

# Design specification

Client: Hire\_From\_Us

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## Introduction

This is a design specification for Hire\_From\_Us. This document's purpose is to provide a design framework to build a software solution for a car hiring system.

This is a server / client combination system that allows users to easily carry out all the data collection from the customer and securely store the data on the database. The system will keep track of cars that are available to rent and the price to rent them out.

The software solution will add the capability to analyse sales data and calculate sales assistants commission. It is designed to run on the provided windows workstation and use the installed java runtime environment.

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## User Interface design

### Familiarity for user

The graphical user interface should closely mimic the look and feel of the existing paper based system. This can be achieved through laying out the input fields in the same order as they appear on the paper based system.

The sales staff at Hire\_From\_Us are familiar with conventional user input. Using traditional forms of input like text fields and comboboxes. Will require no additional training on how to use them.

### Consistency and standards

Button and other gui elements, should have a consistent look and feel over the entire application. The actions should also be consistent, if the user presses a button they expect it to do the same thing every time.

### Error prevention

Measures to prevent user error should be in place within the graphical user interface. Combo boxes with preset values will be used where possible. Check boxes can be used for yes or no inputs.

Users will be prevented from proceeding to the next section of the data entry process if required fields are left empty.

### Error Reporting

Feedback in the form of error messages with a short description of the error should be given to the end user. For example if the user has missed a field the system should prompt them with a message telling them what field is empty, or if they

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have incorrectly entered their password the system should tell them that they have entered the wrong password.

### **Data validation**

Data validation is the process of checking that input data (usually from the end user) exists and is usable. The validation process involves checking the input data against a set of predefined rules.

There are several types of data validation such as:

Format check: Ensures that the data is in the expected format.

Length check: Ensures that the data is not too short or too long.

Presence check: Ensures that data is actually entered.

Range check: Ensures that the data falls within a specified range.

Type check: Ensures that the data entered is the correct data type.

One of the main reasons software engineers implement data validation is to help reduce human error. Highlighting the mistake and providing useful feedback to the user is a vital part of the validation process.

Input validation can also be used to prevent malicious attacks on the system, preventing attackers from entering data that could potentially cause damage.

It is good practice to perform data validation as early in the process as is possible. Preferably as soon as it is entered. All data from untrusted sources should be subject to some form of data validation.

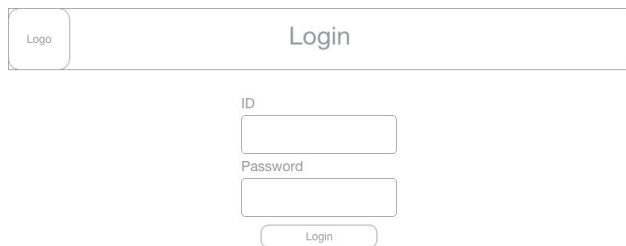
### **Diagrams of proposed screens**

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### Login Screen:

This will be the first screen visible to the end user and the first point of interaction. This screen will allow authorized username and password combinations to proceed to the rest of the application.

It will have feedback to the user when invalid details are provided.



A wireframe of a login screen. At the top, there is a horizontal bar with a rounded rectangle on the left labeled 'Logo' and a larger rectangle on the right labeled 'Login'. Below this bar, the text 'ID' is positioned above a rectangular input field. Below the 'ID' field, the text 'Password' is positioned above another rectangular input field. At the bottom, there is a rounded rectangular button labeled 'Login'.

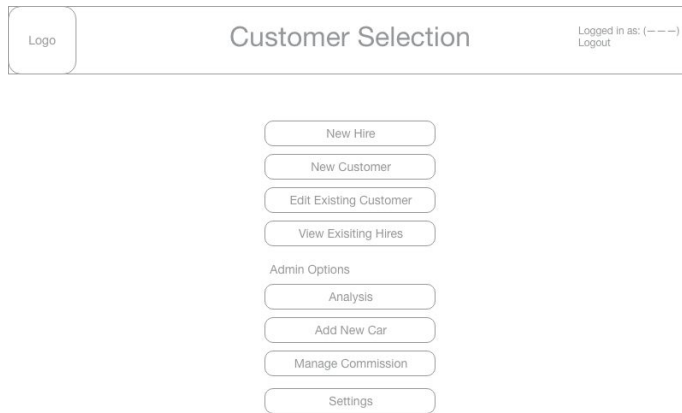
### Main menu screen:

This screen will present the user with a choice of tasks they would like to start. From here the sales assistant can:

- Start a new hire.
- Create a new customer.
- Edit existing customers.
- View existing hires.

Accounts with higher permission levels will see these additional options:

- View sales analysis data.
- Add a new car to the database.
- Manage sales assistants commission.
- Adjust application and organizational settings.



### Customer selection screen:

Once the user has clicked the “New hire” button they will start the process of creating an new hire order. The customer selection screen is the first screen in this process.

This screen will be used to select the customer that is hiring the car. The screen will consist of search field on the left and a table displaying the resulting customers on the right.

At the bottom of the page there will be a next and back navigation system to move the user backwards and forwards through the process. The user will be prevented from going forward in the process until a customer has been selected.



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Logo

Customer Selection

Logged in as: (---)  
Logout

Search Existing Customers

Name

Search

Search

Add New Customer

ID	Name	DOB	Phone Number	Address	Licence Number

Back

Next

### Date selection screen:

The next step in the process is the date selection screen. From here the user will be able to select the date that the hire started and the date that the hire will end.

### Available cars screen:

Next step is to select what car the customer would like to hire. To aid with car selection a filter will be provided on the left hand side. The user can filter the results based on several factors, like if the customer needs a gps fitted to the car the user can click the checkbox and the system will only display cars with gps fitted. Several of these filter options will be available like: model, make and number of seats.

The user will also have the ability to search for specific licence plate numbers.

Logo

Available Cars

Logged in as: (---)  
Logout

Search Licence Plate Number	Licence Number	Make	Model	Type	Seats	GPS	Rate
<input type="text"/> <input type="button" value="Search"/>							

Filter

Make

Model

Type

Seats

☐ Has GPS

Group

-

Back

Next

## Rental Agreement screen:

The last screen in the create new hire process is the rental agreement screen. This screen will consist of a scrollable text area displaying the generated invoice for review by the sales assistant.

Logo

Rental Agreement

Logged in as: (---)  
Logout

Section 3.1 - Agreement details

Only the persons that are listed on this Car Rental Agreement and above the age of twenty-one may drive this vehicle. The above mentioned Car Rental is hereby responsible for all collision damage to the vehicle regardless if someone else is at fault or the cause is not known. The Car Rental is fully responsible for the cost of any repair up to the value of the vehicle. The Car Rental's insurance may cover all or only part of the financial liability for the rented vehicle. Car Rental should check with their insurance company regarding their coverage and what they are and are not liable for. If there is no breach of this contract the Car Rental and any authorized driver is provided liability insurance and is limited to the minimum financial responsibility as required by state law. Liability insurance will only be in excess over any and all additional collectible insurance. The above mentioned Car Rental hereby waives all uninsured and underinsured motorists, no fault and any other optional additional coverage. If such additional coverage cannot be waived or excluded then the Car Rental agrees that such coverage will be limited to only the minimum state requirements.

The Car Rental is hereby bound by the terms and conditions of this Car Rental Agreement. The vehicle must be returned to the same location in which it was picked up for rental and on or before the above indicated due back date and time. There will be additional fees due if the vehicle is not returned as specified above. When it is permitted by law the Car Rental hereby authorizes us to process their credit card information in their name for all Car Rental charges, including the full vehicle value of any vehicle that is not returned to the Car Rental Company, all fines, towing, any court costs, penalties, and/or administrative fees that we may incur for parking, traffic and/or other violations that may be incurred by the Car Rental during the Car Rental term period as stated above and to apply any payments made to the charges in whatever order that the Car Rental Company sees as necessary. By signing below Car Rental is also signing their Car Rental credit card voucher.

The individual mentioned above in this Car Rental Contract hereby agrees to fill the fuel tank at the above indicated level upon returning the car. Failure to fill the tank at the prescribed level will result in an additional penalty charge of \$20.00 per quarter tank of fuel.

It is the Car Rental's responsibility for all lost car keys and / or a lockout situation.

Section 3.2 - Sign off

Back

Print

Logo

Rental Agreement

Logged in as: (---)  
Logout

Section 3.1 - Agreement details

Only the persons that are listed on this Car Rental Agreement and above the age of twenty-one may drive this vehicle. The above mentioned Car Rental is hereby responsible for all collision damage to the vehicle regardless if someone else is at fault or the cause is not known. The Car Rental is fully responsible for the cost of any repair up to the value of the vehicle. The Car Rental's insurance may cover all or only part of the financial liability for the rented vehicle. Car Rental should check with their insurance company regarding their coverage and what they are and are not liable for. If there is no breach of this contract the Car Rental and any authorized driver is provided liability insurance and is limited to the minimum financial responsibility as required by state law. Liability insurance will only be in excess over any and all additional collectible insurance. The above mentioned Car Rental hereby waives all uninsured and underinsured motorists, no fault and any other optional additional coverage. If such additional coverage cannot be waived or excluded then the Car Rental agrees that such coverage will be limited to only the minimum state requirements.

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It is the Car Rental's responsibility for all lost car keys and / or a lockout situation.

Section 3.2 - Sign off

Back

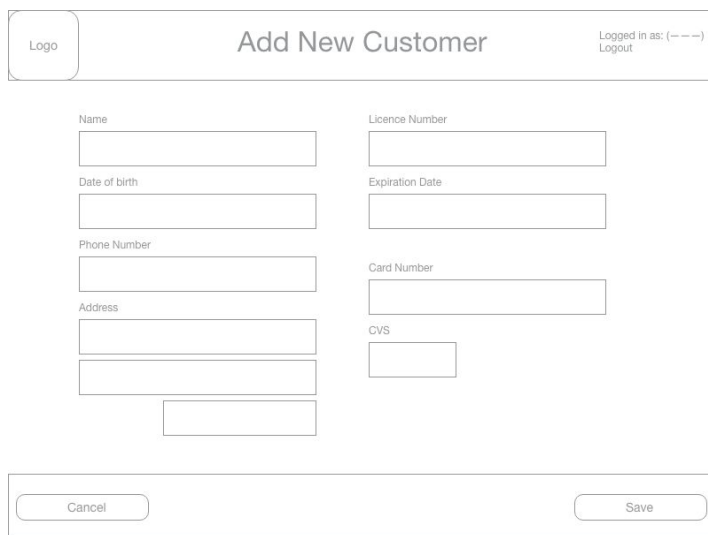
Print

## Add new customer screen:

This screen will be accessible from the main menu or from the customer selection screen.

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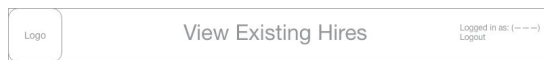
From this screen the user can enter all of the necessary customer details into the input fields. Once they have completed the data entry they can press save, the system will then check the validity of the data and check to see if any fields have been missed. If there is anything wrong with the data the system will provide feedback to the user in the form of an error message. Once the system is happy that all the necessary data is present and valid it will save the new customer to the database.



The form is titled "Add New Customer" and is located within a header bar. The header bar also contains a "Logo" placeholder on the left and a user status area on the right that says "Logged in as: (---) Logout". The form itself is divided into two columns. The left column contains fields for "Name", "Date of birth", "Phone Number", and "Address" (which is a multi-line text area). The right column contains fields for "Licence Number", "Expiration Date", "Card Number", and "CVS". At the bottom of the form, there are two buttons: "Cancel" on the left and "Save" on the right.

#### View existing hire screen:

This screen is accessible through the main menu screen. From here the user can view edit and delete existing hires.



### Manage cars screen:

This screen is only available to accounts with management permission levels and is accessible through the “manage cars” button on the main menu.

From this screen the user will be able to manage the details about the fleet of rental cars. They will have the ability to update car details and delete cars from the database.

### Add new car screen:

This screen is only available to accounts with management permission levels and is accessible through the “add new car” button on the car management screen.

From this screen the user can enter details about new cars.

---

Logo

Add New Car

Logged in as: (---)  
Logout

Licence Plate Number

Rate

Make

Model

Type

Saloon

☐ Has GPS

Cancel

Save

### Sales analysis screen:

This screen is only available to accounts with management permission levels and is accessible through the “analysis” button only visible to management accounts on the main menu.

Logo

Analysis

Logged in as: (---)  
Logout

### Settings screen:

This screen is only available to accounts with management permission levels and is accessible through the “settings” button only visible to management accounts on the main menu.



#### Manage users screen:

This screen is only available to accounts with management permission levels and is accessible through the “manage users” button only visible to management accounts on the settings screen.

From this screen user management functions can be performed. The manager can update user details and delete users.

#### Add new user screen:

This screen is only available to accounts with management permission levels and is accessible through the “add new user” button only visible to management accounts on the manage users screen.

From this screen the management can add new users to the system setting their username and password for their login and also setting the permission level of the account.

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# System Design

## Structure and relationships

### Server Application

- Implemented in Java
- Uses SQL statements to perform operations on the database.

### Client Application

- Implemented in Java.
- Sales team interact with the client application only.
- The client application is used to send SQL queries to the server

### Hardware platform

This project will require a central server connected to a local area network. The server will be running an SQL database implemented and run by netbeans.

The server will be locked inside a secure case that only the management staff have access to.

The case will be well ventilated and stored in a secure part of the building. The server will be connected to a network switch by cat 5 cables. The switch will also be used to connect to the workstations.

The workstations will be basic machines built to meet microsoft windows 10 minimum specification, so that they can run the windows 10 operating system.

Each workstation will need to be supplied with a mouse and keyboard for input and a screen to display the applications graphical user interface.

A networked printer that has also been connected to the switch using cat 5 cables is also required to print the invoices.

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## Application platform

The client workstations will have windows 10 operating system installed on them as well as java runtime environment.

The server will have netbeans installed to run and manage the SQL database.

## Development

For this project java is the chosen language and netbeans is the integrated development environment.

The code will be written using a combination of event driven and object oriented programming paradigms. This so that classes can be easily modified later and reused if any enhancements to the software is needed.

## Processes

- Create, read, delete and update customer data
- Create, read, delete and update user data
- Create , read, delete and update rental car data
- Populate the required information on the rental agreement from the database.
- Calculate the commission to pay each sales assistant.
- Calculate the total cost of rental over a given period
- Add up the profits from the monthly sales to be displayed as sales data.

## Algorithms

SQL statements will be used to interrogate the database. Getting back the desired results from the database will involve using the “SELECT” and “WHERE” clauses.



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The algorithm for calculating the total rental price is:  $(\text{rental rate} * \text{rental duration}) + \text{insurance cost}$

algorithm for calculating the commission is:  $\text{total rental price} * 0.05$

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# Database Design

## Tables

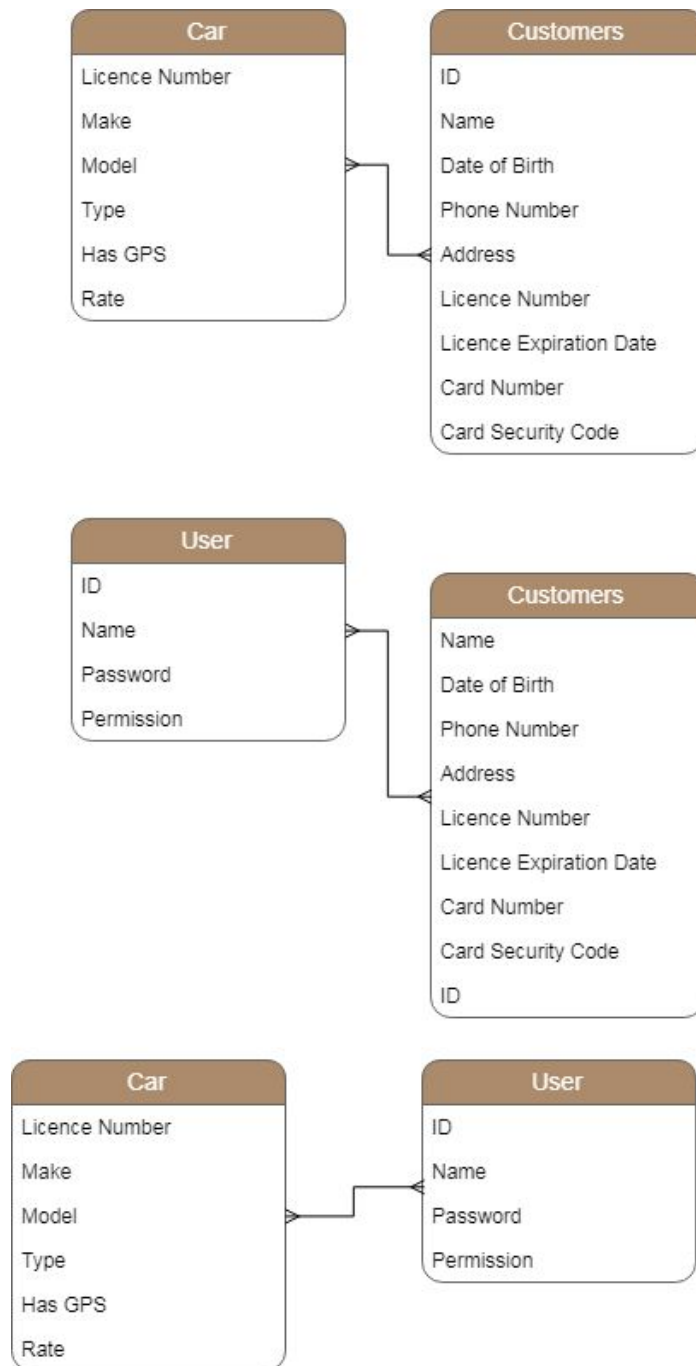
Car
Licence Number
Make
Model
Type
Has GPS
Rate

User
ID
Name
Password
Permission

Customers
ID
Name
Date of Birth
Phone Number
Address
Licence Number
Licence Expiration Date
Card Number
Card Security Code

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## NF2



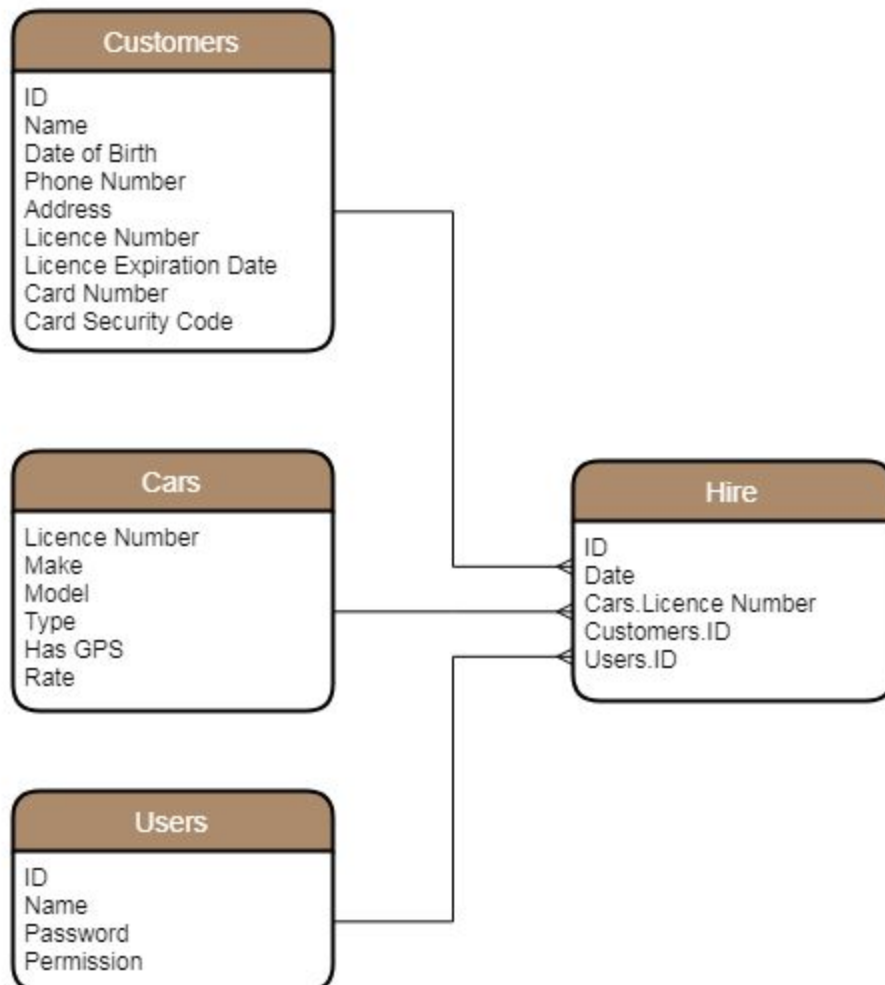
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## NF3

# Entity Relation Diagram

Project: Car rental system

Client: Hire\_From\_Us Date: 26/02/2018



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## SQL statements

Create Tables SQL:

```
CREATE TABLE `Customers` (  
    `ID` INT(8) NOT NULL AUTO_INCREMENT,  
    `Name` VARCHAR(64) NOT NULL,  
    `Date of Birth` DATE NOT NULL,  
    `Phone Number` INT(32) NOT NULL,  
    `Address` VARCHAR(256) NOT NULL,  
    `Licence Number` VARCHAR(128) NOT NULL,  
    `Licence Expiration Date` DATE(128) NOT NULL,  
    `Card Number` INT(32) NOT NULL,  
    `Card Security Code` INT(8) NOT NULL,  
    PRIMARY KEY (`ID`)  
);  
  
CREATE TABLE `Cars` (  
    `Licence Number` VARCHAR(16) NOT NULL,  
    `Make` VARCHAR(64) NOT NULL,  
    `Model` VARCHAR(64) NOT NULL,  
    `Type` VARCHAR(64) NOT NULL,  
    `Has GPS` BOOLEAN(1) NOT NULL,  
    `Rate` DECIMAL(32) NOT NULL,  
    PRIMARY KEY (`Licence Number`)  
);  
  
CREATE TABLE `Users` (  
    `ID` INT(16) NOT NULL AUTO_INCREMENT,  
    `Name` VARCHAR(64) NOT NULL,  
    `Password` VARCHAR(8) NOT NULL,  
    `Permission` INT(8) NOT NULL,  
    PRIMARY KEY (`ID`)
```

```
);

CREATE TABLE `Hire` (
  `ID` INT(16) NOT NULL AUTO_INCREMENT,
  `Start Date` DATE NOT NULL,
  `End Date` DATE NOT NULL,
  `Licence Number` INT(16) NOT NULL,
  `Customer ID` INT(16) NOT NULL,
  `User ID` INT(16) NOT NULL,
  PRIMARY KEY (`ID`)
);

ALTER TABLE `Hire` ADD CONSTRAINT `Hire_fk0` FOREIGN KEY
(`Licence Number`) REFERENCES `Cars`(`Licence Number`);

ALTER TABLE `Hire` ADD CONSTRAINT `Hire_fk1` FOREIGN KEY
(`Customer ID`) REFERENCES `Customers`(`ID`);

ALTER TABLE `Hire` ADD CONSTRAINT `Hire_fk2` FOREIGN KEY (`User
ID`) REFERENCES `Users`(`ID`);
```

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## Appendix

<https://www.draw.io/>

<http://markup.su/highlighter/>