Faculty of Computing, Engineering and the Built Environment

BIRMINGHAM CITY University

Undergraduate Programme Academic Year 2014-2015
Coursework: Team Project

Module:	*CMP2515 Software Design UG2*
School:	**Computing, Telecommunication and Networks**
Module Co-ordinator:	**Professor Zhiming Liu**
Setup Date:	**20/02/2015**
Submission Date:	**21/04/2015**

Team Number: 25

Team Leader: Usman Zakriya

Team Members: Usman Zakriya, Tasawer Hmzah, Qasim Alyas, Mumtahin Islam, Jober Khan

Instruction to Students:

The submission of the final report should contain this cover page with details of the team filled in above.

As part of the project management requirement, each team should have a weekly meeting. A weekly project diary should therefore be maintained to record the attendance of the meetings by team members, together with brief notes about the weekly project tasks allocations and how well individual team members meet the deadlines of their project tasks.

The final report should include the project diary in the appendix.

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Contents

Introduction

This documents consists of the design development for Bvis Car Hire Company (BCHC). This company has expressed an interest in replacing their currently used paper-based system with an innovative computerised system which carries out the same functions as the existing system. As of now BCHC provide a service which allows their clients to hire cars, get these cars serviced when required and then returning the car, when the car has been returned it is recorded. This then creates duplicates if the same car has been hired multiple times and also if the customer has used the system in the past. The new computerized system will allow the company to keep a record of what cars have been hired by and also which cars have are still in the company's fleet, if a car needs to be serviced the customer details will be stored so that if the same customer uses the system repeatedly their details are already stored. This will save time because the customers will not have to keep inputting their details every time they use the service. The employees will also be able to use the computer system to look at profiles of any mechanics they have used and also make sure that they all legalised drivers.

Section 1 - The Initial Requirements Understanding

The nature of the Bvis Car Company & OO Environments

The nature of the Bvis Car Company is that it is currently running on a paper-based system that has to manually perform operations and procedures such as, registering a customer and saving new records to files etc. When a new customer joins the company the staff have to manually register the customer's details via writing and paper, and storing them in a paper-based system, which can be very inefficient and time consuming. When a customer is removed from the company the staff also have to manually remove the customer. All of the concepts within the problem description for the company state that there are staff, customers, cars and mechanics involved within the company's processes. All of which will have designated classes assigned to them within the OO Environment and framework.

As car hires is the main operation performed by the company and which needs to be recorded, each car hire made by a customer needs to be recorded via the staff recording the customer, and car details as well as the estimated return date and the beginning of hire. When the car is returned, the actual return date of the car by the customer and the mileage of the car is recorded. When a mechanic joins the company their details have to be added to the system manually via the staff, and when a mechanic leaves their records must also be deleted. When a car is removed from the company's fleet then that car's details are also removed. It is evident that a lot of information needs to be recorded, and each concept such as car, customer and mechanic needs specific operations and procedures performed on them.

This is why an OO Environment is suitable for this project, as each of the main concepts within the problem domain contain specific attributes and associations affiliated with them, it would be easier for each of them to have their own classes so that each concept can control their own properties.

System Functions

Function No#	Function Name	Function Description
1	New Customer	Registers a new Customer into the company
2	Hire Car	Record that a customer has hired a car from the company
3	Return Car	Record that the customer has returned a car back to the company
4	Calculate Hire rate	Finds the cost of the daily hire for a car depending on the car's daily hire rate
5	Display details	Display information of car hire, and print out a receipt.
6	Log hire	Keeps a log on when the car is hired
7	Record Car Service	Records the service of a car, the date of the service, and the mechanic responsible
8	Remove customer	Removes a customer
9	Add fleet car	Add a car to the company's fleet
10	Remove fleet car	Remove a car from the fleet
11	Add Mechanic	Add Mechanic's details who has just joined the company
12	Remove Mechanic	Delete details of a mechanic who has left the company
13	Check car service	Determine if a car is due a particular service due to the mileage of the car
14	List car hire data	List all information of car hires for a specified car
15	List car service data	List all information of services for a specific car.

Essential Use Cases

Use Case: Register Customer

Actors: Staff (Initiator), Customer

Purpose: Store new customer information

Overview: A customer wants to hire a car from the company, however they first need to register with the company before they can hire a car.

Use Case: Car Hire

Actors: Staff, Customer (Initiator)

Purpose: Record that a customer hired a car

Overview: Customer enters the store, and chooses to hire a car, they select what car they wish to hire and then they leave with the car. Date beginning of hire is recorded, and an estimated return date is recorded also.

Use Case: Car Returned

Actors: Staff, Customer (Initiator)

Purpose: Record that a customer returned a car

Overview: Customer returns the car, and details are altered.

Extended Use Cases

Register Customer

Typical courses of action:

Actor action	System response
1. Customer arrives at cash desk wanting to hire a car	
2. Cashier asks for customer details and records them	3.System receives staff input
	4. System stores new customer registration details
5. Cashier may give their registration details to the customer	6. System displays registration completion
7. Customer leaves with new registration details	

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Car Hire

Typical courses of action

Actor action	System response
1. Customer enters wanting to hire a car	
2. Customer selects car	
3. Cashier checks if customer I already registered	4. System checks for customer registration
5. Cashier checks if customer's car is available for hire	6. System checks car availability
7. Cashier informs customer if the car they want is available	
8. The cashier records the car that has been hired to the system	9. The system records that the car has been hired

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<u>Car Return</u>

Typical courses of action

<u>Actor action</u>	<u>System response</u>
1. Customer returns to the cashier desk asking to return a car	
2. Customer shows registration details	
3. Cashier checks to see if the customer is already registered with the company	4. System checks for customer registration
5. Customer inputs car details to check if the car hired is from the company	6. System checks the car's details
7. Cashier informs customer on car return	
8. Cashier inserts return details onto the system	9. The system records the car's return
10. Customer makes payment	11. System records the customer's transaction of payment
12. Cashier issues customer with receipt	13. The system will record the transaction as well as the particular car that has been returned.

批注 [ZL1]: The my important system operations mission in the last two use cases. They are major use cases, and they should be more informative.
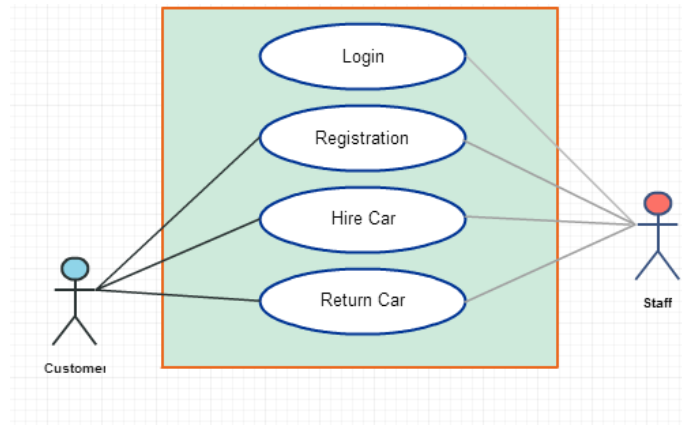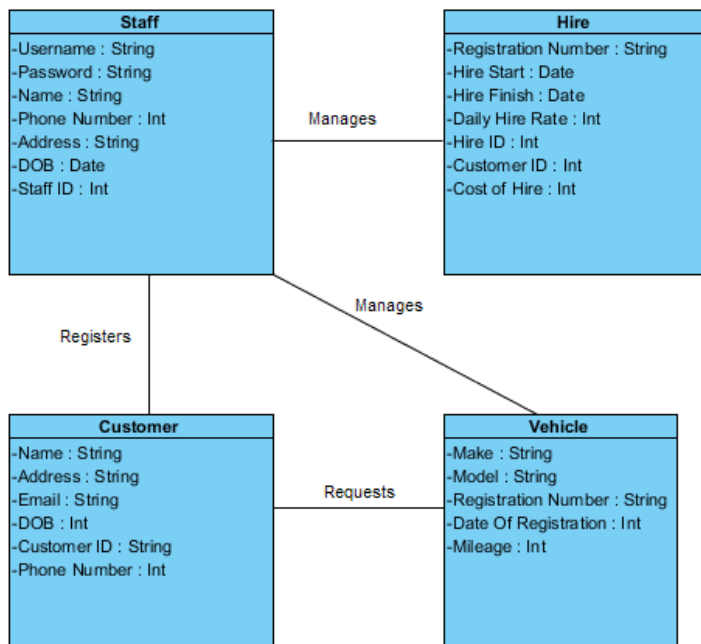
BVIS Car Hire Company Use Case Diagram

Figure 1 – Use Case Diagram

Classes:

Customer

Staff

Conceptual Class Diagram

The Staff table contains a lot of information with a lot of different data types. The data types that would be present within the staff table would include string for names of staff and address of staff. These details would be needed to contact a staff member if management needed to do so. String data type would also be used to store login information for the staff members, this would include a username and a password. The username and password would dictate what permission status each member of staff has, this would limit the amount of data a particular staff member could access as well as change. Each staff member would have a different level of access. The data type "integer" would be used for a staff members contact number and staff ID. The contact number would be used if the staff member needed to be contacted for any reason and the staff ID would be used to give each staff member a unique ID so that they could be differentiated between. The data type "Date" would be used to store the date in a table, the date would be the staff members Date of Birth. The Staff table is linked to the customer table, the vehicle table and the hire table. It is linked to the customer table as the Staff need to enter the details of the customers that are hiring the vehicle into the table. The Staff table is also linked to the Vehicle table as the staff member would need to find a suitable car for the customer and then give the details to the customer to ask them if that particular vehicle is suitable. The staff table is also linked to the Hire table as the staff member needs to enter the details of when the car was hired, who to and for how long.

The Hire table would contain information about the transaction. The staff would need to take details from the person hiring the car so that they can be contacted, and they know who the car is being hired to. The details that would be stored are: Customer ID(int), Reg no (String), hire start date(date), hire finish date(date), daily hire rate(int), hire ID(int), cost of Hire(int). These details would be stored so that staff know when the car left them and when it is due back as well as which vehicle has been rented and how much the customer has paid or has to pay. Having a customer ID allows the staff member to use the details from a previous hire agreement if they have a returning customer. This would save the company time and make the experience swifter for the customer. The hire table is linked to the vehicle table as it holds information of which car is being hired. The hire table is also linked to the customer table as it holds information on who has rented the car.

The vehicle table stores the following information within the table: Make (str), Model (str), Reg No. (str), Date of Registration (Date), and Mileage (Int). The Make and model of the vehicle are string data types as they can contain both letters and numbers, this information shows what the car is. Reg no. is also a string as it contains both letters and numbers. The Reg No. can be used as a shortcut to display the information of a particular vehicle as the Registration numbers are unique to each vehicle. The date of registration is a "date" data type and is used to see how old a particular car is as a company may only wish to keep cars no older than 3 years in there fleet. Mileage is an "integer" data type that is used to check the amount of mileage that the car has covered while under hire, this is used to check that mileage allowances have not been exceeded. This table is linked to the staff table as they need to access information from it on a regular basis and it is also linked to the hire table as the vehicle details are present in the hire agreement.

The Customer table contains the following information: Name (str), Address (str), Email (str), DOB (Date), Customer ID (int) and Contact Number (int). The Name, Address and Email are all strings because they can all contain a mix of letters and numbers. The name and address would be used to find or check who the car has been hired to. The Email may be used to contact a customer or to send them offers or updates from the hire company. The DoB is a "date" data type and would be used to check if the particular customer is old enough to hire a car from the company. Customer ID which is an "integer" data type is used to save time, it can be used to access stored details of customers who have hired from the company before. The Contact number can be used to contact the customer for

any reason. The Customer table is linked to the staff table as the staff may have to access the customer's details. The Customer table is also linked to the Hire table as the customer details are also present within the hire agreement.

> 批注 [ZL2]: The conceptual class diagram is not informative enough, missing important classes and associations

Section 2. Functionality Analysis of System Operations

System Sequence Diagrams

The following diagrams are used to represent how actors relate to the system and to other actors.
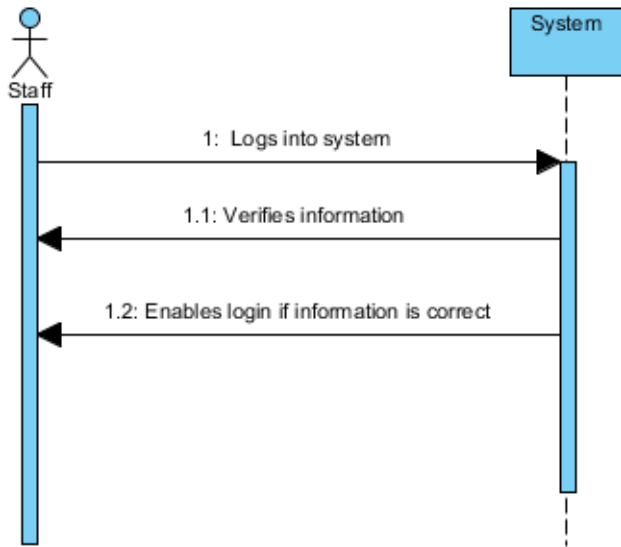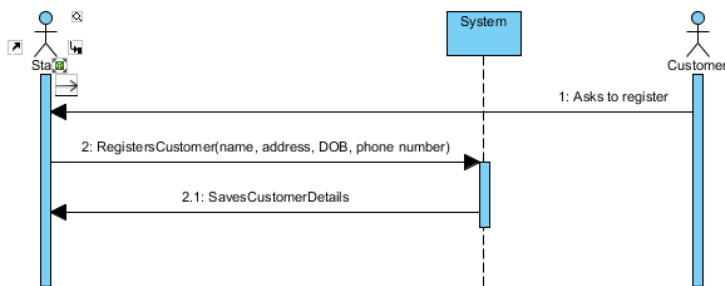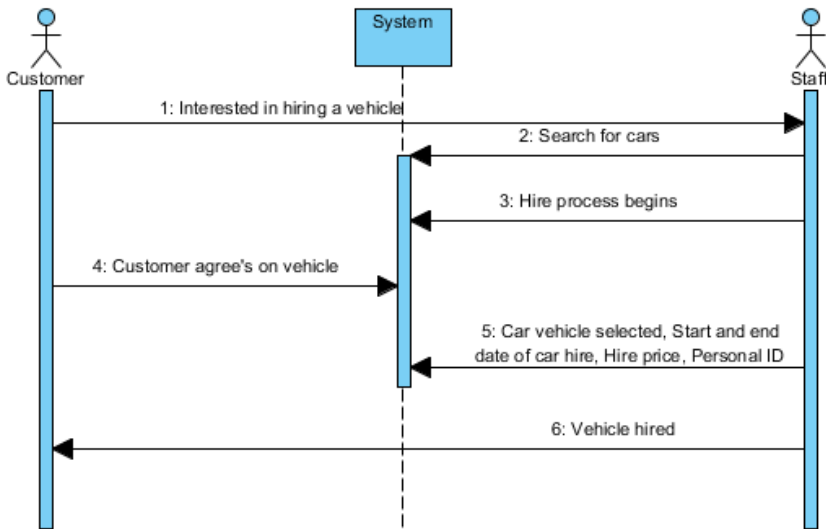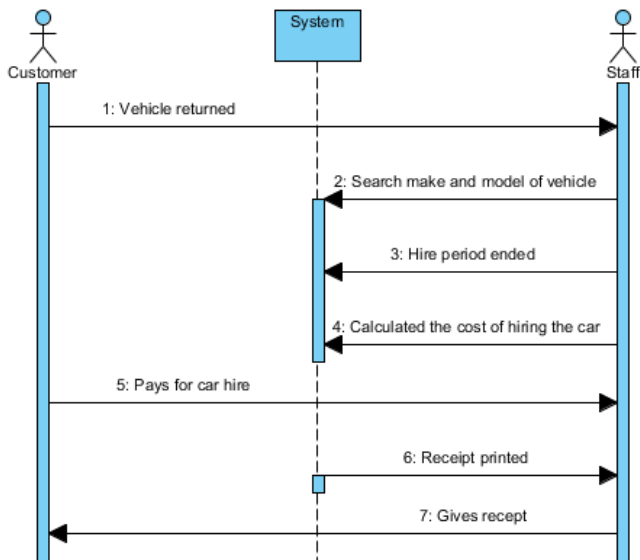

Figure 1

Figure 2

Figure 3

Figure 4

Contracts

Contract	Staff Login
Name	Login (username: String, password: String, phone number: Integer staff id: Integer)
Responsibilities	Allows existing users to login to hire company website.
Type	System
Note	Allows staff to login to individual accounts into the company.
Exceptions	If login fails, employee can access the system
Output	Employee successfully logs into system
Pre-Conditions	-
Post-Conditions	-

Contract	Register Customer
Name	Register customer(name: String, Address: String, DOB: Date, Customer ID: Integer, Email: String
Responsibilities	Register to hire company and request vehicle.
Type	System
Note	Allows customer to register to Bvis car hire company to be able to access available vehicles for hire
Exceptions	If Customer details are false, they will not be registered to the company
Output	Customer registers successfully
Pre-Conditions	Proof of ID
Post-Conditions	-

Contract	Car Hire
Name	Hire Vehicle (Registration Number: String, Hire Start: Date, Hire Finish: Date, Daily Hire Rate: Integer, Cost of Hire: Integer.
Responsibilities	Allows customer to hire out a vehicle.
Type	System
Note	Allows staff to hire multiple cars to various customers.
Exceptions	Due to age of customer and experience, customers may not be eligible to hire out certain cars or no cars at all
Output	Customer successfully hires out vehicle
Pre-Conditions	Driving License, experience and also Deposit for vehicle.
Post-Conditions	

Contract	Return Car
Name	Return Vehicle (Registration Number: String, Hire Start: Date, Hire Finish: Date, Daily Hire Rate: Integer, Hire ID: Integer, Customer ID: Integer, Cost Of Hire: Integer.
Responsibilities	Thorough check of vehicle if damages have been done, deposit to be given back to customer if no damages are present and also updating system that car is returned and available to be re-hired.
Type	System
Note	-
Exceptions	If vehicle is damaged deposit will not be returned to customer instead it will be given to mechanic for repairs.
Output	Customer returns vehicle in the condition it was supplied to them for hire.
Pre-Conditions	Vehicle is immaculate to present to customer.
Post-Conditions	No damage is made to the car so deposit is returned to customer.

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Project Diary

Date	Location	Who Attended	Points of Discussion
12/02/15	Room 158	Usman Zakriya Tasawer Hmzah Qasim Alyas Jober Khan Mumtahin Islam	Giving each members their roles in the task.
19/02/15	Room 158	Usman Zakriya Tasawer Hmzah Qasim Alyas Jober Khan Mumtahin Islam	Seeing how everyone is coping with the task that is given.
24/02/15	Student Union	Usman Zakriya Tasawer Hmzah Qasim Alyas Jober Khan Mumtahin Islam	Reviewing each other's work that has been done so far. Practise how to use Visual Paradigm as a group.
01/03/15	Student Union	Usman Zakriya Tasawer Hmzah Qasim Alyas Jober Khan Mumtahin Islam	Deciding what use cases to use.
11/03/15	Room 252	Usman Zakriya Tasawer Hmzah Qasim Alyas Jober Khan Mumtahin Islam	Seeing how everyone's coming along with the task given.
18/03/15	Room 252	Usman Zakriya Tasawer Hmzah Qasim Alyas Jober Khan Mumtahin Islam	Reviewing work done by group so far.
20/04/15	Room 252	Usman Zakriya Tasawer Hmzah Qasim Alyas Jober Khan Mumtahin Islam	Finishing all the work and putting together report.