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iPark

(Organizational Parking Solution)

In partial fulfilment of the requirements for the degree of
Bachelor of Science in Computer Science

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Certificate



We accept the work contained in the report titled
“IPARK (ORGANIZATIONAL PARKING SOLUTION)”,
written by
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as a confirmation to the required standard for the partial fulfilment of the degree of
Bachelor of Science in Computer Science.

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June 4th, 2018

DECLARATION

We hereby declare that this project report is based on our original work except for citations and quotations which have been duly acknowledged. We also declare that it has not been previously and concurrently submitted for any other degree or award at Bahria University or other institutions.

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Specially dedicated to
my beloved grandmother, mother and father
(Asad Rehman)
my beloved grandmother, mother and father
(Abubakar)

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We would like to thank everyone who had contributed to the successful completion of this project. We would like to express my gratitude to my research supervisor, Mr TAIMOOR AAMER for his invaluable advice, guidance and his enormous patience throughout the development of the research.

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Asad Rehman
Abubakar

IPARK (ORGANIZATIONAL PARKING SOLUTION)

ABSTRACT

Parking spaces area has significantly increases with the rapid population growth and vehicles geared by peoples. Finding an empty parking space is becoming a quiet challenging task. Driver moves their cars in cycles, back and forth or check different section to find an empty parking space. This creates frustration in driver mind that can cause accidents. This can also lead more fuel consumption and air pollution. According to analysis the traffic congestion is generated by vehicles searching for parking spaces takes up to 45% of the total traffic. So, many parking management systems have been deployed in order to reduce such traffic congestion and improve the convenience for vehicle drivers.

The main objectives of iPARK project is to design and implement a system that provide access control system, fully guidance system according to the zones or sections by providing the real time status of parking spaces wirelessly. We divided iPARK project in three phases. In first phase we gather requirement from TechnoOne Company and make designs. Development shall be done in second phase. Third phase involves installation of system.

The system includes both hardware and software component. Different type of wireless component is used that interact with admin panel page wirelessly. The objective of this project were achieved and assumed that it will solve all the problem faces by drivers. The user also checks the parking status through mobile application. Therefore, iPARK provide a complete organizational parking solution.

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LIST OF SYMBOLS / ABBREVIATIONS

<i>iPARK</i>	Name of Project
<i>PCB</i>	printed circuit board
<i>U</i>	Use Case
<i>RF ID</i>	Radio-frequency identification
<i>US</i>	Ultrasonic sensor
<i>MAX7219</i>	Display led
<i>APP</i>	Application
<i>HTTP</i>	Hypertext transfer protocol
<i>SSID</i>	Service set identifier
<i>DNS</i>	Domain name server

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CHAPTER 1

INTRODUCTION

1.1 Background

Parking space are become an emerging issue also in organization. People don't find empty slot easily and waste a lot of time in finding empty space, this can create some unbearable problems. With the passage of time parking spaces area increases and it's very difficult to find a parking space in large area. There is some well-known parking system but they don't work efficiently and they are also costly.

iPARK is an automatic cooperative parking solution for day to day parking problems. iPARK system provide a fully guidance system and also a cost effective solution for parking systems.

1.2 Problem Statements

Finding an empty parking space in an organization become a crucial task. This take so much time to find an empty parking space. This leads towards many problems that faces by driver in their daily life. Doesn't know the exact empty parking spot driver pay fully attention on find free parking spot that cause accident. Previous solutions are wire based system and costly. We want to developed iPARK cost effective so instead using wire we make it wireless.

It is assumed that other people also access parking spaces so tags are assigned to authorize people and no enter without having an RFID tag.

1.3 Aims and Objectives

The objectives of the thesis are shown as following:

- i) Car recognition system
- ii) Parking slot management system
- iii) Car parking guidance system

1.4 Scope of Project

As we all know that the world is advancing day by day new technologies come and go, many new methods are been introduced almost daily, therefore, the demand of the new systems have been increased in every organization old systems have been replaced by new systems, It's because every organization demands excellent quality work more profit to be earned in short span of time, to gain as much market trust as they can, and not to forget as quick they can so they can compete with other organizations.

1.4.1 Car recognition system

- i. Tag Reading
Tag will be read by RFID reader.
- ii. Access Grants
Car should be grants access to parking space after identification.

1.4.2 Parking slot management system

- i. Parking slots
Free and occupied slots will be indicated by LED's.
- ii. Reserved slots
Parking slots can be reserved on the basis of time.
- iii. Parking web interference
Managing and checking all real time status of parking through web.

iv. Report Generation.

Report will be generated on the basis of time.

1.4.3 Car parking guidance system

i Easily Finding

User will be guided by led to find an empty parking space.

ii Car Finding

User store slot tag number in app to find car easily.

CHAPTER 2

LITERATURE REVIEW

2.1 Role and Levels

Following are the role and levels of each person respectfully according to their modules.

Car recognition system:

Every User, interact with the access grants by RFID through their tags. Then they move towards parking spaces.

Parking slot management system:

Admin can manage all the parking space through web portal. Admin can also check the real time status of parking space. They also have the right of reserved any parking space for a specific time.

Executive can have all the same rights including executive can manages the account of admin and report generation.

Car parking guidance system:

Both admin, executive and typical employees can check the real time status of parking system. They can use mobile app and web to check the real time status according to their parking zones.

2.2 Operating Environment

iPARK is an embedded system so it includes both hardware and software on which the whole system operates. Both hardware and software platform are as follow:

2.2.1 Hardware Environment:

Hardware components such as ultrasonic sensors, Microcontroller, raspberry pi, Display Led and RFID reader. Arduino IDE is used to program microcontroller. Raspbian operating system is used for raspberry pi, and configures it as server.

Firstly, sensor fetch data and send to microcontroller. Microcontroller process data then send command to LED and status will be send on server. The communication between the microcontroller and server will be held wirelessly.

2.2.2 Software Environment:

PHP platform is used for design our web application. Operating system compatible with our software is window 7, 8 and 10. The supported web browser are commonly Chrome (version 35.1 or higher), Firefox (version 40.0 or higher).

For iPARK mobile application will be operate on android platform.

2.2.3 Design and Implementation Constraints

iPARK is based upon two main module primary is Web application and secondary is mobile application. For implementation of web front-end HTML and CSS will be used and backend developed using PHP Codeigniter (mvc) and MySQL database. Moreover, mobile application is android specified. Both have different platform for designing purpose, it uses a modular design where every feature is wrapped into a separate module and the modules depend on each other through well-written APIs and libraries. The network connection is required for system to work completely.

2.2.4 Assumption and dependency

iPARK provide fully guidance system. Each slot status will be send by microcontroller, if any problem power problem occurs with microcontroller then the status will not be transfer that's why status of each slot depend on microcontroller.

iPARK system also have a web portal and mobile app. So it requires compatible browser and android platform.

2.2.5 System Requirement Chart

ID	Priority	Type NF=Non Functional F=Functional	Source	Used in Use case	Description
1	High	F	Company -Techno one.	N/A	Communicate Microcontroller with sensor
2	High	F	Company -Techno one.	N/A	To check weather car is in slot or not
3	High	F	Company -Techno one.	N/A	Change status of led on real time
4	High	F	Company -Techno one.	N/A	Display current status of parking slots
5	High	F	Company -Techno one.	N/A	Configure raspberry pi as a server
6	High	F	Company -Techno one.	N/A	Connection between nodemcu and Raspberry pi
7	Medium	F	Company -Techno one.	N/A	Server receive current status of every slot wirelessly
8	Medium	F	Company -Techno one.	N/A	Storing sensor data into server
9	Medium	F	Company -Techno one.	U1	Read mifare tag quickly
10	Medium	F	Company -Techno one.	U1	Access grant after authenticated
11	High	F	Company -Techno one.	U2	Executive create the account of admin
12	High	F	Company Techno one.	U2	Login into iPARK
13	Low	F	Company -Techno one.	U2	Set new password link through email.

14	Medium	F	Company -Techno one.	U3	Display admin profile information
15	Medium	F	Company -Techno one.	U3	Admin can Update profile information on web
16	Medium	F	Company -Techno one.	U3	Disable admin account by executives
17	Medium	F	Company -Techno one.	U4	Provide view of parking slot status on web
18	High	F	Company -Techno one.	U5	Reserved desired parking slot manually by the admin through web according to time
19	Medium	F	Company -Techno one.	U6	Report generate according to provided date by the admin on the web
20	High	F	Company -Techno one.	U7	sign up into iPARK app by user
21	High	F	Company -Techno one.	U7	Login to iPARK by the user
22	Low	F	Company -Techno one.	U7	Set new password link through email for the user
23	High	F	Company -Techno one.	U8	Login to iPARK by the admin
24	Low	F	Company -Techno one.	U8	Set new password link through email for the admin
25	Medium	F	Company -Techno one.	U9	Display admin profile info on app

26	Low	F	Company -Techno one.	U9	Admin can Update profile information on app
27	Medium	F	Company -Techno one.	U10	Provide real time view of parking slot status on app
28	Low	F	Company -Techno one.	U11	Reserved desired parking slots manually by admin.
29	Medium	NF	Company -Techno one.	N/A	Change / check the status of slot at every five second
30	Medium	NF	Company -Techno one.	U5	Reserve the slot through web will be occur within 4 second
31	Medium	NF	Company -Techno one.	U4	Status will be update within 4 second in web UI
32	Medium	NF	Company -Techno one.	U11	Parking slot status will be update within 4 second on mobile app
33	Low	NF	Company -Techno one.	U5	Pop up message come when reserved the slot through web
34	Medium	NF	Company -Techno one.	N/A	All hardware component are placed in box
35	Medium	NF	Company -Techno one.	U3	Website open on chrome ,Mozilla web browser

36	High	NF	Company -Techno one.	U1	Reader always only give access to authentic vehicle
37	Medium	NF	Company -Techno one.	U7	User will be verified through phone number

Table 1 System Requirement Chart

CHAPTER 3

DESIGN AND METHODOLOGY

Following artefacts included in this Chapter

1. Use case diagram
2. Use case description
3. Domain Model
4. Design Class Diagram.
5. Sequence Diagram
6. Collaboration Diagram.
7. Data Model

3.1 Use case diagram

The whole Use case elaborates the complete iPARK system that how system will work and all actors will interact with iPARK. iPARK contain 15 use case having 2 extends and 2 include functionalities. All the actors can perform their specific function which can be shown in this use case Diagram

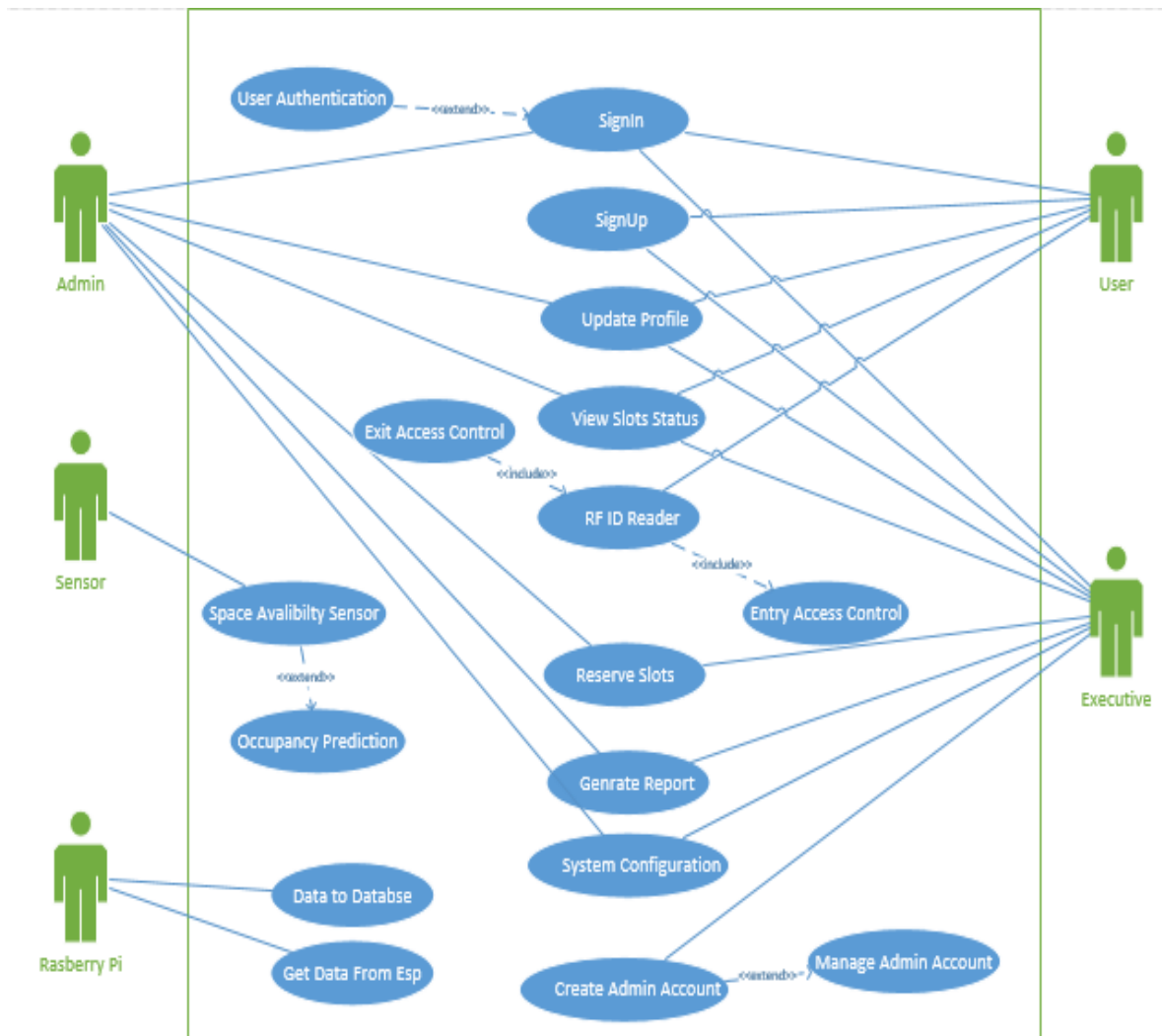


Figure 1 Use Case

3.2 Use Case description

3.2.1 RFID Tag Reading

1. **U1**
2. **Objective** –Authorize the user for parking.
3. **Priority** – High
4. **Source** –Techno-one
5. **Actors** – User
6. **Flow of Events**
 - 6.1.**Basic Flow**
 - 6.1.1. User reached at main entrance.
 - 6.1.2. User display card for scan
 - 6.1.3. Tag read by RFID reader
 - 6.1.4. Access granted and barrier open
 - 6.2.**Alternative Flow 1** – The step 6.1.2. user display incorrect/expired card
 - 6.2.1. Display invalid card.
 - 6.2.2. Does not grant access.
 - 6.2.3. Return to step 6.1.2

6.3.Exception Flow 1 –

6.3.1. Electricity problem occur while card scanning.

7. **Includes** -None
8. **Preconditions** – User have RFID tag
9. **Post conditions** – user grant access to parking space
10. **Notes/Issues** – None

3.2.2 Admin System Authentication Web (U2)

1. **U2**
2. **Objective** –The admin can get access to the iPARK admin panel.
3. **Priority** – High
4. **Source** –Techno-one
5. **Actors** – admin
6. **Flow of Events**
 - 6.1.**Basic Flow**
 - 6.1.1. Choose the login option
 - 6.1.2. Enter email and password
 - 6.1.3. Click on login button
 - 6.2.**Alternative Flow 1** – The step 6.1.1. the admin does not have any account
 - 6.2.1. Contact the executive person for account creation.
 - 6.2.2. Return to step 6.1.1
 - 6.3.**Alternative Flow 2** – Admin entered incorrect credentials
 - 6.3.1. Renter credential.
 - 6.3.2. Return to step 6.1.3
 - 6.4.**Alternative Flow 3** – Admin forgot the password
 - 6.4.1. Select the option forgot password.
 - 6.4.2. Enter email
 - 6.4.3. Click on send password button.
 - 6.5.**Exception Flow 1** –
 - 6.5.1. Server is down.
7. **Includes** -None
8. **Preconditions** – Admin will have an account
9. **Post conditions** – Admin get access to the iPARK admin panel
10. **Notes/Issues** – None

3.2.3 Admin Profile (U3)

1. **U3**
2. **Objective** –Check or update profile.
3. **Priority** – Medium
4. **Source** –Techno-one
5. **Actors** – admin
6. **Flow of Events**
 - 6.1. **Basic Flow**
 - 6.1.1. Click on Profile option
 - 6.1.2. Admin can view profile.
 - 6.1.3. Admin can edit profile.
 - 6.1.4. Enter new information
 - 6.1.5. Click on update profile button.
 - 6.2. **Alternative Flow 1** – The step 6.1.4. admin enter incorrect information
 - 6.2.1. Display an error message
 - 6.2.2. Return to step 6.1.4
 - 6.3. **Alternative Flow 2** – The step 6.1.4 admin have not provided all required fields
 - 6.3.1. Fills all required fields

- 6.3.2. Return to step 6.1.5
- 6.4. **Alternative Flow 3** – The step 6.1.1. admin select other option
 - 6.4.1. Admin select cancel button or change the menu.
- 6.5. **Exception Flow 1** –
 - 6.5.1. Record cannot have updated.
- 7. **Includes** -None
- 8. **Preconditions** – Admin should have logged in account
- 9. **Post conditions** – Admin profile updated.
- 10. **Notes/Issues** – None

3.2.4 View Slots status (U4)

- 1. U4
- 2. **Objective** –Admin view the status of all parking slots.
- 3. **Priority** – High
- 4. **Source** –Techno-one
- 5. **Actors** – admin
- 6. **Flow of Events**
 - 6.1.**Basic Flow**
 - 6.1.1. Click on parking slots menu
 - 6.1.2. Select floor from tree menu.
 - 6.1.3. View all real time status of parking system.
 - 6.2.**Exception Flow 1** –
 - 6.2.1. Error in page loading due to slow internet.
 - 6.2.2. Error while data fetching.
- 7. **Includes** -None
- 8. **Preconditions** – Admin should have logged in account
- 9. **Post conditions** – Admin checked the status of parking at floor.
- 10. **Notes/Issues** – None

3.2.5 Reserved Parking slots (U5)

- 1. U5
- 2. **Objective** –Admin reserved selected parking slot manually.
- 3. **Priority** – High
- 4. **Source** –Techno-one
- 5. **Actors** – admin
- 6. **Flow of Events**
 - 6.1. **Basic Flow**
 - 6.1.1. Click on parking option
 - 6.1.2. Select floor from tree menu.
 - 6.1.3. Click on “**Select Slots**” Button.
 - 6.1.4. Mark/select slots to reserve.
 - 6.1.5. Click on done button.
 - 6.2. **Alternative Flow 1** – The step 6.1.5. admin select incorrect slots
 - 6.2.1. Click on select slots button.
 - 6.2.2. Unselect the incorrect slots.
 - 6.2.3. Return to 6.1.5.
 - 6.3. **Alternative Flow 2** – The step 6.1.3 admin press cancel button
 - 6.3.1. Admin press cancel button
 - 6.3.2. Return to step 6.1.2
- 6.4. **Exception Flow 1** –
 - 6.4.1. Error in internet connection while select the slots.
- 7. **Includes** -None

- 8. **Preconditions** – Admin should have logged in account
- 9. **Post conditions** – Slots are reserved successfully.
- 10. **Notes/Issues** – None

3.2.6 Report Generation (U6)

- 1. U6
- 2. **Objective** –Report generation of parking slots system.
- 3. **Priority** – Medium
- 4. **Source** –Techno-one
- 5. **Actors** – admin
- 6. **Flow of Events**
 - 6.1.**Basic Flow**
 - 6.1.1. Admin click on generate report menu from side bar.
 - 6.1.2. Admin select start date
 - 6.1.3. Admin select end date
 - 6.1.4. Click on generate report button
 - 6.2.**Alternative Flow 1** – The step 6.1.2. admin cannot choose end date
 - 6.2.1. Display error message.
 - 6.2.2. Return to step 6.1.3
 - 6.3.**Alternative Flow 2** – The step 6.1.4 the admin clicks cancel button
 - 6.3.1. Both field become null
 - 6.3.2. Return to step 6.1.2
- 6.4.**Exception Flow 1** –
 - 6.4.1. Required data is missing to generate report
 - 6.4.2. Error while fetching data to generate report.
- 7. **Includes** -None
- 8. **Preconditions** – Admin will have an account
- 9. **Post conditions** – Admin get access to the iPARK admin panel
- 10. **Notes/Issues** - None

3.2.7 User Authorization for iPARK App (U7)

- 1. U7
- 2. **Objective** – User can get access to iPARK application to check parking status.
- 3. **Priority** – High
- 4. **Source** –Techno-one
- 5. **Actors** – User
- 6. **Flow of Events**
 - 6.1.**Basic Flow**
 - 6.1.1. User click on signup option.
 - 6.1.2. User provide information and make account.
 - 6.1.3. User click on login option
 - 6.1.4. Enter email and password.
 - 6.1.5. Click on login button.
 - 6.2.**Alternative Flow 1** – The step 6.1.2. user cannot provide all information
 - 6.2.1. Display error message on fields.
 - 6.2.2. Return to step 6.1.2
 - 6.3.**Alternative Flow 2** – The step 6.1.4 user entered incorrect credentials
 - 6.3.1. Renter the credential.
 - 6.3.2. Return to step 6.1.3
 - 6.4.**Alternative Flow 3** – The step 6.1.5 user forgot the password

- 6.4.1. Select the option forgot password.
- 6.4.2. Enter email
- 6.4.3. Click on send password button.
- 6.5. **Exception Flow 1** –
 - 6.5.1. Server is down.
- 7. **Includes** -None
- 8. **Preconditions** – User download iPARK application
- 9. **Post conditions** – User get access to the iPARK application
- 10. **Notes/Issues** – None

3.2.8 Admin Authentication for iPARK App (U8)

- 1. **U8**
- 2. **Objective** –The admin can get access to the iPARK mobile application admin panel.
- 3. **Priority** – High
- 4. **Source** –Techno-one
- 5. **Actors** – admin
- 6. **Flow of Events**
 - 6.1. **Basic Flow**
 - 6.1.1. Choose the login option
 - 6.1.2. Enter email and password
 - 6.1.3. Click on login button
 - 6.2. **Alternative Flow 1** – The step 6.1.1. the admin does not have any account
 - 6.2.1. Contact the executive person for account creation.
 - 6.2.2. Return to step 6.1.1
 - 6.3. **Alternative Flow 2** – Admin entered incorrect credentials
 - 6.3.1. Renter the credential.
 - 6.3.2. Return to step 6.1.3
 - 6.4. **Alternative Flow 3** – Admin forgot the password
 - 6.4.1. Select the option forgot password.
 - 6.4.2. Enter email
 - 6.4.3. Click on send password button.
 - 6.5. **Exception Flow 1** –
 - 6.5.1. Server is down.
- 7. **Includes** -None
- 8. **Preconditions** – Admin will have an account
- 9. **Post conditions** – Admin get access to the iPARK mobile application admin panel
- 10. **Notes/Issues** – None

3.2.9 Admin Profile On iPARK Application (U9)

- 1. **U9**
- 2. **Objective** –Check or update profile.
- 3. **Priority** – Medium
- 4. **Source** –Techno-one
- 5. **Actors** – admin
- 6. **Flow of Events**
 - 6.1. **Basic Flow**
 - 6.1.1. Click on Profile option
 - 6.1.2. Admin can view profile.
 - 6.1.3. Admin can edit profile.

- 6.1.4. Enter new information
- 6.1.5. Click on update profile button.
- 6.2. **Alternative Flow 1** – The step 6.1.4. admin enter incorrect information
 - 6.2.1. Display an error message
 - 6.2.2. Return to step 6.1.4
- 6.3. **Alternative Flow 2** – The step 6.1.4 admin have not provided all required fields
 - 6.3.1. Fills all required fields
 - 6.3.2. Return to step 6.1.5
- 6.4. **Alternative Flow 3** – The step 6.1.1. admin select other option
 - 6.4.1. Admin select cancel button or change the menu.
- 6.5. **Exception Flow 1** –
 - 6.5.1. Record cannot be updated.
- 7. **Includes** -None
- 8. **Preconditions** – Admin should have logged in account
- 9. **Post conditions** – Admin profile updated.
- 10. **Notes/Issues** – None

3.2.10 View Slots status on iPARK Application (U10)

- 1. **U10**
- 2. **Objective** –Admin and user view the current status of all parking slots.
- 3. **Priority** – High
- 4. **Source** –Techno-one
- 5. **Actors** – admin and user
- 6. **Flow of Events**
 - 6.1.**Basic Flow**
 - 6.1.1. Click on parking slots menu
 - 6.1.2. Select floor from tree menu.
 - 6.1.3. View all real time status of parking system.
 - 6.2.**Exception Flow 1** –
 - 6.2.1.Error in page loading due to slow internet.
 - 6.2.2.Error while data fetching.
- 7. **Includes** -None
- 8. **Preconditions** – Admin and user should have logged in account
- 9. **Post conditions** – Both admin and user checked the status of parking slots.
- 10. **Notes/Issues** – None

3.2.11 Admin Reserve Parking slots Through Mobile App (U11)

- 1. **U11**
- 2. **Objective** –Admin reserved selected parking slot manually.
- 3. **Priority** – Low
- 4. **Source** –Techno-one
- 5. **Actors** – admin
- 6. **Flow of Events**
 - 6.1. **Basic Flow**
 - 6.1.1. Click on parking option
 - 6.1.2. Select floor from tree menu.
 - 6.1.3. Click on “**Select Slots**” Button.
 - 6.1.4. Mark/select slots to reserve.
 - 6.1.5. Click on done button.
 - 6.2. **Alternative Flow 1** – The step 6.1.5. admin select incorrect slots
 - 6.2.1. Click on select slots button.
 - 6.2.2. Unselect the incorrect slots.

- 6.2.3. Return to 6.1.5.
- 6.3. **Alternative Flow 2** – The step 6.1.3 admin press cancel button
 - 6.3.1. Admin press cancel button
 - 6.3.2. Return to step 6.1.2
- 6.4. **Exception Flow 1** –
 - 6.4.1. Error in internet connection while selecting the slots.
- 7. **Includes** -None
- 8. **Preconditions** – Admin should have logged in account
- 9. **Post conditions** – Slots are reserved successfully.
- 10. **Notes/Issues** – None

3.3 Domain Model

Domain models represent the set of requirements that are common to systems within a product line. There may be many domains, or areas of expertise, represented in a single product line and a single domain may span multiple product lines. Following is the Domain Model of iPARK.

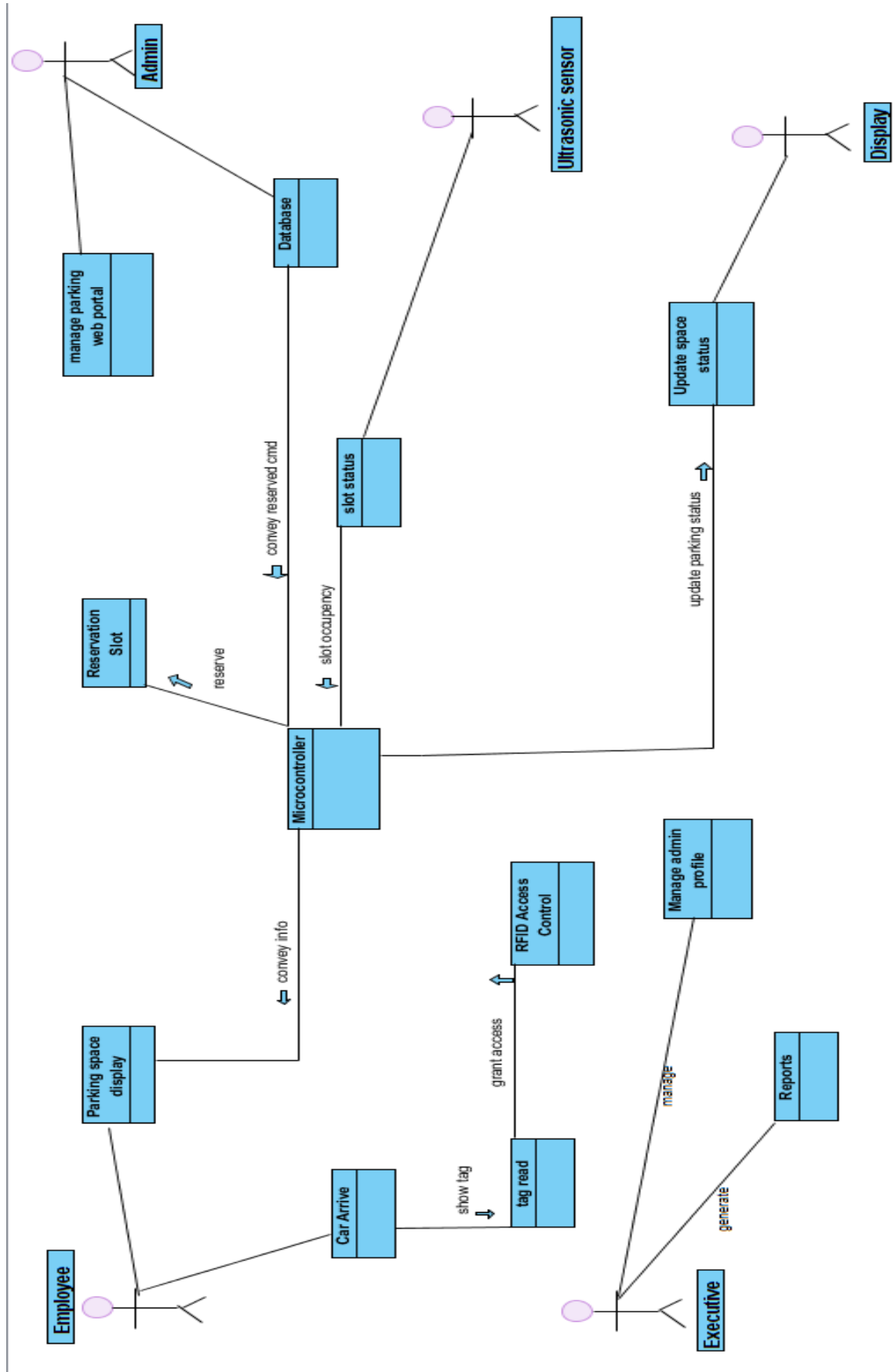


Figure 2 Domain Model

3.4 Class Diagram:

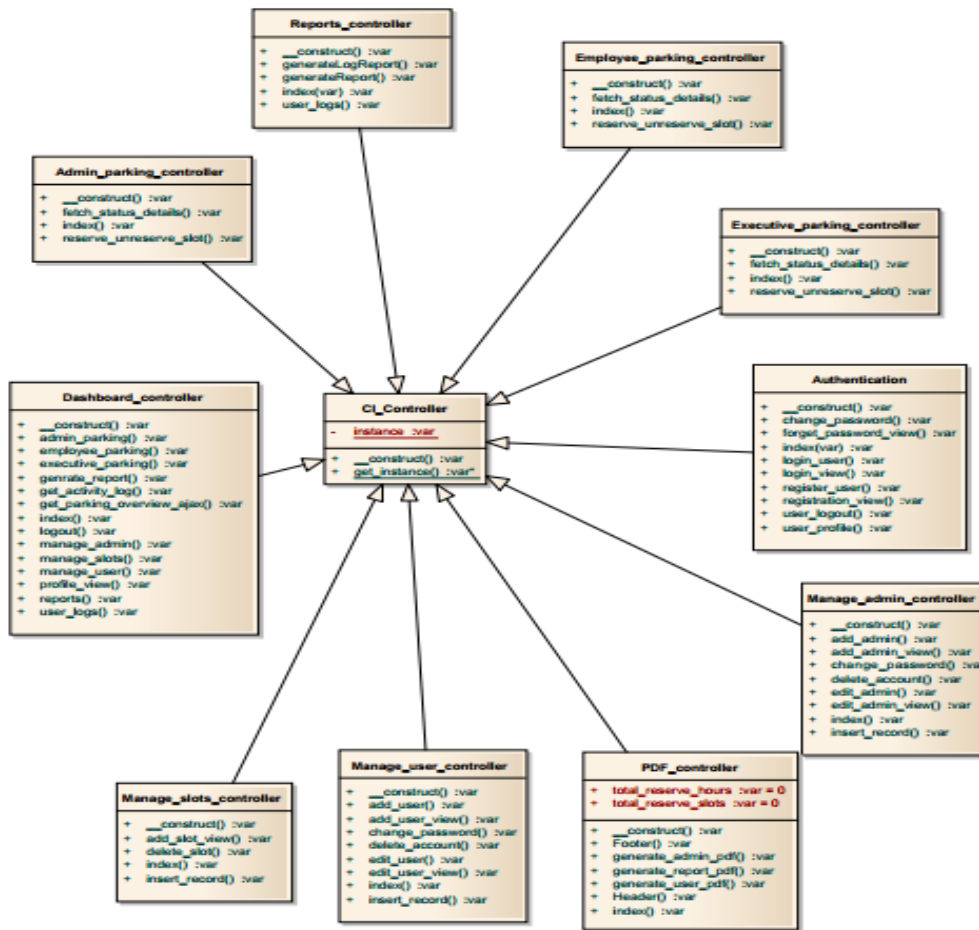


Figure 3 Class Diagram1(web)

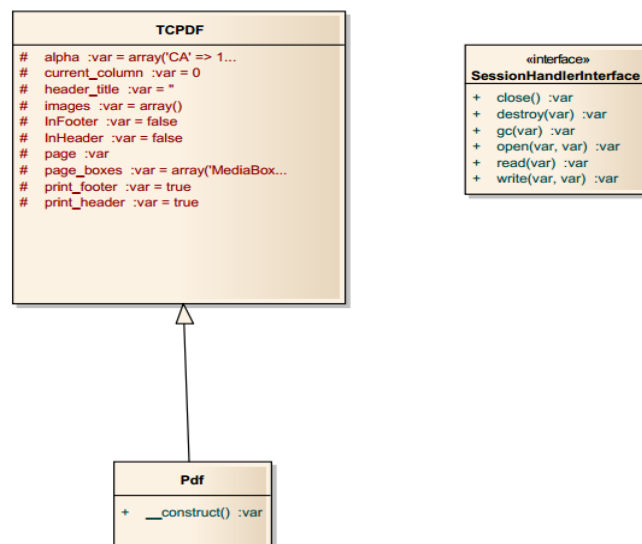


Figure 4 Class Diagram1(web)

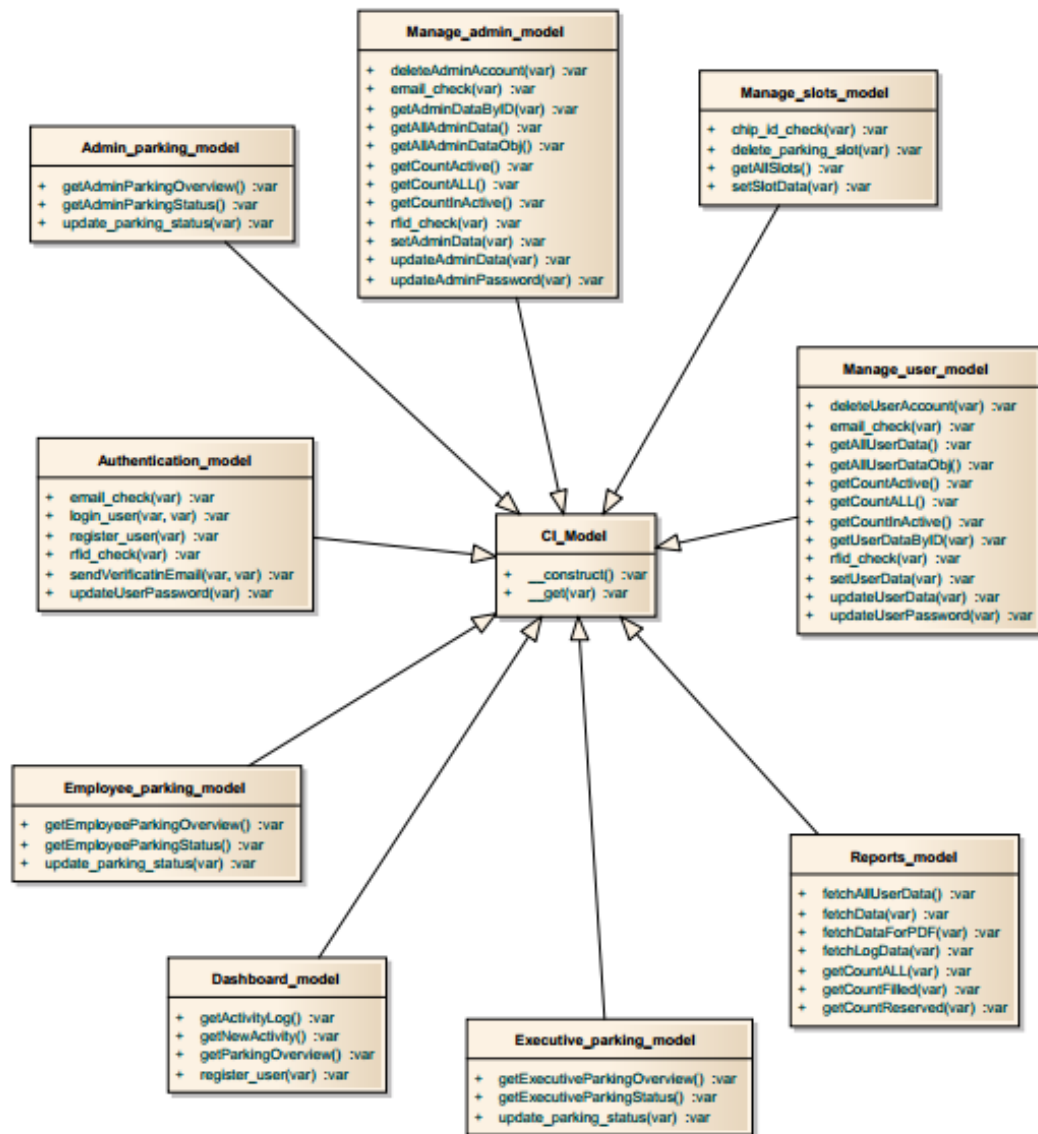


Figure 5 Class Diagram3(web)

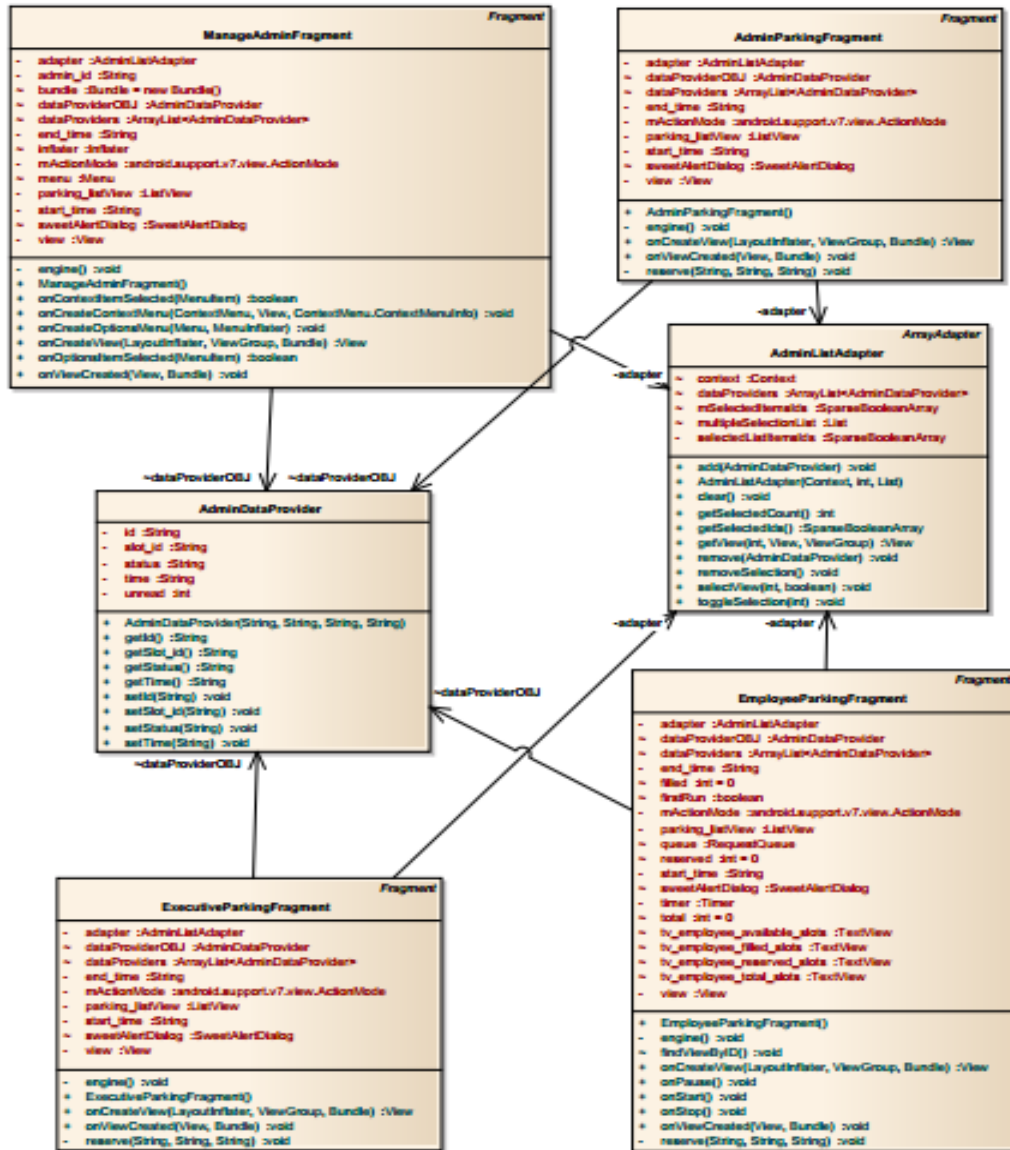


Figure 6 Class Diagram1(Android)

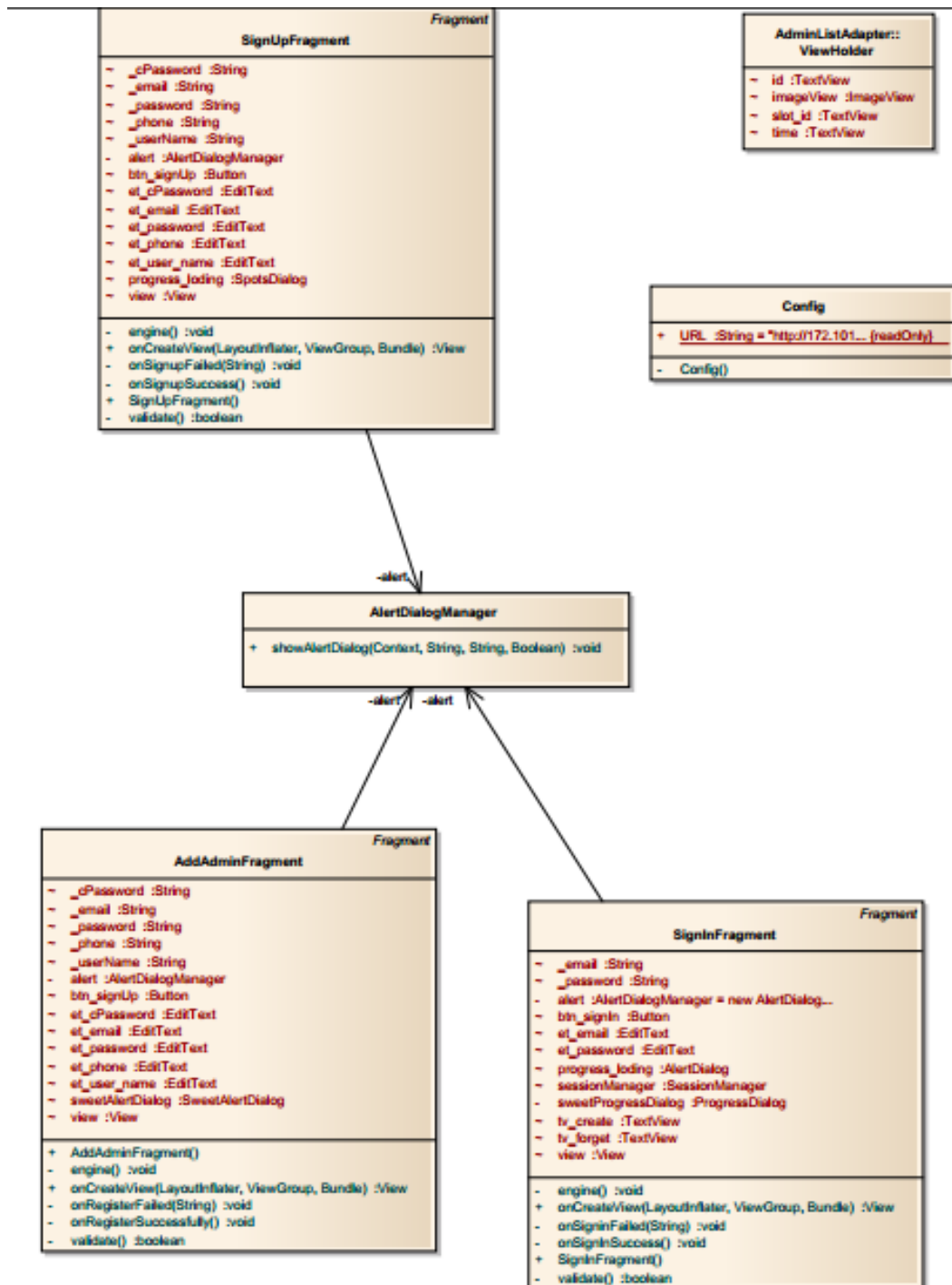


Figure 7 Class Diagram2(Android)



3.5 Data Model

The data model is a subset of the implementation model, which describes the logical and physical representation of persistent data in the system.

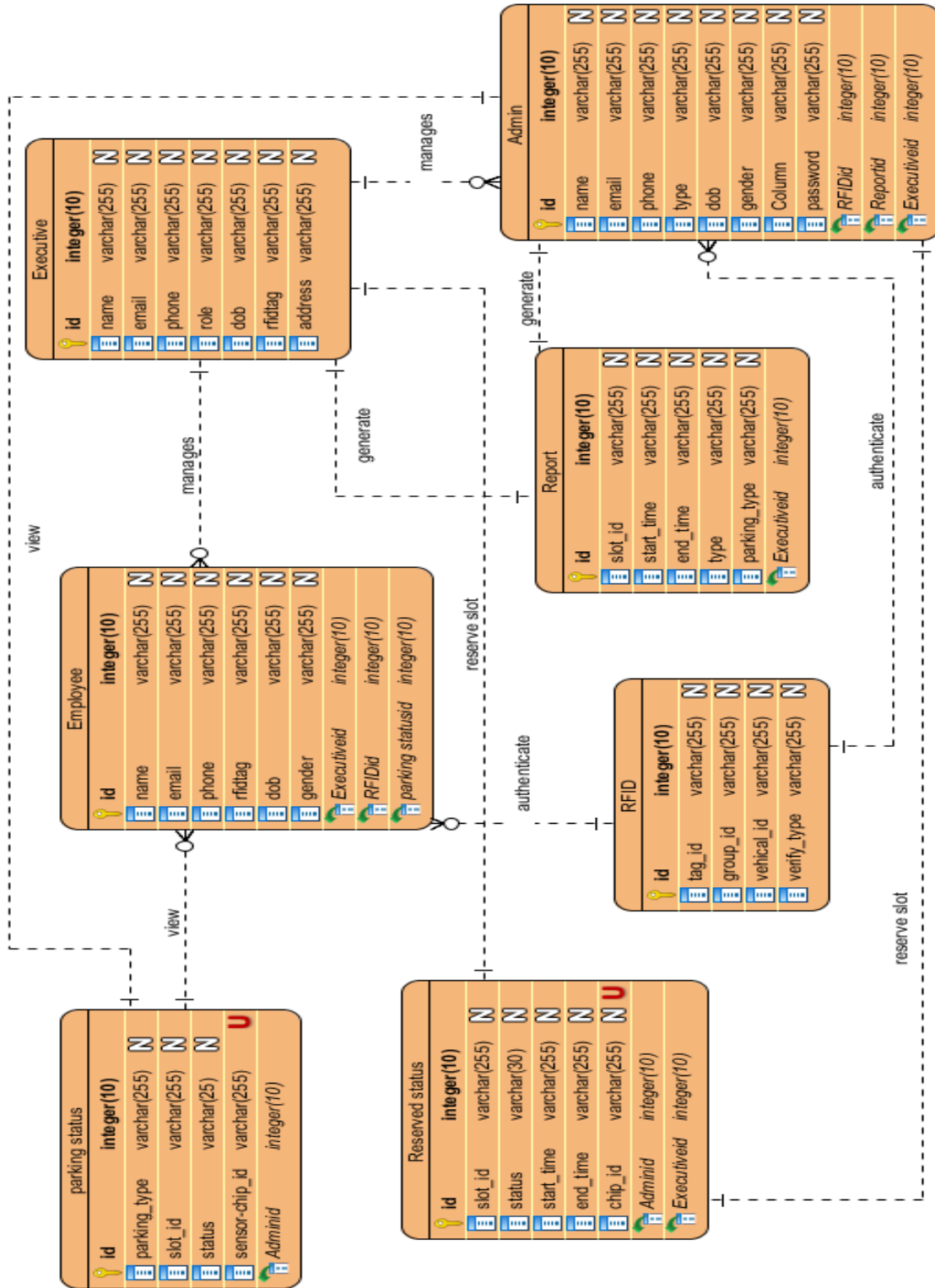


Figure 8 Data Model

3.6 Sequence Diagram

Sequence diagrams describe interactions among classes in terms of an exchange of messages over time. They're also called event diagrams. A sequence diagram is a good way to visualize and validate various runtime scenarios. These can help to predict how a system will behave and to discover responsibilities a class may need to have in the process of modelling a new system. There exists sequence diagram against every use case.

3.6.1 Interaction of user with parking system

This sequence diagram shows the interaction of user with parking system that how system will be response. The user firstly grants access by the RFID and then places their car at empty parking slots.

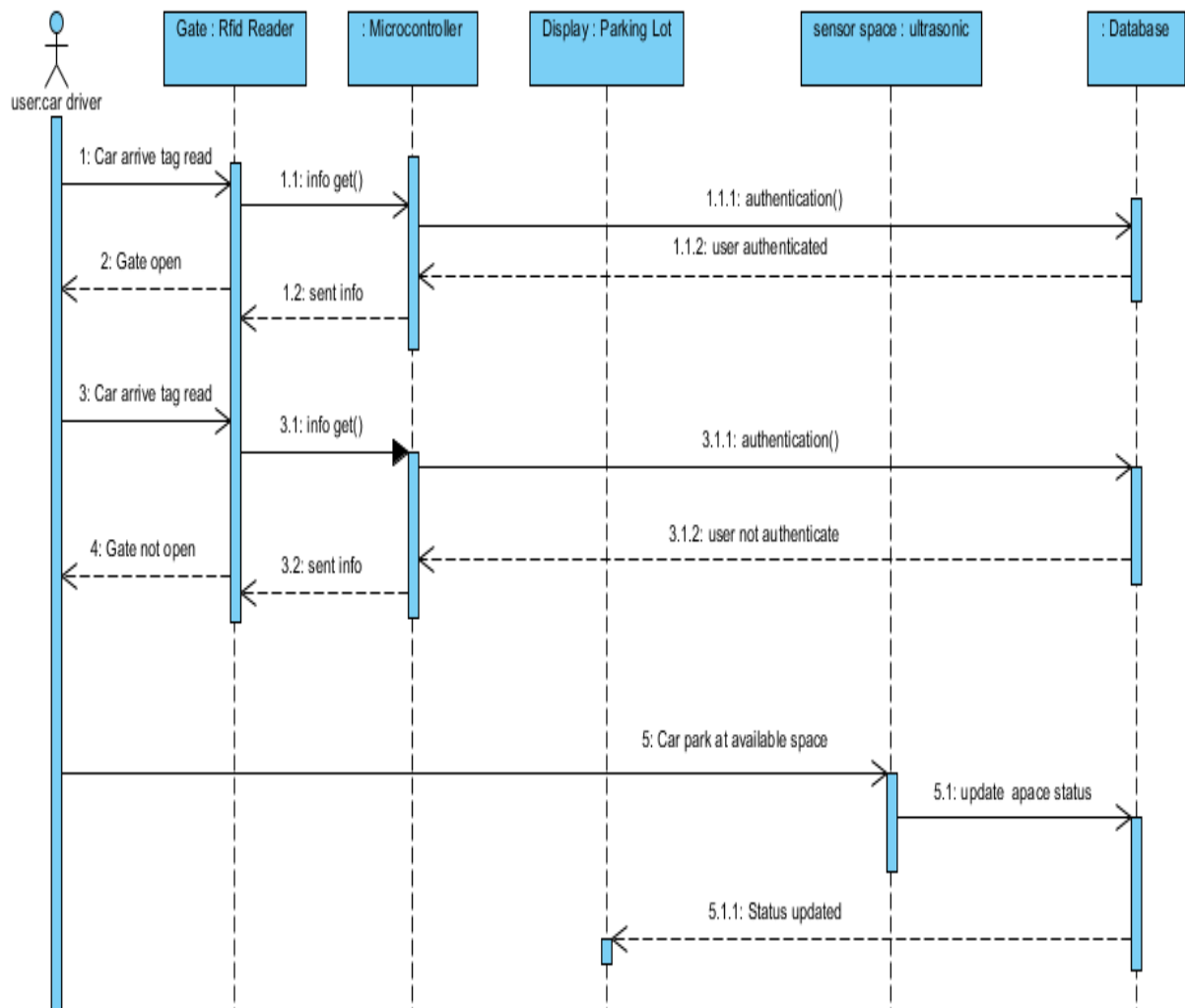


Figure 9 Interaction of user with parking system

3.6.2 Admin Registration on iPARK Website

Admin will be register by the executive. Executive have permission to manage the profile of the Admin.

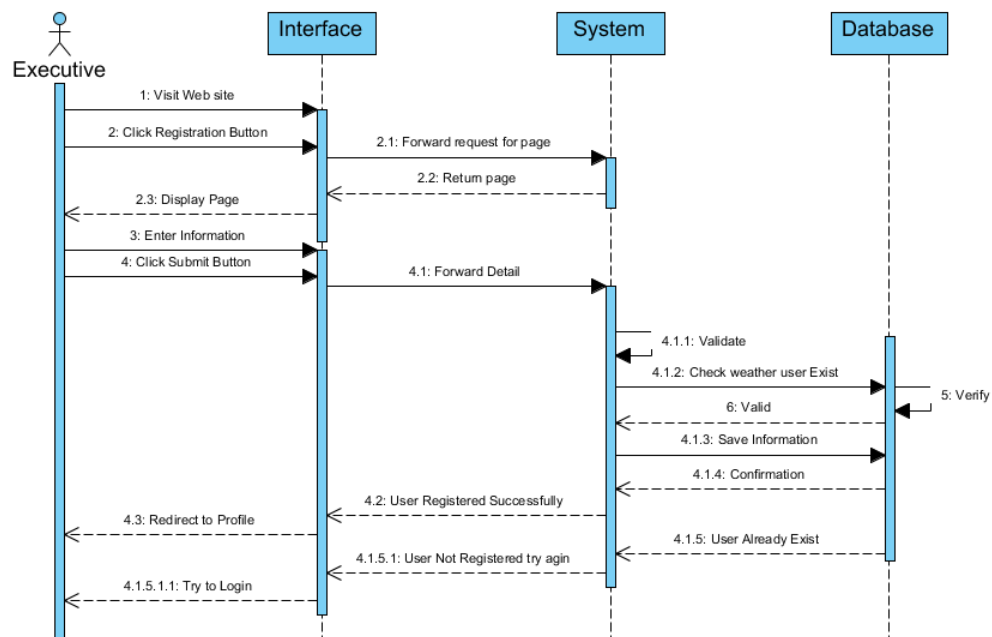


Figure 10 Admin Registration on iPARK Website

3.6.3 Admin Login on iPARK Website

Admin login into iPARK website by enter his/her credentials. The credentials validate and then verify by system using database.

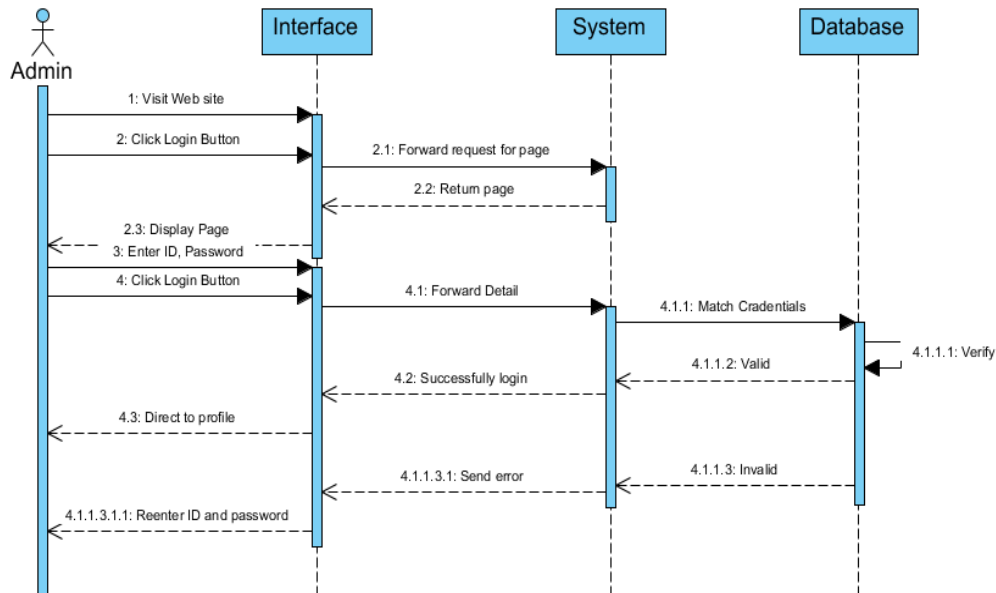


Figure 11 Admin Login on iPARK Website

3.6.4 Executive Login on iPARK Website

Executive login into iPARK website by enter his/her credentials. The credentials validate and then verify by system using database.

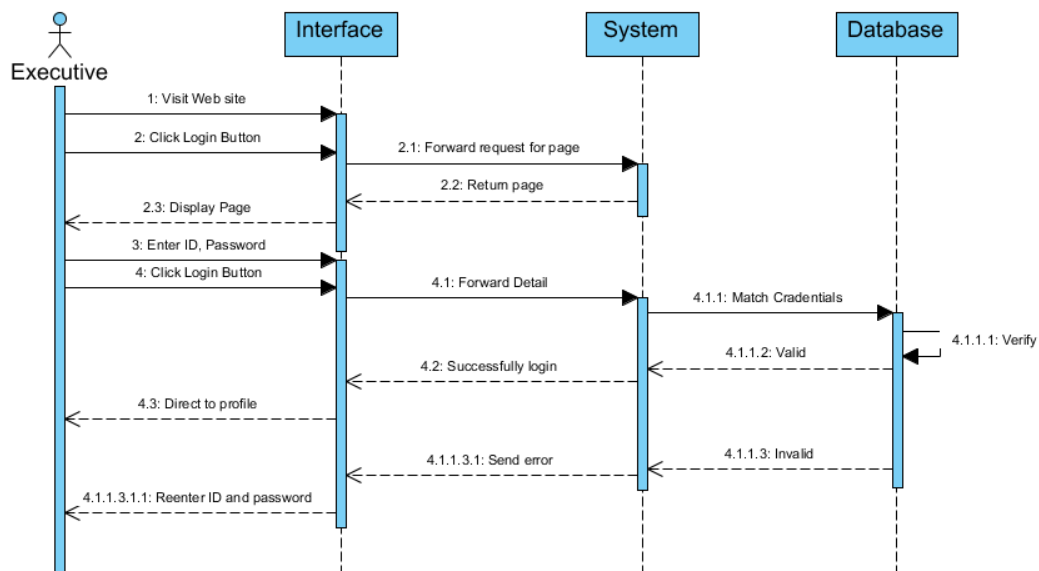


Figure 12 Executive Login on iPARK Website

3.6.5 User Login on iPARK Website

User login into iPARK website by enter his/her credentials. The credentials validate and then verify by system using database

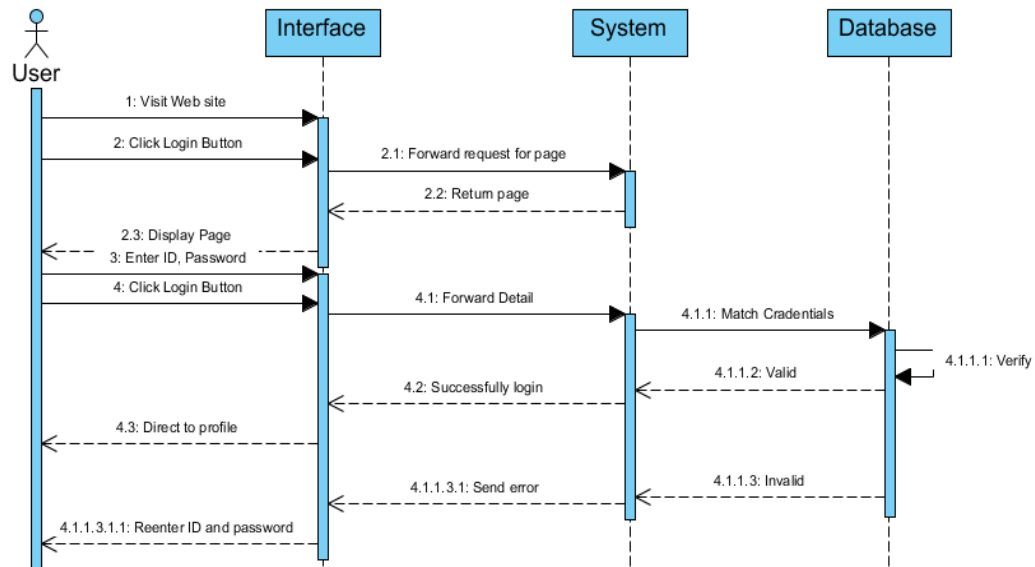


Figure 13 User Login on iPARK Website

3.6.6 User Registration on iPARK Website

User register into iPARK website by enter his/her information. User will register after authorize by admin.

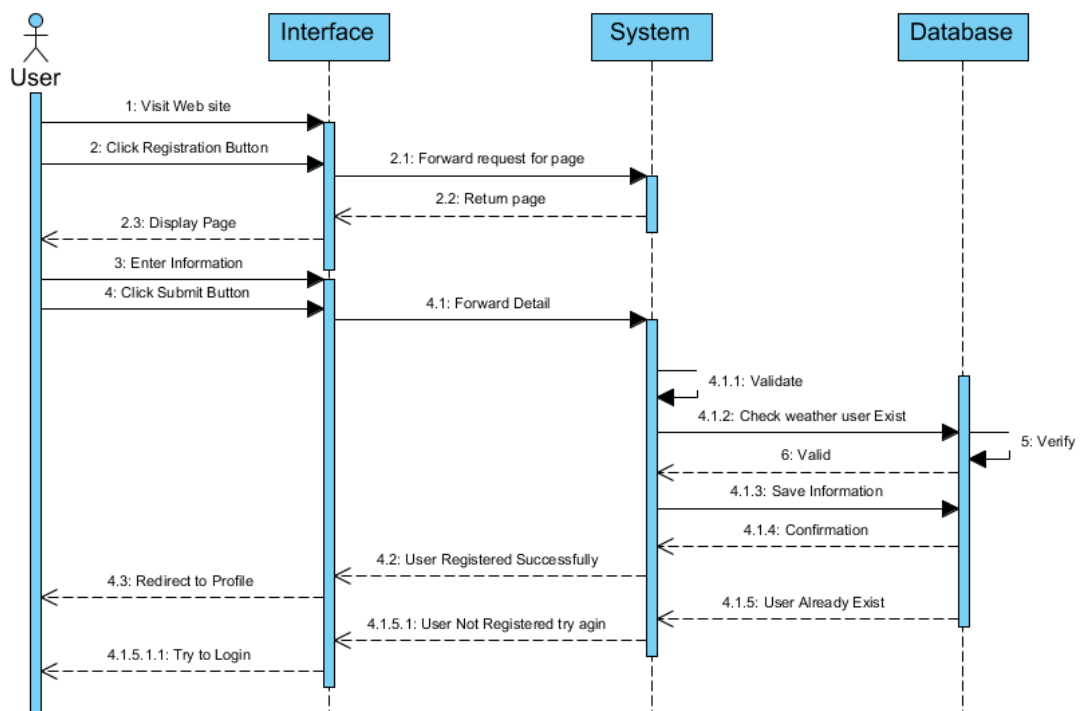


Figure 14 User Registration on iPARK Website

3.6.7 Admin View Parking Slot status on Website

Admin can view the whole parking status from iPARK website. The filled, empty and reserved status will be viewed.

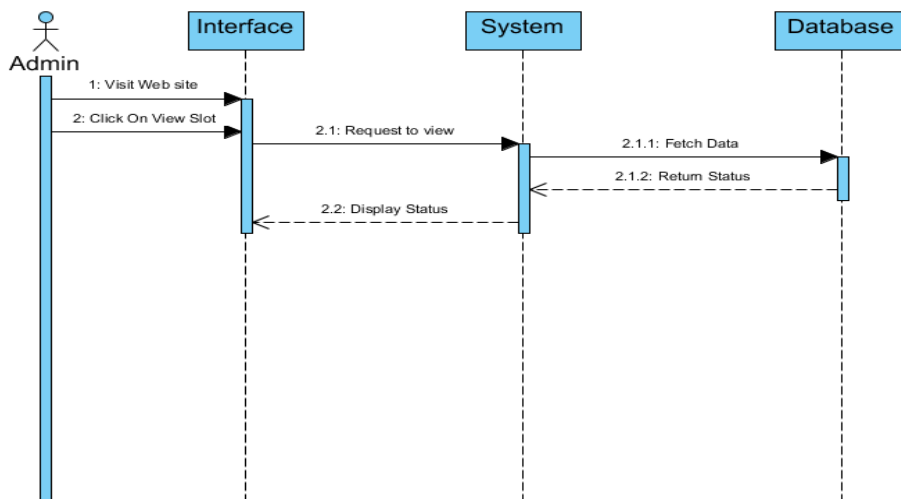


Figure 15 Admin View Parking Slot status on Website

3.6.8 User View Parking Slot status on Website

User can also view the whole parking status from iPARK website. The fill, empty and reserved status can know before entering into the parking space.

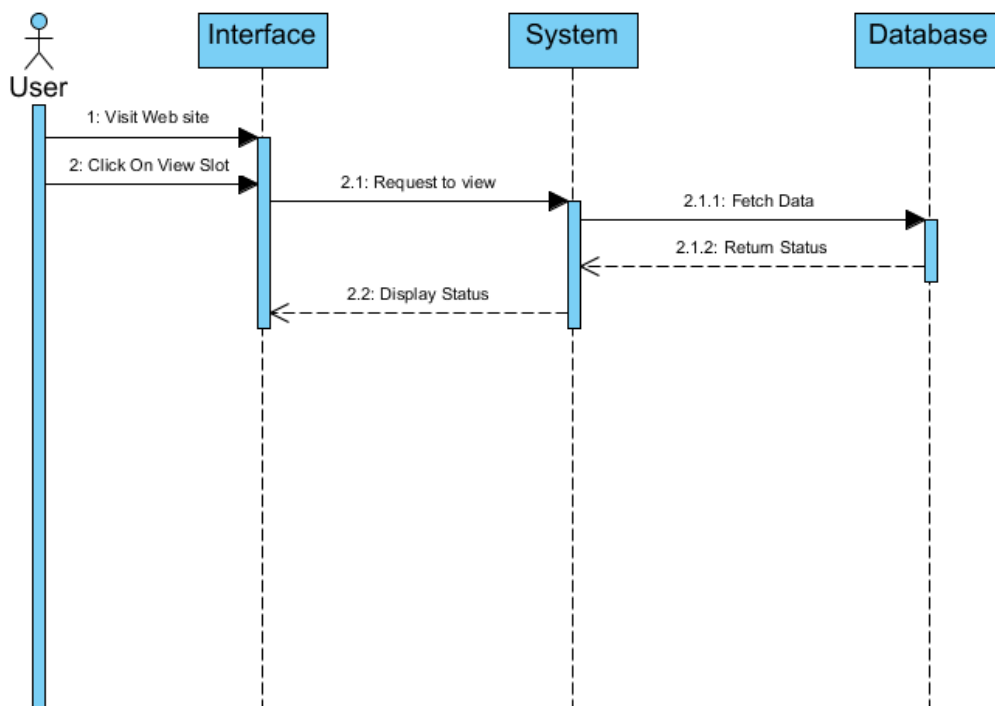


Figure 16 User View Parking Slot status on Website

3.6.9 User View Parking Slot status on Website

Admin can also have facility to reserve the slot. The command will first go to database and then it will receive by the microcontroller and status will change.

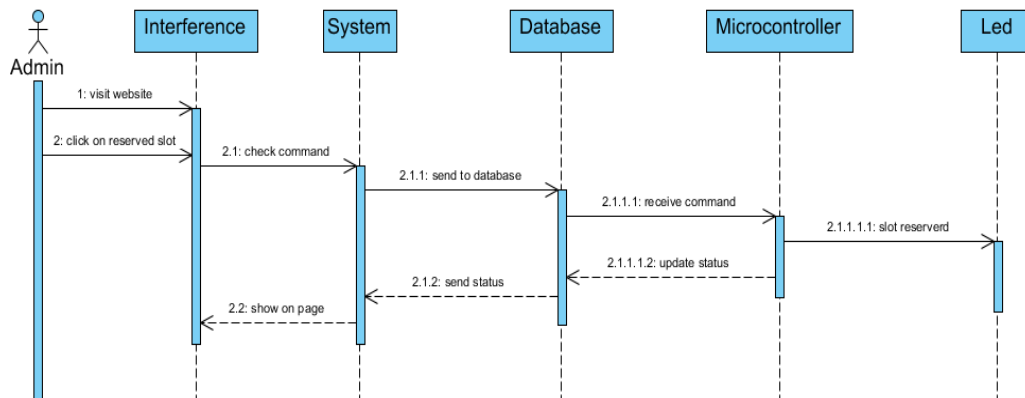


Figure 17 User View Parking Slot status on Website

3.6.10 Admin Generate Report iPARK website

Admin can generate the report on daily and weekly basis

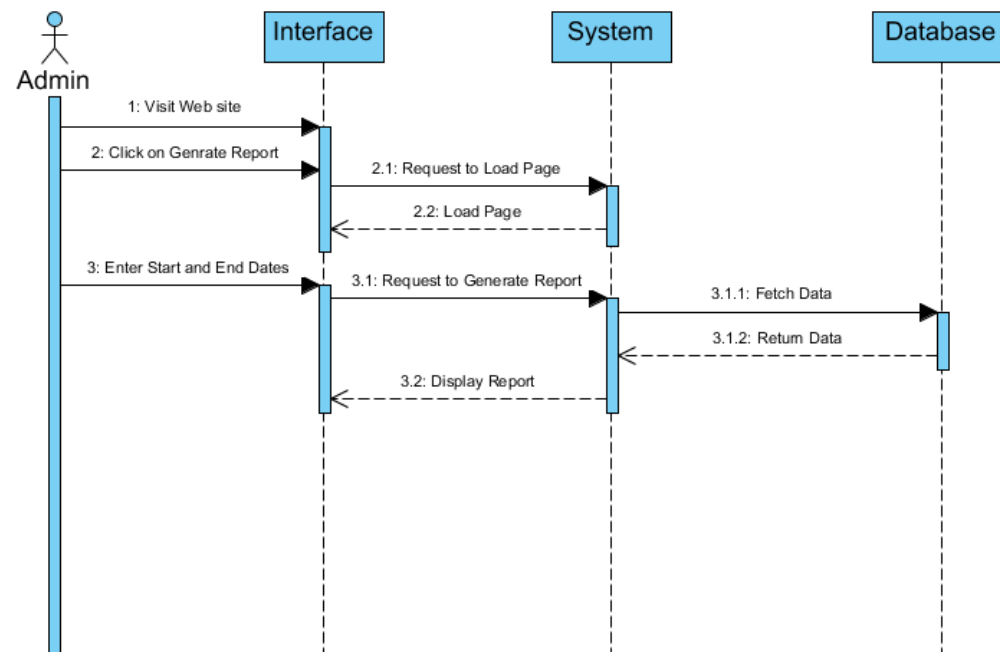


Figure 18 Admin Generate Report iPARK website

3.6.11 Executive Generate Report iPARK website

Executive can also generate the report on daily and weekly basis

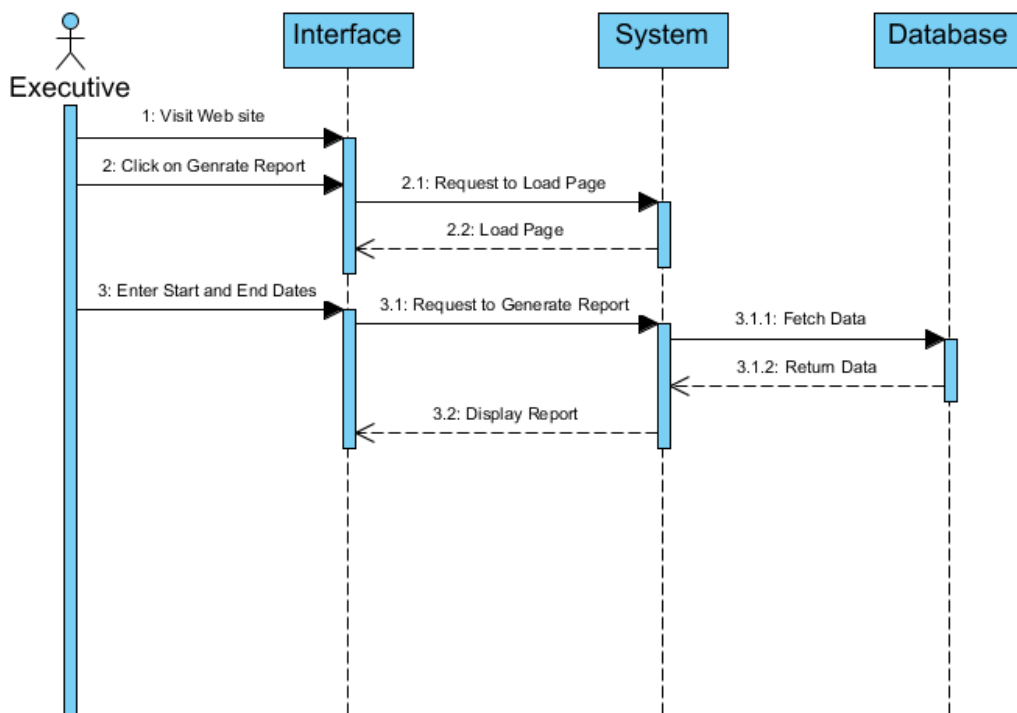


Figure 19 Executive Generate Report iPARK website

3.6.12 Admin Registration on iPARK APP

iPARK system also provide mobile application for both user and admin. Here is admin registration on iPARK app.

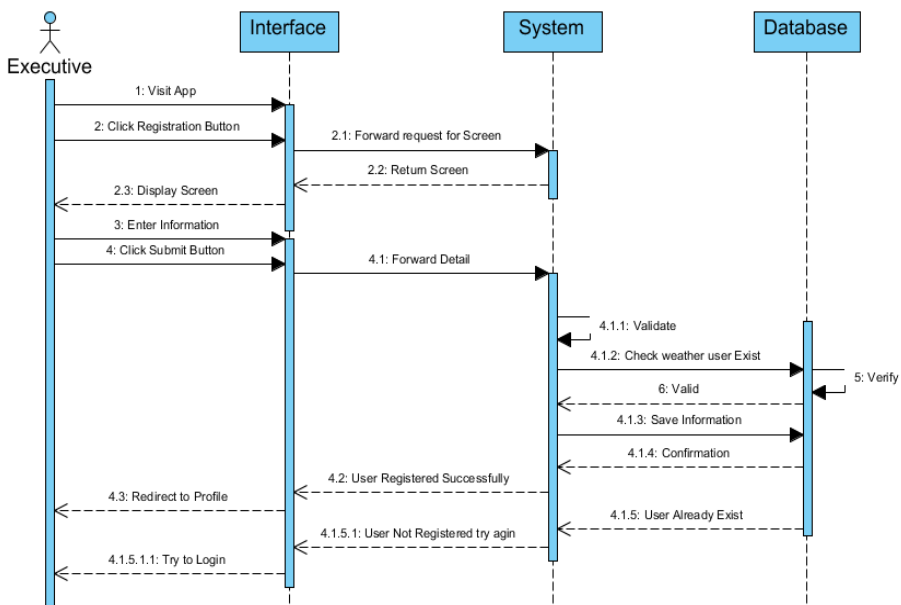


Figure 20 Admin Registration on iPARK APP

3.6.13 User Registration in iPARK APP

User can first register on iPARK app to view the whole parking status on mobile.

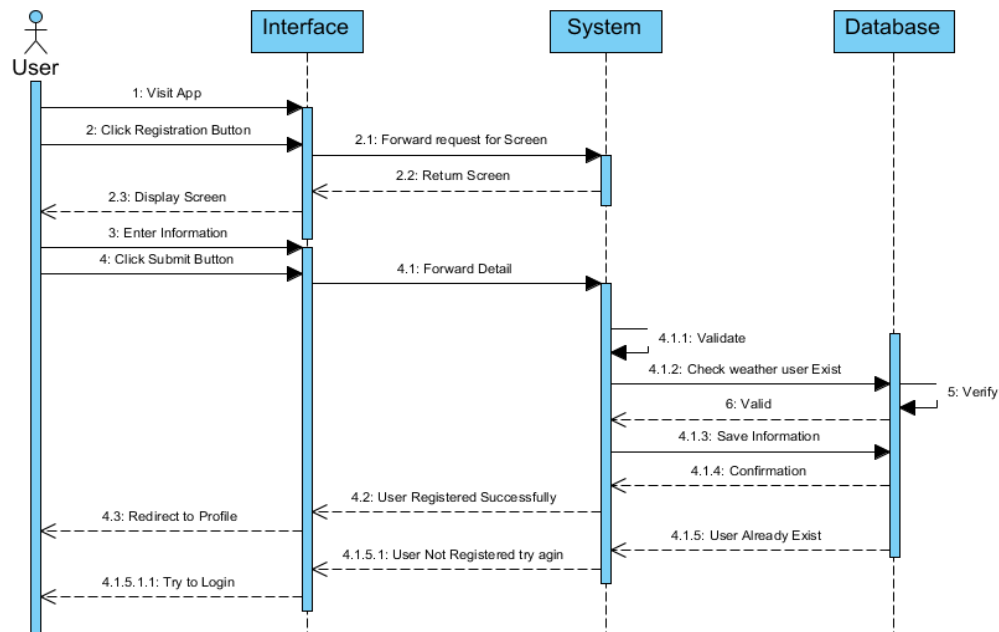


Figure 21 User Registration in iPARK APP

3.6.14 Admin Login on iPARK APP

Admin login by enter their use name and password. Both credentials validate and verify by the database after authenticate admin login successfully

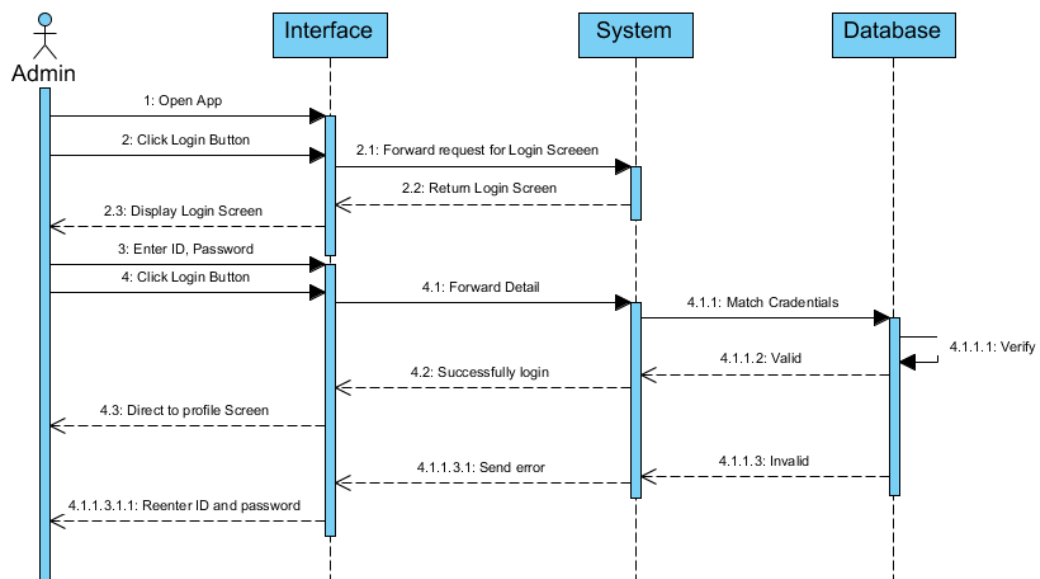


Figure 22 Admin Login on iPARK APP

3.6.15 Executive Login on iPARK APP

Executive login by enter their use name and password. Both credentials validate and verify by the database after authenticate executive login successfully

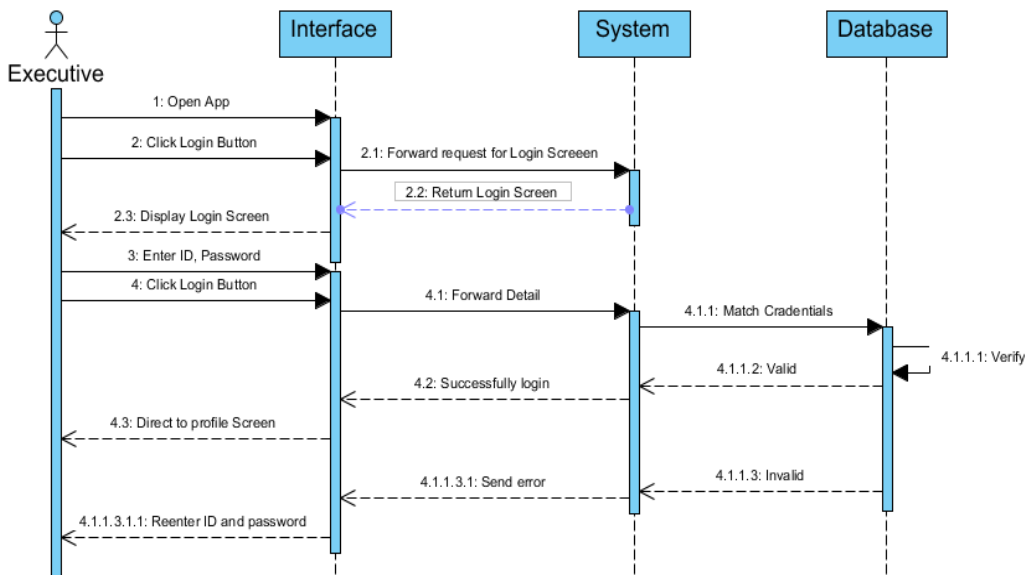


Figure 23 Executive Login on iPARK APP

3.6.16 User Login on iPARK APP

User login by enter their use name and password. Both credentials validate and verify by the database after authenticate User login successfully

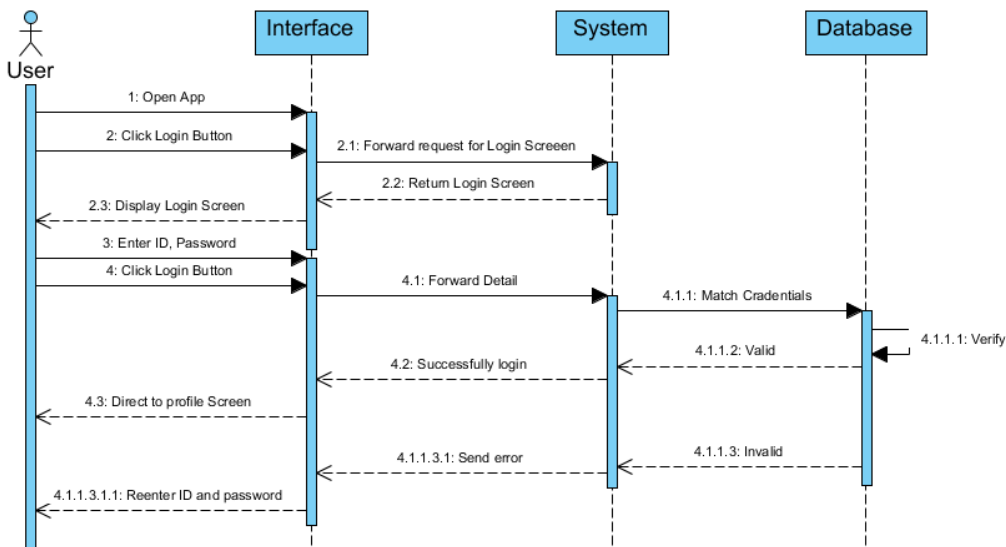


Figure 24 User Login on iPARK APP

3.6.17 User View Slots on iPARK APP

User can view the parking space status before entering into the parking area to check weather space available or not.

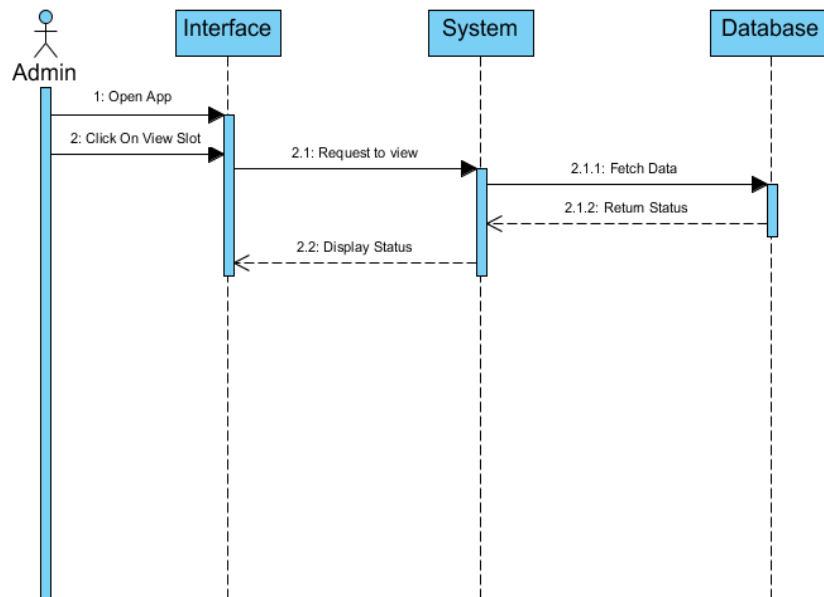


Figure 25 User View Slots on iPARK APP

3.6.18 Admin View Slots on iPARK APP

Admin can view the parking status on iPARK application.

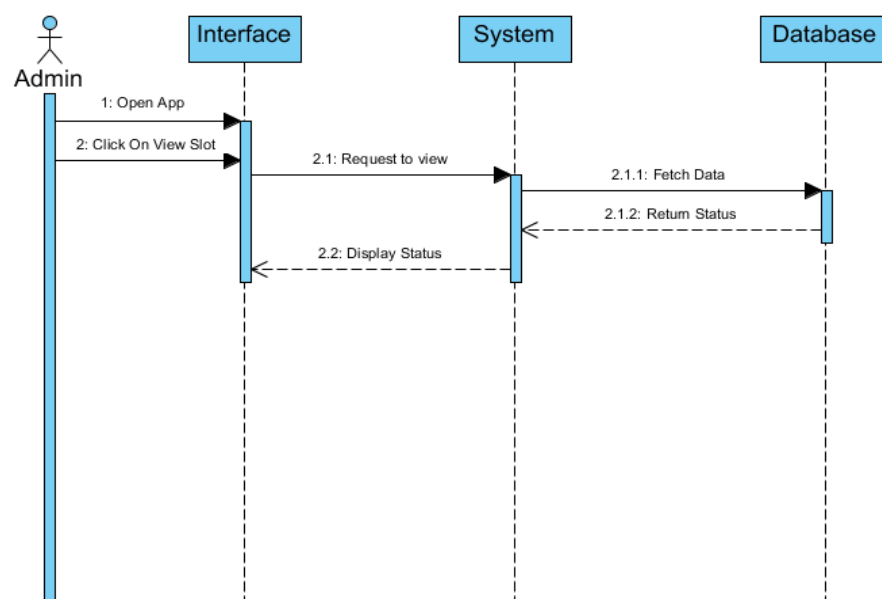


Figure 26 Admin View Slots on iPARK APP

3.6.19 Admin Reserved slot by iPARK APP

Admin can also reserve the parking slots from iPARK mobile application

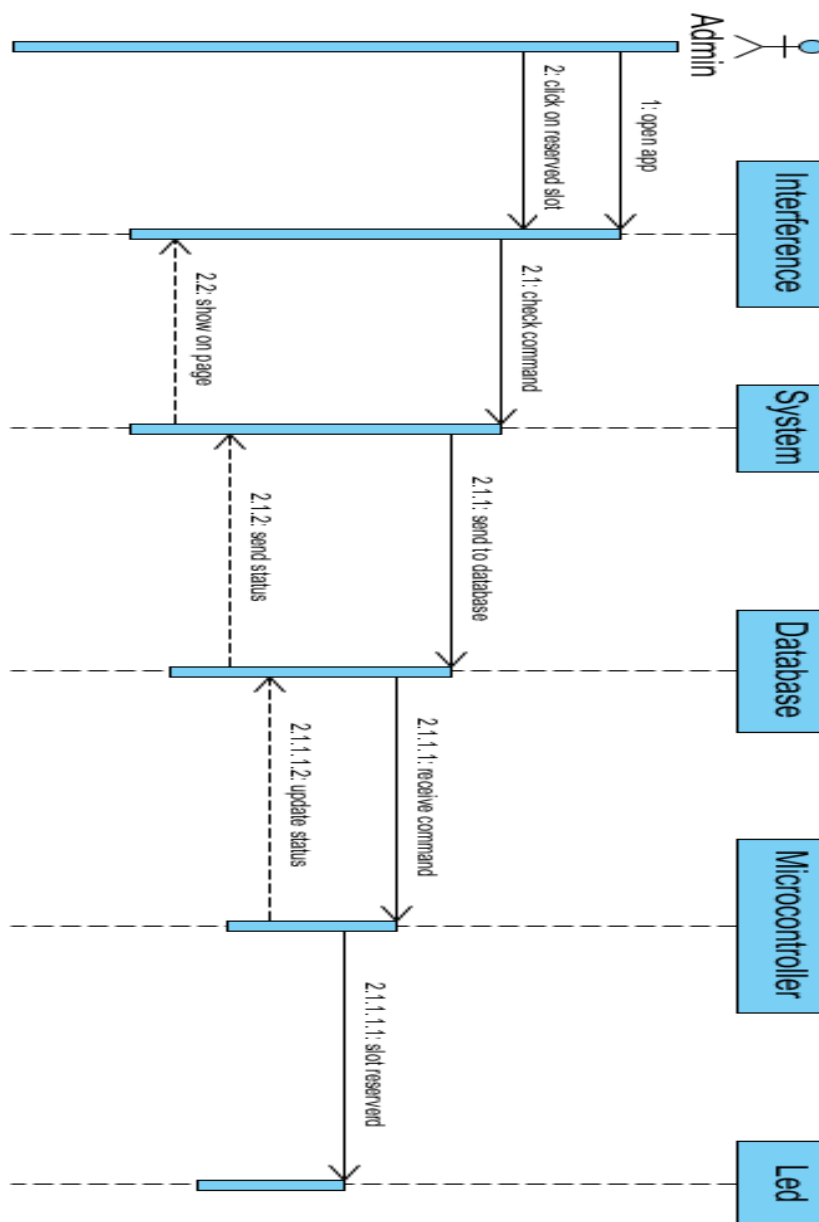


Figure 27 Admin Reserved slot by iPARK APP

3.6.20 Admin deletes employee account

Admin will delete the specific user account, by putting his/her correct credentials

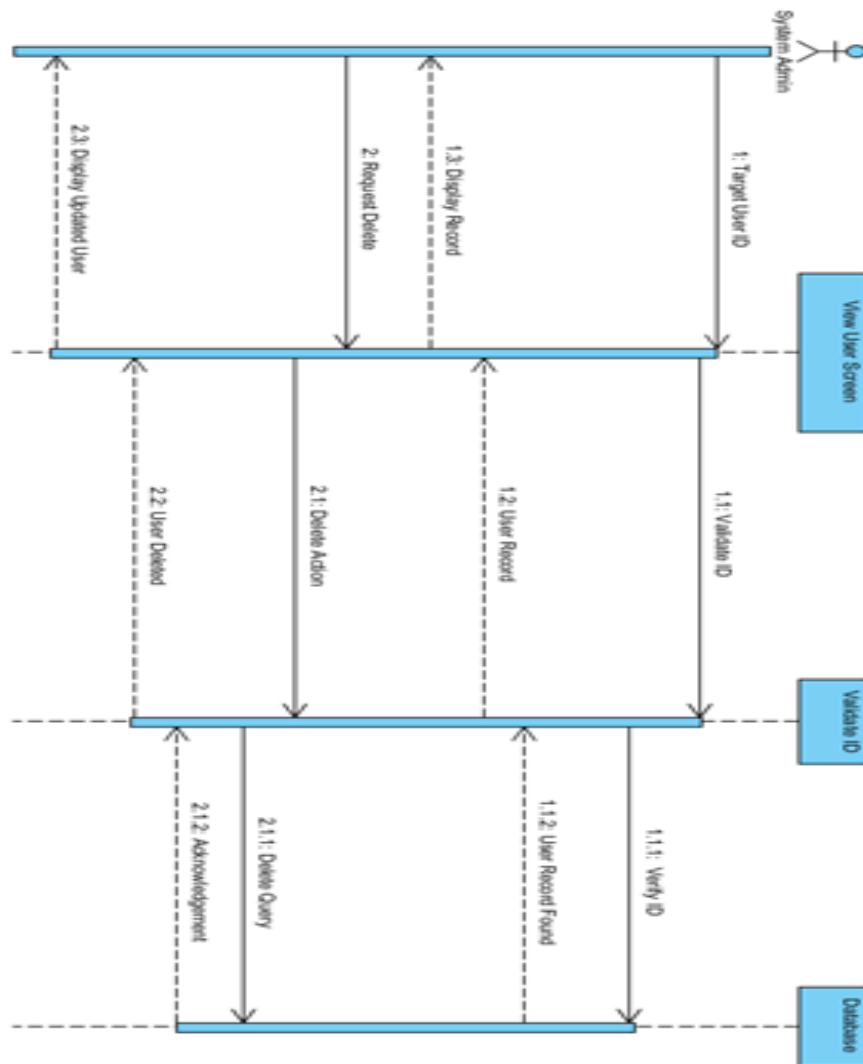


Figure 28 Admin deletes employee account

3.6.21 Admin Logout

Admin can logout by clicking on logout button, session will be deleted and admin Redirect to login page.

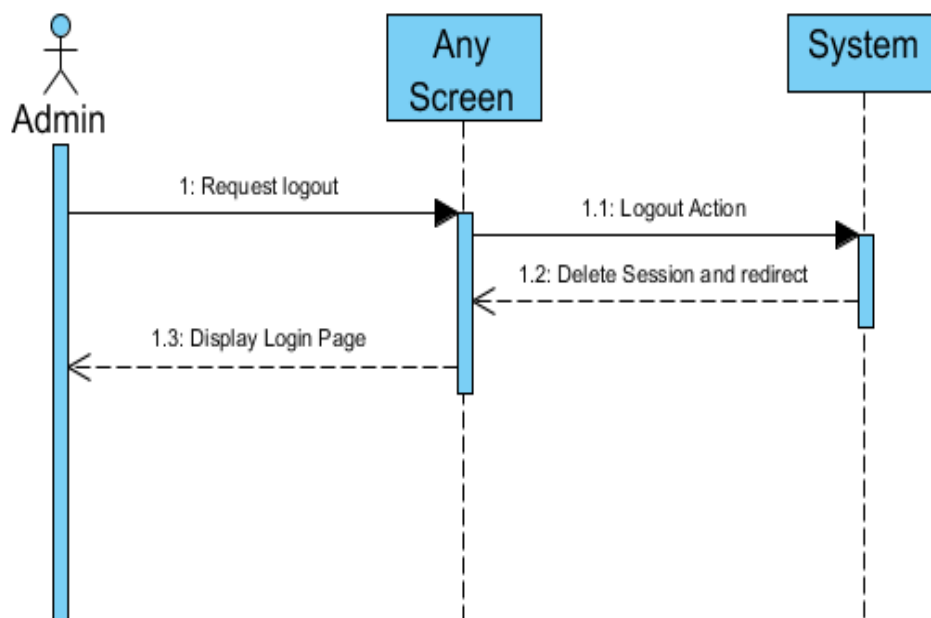


Figure 29 Admin Logout

3.6.22 User Logout

User can logout by clicking on logout button, session will be deleted and user redirect to login page

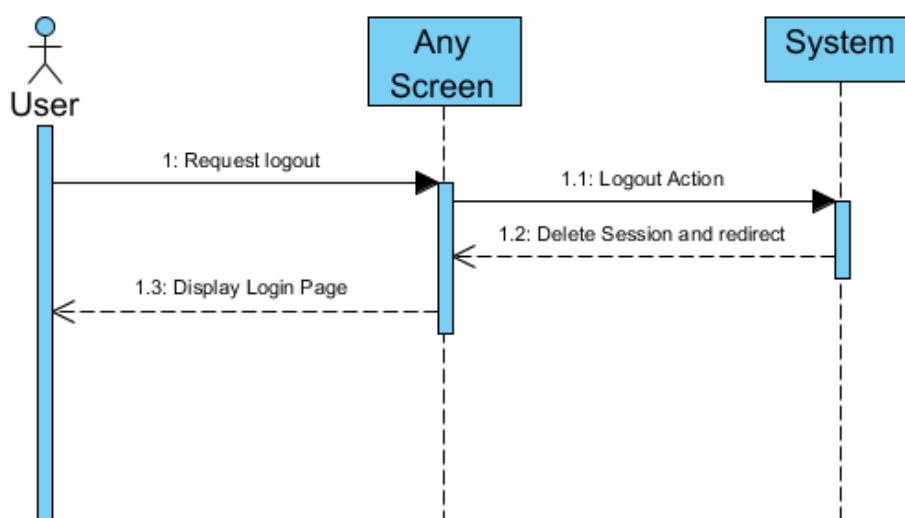


Figure 30 User Logout

3.6.23 Executive Logout

Executive can logout by clicking on logout button, session will be deleted and Executive redirect to login page.

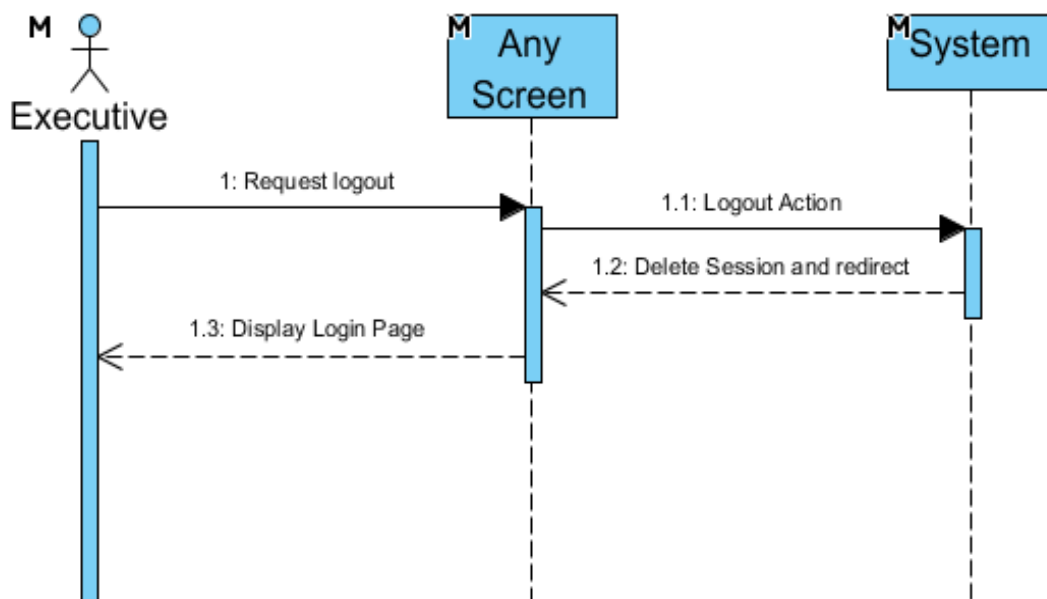


Figure 31 Executive Logout

3.6.24 System Diagram

This diagram shows the whole interaction of user, admin and Executive. How they register , login and view the parking slot

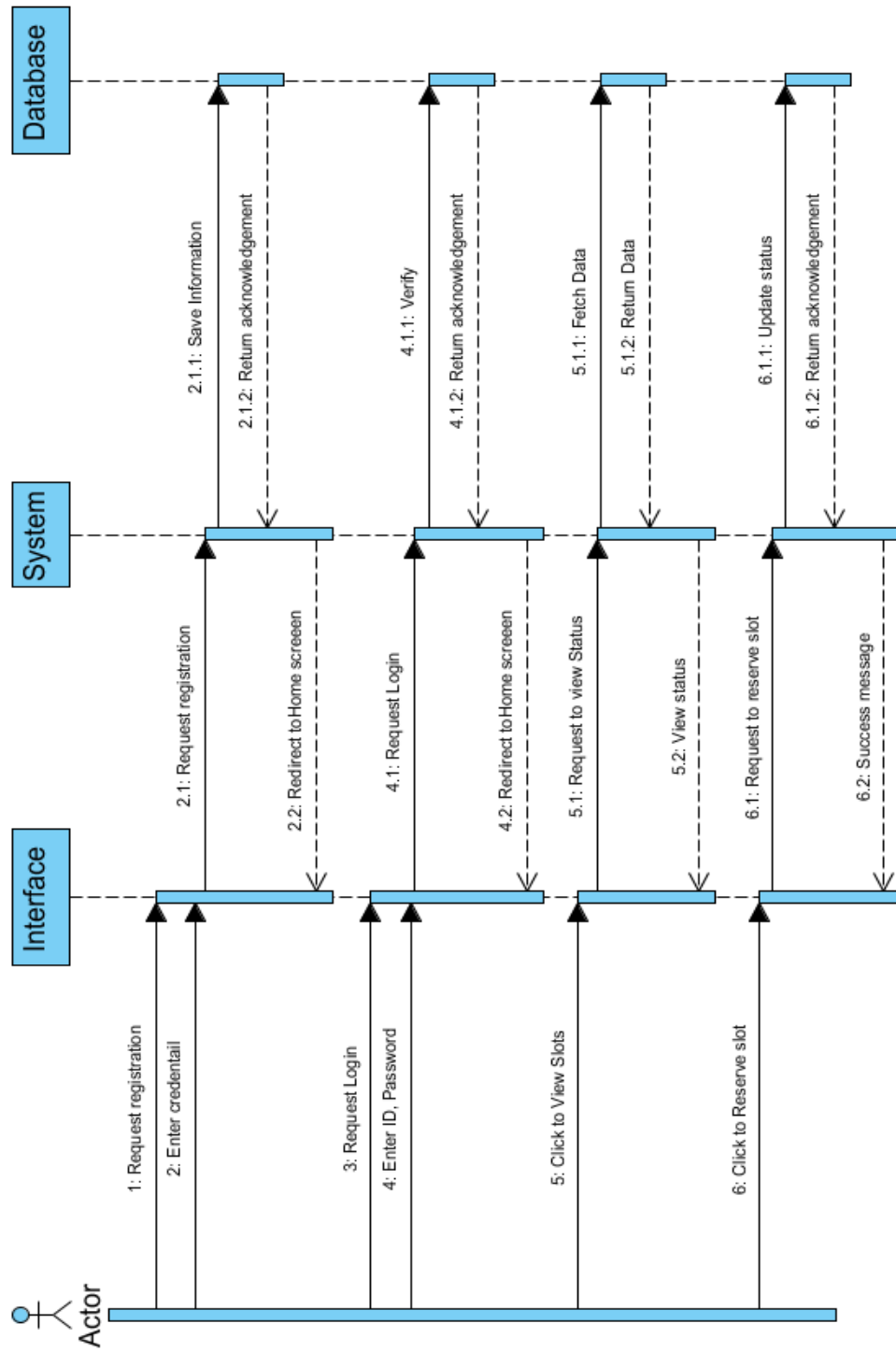


Figure 32 System Diagram

3.7 Collaboration Diagram

3.7.1 Interaction of user with parking system

The user will come and authenticated by access control. After authenticated user enter into the parking space and place their car in free parking slot.

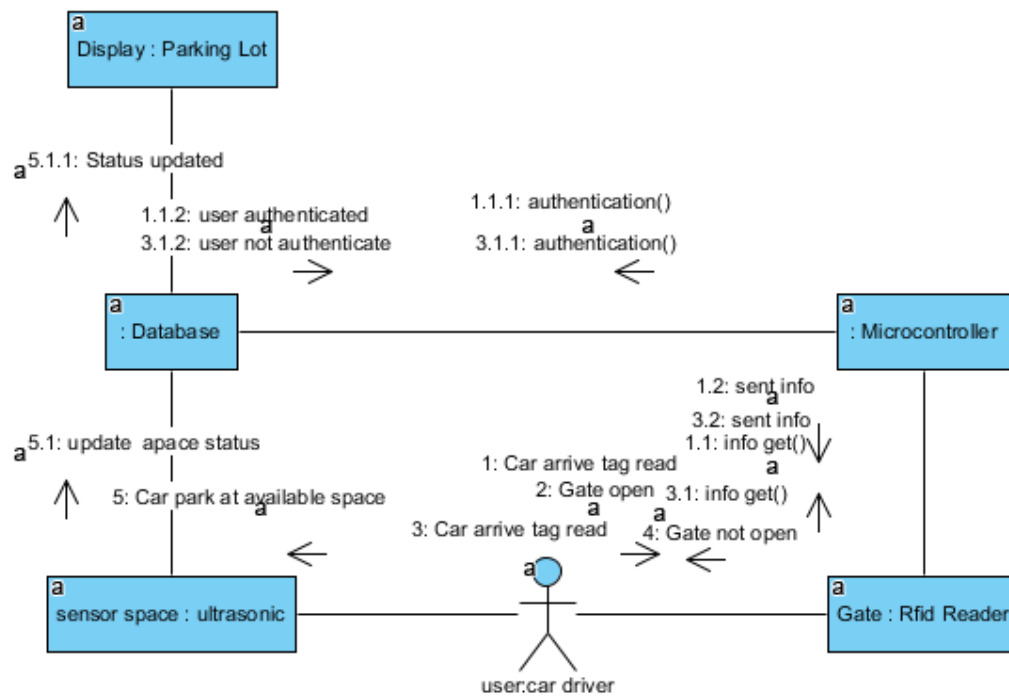


Figure 33 Interaction of user with parking system

3.7.2 View Parking Slots:

User will view the current parking status of each status on iPARK website.

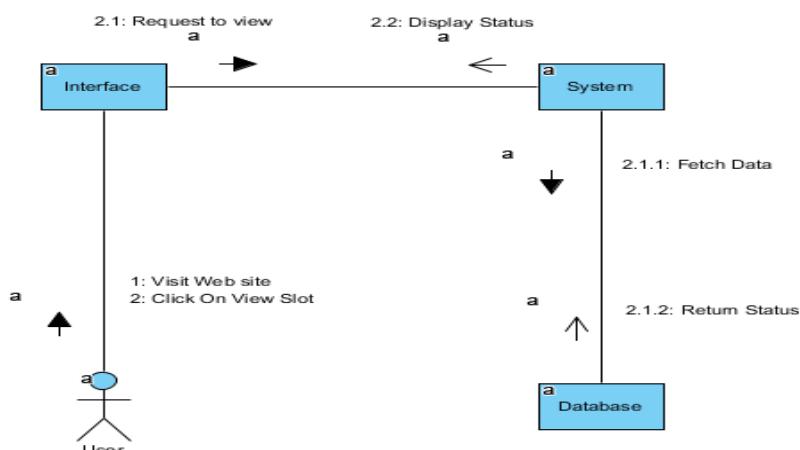


Figure 34 View Parking Slots

3.7.3 Admin Login iPARK Website:

Admin login into iPARK website by providing his/her credential validate and verify by system using database.

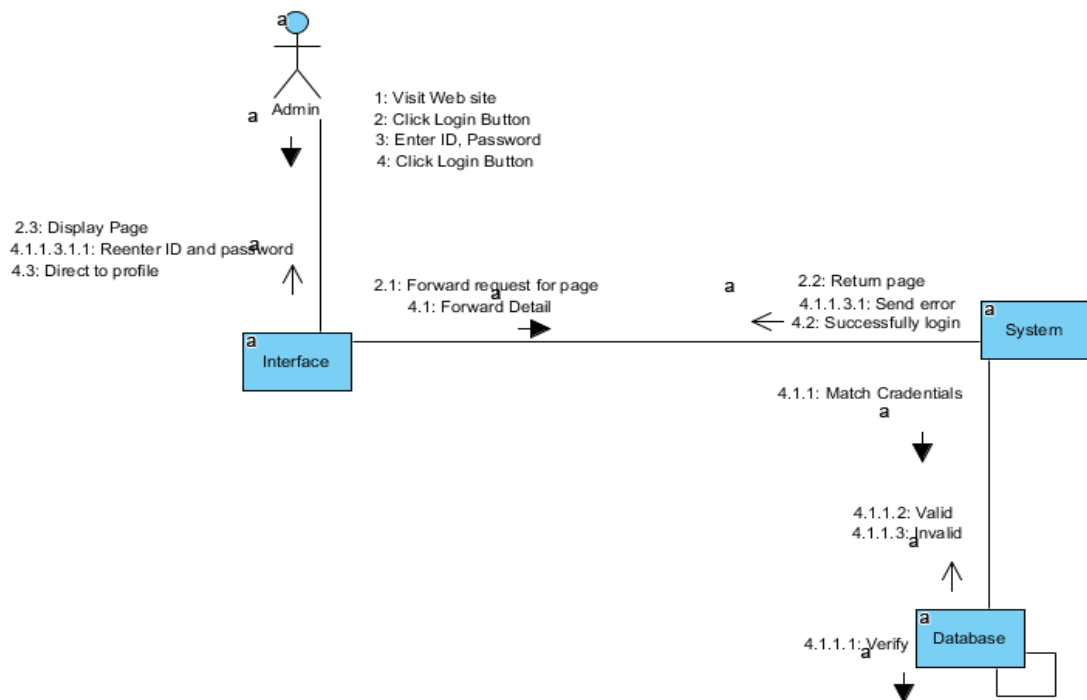


Figure 35 Admin Login iPARK Website

3.7.4 Admin Logout iPARK Website:

Admin will logout by clicking on logout button, session will be deleted and admin redirect to login page.

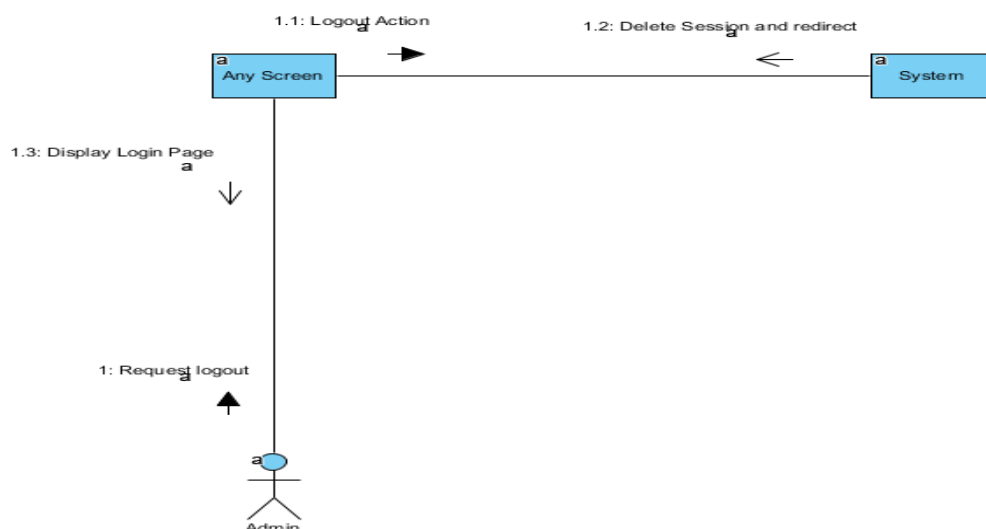


Figure 36 Admin Logout iPARK Website

3.7.5 Admin Registration iPARK Website:

Admin will be register in iPARK website by the executive. Executive have permission to manage the profile of the Admin.

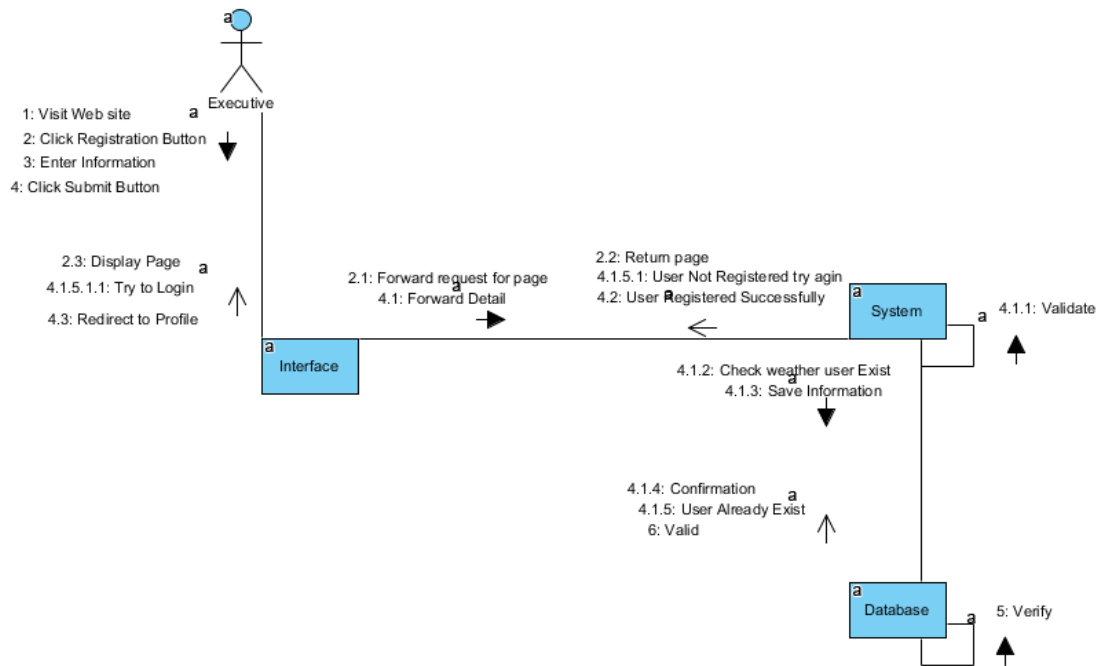


Figure 37 Admin Registration iPARK Website

3.7.6 Admin Registration iPARK APP:

Admin will be register in iPARK App by the executive. Executive have permission to manage the profile of the Admin.

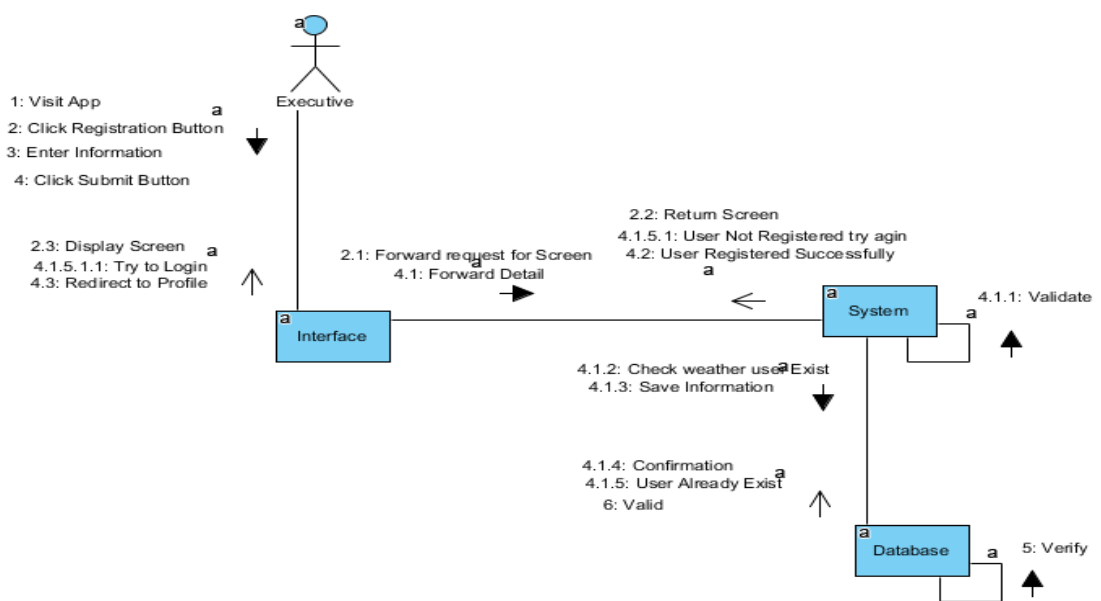


Figure 38 Admin Registration iPARK APP

3.7.7 Executive login iPARK Website:

Executive login into iPARK website by providing his/her credential validate and verify by system using database.

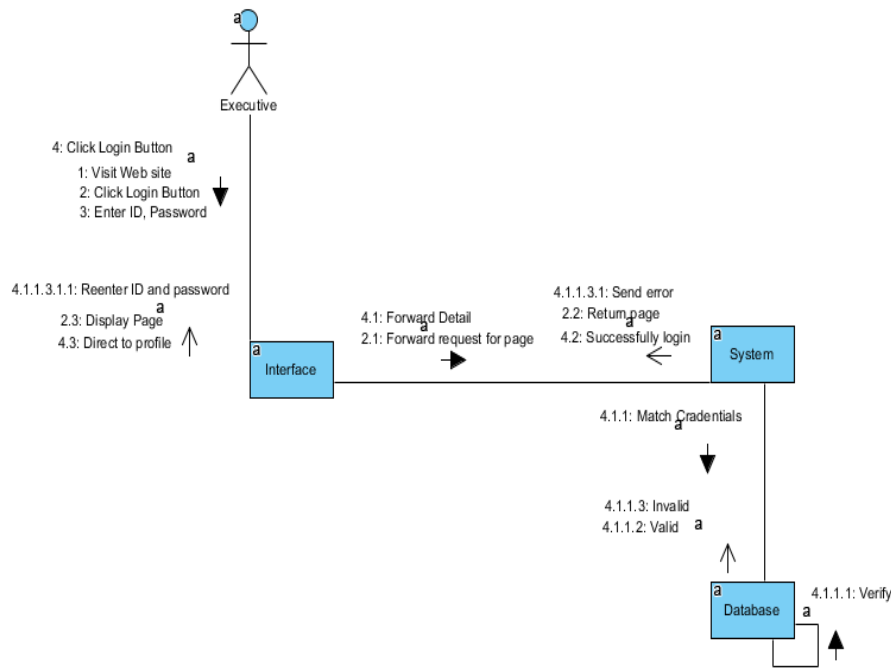


Figure 39 Executive login iPARK Website

3.7.8 Executive Login iPARK APP:

Executive login into iPARK App by providing his/her credential validate and verify by system using database.

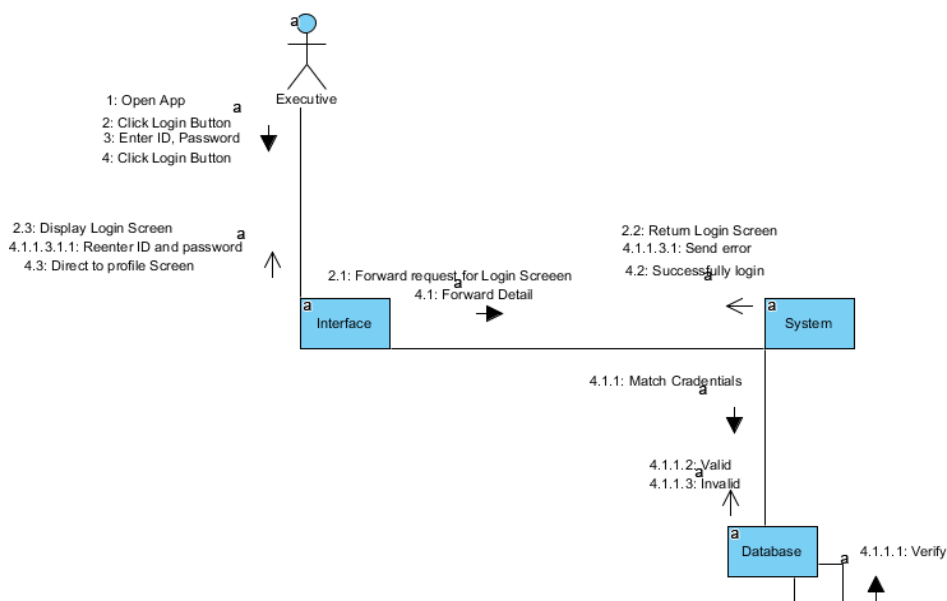


Figure 40 Executive Login iPARK APP

3.7.9 Executive Logout iPARK Website:

Executive can logout by clicking on logout button, session will be deleted and admin redirect to login page.

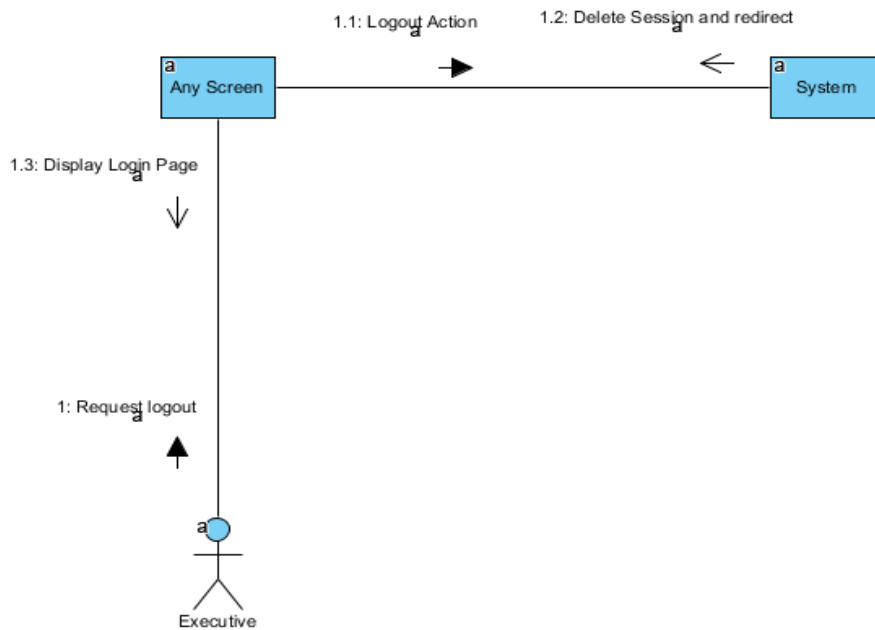


Figure 41 Executive Logout iPARK Website

3.7.10 User Login iPARK Website:

User login into iPARK Website by providing his/her credential validate and verify by system using database.

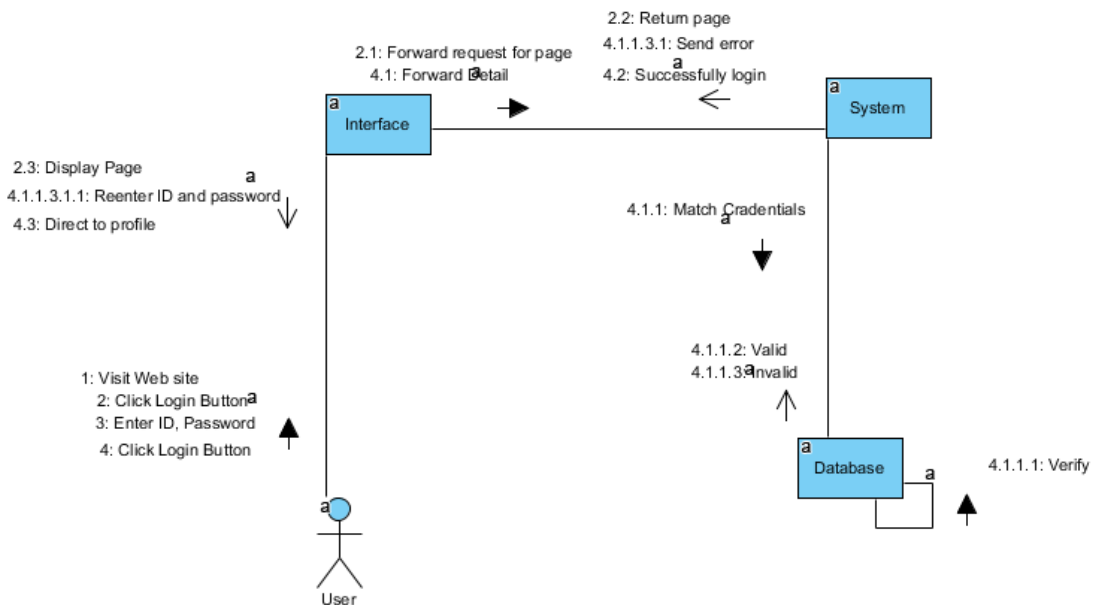


Figure 42 User Login iPARK Website

3.7.11 User Logout iPARK Website:

User can logout by clicking on logout button, session will be deleted and admin redirect to login page.

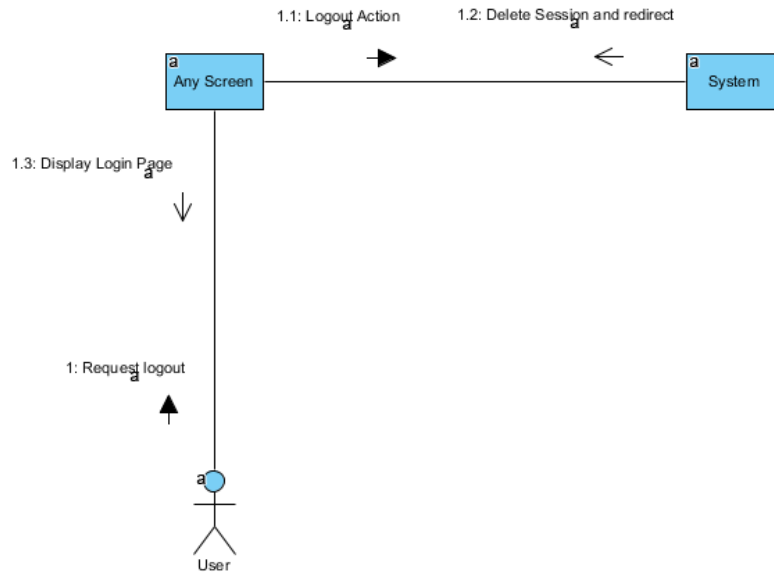


Figure 43 User Logout iPARK Website

3.7.12 User Login iPARK APP:

User login into iPARK App by providing his/her credential validate and verify by system using database.

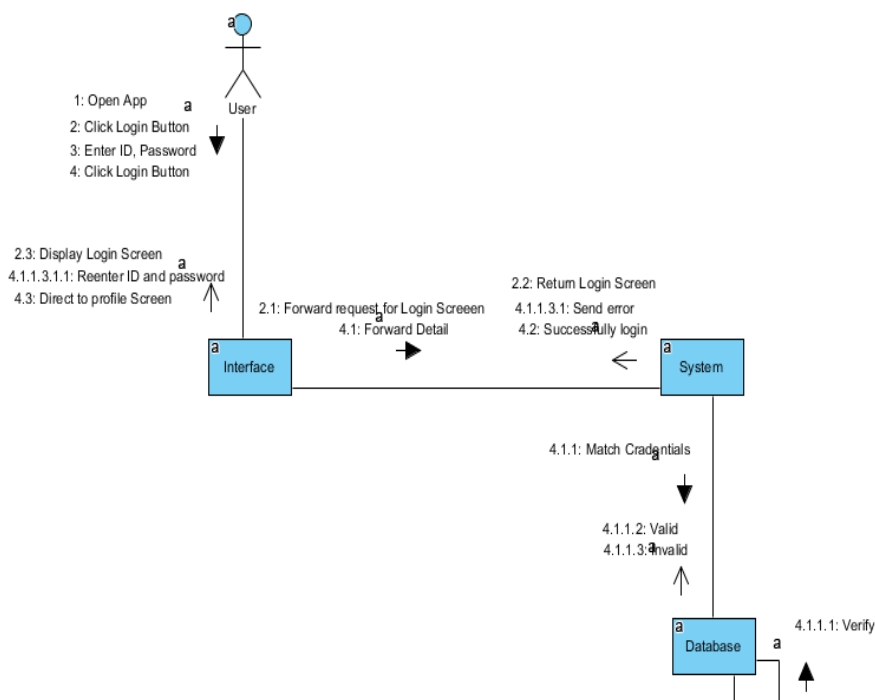


Figure 44 User Login iPARK APP

3.7.13 User registration iPARK Website:

User can first register on iPARK Website to view the whole parking status.

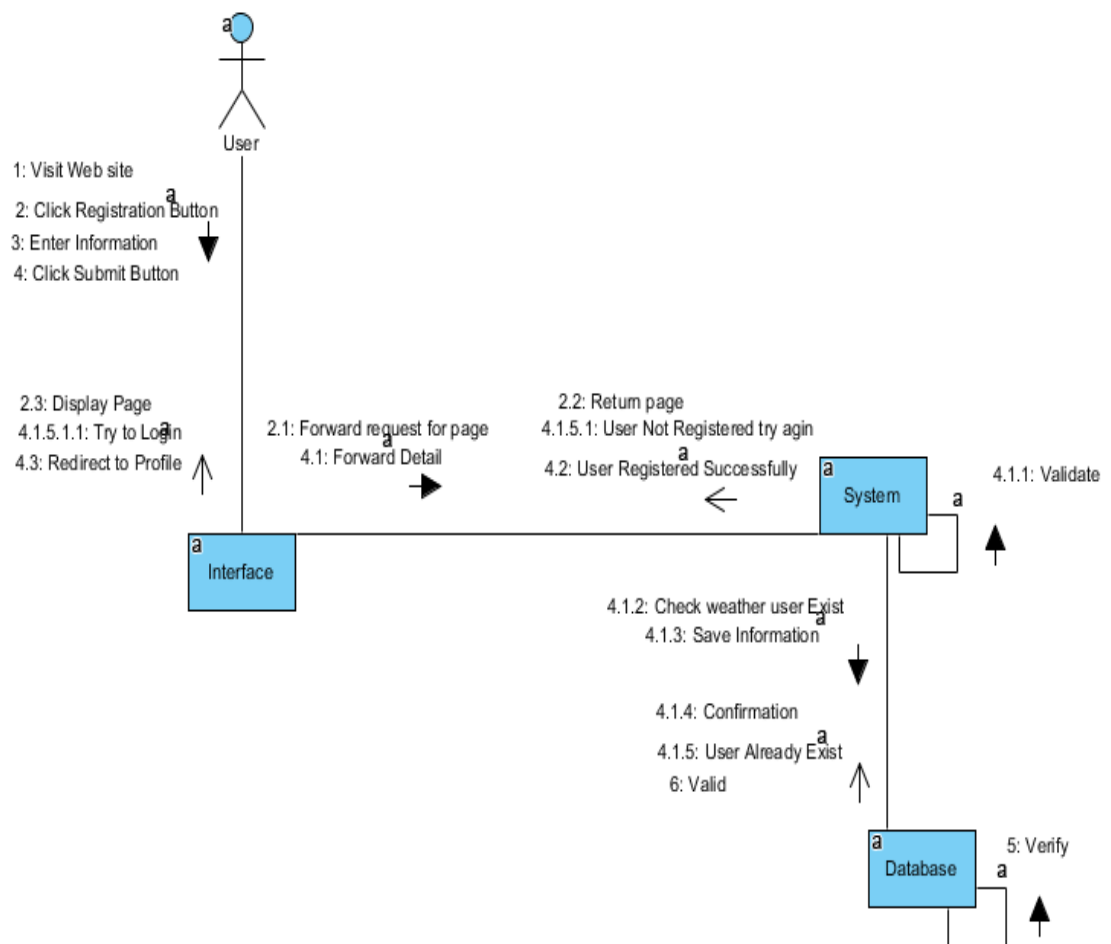


Figure 45 User registration iPARK Website

3.7.14 User registration iPARK APP:

User can first register on iPARK app to view the whole parking status on mobile.

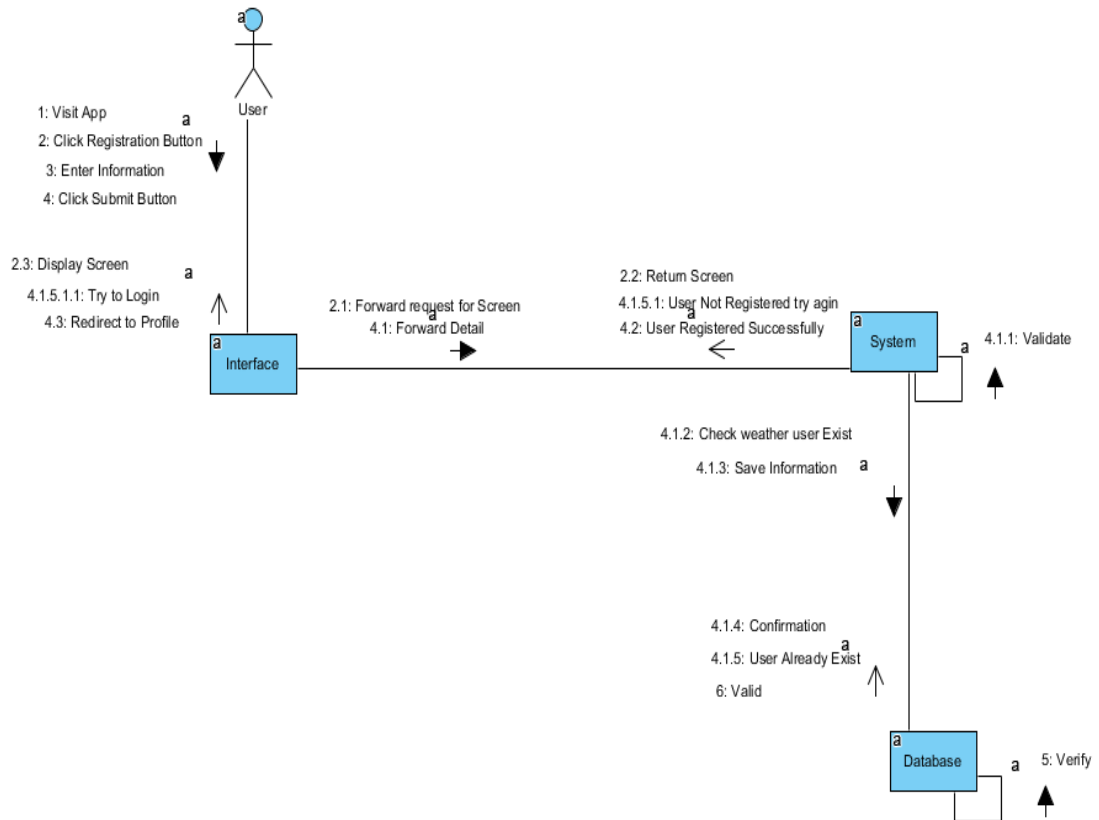


Figure 46 User registration iPARK APP

3.7.15 Admin Generate report:

Admin can generate the report on daily and weekly basis.

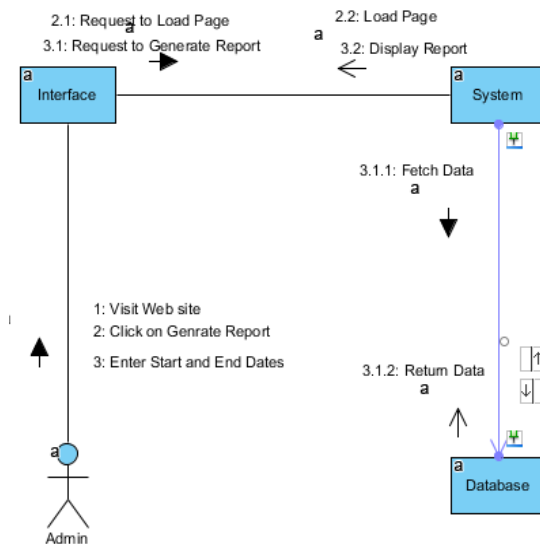


Figure 47 Admin Generate report

3.7.16 Executive generate report:

Executive can generate the report on daily and weekly basis.

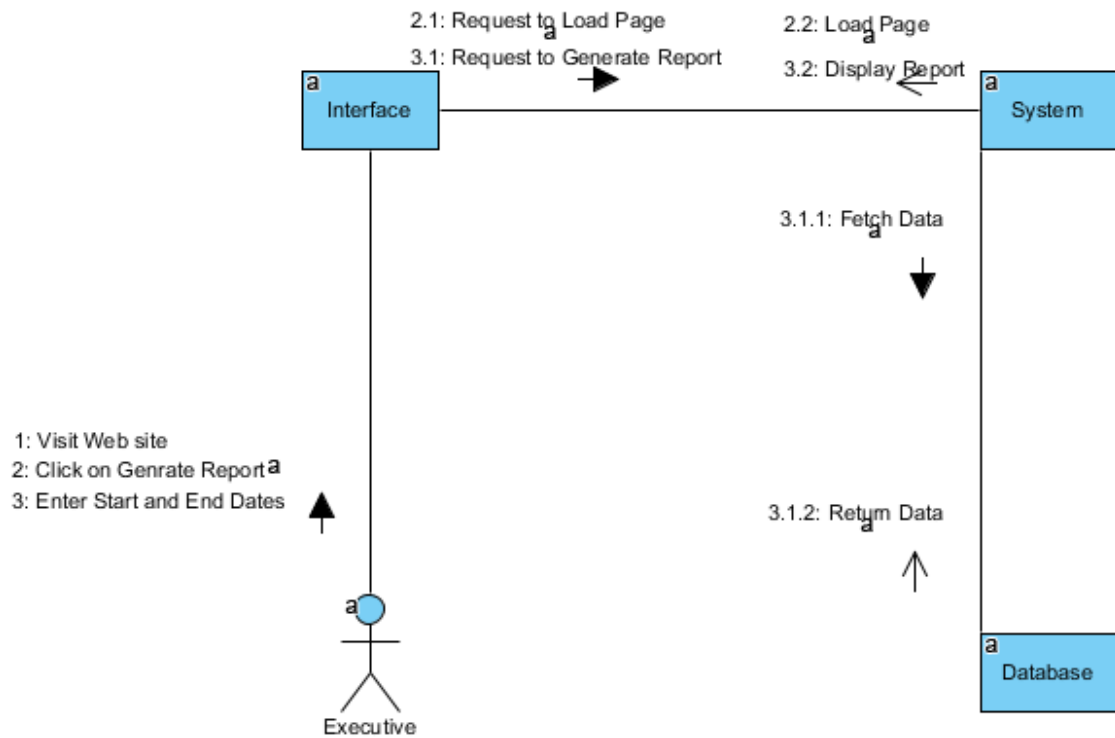


Figure 48 Executive generate report

3.7.17 Admin View Slots iPARK Website:

Admin can view the whole parking status from iPARK website. The fill, empty and reserved status.

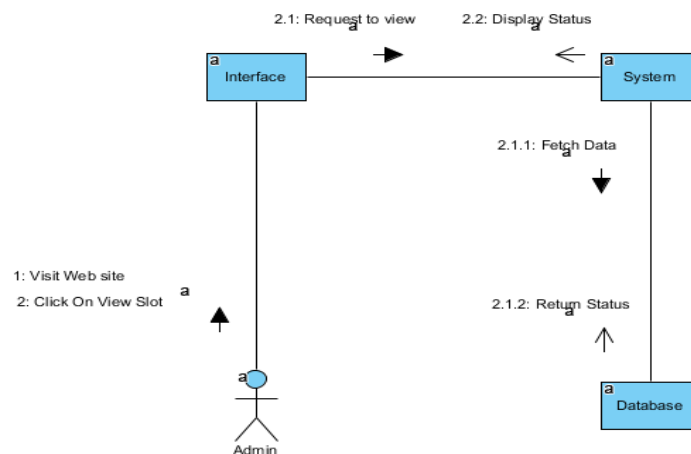


Figure 49 Admin View Slots iPARK Website

3.7.18 Admin View Slots iPARK APP:

Admin can view the whole parking status from iPARK App. The fill, empty and reserved status.

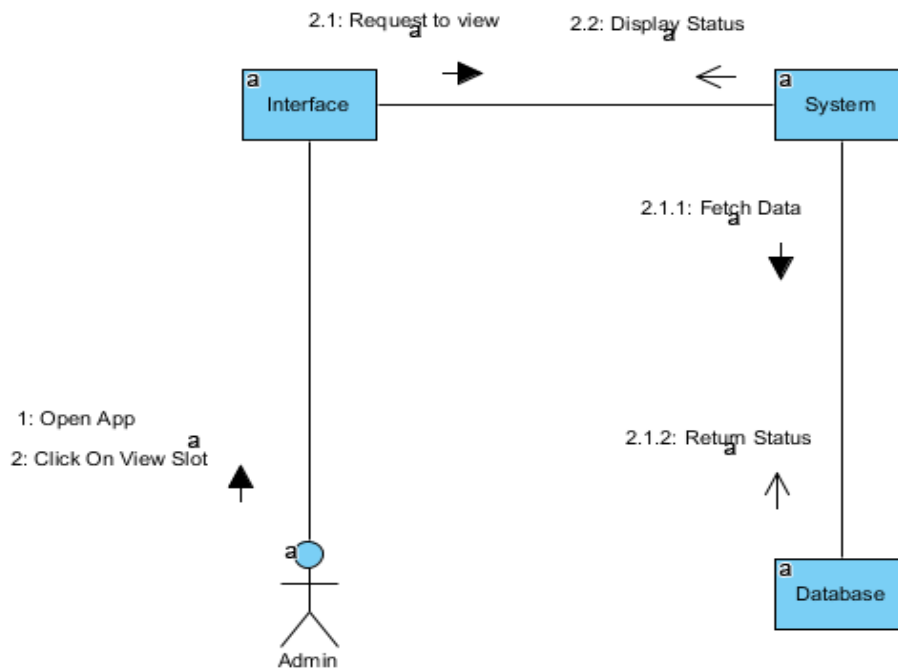


Figure 50 Admin View Slots iPARK APP

3.7.19 User View Slots iPARK:

User can view the whole parking status of iPARK. The fill, empty and reserved status.

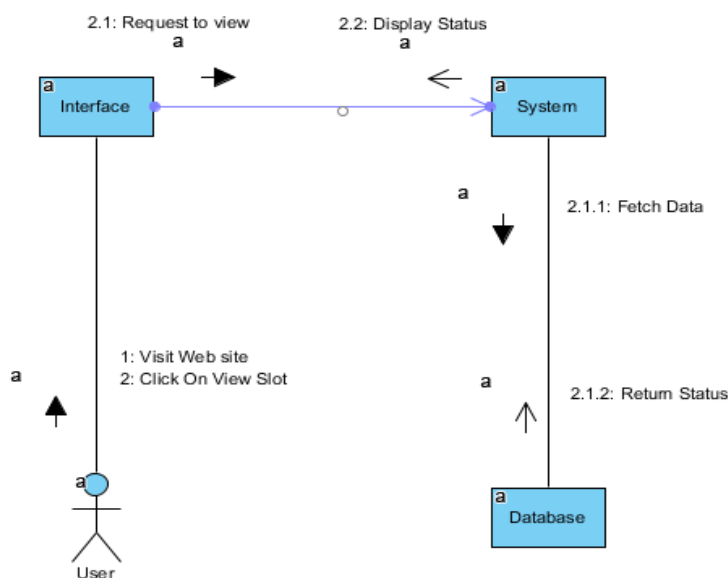


Figure 51 User View Slots iPARK

3.7.20 Full System

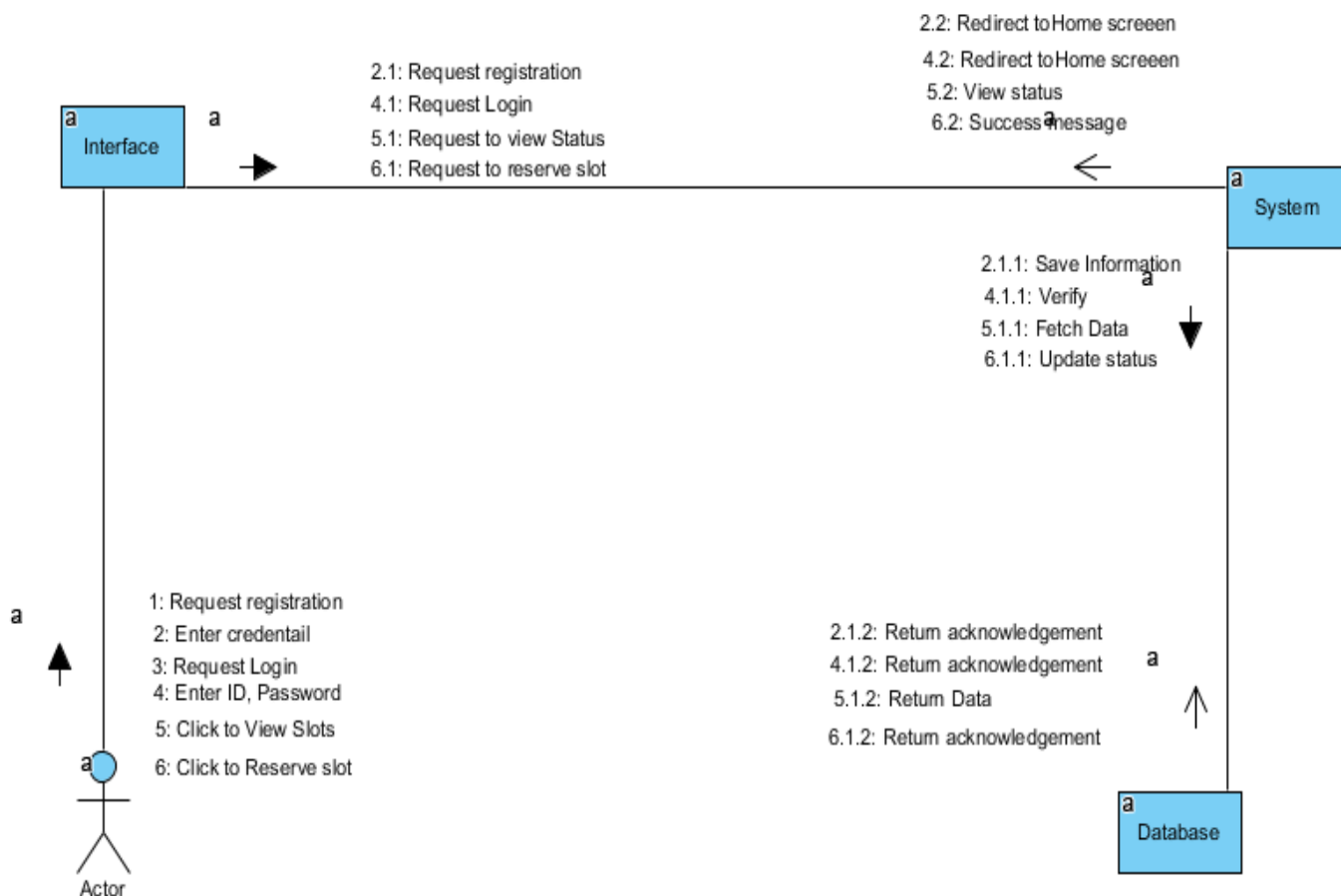


Figure 52 Full System

CHAPTER 4

DATA AND EXPERIMENTS

4.1 Methodology

Different kind of methodologies will be used to design different kind of web based solution, it is very important to choose best methodology for making of software. Here the summary below will describe more content about current project methodology.

4.1.1 Present Available methodologies

In the first methodologies created are described as being based on the waterfall model, which instructed developers to create systems in a linear step-by-step manner. The model states that before any work can begin on the actual software solution, a detailed feasibility requirements analysis must be conducted, and converted into a specification for the system. The software and all its features should then be thoroughly designed before implementation can occur. The finished product should then be tested, and any problems rectified, before being deployed in the appropriate environment.

Waterfall model was used successfully for many years, however eventually the limitations of the model become clear. The requirements and specifications for a project aren't 't always fully known initially, so it can become apparent later during the implementation phase that the system design is inconsistent, which can often lead to project failure. These problems were addressed in later years, when agile methodologies were devised to develop systems faster, and with greater flexibility.

In agile methodologies are described as those where —the system is developed using a prototype and refined through user feedback of the system in use and changes in the application itself. The main advantage to this is the constant improvement of the system to fulfil the requirements of the users. Source however describes how prototypes can often be inefficient and difficult to maintain, and may not scale well to large systems.

Incremental methodologies were first applied in iterative rapid application development (RAD) models, whereby the waterfall model was repeatedly applied. The primary objectives of RAD include fast development of high quality solutions at a low cost. This methodology is now in widespread use, and continues to be a highly regarded approach. In addition, Feature Driven Development (FDD) is a production process, which highly oriented on resulting out small blocks of client-valued functionality. This drives developers to come up with working features once every two weeks typically and it can track down the project progress with precision. FDD, which is one of a number of agile development processes, is an iterative and incremental software development process having the main purpose of delivering tangible working software repeatedly in a timely manner. Scrum is most common method used during these days. We can manage the big projects by making product back logs on basis of priority features

4.1.2 Choosing a Suitable Methodology

After conducting the research described above into methodologies, and understanding the requirements from the TechnoOne, it was decided to follow an agile methodology called Scrum, to complete the project. Class diagram and sequence diagram will be used in the system analysis, and feedback on the initial design will be acquired from real users of the system. The project risk will be controlled by implementing features on a priority basis. By creating screen prototypes at each stage, user feedback will be incorporated, and human-computer interaction issues will be addressed. After every sprint, the developed module will be tested.

4.1.3 Design/Building Model

In first phase, we arrange a meeting session TechnoOne managers to collect all the requirements related to iPark software. After that, we thoroughly analyse the requirements, identify our user classes and characteristics and make a requirement chart with difference of functional and non-functional requirements. After making the System requirement chart, we arrange another session to make conformance of requirement of iPark system. Later on we show up some screen prototypes to company manager of our system. Some of changes held so after complete this we design model and class diagram.

4.2 Framework

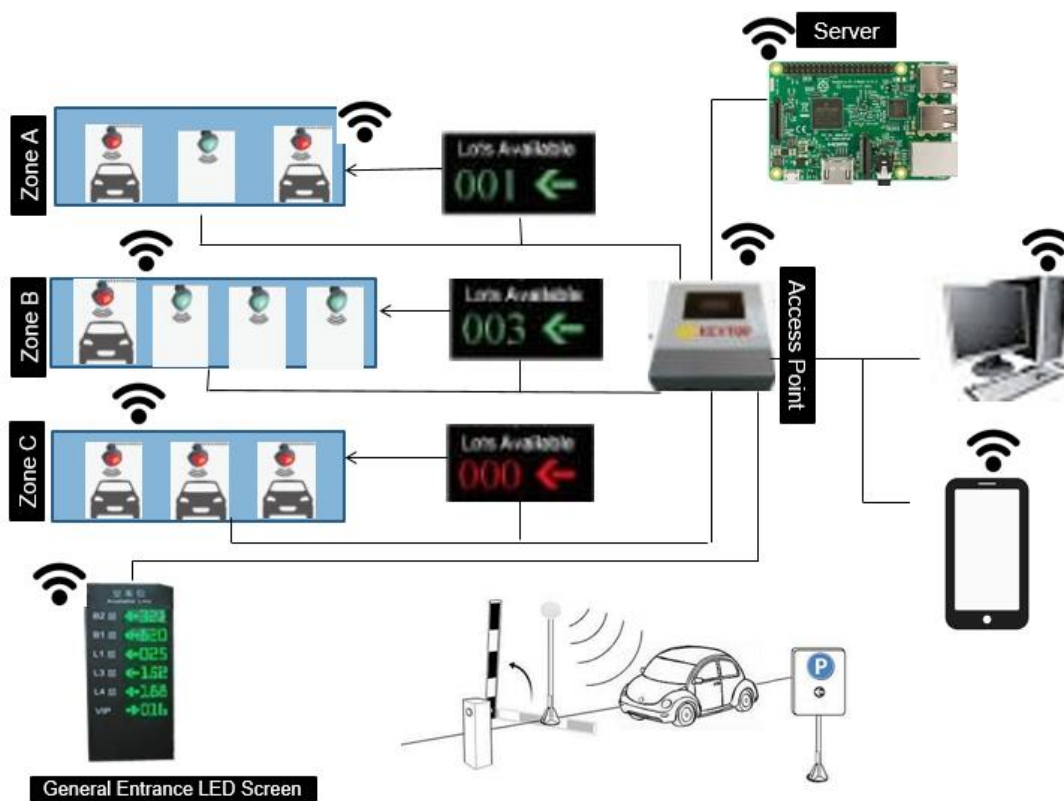
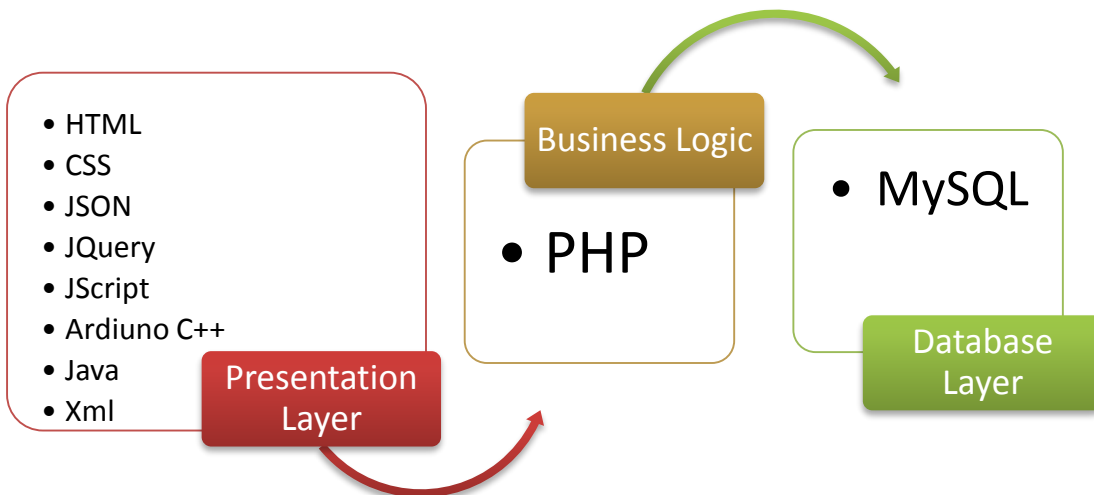
4.2.1 Code ignite (v.3.1.7)

Code ignitor is a PHP framework which works on the MVC (Model, View, Controller). view section contains the views of web pages, controller section counting the function and load the views and in model section we write the quarries of SQL. for insertion, manipulation, and retrieving the data form database.

4.2.2 Bootstrap

Bootstrap is the framework which is used to make responsive websites. In bootstrap screen in divided into grid view system. It contains the three types of files i.e Bootstrap.css, Bootstrap.css and glyph icons

4.3 System Architecture



CHAPTER 5

RESULTS AND DISCUSSIONS

5.1 User Access, Roles and Privileges

Following are the role and levels of each person respectfully according to their modules.

5.1.1 Car recognition system:

Every User, interact with the access grants by RFID through their tags. Then they move towards parking spaces.

5.1.2 Parking slot management system:

Admin can manage all the parking space through web portal. Admin can also check the real time status of parking space. They also have the right of reserved any parking space for a specific time.

Executive can have all the same rights including executive can manages the account of admin and report generation.

5.1.3 Car parking guidance system:

Both admin, executive and typical employees can check the real time status of parking system. They can use mobile app and web to check the real time status according to their parking zones.

5.2 How to Access iPARK WEB

Open internet browser (i.e. Google Chrome and Mozilla Firefox) and type in the following URL <http://localhost/ipark/login.PHP> on the browser's address bar and hit 'Enter key' (As shown in below figure)

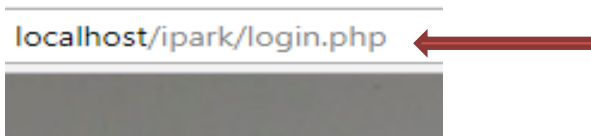


Figure 53 iPARK Link

5.2.1 Login and Registration at iPARK WEB

After accessing iPARK, Login screen (as shown below) will display.

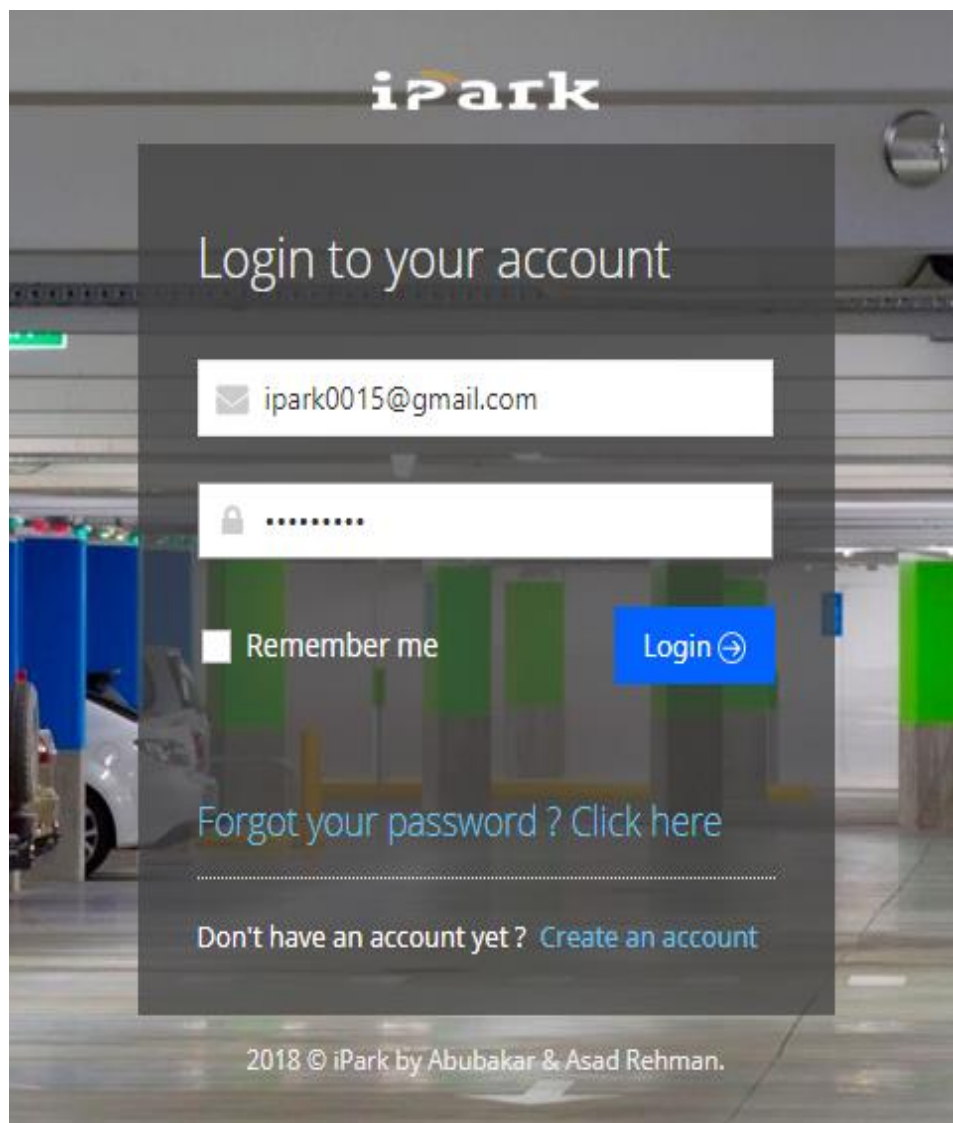
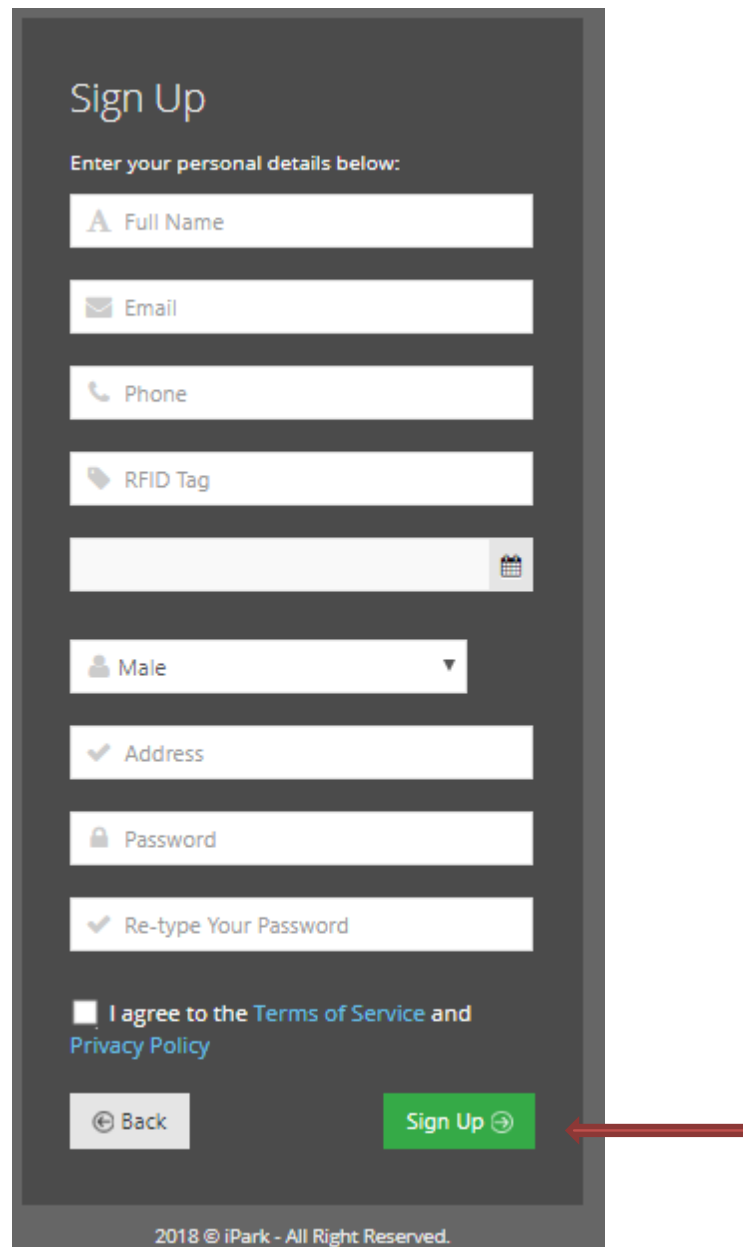


Figure 54 Login at iPARK Web

- 1) Enter login credentials if you are already registered at iPARK and click on Login button.
- 2) Click on 'Sign Up' to registered at iPARK. After click on 'Sign Up' registration form will show as in below figure



Sign Up

Enter your personal details below:

Full Name

Email

Phone

RFID Tag

Male

Address

Password

Re-type Your Password

I agree to the [Terms of Service](#) and [Privacy Policy](#)

Back Sign Up

2018 © iPARK - All Right Reserved.

Figure 55 Registration at iPARK Web

- 1) Fill the registration form by providing required information, click on agreement checkbox and then on sign up button.
- 2) By click on Login button, you will go back to Login screen.

5.2.2 Forget Password

In case of forget password, provide your email in forget password screen and click on send password.

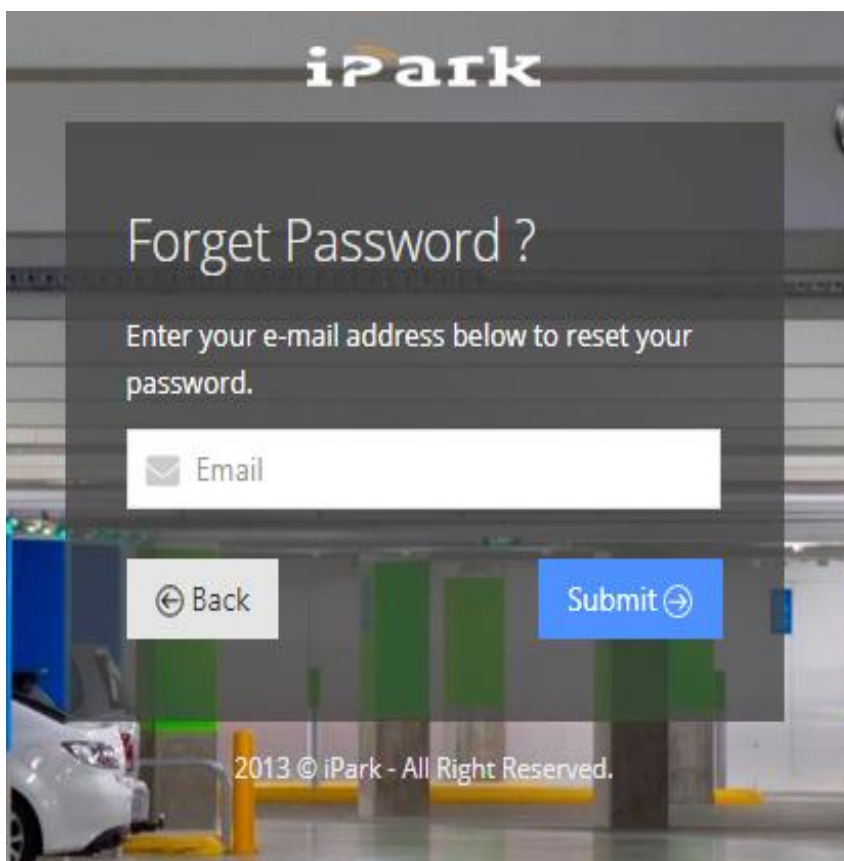


Figure 56 Forget Password

5.2.3 Role Base Authorised Screen

Every User can View there screen according to their role.

The simple employee can only see these three menu, Dashboard which shows the overall summary of parking spaces according to their sections. They can also see their profile. In parking slot menu they can check the slot status of each section.

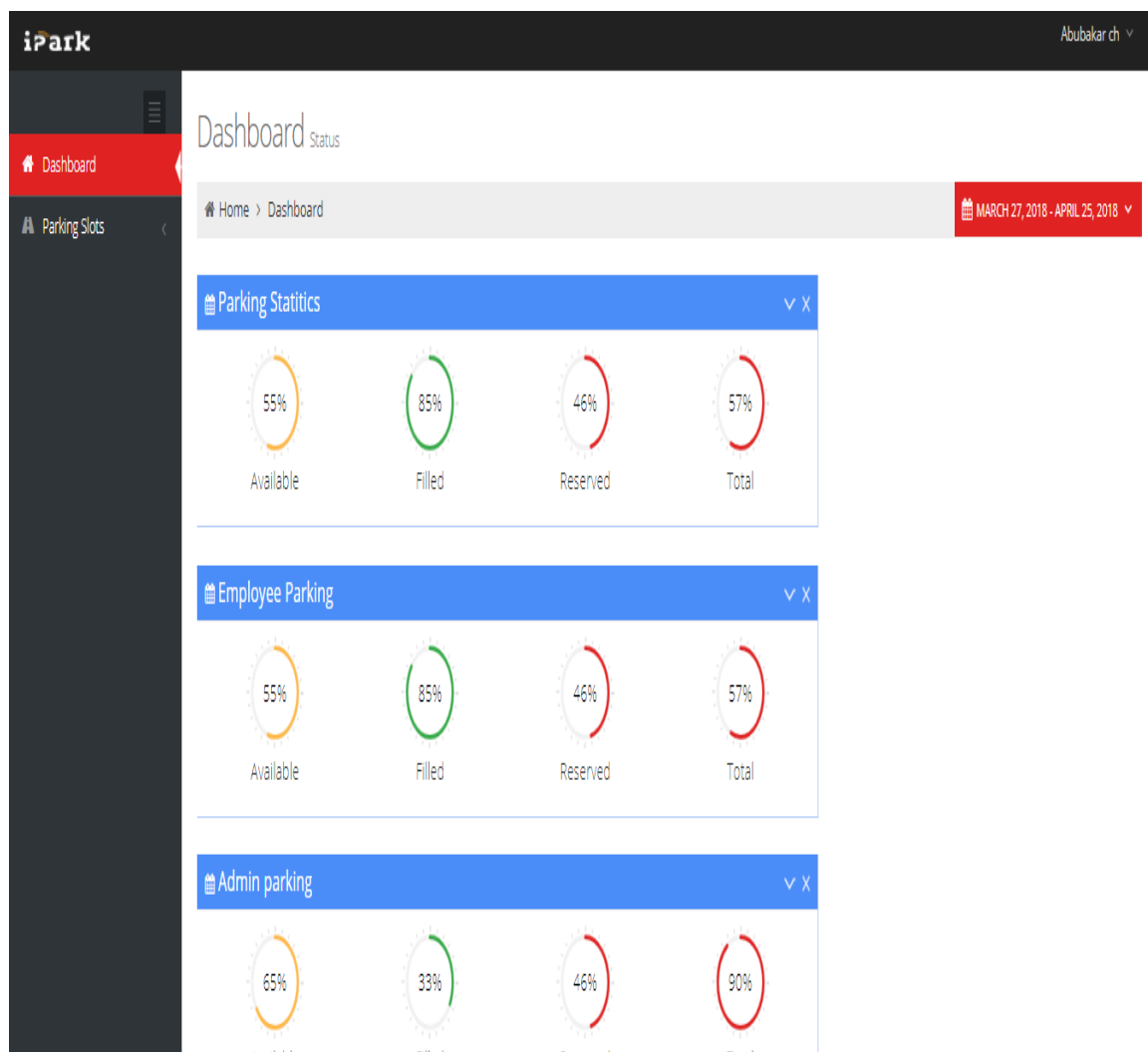


Figure 57 User Dashboard

5.2.3.1 User Side Bar

For User screen they have Dashboard and Parking Slot options in side bar. Shown as below

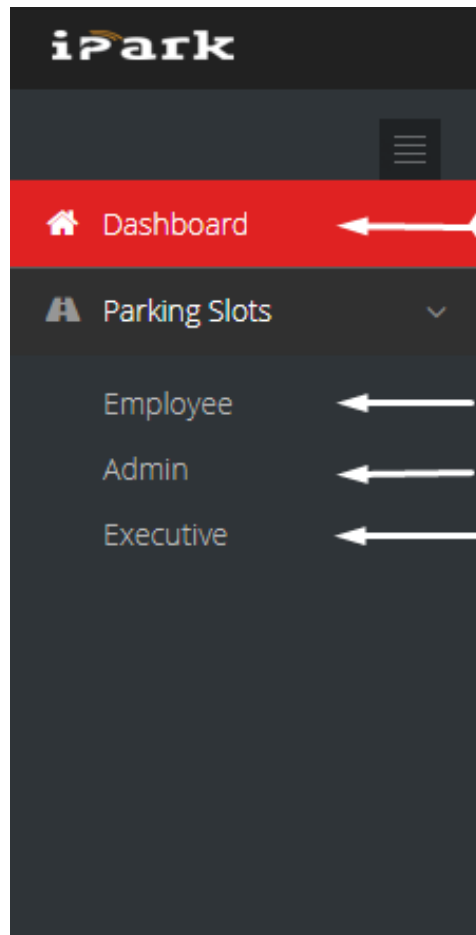


Figure 58 User Menu

5.2.3.2 Admin Sidebar

Admin sidebar have parking slot management, user management, configuration to add new slots and report menu in navigation bar. Shown as below

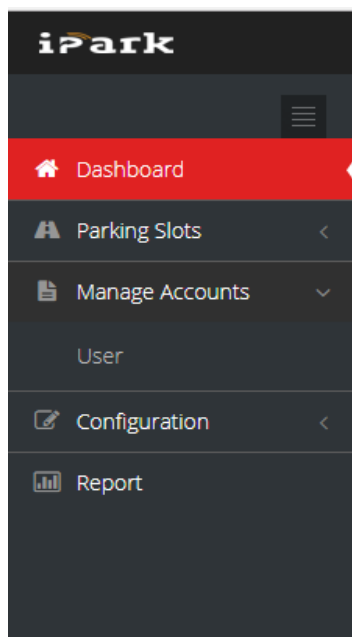


Figure 59 Admin Menu

5.2.3.3 Executive Sidebar

Executive have all admin rights and the right to manage admin accounts. Shown as below

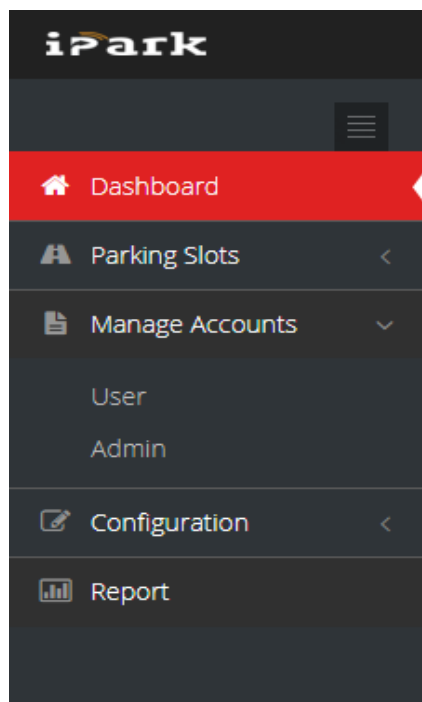


Figure 60 Executive Menu

5.2.4 Parking Status and Management

Parking status is visible on parking every user can view parking current parking status









Slot Id	Status	Reserve Time	Actions
slot_1	3 	4 00:00:00 -- 00:00:00	1  Reserve
slot_2		21:01:45 -- 21:02:45	2  UnReserve
slot_3		00:00:00 -- 00:00:00	UnReserve
slot_4		00:00:00 -- 00:00:00	Reserve
slot_5		00:00:00 -- 00:00:00	Reserve
slot_6		22:44:15 -- 23:44:15	UnReserve

Figure 61 Parking Status

5.2.4.1 Reserve Parking Slot

To Reserve parking slot click on Reserve button (1)

The screenshot shows the 'iPark' interface for 'Employee Parking'. A table titled 'Parking Status' lists six parking slots. The first row, 'slot_1', has a status of '3' and a green car icon, with a red box around the icon and the number '3'. The 'Reserve Time' column for 'slot_1' shows '00:00:00 -- 00:00:00', also enclosed in a red box. The 'Actions' column for 'slot_1' contains a blue 'Reserve' button, with a red arrow pointing to it labeled '1'. The other rows show various statuses and reservation times, with 'slot_2' having an 'UnReserve' button with a red arrow labeled '2'.

Slot Id	Status	Reserve Time	Actions
slot_1	3	00:00:00 -- 00:00:00	1
slot_2		21:01:45 -- 21:02:45	2
slot_3		00:00:00 -- 00:00:00	
slot_4		00:00:00 -- 00:00:00	
slot_5		00:00:00 -- 00:00:00	
slot_6		22:44:15 -- 23:44:15	

Figure 62 Reserve Slot Option

5.2.4.2 Select Start Time and End Time of Reservation

Select start time and end time from timer and click on save changes.

The dialog box is titled 'Select Time To Reserve'. It contains two input fields for time selection. The 'Start Time' field is set to '08:12:30' and the 'End time' field is set to '13:16:30'. Both fields have a circular refresh icon to their right. At the bottom of the dialog, there are two buttons: a grey 'Close' button and a green 'Save changes' button.

Figure 63 Select Time

5.2.4.3 Un reserve Parking Slot

To un reserve a parking slot click on reserve button in front of that slot and click save button on dialog button.

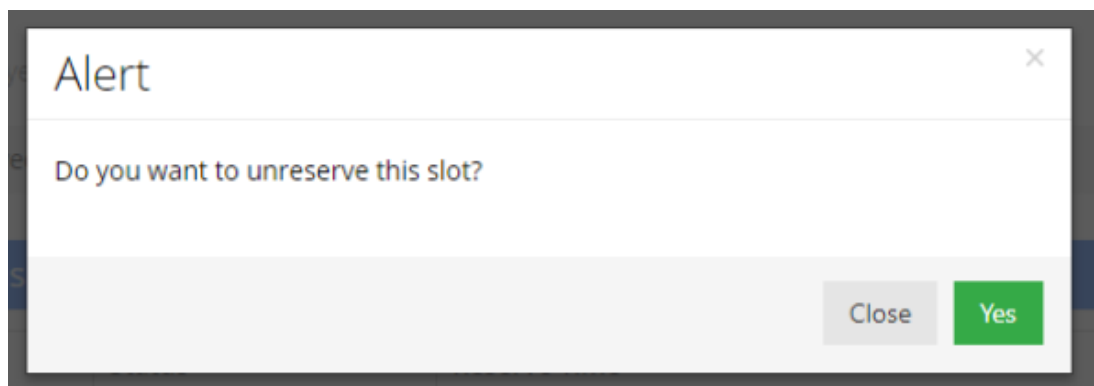


Figure 64 UN Reserve Parking Slot

5.2.5 Manage Accounts

Admin and Executive can manage accounts of iPark users. There are two types of user account to manage as given below.

5.2.5.1 User Accounts

User management have following options as show below

1. Add new user
2. Edit old user

Manage Accounts Users

Home > Manage Users

Users Table

Add New + ← 1

5 records per page Search:

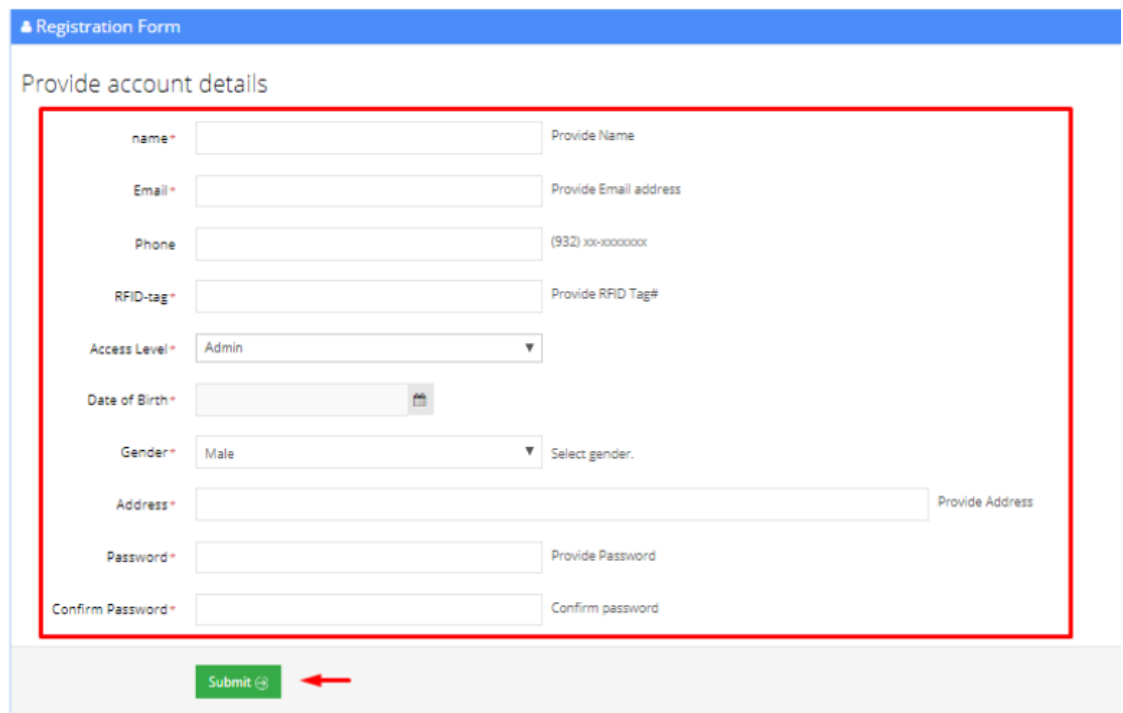
<input type="checkbox"/>	Username	Email	Points	Joined	
<input type="checkbox"/>	shuxer	shuxer@gmail.com	120	12 Jan 2012	2 → Approved
<input type="checkbox"/>	looper	looper90@gmail.com	120	12.12.2011	Suspended
<input type="checkbox"/>	userwow	userwow@yahoo.com	20	12.12.2012	Approved
<input type="checkbox"/>	userlwow	userwow@gmail.com	20	12.12.2012	Blocked
<input type="checkbox"/>	retest	test@gmail.com	20	12.12.2012	Approved

Showing 1 to 5 of 25 entries

← Prev 1 2 3 4 5 Next →

Figure 65 Manage User Accounts

1. To add new user click on add button a new screen is visible provide user credentials and click on save as show below



The image shows a web interface for adding a new user. At the top, there is a blue header with the text "Registration Form". Below this, the main heading is "Provide account details". The form contains several input fields and a submit button:

- name***: Text input field with placeholder "Provide Name".
- Email***: Text input field with placeholder "Provide Email address".
- Phone**: Text input field with placeholder "(932) xx-xxxxxxx".
- RFID-tag***: Text input field with placeholder "Provide RFID Tag#".
- Access Level***: Dropdown menu with "Admin" selected.
- Date of Birth***: Date picker field.
- Gender***: Dropdown menu with "Male" selected and placeholder "Select gender".
- Address***: Text input field with placeholder "Provide Address".
- Password***: Text input field with placeholder "Provide Password".
- Confirm Password***: Text input field with placeholder "Confirm password".

At the bottom of the form, there is a green "Submit" button with a right-pointing arrow. A red arrow points to this button from the left.

Figure 66 Add New User

2. To Edit user account click on edit button add new credentials and click on update buttons or if you want to suspend account click on toggle button to suspend user account as shown below.

Figure 67 Edit User Account

5.2.5.2 Admin Accounts

Admin management have following options as show below

1. Add new admin account
2. Edit admin account

Username	Email	Points	Joined	Status
shuxer	shuxer@gmail.com	120	12 Jan 2012	Approved
looper	looper90@gmail.com	120	12.12.2011	Suspended
userwov	userwov@yahoo.com	20	12.12.2012	Approved
user1wov	userwov@gmail.com	20	12.12.2012	Blocked
restest	rest@gmail.com	20	12.12.2012	Approved

Figure 68 Manage Admin Accounts

1. To add new admin account click on add button a new screen is visible provide user credentials and click on save as show below

The image shows a web form titled "Registration Form" with the subtitle "Provide account details". The form is enclosed in a red rectangular border. It contains the following fields and controls:

- name***: Text input field with placeholder "Provide Name".
- Email***: Text input field with placeholder "Provide Email address".
- Phone**: Text input field with placeholder "(932) xx-xxxxxxx".
- RFID-tag***: Text input field with placeholder "Provide RFID Tag#".
- Access Level***: Dropdown menu with "Admin" selected.
- Date of Birth***: Date picker with a calendar icon.
- Gender***: Dropdown menu with "Male" selected and placeholder "Select gender".
- Address***: Text input field with placeholder "Provide Address".
- Password***: Text input field with placeholder "Provide Password".
- Confirm Password***: Text input field with placeholder "Confirm password".

At the bottom of the form is a green "Submit" button with a right-pointing arrow icon. A red arrow points to this button from the right.

Figure 69 Add Admin Accounts

2. To edit admin account click on edit button add new credentials and click on update buttons or if you want to suspend account click on toggle button to suspend admin account as shown below.

Figure 70 Edit Admin Account

5.2.6 Manage Slots

Manage slot option contains total slots list and add new slot to iPark system, as shown below.

1. To add new Slot click on add button and provide credentials and click on save button as shown below.

Figure 71 Add New Slot

5.2.7 Report Generation

Report will be generated on the basis of time .Firstly user can select the type Reserved or filled then parking type to check which section he want to generate report then select the date and lastly click on generate.

Slot Id	Start Time	End Time	Reserve Date	Parking Type
s1	01:05:00	03:00:00	2018-03-08	employee
s1	02:05:00	07:00:00	2018-03-01	employee
s2	03:05:00	05:00:00	2018-03-08	employee
s3	03:05:00	05:00:00	2018-03-08	employee
s1	03:11:12	13:07:26	2018-03-15	employee

Figure 72 Report Generation

5.2.8 Edit profile

To edit profile click on my profile option profile

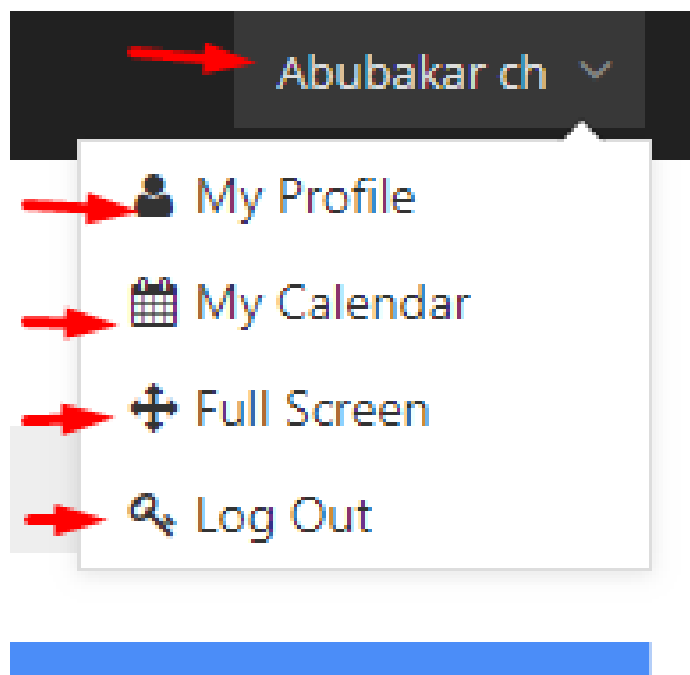


Figure 73 Profile Menu

1. Edit profile Information

Click on enable edit option, than provide new credentials and click on update

Personal info ← 1

ON ← 2

Change Password ← 4

name* Provide your Name

Email* Provide your email address

Phone (932) xx-xxxxxxx

RFID-tag* Provide your RFID tag no

Access Level* Admin ▾

Date of Birth* 📅

Gender* Male ▾ Select your gender.

Address* Provide your Address

Password* Provide your Password

Confirm Password* Confirm your password

Submit → 3

Figure 74 Edit Profile

2. Change Password

Click on change password to change account password, provide old password, new password and click on update option

Personal info

Change Password

Current Password

New Password

Re-type New Password

Change Password Cancel

Figure 75 Change Password

5.2.9 iPARK Mobile App Welcome Page

In iPARK welcome page the user have to see Sign-In and Sign-Up option.

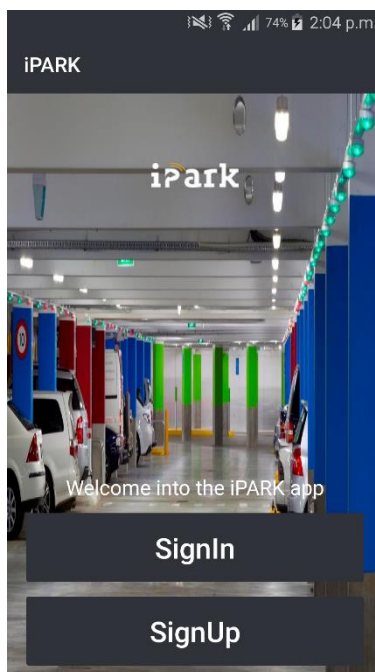


Figure 76 iPARK App Welcome

5.2.10 iPARK app sign-in window

Every user who want to use iPARK app have firstly login into the app. They enter the credentials and click on sign-in button.

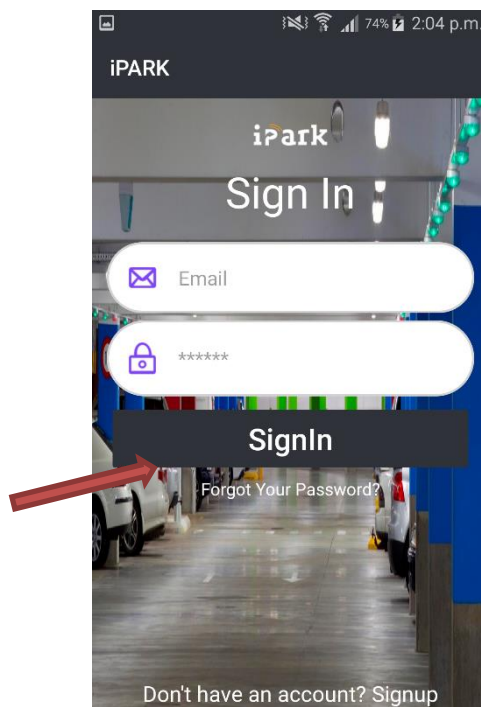


Figure 77 iPARK App Welcome

5.2.11 iPARK app sign-Up window

If the user cannot have any account into the iPARK app then it has to firstly register into iPARK app. Firstly they enter the required credentials and then click on register.

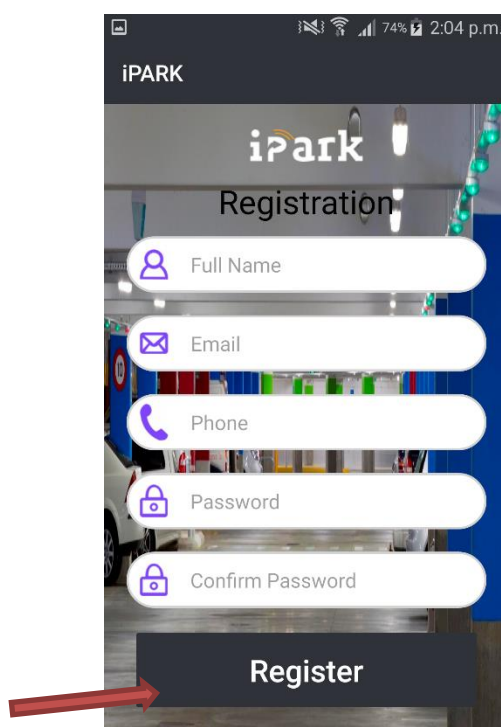


Figure 78 iPARK app sign-Up window

5.2.12 Dashboard in iPARK app

Here user can see the whole status of parking .User provide advantage to user to check the whole summary of parking space before enter into the parking.

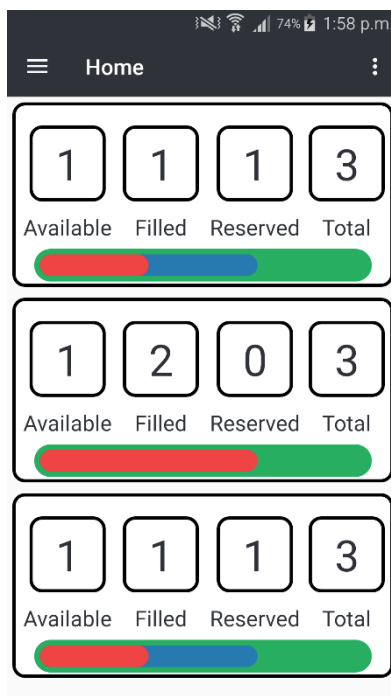


Figure 79 Dashboard in iPARK app

5.2.13 Slot Reserve and un Reserve iPARK app

Click on slot to see details

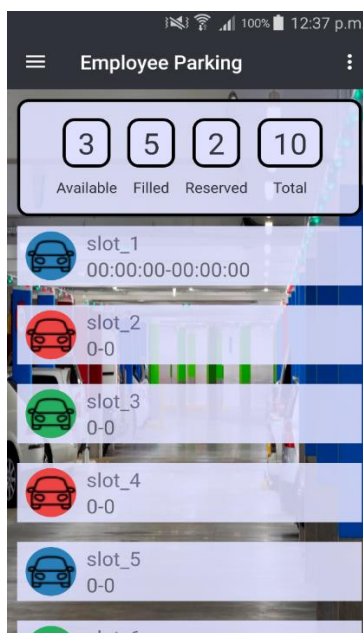


Figure 80 Manage Parking Slots App

1. Reserve



Figure 81 Reserve Parking Slot App

Admin have reserved multiple slot on the basis of start and end time by select one by one. After enter the start and end time click on ok button to make the slot reserved.

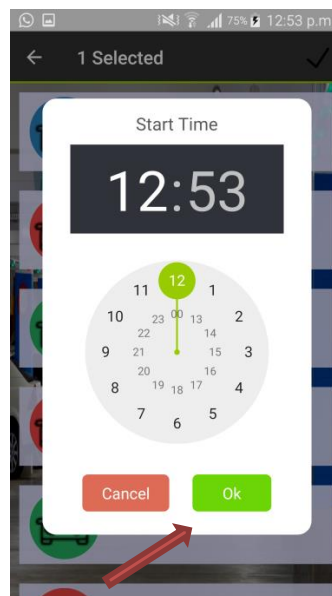


Figure 82 Enter start time for slot reserved in iPARK app

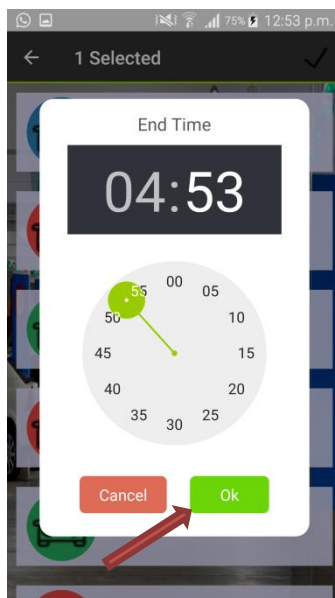


Figure 83 End time for slot reserved in iPARK app

2. Un Reserve

Click on Un Reserve button to free the parking slot



Figure 84 Un Reserve Slot App

5.2.14 Side bar view in iPARK app

iPARK app also display the status of parking spaces according to their section. They have employee admin and executive section. In summary section user can see the whole status of parking space.

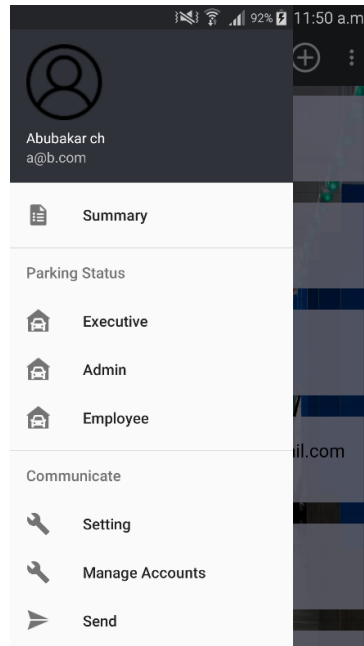


Figure 85 Side bar view in iPARK app

5.2.15 Manage Accounts iPARK app

Click on manage Account option to manage accounts of all users

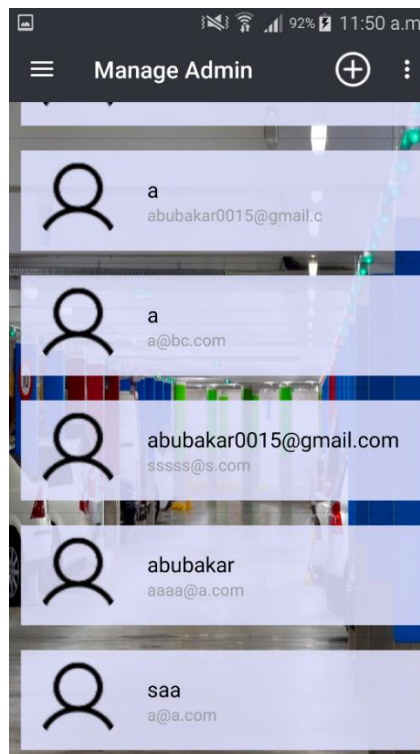
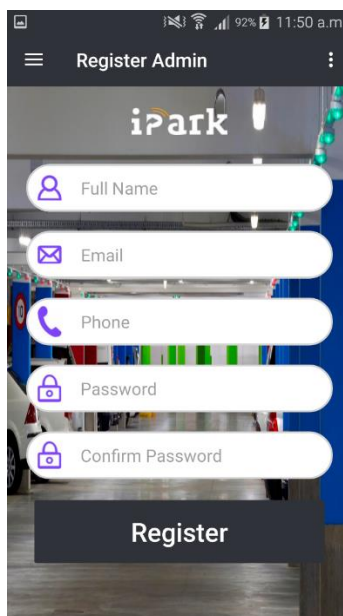


Figure 86 Accounts App

1. Add account

Click on add option available in option menu , provide credentials and click on register button as show below

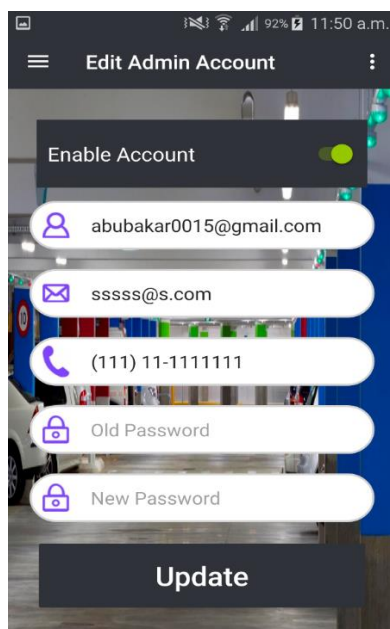


The screenshot displays the 'Register Admin' screen of the iPark app. At the top, there is a hamburger menu icon on the left and a three-dot menu icon on the right. The title 'Register Admin' is centered. Below the title is the iPark logo. The form consists of five input fields: 'Full Name' (with a person icon), 'Email' (with an envelope icon), 'Phone' (with a telephone icon), 'Password' (with a lock icon), and 'Confirm Password' (with a lock icon). At the bottom of the form is a dark blue button labeled 'Register'.

Figure 87 Add New Account App

2. Edit Admin

Click on account, provide credentials and click on update to update profile or click on toggle button to suspend account as show below



The screenshot displays the 'Edit Admin Account' screen of the iPark app. At the top, there is a hamburger menu icon on the left and a three-dot menu icon on the right. The title 'Edit Admin Account' is centered. Below the title is an 'Enable Account' toggle switch, which is currently turned on (green). The form consists of four input fields: 'Email' (with a person icon and the value 'abubakar0015@gmail.com'), 'Phone' (with a telephone icon and the value '(111) 11-1111111'), 'Old Password' (with a lock icon), and 'New Password' (with a lock icon). At the bottom of the form is a dark blue button labeled 'Update'.

Figure 88 Update User Account App

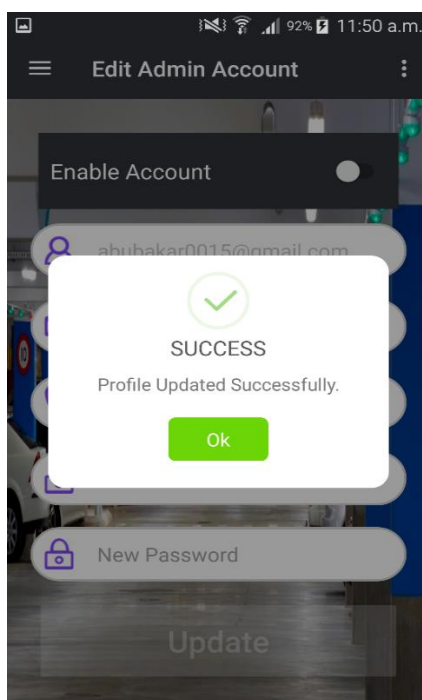


Figure 89 Suspend user Account App

5.2.16 Logout in iPARK app

When user want to logout from iPARK app they have to click on logout button.

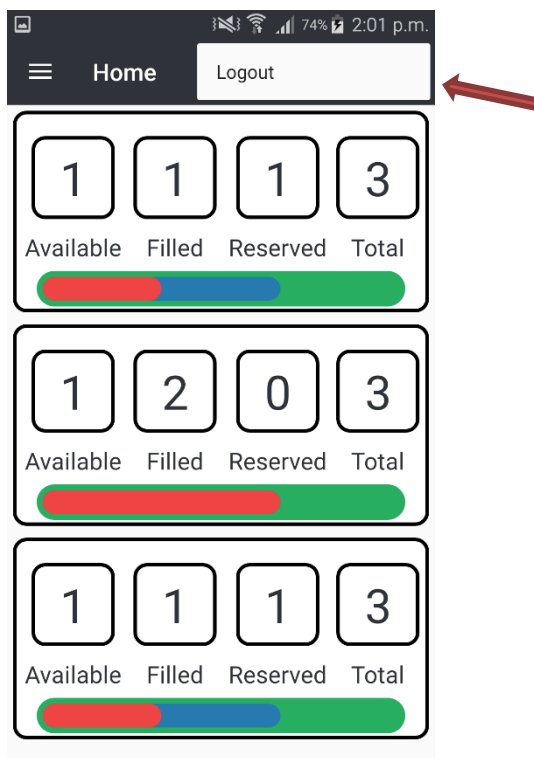


Figure 90 Logout in iPARK app

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

The main aspect of this study is to introduce the most extensive parking problem — i.e., finding an empty space — and propose a solution. RFID system grants access to the vehicles to parking spaces. Ultrasonic sensor will be used for parking space detection. The proposed architecture for a parking access and guidance system would make the parking system efficient and decrease searching time for vacant spaces.

The web module also developed with this system to make system more manageable. Admin manages the parking space and reserved parking slots on the basis of time.

iPARK mobile application also provide the facility to admin and user to check the real time status of the parking spaces. Admin will also be reserved the slots from iPARK mobile application.

In Future research this system will be apply on public places which might include car park booking procedures on the basis of account management. We have evolved from traditional servicing channels like low cost dispenser and parking attendants to incorporate automated pay stations, meters and gates. Cost effectiveness and marketing will be studied as well. Some of the underlying benefits could be lowering operating costs in future. Finally, in the long run, smart parking can actually transform the very makeup of our urban landscapes, making them more amenable to people rather than cars.

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APPENDICES

APPENDIX A: Definition and acronyms

Definition, acronyms, and abbreviation

Term	Definition
User	Someone who interacts with the mobile phone application
Admin/Administrator	System administrator who is given specific permission for managing and controlling the system
Premises Owner	Someone who has a house/building and wants his house/building to be a part of the application.
Application Store	An installed application on mobile phone which helps user to find new compatible applications with mobile phone platform and download them from Internet
Android	An open-source operating system used for smartphones and tablet computers.
Android App	An Android app is a software application running on the Android platform. Because the Android platform is built for mobile devices, a typical Android app is designed for a smartphone or a tablet PC running on the Android OS.
Stakeholder	Any person who has interaction with the system who is not a developer.

PCB layout	A printed circuit board is a non-conductive material with conductive lines printed or etched.
Modules	Each of a set of standardized parts or independent units that can be used to construct a more complex structure, such as an item of furniture or a building.
Nodemcu	Communicator between micro controllers
Raspberry-Pi	Main Board
Hardware	The machines, wiring, and other physical components of a computer or other electronic system.
Software	The programs and other operating information used by a computer.
Sensor	A device which detects or measures a physical property and records, indicates, or otherwise responds to it.
RF ID	Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects.
Mifare	MIFARE is the NXP Semiconductors-owned trademark of a series of chips widely used in contactless smart cards
Raspbian	Raspbian is a Debian-based computer operating system for Raspberry Pi.