MM/YYYY): (empty input field)

Amount Paid: 2994.00

If the payment is successful, then an indicator will be shown.



The rent table before update:

47	1	C1234	ASD-6	Vancouver	2660 Wesbrook Mall	namitha	MasterC...	5415935026170659	09
► 56	1	ABCJ-19087	ABC-7	Vancouver	2660 Wesbrook Mall	namitha	Visa	4507556798979872	03

The return table after update:

41	46	2015-04-30	6	Toronto	300 Regina Street	1	10000	2025	Cash
► 54	56	2015-04-17	6	Vancouver	2660 Wesbrook Mall	0	700000	2994	Cash

The status of the vehicle in the vehicleforrent table is also updated (1 means available now).

ABC-6	0	2015-04-10	car	full-size	BMW	frank1	0
► ABC-7	1	2015-04-10	car	luxury	BMW	frank1	700000
ABC-8	1	2015-04-10	car	midsized	BMW	frank1	0
ABC-9	1	2015-04-10	car	premium	BMW	frank1	0
AMAZON	1	2006-05-01	truck	foot15	Ford...	frank1	30000
ASD-1	1	2015-04-11	car	economy	BMW	frank1	0
ASD-10	1	2015-04-11	car	standard	BMW	frank1	12000
ASD-11	1	2015-04-11	truck	foot15	BMW	frank1	0

Test Passed (All related data are updated).

Appendix B-10: Test Case (Clerk: Search Vehicle)

User input all required vehicle information, and all available vehicles will be shown if available vehicles is checked.

The screenshot shows the 'super rent' rental & logistics software interface. The top navigation bar includes 'Username: frank2', 'Type: CLERK', and a 'Log out' button. Below the header, there are three tabs: 'Reserve&Rent', 'Return', and 'Search vehicles'. The 'Search vehicles' tab is active, displaying a table of vehicle results. The table has columns: city, location, vehicleType, vlicense, category, and brand. The results show multiple entries for Toronto, 300 Regina Street, boxtrucks, with various license plates (ABC-12, ASD-12, ASD-35, ASD-36, ASD-37, ASD-38, ASD-39, ASD-40, ASD-41, ASD-42) and brands (BMW, DMAZON, Ford FSeries). On the left side of the screen, there is a sidebar titled 'Queries' with sections for 'Search for' (radio buttons for Available vehicles, Overdue vehicles, Vehicles for sale), 'Location' (dropdown menu showing '300 Regina Street, Tor...'), 'Vehicle type' (dropdown menu showing 'boxtrucks'), 'From date' (text input showing '16/04/2015'), 'To date' (text input showing '17/04/2015'), and a 'Submit' button.

Check Overdue Vehicles: Unspecified location and type

The screenshot shows the 'super rent' rental & logistics software interface. The top navigation bar includes 'Username: frank2', 'Type: CLERK', and a 'Log out' button. Below the header, there are three tabs: 'Reserve&Rent', 'Return', and 'Search vehicles'. The 'Search vehicles' tab is active, displaying a table of vehicle results. The table has columns: city, location, vehicleType, rentid, customer_username, vlicense, and expected_return. The results show entries for both Toronto and Vancouver, with various vehicle types (boxtrucks, boxtrucks, boxtrucks, boxtrucks, cargovans), customer usernames (customer, customer, customer, customer, namitha, supfrank, frank9), and expected return dates (2014-04-23, 2014-04-06, 2014-03-16, 2014-03-06, 2015-04-15, 2014-04-23, 2014-04-06). On the left side of the screen, there is a sidebar titled 'Queries' with sections for 'Search for' (radio buttons for Available vehicles, Overdue vehicles, Vehicles for sale), 'Location' (dropdown menu showing 'unspecified'), 'Vehicle type' (dropdown menu showing 'unspecified'), 'From date' (text input showing '16/04/2015'), 'To date' (text input showing '17/04/2015'), and a 'Submit' button.

Check Vehicle for sale: By location, type and date

The screenshot shows a software application window titled "super rent rental & logistics". At the top right, it displays "Username: frank2" and "Type: CLERK" with a "Log out" button. The main area has tabs for "Reserve&Rent", "Return", and "Search vehicles". On the left, there's a sidebar with sections for "Queries", "Search for" (with radio buttons for "Available vehicles", "Overdue vehicles", and "Vehicles for sale"), "Location" (dropdown set to "unspecified"), "Vehicle type" (dropdown set to "unspecified"), "From date" (set to "16/04/2015"), and "To date" (set to "17/04/2015"). A "Submit" button is at the bottom of the sidebar. The main content area is a table with columns: city, location, vehicleType, license, brand, category, odometer (km), and price. The table lists vehicle records from two locations: Toronto and Vancouver. The data includes various vehicle types like cargo vans, compact, economy, luxury, and vans, with brands like FMAZON, Dodge Ram, BMW, and IGONAR.

	city	location	vehicleType	license	brand	category	odometer (km)	price
Toronto	300 Regina Street	cargovans	FMAZON	Dodge Ram	truck	30.0	10000	
Toronto	300 Regina Street	compact	BCPL5S	BMW	car	60.0	3000.0	
Toronto	300 Regina Street	compact	BCPL6S	BMW	car	60.0	3000.0	
Toronto	300 Regina Street	compact	BCPL4S	BMW	car	30.0	3000.0	
Toronto	300 Regina Street	economy	BCPL3S	BMW	car	30.0	3000.0	
Toronto	300 Regina Street	economy	BCPL1S	BMW	car	30.0	3000.0	
Toronto	300 Regina Street	economy	BCPL2S	BMW	car	30.0	3000.0	
Toronto	300 Regina Street	full-size	BCPL8S	BMW	car	60.0	3000.0	
Toronto	300 Regina Street	full-size	BCPL7S	BMW	car	60.0	3000.0	
Toronto	300 Regina Street	luxury	BCPL0S	BMW	car	60.0	3000.0	
Toronto	300 Regina Street	luxury	BCPL9S	BMW	car	60.0	7000.0	
Toronto	300 Regina Street	van	IGONAR	BMW	car	30.0	10000	
Vancouver	2660 Wesbrook Mall	boxtrucks	ACPL8S	BMW	truck	90.0	3000.0	
Vancouver	2660 Wesbrook Mall	foot12	ACPL5S	Dodge Ram	truck	90.0	3000.0	
Vancouver	2660 Wesbrook Mall	foot15	ACPL6S	Dodge Ram	truck	90.0	3000.0	
Vancouver	2660 Wesbrook Mall	foot15	ACPL3S	Dodge Ram	truck	90.0	3000.0	
Vancouver	2660 Wesbrook Mall	foot24	ACPL4S	Dodge Ram	truck	90.0	3000.0	
Vancouver	2660 Wesbrook Mall	foot24	ACPL7S	Dodge Ram	truck	90.0	3000.0	
Vancouver	2660 Wesbrook Mall	midsized	ACPL2S	BMW	car	60.0	3000.0	

Test Passed (All queries returned correct information).

Appendix B-11: Test Case (Manager: Manage Vehicle: Add Vehicle)

Manager gives the vehicle information and click add button.

Manage Vehicle | Find Vehicle | Set Price

Add Vehicle

Location: 300 Regina Street...

Car Truck

Type: boxtrucks

Brand: BMW

Plate Num: KJI-123

Date: 15/04/2015

Vehicle Added!

Database has been updated: Vehicle has been added to the database

100% 1:1

Result Grid | Filter Rows: Search | Edit:

vlicense	isAvailable	starting_date	category	vehicleType	brand	manager	odometer
IGOPAR	1	2013-05-01	truck	foot15	Ford...	frank1	30000
KJI-123	1	2015-04-15	truck	boxtrucks	BMW	frank1	0
QUDAO	1	2015-05-01	truck	boxtrucks	BMW	frank1	00000

Test Passed.

Test Case A-12 (Manager: Find Vehicle)

By choosing the type and sorting by location

super rent
rental & logistics

Username: frank1
Type: MANAGER
Log out

Manage Vehicle Find Vehicle Set Price Reports

Car Truck

Location:

Sort By Location
 Sort By Category

Vehicles older than years

Vehicle List:

license	location	category	starting_date
4U 2AVY	2660 Wesbrook Mall	truck	1999-05-01
ASD-100	2660 Wesbrook Mall	truck	2015-04-11
ASD-19	2660 Wesbrook Mall	truck	2015-04-11
ASD-88	2660 Wesbrook Mall	truck	2015-04-11
ASD-96	2660 Wesbrook Mall	truck	2015-04-11
ABC-18	2660 Wesbrook Mall	truck	2015-04-10
ASD-93	2660 Wesbrook Mall	truck	2015-04-11
4U 2NCY	2660 Wesbrook Mall	truck	2006-05-01
ASD-21	2660 Wesbrook Mall	truck	2015-04-11
ASD-90	2660 Wesbrook Mall	truck	2015-04-11
ASD-98	2660 Wesbrook Mall	truck	2015-04-11
ABC-121	2660 Wesbrook Mall	truck	2015-04-10
ASD-18	2660 Wesbrook Mall	truck	2015-04-11
ASD-87	2660 Wesbrook Mall	truck	2015-04-11
ASD-95	2660 Wesbrook Mall	truck	2015-04-11

Set Price: Remove

By choosing the age of the vehicles:

super rent
rental & logistics

Username: frank1
Type: MANAGER
Log out

Manage Vehicle Find Vehicle Set Price Reports

Car Truck

Location:

Sort By Location
 Sort By Category

Vehicles older than 10 years

Vehicle List:

license	location	category	starting_date
QMAZON	300 Regina Street	car	1999-05-01
IGONAR	300 Regina Street	car	1999-05-01
4U 2AVY	2660 Wesbrook Mall	truck	1999-05-01
IGOFAR	2660 Wesbrook Mall	car	1999-05-01
GOOGLE	300 Regina Street	truck	1999-05-01
FMAZON	300 Regina Street	truck	1999-05-01
4U 2NRY	2660 Wesbrook Mall	truck	2000-05-01
PLT-4T	2660 Wesbrook Mall	car	2000-05-01
PLT-4M	300 Regina Street	car	2000-05-01
OUR XC	2660 Wesbrook Mall	car	2000-05-01
GMAZON	300 Regina Street	truck	2000-05-01
IGOORAR	300 Regina Street	truck	2000-05-01
IGODAR	2660 Wesbrook Mall	car	2000-05-01
YAH-OO	300 Regina Street	truck	2000-05-01
IGOEAR	2660 Wesbrook Mall	car	2001-05-01

Set Price: Remove

Selecting a vehicle and set the price:

The screenshot shows the 'super rent' rental & logistics software interface. At the top, it displays the logo 'super rent' with 'rental & logistics' underneath. To the right, it shows the username 'frank1', type 'MANAGER', and a 'Log out' button. Below the header, there are tabs for 'Manage Vehicle', 'Find Vehicle', 'Set Price', and 'Reports'. On the left, there are filters for 'Car' (selected) and 'Truck', a dropdown for 'Location', and checkboxes for 'Sort By Location' and 'Sort By Category'. A text input for 'Vehicles older than' with a value of '10' and buttons for 'Clear' and 'Show' are also present. The main area contains a table with columns: 'vlicense', 'location', 'category', 'starting_date', and others. The table lists various vehicles with their details. One row, 'IGODAR', is highlighted with a blue background. At the bottom right, there is a 'Set Price:' input field containing '10000' and a 'Remove' button.

vlicense	location	category	starting_date	
QMAZON	300 Regina Street	car	1999-05-01	
PLT-4D	2660 Wesbrook Mall	car	1999-05-01	
OUR DC	2660 Wesbrook Mall	car	1999-05-01	
4U 2AVY	2660 Wesbrook Mall	truck	1999-05-01	
IGO FAR	2660 Wesbrook Mall	car	1999-05-01	
GOOGLE	300 Regina Street	truck	1999-05-01	
4U 2NRY	2660 Wesbrook Mall	truck	2000-05-01	
PLT-4T	2660 Wesbrook Mall	car	2000-05-01	
PLT-4M	300 Regina Street	car	2000-05-01	
GMAZON	300 Regina Street	truck	2000-05-01	
OUR XC	2660 Wesbrook Mall	car	2000-05-01	
IGODAR	2660 Wesbrook Mall	car	2000-05-01	
IGO OAR	300 Regina Street	truck	2000-05-01	
YAH-OO	300 Regina Street	truck	2000-05-01	
IGO EAR	2660 Wesbrook Mall	car	2001-05-01	

Database before removing the vehicle from Rent to for Sale table:

A screenshot of a database grid titled 'Result Grid'. The grid has columns: vlicense, isAvailable, starting_date, category, vehicleType, brand, manager, and odometer. There are 8 rows of data. The last row is labeled 'vehicleforrent 1'. The row for 'IGODAR' is selected and highlighted with a blue background.

vlicense	isAvailable	starting_date	category	vehicleType	brand	manager	odometer
IGO BAR	1	2010-05-01	car	luxury	BMW	frank1	60000
IGO CAR	1	1998-05-01	car	midsize	BMW	frank1	60000
IGODAR	1	2000-05-01	car	premium	BMW	frank1	60000
IGO EAR	1	2001-05-01	car	premium	BMW	frank1	60000
IGO FAR	1	1999-05-01	car	midsize	BMW	frank1	60000
vehicleforrent 1							

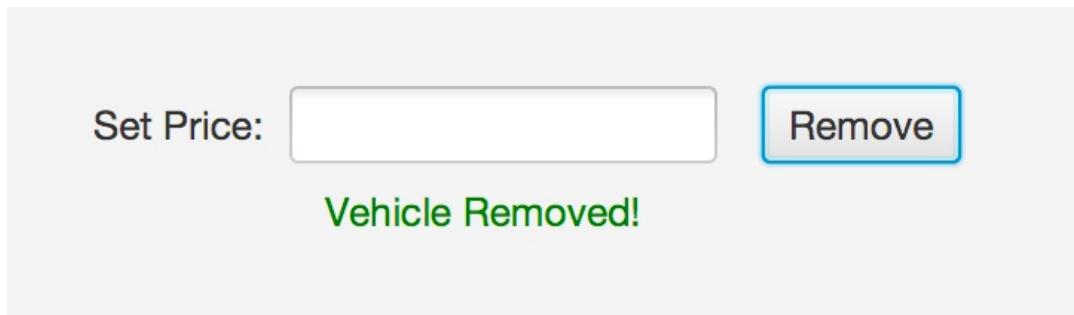
Setting the price and removing the vehicle from rent:

A screenshot of the software interface showing a list of vehicles. The table has columns: vlicense, location, category, starting_date, and others. The row for 'IGODAR' is selected and highlighted with a grey background. At the bottom, there is a 'Set Price:' input field containing '10000' and a 'Remove' button.

vlicense	location	category	starting_date	
OUR XC	2660 Wesbrook Mall	car	2000-05-01	
IGODAR	2660 Wesbrook Mall	car	2000-05-01	
IGO OAR	300 Regina Street	truck	2000-05-01	
YAH-OO	300 Regina Street	truck	2000-05-01	
IGO EAR	2660 Wesbrook Mall	car	2001-05-01	

Set Price: Remove

Vehicle is removed:



Database: The vehicle has been removed from Vehicle for Rent Table and added to vehicle for sale:

vlicense	price	starting_date	category	brand	vehicleType	odometer
TMZON	1000000	1999-05-01	truck	Dodge Ram	cargo van	30000
► IGODAR	1000000	2000-05-01	car	BMW	premium	60000
ICONAR	1000000	1000-05-01	car	BMW	van	20000

Test Passed.

Appendix B-13: Test Case (Customer: registration)

Before the registration, 'newCustomer' doesn't exist

username	password	name	type
customer5	customer5	customer5	customer
customer6	customer6	customer6	customer
customer7	customer7	customer7	customer
customer8	customer8	customer8	customer
customer9	customer9	customer9	customer
frank10	12345	frank10	customer
frank7	12345	frank7	customer
frank8	12345	frank8	customer
frank9	12345	frank9	customer
manisha1	123456	manisha	customer
manisha18	12345	manisha	customer
namitha	12345	Nami	customer
supfrank	12345	frank	customer
NULL	NULL	NULL	NULL

A customer registered as 'newCustomer'

The screenshot shows a 'Customer Registration' window for 'super rent rental & logistics'. The window title is 'Customer Registration'. It features a red 'REGISTER' button and a small icon of a person holding a key and a lock. A green success message 'Registration Sucessfull!' is displayed. Below the message, there are input fields for 'Username' (newCustomer), 'Password' (redacted), 'Re-Type Password' (redacted), 'Name' (newCustomer), 'Phone' (567-221-7895), and 'Address' (237 Maple Street). At the bottom are 'Clear', 'Register' (highlighted in blue), and 'Go back' buttons.

After this operation, 'newCustomer' is in the User table.

namitha	12345	Nami	customer
► newCustomer	newCustomer	newCustomer	customer
supfrank	12345	frank	customer
NULL	NULL	NULL	NULL

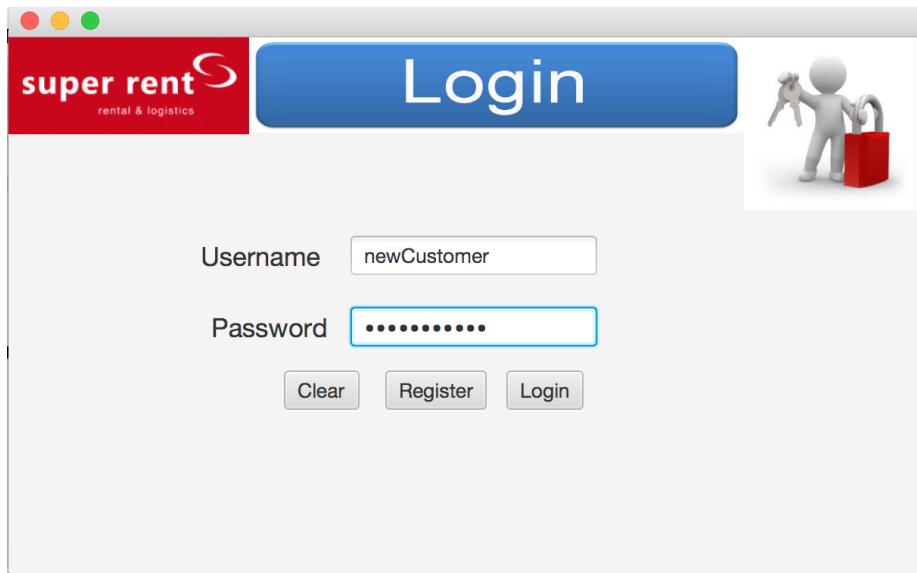
Also, the customer table is updated.

Customer	Customer ID	First Name	Last Name	Address	Phone Number	Balance	Date Entered
frank8	519-781-6708	1	0	0	0	0	NULL
frank9	519-781-6709	1	0	1	500	1	2014-12-04
namitha	604-360-5492	1	0	0	0	0	NULL
► newCustomer	567-221-7895	237 Maple Street		0	0	0	NULL
supfrank	888-888-8888	1	1	1	10000	1	2014-03-04
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Test Passed.

Appendix B-14: Test Case (Customer: customer login)

User input username and password:



User login successfully:

Test Passed.

Appendix B-15: Test Case (Customer: Make reservation)

Before the reservation:

confirmation_number	pickup_date	pickup_time	return_date	return_time	branch_city	branch_location	customer_username	status	vehicle_type
13	2015-04-09	6	2015-04-30	9	Vancouver	2660 Westbrook Mall	supfrank	rented	economy
15	2015-04-08	6	2015-04-22	7	Vancouver	2660 Westbrook Mall	frank8	rented	economy
16	2015-04-10	8	2015-04-23	14	Vancouver	2660 Westbrook Mall	customer26	rented	economy
17	2015-04-10	8	2015-04-23	14	Vancouver	2660 Westbrook Mall	customer27	rented	boxtruck
18	2015-04-10	6	2015-04-23	11	Vancouver	2660 Westbrook Mall	customer14	Pending	midsize
19	2015-04-11	6	2015-04-14	6	Toronto	300 Regina Street	customer	Pending	SUV
22	2015-04-13	6	2015-04-14	6	Toronto	300 Regina Street	namitha	Cancelled	economy
23	2015-04-14	6	2015-04-15	6	Toronto	300 Regina Street	namitha	Cancelled	economy
24	2015-04-14	6	2015-04-15	6	Toronto	300 Regina Street	namitha	Rented	cargo van
25	2015-04-20	6	2015-04-21	6	Toronto	300 Regina Street	namitha	Rented	van
26	2015-04-14	6	2015-04-22	9	Vancouver	2660 Westbrook Mall	namitha	Rented	full-size
27	2015-04-15	6	2015-04-30	9	Toronto	300 Regina Street	namitha	Rented	economy
28	2015-04-17	6	2015-04-30	10	Toronto	300 Regina Street	namitha	Rented	SUV
29	2015-04-17	6	2015-04-30	10	Vancouver	2660 Westbrook Mall	namitha	Rented	Premium
31	2015-04-23	6	2015-04-29	11	Vancouver	2660 Westbrook Mall	namitha	Rented	full-size
32	2015-04-15	6	2015-04-23	6	Vancouver	2660 Westbrook Mall	namitha	Rented	Luxury
► 48	2015-04-16	6	2015-04-21	12	Vancouver	2660 Westbrook Mall	customer	Pending	standard
	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

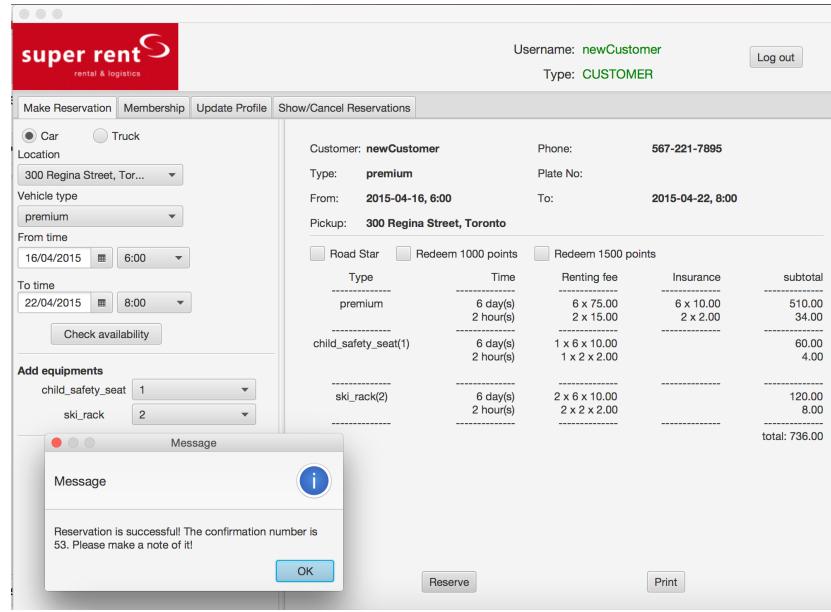
Making reservation:

The screenshot shows the 'super rent' rental application interface. At the top, there's a logo and navigation links for 'Make Reservation', 'Membership', 'Update Profile', and 'Show/Cancel Reservations'. The user is logged in as 'newCustomer' (Type: CUSTOMER). On the left, there are fields for selecting a 'Car' or 'Truck', choosing a 'Location' (300 Regina Street, Toronto), specifying a 'Vehicle type' (premium), setting a 'From time' (16/04/2015, 6:00), and a 'To time' (22/04/2015, 8:00). A 'Check availability' button is present. On the right, the customer information is summarized: Customer: newCustomer, Phone: 567-221-7895, Type: premium, From: 2015-04-16, 6:00, To: 2015-04-22, 8:00, Pickup: 300 Regina Street, Toronto. Below this, there are checkboxes for 'Road Star' (selected), 'Redeem 1000 points', and 'Redeem 1500 points'. A detailed breakdown of the reservation costs is shown in a table:

Type	Time	Renting fee	Insurance	subtotal
premium	6 day(s) 2 hour(s)	6 x 75.00 2 x 15.00	6 x 10.00 2 x 2.00	510.00 34.00
child_safety_seat(1)	6 day(s) 2 hour(s)	1 x 6 x 10.00 1 x 2 x 2.00		60.00 4.00
ski_rack(2)	6 day(s) 2 hour(s)	2 x 6 x 10.00 2 x 2 x 2.00		120.00 8.00
				total: 736.00

At the bottom, there are 'Reserve' and 'Print' buttons.

After reservation has been made:



Check database for the reservation:

confirmation_number	pickup_date	pickup_time	return_date	return_time	branch_city	branch_location	customer_username	status	vehicle_type
15	2015-04-08	6	2015-04-22	7	Vancouver	2660 Wesbrook Mall	frank8	rented	economy
16	2015-04-10	8	2015-04-23	14	Vancouver	2660 Wesbrook Mall	customer26	rented	economy
17	2015-04-10	8	2015-04-23	14	Vancouver	2660 Wesbrook Mall	customer27	rented	boxtruck
18	2015-04-10	6	2015-04-23	11	Vancouver	2660 Wesbrook Mall	customer14	Pending	midsize
19	2015-04-11	6	2015-04-14	6	Toronto	300 Regina Street	customer	Pending	SUV
22	2015-04-13	6	2015-04-14	6	Toronto	300 Regina Street	namitha	Cancelled	economy
23	2015-04-14	6	2015-04-15	6	Toronto	300 Regina Street	namitha	Cancelled	economy
24	2015-04-14	6	2015-04-15	6	Toronto	300 Regina Street	namitha	Rented	cargo van
25	2015-04-20	6	2015-04-21	6	Toronto	300 Regina Street	namitha	Rented	van
26	2015-04-14	6	2015-04-22	9	Vancouver	2660 Wesbrook Mall	namitha	Rented	full-size
27	2015-04-15	6	2015-04-30	9	Toronto	300 Regina Street	namitha	Rented	economy
28	2015-04-17	6	2015-04-30	10	Toronto	300 Regina Street	namitha	Rented	SUV
29	2015-04-17	6	2015-04-30	10	Vancouver	2660 Wesbrook Mall	namitha	Rented	Premium
31	2015-04-23	6	2015-04-29	11	Vancouver	2660 Wesbrook Mall	namitha	Rented	full-size
32	2015-04-15	6	2015-04-23	6	Vancouver	2660 Wesbrook Mall	namitha	Rented	Luxury
48	2015-04-16	6	2015-04-21	12	Vancouver	2660 Wesbrook Mall	customer	Pending	standard
53	2015-04-16	6	2015-04-22	8	Toronto	300 Regina Street	newCustomer	Pending	Premium
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Also, the reserve_addon table is also updated to indicate the reserved equipment.

confirmNo	quantity	equipName
53	1	child_safety_seat
53	2	ski_rack
NULL	NULL	NULL

Test Passed.

Appendix B-16: Test Case (Customer: apply membership)

Before the operation, 'newCustomer' is not a member

username	phone	address	isRoadStar	isClubMember	point	isAnnualPaid	payment_date
newCustomer	567-221-7895	237 Maple Street	0	0	0	NULL	NULL
HULL	HULL	HULL	HULL	HULL	HULL	HULL	HULL

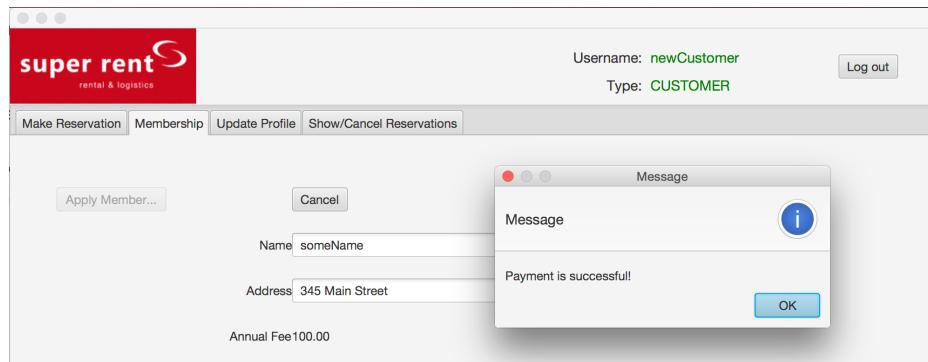
Apply for membership:

The screenshot shows a web application for 'super rent rental & logistics'. At the top right, it displays 'Username: newCustomer' and 'Type: CUSTOMER' with a 'Log out' button. Below the header, there are four navigation buttons: 'Make Reservation', 'Membership', 'Update Profile', and 'Show/Cancel Reservations'. The main content area is titled 'Apply Member...' and contains fields for 'Name' (with value 'someName') and 'Address' (with value '345 Main Street'). Below these fields is a note 'Annual Fee100.00'. At the bottom right of this section is a blue-bordered 'Make Payment' button.

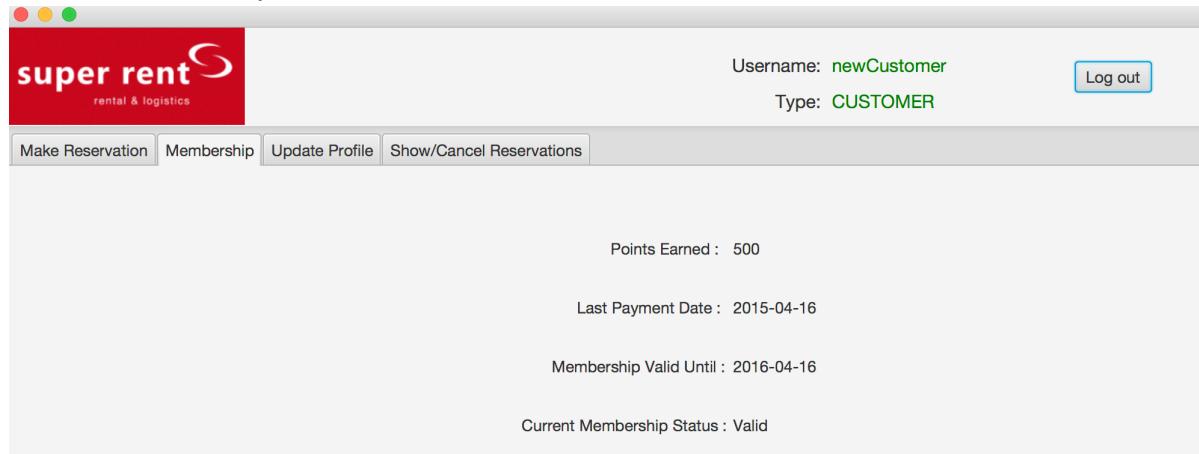
Pay annual fees:

The screenshot shows a 'Payment' window with a 'Payment Information' tab selected. It includes a 'CheckOut' button. The form fields are: 'Amount' (100.00.00), 'Card type' (Visa), 'Card number' (4539865388180612), and 'Expiry time (MM/YYYY)' (12/2019). The 'Card number' field has a blue border, indicating it is the active or selected field.

Successful payment:



Show membership information:



After the operation, 'newCustomer' becomes a member

username	phone	address	isRoadStar	isClubMember	point	isAnnualPaid	payment_date
► newCustomer	567-221-7895	345 Main Street	0	1	500	NULL	2015-04-16
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Test Passed.

Appendix B-17: Test Case (Customer: Change password)

Before the operation, the password is 'newCustomer'

username	password	name	type
► newCustomer	newCustomer	someName	customer
NULL	NULL	NULL	NULL

Change password to 'new'

super rent
rental & logistics

Username: newCustomer
Type: CUSTOMER

Log out

Make Reservation Membership Update Profile Show/Cancel Reservations

Change Password

Old Password: [REDACTED]

New password: [REDACTED]

Re-type new password: [REDACTED]

Change Password

Successful change:

Change Password

The password for has been updated.

Old Password: [REDACTED]

New password: [REDACTED]

Re-type new password: [REDACTED]

Change Password

The database has been updated:

username	password	name	type
► newCustomer	new	someName	customer
NULL	NULL	NULL	NULL

Test Passed.

Appendix B-18: Test Case (Customer: Change phone number)

Before the operation, the phone number is 567-221-7895:

username	phone	address	isRoadStar	isClubMember	point	isAnnualPaid	payment_date
► newCustomer	567-221-7895	345 Main Street	0	1	500	NULL	2015-04-16
	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Change the phone number to 123-456-1111:

Change Phone

Phone Number:

After the operation, the phone number becomes 123-456-1111

username	phone	address	isRoadStar	isClubMember	point	isAnnualPaid	payment_date
► newCustomer	123-456-1111	345 Main Street	0	1	500	NULL	2015-04-16
	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Test Passed.

Appendix B-19: Test Case (Customer: change address)

Before the operation:

username	phone	address	isRoadStar	isClubMember	point	isAnnualPaid	payment_date
► newCustomer	123-456-1111	345 Main Street	0	1	500	NULL	2015-04-16
	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Change address:

Change Address

Address: 888 Main Mall

Change Address

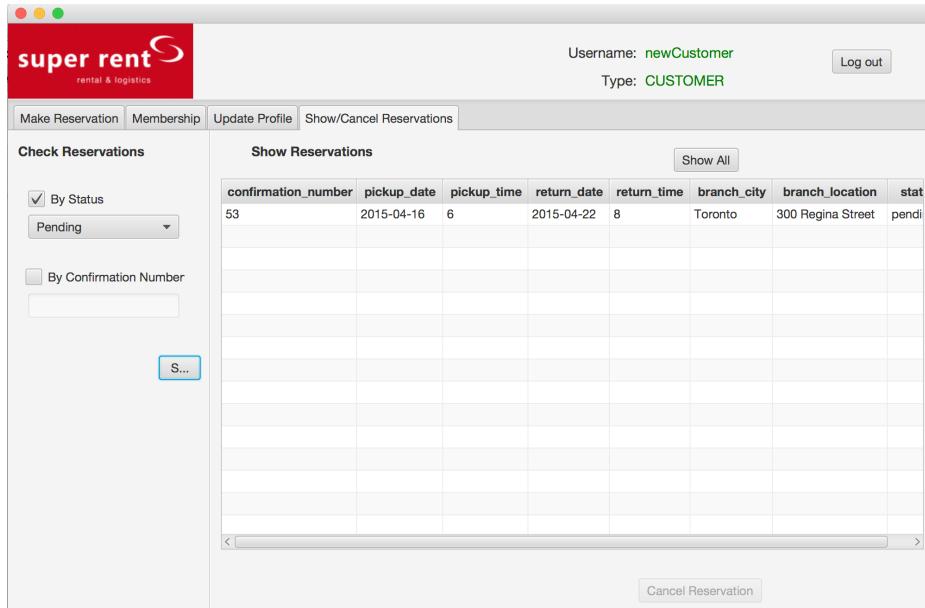
After the operation:

username	phone	address	isRoadStar	isClubMember	point	isAnnualPaid	payment_date
► newCustomer	123-456-1111	888 Main Mall	0	1	500	NULL	2015-04-16
	NULL	NULL	NULL	NULL	NULL	NULL	NULL

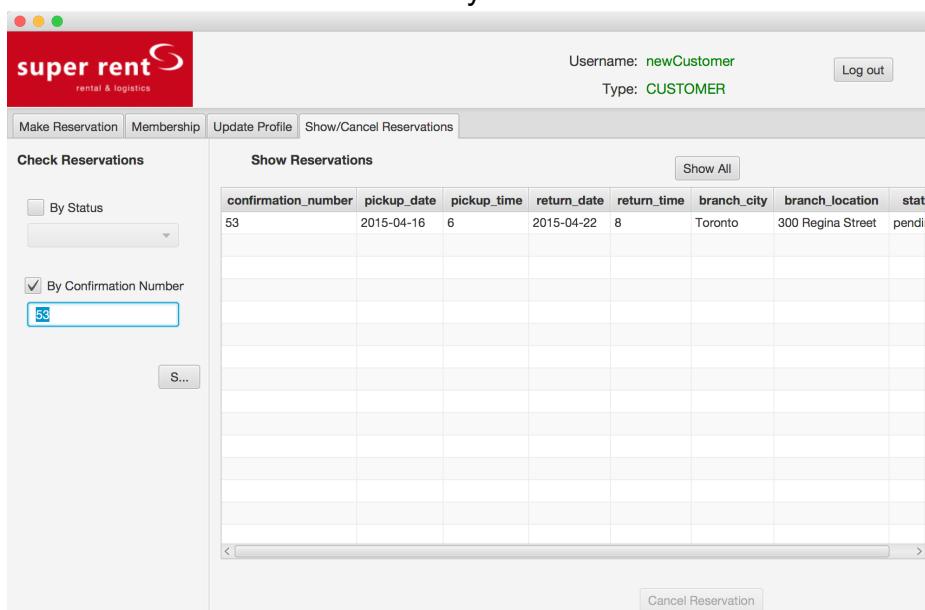
Test Passed.

Appendix B-20: Test Case (Customer: check reservation)

Customer can see his own reservation by status:



Customer can see his own reservation by confirmation number:



Test Passed.

Appendix B-21: Test Case (Customer: cancel reservation)

Before the operation:

confirmation_number	pickup_date	pickup_time	return_date	return_time	branch_city	branch_location	customer_username	status	vehicleType
15	2015-04-08	6	2015-04-22	7	Vancouver	2660 Wesbrook Mall	frank8	rented	economy
16	2015-04-10	8	2015-04-23	14	Vancouver	2660 Wesbrook Mall	customer26	rented	economy
17	2015-04-10	8	2015-04-23	14	Vancouver	2660 Wesbrook Mall	customer27	rented	boxtrucks
18	2015-04-10	6	2015-04-23	11	Vancouver	2660 Wesbrook Mall	customer14	pending	midsize
19	2015-04-11	6	2015-04-14	6	Toronto	300 Regina Street	customer	pending	suv
22	2015-04-13	6	2015-04-14	6	Toronto	300 Regina Street	namitha	cancelled	economy
23	2015-04-14	6	2015-04-15	6	Toronto	300 Regina Street	namitha	cancelled	economy
24	2015-04-14	6	2015-04-15	6	Toronto	300 Regina Street	namitha	rented	cargovans
25	2015-04-20	6	2015-04-21	6	Toronto	300 Regina Street	namitha	rented	van
26	2015-04-14	6	2015-04-22	9	Vancouver	2660 Wesbrook Mall	namitha	rented	full-size
27	2015-04-15	6	2015-04-30	9	Toronto	300 Regina Street	namitha	rented	economy
28	2015-04-17	6	2015-04-30	10	Toronto	300 Regina Street	namitha	rented	suv
29	2015-04-17	6	2015-04-30	10	Vancouver	2660 Wesbrook Mall	namitha	rented	premium
31	2015-04-23	6	2015-04-29	11	Vancouver	2660 Wesbrook Mall	namitha	rented	full-size
32	2015-04-15	6	2015-04-23	6	Vancouver	2660 Wesbrook Mall	namitha	rented	luxury
48	2015-04-16	6	2015-04-21	12	Vancouver	2660 Wesbrook Mall	customer	pending	standard
53	2015-04-16	6	2015-04-22	8	Toronto	300 Regina Street	newCustomer	pending	premium
NUL	NUL	NUL	NUL	NUL	NUL	NUL	NUL	NUL	NUL

Cancel reservation:

Show Reservations Show All

confirmation_number	pickup_date	pickup_time	return_date	return_time	branch_city	branch_location	status
53	2015-04-16	6	2015-04-22	8	Toronto	300 Regina Street	Pendi

Cancel Reservation

Successful cancellation:

After the operation:

confirmation_number	pickup_date	pickup_time	return_date	return_time	branch_city	branch_location	customer_username	status	vehicleType
15	2015-04-08	6	2015-04-22	7	Vancouver	2660 Wesbrook Mall	frank8	rented	economy
16	2015-04-10	8	2015-04-23	14	Vancouver	2660 Wesbrook Mall	customer26	rented	economy
17	2015-04-10	8	2015-04-23	14	Vancouver	2660 Wesbrook Mall	customer27	rented	boxtrucks
18	2015-04-10	6	2015-04-23	11	Vancouver	2660 Wesbrook Mall	customer14	pending	midsize
19	2015-04-11	6	2015-04-14	6	Toronto	300 Regina Street	customer	pending	suv
22	2015-04-13	6	2015-04-14	6	Toronto	300 Regina Street	namitha	cancelled	economy
23	2015-04-14	6	2015-04-15	6	Toronto	300 Regina Street	namitha	cancelled	economy
24	2015-04-14	6	2015-04-15	6	Toronto	300 Regina Street	namitha	rented	cargovans
25	2015-04-20	6	2015-04-21	6	Toronto	300 Regina Street	namitha	rented	van
26	2015-04-14	6	2015-04-22	9	Vancouver	2660 Wesbrook Mall	namitha	rented	full-size
27	2015-04-15	6	2015-04-30	9	Toronto	300 Regina Street	namitha	rented	economy
28	2015-04-17	6	2015-04-30	10	Toronto	300 Regina Street	namitha	rented	suv
29	2015-04-17	6	2015-04-30	10	Vancouver	2660 Wesbrook Mall	namitha	rented	premium
31	2015-04-23	6	2015-04-29	11	Vancouver	2660 Wesbrook Mall	namitha	rented	full-size
32	2015-04-15	6	2015-04-23	6	Vancouver	2660 Wesbrook Mall	namitha	rented	luxury
48	2015-04-16	6	2015-04-21	12	Vancouver	2660 Wesbrook Mall	customer	pending	standard
53	2015-04-16	6	2015-04-22	8	Toronto	300 Regina Street	newCustomer	cancelled	premium

Test Passed.