SPU الجامعة السورية الخاصة
SYRIAN PRIVATE UNIVERSITY

Syrian Private University
Faculty of Informatics & Computer Engineering

Service System to provide taxi service to clients
And
Taxi Company’s Automation System.

Senior Project Presented to the Faculty of Computer and Informatics Engineering
In Partial Fulfillment of the Requirements for the Degree of Bachelor of Engineering
In Software & Information Systems.

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الإهداء

بسم الله الرحمن الرحيم

﴿ ن ۚ وَالْقَلَمِ وَمَا يَسْطُرُونَ ﴾ [ن: 1]

﴿ وَفَوْقَ كُلِّ ذِي عِلْمٍ عَلِيمٌ ﴾ [يوسف: 76]

﴿ يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ ﴾ [المجادلة: 11]

صدق الله العظيم

إلهي لا يطيب الليل إلا بشكرك ولا يطيب النهار إلى بطاعتك ولا تطيب اللحظات إلا بذكرك ولا تطيب الآخرة إلا بعفوك ولا تطيب الجنة إلا برؤيتك

(الله جلّ جلاله)

إلى من بلغ الرسالة وأدّى الأمانة ونصح الأمة إلى نبي الرحمة

(سيدنا محمد صلى الله عليه وسلم)

إلى من علمني العطاء بدون انتظار إلى من حصد الأشواك عن دربي ليمهد لي طريق العلم إلى من أحمل أسمه بكل افتخار أرجو من الله أن يمد في عمره ليرى ثماراً قد حان قطافها بعد طول انتظار وستبقى كلماته نجوم أهتدي بها اليوم وفي الغد وإلى الأبد

(أبي)

إلى من أرضعتني الحب والحنان إلى رمز الحب وبلسم الشفاء إلى القلب الناصع بالبياض إلى من كان دعاؤها سر نجاحي وحنانها بلسم جراحي

(أمي)

إلى رفاق دربي وهذه الحياة دونكم أنا لا شيء ومعكم أكون أنا ودونكم أكون مثل أي شيء إلى توائم روحي إلى من رافقني منذ أن حملنا حقائب صغيرة ومعكم سرت الدرب خطوة بخطوة وما تزالوا ترافقوني حتى الآن بمحبتكم أزهرت أيامي وتفتحت براعم للغد

(أخوتي)

إلى الأخوة الذين لم تلدهن أمي إلى من تحلّو بالإخاء وتميزوا بالوفاء والعطاء إلى من معهم سعدت وبرفقتهم في دروب الحياة الحلوة والحزينة سرت إلى من كانوا معي على طريق النجاح والخير إلى من عرفت كيف أجدهم وعلموني ألا أضيعهم

(أصدقائي)

أما الشكر الذي من النوع الخاص أيضا إلى كل من لم يقف إلى جانبنا ووقف في طرقنا وعرقل مسيرتنا وزرع الشوك في طريقنا فلولاهم لما شحذت النفوس بالأصرار والتصميم ولما وصلنا إلى ما وصلنا إليه فلهم منا كل الشكر......

شكر

شكرنا وتقديرنا إلى من علمنا التفاؤل والمضي إلى الأمام إلى أستاذنا المشرف الدكتور باسم قصيبة لإشرافه على إنجاز المشروع وملاحظاته القيمة على مدى العمل في المشروع كما أننا لن نسسا فضل ما قدم لنا من العلم سواء كان أكاديمي أو عمليا وكيف عاملنا كأبناء وأخوة وأصدقاء له.

ونقول له بشراك قول رسول الله صلى الله عليه وسلم:

"إن الحوت في البحر ، والطير في السماء ، ليصلون على معلّم الناس الخير"

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Chapter Table Page

Abstract

The project is about the management of a taxi company that delivers transportation services for clients.

The project is divided into three main components:

The first one: A website for company management:

It organizes business in between company employees. Using it, website user can for example add drivers, cars into the company system, modify the data of them, and assign a certain driver to a car we choose.

The second one: The Client Application:

It depends mainly on GPS (Global Positioning System). The client can order a taxi depending on his position and he should receive detailed information about the money cost, time duration with the choice of accepting or declining. If the client accepts, he would receive information about the car, driver, and their location on the map.

The third one: The Driver Application:

It also depends on GPS. At first, the driver must login to the app so the company can tell that he is active. After that, he should receive the client's location, looked-for destination and the estimated cost. After delivering the client, he changes back his status from busy to active. At the end of the day, the driver must log out of the app so the company can know he is inactive.

Finally: in this report, we cover the analytical side of project and the Techniques that used to create this project.

Introduction

The Problem:

The city of Damascus being the capital and the center of life in the country has long faced a traffic and transportation obstacles.

Each year the population increases massively and people are finding it much harder to transport within the city and move from one place to another.

Add to that the increase in size of the city and its expansion. People are in much need for a fast reliable method for transport, which is mainly the taxi.

Taxis in Damascus are another story. People may have to wait a very long time up to hours while finding the right taxi that delivers them to their desired destination.

Also Damascus has a very difficult weather. It is very hot in the summer, chilling cold and windy in the winter. Therefore, people are more and more preferring taxis to walking in the burning sun or under the pouring rain.

Taxi companies are still way behind providing the best service for customers and have a lot of issues from delays to wrong addresses to inaccurate fares.

Children, college students, teachers, government clerks, tourists, they all need an improvement in the field of transport.

The Solution:

Technology nowadays provides the answer for almost everything in life. The most important aspect is that technology is available within the hands of everyone in society from kids in school to professors in university to average people on the street. Mobile phones are the main form of technology that is well known for people especially the android powered ones.

The idea is to create a system that controls and organizes the work of taxi companies in order to provide the best available service for clients.

There is a system for the company, which is the cornerstone of the project, an android application for the driver and an android application for the client, which the essential part that average people can use easily.

Here comes the interaction between technology and people's lives.

Clients can now using their android powered mobile devices with one click order a taxi to come to their location with details about the cost, time duration and even the driver. The privilege of having the global positioning system technology gives us the most accurate location. All that just with a simple click which can make the transport within the city much easier and using the newest technology.

The Service therefore can reach most people in the city because everyone basically carries an android device making it a perfect solution for clients looking for a fast method for transport.

Opinion:

Our job as software engineers is to find solutions for society problems using the technology we learn and knowledge we receive in college.

The integration of technology especially the mobile devices into people's problems can be the golden standard solution for many issues in society.

The most important part of our project is that for the client the matter is not complicated and very simple and easy to use.

Our project provides a very simple method that basically everyone can use and hopefully it will ease the difficulty of transport in the big city and the concept of it can be applied into other fields of problems that society faces and finding the ideal solution for them.

Chapter 1: Similar project.

Among similar applications for our project:

1.1 CURB: [1]

Curb is here! Prior to curb, we were Taxi Magic, the #1 taxi app in the United States.

Curb connects you to professional, fully insured taxi and for-hire drivers in 60 cities in use. With 35,000 vehicles on the network, a driver is always nearby.

- ➢ Request a ride in seconds. Get picked up in minutes.
- ➢ Connect with nearby licensed, fully insured drivers to experience the safest ride on the road.
- ➢ Track your ride on the map as it arrives to you.
- ➢ Pay your fare using the Curb app, or pay with cash.
- ➢ Receive an email receipt when you pay through the app.
- ➢ Rate your ride - your feedback makes us better!
- ➢ Invite friends to earn free Curb rides.
- ➢ Book your next taxi or black car ride with Curb

1.2 Easy Taxi: [1]

Allows you to easily book a taxi and track it in real time, with just a tap of a button. Loved by 17million+ users and present in over 33 countries and 170 cities, Easy Taxi has redefined taxi booking globally.

Features:

- **Fast & Easy:** Find taxis easily with a push of the button and do not be late anymore
- **Safe:** thoroughly screen and train each driver to ensure that only those with clear history and best skills become our partners. Our cab app allows you to see driver's identity and car. Lost an item? Track your taxi on the go and never worry about safety anymore!
- **Free:** Easy Taxi is free to download and the taximeter only starts running upon boarding. No extra charges when you book a taxi* and the tip is absolutely voluntary
- **Excellent service:** The support team will contact your taxi driver to ensure timely arrival. Should any disruption occur rest assured we do not leave you on your own. No more bargaining and callouts!

In addition more Depending on location, you can request an airport taxi or enlarged luggage. The in-app taxi pay system provides safe mobile payments through credit card or PayPal. So, why wait, request your online taxi now, get your friends together and fancy a night out.

How to use:

- Wait for the app to automatically locate your address using GPS
- Confirm your location and tap "Request taxi"
- Watch how Easy Taxi assigns a nearby driver. Follow him on the map
- You will be prompted to create a new account when you book taxi.
- The app requires good GPS reception and Internet connection.
- The lack of accuracy in determining the location may be an error from Google API, Waze or Foursquare.

Locations:

You can hail a taxi with the app in the following places:

- ✓ **Argentina:** Buenos Aires, Cordoba, Rosario,
- ✓ **Bolivia:** Santa Cruz
- ✓ **Brazil:** São Paulo, Rio de Janeiro, Porto Alegre, Recife, Belo Horizonte, Brasília, Curitiba, and 26 more cities
- ✓ **Chile:** Santiago, Iquique

- ✓ **Colombia:** Barranquilla, Bogotá, Bucaramanga, Cali, Cartagena, Cúcuta, Ibagué, Manizales, Medellín, Pereira, Santa Marta, Villavicencio
- ✓ **Ecuador:** Quito, Guayaquil
- ✓ **Egypt:** Cairo
- ✓ **Ghana:** Accra
- ✓ **Malaysia:** Kuala Lumpur, Johor Bahru, Penang, Kuching
- ✓ **Mexico:** Mexico City, Puebla, Querétaro, León, Monterrey, Cancún, Guadalajara
- ✓ **Nigeria:** Lagos, Abuja
- ✓ **Panama:** Panama City
- ✓ **Peru:** Lima, Arequipa, Cusco, Trujillo, Piura, Chiclayo
- ✓ Philippines: Manila, Cebu City
- ✓ **Qatar:** Doha
- ✓ **Saudi Arabia:** Jeddah, Riyadh
- ✓ **Singapore:** Singapore
- ✓ **South Korea:** Kwangju, Seoul, Yeosu
- ✓ **Thailand:** Bangkok
- ✓ **Uruguay:** Montevideo
- ✓ **Venezuela:** Caracas
- ✓ **Vietnam:** Hanoi

➢ Awards & Recognition:

The Easy Taxi application won multiple awards as a pioneer in taxi call service in Latin America. This includes Startup Weekend RIO, IBM Smart Camp Brazil, Startup Farm RIO, and TNW Awards.

As a leader among the taxi apps, it has been featured under top transportation apps, utilities apps, and travel apps.

1.3 UBER: [1]

Uber is private driver in more than 50 countries.

- Request a ride using the Uber app and get picked up within minutes. On-demand service means no reservations required and no waiting in taxi lines.
- Pay with Google Wallet or PayPal, or add a credit card to your secure Uber account so you never need cash on hand.
- Easily set your pickup location on the map, even if you do not know the exact address.
- Get connected to your personal driver and check the progress of your Uber at any time.
- Sit back, relax, and go anywhere you want. Will email you a receipt when you arrive at your destination.
- An entirely new and modern way to travel is at your fingertips.

Chapter 2: Project Analysis and Design

In this chapter, we explain the use-cases and databases that we use.

2.1Diagrams:

2.1.1 Usecase Diagrams : And in the range of use-cases, we explain the parts of actors (Admin and Manager) and (Clint, Driver and system) and this Figures (2-1) and (2-2) will explain that:

- **Website usecase diagram :** Shown below in Figure 2-1

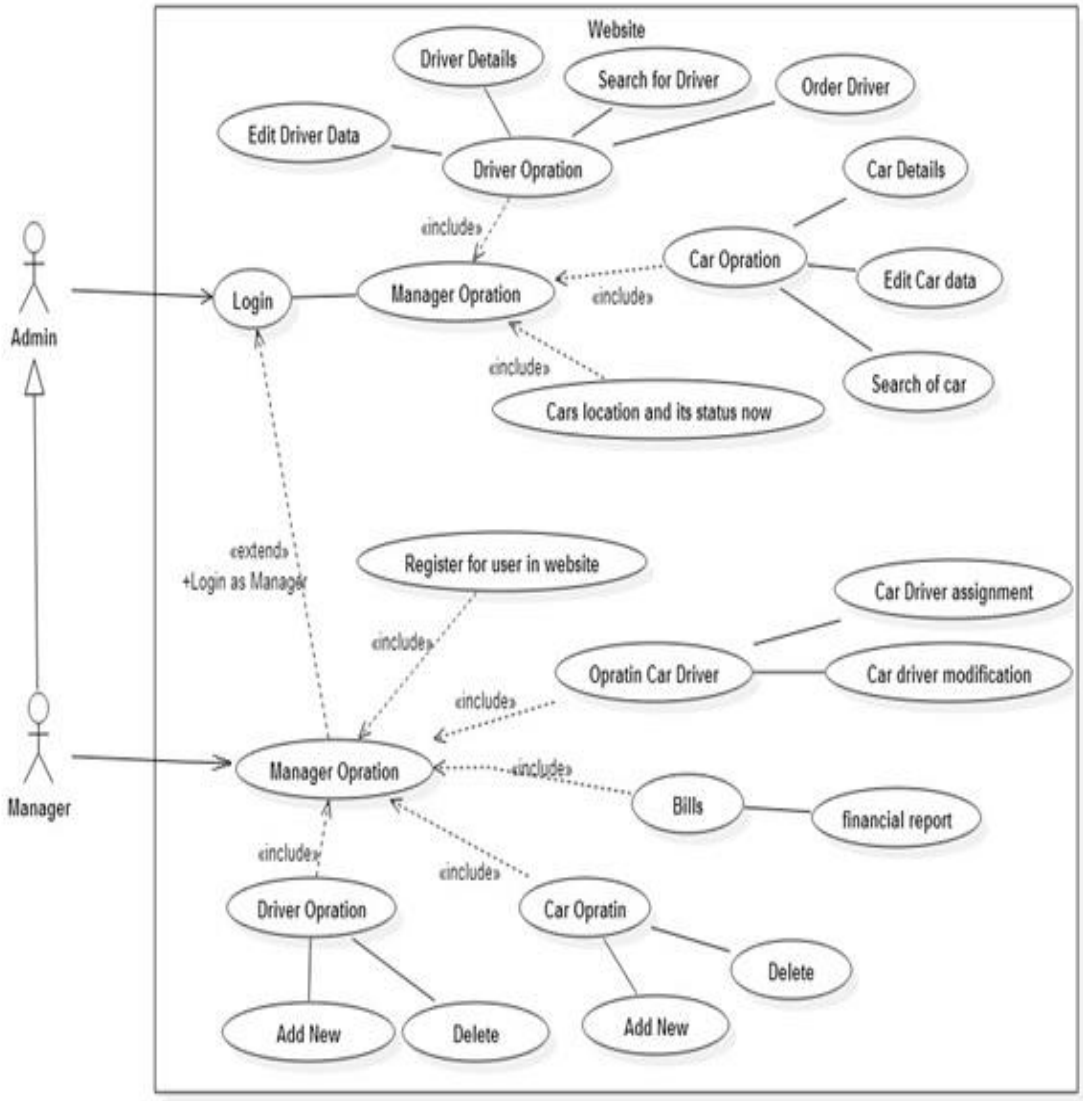


Figure 2-1

- **Service usecase diagram :** Shown below in Figure 2-2

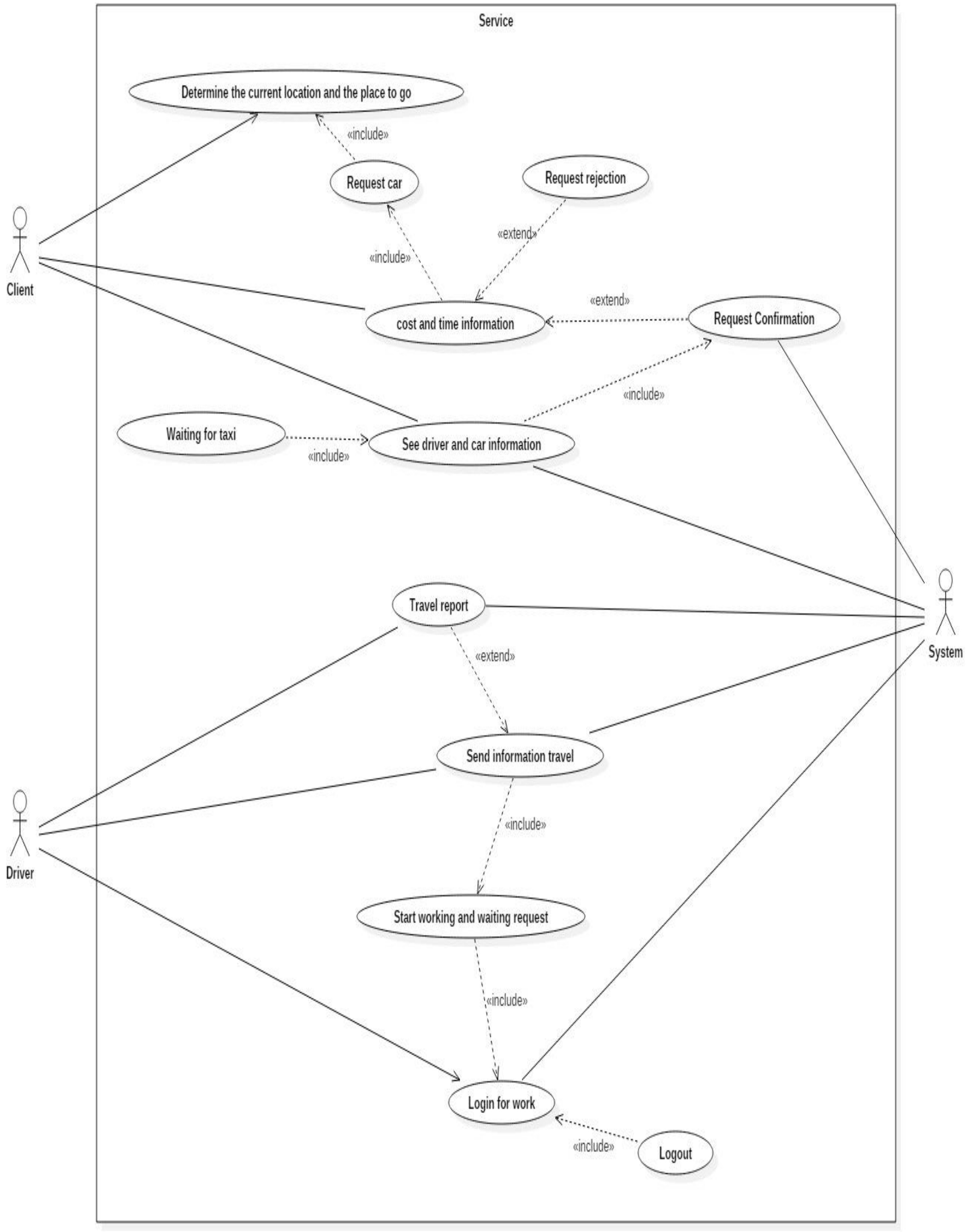


Figure 2-2

2.2 Use Case Description:

➢ Website :

1) **Login:** Explains in the following table (Table 2-1).

Number	1
Name	Login.
Summary	The Admin and Manager can login to website
Actors	Primary: Admin, Manager. Secondary: none.
Pre-conditions	The Admin or Manager should be registered in website.
Scenario	When the Admin Or Manager enter to the site must enter a valid user name and valid password to login.
Exceptions	Internet connection is lost by either the Admin or Manager or the system.
Post-condition	Go to website home page

(Table 2-1)

2) **Logout:** Explains in the following table (Table 2-2).

Number	2
Name	logout
Summary	The Admin or Manager logout after end work
Actors	Primary : Admin , Manager Secondary : none
Pre-conditions	The Admin or Manager should login in website
Scenario	When the Admin or Manager want exit from the site they must logout from website .
Exceptions	Internet connection is lost by either the Admin or Manager or the system.
Post-condition	Go to home page

(Table 2-2)

3) Register for user in website: Explains in the following table (Table 2-3).

Number	3
Name	Register for user in website
Summary	Register in the website for the website users
Actors	Primary: Manager Secondary: none.
Pre-conditions	The Manager should be login.
Scenario	The Manager can Register for users in the website by entering his data in Register page
Exceptions	Internet connection is lost by either the Manager or the system.
Post-condition	Go to home page

(Table 2-3)

4) Add New Driver: Explains in the following table (Table 2-4).

Number	4
Name	Add New Driver
Summary	Add Driver to work in the service
Actors	Primary: Manager Secondary: none
Pre-conditions	The Manager should be login.
Scenario	Chosen Add New Driver to add driver then enter the driver's personal data and save this data
Exceptions	Internet connection is lost by either the Manager or the system.
Post-condition	Go to drivers page

(Table 2-4)

5) Delete Driver: Explains in the following table (Table 2-5).

Number	5
Name	Delete Driver
Summary	Remove the driver from the service
Actors	Primary: Manager Secondary: none
Pre-conditions	The Manager should be login.
Scenario	Choose to delete a specific driver and then go to the driver's personal data and then confirmed the deletion process
Exceptions	Internet connection is lost by either the Manager or the system.
Post-condition	Return to the drivers page

(Table 2-5)

6) **Edit Driver Data:** Explains in the following table (Table 2-6).

Number	6
Name	Edit Driver Data
Summary	edit driver data in the event of a change of his information about the basic
Actors	Primary: Admin , Manager Secondary: none
Pre-conditions	Should be Admin or Manager login and The driver must be registered in the service
Scenario	Edit is selected for the driver to be modified personal data then modified and saved them
Exceptions	Internet connection is lost by either the Admin , Manager or the system.
Post-condition	Return to drivers page

(Table 2-6)

7) **Driver Details:** Explains in the following table (Table 2-7).

Number	7
Name	Driver Details
Summary	Knowledge of the driver information by requested from admin or user
Actors	Primary: Admin , Manager Secondary: none
Pre-conditions	Should be Admin or Manager login and The driver must be registered in the service
Scenario	The driver be choosers by the admin or Manager to know the driver information
Exceptions	Internet connection is lost by either the Admin , Manager or the system.
Post-condition	Return to drivers page

(Table 2-7)

8) **Search for Driver:** Explains in the following table (Table 2-8).

Number	8
Name	Search for Driver
Summary	Search for driver in drivers page
Actors	Primary: Admin , Manager Secondary: none
Pre-conditions	Admin or Manager should be logged in.
Scenario	Enter the name of the driver and will appear Results
Exceptions	Internet connection is lost by either the Admin , Manager or the system.
Post-condition	Appearance of search results

(Table 2-8)

9) Order Drivers: Explains in the following table (Table 2-9).

Number	9
Name	Order Driver
Summary	Order drivers by name or by employment Date
Actors	Primary: Admin , Manager Secondary: none
Pre-conditions	Admin or Manager should be logged in.
Scenario	Pressure is on the word full name or pressure on employment Date
Exceptions	Internet connection is lost by either the Admin , Manager or the system.
Post-condition	Appearance of order results

(Table 2-9)

10) Add New Car: Explains in the following table (Table 2-10).

Number	10
Name	Add New Car
Summary	Add car to work in the service
Actors	Primary: Manager Secondary: none
Pre-conditions	The Manager should be login .
Scenario	Chosen Add New car to add car then enter the car's data and save this data
Exceptions	Internet connection is lost by either the Manager or the system.
Post-condition	Go to cars page

(Table 2-10)

11) Delete Car: Explains in the following table (Table 2-11).

Number	11
Name	Delete Car
Summary	Remove the car from the service
Actors	Primary: Manager Secondary: none
Pre-conditions	The Manager should be login .
Scenario	Choose to delete a specific car and then go to the car’s data and then confirmed the deletion process
Exceptions	Internet connection is lost by either the Manager or the system.
Post-condition	Return to the cars page

(Table 2-11)

12) Edit Car data: Explains in the following table (Table 2-12).

Number	12
Name	Edit Car data
Summary	edit car data in the event of a change of its information about the basic
Actors	Primary: Admin , Manager Secondary: none
Pre-conditions	Should be Admin or Manager login and The car must be registered in the service
Scenario	Edit is selected for the car to be modified its data then modified and saved them
Exceptions	Internet connection is lost by either the Admin , Manager or the system.
Post-condition	Return to cars page

(Table 2-12)

13) Car Details: Explains in the following table (Table 2-13).

Number	13
Name	Car Details
Summary	Knowledge of the car information by requested from admin or user
Actors	Primary: Admin , Manager Secondary: none
Pre-conditions	Should be Admin or Manager login and The car must be registered in the service
Scenario	The car be choosers by the admin or user to know the car information
Exceptions	Internet connection is lost by either the user or the system.
Post-condition	Return to drivers page

(Table 2-13)

14) Search for car: Explains in the following table (Table 2-14).

Number	14
Name	Search of car
Summary	Search for car in cars page
Actors	Primary: Admin , Manager Secondary: none
Pre-conditions	Admin or Manager should be logged in.
Scenario	Enter the company or model or number of car and will appear Results
Exceptions	Internet connection is lost by either the user or the system.
Post-condition	Appearance of search results

(Table 2-14).

15) Order cars: Explains in the following table (Table 2-15).

Number	15
Name	Order cars
Summary	Order cars by company name of car or by bought Date
Actors	Primary: Admin , Manager Secondary: none
Pre-conditions	Admin or Manager should be logged in.
Scenario	Pressure is on the word company or pressure on buy Date
Exceptions	Internet connection is lost by either the Admin , Manager or the system.
Post-condition	Appearance of order results

(Table 2-15).

16) Car Driver assignment: Explains in the following table (Table 2-16).

Number	16
Name	Car Driver assignment
Summary	Determine the driver who drives the car
Actors	Primary: Manager Secondary: none
Pre-conditions	Should be Manager login and Must be the driver and the car registered to the service
Scenario	The driver is determined by the Manager who will be driving the car from Car Driver assignment page
Exceptions	Internet connection is lost by either the Manager or the system.
Post-condition	None

(Table 2-16).

17) Car driver modification: Explains in the following table (Table 2-17).

Number	17
Name	Car driver modification
Summary	Change the driver who drives the car
Actors	Primary: Manager Secondary: none
Pre-conditions	Should be Manager login and Must be the driver and the car registered to the service
Scenario	Choose the driver who will be changed and put another driver by the Manager
Exceptions	Internet connection is lost by either the Manager or the system.
Post-condition	None

(Table 2-17).

18) Search: Explains in the following table (Table 2-18).

Number	18
Name	Search
Summary	Search by car’s number or driver name
Actors	Primary: Admin , Manager Secondary: none
Pre-conditions	Admin or Manager should be logged in.
Scenario	Enter car’s number or driver name and will appear Results
Exceptions	Internet connection is lost by either the Admin , Manager or the system.
Post-condition	Appearance of search results

(Table 2-18).

19) Cars location and its status now: Explains in the following table(Table 2-19).

Number	19
Name	Cars location and its status now
Summary	Know where cars location and its status on map.
Actors	Primary: Admin , Manager Secondary: none
Pre-conditions	Should be Admin or Manager login and Must be chose map button
Scenario	Appear at the site on the map and see available and busy cars .
Exceptions	Internet connection is lost by either the Admin , Manager or the system.
Post-condition	None

(Table 2-19).

20) Financial report: Explains in the following table (Table 2-20).

Number	20
Name	financial report
Summary	When the Manager wants to see a statement of financial report
Actors	Primary: Manager Secondary:
Pre-conditions	Must be the Manager is login
Scenario	After that are logged by a Manager and request a statement of financial report by date or driver or car
Exceptions	Internet connection is lost by either the Manager or the system.
Post-condition	Appearance of results

(Table 2-20).

➢ Driver Application :

21) Login for work: Explains in the following table (Table 2-21).

Number	21
Name	Login for work
Summary	Login to Notify the company that he starting his working
Actors	Primary: Driver Secondary: system.
Pre-conditions	Owns the company drivers application and There are Internet and gps
Scenario	The driver logs on through a application for the company to notify the company he begin to exercise his work
Exceptions	Internet connection is lost by either the driver or the system, server failure.
Post-condition	go to the application page

(Table 2-21).

22) Logout from work: Explains in the following table (Table 2-22).

Number	22
Name	logout from work
Summary	logout to Notify the company that he ending his working
Actors	Primary: Driver Secondary: system.
Pre-conditions	Owns the company drivers application and There are Internet and gps
Scenario	The driver logs out through an application of the company to notify the company he ending to exercise his work
Exceptions	Internet connection is lost by either the driver or the system, server failure.
Post-condition	Back to the login page

(Table 2-22).

23) **Starting work:** Explains in the following table (Table 2-23).

Number	23
Name	Starting work
Summary	The driver sees the his Place in map and waiting for request.
Actors	Primary: Driver Secondary: system.
Pre-conditions	Owns the company drivers application and There are Internet and gps
Scenario	The driver sees his place in map and waiting for request and when there is one The company sends an alert to him.
Exceptions	Internet connection is lost by either the driver or the system, server failure.
Post-condition	See Place of request on map

(Table 2-23)

24) **See Travel Information:** Explains in the following table (Table 2-24).

Number	24
Name	See Travel Information
Summary	The driver sees the customer's Place
Actors	Primary: Driver Secondary: system.
Pre-conditions	Owns the company drivers application and There are Internet and gps
Scenario	The company sends an alert to driver and give him customer's request place on the map and required destination and the cost of this request.
Exceptions	Internet connection is lost by either the driver or the system, server failure.
Post-condition	See Place of request on map

(Table 2-24)

25) Travel report: Explains in the following table (Table 2-25).

Number	25
Name	Travel report
Summary	The driver reported arrival the customer
Actors	Primary: Driver Secondary: system.
Pre-conditions	Owns the company drivers application and There are Internet
Scenario	When arrival a customer to his destination the driver give his report to the company about delivery process then change his status to available
Exceptions	Internet connection is lost by either the driver or the system, server failure.
Post-condition	go to the application page

(Table 2-25).

➢ Client application :

26) Determine the current location and the place to go: Explains in the following table (Table 2-26).

Number	26
Name	Determine the current location and the place to go
Summary	The client Determine the current location and the place to go
Actors	Primary: Client Secondary: system.
Pre-conditions	Owns the company clients application and There are Internet and gps
Scenario	The client Determine the current location and the place to go in map.
Exceptions	Internet connection is lost by either the Client or the system, server failure.
Post-condition	Stay on the application page

(Table 2-26).

27) Request car: Explains in the following table (Table 2-27).

Number	27
Name	Request car
Summary	The client Request car
Actors	Primary: Client Secondary: system.
Pre-conditions	Owns the company clients application and There are Internet and gps
Scenario	The client send Request for company included his location and the required destination
Exceptions	Internet connection is lost by either the Client or the system, server failure.
Post-condition	Stay on the application page

(Table 2-27).

28) Cost and time information: Explains in the following table (Table 2-28).

Number	28
Name	Cost and time information
Summary	The client sees estimated time of and total cost to this request
Actors	Primary: Client Secondary: system.
Pre-conditions	Owns the company clients application and There are Internet and sent request to the company
Scenario	After the customer's request for a car his application estimated time for the travel time and give the cost of this request
Exceptions	Internet connection is lost by either the Client or the system, server failure.
Post-condition	Appear as an alert

(Table 2-28).

29) Request Confirmation: Explains in the following table (Table 2-29).

Number	29
Name	Request Confirmation
Summary	The Clint sent to system his Confirmation about his request
Actors	Primary: Client Secondary: system.
Pre-conditions	Owns the company clients application and There are Internet and sent request to the company
Scenario	After the client sees the basic information of estimated time of travel and total cost to this request then the Clint resent his Confirmation about this information to company
Exceptions	Internet connection is lost by either the Client or the system, server failure.
Post-condition	go to the application page

(Table 2-29).

30) Request rejection: Explains in the following table (Table 2-30).

Number	30
Name	Request rejection
Summary	The Clint sent to system his rejection about his request
Actors	Primary: Client Secondary: system.
Pre-conditions	Owns the company clients application and There are Internet and sent request to the company
Scenario	After the client sees the basic information of estimated time of travel and total cost to this request then the Clint resent his rejection about this information to company
Exceptions	Internet connection is lost by either the Client or the system, server failure.
Post-condition	go to the application page

(Table 2-30).

31) See Travel information: Explains in the following table (Table 2-31).

Number	31
Name	See Travel information
Summary	The company sent a car and driver data to the customer
Actors	Primary: Client Secondary: system.
Pre-conditions	Owns the company clients application and There are Internet and Request Confirmation
Scenario	After the customer send Request Confirmation company send car and the car's driver and the time of arrive car to him information, who will meet the request of the customer
Exceptions	Internet connection is lost by either the Client or the system, server failure or the Clint sent Request rejection
Post-condition	Appear as an alert and show car on map

(Table 2-31).

32) Waiting taxi: Explains in the following table (Table 2-32).

Number	32
Name	Waiting taxi
Summary	The company sent a car location data to the customer
Actors	Primary: Client Secondary: system.
Pre-conditions	Owns the company clients application and There are Internet and Request Confirmation
Scenario	The customer can sees the driver location in map and his location and his distance
Exceptions	Internet connection is lost by either the Client or the system, server failure or the Clint sent Request rejection
Post-condition	Appear as an alert and show car on map

(Table 2-32).

2.3 Actor Specification:

1) Website:

- **Admin:** Is user uses the website he can make operation in the website, Such as search for drivers, and other operation but he does not has full warrant.

- **Manager:** Is the administrator of the website he makes many operations and have permissions to control in all sites.

2) Service:

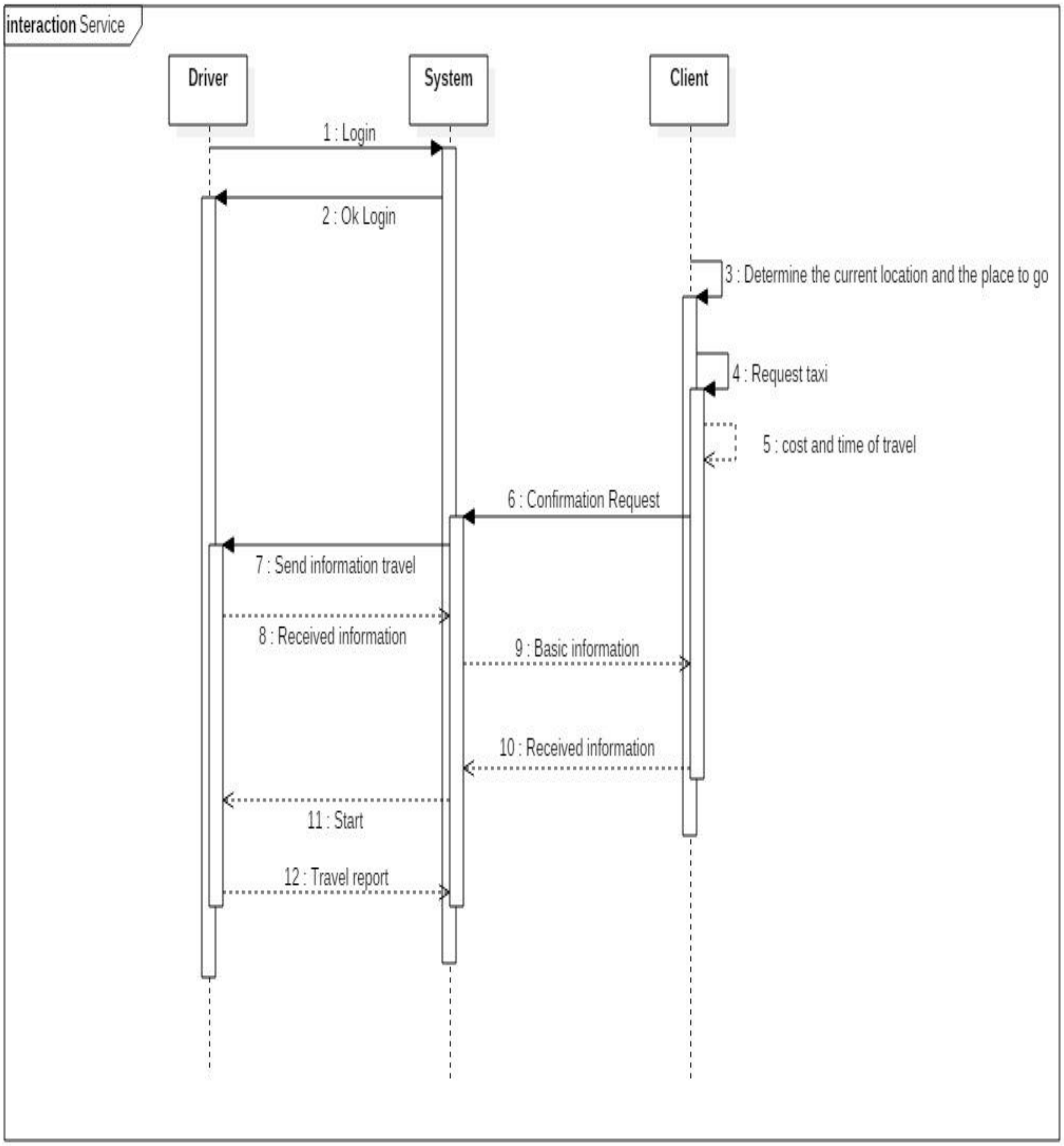
- **Driver:** The driver, have a specific process to communicate with the system through a mobile phone application which, must to do after the login process.

- **Clint:** The Clint, use the Mobil application to send request for system to asked system for service and another operation.

- **System:** The System, its secondary actor in mobile service and management the service

2.4 Service Sequence Diagram:

After we were identified and described usecase we will see events for these operations in the following Figure (Figure 2-3):



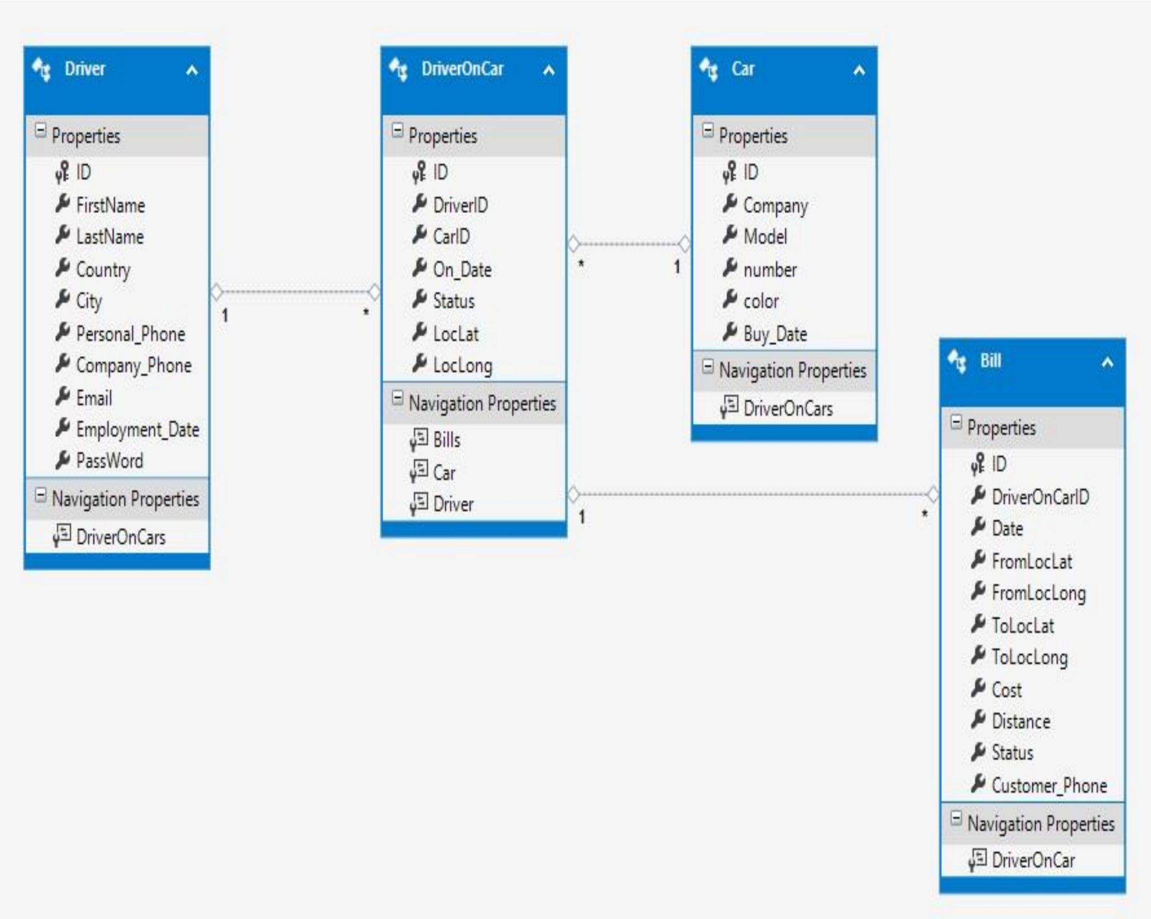
(Figure 2-3)

2.5 Database Diagram:

In addition, in the range of databases, we use two databases to make loss of data less and we will discuss that:

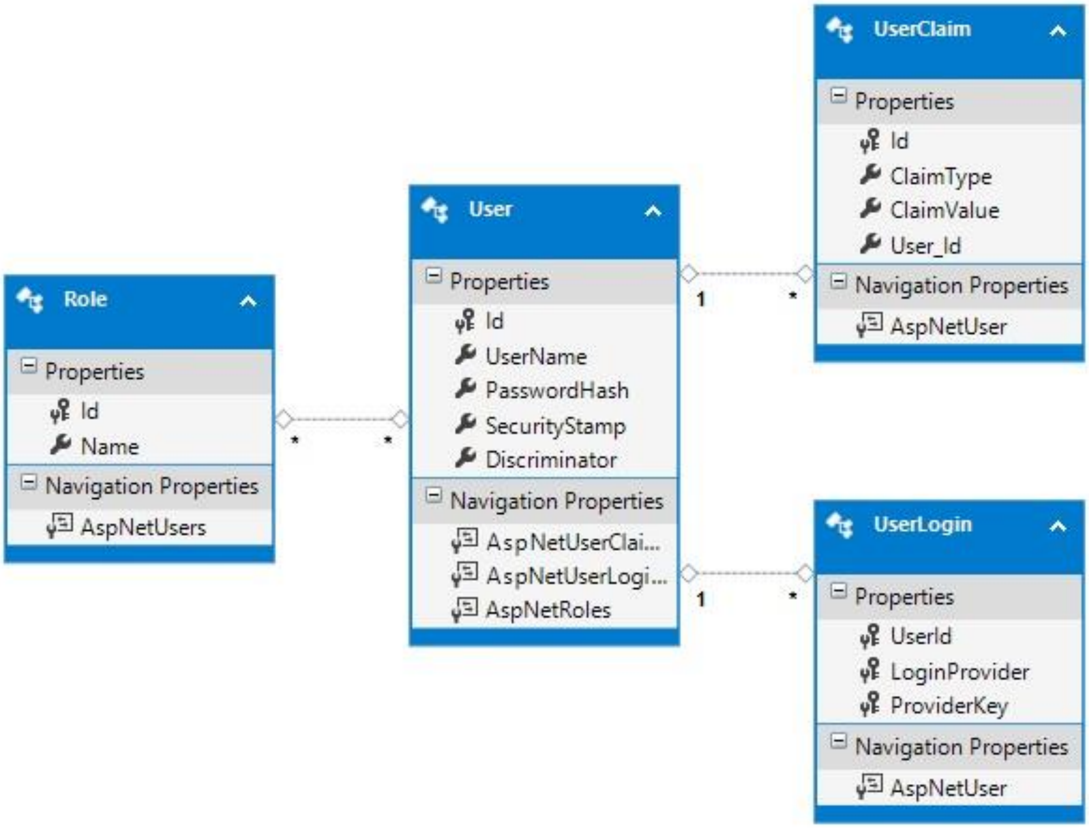
- **First one (You Taxi Database):** Most of process and serves will use data in this database.

And It is Shown in the (Figure 2-4):



(Figure 2-4)

- **The second one (aspnet-YourTaxi):** Registration, login, logout, and we used the common Microsoft database security because it is the most safety and reliability and it is shown in (Figure 2-5).

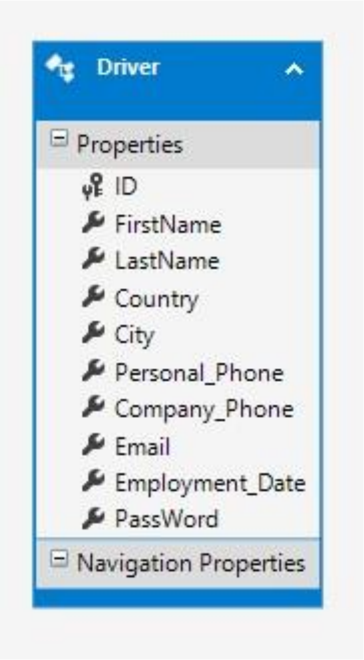


(Figure 2-5)

2.6 Database Tables:

- **First one (YouTaxi Database):** Now we will Show each table of the two databases.

1) **Driver Table:** show its attribute details in (Figure 2-6).
   - **Employment_Date:** the date that the driver start work at the company.
   - **PassWord:** is the password that the driver use for login in driver mobile application.



Driver

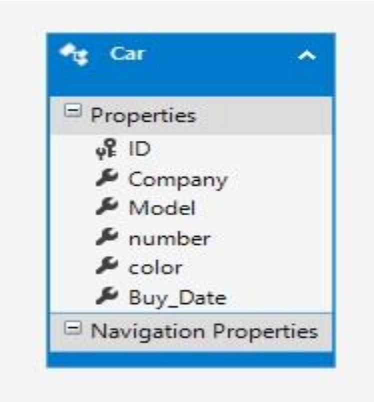
Properties

ID
FirstName
LastName
Country
City
Personal_Phone
Company_Phone
Email
Employment_Date
PassWord

Navigation Properties

(Figure 2-6)

2) **Cars Table:** show its attribute details in (Figure 2-7).
   - **Number:** is the number of the car.



Car

Properties

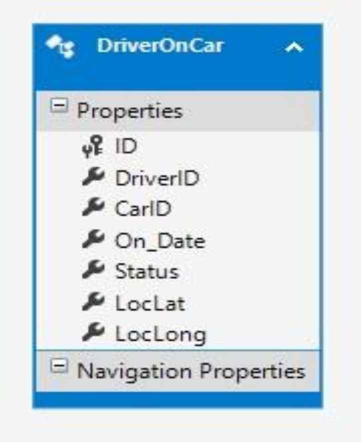
ID
Company
Model
number
color
Buy_Date

Navigation Properties

(Figure 2-7)

3) **DriverOnCar Table :** which appears to who drive each car and show its attribute details in (Figure 2-8)

- **On_Date :** the date of put driver on car
- **LocLat :** Coordinates of the car on the Latitude
- **LocLong :** Coordinates of the car on the Longitude
- **Status:** It represents a case driver on this car (at work ,have order or stop)



DriverOnCar

Properties

ID

DriverID

CarID

On_Date

Status

LocLat

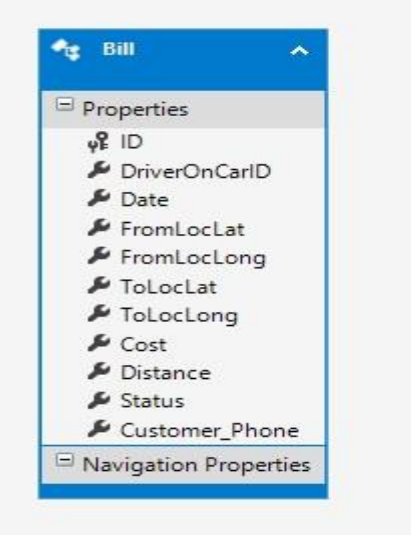
LocLong

Navigation Properties

(Figure 2-8)

4) **Bill Table:** Which relates to calculations and show its attribute details in (Figure 2-9).

- **FromLocLat :** Coordinates of the place request on the Latitude.
- **FromLocLong :** Coordinates of the place request on the Longitude.
- **ToLocLat :** Coordinates of the place Destination on the Latitude.
- **ToLocLong :** Coordinates of the place on the Longitude.
- **Distance:** This trip, a distance from the client place to place to go.
- **Status:** The case of request (in the way , done or there are problem).



Bill

Properties

ID

DriverOnCarID

Date

FromLocLat

FromLocLong

ToLocLat

ToLocLong

Cost

Distance

Status

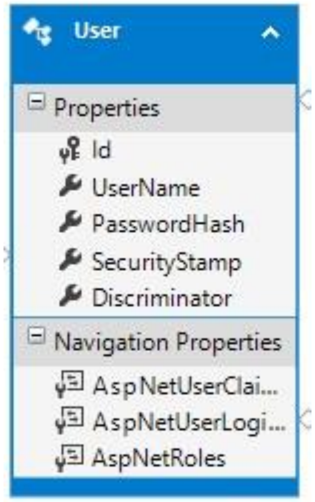
Customer_Phone

Navigation Properties

(Figure 2-9)

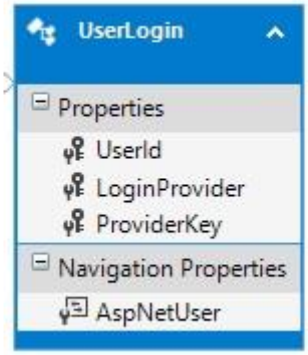
➢ Second one(aspnet-YourTaxi):

5) **User Table:** table will keep track of the user's login credentials and show its attribute details in (Figure 2-10).



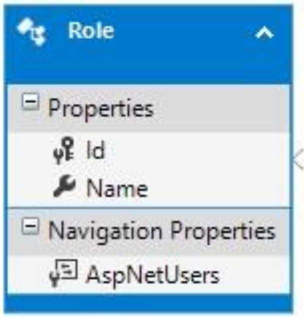
(Figure 2-10)

6) **UserLogin Table:** This table will keep track of the user using the open authentication to login to the application and show its attribute details in (Figure 2-11).



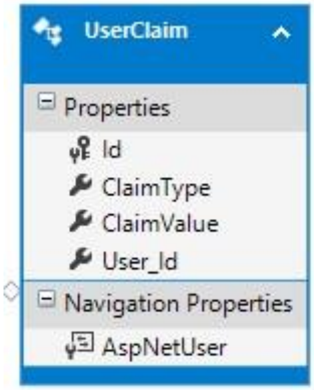
(Figure 2-11)

7) **UserRol Table:** This table will keep track of the all the roles in the system and show its attribute details in (Figure 2-12).



(Figure 2-12)

8) **UserClaim Table:** show its attribute details in (Figure 2-13).



(Figure 2-13)

Chapter 3: Project Estimation

3.1 Usease Points (UCP)[23] :

Is a software estimation technique used to forecast the software size for software development projects? UCP is used when the Unified Modeling Language (UML) and Rational Unified Process (RUP) methodologies are being used for the software design and development. The concept of UCP is based on the requirements for the system being written using use cases, which is part of the UML set of modeling techniques. The software size (UCP) is calculated based on elements of the system use cases with factoring to account for technical and environmental considerations. The UCP for a project can then be used to calculate the estimated effort for a project.

3.2 Why UseCase points (UCP) [23]:

The first advantage to estimating with use case points is that the process can be automated. Some use case management tools will automatically count the number of use case points in a system. This can save the team a great deal of estimating time. Of course, there is the counter argument that an estimate is only as good as the effort put into it.

A second advantage is that it should be possible to establish an organizational average implementation time per use case point. This would be very useful in forecasting future schedules. Unfortunately, this depends heavily on the assumption that all use cases are consistently written with the same level of detail. This may be a very false assumption, especially when there are multiple use case authors.

A third advantage to use case points is that they are a very pure measure of size. Good estimation approaches allow us to separate estimating of size from deriving duration. Use case points qualify in this regard because the size of an application will be independent of the size, skill, and experience of the team that implements it.

3.3 Attention when using UseCase points to[23]:

A fundamental problem with estimating with use case points is that the estimate cannot be arrived at until all of the use cases are written. Writing user goal use cases is a significant effort that can represent 10–20% of the overall effort of the project. This investment delays the point at which the team can create a release plan. More important, if all the use cases are all written up front, there is no learning based on working software during this period.

Use cases are large units of work to be used in planning a system.
While use case points may work well for creating a rough, initial estimate of overall project size they are much less useful in driving the iteration-to-iteration work of a team. A better approach will often be to break the use case into a set of user stories and estimate the user stories in either story points or ideal time (Cohn 2005).

A related issue is that the rules for determining what constitutes a transaction are imprecise. Counting the number of steps in a user goal user story is an approximation. However, since the detail reflected in a use case varies tremendously by the author of the use case, the approach is flawed.

An additional problem with use case points is that some of the Technical Factors do not really have an impact across the overall project. Yet, because of the way they are multiplied with the weight of the use cases and actors the impact is such that they do. For example, technical factor reflects the requirement for being able to easily install the system. Yes, in some ways, the larger a system is, the more time-consuming it will be to write its installation procedure. However, the typical feel much more comfortable thinking of installation requirements on their own (for example, as separate user stories) rather than as a multiplier against the overall size of the system.

3.4 Estimation of our project:

We will use to the calculation usecase diagram in (Figure2-1) and (Figure2-2) Which has already been explained in Chapter 2.

➢ First part Website:

1) Website Unadjusted Use Case Weight (UUCW) :

UUCW = (Total No. of Simple Use Cases x 5) + (Total No. Average Use Cases x 10) + (Total No. Complex Use Cases x 15)

UUCW = (5 x 5) + (13x 10) + (2 x 15) = 185

2) Website Unadjusted Actor Weight (UAW) :

UAW = (Total No. of Simple Actors x 1) + (Total No. Average Actors x 2) + (Total No. Complex Actors x 3)

UAW = (1 x 2) + (2x 3) = 8

3) Website Technical Complexity Factor (TCF): Shown below in Table (Table 3-1).

Factor	Description	Weight	Assigned Value	Weight x Assigned Value
T1	Distributed system	2.0	4	8
T2	Response time/performance objectives	1.0	5	5
T3	End-user efficiency	1.0	3	3
T4	Internal processing complexity	1.0	4	4
T5	Code reusability	1.0	3	3
T6	Easy to install	0.5	4	2.0
T7	Easy to use	0.5	5	2.5
T8	Portability to other platforms	2.0	3	15
T9	System maintenance	1.0	3	3
T10	Concurrent/parallel processing	1.0	4	4
T11	Security features	1.0	5	5
T12	Access for third parties	1.0	3	3
T13	End user training	1.0	3	3
Total (TF):				**60.5**

(Table 3-1)

Next, the TCF is calculated:

TCF = 0.6 + (TF/100)

For the Online website System, TCF = 0.6 + (60.5 /100) = 1.205

TCF = 1.205

4) Website Environmental Complexity Factor (ECF) : Shown below in Table (Table 3-2).

Factor	Description	Weight	Assigned Value	Weight x Assigned Value
E1	Familiarity with development process used	1.5	2	3.0
E2	Application experience	0.5	4	2.0
E3	Object-oriented experience of team	1.0	2	2
E4	Lead analyst capability	0.5	5	2.5
E5	Motivation of the team	1.0	3	3
E6	Stability of requirements	2.0	2	4
E7	Part-time staff	-1.0	5	5
E8	Difficult programming language	-1.0	4	4
Total (EF):				**7.5**

(Table 3-2)

The ECF is calculated:

ECF = 1.4 + (-0.03 x EF)

ECF = 1.4 + (-0.03 * 7.5) = 1.175

5) Website Use Case Points (UCP) :

UCP = (UUCW + UAW) x TCF x ECF

UCP = (185 + 8) x 1.205x 1.175= 273.263875

Now that the size of the project is known, the total effort for the project can be estimated. For the Online Website System, 9 man hours per use case point will be used.

Estimated Effort = UCP x Hours/UCP

Estimated Effort = 273.26 x 9

Estimated Effort = 2459.37 Hours

Estimated Effort = 2459.37 Hours / 24 = 102.47 days

➢ Second part (Driver Application):

1) Driver Application Unadjusted Use Case Weight (UUCW) :

UUCW = (Total No. of Simple Use Cases x 5) + (Total No. Average Use Cases x 10) + (Total No. Complex Use Cases x 15)

UUCW = 0 + (2x 10) + (2 x 15) = 50

2) Driver Application Unadjusted Actor Weight (UAW) :

UAW = (Total No. of Simple Actors x 1) + (Total No. Average Actors x 2) + (Total No. Complex Actors x 3)

UAW = 0 + (1 x 2) + (2x 3) = 8

3) Driver Application Technical Complexity Factor (TCF) : Shown below in Table (Table 3-3).

Factor	Description	Weight	Assigned Value	Weight x Assigned Value
T1	Distributed system	2.0	5	10
T2	Response time/performance objectives	1.0	5	5
T3	End-user efficiency	1.0	4	4
T4	Internal processing complexity	1.0	5	5
T5	Code reusability	1.0	3	3
T6	Easy to install	0.5	4	2.0
T7	Easy to use	0.5	5	2.5
T8	Portability to other platforms	2.0	3	15
T9	System maintenance	1.0	2	2
T10	Concurrent/parallel processing	1.0	4	4
T11	Security features	1.0	5	5
T12	Access for third parties	1.0	2	2
T13	End user training	1.0	2	2
Total (TF):				**61.5**

(Table 3-3)

Next, the TCF is calculated:

TCF = 0.6 + (TF/100)

For the Online Shopping System, TCF = 0.6 + (61.5/100) = 1.215

TCF = 1.21

4) Driver Application Environmental Complexity Factor (ECF) :

Shown below in Table (Table 3-4).

Factor	Description	Weight	Assigned Value	Weight x Assigned Value
E1	Familiarity with development process used	1.5	2	3.0
E2	Application experience	0.5	4	2.0
E3	Object-oriented experience of team	1.0	2	2
E4	Lead analyst capability	0.5	5	2.5
E5	Motivation of the team	1.0	3	3
E6	Stability of requirements	2.0	2	4
E7	Part-time staff	-1.0	5	5
E8	Difficult programming language	-1.0	4	4
Total (EF):				**7.5**

(Table 3-4)

The ECF is calculated:

ECF = 1.4 + (-0.03 x EF)

ECF = 1.4 + (-0.03 * 7.5) = 1.175

5) Driver Application Use Case Points (UCP) :

UCP = (UUCW + UAW) x TCF x ECF

UCP = (50 + 8) x 1.215 x 1.175= 82.80225

Now that the size of the project is known, the total effort for the project can be estimated. For the Online Website System, 9 man hours per use case point will be used.

Estimated Effort = UCP x Hours/UCP

Estimated Effort = 82.80 x 9

Estimated Effort = 745.22 Hours

Estimated Effort = 745.22 Hours / 24 = 31.05 days

➢ Third part (Client Application):

1) Client Application Unadjusted Use Case Weight (UUCW):

UUCW = (Total No. of Simple Use Cases x 5) + (Total No. Average Use Cases x 10) + (Total No. Complex Use Cases x 15)

UUCW = 0 + (2 x 10) + (3 x 15) = 65

2) Client Application Unadjusted Actor Weight (UAW) :

UAW = (Total No. of Simple Actors x 1) + (Total No. Average Actors x 2) + (Total No. Complex Actors x 3)

UAW = (1 x 2) + (2x 3) = 8

3) Client Application Technical Complexity Factor (TCF): Shown below in Table (Table 3-5).

Factor	Description	Weight	Assigned Value	Weight x Assigned Value
T1	Distributed system	2.0	5	10
T2	Response time/performance objectives	1.0	5	5
T3	End-user efficiency	1.0	4	4
T4	Internal processing complexity	1.0	5	5
T5	Code reusability	1.0	3	3
T6	Easy to install	0.5	4	2.0
T7	Easy to use	0.5	5	2.5
T8	Portability to other platforms	2.0	3	15
T9	System maintenance	1.0	2	2
T10	Concurrent/parallel processing	1.0	4	4
T11	Security features	1.0	5	5
T12	Access for third parties	1.0	2	2
T13	End user training	1.0	2	2
Total (TF):				**61.5**

(Table 3-5)

Next, the TCF is calculated:

TCF = 0.6 + (TF/100)

For the Online Shopping System, TCF = 0.6 + (61.5/100) = 1.215

TCF = 1.21

4) Client Application Environmental Complexity Factor (ECF): Shown below in Table (Table 3-6).

Factor	Description	Weight	Assigned Value	Weight x Assigned Value
E1	Familiarity with development process used	1.5	2	3.0
E2	Application experience	0.5	4	2.0
E3	Object-oriented experience of team	1.0	2	2
E4	Lead analyst capability	0.5	5	2.5
E5	Motivation of the team	1.0	3	3
E6	Stability of requirements	2.0	2	4
E7	Part-time staff	-1.0	5	5
E8	Difficult programming language	-1.0	4	4
Total (EF):				**7.5**

(Table 3-6)

The ECF is calculated:

ECF = 1.4 + (-0.03 x EF)

ECF = 1.4 + (-0.03 * 7.5) = 1.175

5) Use Case Points (UCP) :

UCP = (UUCW + UAW) x TCF x ECF

UCP = (65 + 8) x 1.215 x 1.175= 104.21

Now that the size of the project is known, the total effort for the project can be estimated. For the Online Website System, 9 man hours per use case point will be used.

Estimated Effort = UCP x Hours/UCP

Estimated Effort = 104.21x 9

Estimated Effort = 937.94Hours

Estimated Effort = 937.94Hours / 24 = 39 days

3.5 The total project cost:

Estimated Effort for project = Estimated Effort for website + Estimated Effort for driver app + Estimated Effort for client app

Estimated Effort for project = 103 + 32+ 39 = 172.52 days

Estimated Effort for project = 174 days / 30 = 6 Month

Chapter 4: Google.

4.1 What is Google?[2]

Is an American multinational corporation specializing in Internet-related services and products these include online advertising technologies, search, cloud computing, and software Most of its profits are derived from AdWords, an online advertising service that places advertising near the list of search results.

4.2 Google's History: [2]

Google began in ***1996*** as a project by Larry Page and Sergey Brin. Larry and Sergey were both studying at Stanford University California. In their research project they came up with a plan to make, a search engine that ranked websites according to the number of other websites that linked to that site (and ultimately came up with the Google we have today). Before Google, search engines had ranked sites simply by the number of times the search term searched for appeared on the webpage, and the duo set out to make a more "aware" search engine.

The domain google.com was registered on September ***1997*** and Google Corporation was formed a year later in September ***1998***.

Google started selling advertisements with its keyword searches in ***2000***, and so Google Adwords/Adsense was born. These advertisements used a system based on the presence that you only paid for your advertising if some clicked on your ad link – hence the term Pay per Click (PPC) was born.

The term PageRank was patented in September ***2001*** – this term is actually named after co-founder Larry Page and not, as some think, named because it is the rank of a page (webpage).

Also in ***2001*** co-founder, Larry Page stood down as the CEO of Google and former CEO of Novel. Eric Schmidt. Was appointed as the new CEO of Google.

Google moved its offices to its large Google estate (nicknamed GooglePlex) in Mountain View California in ***2003***, and is still based there today.

In ***2004***, Google launched its own free web-based email service, known as Gmail. This service was made to rival the free online mail services supplied by Yahoo and Microsoft (Hotmail). This new free email service shook up the very foundation of free email with its enormous 1 GB of email storage which dwarfed its rivals' ten-fold.

In ***2004***, Google launched Google Earth. Google Earth is an amazing creation that is a map of the earth based on satellite imagery. This interactive globe of the world allows you to type in a search for any place in the world and you will automatically be taken to that part of the world. The cool part is that with Google Earth you can zoom right in to street level and actually see your own street and even your house!

An interesting fact in the history of Google is that in September 2005, Google made a new partnership with a very interesting company – NASA. This involved building a 1-million square foot research and development center at NASA's Ames Research Center. This was interestingly followed a few months later by the launch of Google Mars and Google Moon: two Google maps style applications built on pictures of the moon and the planet Mars.

In ***2006***, Google launched Google Video. Google Video is a cool new search tool. As its title suggests Google, video allows you to search the internet for videos. There are thousands of videos to make your search from; from personal homemade videos to TV shows made by the big television corporations.

In ***2006*** Google was added to the Oxford English dictionary as a verb – the verb "to Google" has become so popular that Google has even been worried that their brand name might lose their copyright and patent protections, and allow other companies to be able to legally use the Google brand in their own brand.

Today (Article written end of ***2006***) Google has a dominant controlling share of the search market. Google is the most widely used search engine on the internet with a 54% market share. Yahoo! Is Google's closest rival with 23%, less than half of Google's share, and MSN even falls far short of Yahoo!, lagging far behind in 3rd place with a 13% market share. If these figures aren't impressive enough for Google, independent estimates say that more than 80% of search referrals come from Google – Google receives about a billion search requests per day – and with estimates that Google makes 12 cents for every search you perform, you can see that Google corporation is a very lucrative business!

With the many applications and products, that Google has brought out, and the control it has over the internet it is possible that Google will become a very influential part of all of our lives in years to come obtain information on the Internet.

4.3 Products: [3]

- **Web :** Shown below in Table(4-1)

🔍	Web Search	Search billions of web pages
🌐	Google Chrome	A browser built for speed, simplicity and security
⭐	Bookmarks	Access your bookmarks and starred items

Table (4-1)

- **Mobile :** Shown below in Table(4-2)

	Mobile	Get Google products on your mobile phone
	Maps for mobile	View maps, your location and get directions on your phone
	Search for mobile	Search Google wherever you are

Table (4-2)

- **Media:** Shown below in Table(4-3)

	Books	Search the full text of books
	Image Search	Search for images on the web
	News	Search thousands of news stories
	Video Search	Search for videos on the web

Table (4-3)

- **Geo:** Shown below in Table(4-4)

	Maps	View maps and directions
	Earth	Explore the world from your computer

Table (4-4)

- **Specialized Search:** Shown below in Table(4-5)

	Blog Search	Find blogs on your favorite topics
	Custom Search	Create a customized search experience for your community
	Scholar	Search scholarly papers
	Trends	Explore past and present search trends

Table (4-5)

- **Home & Office:** Shown below in Table(4-6)

	Gmail	Fast, searchable email with less spam
	Drive	Create, share and keep all your stuff in one place
	Docs	Open, edit, and create documents
	Sheets	Open, edit, and create spreadsheets
	Slides	Open, edit, and create presentations
	Forms	Build free surveys
	Drawings	Create diagrams and flow charts
	Sites	Create websites and secure group wikis
	Calendar	Organize your schedule and share events with friends
	Translate	Instantly translate text, web pages, and files between over 50 languages

Table (4-6)

- **Social:** Shown below in Table(4-7)

	Google+	Real-life sharing, rethought for the web
	Blogger	Share your life online with a blog - it's quick, easy and free
	Groups	Create mailing lists and discussion groups
	Hangouts	Conversations that come to life. Anytime, anywhere, for free

Table (4-7)

- **Innovation :** Shown below in Table(4-8)

	Code	Developer tools, APIs and resources

Table (4-8)

Chapter 5: Google Maps

5.1 What is Google Map? [4]

is a desktop and mobile web mapping service application and technology provided by Google, offering satellite imagery, street maps, and Street View perspectives, as well as functions such as a route planner for traveling by foot, car, bicycle (beta test), or with public transportation.

5.2 History: [4]

Google Maps first started as a C++ program designed by two Danish brothers Lars and Jens Eilstrup Rasmussen at the Sydney-based company Where 2 Technologies. It was first designed to be separately downloaded by users, but the company later pitched the idea for a purely Web-based product to Google management, changing the method of distribution. In October **2004**, the company was acquired by Google Inc. where it transformed into the web application Google Maps. In the same month, Google acquired Keyhole, a geospatial data visualization company, (with controversial investment from the CIA), whose marquee application suite, Earth Viewer, emerged as the highly successful Google Earth application in **2005** while other aspects of its core technology were integrated into Google Maps. In September **2004**, Google acquired Zip Dash, a company that provided real-time traffic analysis.

2005: The application was first announced on the Google Blog on February 8, 2005, and was located at Google. It originally only supported users of Internet Explorer and Mozilla web browsers, but support for Opera and Safari was added on February 25, 2005, but currently [when?] Opera is removed from the system requirements list. It was in beta for six months before becoming part of Google Local on October 6, 2005.

In April 2005, Google created Google Ride Finder using Google Maps. In June 2005, Google released the Google Maps API. In July 2005, Google began Google Maps and Google Local services for Japan, including road maps. On July 22, 2005, Google released "Hybrid View". Together with this change, the satellite image data was converted from plate carrée to Mercator projection, which makes for a less distorted image in the temperate climes latitudes. In July 2005, in honor of the thirty-sixth anniversary of the Apollo Moon landing, Google Moon was launched. In September 2005, in the aftermath of Hurricane Katrina, Google Maps quickly updated its satellite imagery of New Orleans to allow users to view the extent of the flooding in various parts of that city. (Oddly, in March 2007, imagery showing hurricane damage was replaced with images from before the storm; this replacement was not made on Google Earth, which still uses post-Katrina imagery.)

2006: From January 2006, Google Maps featured road maps for the United States, Puerto Rico, Canada, the United Kingdom, Japan, and certain cities in the Republic of Ireland. Coverage of the area around Turin was added in time for the 2006 Winter Olympics. On January 23, 2006, Google Maps was updated to use the same satellite image database as Google Earth. On March 12, 2006, Google Mars was launched, which features a drag gable map and satellite imagery of the planet Mars. In April 2006, Google Local was merged into the main Google Maps site. On April 3, 2006, version 2 of the Maps API was released. On June 11, 2006, Google added geocoding capabilities to the API, satisfying the most developer-requested feature for this service. On June 14, 2006, Google Maps for Enterprise was officially launched. As a commercial service, it features intranet and advertisement-free implementations. Also in June, textured 3D building models were added into Google Earth.

In July 2006 Google started including Google Maps business listings in the form of Local One Boxes in the main Google search results. In December 2006 Google integrated a feature called Plus Box into the main search results. On December 19 Google added a feature that lets one add multiple destinations to their driving directions. Beginning in February 2007, buildings and subway stops are displayed in Google Maps "map view" for parts of New York City, Washington, D.C., London, San Francisco, and some other cities.

2007: On January 29, 2007, Local Universal results were upgraded and more data included in the main Google results page. On February 28, 2007, Google Traffic info was officially launched to automatically include real-time traffic flow conditions to the maps of 30 major cities of the United States. On March 8, 2007, the Local Business Center was upgraded. On May 16, 2007 Google rolled out Universal search results, including more Map information on the main Google results page. On May 18, 2007, Google added neighborhood search capabilities. On May 29, 2007, Google driving directions support was added to the Google Maps API. On May 29, 2007, Street View was added, giving a ground-level 360-degree view of streets in some major cities in United States.

On June 19, 2007, reviews were allowed to be added directly to businesses on Google Maps. On June 28, 2007, drag gable driving directions were introduced. On July 31, 2007, support for the hCard micro format was announced. Unfortunately, the implementation is broken. August 21, 2007, Google announced a simple way to embed Google Maps into other websites. On September 13, 2007, 54 new countries were added to Google Maps in Latin America and Asia.

On October 3, 2007, Google Transit was integrated into Google Maps making public transportation routing possible on Google Maps. On October 27, 2007, Google Maps started mapping the geoweb and showing the results in Google Maps. On October 27, 2007, Google Maps added a searchable interface for coupons in the business listings. On November 27, 2007, "Terrain" view showing basic topographic features was added. The button for "Hybrid" view was removed, and replaced with a "Show labels" checkbox under the "Satellite" button to switch between "Hybrid" and "Satellite" views.

2008: On January 22, 2008, Google expanded the Local One box from three business listings to ten On February 20, 2008, Google Maps allowed searches to be refined by User Rating and neighborhoods. On March 18, 2008, Google allowed end users to edit business listings and add new places. On March 19, 2008, Google added unlimited category options in the Local Business Center. On April 2, 2008, Google added contour lines to the Terrain view. In April 2008, a button to view recent Saved Locations was added to the right of the search field. In May 2008, a "More" button was added alongside the "Map", "Satellite", and "Terrain" buttons, permitting access to geographically related photos on Panoramic and articles on Wikipedia. On May 15, 2008, Google Maps was ported to Flash and ActionScript 3 as a foundation for richer internet applications. On July 22, 2008, walking directions were added. On August 4, 2008, Street View launched in Japan and Australia. On August 5, 2008, the user interface was redesigned.

On August 29, 2008, Google signed a deal under which GeoEye would supply them with imagery from a satellite, and introduced the Map Maker tool, which allows any user to improve the map data seen by all. On September 19, 2008, a reverse business lookup feature was added. On September 26, 2008, information for the New York City Metropolitan Transit Authority was added. On October 7, 2008, GeoEye-1 took its first image, a bird's-eye view of Kutztown University in Pennsylvania. On October 26, 2008, reverse geocoding was added to the Maps API. On November 11, 2008, Street View in Spain, Italy, and France was introduced. On November 23, 2008, AIR support for the Maps API for Flash was added. On November 14, 2008, a new user interface for Street View was introduced. On November 28, 2008, maps, local business information, and local trends for China were introduced. On December 9, 2008, Street View coverage was introduced.

2009: On Mar 19, 2009, Street View was launched in the United Kingdom and the Netherlands. In May 2009, a new Google Maps logo was introduced. In early October 2009, Google replaced Tele Atlas as their primary supplier of geospatial data in the US version of Maps and use their own data. In October 2009, the railroads were redone, featuring a slightly new look and updated, removing older lines. Also in the same month, maps in several areas were changed to include paper streets and other odd roads that don't exist, as well as lot lines showing up on the map interface.

2010: On February 11, 2010, Google Maps Labs was added. On March 11, 2010, Street View in Hong Kong and Macau were launched. On May 25, 2010, public transportation routing for Denmark was added by integrating with Rejseplanen.dk. As of December 2010 Internet Explorer 7.0+, Firefox 3.6+, Safari 3.1+, and Google Chrome are supported.

2011: On April 8, 2011, Google announced that it would begin charging for API usage by commercial sites over a limit. They also introduced a premium licensed service.

On April 19, 2011, Map Maker was added to US Google Maps, allowing any viewer to edit and add changes to Google Maps. This provides Google with local map updates almost in real time instead waiting for digital map data companies to release more infrequent updates.

2012: On January 31, 2012, Google, due to offering its Maps for free, was found guilty of abusing the dominant position of its Google Maps application and ordered by a court to pay a fine and damages to Bottin Cartographes, a French mapping company.

On May 30, 2012, Google Places was replaced by Google+ Local, which now integrates directly with the Google+ service to allow users to post photos and reviews of locations directly to its page on the service. Additionally, Google+ Local and Maps also now feature detailed reviews and ratings from Zagat, which was acquired by Google in September 2011.

In June 2012, Google started mapping Britain's rivers and canals in partnership with the Canal and River Trust. The company has stated that it will update the program during the year to allow users to plan trips which include locks, bridges and towpaths along the 2,000 miles of river paths in the UK.

It was announced on October 11 that Google updated 250,000 miles of roads in the US.

In December 2012, the Google Maps application was separately made available in the App Store, after Apple removed it from its default installation of the mobile operating system version iOS 6. In the face of numerous complaints about the newly released Apple Maps application, Apple CEO Tim Cook was forced to make an apology and recommend other similar applications.

2013: On January 29, 2013, Google Maps was updated to include a map of North Korea.

On March 27, 2013, Google launched Google Maps Engine Lite, a simplified version of its commercial Maps Engine product which is meant to eventually replace the My Maps feature.

On April 23, 2013, Street View was launched in Hungary and Lesotho, expanding the coverage of Google Maps' 360-degree mapping imagery to fifty countries. During the same time period, Google also completed the "largest single update of Street View imagery" ever, with photos of over 350,000 miles (560,000 km) of road across fourteen countries.

As of May 3, 2013, Google Maps recognizes Palestine as a country, instead of redirecting to the Palestinian territories.

Google announced on its Google Maps blog on May 15, 2013 that a new upgraded version of Google Maps is available for use by those registered Google users who request an invitation. The new Google Maps can create a customized map that is specific to the behavior of each user, revealing highlights that are based on the information that is entered, and providing useful local information such as restaurants. A new feature is a carousel that gathers all Google Maps imagery in one location and contains an Earth view that directly integrates the 3D experience from Google Earth into the new maps. The new version is also more closely connected to Google+ and the local businesses that are displayed are based on each user's Google+ network. Advertisements in the new Google Maps have been redesigned and short sections of advertisements are placed directly onto the map itself, alongside the business name.

In August 2013, Google Maps removed the Wikipedia Layer, which provided links to Wikipedia content about locations shown in Google Maps using Wikipedia geocodes.

2014: On March 21, 2014, Google rolled out a new Google Maps interface, although it is not the default interface as of December 2014.

On April 5, 2014, Street View was launched in Cook Islands, expanding the coverage of Google Maps' 360-degree mapping imagery to 58 countries. During the same period, Google also completed the "largest single update of Street View imagery ever" with photos of over 370,000 miles (600,000 km) of roadways.

On April 12, 2014, Google Maps was updated to reflect the 2014 Crimean crisis. Crimea is shown as the Republic of Crimea in Russia and as the Autonomous Republic of Crimea in Ukraine. All other versions show a dotted disputed border.

5.3 Advantages and disadvantages:[5]

Although traditional paper maps are still widely used, online mapping services such as the Google Maps website are gaining increasing popularity due to the large amounts of useful information they offer alongside a traditional map. While the advantages of Google Maps are numerous, the website also has a number of downsides that may limit its usefulness.

- **Map Views:** The Google Maps website offers several map views that you can switch between depending on your needs. In addition to switching from a normal map to satellite imagery, you can overlay terrain information on the normal map. You can also use the Street View feature to get a panoramic view of the buildings and areas surrounding a particular street, which are put together from photographs taken at street level by specially equipped cars.
- **Directions:** Enter two or more distinct locations into the Google Maps website to get driving, walking and cycling directions for the most practical routes. Depending on the location, you are interested in; public transport directions also may be available. If several possible routes exist, you will see a summary of each with a rough estimate of the time that each route would take.
- **Custom Maps:** Using Google Maps, you can create a custom map for any location, adding place marks, lines and shapes to it, and save it to your Google account. You can load the saved map at any time, print it out for your reference and share a link to it with others. This makes the Google Maps website a useful tool to plan a holiday or a visit to a new city.
- **Additional Information:** Depending on the location you are interested in, Google Maps can provide additional information you might find useful, such as current traffic load, roadwork and road closures, photos of areas and landmarks, nearby webcams, and weather forecasts. If you search for the location of a business, Google Maps will provide you with a general rating and reviews of that business and a link to the company's website, if one exists.
- **Accuracy:** Information provided by the Google Maps website may be inaccurate or out of date. Walking and cycling directions, in particular, may suggest routes that are missing sidewalks, pedestrian paths or cycling paths. The suggested driving routes also may not be the most efficient ones available, and may not account for any specific requirements you may have, such as avoiding low clearance bridges and overpasses. Relying on Google Maps alone for any additional information you may need, such as public transit timetables, the location or opening hours of a business, road closures or traffic load, may lead to wasted time and frustration.
- **Accessibility:** The Google Maps website relies on downloading and displaying large images. Because of this, it may load slowly or not at all if you have a connection that is limited in speed. Similarly, the website may function poorly or not at all if viewed on a browser that is not fully updated or if Java is not updated.
- **Inappropriate Content:** The images used on the Google Maps website could occasionally contain inappropriate content. For example, photographs taken for the Street View feature may show people in compromising positions that would

not be appropriate for the general public. The pictures could also contain disturbing scenes such as car crashes. Satellite imagery taken at the wrong moment may display inappropriate words or drawings as a result of short-lived pranks. Google does, however, remove or replace these images when informed about them.

- **Missing Information:** Depending on the country and location you are interested in, you may find that entire buildings are blurred out in Street View. This is done on request because of privacy concerns, but this also severely limits the usefulness of the feature. Similarly, in the satellite view, certain areas may be displayed using older imagery or may be blurred out altogether.

5.4 Google APIs :[6]

Is a set of APIs developed by Google , which allow communication with Google Services and their integration to other services Examples of these include Search, Gmail, Translate or Google Maps. Third-party apps can use these APIs to take advantage of or extend the functionality of the existing services.

The APIs provide functionality like analytics, machine learning as a service (the Prediction API) or access to user data (when permission to read the data is given). Another important example is an embedded Google map on a website, which can be achieved using the Static maps API, Places API or Google Earth API.

5.4.1 Authentication and authorization:

Usage of some of the APIs require authentication and authorization using the OAuth 2.0 protocol. OAuth 2.0 is a simple protocol. To start, it is necessary to obtain credentials from the Developers Console. Then the client app can request an access token from the Google Authorization Server, and uses that token for authorization when accessing a Google API service.

5.4.2 Client libraries:

There are client libraries in various languages, which allow developers to use Google APIs from within their code, including Java, JavaScript, .NET, Objective-C, PHP and Python.

The Google Loader is a JavaScript library, which allows web developers to easily load other JavaScript APIs provided by Google and other developers of popular libraries. Google Loader provides a JavaScript method for loading a specific API (also called module), in which additional settings can be specified such as API version, language, location, selected packages, load callback and other parameters specific to a particular API. Dynamic loading or auto-loading is also supported to enhance the performance of the application using the loaded APIs.

5.4.3 Google Apps Script:

Google Apps Script is a cloud-based JavaScript platform which allows developers to write scripts that can manipulate APIs of services such as Calendar, Docs, Drive, Gmail, and Sheets and easily create Add-Ons for these services with chromium based applications.

5.4.4 Common use cases:

- **User registration** is commonly done via Google+ sign in, which allows users to securely log in to 3rd party services with their Google+ account using the Google+ API. This is currently available from within Android, iOS or JavaScript.

  It is popular to include a “Sign in with Google” button in Android apps, as typing login credentials manually is time-consuming due to limited screen size. As the user is usually signed into their Google account on their mobile device, signing-in/signing-up for a new service with a Google is usually a matter of a few button clicks.

- **Drive apps** are various web applications (often third party) which work within Google Drive using the Drive API. Users can integrate these apps into their Drive from the Chrome Web Store which allows them to do work entirely in the cloud. There are many apps available for collaborative document editing (Google Docs, Sheets), picture/video editing, work management or for sketching diagrams and workflows.

- **Custom Search** allows web developers to provide a search of their own website by embedding a custom search box and using the Custom Search API. They can customize the search results and make money off the ads shown using AdSense for Search.

- **App Engine apps** are web apps that run on the Google App Engine, a platform-as-a-service (PaaS) cloud computing platform which allows web developers to run their websites in Google datacenters.These web apps often take advantage of APIs to manipulate services such as TaskQueue (a distributed queue), BigQuery (a scalable database based on Dremel) or DataStore.

Chapter 6: Global Positioning System (GPS).

6.1What is GPS? [7]

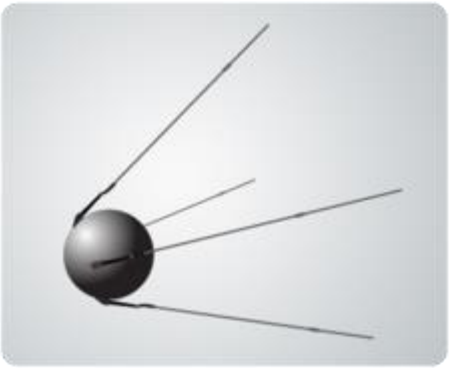
GPS or Global Positioning System is a network of orbiting satellites that send precise details of their position in space back to earth. The signals are obtained by GPS receivers, such as navigation devices and are used to calculate the exact position, speed and time at the vehicles location.

GPS is well known for its military uses and was first developed by the US to aid in its global intelligence efforts at the height of the Cold War.

Ever since the early 1980s, however, the GPS has been freely available to anyone with a GPS receiver. Airlines, shipping companies, trucking firms, and drivers everywhere use the GPS system to track vehicles, follow the best route to get them from A to B in the shortest possible time.

6.2History of GPS :[7]

Originally designed for military and intelligence applications at the height of the Cold War in the 1960s, with inspiration coming from the launch of the Soviet spacecraft Sputnik in 1957, the global positioning system (GPS) - is a network of satellites that orbit the earth at fixed points above the planet and beam down signals to anyone on earth with a GPS receiver. These signals carry a time code and geographical data point that allows the user to pinpoint their exact position, speed and time anywhere on the planet.



Transit was the first satellite system launched by the USA and tested by the US Navy in 1960. Just five satellites orbiting the earth allowed ships to fix their position on the seas once every hour. In 1967, Transit was succeeded by the Timation satellite, which demonstrated that highly accurate atomic clocks could be operated in space. GPS developed quickly for military purposes thereafter with a total of 11 "Block" satellites being launched between 1978 and 1985.

However, it wasn’t until the USSR shot down a Korean passenger jet - flight 007 - in 1983 that the Reagan Administration in the US had the incentive to open up GPS for civilian applications so that aircraft, shipping, and transport the world over could fix their positions and avoid straying into restricted foreign territory.

Upgrading the GPS was delayed by NASA space shuttle SS Challenger disaster in 1986 and it was not until 1989 that the first Block II satellites were launched. By the summer of 1993, the US launched their 24th Navistar satellite into orbit, which completed the modern GPS constellation of satellites - a network of 24 - familiar now as the Global Positioning System, or GPS. 21 of the constellation of satellites were active at any one time; the other three satellites were spares; in 1995, it was declared fully operational. Today's GPS network has around 30 active satellites in the GPS constellation.

Today, GPS is used for dozens of navigation applications, route finding for drivers, map-making, earthquake research, climate studies, and an outdoor treasure hunting game known as geocaching.

6.3 How does GPS work? [7]

There are three parts to a GPS system: a constellation of between 24 and 32 solar-powered satellites orbiting the earth in orbits at an altitude of approximately 20000 kilometers, a master control station and four control and monitoring stations (on Hawaii, Ascension Islands, Diego Garcia and Kawajale) and GPS receivers such as the one in a car.

Each of the satellites is in an orbit that allows a receiver to detect at least four of the operational satellites. The satellites send out microwave signals to a receiver where the built-in computer uses these signals to work out your precise distance from each of the four satellites and then triangulates your exact position on the planet to the nearest few meters based on these distances.

In fact, signals from just three satellites are needed to carry out this trilateration process; the calculation of your position on earth based on your distance from three satellites. The signal from the fourth satellite is redundant and is used to confirm the results of the initial calculation. If the position calculated from distances to satellites “A-B-C” do not match the calculation based on “A-B-D” then other combinations are tested until a consistent result is obtained.

The process of measuring the distance from satellite to GPS receiver is based on timed signals. For example, at 16h45m precisely, the satellite may begin broadcasting its signal. The GPS receiver will also begin running the same random sequence at 16h45m local time, but does not broadcast the sequence. When the receiver picks up the signal from the different satellites, there will be a time lag, because the microwaves take a fraction of a second to travel from the satellite to the receiver. The time lag is easily converted into distance to each satellite. The slight difference between signals from each satellite is then used to calculate the receiver's position.

6.4How does GPS mapping software work? [7]

The global positioning system (GPS) is a network of satellites that orbit the earth and send a signal to GPS receivers and Navigation devices, giving them the precise location, speed, and if you are in an aircraft or up a mountain, altitude.

To be really useful for navigation, GPS mapping software has to be kept up to date. Every year, some 5 percent of our roads are changed in some way. New bypasses are built, lanes are added to existing roads, speed limits are changed, one-way systems are introduced, and traffic signals are changed. Your Navigation device needs mapping software that is regularly updated.

This is the most obvious advantage of a digital mapping device, such as a Navigation device. Long gone are the days of relying on a traditional road atlas that is almost obsolete in some areas before you get into your vehicle.

Digital mapping companies are working constantly to update the GPS mapping software and to make it available to navigation device users as quickly and efficiently as possible. Digital maps come with street level detail to help you to find your way from A to B as conveniently as possible.

GPS satellites do not provide the maps they simply provide the position lock that is then overlaid on the maps by your GPS receiver. All navigation devices come with preloaded maps, but to make sure you have the latest maps for your navigation device, you have to install updated GPS mapping software regularly.

Map updates are available in two forms: either purchase an expansion card from a retailer or go online and download the updates to your computer ready for installing next time you connect your navigation device.

6.5Applications of GPS :[7]

Although originally designed for military and intelligence applications at the height of the Cold War in the 1960s, in the 1980s GPS was released for use in civilian applications. Today, millions of users rely on satellite navigation for finding their way from A to B and a whole lot more besides.The most obvious application for GPS is satellite navigation in vehicles, aircraft and ships. It allows anyone with a GPS receiver to pinpoint their speed and position on land, air or sea, with incredible accuracy. Drivers can use in-vehicle portable navigation devices to follow a route, find detours around traffic

problems and with additional software receive traffic alerts and warnings on safety camera locations.

GPS is also available for other uses: hikers and ramblers can use GPS receivers to ensure they are following their chosen route and to mark rendezvous points along the way. While gamers can take part in geocaching, a kind of treasure hunt for the digital age, which uses precise GPS, signals to help the players track down a hidden stash.

The emergency services, for instance, can use GPS not only to find their way to an incident quicker than ever before but also to pinpoint the location of accidents and allow follow-up staff to find the scene quickly. This is particularly useful for search and rescue teams at sea and in extreme weather conditions on land where time can be a matter of life or death. Scientists and engineers also have applications for GPS receivers, in scientific experiments, and in monitoring geological activity such as earth tremors, earthquakes and volcanic rumblings. They can use strategically positioned GPS devices to assist them in tracking climate change and other phenomena. Fundamentally, GPS can now be used to produce very accurate maps.

Chapter 7: Android

Android is an operating system based on the Linux kernel with a user interface based on direct manipulation, designed primarily for touchscreen mobile devices such as smartphones and tablet computers.
The operating system uses touch inputs that loosely correspond to real-world actions, like swiping, tapping, pinching, and reverse pinching to manipulate on-screen objects, and a virtual keyboard.
Despite being primarily designed for touchscreen input, it also has been used in televisions, games consoles, digital cameras, and other electronics[7][8].

7.1 History:[8]

Android Inc. Was founded in Palo Alto, California in October 2003 by Andy Rubin (co-founder of Danger), Rich Miner (co-founder of Wildfire Communications, Inc.), Nick Sears (once VP at T-Mobile), and Chris White (headed design and interface development at WebTV) to develop, in Rubin's words "smarter mobile devices that are more aware of its owner's location and preferences". The early intentions of the company were to develop an advanced operating system for digital cameras, when it was realized that the market for the devices was not large enough, and diverted their efforts to producing a smartphone operating system to rival those of Symbian and Windows Mobile. Despite the accomplishments of the founders and early employees, Android Inc. operated secretly, revealing only that it was working on software for mobile phones. That same year, Rubin ran out of money.Steve Perlman, a close friend of Rubin, brought him $10,000 in cash in an envelope and refused a stake in the company.

Google acquired Android Inc. on August 17, 2005; key employees of Android Inc., including Rubin, Miner, and White, stayed at the company after the acquisition.

Not much was known about Android Inc.

At the time, but many assumed that Google was planning to enter the mobile phone market with this move. At Google, the team led by Rubin developed a mobile device platform powered by the Linux kernel.Google marketed the platform to handset makers and carriers on the promise of providing a flexible, upgradable system. Google had lined up a series of hardware component and software partners and signaled to carriers that it was open to various degrees of cooperation on their part.

Speculation about Google's intention to enter the mobile communications market continued to build through ***December 2006***. An earlier prototype codenamed "Sooner" had a closer resemblance to a BlackBerry phone, with no touchscreen, and a physical, QWERTY keyboard, but was later re-engineered to support a touchscreen, to compete with other announced devices such as the ***2006*** LG Prada and ***2007*** Apple iPhone. In ***September 2007***, InformationWeek covered an Evalueserve study Reporting that Google had filed several patent applications in the area of mobile telephony.On ***November 5, 2007***, the Open Handset Alliance, a consortium of technology companies including Google, device manufacturers such as HTC, Sony and Samsung, wireless carriers such as Sprint Nextel and T-Mobile, and chipset makers such as Qualcomm and Texas Instruments, unveiled itself, with a goal to develop open standards for mobile devices. That day, Android was unveiled as its first product, a mobile device platform built on the Linux kernel version 2.6.25. The first commercially available smartphone running Android was the HTC Dream, released on ***October 22, 2008***.

In ***2010***, Google launched its Nexus series of devices – a line of smartphones and tablets running the Android operating system, and built by manufacturing partners. HTC collaborated with Google to release the first Nexus smartphone, the Nexus One. Google has since updated the series with newer devices, such as the Nexus 5 phone (made by LG) and the Nexus 7 tablet (made by Asus). Google releases the Nexus phones and tablets to act as their flagship Android devices, demonstrating Android's latest software and hardware features. On ***March 13, 2013,*** Larry Page announced in a blog post that Andy Rubin had moved from the Android division to take on new projects at Google. He was replaced by Sundar Pichai, who also continues his role as the head of Google's Chrome division, which develops Chrome OS.

Since ***2008***, Android has seen numerous updates, which have incrementally improved the operating system, adding new features and fixing bugs in previous releases. Each major release is named in alphabetical order after a dessert or sugary treat; for example, version 1.5 Cupcake was followed by 1.6 Donut. The latest released version, 4.4.3 KitKat, appeared on ***June 2, 2014***.

From ***2010 to 2013***, Hugo Barra served as product spokesperson for the Android team, representing Android at both press conferences and Google I/O, Google’s annual developer-focused conference. Barra’s product involvement included the entire Android ecosystem of software and hardware, including Honeycomb, Ice Cream Sandwich, Jelly Bean and KitKat operating system launches, the Nexus 4 and Nexus 5 smartphones, the Nexus and Nexus 10 tablets, and other related products such as Google Now and Google Voice Search, Google’s speech recognition product comparable to Apple’s Siri. In ***2013,*** Barra left the Android team for Chinese smartphone maker Xiaomi.

7.2 Features:[8] [9]

7.2.1 Interface:

Android's default user interface is based on direct manipulation, using touch inputs, that loosely correspond to real-world actions, like swiping, tapping, pinching, and reverse pinching to manipulate on-screen objects, and a virtual keyboard.

The response to user input is designed to be immediate and provides a fluid touch interface, often using the vibration capabilities of the device to provide haptic feedback to the user.

Internal hardware such as accelerometers, gyroscopes and proximity sensors are used by some

applications to respond to additional user actions, for example adjusting the screen from portrait to landscape depending on how the device is oriented, or allowing the user to steer a vehicle in a racing game by rotating the device, simulating control of a steering wheel.

7.2.2 Applications:

Android has a growing selection of third party applications, which can be acquired by users either through an app store such as Google Play or the Amazon Appstore, or by downloading and installing the application's APK file from a third-party site. Google Play Store allows users to browse, download and update applications published by Google and third-party developers, and the Play Store client application is pre-installed on devices that comply with Google's compatibility requirements and license the Google Mobile Services software. The client application filters the list of available applications down to those compatible with the user's device, and developers may restrict their applications to particular carriers or countries for business reasons.

As of July 2013, there are more than one million applications available for Android in Play Store. As of May 2013, 48 billion apps have been installed from Google Play store.

Applications ("apps") that extend the functionality of devices are developed primarily in the Java programming language using the Android software development kit (SDK).

The SDK includes a comprehensive set of development tools, including a debugger, software libraries, a handset emulator based on QEMU, documentation, sample code, and tutorials.

The officially supported integrated development environment (IDE) is Eclipse using the Android Development Tools (ADT) plugin.

Other development tools are available, including a Native Development Kit for applications or extensions in C or C++, Google App Inventor, a visual environment for novice programmers, and various cross platform mobile web applications frameworks.

It was announced in January 2014 that Chrome HTML5 web applications should become available, using a compatibility layer from the open source Apache Cordova framework to allow such applications to be wrapped in a native application shell, enabling their distribution over Google Play.

7.2.3 Memory Management:

Since Android devices are usually battery-powered, Android is designed to manage memory (RAM) to keep power consumption at a minimum, in contrast to desktop operating systems, which generally assume they are connected to unlimited mains electricity.

When an Android app is no longer in use, the system will automatically suspend it in memory – while the app is still technically "open", suspended apps consume no resources (for example, battery power or processing power) and sit idly in the background until needed again.

This has the dual benefit of increasing the general responsiveness of Android devices, since applications do not need to be closed and reopened from scratch each time, and ensuring that background applications do not consume power needlessly.

Android manages the apps stored in memory automatically: when memory is low, the system will begin killing apps and processes that have been inactive for a while, in reverse order since they were last used (oldest first). This process is designed to be invisible to the user, such that users do not need to manage memory or the killing of apps themselves. However, confusion over Android memory management has resulted in third-party task killers becoming popular on Google Play store; these third-party task killers are generally regarded as doing more harm than good.

7.3 Hardware:[8] [10]

The main hardware platform for Android is the 32-bit ARMv7 architecture. The Android-x86 project provides support for the x86 architecture, and Google TV uses a special x86 version of Android. In 2012, Intel processors began to appear on more mainstream Android platforms, such as phones. In 2013, Freescale announced support for Android on its i.MX processor, specifically the i.MX5X and i.MX6X series.

As of November 2013, current versions of Android recommend at least 512 MB of RAM (with 340 MB as a requirement), and require a 32-bit ARMv7, MIPS or x86 architecture processor (latter two through unofficial ports), together with an OpenGL ES 2.0 compatible graphics processing unit (GPU). Android supports OpenGL ES 1.1, 2.0 and 3.0. Some applications explicitly require certain version of the OpenGL ES, thus suitable GPU hardware is required to run such applications.

In addition to running directly on x86-based hardware, Android can also be run on x86 architecture by using an Android emulator which is part of the Android SDK, or by using BlueStacks or Andy.

Android devices incorporate many optional hardware components, including still or video cameras, GPS, orientation sensors, dedicated gaming controls, accelerometers, gyroscopes, barometers, magnetometers, proximity sensors, pressure sensors, thermometers, and touchscreens.

Some hardware components are not required, but became standard in certain classes of devices, such as smartphones, and additional requirements apply if they are present.

Some other hardware was initially required, but those requirements have been relaxed or eliminated altogether.

For example, as Android was developed initially as a phone OS, hardware such as microphones were required, while over time the phone function became optional.

Android used to require an autofocus camera, which was relaxed to a fixed-focus camera if it is even present at all, since the camera was dropped as a requirement entirely when Android started to be used on set-top boxes.

7.4 Development:[8] [9] [11]

Android is developed in private by Google until the latest changes and updates are ready to be released, at which point the source code is made available publicly.

This source code will only run without modification on select devices, usually the Nexus series of devices. The source code is, in turn, adapted by OEMs to run on their hardware.

Android's source code does not contain the often proprietary device drivers that are needed for certain hardware components.

The green Android logo was designed for Google in 2007 by graphic designer Irina Blok.

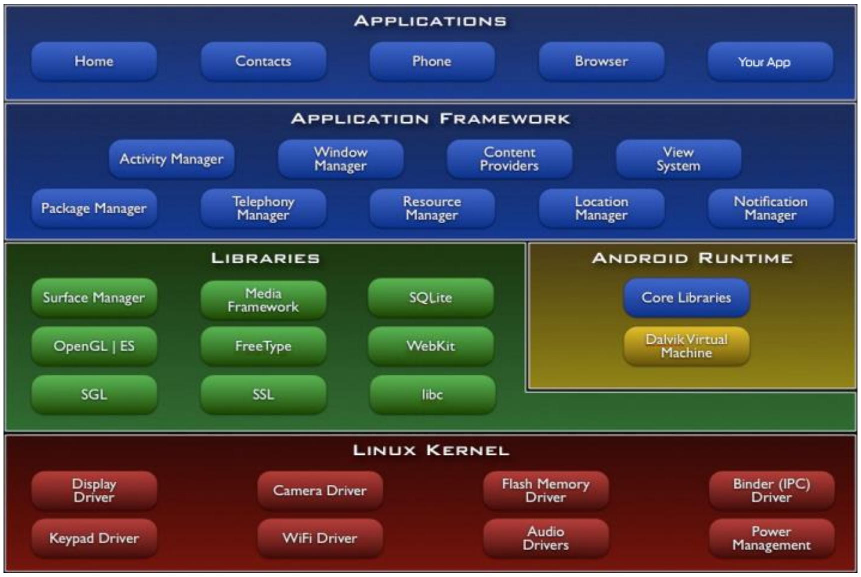
The design team was tasked with a project to create a universally identifiable icon with the specific inclusion of a robot in the final design.

After numerous design developments based on science-fiction and space movies, the team eventually sought inspiration from the human symbol on restroom doors and modified the figure into a robot shape.

As Android is open-sourced, it was agreed that the logo should be likewise, and since its launch the green logo has been reinterpreted into countless variations on the original design.

7.5 Android architecture:[10]

We can show in below Figure (7-1)



(Figure 7-1)

7.5.1 Linux Kernel:

Android consists of a kernel based on the Linux kernel long-term support (LTS) branch. As of January 2014, current Android versions are built upon Linux kernel 3.4 or newer, but the specific kernel version number depends on the actual Android device and chipset. Android has used various kernels since its first 2.6.25.

Android's Linux kernel has further architectural changes that are implemented by Google outside the typical Linux kernel development cycle, such as the inclusion of components like Binder, ashmem, pmem, logger, wakelocks, and different out-of-memory (OOM) handling.

Certain features that Google contributed back to the Linux kernel, notably a power management feature called "wakelocks", were rejected by mainline kernel developers partly because they felt that Google did not show any intent to maintain its own code.

Google announced in April 2010 that they would hire two employees to work with the Linux kernel community, but Greg Kroah-Hartman, the current Linux kernel maintainer for the stable branch, said in December 2010 that he was concerned that Google was no longer trying to get their code changes included in mainstream Linux.

Some Google Android developers hinted that "the Android team was getting fed up with the process," because they were a small team and had more urgent work to do on Android.

In August 2011, Linus Torvalds said that "eventually Android and Linux would come back to a common kernel, but it will probably not be for four to five years".

In December 2011, Greg Kroah-Hartman announced the start of Android Mainlining Project, which aims to put some Android drivers, patches and features back into the Linux kernel, starting in Linux 3.3. Linux included the auto sleep and wake locks capabilities in the 3.5 kernel, after many previous attempts at merger.

The interfaces are the same but the upstream Linux implementation allows for two different suspend modes: to memory (the traditional suspend that Android uses), and to disk (hibernate, as it is known on the desktop). Google maintains a public code repository that contains their experimental work to re-base Android off the latest stable Linux versions.

The flash storage on Android devices is split into several partitions, such as /system for the operating system itself, and /data for user data and application installations.

In contrast to desktop Linux distributions, Android device owners are not given root access to the operating system and sensitive partitions such as /system are read-only.

However, root access can be obtained by exploiting security flaws in Android, which is used frequently by the open-source community to enhance the capabilities of their devices, but also by malicious parties to install viruses and malware.

Android is a Linux distribution according to the Linux Foundation, Google's open-source chief Chris DiBona, and several journalists. Others, such as Google engineer Patrick Brady, say that Android is not Linux in the traditional Unix-like Linux distribution sense; Android does not include the GNU C Library and some of other components typically found in Linux distributions.

Libraries: The next layer is the Android's native libraries. It is this layer that enables the device to handle different types of data. These libraries are written in c or c++ language and are specific for a particular hardware.

7.5.2 Libraries:

Some of the important native libraries include the following:

- **Surface Manager:** It is used for compositing window manager with off-screen buffering. Off-screen buffering means you can't directly draw into the screen, but your drawings go to the off-screen buffer. There it is combined with other drawings and form the final screen the user will see. This off screen buffer is the reason behind the transparency of windows.
- **Media framework:** Media framework provides different media codecs allowing the recording and playback of different media formats
- **SQLite:** SQLite is the database engine used in android for data storage purposes
- **WebKit:** It is the browser engine used to display HTML content
- **OpenGL:** Used to render 2D or 3D graphics content to the screen

7.5.3 Android Runtime:

Android Runtime consists of Dalvik Virtual machine and Core Java libraries.

Dalvik Virtual Machine It is a type of JVM used in android devices to run apps and is optimized for low processing power and low memory environments. Unlike the JVM, the Dalvik Virtual Machine doesn’t run .class files, instead it runs .dex files. .dex files are built from .class file at the time of compilation and provides hifger efficiency in low resource environments. The Dalvik VM allows multiple instance of Virtual machine to be created simultaneously providing security, isolation, memory management and threading support. It is developed by Dan Bornstein of Google.

Core Java Libraries These are different from Java SE and Java ME libraries. However these libraries provides most of the functionalities defined in the Java SE libraries.

7.5.4 Application Framework:

These are the blocks that our applications directly interacts with. These programs manage the basic functions of phone like resource management, voice call management etc. As a developer, you just consider these are some basic tools with which we are building our applications.

Important blocks of Application framework are:

- **Activity Manager:** Manages the activity life cycle of applications
- **Content Providers:** Manage the data sharing between applications
- **Telephony Manager:** Manages all voice calls. We use telephony manager if we want to access voice calls in our application.
- **Location Manager:** Location management, using GPS or cell tower
- **Resource Manager:** Manage the various types of resources we use in our Application

7.5.5 Application:

Applications are the top layer in the Android architecture and this is where our applications are goanna fit. Several standard applications comes pre-installed with every device, such as:

- **SMS client app**
- **Dialer**
- **Web browser**
- **Contact manager**

As a developer, we are able to write an app, which replace any existing system app.

That is, you are not limited in accessing any particular feature.

You are practically limitless and can whatever you want to do with the android (as long as the users of your app permits it).

Thus, Android is opening endless opportunities to the developer.

7.6 Platform Usage:[8]

We can show in below figure (Figure 7-2)

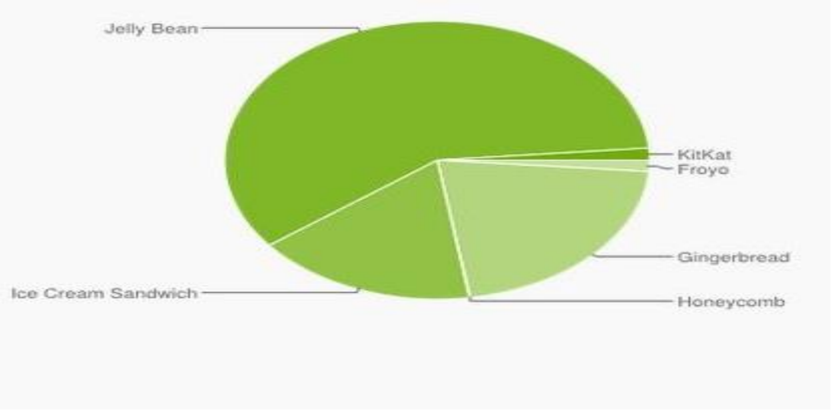


Figure 7-2

The Table (7-1) below provides a breakdown of Android versions.
This is based on devices accessing Play Store as of June 1, 2014, and therefore it excludes Android derivatives that do not access Google Play (for example, Kindle Fire).

Version	Code name	Release date	API level	Distribution
4.4	KitKat	October 31,2013	19	1.4%
4.3	Jelly Bean	July 24, 2013	18	7.8%
4.2.x		November 13,2012	17	15.4%
4.1.x		July 9, 2012	16	35.9%
4.0.3 – 4.0.4	Ice Cream Sandwich	December 16,2011	15	16.9%
3.2	Honeycomb	Nov 2011	13	0.1%
2.3.3 – 2.3.7	Gingerbread	February 9,2011	10	21.2%
2.2	Froyo	May 20, 2010	8	1.3%

Table 7-1

Chapter 8: ASP.NET MVC 5

8.1 What is ASP.NET MVC?[12]

ASP.NET MVC provides an alternative to Web Forms for building web applications on the .NET platform.

It was first unveiled by Microsoft in November 2007 and has since had four major releases.

The third major version, ASP.NET MVC 3, was released at the end of January 2011 and is the first version of ASP.NET MVC to take a dependency on .NET 4. ASP.NET MVC 4 and MVC 5 works with .NET 4 as well as .NET 4.5, which has not released at publishing time MVC stands for Model-View-Controller, a design pattern that's very popular in the web development space.

As an alternative to Web Forms, ASP.NET MVC takes a different approach when it comes to structuring web applications.

This means you will not be dealing with ASPX pages and controls, post backs or view state, or complicated event lifecycles. Instead, you will be defining controllers, actions, and views. The underlying ASP.NET platform is the same, however, so things like HTTP handlers and HTTP modules still apply, and you can mix MVC and Web Forms pages in the same application. Both ASP.NET Web Forms and ASP.NET MVC sit alongside each other on top of the core ASP.NET platform.

8.2 The MVC pattern: [12]

The Model-View-Controller pattern originated in the Smalltalk development community in the 1970s, although it was popularized for use on the web with the advent of Ruby on Rails in 2003.

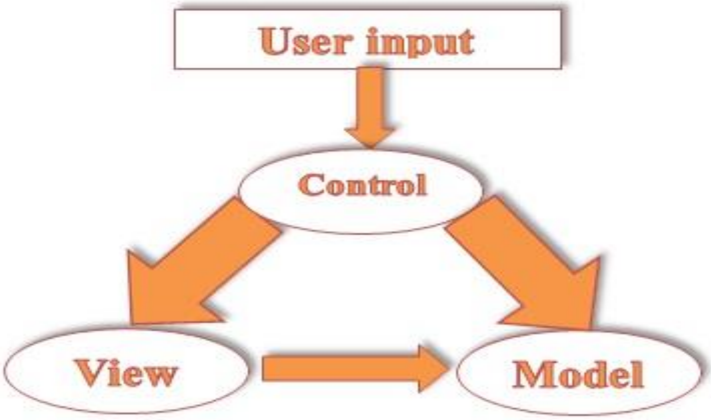
There are three pieces to the MVC pattern:

1. **The model:** the domain that your software is built around. If you were building a blog, your models might be post and comment. In some contexts, the term model might refer to a view-specific model a representation of the domain for the specific purpose of being displayed in the user interface.

2. **The view:** the visual representation of a model, given some context. It is usually the resulting markup that the framework renders to the browser, such as the HTML representing the blog post.

3. **The controller:** the coordinator that provides the link between the view and the model. The controller is responsible for processing input, acting upon the model, and deciding on what action should be performed, such as rendering a view or redirecting to another page.

Continuing the blog example, the controller might look up the most recent comments for a post (the model) and pass them to the view for rendering. As shown in figure (8-1).



(Figure 8-1)

8.3 Benefits of ASP.NET MVC:[12][13]

ASP.NET MVC addresses many of the shortcomings of ASP.NET Web Forms, which can often make it a better choice for developing new applications on the .NET platform.

8.3.1 CLOSER TO THE PROTOCOL:

While ASP.NET Web Forms attempts to completely hide the stateless nature of HTTP, ASP.NET MVC does not. By embracing the MVC pattern and mapping a single HTTP request to a single method call, ASP.NET MVC provides a development experience that is far more familiar to anyone with a web development background. The model is also drastically simplified—gone are the complex page lifecycle events of Web Forms, and the abstractions over HTTP are minimal.

8.3.2 SEPARATION OF CONCERNS:

While ASP.NET Web Forms tightly couples the user interface to its code-behind, ASP.NET MVC encourages a design where the user interface (the view) is kept separate from the code that drives it (the controller). When implemented well, this means that applications can be easier for developers to navigate, and it also makes the application easier to maintain—making a change to a controller does not necessarily mean you also have to modify the user interface.

8.3.3 TESTABILITY :

By separating application logic from the user interface, ASP.NET MVC makes it easier to test individual components in isolation. Controller classes can be tested without testing the actual user interface. Unlike Web Forms, MVC controllers do not have a direct dependency on the infamously untestable HttpContext class and instead rely on an abstraction, which makes it far easier to write automated unit tests. Now that you've seen some of the benefits of ASP.NET MVC, we'll briefly explore what's new in the third release of the framework.

8.4 WHAT IS NEW IN ASP.NET MVC 5?[12] [13]

- **MVC 5** come with many improvements and several new features in addition to the new dependency on .NET 4. These new features include
- **One ASP.NET:** The Web MVC project templates integrate seamlessly with the new One ASP.NET experience. You can customize your MVC project and configure authentication using the One ASP.NET project creation wizard. An introductory tutorial to ASP.NET MVC 5 can be found at Getting Started with ASP.NET MVC 5.
- **ASP.NET Identity:** The MVC project templates have been updated to use ASP.NET Identity for authentication and identity management. A tutorial featuring Facebook and Google authentication and the new membership API can be found at Create an ASP.NET MVC 5 App with Facebook and Google OAuth2 and OpenID Sign-on and Deploy a Secure ASP.NET MVC app with Membership, OAuth, and SQL Database to a Windows Azure Web Site.
- **Bootstrap:** The MVC project template has been updated to use Bootstrap to provide a sleek and responsive look and feel that you can easily customize. For more information
- **Authentication filters :**Authentication filters are a new kind of filter in ASP.NET MVC that run prior to authorization filters in the ASP.NET MVC pipeline and allow you to specify authentication logic per-action, per-controller, or globally for all controllers. Authentication filters process credentials in the request

and provide a corresponding principal. Authentication filters can also add authentication challenges in response to unauthorized requests.

- **Filter overrides:** You can now override which filters apply to a given action method or controller by specifying an override filter. Override filters specify a set of filter types that should not be run for a given scope (action or controller). This allows you to configure filters that apply globally but then exclude certain global filters from applying to specific actions or controllers. See New Filter Overrides feature in ASP.NET MVC 5 and ASP.NET Web API 2, How to use the ASP.NET MVC 5 Filter Overrides Feature, and Filter Overrides in ASP.NET MVC 5
- **Attribute routing:** ASP.NET MVC now supports attribute routing, thanks to a contribution by Tim McCall, the author of http://attributerouting.net. With attribute, routing you can specify your routes by annotating your actions and controllers.
- **New Web Project Experience:** We have enhanced the experience of creating new web projects in Visual Studio 2013. In the New ASP.NET Web Project dialog, you can select the project type you want, configure any combination of technologies (Web Forms, MVC, and Web API), configure authentication options, and add a unit test project.
- **ASP.NET Scaffolding:** ASP.NET Scaffolding is a code generation framework for ASP.NET Web applications. It makes it easy to add boilerplate code to your project that interacts with a data model.

8.5 The Razor view ENGINE:[13] [14]

One of the core components of the new ASP.NET Web Pages technology is the Razor view engine. This engine provides a concise way to mix code and markup within the same file.

ASP.NET MVC applications can also make use of the Razor view engine as an alternative to the Web Forms view engine that was available in both ASP.NET MVC 1 and 2.

As an example, the following code snippet shows a simple page that constructs a list of product names using the older Web Forms view engine:

```
<%@ Page Language="C#" Inherits="System.Web.Mvc.ViewPage<Student[ ]>"
%>
<ul>
<% foreach(var product in Model) { %>
<li><%: Student.Name %></li>
<% } %>
</ul>
```

This is quite verbose. The Page declaration at the top and the code nuggets (<% and %>) that are used to switch between code and markup add a lot of additional characters to the page markup. By contrast, Razor provides a much cleaner way to achieve the same result:

```
@model Student [ ]
<ul>
@foreach(var Student  in Model) {
<li>@ Student.Name</li>
}
</ul>
```

As you can see, Razor does not require code nuggets to transition between code and markup, which helps to keep view logic much more focused on the page's markup.

8.6 DATA ACCESS : [13] [14] [15]

For data access to our project, we have used the SQL Server Compact Edition (SQL CE), it is a free, embedded, file database that does not requires any installation or configuration.

8.6.1 Database access with Entity Framework Code-First:

We will use the Entity Framework (EF) support that is included in ASP.NET MVC 3 projects to query and update the database. EF is a flexible object relational mapping (ORM) data API that enables developers to query and update data stored in a database in an object-oriented way.

Entity Framework version 4 supports a development paradigm called code-first. Code-first allows you to create model object by writing simple classes (also known as POCO from "plain-old" CLR objects), and can even create the database on the fly from your classes.

And here is a brief example on how to use this tool (let's say the table name is Products)

```
using System;
using System.Collections.Generic;
using System.ComponentModel.DataAnnotations;
using System.ComponentModel.DataAnnotations.Schema;
using PagedList;

namespace NewUniversity.Models
{
  public class Student
  {
    public int StudentID { get; set; }
    public string FirstMidName { get; set; }
```

```
            public string LastName { get; set; }
            public string Country { get; set; }
            public string City { get; set; }
            public string Phone { get; set; }
            public string PassCode { get; set; }

        public virtual ICollection<Register> Registers { get; set; }
    }
}
```

8.6.2 Using Data Annotations for Model Validation:

We have a major issue with our Create and Edit forms: they are not doing any validation. We can do things like leave required fields blank or type letters in the Price field, and the first error we will see is from the database.

We can easily add validation to our application by adding Data Annotations to our model classes. Data Annotations allow us to describe the rules we want applied to our model properties, and ASP.NET MVC will take care of enforcing them and displaying appropriate messages to our users.

In addition, here is the main Data Annotation attributes:

- **Required:** Indicates that the property is a required field.
- **DisplayName:** Defines the text we want used on form fields and validation messages.
- **StringLength:** Defines a maximum length for a string field.
- **Range:** Gives a maximum and minimum value for a numeric field.
- **RegularExpression:** Used to identify mistakes in writing to restrict the entry.
- **Column:** Defines a New name for Colum.
- **DisplayFormat:** Defines the Date Type we want used on form fields.
- **DataType :**Defines a Data Type for a string field
- **EmailAddress:** Defines an Email Address for a string field.

After making the validation using Data Annotation on the model, the Product class (table) will be as shown:

```
using System;
using System.Collections.Generic;
using System.ComponentModel.DataAnnotations;
using System.ComponentModel.DataAnnotations.Schema;
using PagedList;

namespace NewUniversity.Models
```

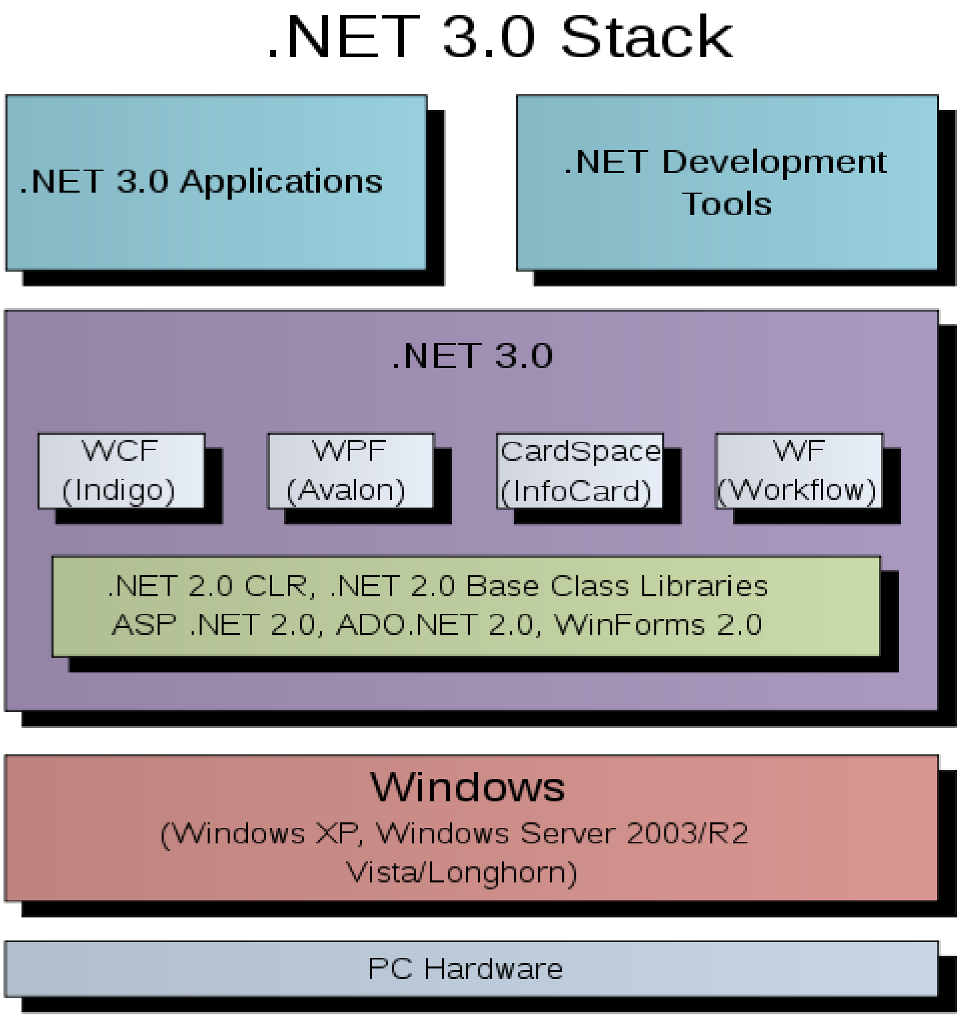
```
{
  public class Student
  {
    public int StudentID { get; set; }

    [RegularExpression(@"^[A-Z]+[a-zA-Z"-'\s]*$")]
    [StringLength(50, ErrorMessage = "First name cannot be longer than 50 characters.")]
    [Column("FirstName")]
    public string FirstMidName { get; set; }

    [RegularExpression(@"^[A-Z]+[a-zA-Z"-'\s]*$")]
    [StringLength(50, MinimumLength = 1, ErrorMessage = "Last name cannot be longer
than 50 characters.")]
    public string LastName { get; set; }
    [StringLength(10, ErrorMessage = "Country name cannot be longer than 10
characters.")]
    public string Country { get; set; }

    [StringLength(10, MinimumLength = 1, ErrorMessage = "City name cannot be longer
than 10 characters.")]
    public string City { get; set; }


     [Required]
    [Display(Name = "Register Date ")]
    [DataType(DataType.Date)]
    [DisplayFormat(DataFormatString = "{0:yyyy-MM-dd}", ApplyFormatInEditMode =
true)]
    public DateTime EnrollmentDate { get; set; }

    [Display(Name = "Phone ")]
    [RegularExpression(@"^(\+\s?)?((?<!\+.*)\(\+?\d+([\s\-\.]?\d+)?\)|\d+)([\s\-
\.]?(\(\d+([\s\-\.]?\d+)?\)|\d+))*(\s?(x|ext\.?)\s?\d+)?$", ErrorMessage = "Invalid Phone
Number!")]
    public string Phone { get; set; }

    [Display(Name = "Email addres ")]
    [EmailAddress(ErrorMessage = "Roung Email Address")]
    public string Email { get; set; }

    [Required]
    [Display(Name = "Pass Code")]
    [DataType(DataType.Password)]
    [StringLength(10, MinimumLength = 5, ErrorMessage = "Pass Code cannot be less
than 5 and longer than 10 characters.")]
    public string PassCode { get; set; }

    public virtual ICollection<Register> Registers { get; set; }
  }
}
```

Chapter 9: windows communication foundation services

Visual Studio 2012 provides tools for working with Windows Communication Foundation (WCF) and WCF Data Services, Microsoft technologies for creating distributed applications. This topic provides an introduction to services from a Visual Studio perspective.

9.1 WCF Architecture :[16] [17]

Shown below in Figure (Figure 9-1).



(Figure 9-1)

WCF is a tool often used to implement and deploy a service-oriented architecture (SOA).It is designed using service-oriented architecture principles to support distributed computing where services have remote consumers.

Clients can consume multiple services; services can be consumed by multiple clients. Services are loosely coupled to each other.

Services typically have a WSDL interface (Web Services Description Language) that any WCF client can use to consume the service, regardless of which platform the service is hosted on.

WCF implements many advanced Web services (WS) standards such as WS-Addressing, WS-ReliableMessaging and WS-Security. With the release of .NET Framework 4.0, WCF also provides RSS Syndication Services, WS-Discovery, routing and better support for REST services.

9.2 Endpoints: [16] [17]

A WCF client connects to a WCF service via an Endpoint. Each service exposes its contract via one or more endpoints. An endpoint has an address (which is a URL specifying where the endpoint can be accessed) and binding properties that specify how the data will be transferred.

The mnemonic "ABC" can be used to remember address / binding / Contract. Binding specifies what communication protocols are used to access the service, whether security mechanisms are to be used, and the like. WCF includes predefined bindings for most common communication protocols such as SOAP over HTTP, SOAP over TCP, and SOAP over Message Queues, etc. Interaction between WCF endpoint and client is done using a SOAP envelope. SOAP envelopes are in simple XML form, which makes WCF platform-independent. When a client wants to access the service via an endpoint, it not only needs to know the contract, but it also has to adhere to the binding specified by the endpoint. Thus, both client and server must have compatible endpoints.

With the release of the .NET Framework 3.5 in November 2007, Microsoft released an encoder that added support for the JSON serialization format to WCF. This allows WCF service endpoints to service requests from AJAX-powered Web pages which only accept JSON.

9.3 Behaviors: [16] [17]

Behaviors are just types that modify or extend service or client functionality. Behaviors allow the developer to create custom processing, transformation, or inspection that is applied to messages as they are sent or received. Some examples of uses for behaviors are:

- Controlling whether metadata is published with a service.
- Adding security features to a service, such as impersonation, authorization, or managing tokens
- Recording information about messages, such as tracking, tracing, or logging
- Message or parameter validation
- Invoking all additional operations when messages are received--such as notifying users when certain messages arrive

Behaviors implement the IServiceBehavior interface for service extensions, the IEndpointBehavior for endpoints, the IContractBehavior interface for service contracts, or the IOperationBehavior for operations. Service behaviors are used for message processing across a service, rather than processing that would be specific to a single operation.

9.4 What Is WCF? [16] [17]

Windows Communication Foundation (WCF) is a unified framework for creating secure, reliable, transacted, and interoperable distributed applications. In earlier versions of Visual Studio, there were several technologies that could be used for communicating between applications.

If you wanted to share information in a way that enabled it to be accessed from any platform, you would use a Web service (also known as an ASMX Web service). If you wanted to just move data between a client and server that was running on the Windows operating system, you would use .NET Remoting. If you wanted transacted communications, you would use Enterprise Services (DCOM), or if you wanted a queued model you would use Message Queuing (also known as MSMQ).

WCF brings together the functionality of all those technologies under a unified programming model. This simplifies the experience of developing distributed applications.

9.5 What are WCF Data Services? [16] [17]

WCF Data Services are services that interact directly with a database, allowing you to return data using standard HTTP verbs such as GET, POST, PUT or DELETE. In general, WCF Data Services are a good choice for applications that are used to create, update, or delete records in a database.

9.6 WCF Programming Model: [16] [17]

The WCF Programming model is based on communication between two entities: a WCF service and a WCF client. The programming model is encapsulated in theSystem.ServiceModel namespace in the .NET Framework.

9.7 WCF Service: [16] [17]

A WCF service is based on an interface that defines a contract between the service and the client. It is marked with a ServiceContractAttribute attribute, as shown in the following code:

```
C#
[OperationContract]
string GetData(string value);
```

You define functions or methods that are exposed by a WCF service by marking them with an OperationContractAttribute attribute. In addition, you can expose serialized data by marking a composite type with a DataContractAttribute attribute. This enables data binding in a client.

After an interface and its methods are defined, they are encapsulated in a class that implements the interface. A single WCF service class can implement multiple service contracts.

A WCF service is exposed for consumption through what is known as an endpoint. The endpoint provides the only way to communicate with the service; you cannot access the service through a direct reference as you would with other classes.

An endpoint consists of an address, a binding, and a contract. The address defines where the service is located; this could be a URL, an FTP address, or a network or local path. A binding defines the way that you communicate with the service. WCF bindings provide a versatile model for specifying a protocol such as HTTP or FTP, a security mechanism such as Windows Authentication or user names and passwords, and much more. A contract includes the operations that are exposed by the WCF service class.

Multiple endpoints can be exposed for a single WCF service. This enables different clients to communicate with the same service in different ways. For example, a banking service might provide one endpoint for employees and another for external customers, each using a different address, binding, and/or contract.

9.8 WCF Client: [16] [17]

A WCF client consists of a proxy that enables an application to communicate with a WCF service, and an endpoint that matches an endpoint defined for the service. The proxy is generated on the client side in the app.config file and includes information about the types and methods that are exposed by the service. For services that expose multiple endpoints, the client can select the one that best fits its needs, for example, to communicate over HTTP and use Windows Authentication.

After a WCF client has been created, you reference the service in your code just as you would any other object. For example, to call the GetData method shown earlier, you would write code that resembles the following:

```
C#
private void button1_Click(System.Object sender, System.EventArgs e)
{
ServiceReference1.Service1Client client = new
ServiceReference1.Service1Client();
string returnString;
returnString = client.GetData(textBox1.Text);
label1.Text = returnString;
}
```

9.9 WCF Tools in Visual Studio:[17]

Visual Studio 2012 provides tools to help you create both WCF services and WCF clients.

9.9.1 Creating and Testing WCF Services:

You can use the WCF Visual Studio templates as a foundation to quickly create your own service. You can then use WCF Service Auto Host and WCF Test Client to debug and test the service. These tools together provide a fast and convenient debug and testing cycle, and eliminate the requirement to commit to a hosting model at an early stage.

9.9.2 WCF Templates:

WCF Visual Studio templates provide a basic class structure for service development. Several WCF templates are available in the Add New Project dialog box. These include WCF Service Library projects, WCF Service Web Sites, and WCF Service Item templates.
When you select a template, files are added for a service contract, a service implementation, and a service configuration. All necessary attributes are already

added, creating a simple "Hello World" type of service, and you did not have to write any code. You will, of course, want to add code to provide functions and methods for your real world service, but the templates provide the basic foundation.

9.9.3 WCF Service Host:

When you start the Visual Studio debugger (by pressing F5) for a WCF service project, the WCF Service Host tool is automatically started to host the service locally. WCF Service Host enumerates the services in a WCF service project, loads the project's configuration, and instantiates a host for each service that it finds.

By using WCF Service Host, you can test a WCF service without writing extra code or committing to a specific host during development.

9.9.4 WCF Test Client:

The WCF Test Client tool enables you to input test parameters, submit that input to a WCF service, and view the response that the service sends back. It provides a convenient service testing experience when you combine it with WCF Service Host.

When you press F5 to debug a WCF service project, WCF Test Client opens and displays a list of service endpoints that are defined in the configuration file. You can test the parameters and start the service, and repeat this process to continuously test and validate your service.

9.9.5 Accessing WCF Services in Visual Studio:

Visual Studio 2012 simplifies the task of creating WCF clients, automatically generating a proxy and an endpoint for services that you add by using the Add Service Reference dialog box. All necessary configuration information is added to the app.config file. Most of the time, all that you have to do is instantiate the service in order to use it.

The Add Service Reference dialog box enables you to enter the address for a service or to search for a service that is defined in your solution. The dialog box returns a list of services and the operations provided by those services. It also enables you to define the namespace by which you will reference the services in code.

The Configure Service References dialog box enables you to customize the configuration for a service. You can change the address for a service, specify access level, asynchronous behavior, and message contract types, and configure type reuse.

9.10 Interoperability: [16] [17]

WCF supports interoperability with WCF applications running on the same Windows machine or WCF running on a different Windows machines or standard Web services built on platforms such as Java running on Windows or other operating systems. In addition to SOAP, WCF 4 supports non-SOAP XML, RSS, JSON, and binary formats for external communication via HTTP or HTTPS.

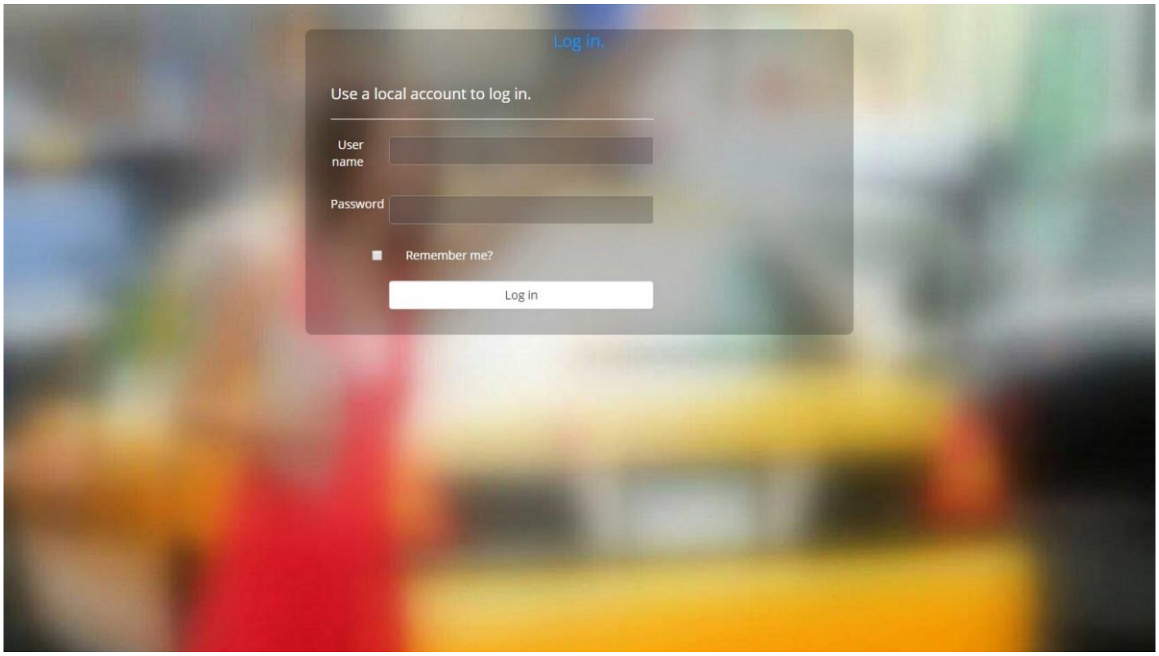
Chapter 10: Project Implementation

In this Chapter we will see some pictures taken of the three parts of the project.

10.1 First part (YourTaxi website):

10.1.1 Login:

It is the case of access to the site in case the information is entered correctly login done and if the wrong information that rejects login Shown below in Figure (Figure 10-1).



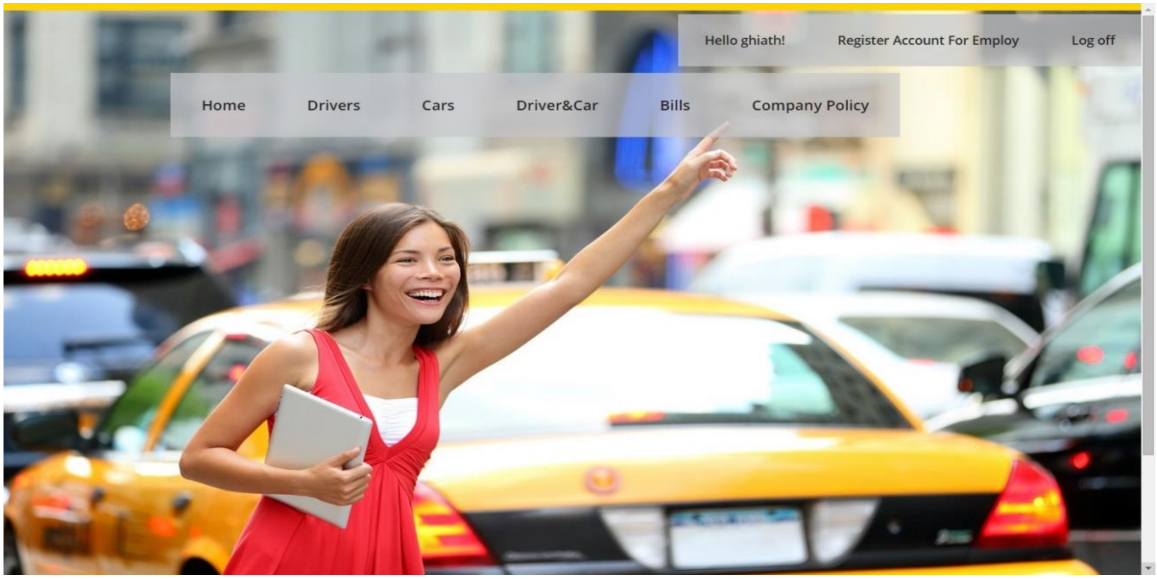
Log in.

Use a local account to log in.

(Figure 10-1).

10.1.2 Home page:

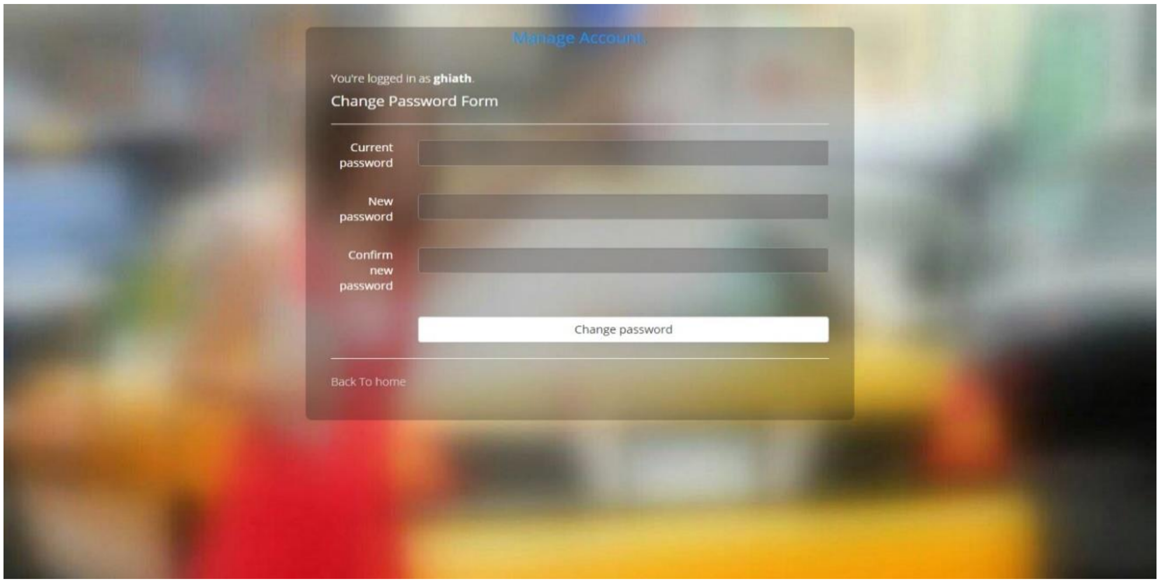
They come after the login process and is the main interface to navigate to any section we want by the role given Shown below in Figure (Figure 10-2).



(Figure 10-2).

10.1.3 Manage Account page:

In this user is able to change its own password as Shown below in Figures (Figure 10-3)

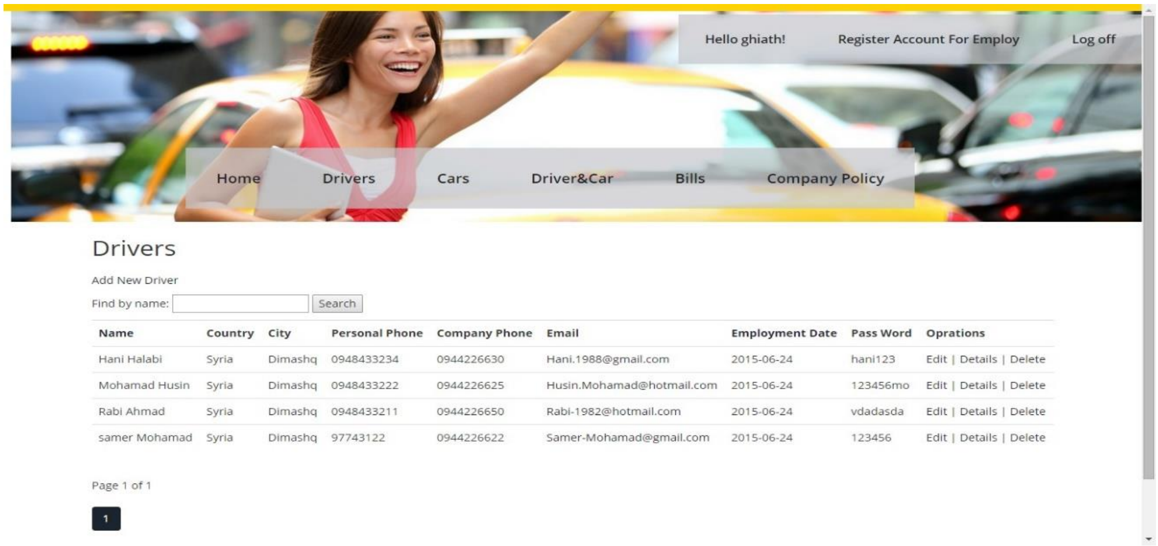


You're logged in as **ghiath**.

(Figure 10-3)

10.1.4 The index page:

It is the page where the data show for the user and it is found in all of the sections (Drivers,Cars,Drivers&car and Bills) They are similar to the following example Shown below in Figures (Figure 10-4), (Figure 10-5), (Figure 10-6), (Figure 10-7).



Drivers

Add New Driver

Find by name: Search

Name	Country	City	Personal Phone	Company Phone	Email	Employment Date	Pass Word	Oprations
Hani Halabi	Syria	Dimashq	0948433234	0944226630	Hani.1988@gmail.com	2015-06-24	hani123	Edit | Details | Delete
Mohamad Husin	Syria	Dimashq	0948433222	0944226625	Husin.Mohamad@hotmail.com	2015-06-24	123456mo	Edit | Details | Delete
Rabi Ahmad	Syria	Dimashq	0948433211	0944226650	Rabi-1982@hotmail.com	2015-06-24	vdadasda	Edit | Details | Delete
samer Mohamad	Syria	Dimashq	97743122	0944226622	Samer-Mohamad@gmail.com	2015-06-24	123456	Edit | Details | Delete

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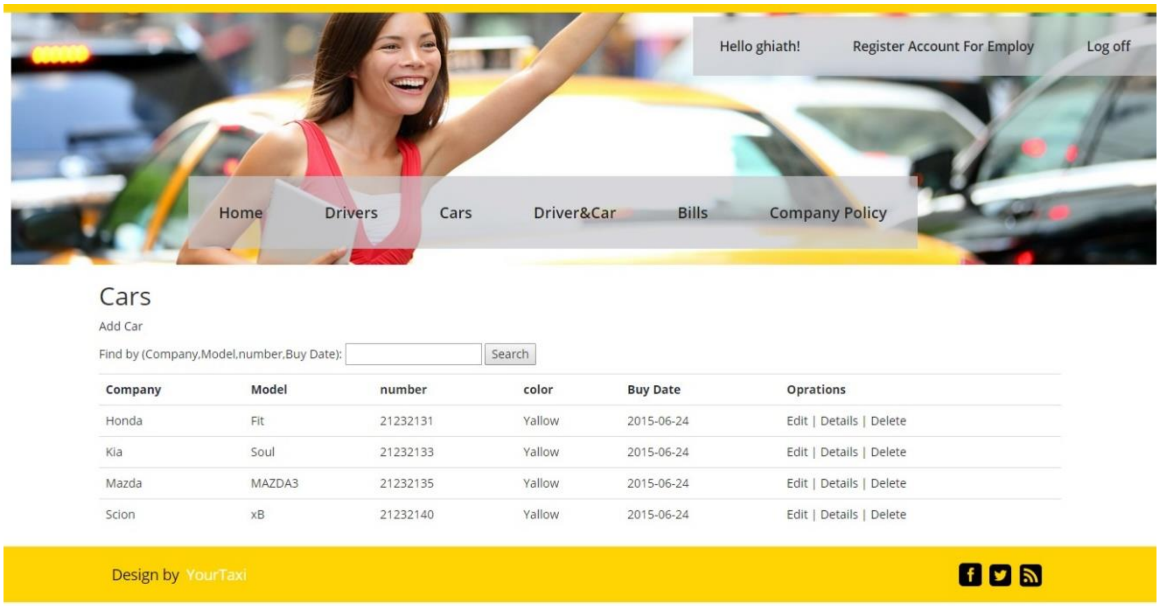
1

(Figure 10-4)



Cars

Add Car

Find by (Company,Model,number,Buy Date): Search

Company	Model	number	color	Buy Date	Oprations
Honda	Fit	21232131	Yallow	2015-06-24	Edit | Details | Delete
Kia	Soul	21232133	Yallow	2015-06-24	Edit | Details | Delete
Mazda	MAZDA3	21232135	Yallow	2015-06-24	Edit | Details | Delete
Scion	xB	21232140	Yallow	2015-06-24	Edit | Details | Delete

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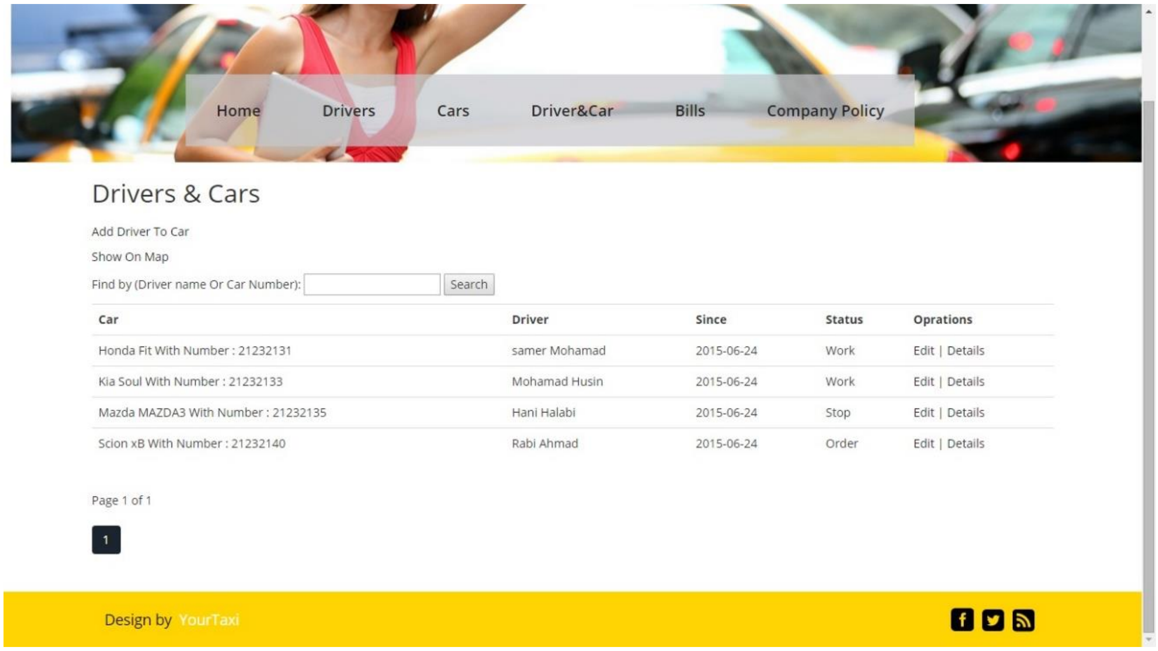
(Figure 10-5)



Drivers & Cars

Add Driver To Car

Show On Map

Find by (Driver name Or Car Number): Search

Car	Driver	Since	Status	Oprations
Honda Fit With Number : 21232131	samer Mohamad	2015-06-24	Work	Edit | Details
Kia Soul With Number : 21232133	Mohamad Husin	2015-06-24	Work	Edit | Details
Mazda MAZDA3 With Number : 21232135	Hani Halabi	2015-06-24	Stop	Edit | Details
Scion xB With Number : 21232140	Rabi Ahmad	2015-06-24	Order	Edit | Details

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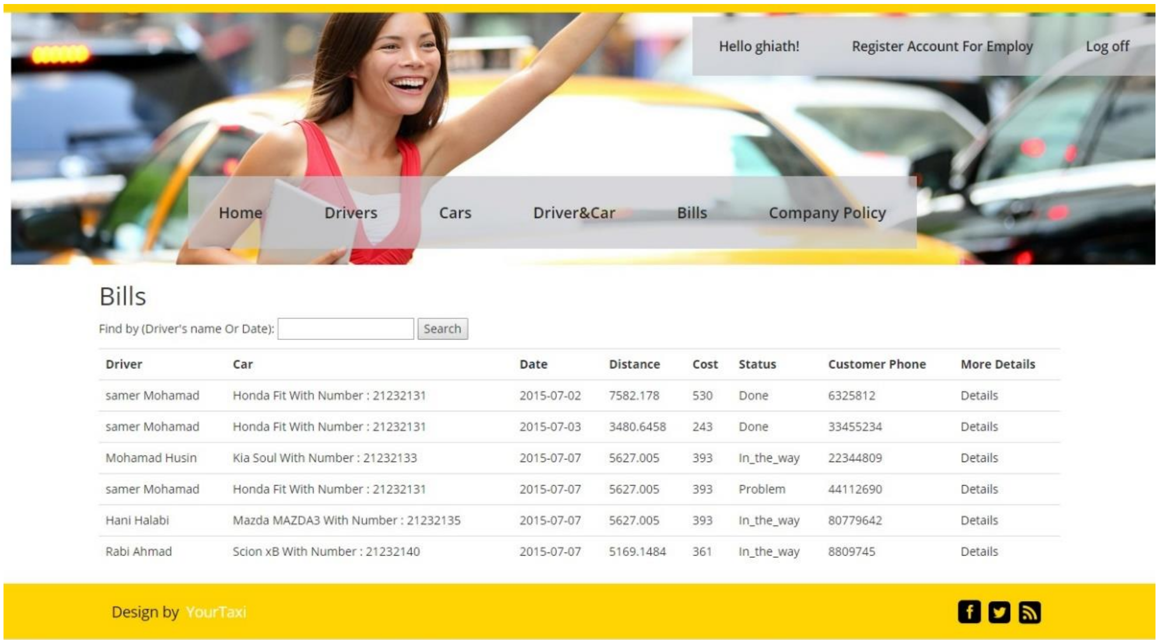
(Figure 10-6)



Bills

Find by (Driver's name Or Date): Search

Driver	Car	Date	Distance	Cost	Status	Customer Phone	More Details
samer Mohamad	Honda Fit With Number : 21232131	2015-07-02	7582.178	530	Done	6325812	Details
samer Mohamad	Honda Fit With Number : 21232131	2015-07-03	3480.6458	243	Done	33455234	Details
Mohamad Husin	Kia Soul With Number : 21232133	2015-07-07	5627.005	393	In_the_way	22344809	Details
samer Mohamad	Honda Fit With Number : 21232131	2015-07-07	5627.005	393	Problem	44112690	Details
Hani Halabi	Mazda MAZDA3 With Number : 21232135	2015-07-07	5627.005	393	In_the_way	80779642	Details
Rabi Ahmad	Scion xB With Number : 21232140	2015-07-07	5169.1484	361	In_the_way	8809745	Details

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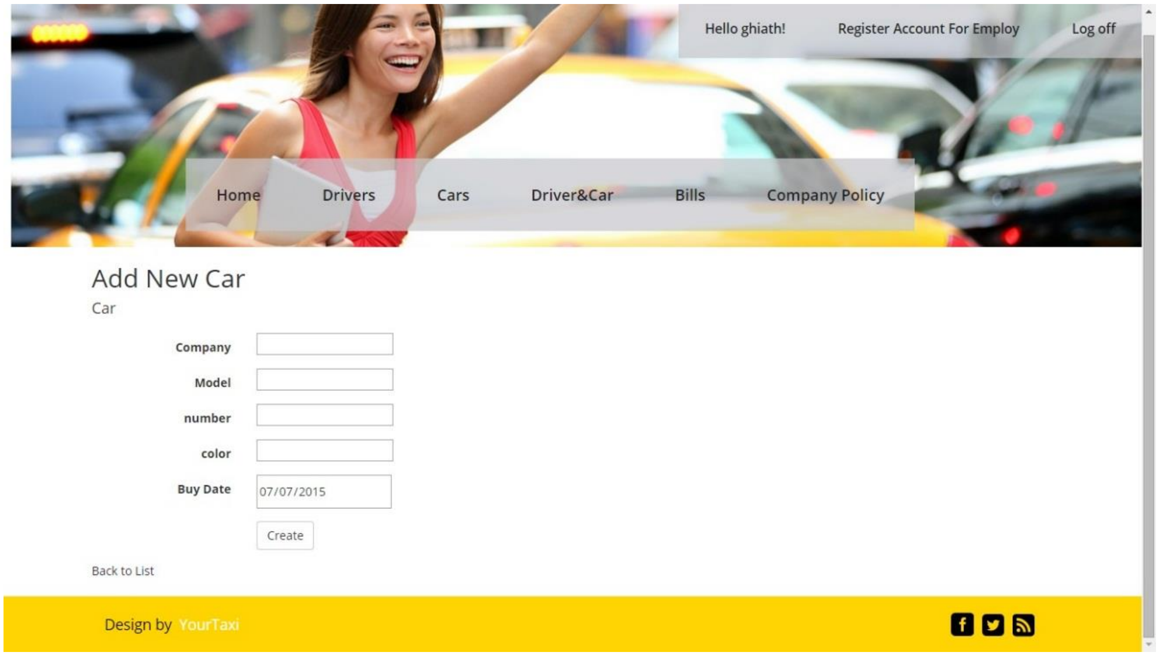
(Figure 10-7)

10.1.5 Add new :

It is service available to the site manager to add a driver or a car or even a driver on a car after filling the data correctly. It is similar to the following example Shown below in Figure (Figure 10-8).



Add New Car

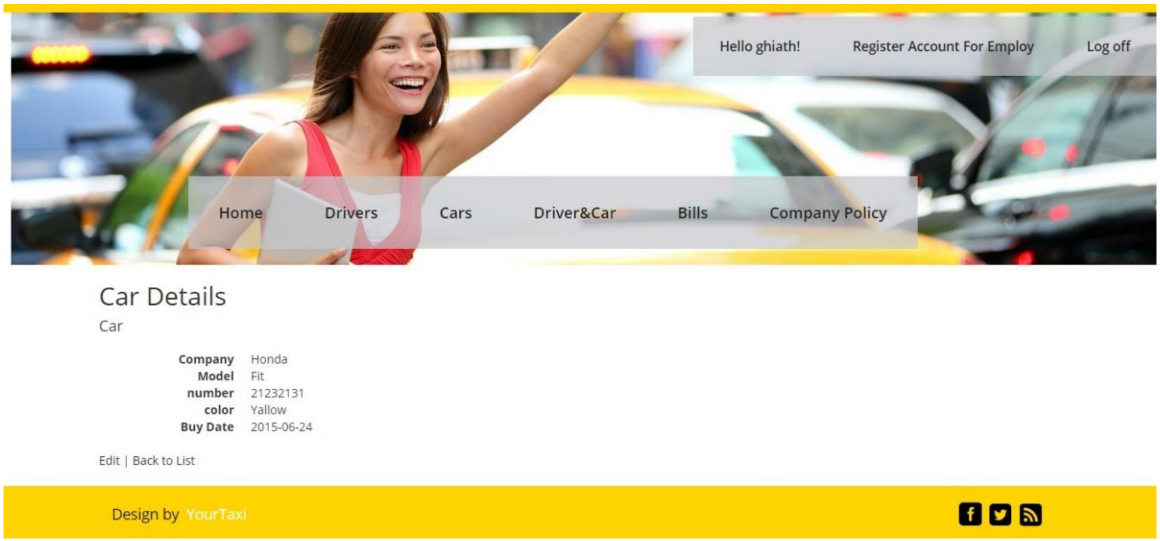
Car

Company	
Model	
number	
color	
Buy Date	07/07/2015

(Figure 10-8)

10.1.6 Details page :

Is a page are presented detailed data shows in it, it is available for each driver, car or driver on a car.it is similar to the following example Shown below in Figures (Figure 10-9) and (Figure 10-10).

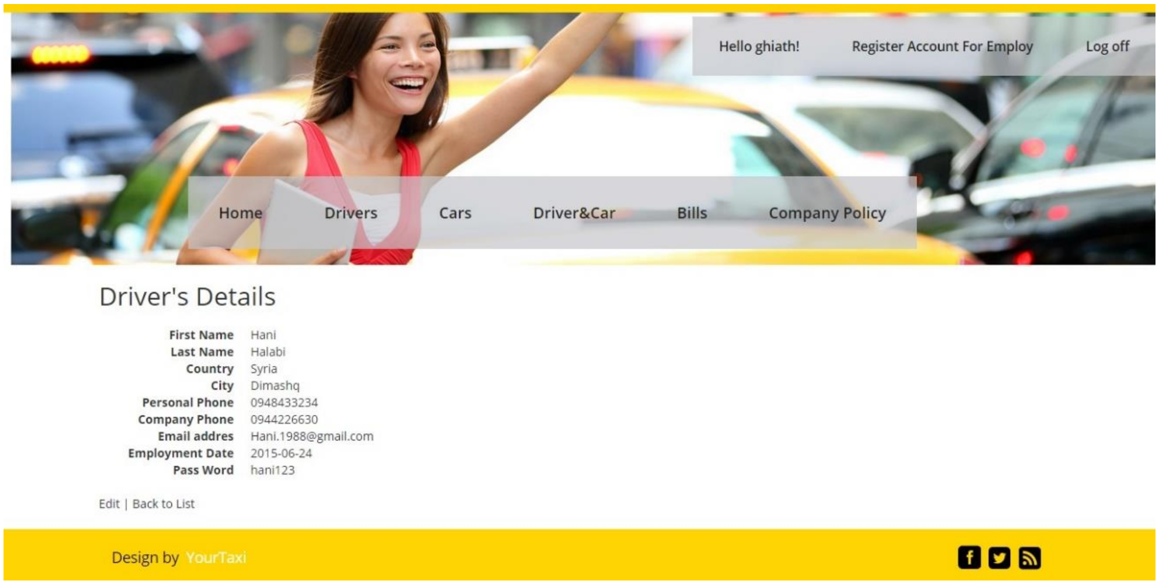


Car Details

Car

Company	Honda
Model	Fit
number	21232131
color	Yallow
Buy Date	2015-06-24

(Figure 10-9).



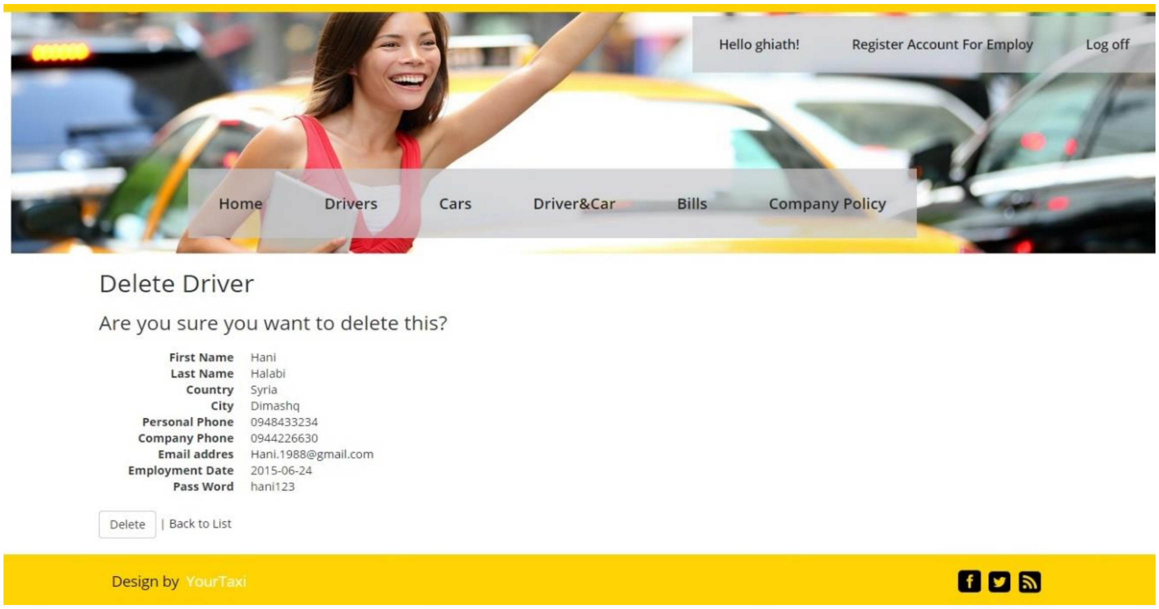
Driver's Details

First Name	Hani
Last Name	Halabi
Country	Syria
City	Dimashq
Personal Phone	0948433234
Company Phone	0944226630
Email addres	Hani.1988@gmail.com
Employment Date	2015-06-24
Pass Word	hani123

(Figure 10-10).

10.1.7 Delete page:

It is if manager want to remove driver or car from the service by circumstance and it like the following example Shown below in Figure (Figure 10-11).



Delete Driver

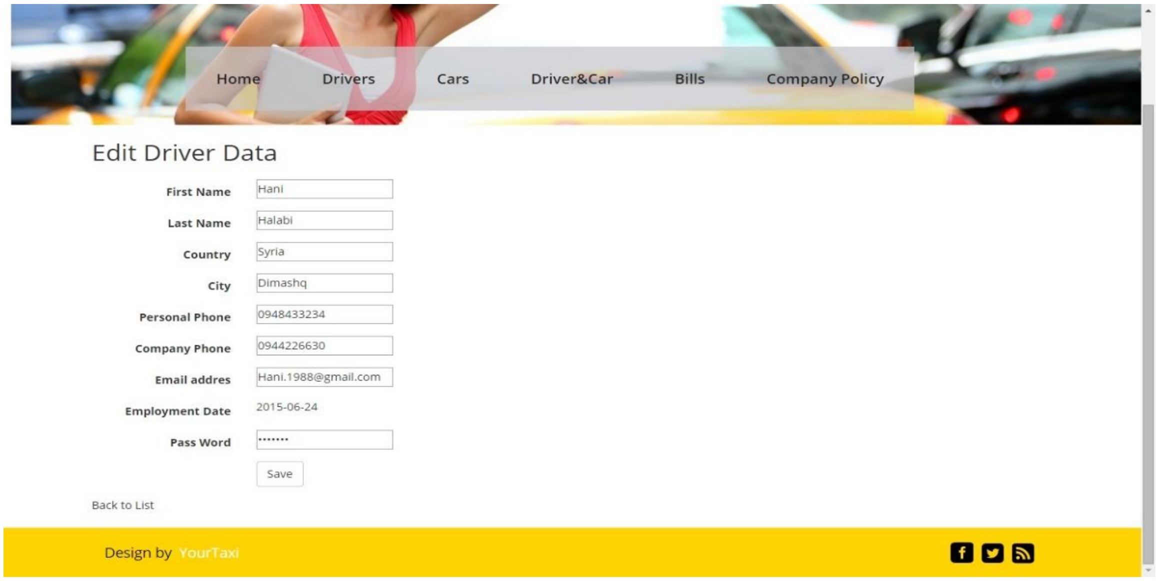
Are you sure you want to delete this?

First Name	Hani
Last Name	Halabi
Country	Syria
City	Dimashq
Personal Phone	0948433234
Company Phone	0944226630
Email addres	Hani.1988@gmail.com
Employment Date	2015-06-24
Pass Word	hani123

(Figure 10-11).

10.1.8 Edit data page:

It is a page that allows modifying the current data is available for each driver, car or even a driver on a car it like the following example Shown below in Figure (Figure 10-12).



Edit Driver Data

First Name	Hani
Last Name	Halabi
Country	Syria
City	Dimashq
Personal Phone	0948433234
Company Phone	0944226630
Email addres	Hani.1988@gmail.com
Employment Date	2015-06-24
Pass Word	•••••••

Save

Back to List

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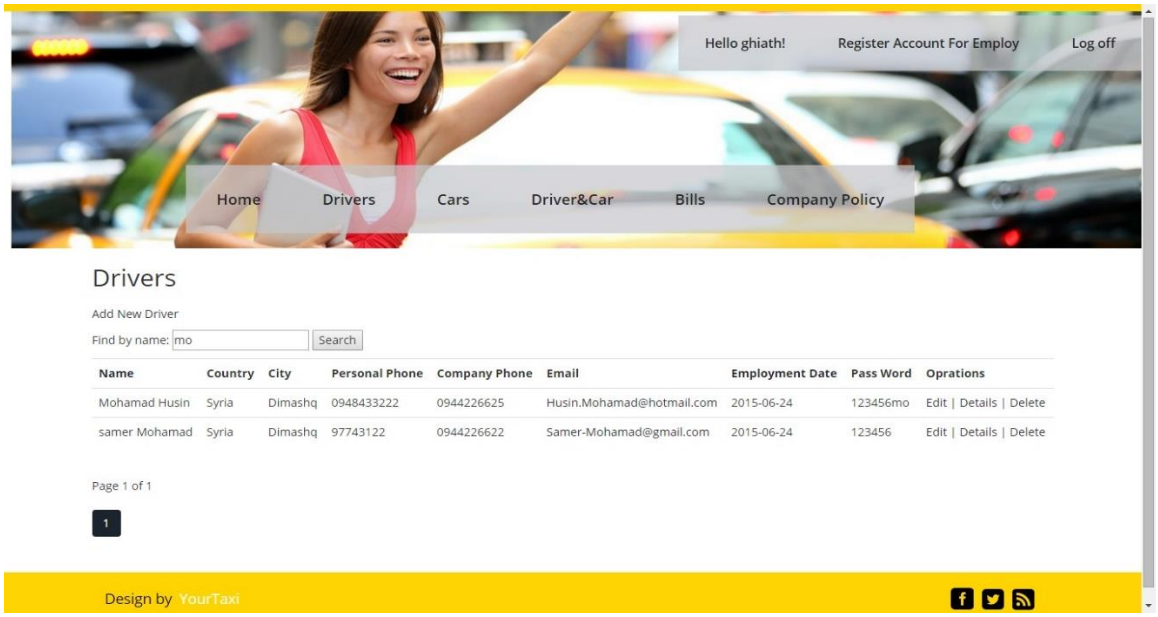
(Figure 10-12).

10.1.9 Search usecase:

It a process allow user search by name or model and others data and it is available for each driver, car or even a driver on a car it like the following example Shown below in Figure (Figure 10-13).



Drivers

Add New Driver

Find by name: mo Search

Name	Country	City	Personal Phone	Company Phone	Email	Employment Date	Pass Word	Oprations
Mohamad Husin	Syria	Dimashq	0948433222	0944226625	Husin.Mohamad@hotmail.com	2015-06-24	123456mo	Edit | Details | Delete
samer Mohamad	Syria	Dimashq	97743122	0944226622	Samer-Mohamad@gmail.com	2015-06-24	123456	Edit | Details | Delete

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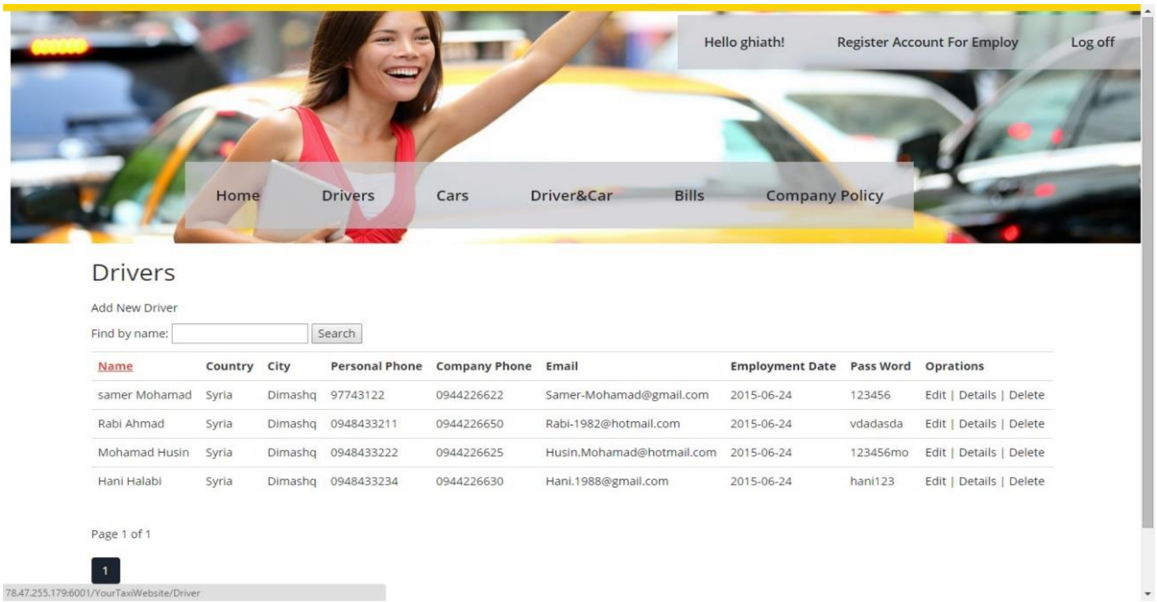
(Figure 10-13).

10.1.10 Order usecase:

It a process allow user order data by name or date and it is available for each driver, car or even a driver on a car it like the following examples Shown below in Figures (Figure 10-14) and (Figure 10-15).



Drivers

Add New Driver

Find by name: Search

Name	Country	City	Personal Phone	Company Phone	Email	Employment Date	Pass Word	Oprations
samer Mohamad	Syria	Dimashq	97743122	0944226622	Samer-Mohamad@gmail.com	2015-06-24	123456	Edit | Details | Delete
Rabi Ahmad	Syria	Dimashq	0948433211	0944226650	Rabi-1982@hotmail.com	2015-06-24	vdadasda	Edit | Details | Delete
Mohamad Husin	Syria	Dimashq	0948433222	0944226625	Husin.Mohamad@hotmail.com	2015-06-24	123456mo	Edit | Details | Delete
Hani Halabi	Syria	Dimashq	0948433234	0944226630	Hani.1988@gmail.com	2015-06-24	hani123	Edit | Details | Delete

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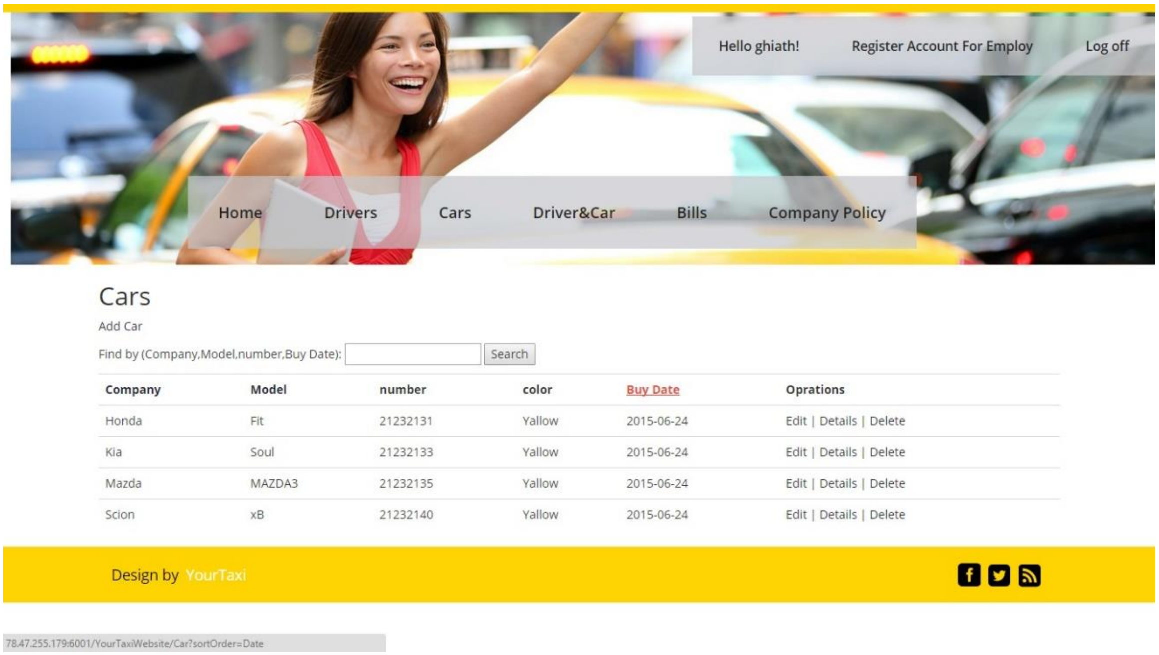
78.47.255.179:6001/YourTaxiWebsite/Driver

(Figure 10-14)



Cars

Add Car

Find by (Company,Model,number,Buy Date): Search

Company	Model	number	color	Buy Date	Oprations
Honda	Fit	21232131	Yallow	2015-06-24	Edit | Details | Delete
Kia	Soul	21232133	Yallow	2015-06-24	Edit | Details | Delete
Mazda	MAZDA3	21232135	Yallow	2015-06-24	Edit | Details | Delete
Scion	xB	21232140	Yallow	2015-06-24	Edit | Details | Delete

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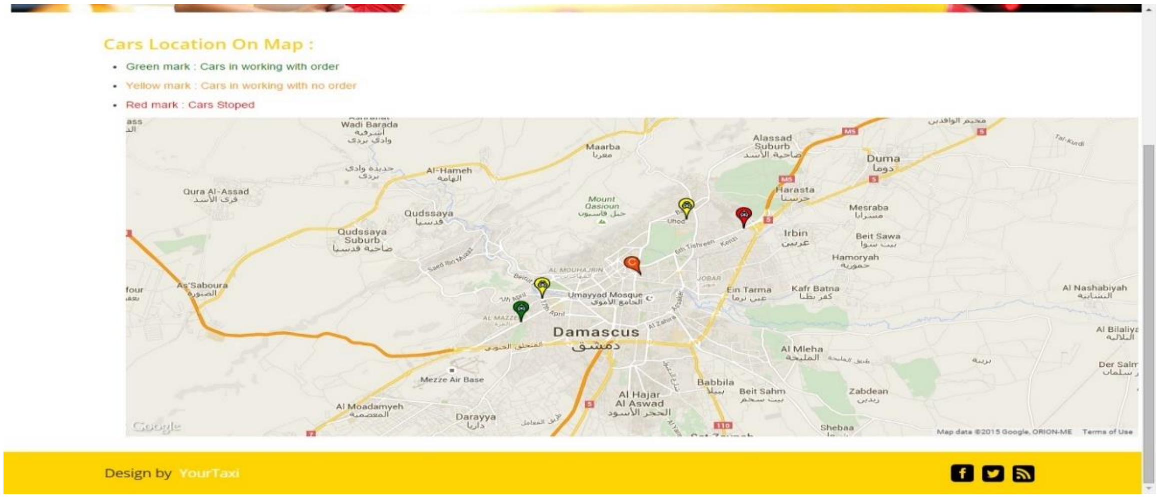
78.47.255.179:6001/YourTaxiWebsite/Car?sortOrder=Date

(Figure 10-15)

10.1.11 Drivers on map:

It a page allow user shown each drivers and there statue and shows company place on map and it is available on a driver&car page it Shown below in Figure (Figure 10-16).



Cars Location On Map :

- Green mark : Cars in working with order
- Yellow mark : Cars in working with no order
- Red mark : Cars Stoped

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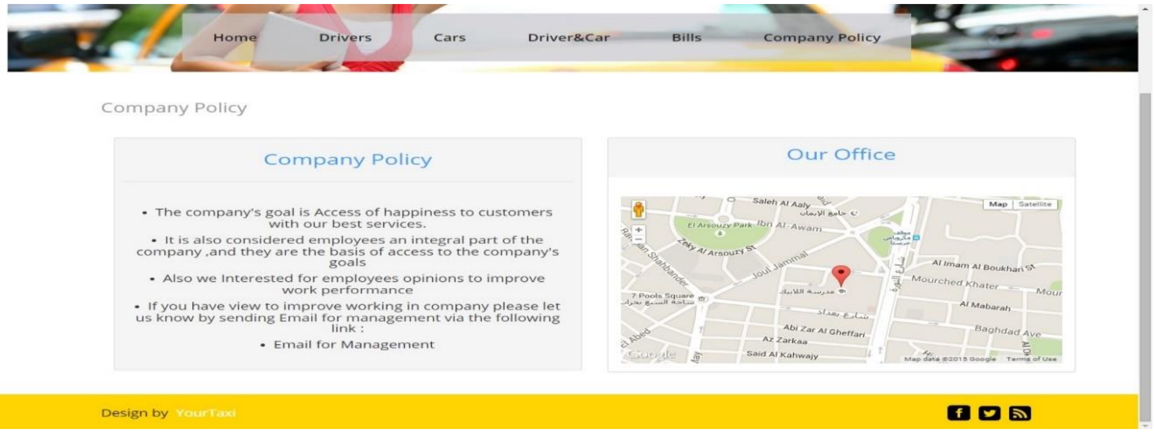
(Figure 10-16).

10.1.12 Company policy page:

A page explaining the company's policy for employees and it allows staff suggestions for improving the company's work it Shown below in Figures (Figure 10-17) and (Figure 10-18).



Company Policy

Company Policy

- The company's goal is Access of happiness to customers with our best services.
- It is also considered employees an integral part of the company ,and they are the basis of access to the company's goals
- Also we Interested for employees opinions to improve work performance
- If you have view to improve working in company please let us know by sending Email for management via the following link :
- Email for Management

Our Office

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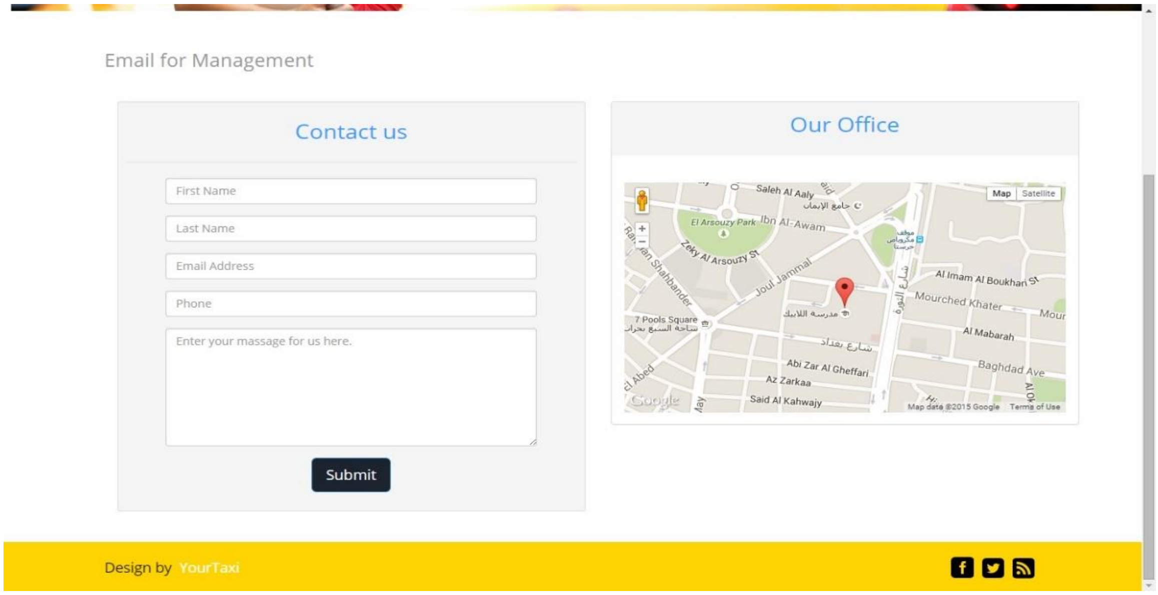
(Figure 10-17)



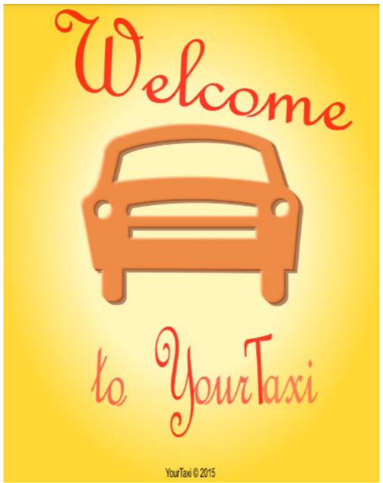
(Figure 10-18)

10.2 Second part (Clients android application):

It is an application for Android mobile phone system allows the clients to request the company services. It is comfortable and easy to save a lot of time and effort

10.2.1 Welcome activity:

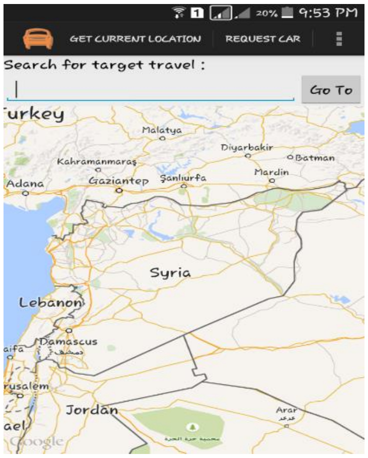
Where a welcome message from the company show for no more than 6 seconds it Shown below in Figure (Figure 10-19).



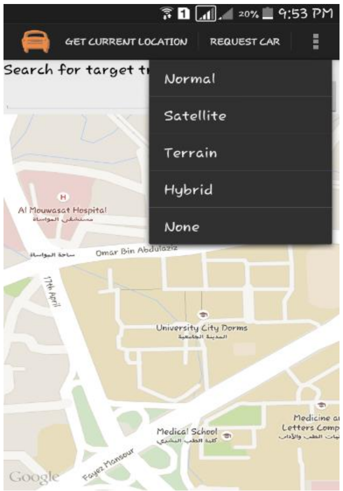
(Figure 10-19).

10.2.2 Starting Activity:

Map shows and the use cases become available for client seconds and allows Control feature of map according to user's desire it Shown below in Figures (Figure 10-20) and (Figure 10-21).



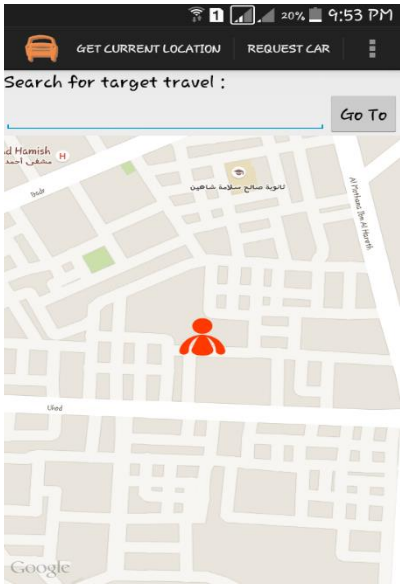
(Figure 10-20).



(Figure 10-21).

10.2.3 Current location process:

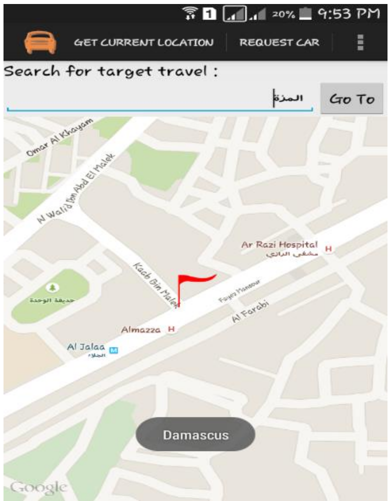
A process that is available by pressing the button Get Current location and specify the client place on the map using GPS it Shown below in Figure (Figure 10-22).



(Figure 10-22).

10.2.4 Go To process:

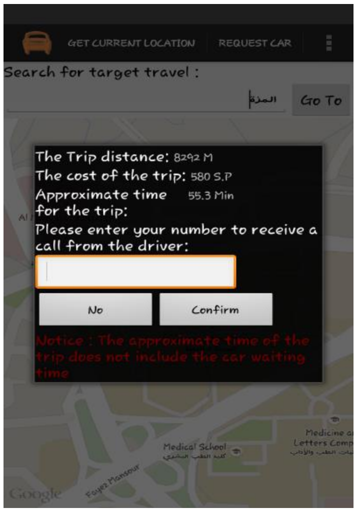
It is a process to determine where to go on the map it Shown below in Figure (Figure 10-23).



(Figure 10-23).

10.2.5 Request Car process:

It is the client request process for a car based on the information that has been identified It is moving to Dialog show the basic information of trip and asks him to enter his phone number as it Shown below in Figure (Figure 10-24).



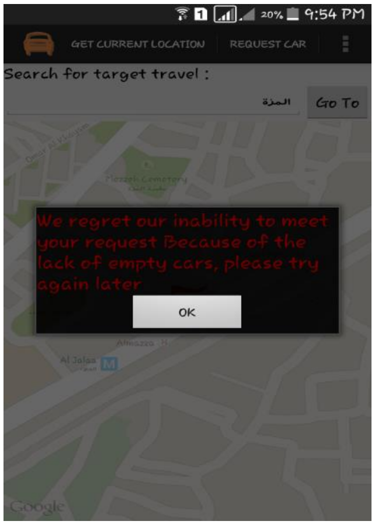
The Trip distance: 8292 M
The cost of the trip: 580 S.P
Approximate time for the trip: 55.3 Min
Please enter your number to receive a call from the driver:

Notice : The approximate time of the trip does not include the car waiting time

(Figure 10-24).

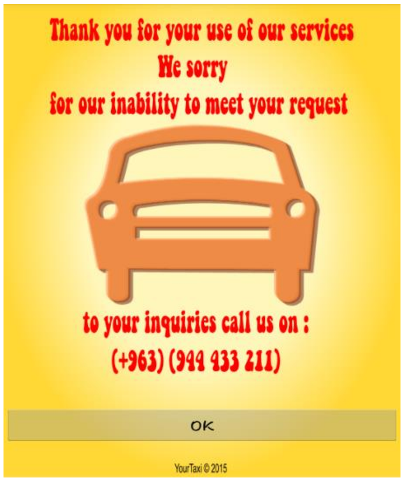
10.2.6 Apology about the request :

After request confirmation information sent to the server in case there were no cars available at that moment server sent to client a letter of apology as it Shown below in Figures (Figure 10-25)and(Figure 10-26).



We regret our inability to meet your request Because of the lack of empty cars, please try again later

(Figure 10-25)



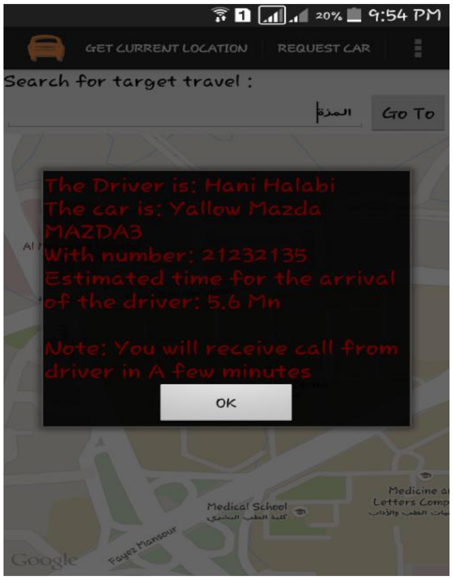
Thank you for your use of our services
We sorry
for our inability to meet your request

to your inquiries call us on :
(+963) (944 433 211)

(Figure 10-26)

10.2.7 Complete the request process :

After request confirmation information sent to the server in case there are car is available. Locate the nearest car to the customer and send him a car and driver information and estimated time of arrival as it Shown below in Figure (Figure 10-27).



Search for target travel :

المزة

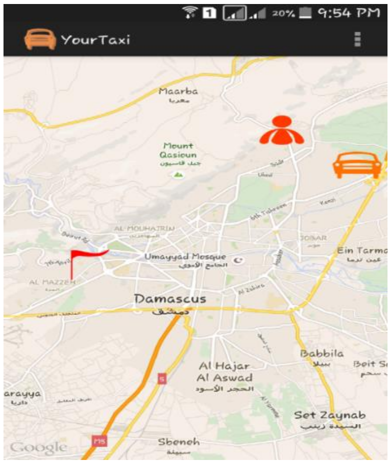
The Driver is: Hani Halabi
The car is: Yallow Mazda MAZDA3
With number: 21232135
Estimated time for the arrival of the driver: 5.6 Mn

Note: You will receive call from driver in A few minutes

(Figure 10-27)

10.2.8 Waiting Activity :

After all previous operations are successfully. Transferred the client to map where him locate and place to going and show the driver at his place on the map as it Shown below in Figure (Figure 10-28).



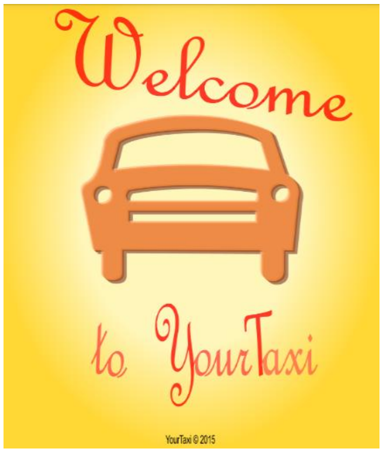
(Figure 10-28).

10.3 : Third part (Drivers android application):

It is an application for Android mobile phone system allows the drivers to request the company services and work according to the company policy. It is comfortable and easy to save a lot of time and effort

10.3.1 Welcome activity:

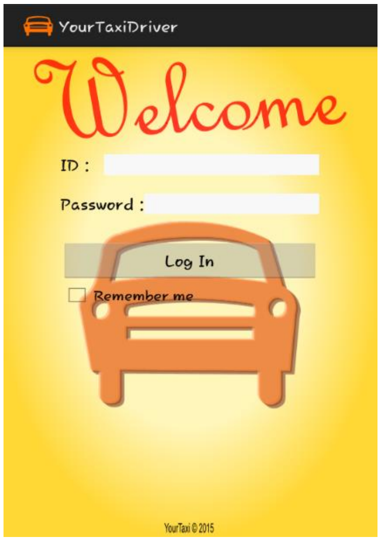
Where a welcome message from the company show for no more than 6 seconds it Shown below in Figure (Figure 10-29).



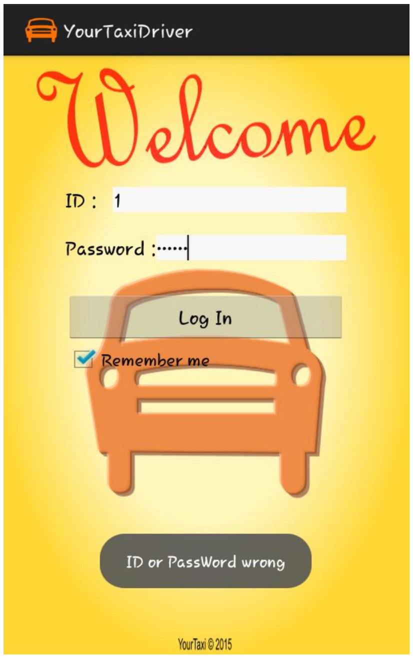
(Figure 10-29).

10.3.2 Login Activity:

And the driver enters the ID and password its own to server verified whether true or false as it Shown below in Figures (Figure 10-30) and (Figure 10-31).



(Figure 10-30).



ID : 1

Password :••••••

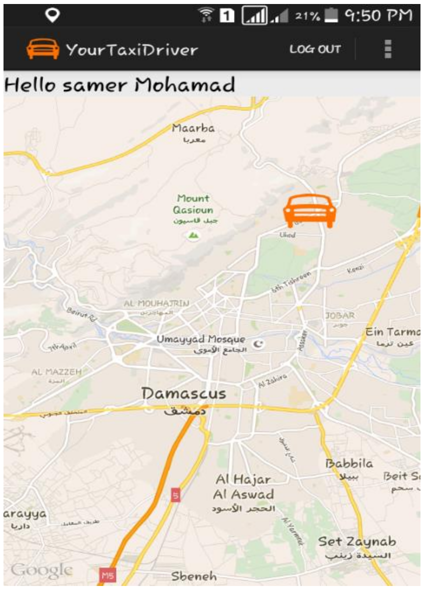
☑ Remember me

ID or PassWord wrong

(Figure 10-31)

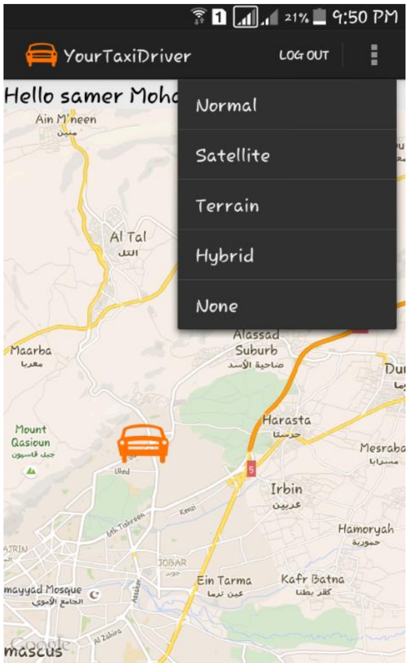
10.3.3 Starting Work:

Which case it moves after the login to. Driver starting work and the wait for a request information from the server and has the authority to change the pattern of map In addition to its ability to log out as it Shown below in Figures (Figure 10-32) and (Figure 10-33).



Hello samer Mohamad

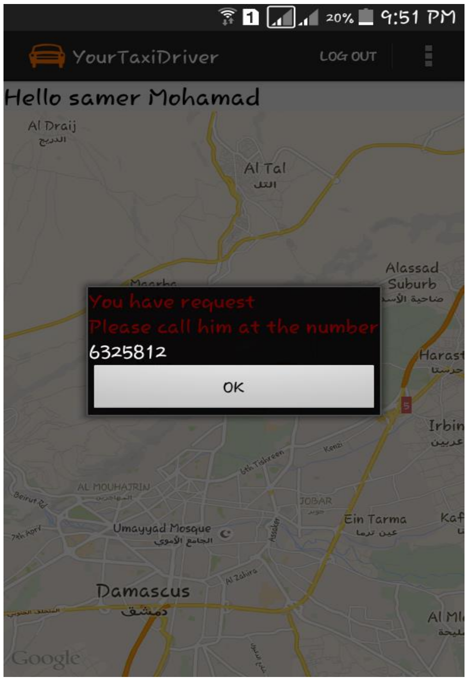
(Figure 10-32)



(Figure 10-33)

10.3.4 Start the trip:

In case there has been requested is available for this driver the server sent information automatically and this information appears on the map as it Shown below in Figures (Figure 10-34) and (Figure 10-35).



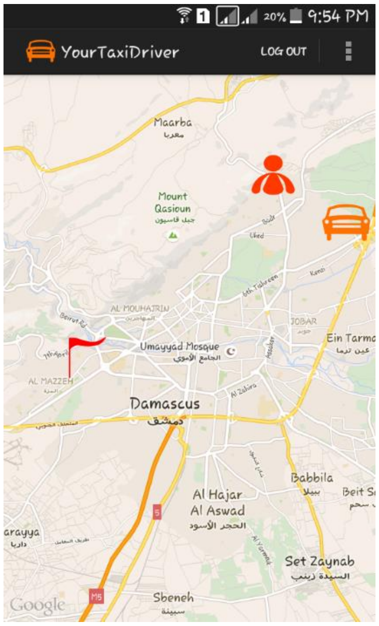
Hello samer Mohamad

You have request

Please call him at the number

6325812

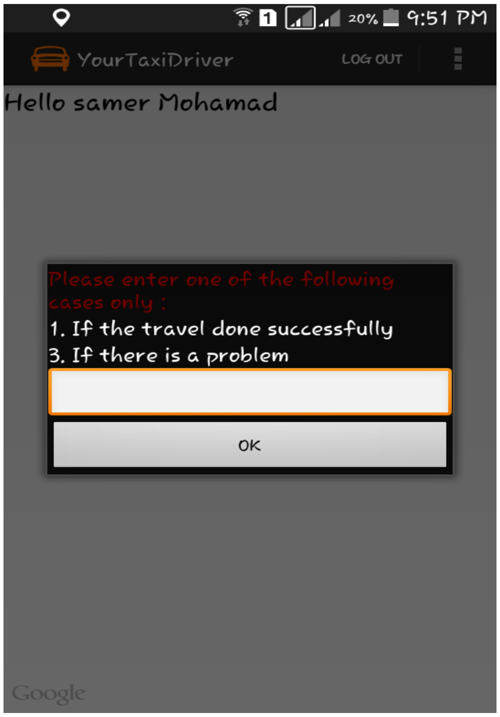
(Figure 10-34)



(Figure 10-35)

10.3.5 End trip:

At the end of the trip the driver enters a trip state by options as it Shown below in Figures (Figure 10-36).



Hello samer Mohamad

Please enter one of the following cases only :

1. If the travel done successfully

3. If there is a problem

(Figure 10-36)

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