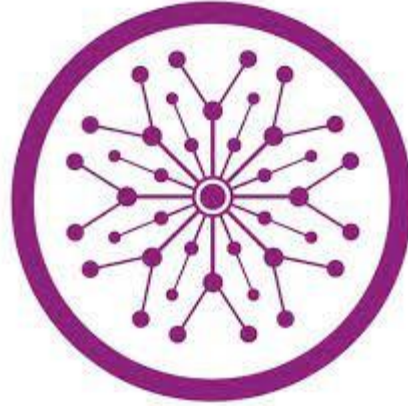


The Superior University Lahore



Faculty of Computer Science & IT

Final Year Project PROJECT REPORT Park at Ease

Project ID: **FYP-MCSM-F21-004**

St. name	St. ID	Program	Contact number	Email address
Kainat kanwal	Mcsm-s19-015	Mcs	03094510592	Mcsm-s19-015@superior.edu.pk

Project Supervisor

Javed Iqbal

Project Report

[Park at Ease]

Change Record

Author(s)	Version	Date	Notes	Supervisor's Signature
Kainat kanwal	1.0	22-10-2020	This is the first version of project. Template 1,2	
Kainat kanwal	1.1	22-10-2020	This is the second version of project. Template 3,4	
Kainat kanwal	1.2	22-10-2021	This is the third version of project. Template 5,6 Including Uml diagrams Prototyping	

APPROVAL

PROJECT SUPERVISOR

Comments: _____

Name: _____

Date: _____

Signature: _____

PROJECT MANAGER

Comments: _____

Date: _____

Signature: _____

HEAD OF THE DEPARTMENT

Comments: _____

Date: _____

Signature: _____

Dedication

I dedicate this work to my parents and faculty members who always supported me in everything and in every condition, my teacher who never fails to teach and guide me to administrators of Information Technology Department for their help and support throughout the degree.

Acknowledgements

I am highly grateful to **ALMIGHTY ALLAH**, the omnipotent, the most compassionate who bestowed me with His blessing and His beloved Prophet **HAZRAT MUHAMMAD (P.B.U.H)** who made it compulsory for every Muslim to get knowledge from cradle to grave.

I feel highly privileged in taking this opportunity to express my heartiest gratitude to my respective project supervisor Sir Javed, Department of Information Technology, Superior University, for his dexterous supervision, inspiring and impetuous guidance, valuable suggestions, technical help and mostly his scolding to complete this research study as well as for writing this dissertation.

No acknowledgement could ever adequately express to my Parents who helped me out in each and every difficulty, whose love and trust enabled me to complete this project without any problem. I really feel this acknowledgement is incomplete without mentioning the contribution of my Brothers and Sisters who always prayed for my success.

I express my profound gratitude to my dear friends who were always here with me for help and support.

Executive Summary

This is a mobile application in which users can book online parking slot by using this application. With the help of this App, the target audience can find parking slots easily. Park at Ease will be very helpful for those people who don't want to waste their time in parking. Park at Ease gives proper time scheduling and parking slots with suitable charges in useful manner.

Mainly parking issues are at hospitals, universities and markets so. A person who wants to confirmed the parking slot for specific time he/she request for it and if place is available the system will allocate the slot for parking by sending a text message. After leaving the parking slot his/her record will be saved in website database including mobile number, CNIC number and name with date and time. Here camera for number picking from number plate will be installed. An admin can manage the database, complains and suggestions.

Table of Contents

Dedication	4
Acknowledgements.....	5
Executive Summary.....	6
Table of Contents	7
Table of Figures.....	9
List of Tables	10
Chapter 1.....	11
Introduction	11
1.1. Background.....	12
1.2. Goals and Objectives.....	12
1.3. Existing Solutions.....	12
1.4. Gap Analysis	12
1.5. Proposed Solution	13
1.6. Project Plan	13
1.6.1. Gantt Chart	13
1.7. Report Outline.....	14
Chapter 2.....	15
Software Requirement Specifications	15
2.1. Introduction.....	16
2.1.1. Purpose.....	16
2.1.2. Intended Audience and Reading Suggestions	16
2.1.3. Product Scope.....	16
2.1.4. References	16
2.2. Overall Description.....	17
2.2.1. Product Perspective.....	17
2.2.2. Product Functions.....	17
2.2.3. User Classes and Characteristics	20
2.2.4. Operating Environment.....	20
2.2.5. Design and Implementation Constraints.....	20
2.2.6. User Documentation	20
2.2.7. Assumptions and Dependencies	20
2.3. External Interface Requirements	21
2.3.1. User Interfaces.....	21
2.3.2. Software Interfaces	21
2.3.3. Communications Interfaces.....	21
2.4. System Features	21
2.4.1. System Feature 1	21
2.4.1.1. Description and Priority	21
2.4.1.2. Stimulus/Response Sequences	21
2.5. Other Nonfunctional Requirements	22
2.5.1. Performance Requirements	22
2.5.2. Safety Requirements	22

2.5.3. Security Requirements	22
2.5.4. Software Quality Attributes.....	22
2.5.5. Business Rules.....	22
Chapter 3.....	23
Use Case Analysis.....	23
3.1. Use Case Model.....	24
3.2. Use Case Descriptions	28
Chapter 4.....	33
System Design.....	33
4.1. Architecture Diagram	34
4.2. Entity Relationship Diagram with data dictionary	35
4.3. Sequence / Collaboration Diagram	36
4.4. Operation contracts	42
4.5. Activity Diagram	42
4.6. Data Flow diagram [only if structured approach is used - Level 0 and 1].....	47
Chapter 5.....	49
Implementation	49
5.1. Important Flow Control/Pseudo codes.....	50
5.2. Components, Libraries, Web Services and stubs	50
5.3. Deployment Environment.....	51
5.4. Tools and Techniques.....	51
5.5. Best Practices / Coding Standards.....	52
5.6. Version Control	52
Chapter 6.....	53
Testing and Evaluation.....	53
6.1. Use Case Testing.....	54
6.2. Data flow testing	57
6.3. Unit testing.....	58
6.4. Integration testing.....	58
6.5. Performance testing.....	59
6.6. Stress Testing	59
Chapter 7.....	60
Summary, Conclusion and Future Enhancements.....	60
7.1. Project Summary	61
7.2. Achievements and Improvements	61
7.3. Critical Review	62
7.4. Lessons Learnt	62
7.5. Future Enhancements/Recommendations	62
Appendices.....	63
Appendix A: User Manual	64
Appendix C: Information / Promotional Material	75
Reference and Bibliography.....	78

Table of Figures:

Figure 1. Gantt chart	13
Figure 2. Log in use case	24
Figure 3. Log out use case	24
Figure 4. Search nearest Parking Point	25
Figure 5. Book parking slot	25
Figure 6. Adjust Time Slot for parking	26
Figure 7. Extra time charges	26
Figure 8. Update parking time Use Case	27
Figure 9. Aggregated Use Case Diagram	27
Figure 10. Architecture Diagram	34
Figure 11. Entity Relationship Diagram with data dictionary	35
Figure 12. Sign Up.....	36
Figure 13. Login.....	37
Figure 14. Logout.....	37
Figure 15. Internet.....	38
Figure 16. Location.....	39
Figure 17. Destination Location	40
Figure 18. Update.....	40
Figure 19. Arrival Time	41
Figure 20. Nearest Parking	41
Figure 21. Sign Up.....	43
Figure 22. Log in.....	44
Figure 23. Internet.....	44
Figure 24. Location.....	45
Figure 25. Nearest Parking	45
Figure 26. Reach Destination.....	46
Figure 27. DFD Level 0	47
Figure 28. DFD Level 1	48
Figure 29. Log in.....	64
Figure 30. Log In	65
Figure 31. Sign Up.....	66
Figure 32. Verification Code	67
Figure 33. Verification Code	68
Figure 34. Internet Dialogue.....	69
Figure 35. Selecting Parking Slot	70
Figure 36. Book Parking Slot.....	71
Figure 37. Check Out.....	72
Figure 38. Broacher	75

List of Tables:

2.1. Functional Requirement of log in.....	7
2.2. Functional Requirement of log out.....	7
2.3. Functional Requirement search of nearest parking point.....	8
2.4. Functional Requirement of book parking slot	8
2.5. Functional Requirement Adjust Time Slot For Parking.....	8
2.6. Functional requirement extra time charges	9
3.1. Use description of log in	18
3.2. Use Case description of logout	18
3.3. Use Case description of nearest parking point.....	23
3.4. Use case description of booked parking slot.....	23
3.5. Use case description of adjust time slot for parking	20
3.6. Use case description of Extra Time Charges.....	21
3.7. Use case description of update parking time	22
4.1. Operation contracts.....	31
6.1. Log in testing case.....	53
6.2. Log out testing case	53
6.3. Nearest Parking slot testing case.....	44
6.4. Book parking slot testing case	44
6.5. Adjust time slot testing case.....	44
6.6. Extra time charges testing case	45
6.7. Update Parking time testing case	45

Chapter 1

Introduction

Chapter 1: Introduction

Park at Ease is an android based application which is used to facilitate users to search and book online parking slot by using this application. The solution provides parking slots before they reach and easy to pay for it through cash on delivery. This system secures their vehicles properly. Data will be stored in the database as a record for safety purpose.

The purpose of this project is to reduce the difficulties of the visually impaired people during travelling. Many visually impaired people afraid of using public transport. This project will help them to easy and save travel without any afraid.

1.1. Background

Immense increase in population is the biggest challenge now-a-days and as we all are well aware that traffic is directly proportional to the population. So, due to this public is facing enormous problems, especially parking problem. People faced difficulties during traveling because there is no proper safety and slots for parking. There are many existing solutions for this main problem but these solutions are too costly, not user friendly and only have specific slots for parking. All this problems bothers me a lot in my work.

1.2. Goals and Objectives

The main objective of my project is to develop a cheaper in price but will still maintain with a good functional system for the parking finders. I am creating a concept for a public online parking application and I ease the people (especially parking finder people with the facility of route guidance), and also assist the people by path navigation. I provide security to their vehicles and parking slots to them online. I also save the precious time which they waste to find parking.

1.3. Literature Review/Existing Solutions

There are multiple applications of this problem but each application has different solutions. Each existing application lacks some functionality for example e-park, GPS Car Parking. There are many disadvantages of existing solutions. Existing solutions are not user friendly and not providing any ticket number. These solutions are too costly and having specific parking areas.

1.4. Gap Analysis

There are many gaps in existing system. They are not working properly. Some online parking applications have no proper safety and have specific slot for parking. People give critical reviews about existing solutions.

1.5. Proposed Solution

With the help of this App, the target audience can find parking slots easily. Park at Ease will be very helpful for those people who don't want to waste their time in parking. Park at Ease gives proper time scheduling and parking slots with suitable charges in useful manner. In Park at Ease application user environment very friendly and can easily use it.

1.6. Project Plan

In this project I will be using incremental model. As I will be gradually adding more features to my project. I will update and include many other features in my project which will be very useful and helpful for users.

1.6.1. Gantt chart

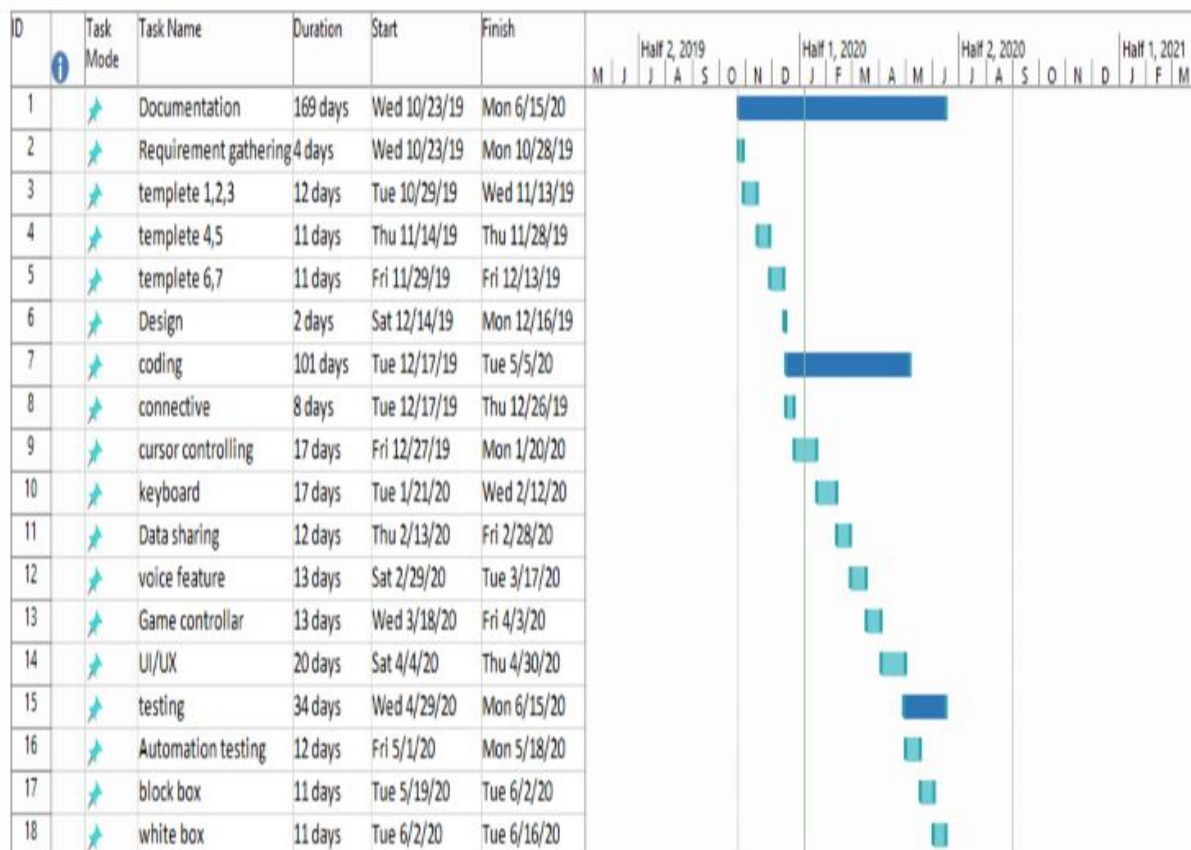


Figure 1. 1.6.1. Gantt chart

1.7. Report Outline

1. Summarized all project requirements in the first chapter and mentioned all functional requirements.
2. Briefly explained our product and all functional and non-functional requirements of product are described in the 2nd chapter.
3. Use case diagram is drawn in the 3rd chapter of this document.
4. UML diagrams are placed in the 4th chapter of document.
5. At the end the implementation procedure is described.

Chapter 2

Software Requirement Specifications

Chapter 2: Software Requirement Specifications

2.1. Introduction

Park at Ease is an android based application which is used to facilitate users to search and book online parking slot by using this application. The solution provides parking slots before they reach and easy to pay for it through cash on delivery. This system secures their vehicles properly. Data will be stored in the database as a record for safety purpose.

2.1.1. Purpose

The purpose of this project is to reduce the difficulties of the general public during parking because many people afraid of using their own transport due to parking issues. This project will help them to easy and save parking without any afraid.

2.1.2. Intended Audience and Reading Suggestions

I have made a standard document and didn't use special conventions so that the user and the developers and marketing staff can easily understand this document. They don't feel difficult to understand the document. The acronyms and abbreviations which are used in this document are written below:

PE Park at Ease
SRS Software requirement Specification
NFR's Non-functional Requirements

2.1.3. Product Scope

The Scope of the project is to help general public for online park their vehicles. Cheaper in price but will still maintain with a good functional system for the general public. Ease the people (especially general public with allocating parking slot online). It's about to bring proper access of parking in their own hands.

2.1.4. References

1. <https://play.google.com/store/apps/details?id=com.virtualmaze.gpscarparking&hl=en>
2. <https://play.google.com/store/apps/details?id=se.netix.eparkera&hl=en>

2.2 Overall Description

2.2.1 Product Perspective

My final year project is android, and java based. The purpose of this application is to reduce the difficulties of general public while parking their own vehicles. It includes customer current location and where he wants to go (departure location) and nearest parking point for the customer and also available parking slots.

2.2.2 Functional requirements/ Product functions

2.2.2.1 FR_01 Log-in

Id	FR_01		
Name	Log-In		
Description	Input	Output	Basic work flow
Login into user account	User Email id User Password	Successfully Login	User login into Application for further Use

Table 1 functional requirement Log-in

2.2.2.2 FR_02 Log-out

Id	FR_02		
Name	Log-Out		
Description	Input	Output	Basic work flow
Log-out User Account	Click on log- out button	Successfully Logout	User logout from application

Table 2 functional requirement Log-out

2.2.2.3 FR_03 Search nearest parking point

Id	FR_03		
Name	Search Nearest parking point		
Description	Input	Output	Basic work flow
System will check suitable nearest point for parking of vehicle	User current location	Find nearest parking for user	Application helps user to find nearest parking point

Table 3 functional requirement Search Nearest parking point

2.2.2.4 FR_04 Book Parking Slot

Id	FR_04		
Name	Book Parking Slot		
Description	Input	Output	Basic work flow
User select suitable parking slot and book it.	User book the parking slot according to desired time	User can access QR code after booking the parking slot.	User books their parking slot according to their own time and need.

Table 4 functional requirement Book Parking Slot

2.2.2.5 FR_05 Adjust Time Slot for Parking

Id	FR_05		
Name	Adjust Time Slot for parking.		
Description	Input	Output	Basic work flow
User adjusts time by providing starting and ending time period for parking during booking the parking slot.	Start and end time of parking	According to given hours charges will implement	Start and end time provide for booking parking slot.

Table 5 functional requirement Adjust Time Slot for Parking

2.2.2.6 FR_06 Extra Time Charges

Id	FR_06		
Name	Extra Time Charges		
Description	Input	Output	Basic work flow
System will check time after starting the parking duration, as the time limit exceeds and vehicle not leave parking slot would be fined double charges.	End time of vehicle parking	Double charges deduct from the account.	System fine automatically as time limit exceeds.

Table 6 functional requirement Extra Time Charges

2.2.2.7 FR_07 Update Parking Time

Id	FR_07		
Name	Update Parking Time		
Description	Input	Output	Basic work flow
User can update parking time during his/her time duration.	Update time of parking using edit option.	Time update or increase according to user need with implementation of charges.	User update time period according to need.

Table 7 functional requirement Update Parking Time

2.2.3 User Classes and Characteristics

Application User

After the completion of project Application user will be able to park their vehicle easily at any online parking point. Application user can easily search online parking slots before him/her leaving home.

2.2.4 Operating Environment

The application must run in Android. Installing the application in an Android environment and run. The application must be able to run with minimum android version is 5.1. The application must use less than one GB of hard disk space. Checking the total size of the folder in which the application was installed, for the hard disk space can test this requirement. For the RAM used, when use the application, we can check the physical memory in the android mobile Task Manager Performance tab.

2.2.5 Design and Implementation Constraints

The Application needs an internet access it will not work without internet access. Google map or Google API's need an internet access for getting and managing application user's location. During booking parking slot internet also need that time.

2.2.6 User Documentation

My application is simple and reliable for every user. But in just beginning process I should aware everyone to how they can use my application. I will provide some video of my application where users can see how they can use application and the help of video user can easily use my application. And user learns how they can use for their work.

2.2.7 Assumptions and Dependencies

- This Application will target general public who want to park their vehicle easily.
- User should know the basic knowledge of the system.

2.3 External Interface Requirements

2.3.1 User Interfaces

The user interfaces is the internal interfaces of the application means GUI's of the application. The UI of the application is very attractive and will be a good design and also will easy to understand and a video for new users. Every Function will have separate videos.

2.3.2 Software Interfaces

This product will be compatible with every Android operating system and on every platform it will work. I will not specify or restrict this product. Every user can use it easily according to his need.

2.3.3 Communications Interfaces

The communication will be done by using internet and Google map or Google API's need an internet access for getting and managing application user's location.

2.4 System Features

In system features, there are some requirement user must on internet connection before using any function from this application. Once he/she connected then user will be able to use all function of application.

2.4.1 System Feature 1

User can perform the different function from our application.

2.4.1.1 Description and Priority

To perform any function from this application user must connect with internet. Without internet connection he/she will not be able to perform any function and they can't search and book parking slots.

2.4.1.2 Stimulus/Response Sequences

If user wants to book parking slot for their vehicle he/she should signup first in application and then he/she select nearest parking slot. User can confirm his parking slot which will be booked after this he/she checkout parking time and charges. Extra time charges also added.

2.5 Other Nonfunctional Requirements

2.5.1 Performance Requirements

Performance of the system is high because it is not so heavy.

2.5.2 Safety Requirements

There will be not any confidential data and we will not take any personal information from the user.

2.5.3 Security Requirements

Security requirement of the system assures that all data inside the system or its part will be protected against malware attacks or unauthorized access.

2.5.4 Software Quality Attributes

- **Reusability**

This application designed so that its code can be reused in other applications similar to this application and as well as in other applications.

- **Response Time**

Response time depends on the speed of internet of user. Higher the speed of internet higher will be the response time.

- **Usability**

Usability of the system is high because it is easy to use. Names of choices are very clear and according to their functionality. Its interface is not difficult as user can understand everything clearly and use its functionality without any confusion.

- **Maintainability**

System will be developed module wise so maintainability will be achieved by architecture.

2.5.5 Business Rules

The business rules for this product are very obvious the product will be promote using different techniques and marketing techniques we will use Face book and YouTube to promote our product. We will patent this product. And then give the users.

Chapter 3

Use Case Analysis

Chapter 3: System Analysis

In this chapter I will be showing you the use case diagram and describing that how user will communicate with the application. This is what I will be discussing in this chapter. I will also be discussing that who will be the stakeholder of our project and what will be the pre or post conditions for this project and what will be the special requirements to use it.

3.1. Use Case Model

3.1.1) Log in use case

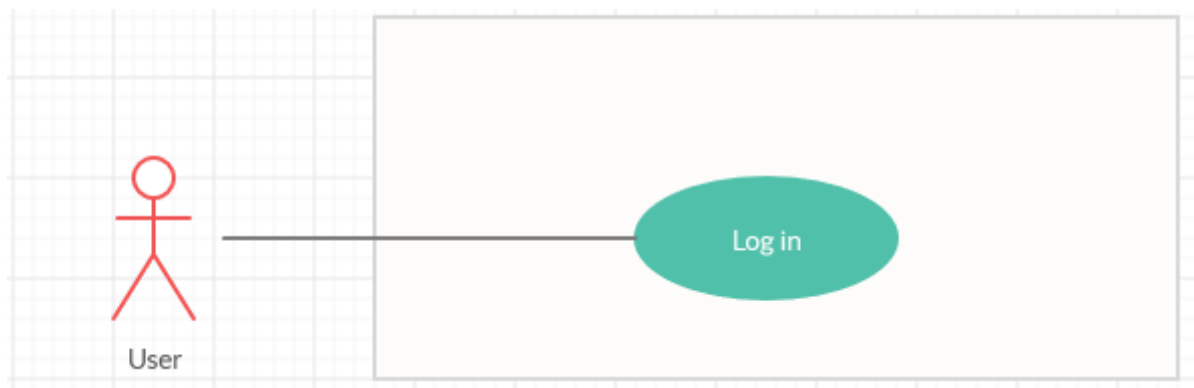


Figure 2. Log in use case

3.1.2) Log out use case

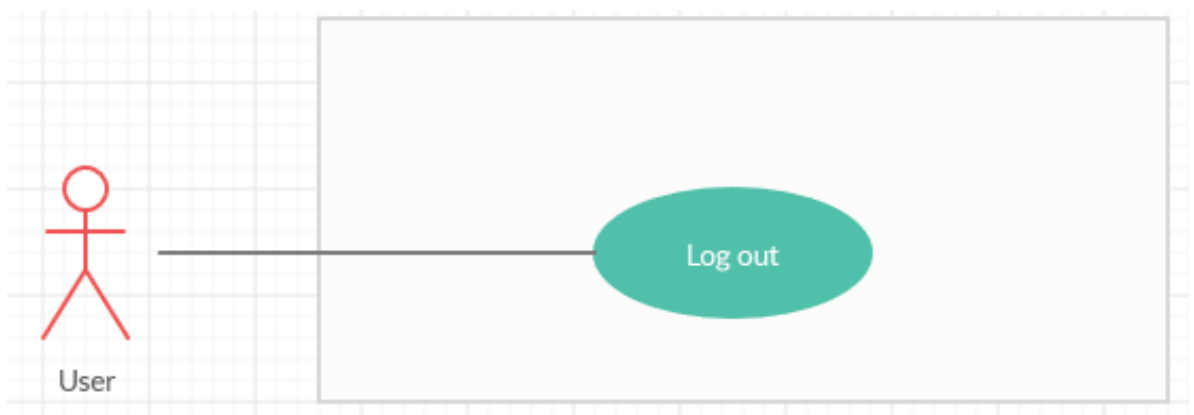


Figure 3. Log out use case

3.1.3) Search nearest Parking Point

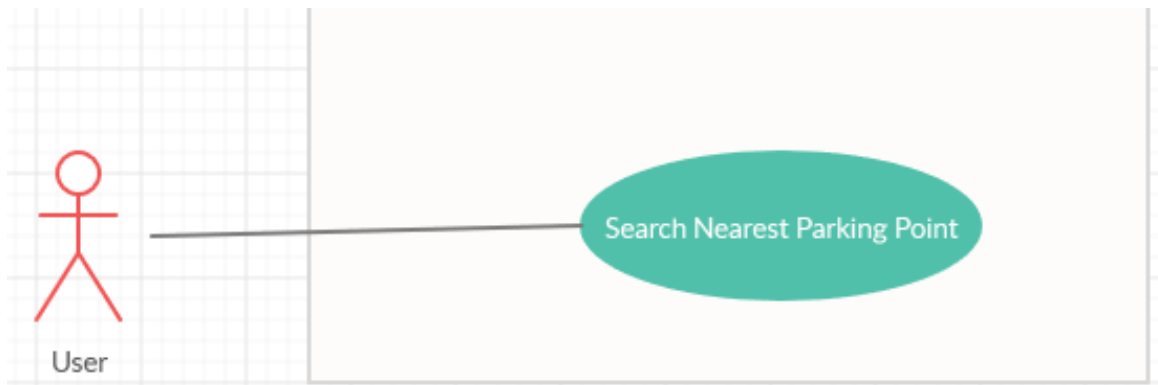


Figure 4. Search nearest Parking Point

3.1.4) Book parking slot

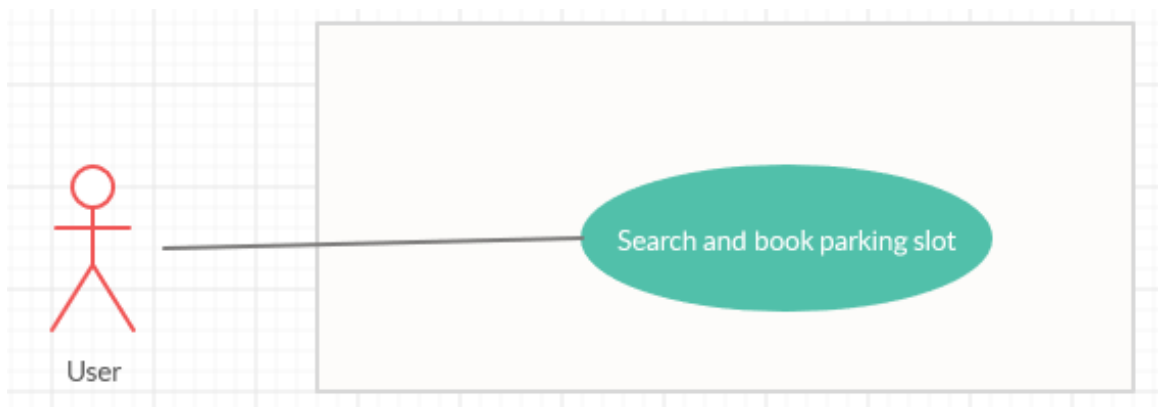


Figure 5. Book parking slot

3.1.5) Adjust Time Slot for parking

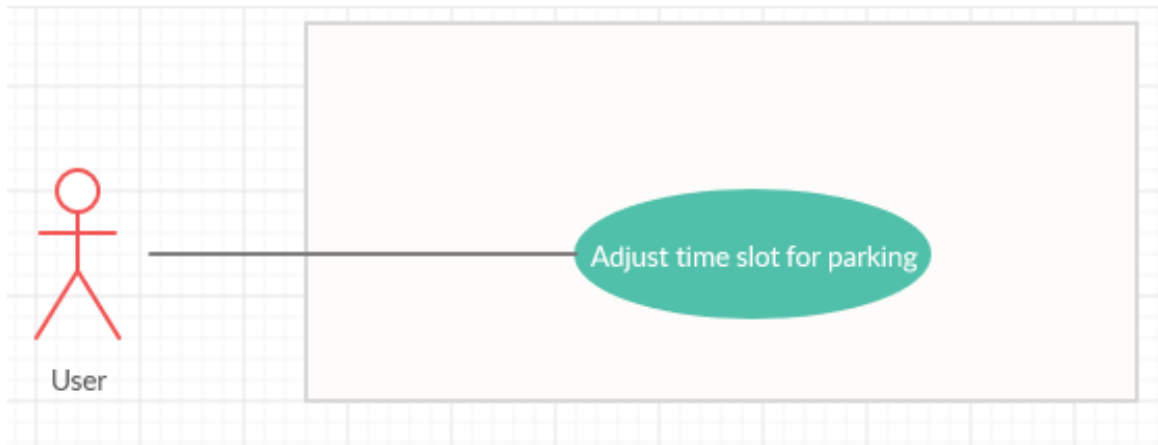


Figure 6. Adjust Time Slot for parking

3.1.6) Extra time charges



Figure 7. Extra time charges

3.1.7) Update parking time

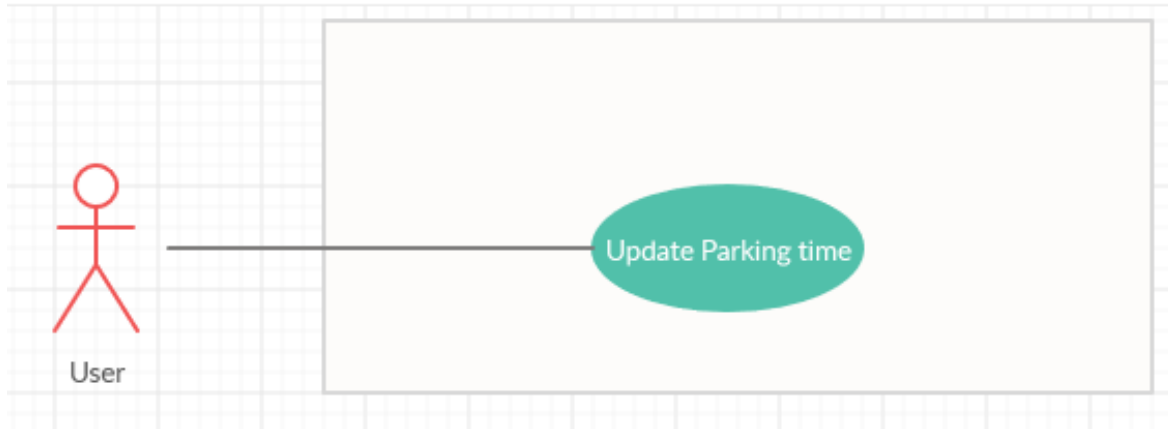


Figure 8. Update parking time Use Case

3.1.8) Aggregated Use Case Diagram

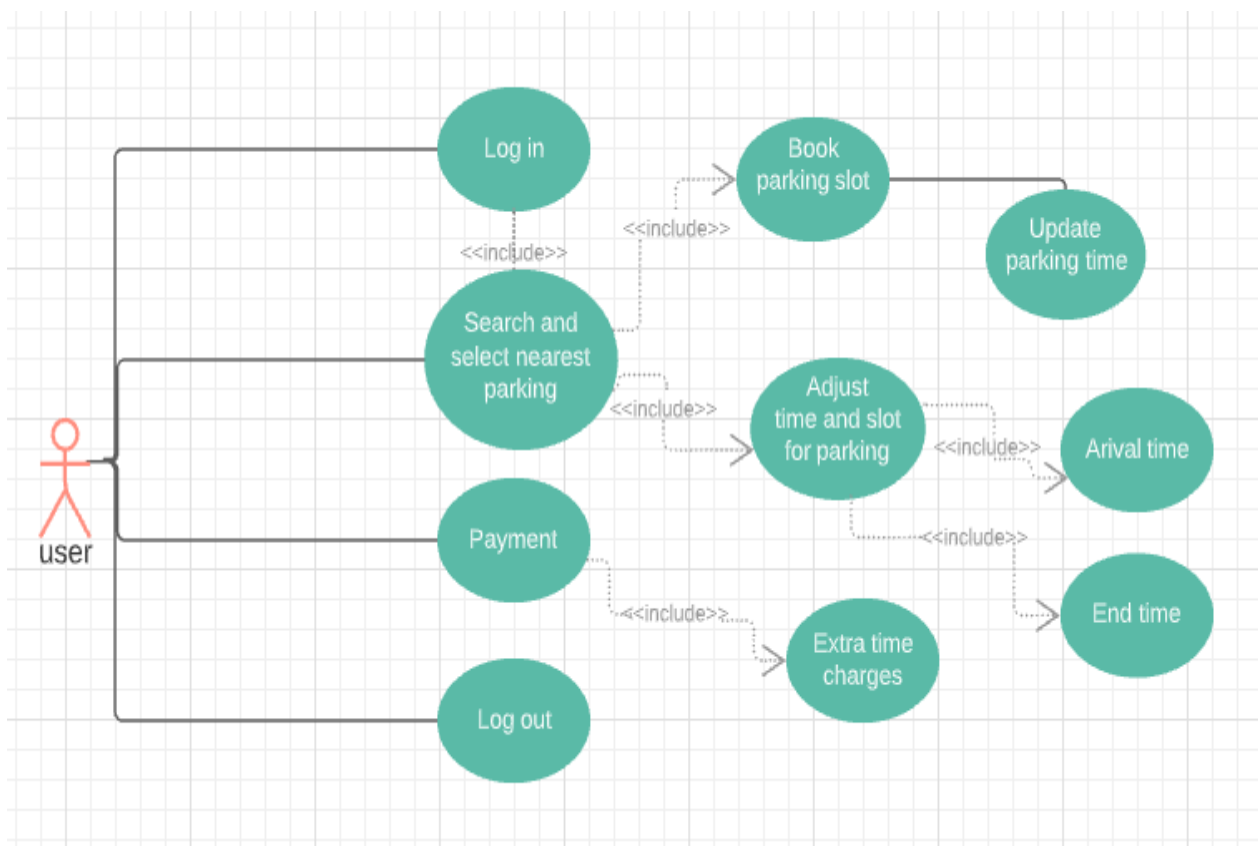


Figure 9. Aggregated Use Case Diagram

3.2. Use Case Descriptions

3.2.1) Log in use case description

Use Case ID	UC_01	
FR ID	FR_01	
Use Case Name	Log in	
Description	This use case describes that the user will get access of the application to book the parking slot	
Primary Actor	User	
Secondary Actor	System	
Pre-Conditions	User must have an account	
Post-Conditions	User successfully entered into application	
Basic Flow	Actor Action	System Action
	User enter name/email and password	Check data and able to use application
Alternate Flow	Error due to invalid details	

3.2.2) Log out use case description

Use Case ID	UC_02	
FR ID	FR_02	
Use Case Name	Log out	
Description	This use case describes that the user will be out of application	

Primary Actor	User	
Secondary Actor	System	
Pre-Conditions	User must have an account	
Post-Conditions	User successfully out of application	
Basic Flow	Actor Action	System Action
	User press log out button	Take out user form application
Alternate Flow		

3.2.3) Search nearest parking point use case description

Use Case ID	UC_03	
FR ID	FR_03	
Use Case Name	Search Nearest Parking Point	
Description	System will check suitable nearest point for parking of vehicle	
Primary Actor	User	
Secondary Actor	System	
Pre-Conditions	User must be done booking	
Post-Conditions	User receive every update notification	
Basic Flow	Actor Action	System Action
	Turn on Wi-Fi or mobile data	To collect information
Alternate Flow	Error	

3.2.4) Book Parking slot use case description

Use Case ID	UC_04	
FR ID	FR_04	
Use Case Name	Book parking slot	
Description	User select suitable parking slot and book it.	
Primary Actor	User	
Secondary Actor	System	
Pre-Conditions	User must be done booking	
Post-Conditions	User receive every update notification	
Basic Flow	Actor Action	System Action
	Turn on Wi-Fi or mobile data	To collect information
Alternate Flow	Error	

3.2.5) Adjust time slot use case description

Use Case ID	UC_05
FR ID	FR_05
Use Case Name	Adjust Time Slot for parking
Description	User adjusts time by providing starting and ending time period for parking during booking the parking slot.
Primary Actor	User

Secondary Actor	System	
Pre-Conditions	User must be done booking	
Post-Conditions	User receive every update notification	
Basic Flow	Actor Action	System Action
	Turn on Wi-Fi or mobile data	To collect information
Alternate Flow	Error	

3.2.6) Extra time charges use case description

Use Case ID	UC_06	
FR ID	FR_06	
Use Case Name	Extra time charges	
Description	System will check time after starting the parking duration, as the time limit exceeds and vehicle not leave parking slot would be fined double charges.	
Primary Actor	User	
Secondary Actor	System	
Pre-Conditions	User must be done booking	
Post-Conditions	User receive every update notification	
Basic Flow	Actor Action	System Action
	Turn on Wi-Fi or mobile data	To collect information
Alternate Flow	Error	

3.2.7) Update parking time use case description

Use Case ID	UC_07	
FR ID	FR_07	
Use Case Name	Update parking time	
Description	User can update parking time during his/her time duration.	
Primary Actor	User	
Secondary Actor	System	
Pre-Conditions	User must be done booking	
Post-Conditions	User receive every update notification	
Basic Flow	Actor Action	System Action
	Turn on Wi-Fi or mobile data	To collect information
Alternate Flow	Error	

Chapter 4

System Design

Chapter 4: System Design

In this chapter I will show you how user is interacting with the application and how data is being sent and received.

4.1. Architecture Diagram

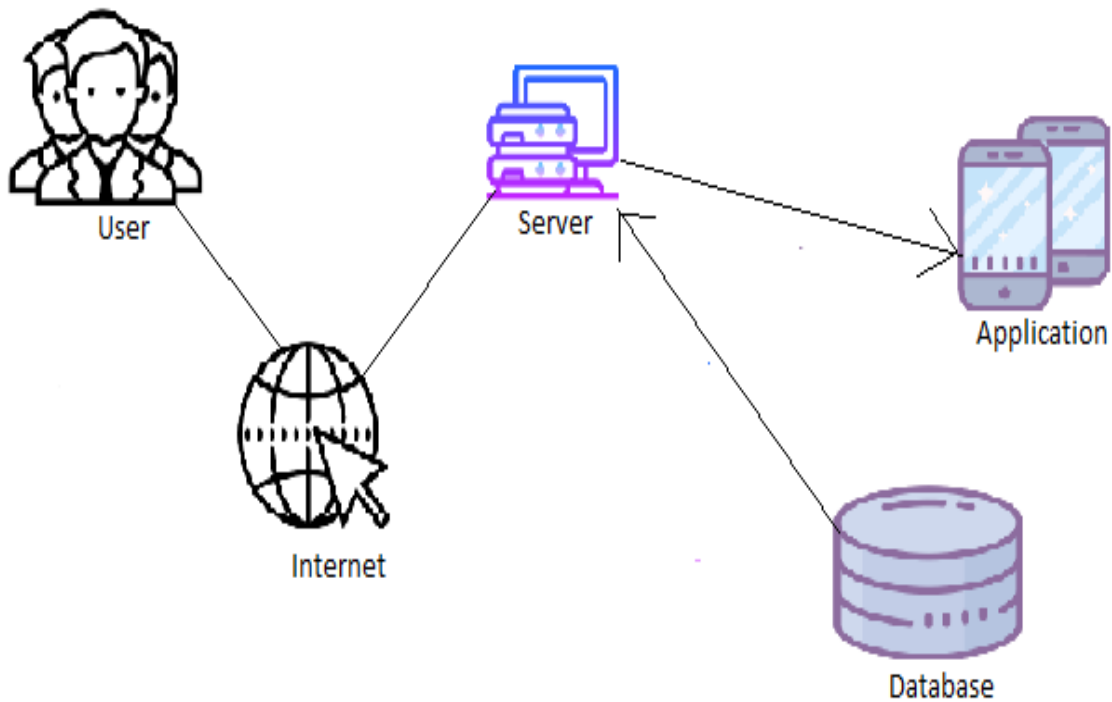


Figure 10. 4.1. Architecture Diagram

4.2. Entity Relationship Diagram with data dictionary

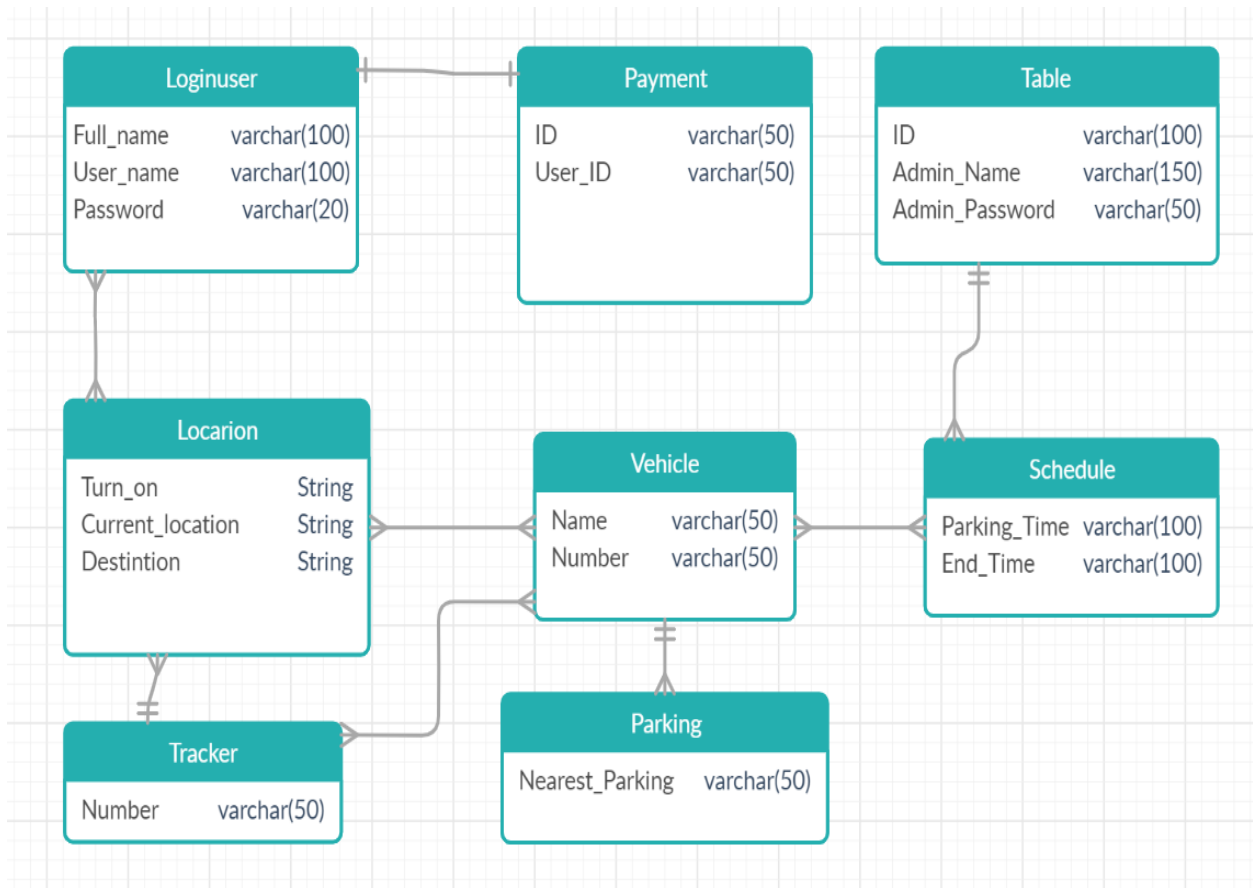


Figure 11. 4.2. Entity Relationship Diagram with data dictionary

4.3. Sequence / Collaboration Diagram

4.3.1. Sign Up

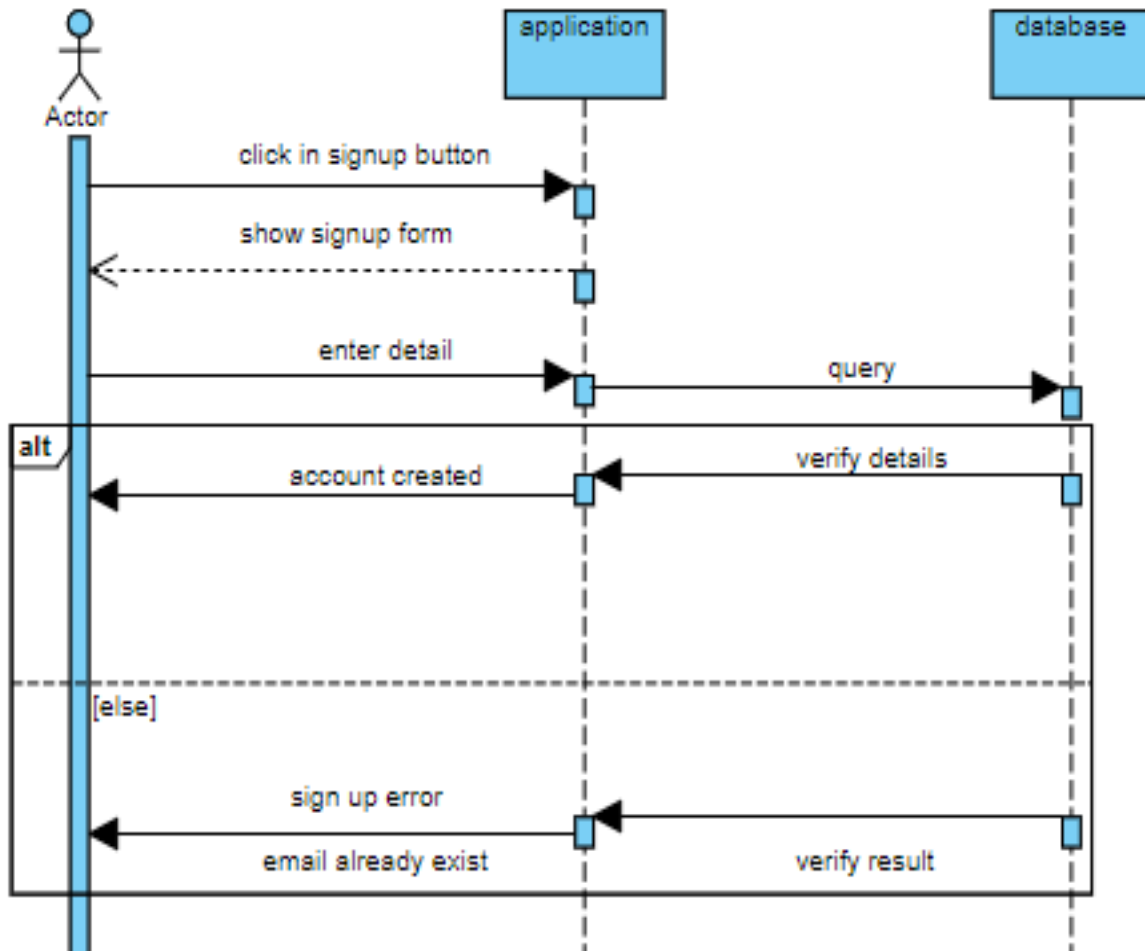


Figure 12. Sign Up

4.3.2. Login

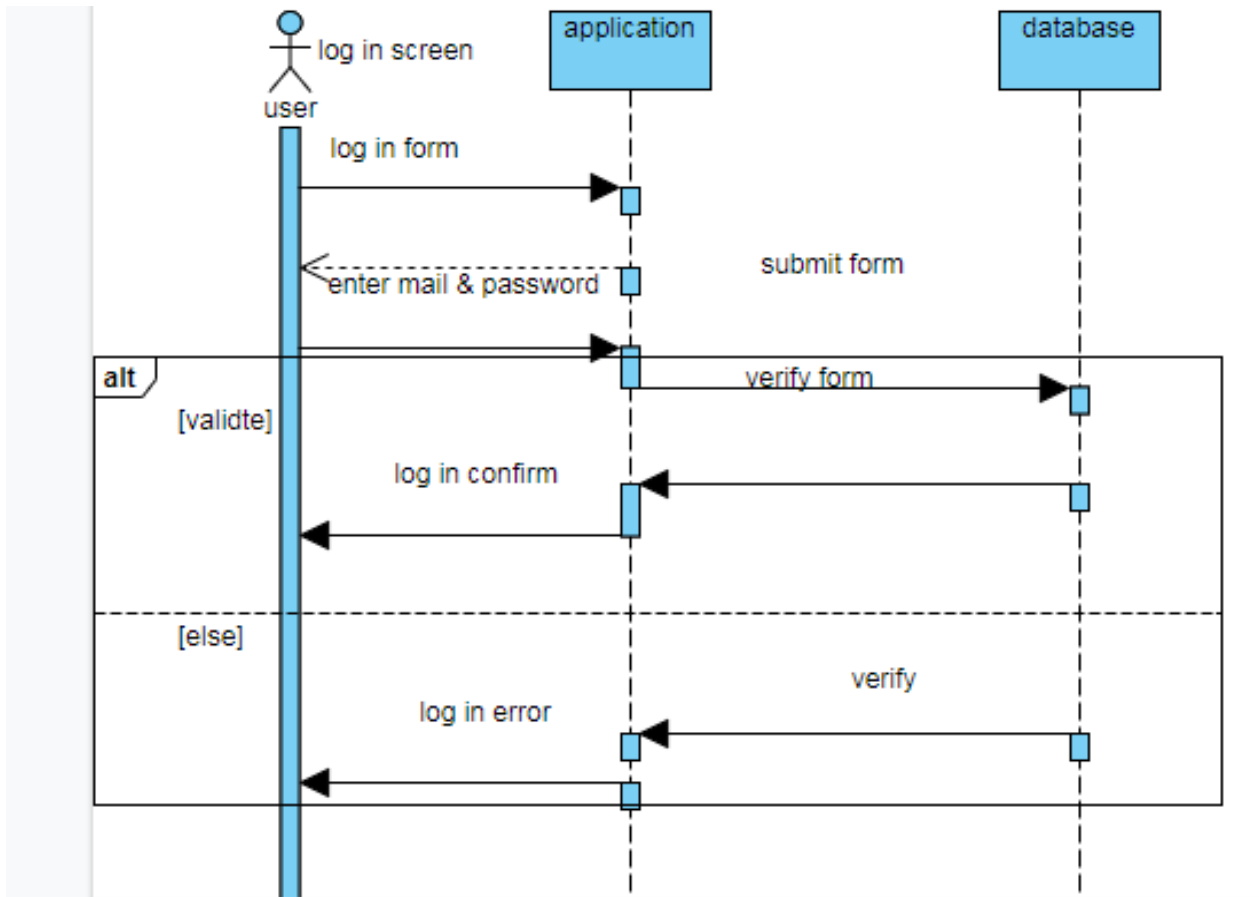


Figure 13. Login

4.3.3. Logout

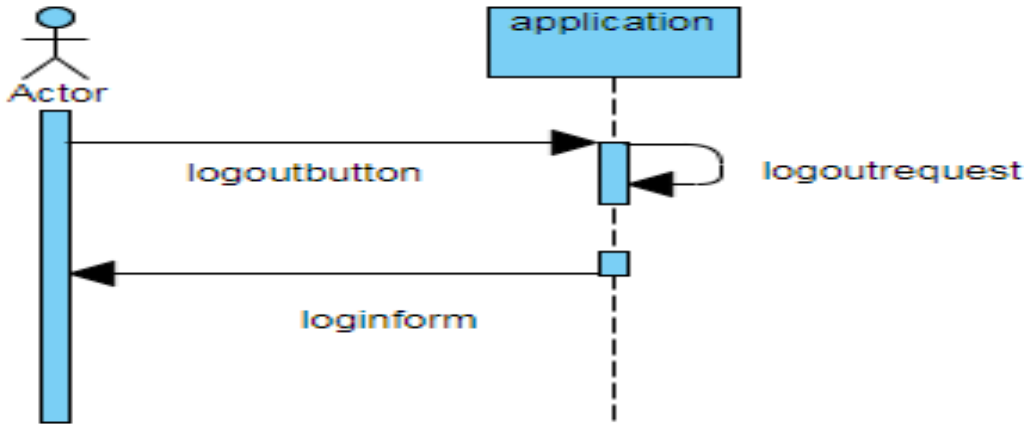


Figure 14. Logout

4.3.4. Internet

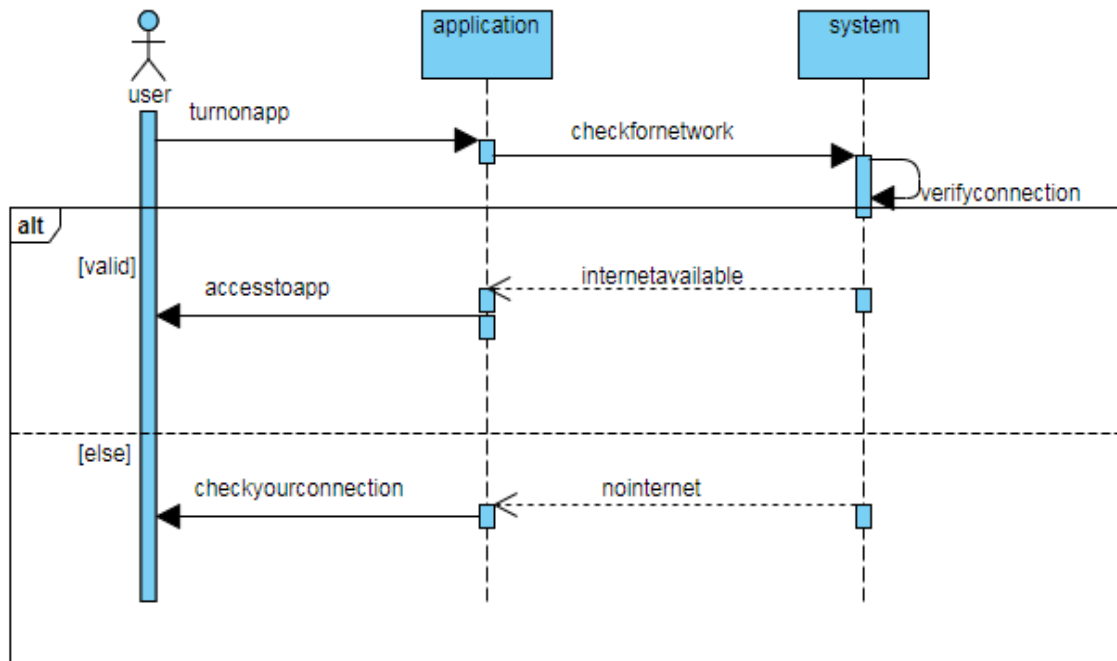


Figure 15. Internet

4.3.5. Location

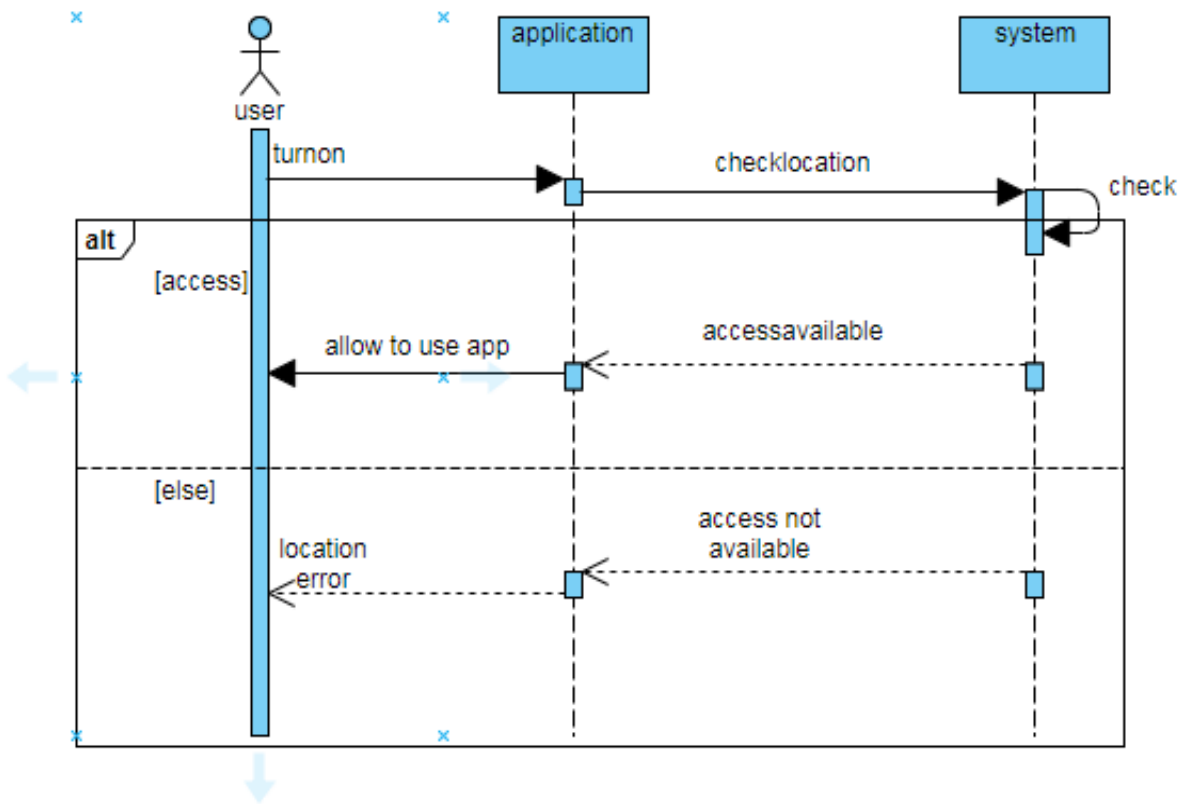


Figure 16. Location

4.3.6. Destination location

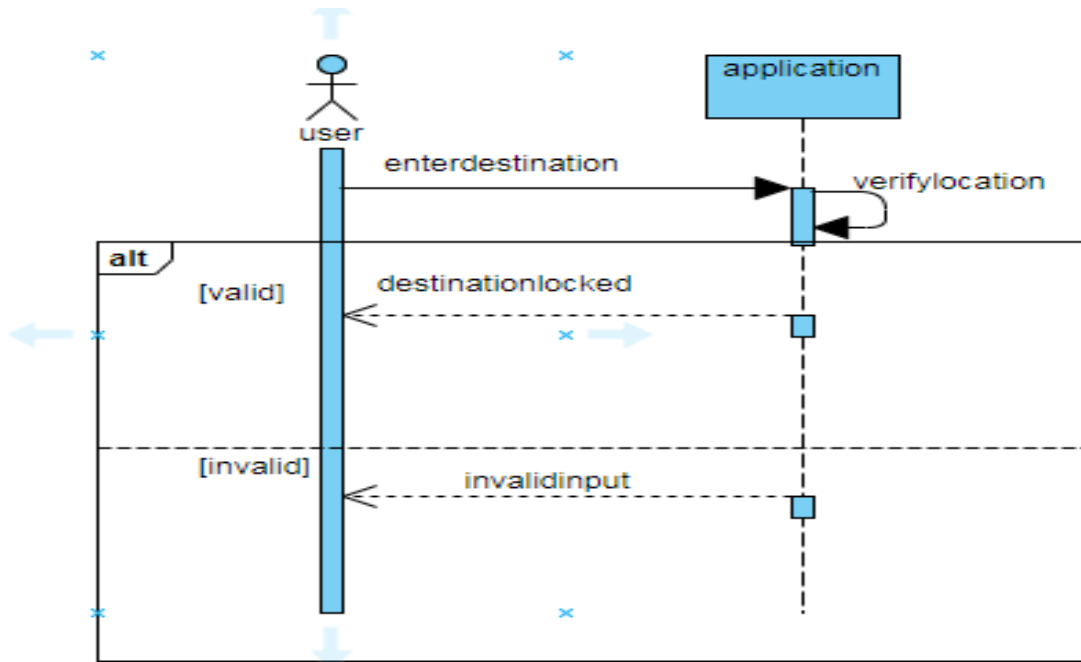


Figure 17. Destination Location

4.3.7. Update

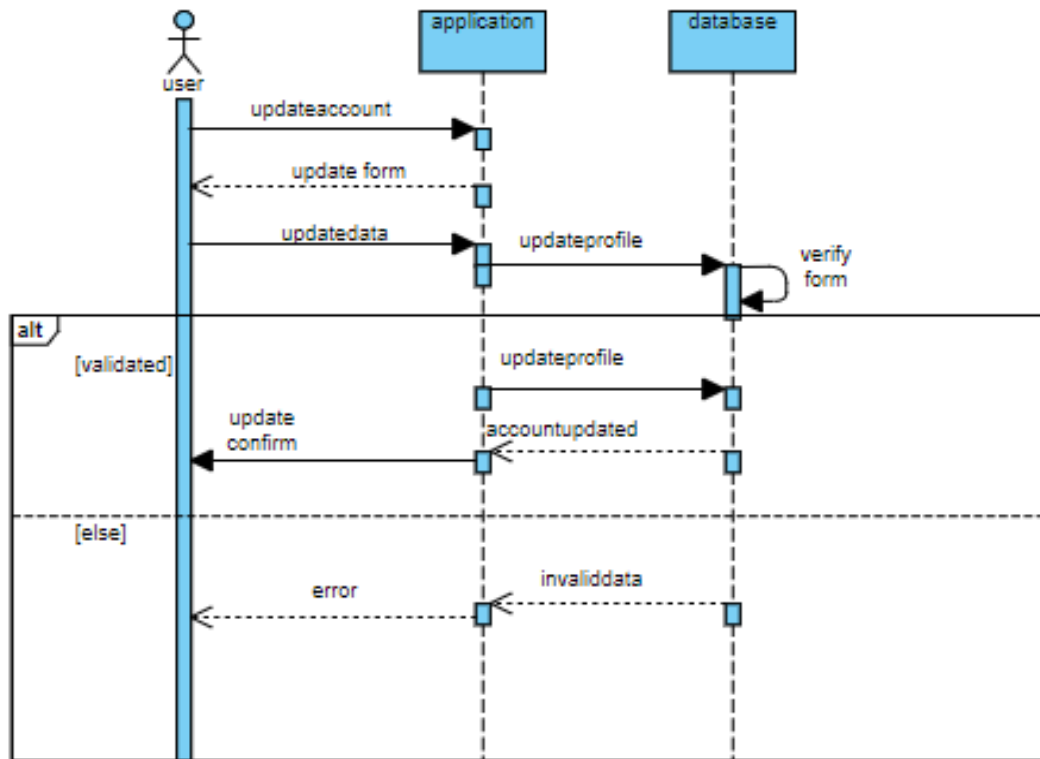


Figure 18. Update

4.3.8. Arrival Time

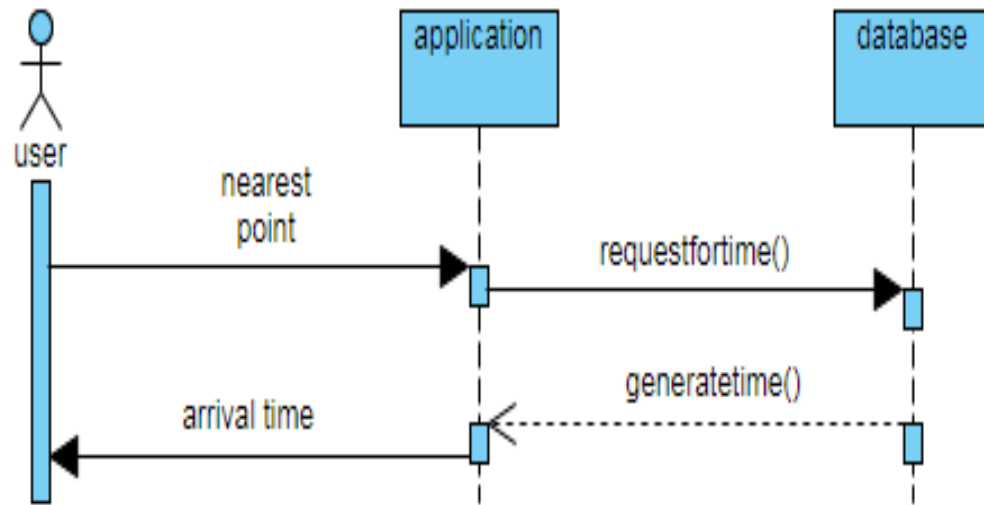


Figure 19. Arrival Time

4.3.9. Nearest parking

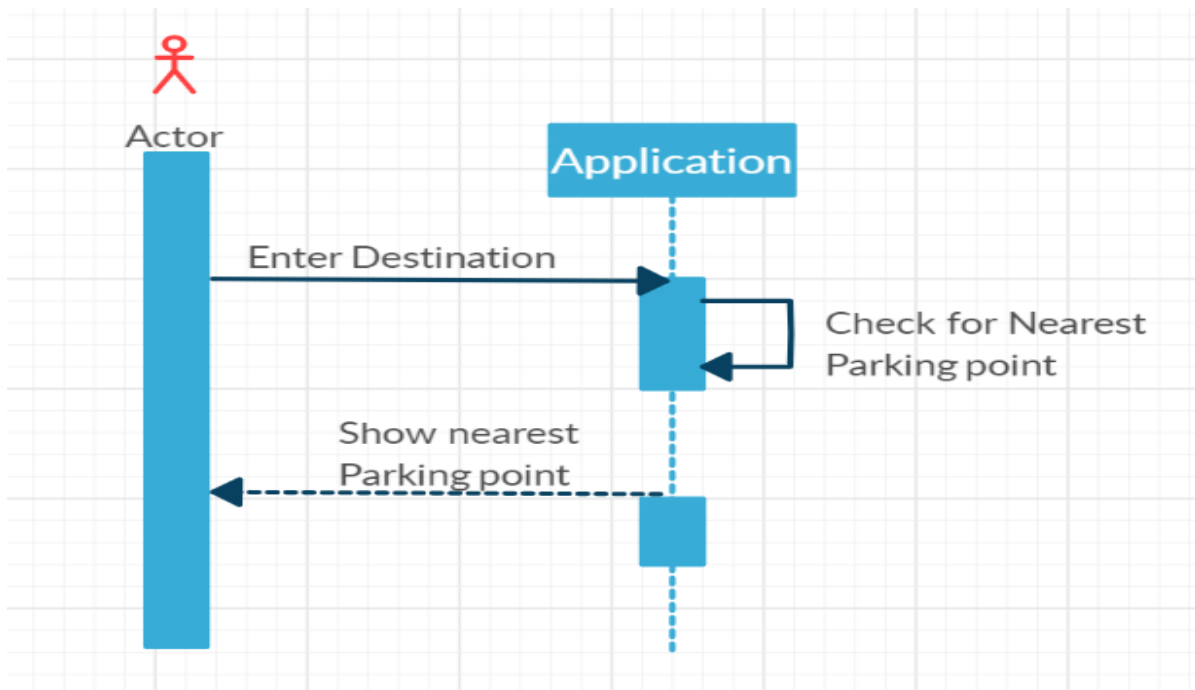


Figure 20. Nearest Parking

4.4. Operation contracts

Operation	Book parking slot
Cross reference	Use case diagram
Pre-condition	<ul style="list-style-type: none"> • User must have an account • User must be done booking his parking slot • User must have Internet connection
post condition	<ul style="list-style-type: none"> • User successfully entered into application • User successfully out of application • User receive every update notification • Adjust time slot • Extra time charges • Update parking time

4.5. Activity Diagram

4.5.1. SIGN UP

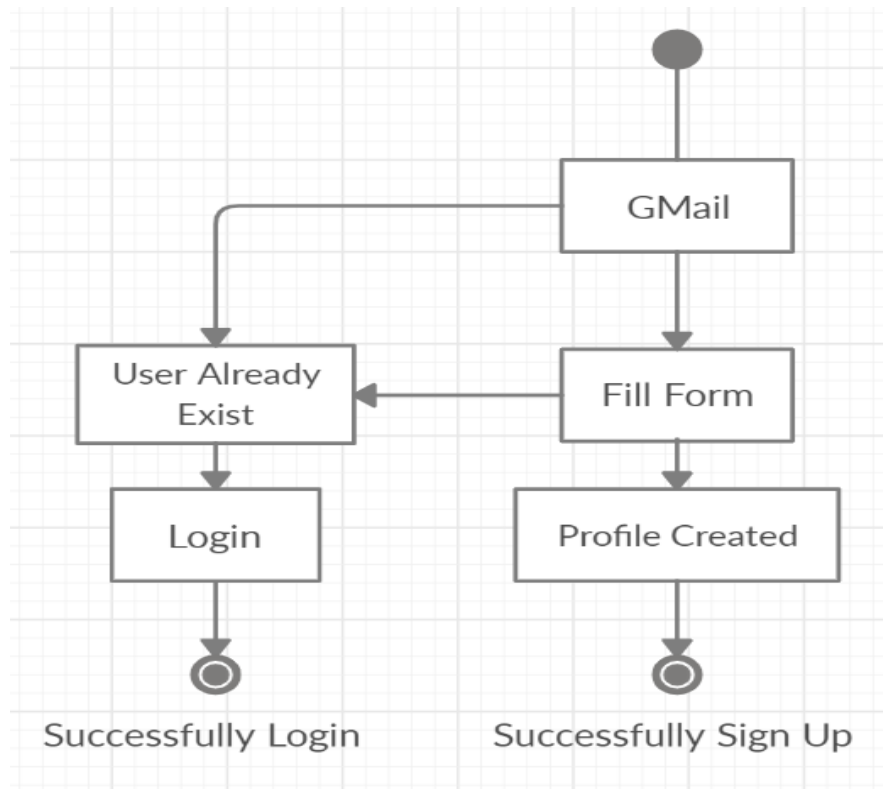


Figure 21. Sign Up

4.5.2. Login

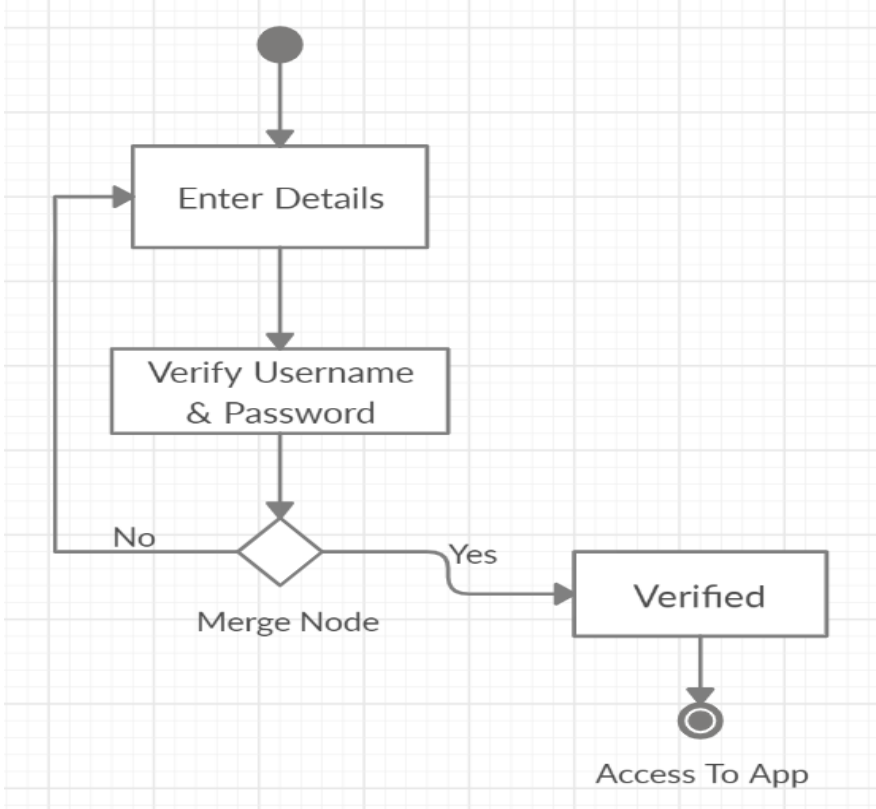


Figure 22. Log in

4.5.3. Internet

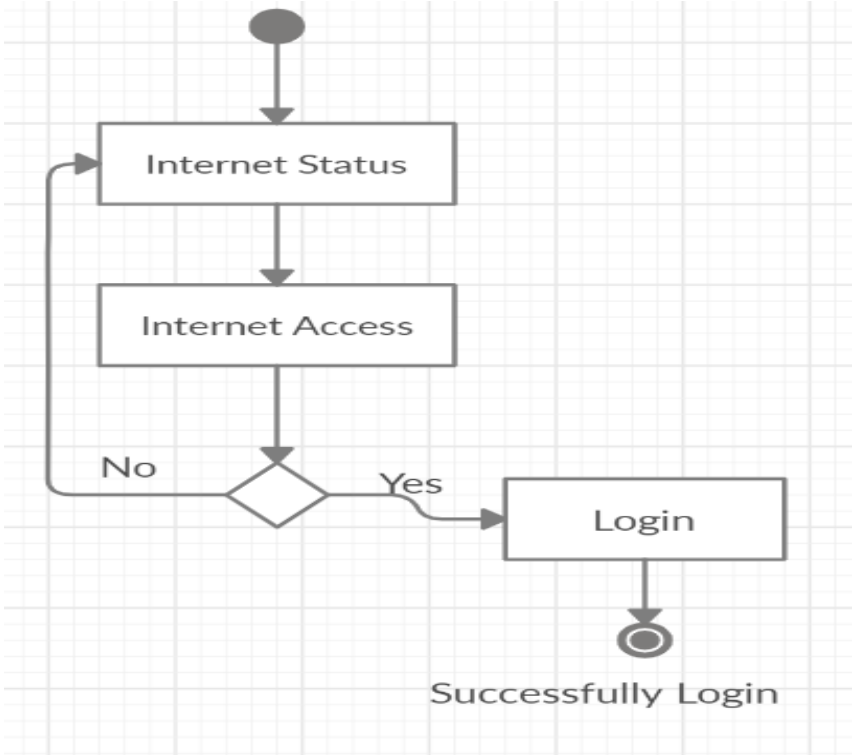


Figure 23. Internet

4.5.4. Location

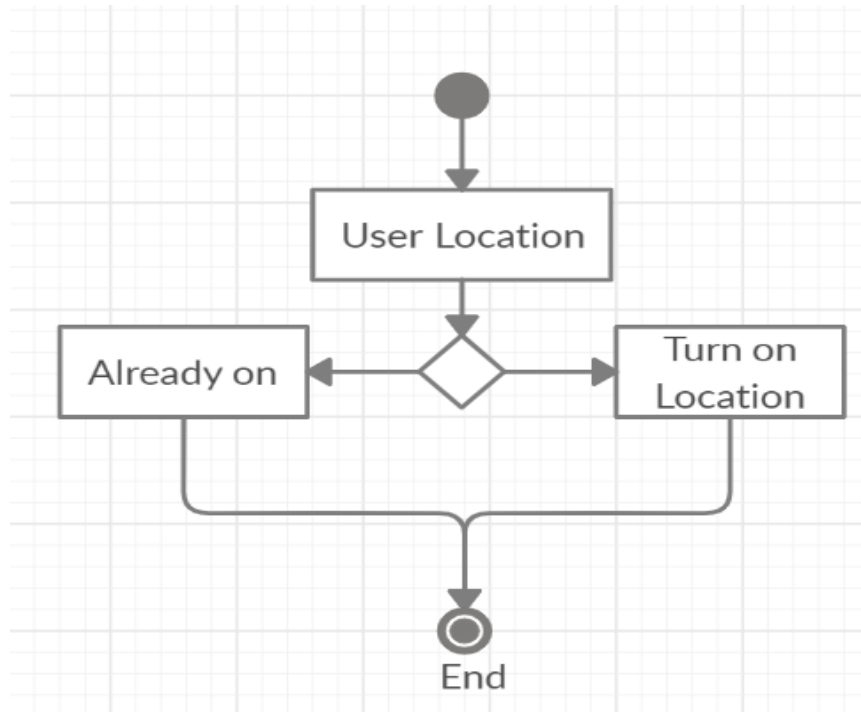


Figure 24. Location

4.5.5. Nearest Parking

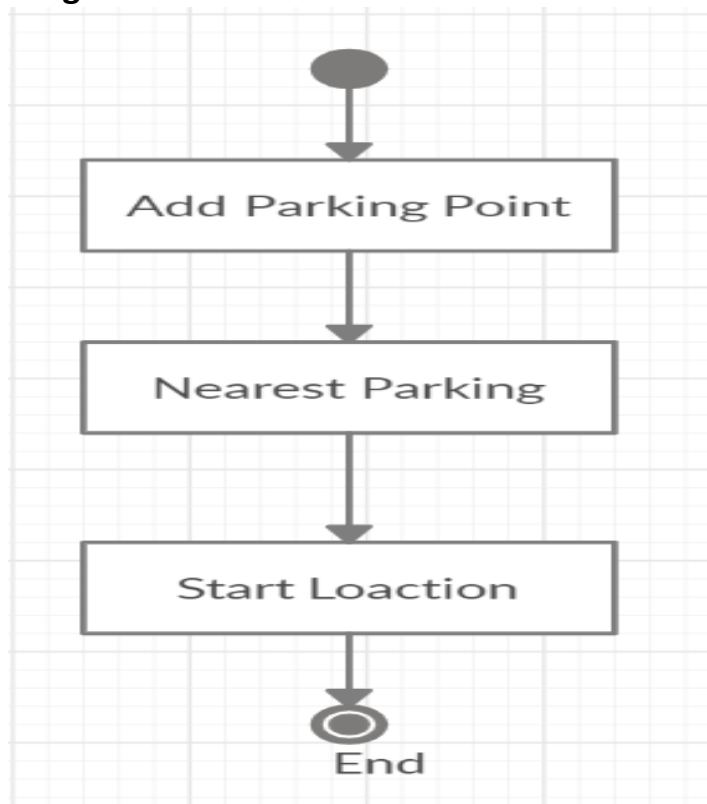


Figure 25. Nearest Parking

4.5.6. Reach Destination

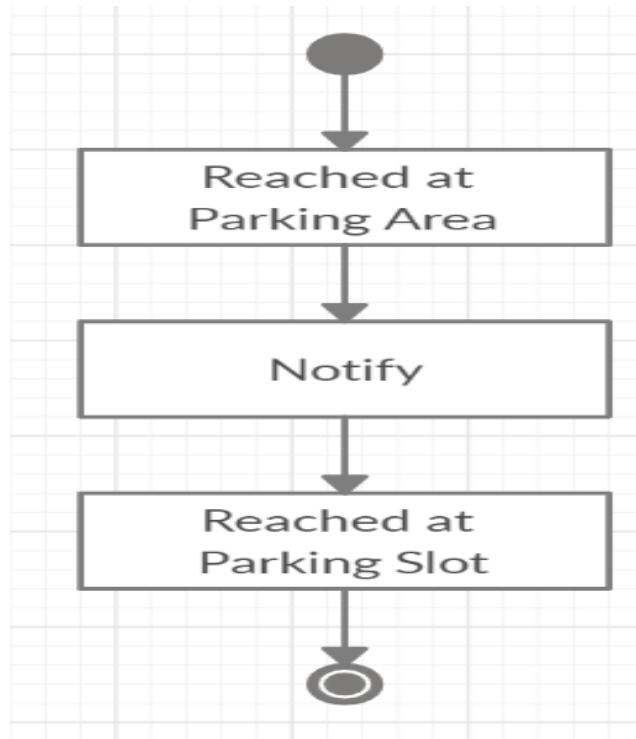


Figure 26. Reach Destination

4.6. Data Flow diagram

4.6.1 DFD LEVEL 0

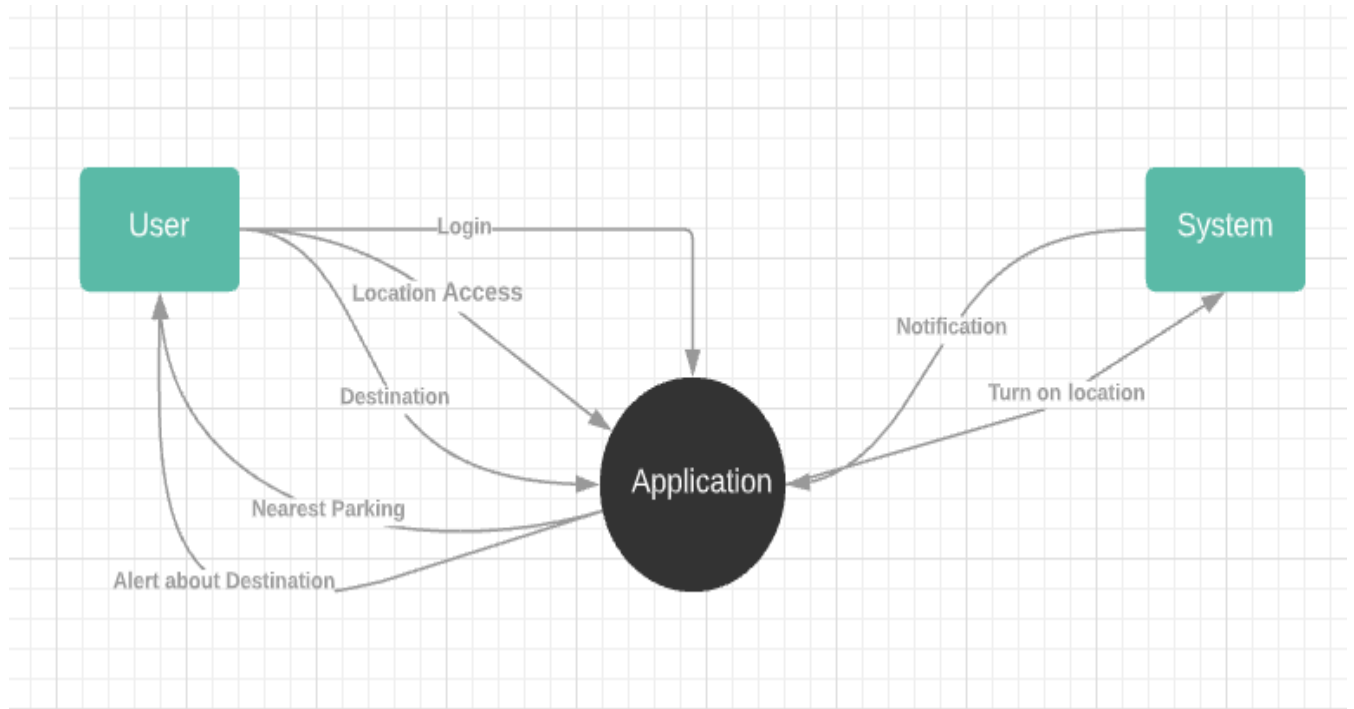


Figure 27. DFD Level 0

4.6.2 DFD LEVEL 1

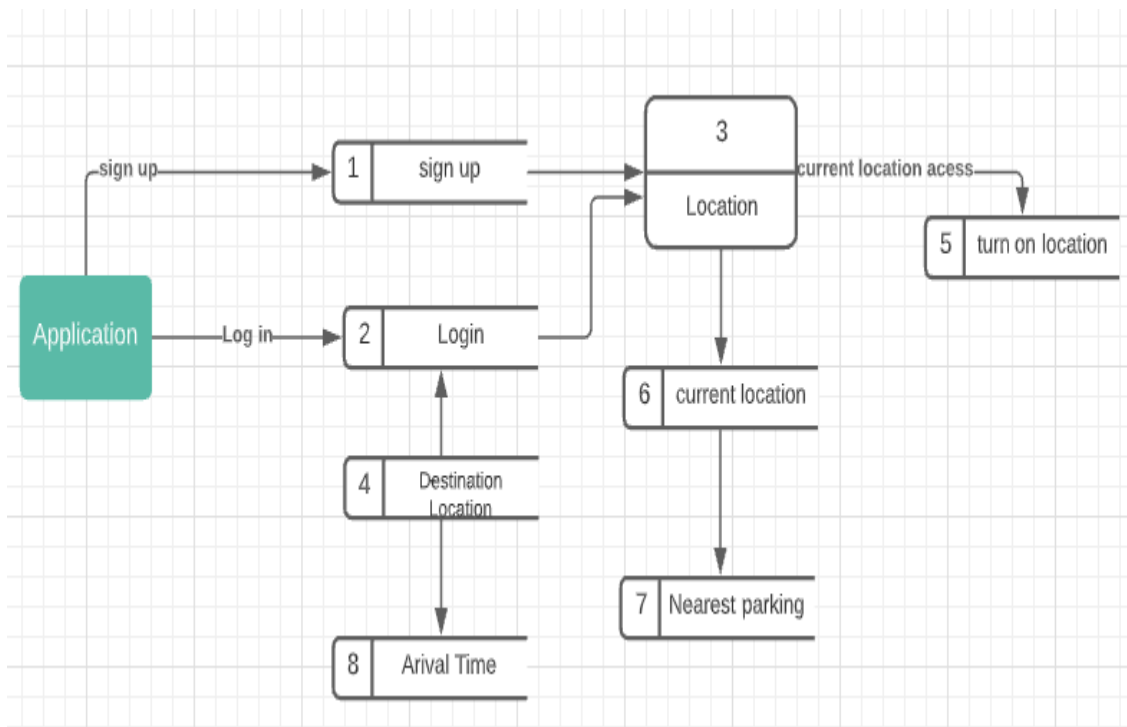


Figure 28. DFD Level 1

Chapter 5

Implementation

Chapter 5: Implementation

In this chapter I will discuss about how we developed an app and app. How we use tools technique to develop an app. And make an application user friendly. Most Android phones use the touch screen as the primary medium to interact with a user. The screen of a phone is used to interact with a user interface of an application. Android supports both a single touch and multi touch. Touch events in an Android phone are supported by view, custom views and an activity. Touches are interpreted in an Android phone in the form of scroll, copy and paste, drag. Android has provided proper classes and methods to handle the touch events.

5.1. Important Flow Control/Pseudo codes

First of all, you need to install this App on your Smartphone to book parking slot for your vehicle and you need to create an account on this app after this you will search and book parking slot. When slot will be booked you need to confirm your parking time and charges and for this you will need to click the confirm button for checking time and charges. When you click confirm button the app will show you the checkout screen. After this you will need to click checkout button and your all work will be done. There are few things that you need to keep in mind every time you want to connect to internet.

5.2. Components, Libraries, Web Services and stubs

- Content provider
- Windows manager
- Resources manager

5.3. Deployment Environment

To develop this application I use JAVA and Xml. I define system in different ways using domain model, use case, sequence diagram, activity diagrams other many diagrams which defines working of my application very extremely. Other tools and techniques are also used like android studio, firebase, lucid chart, canva etc.

5.4. Tools and Techniques

Tools

Android studio used for application development.

Android studio

Android studio is officially used for Android Applications Development and it is freely available for Apache License.

Lucid chart

I used lucid chart for use case diagram.

Canva

I used canva for promotional materials of my app for example banner and brochure.

Techniques

Languages

I used two languages java and xml.

- **Java**

I used java for backend of Application.

- **Xml**

I used xml for designing of application.

- **Firebase**

I used firebase database.

5.5. Best Practices / Coding Standards

For good application best practice is that you should use best coding standard. There are lots of standard but I select JAVA, Android studio and xml is the one of the best standard language in which i ensure that all user requirement are fulfill in best practices.

5.6. Version Control

Different applications are creating to solve the current problem of different people. So many developers develop different application to solve different problem. In Version control I am changing features of application on demand of different Users. This is my first version of application. After launching it in market and after getting user feedback I will update features day by day on user demand.

Chapter 6

Testing and Evaluation

Chapter 6: Testing and Evaluation

This chapter includes some test cases for the App to check if the App works properly in various situations. I test this app in different phases. Which help me to understand the environment of my website? I can check that they work properly or not in different situation.

6.1. Use Case Testing

6.1.1. Login testing case

Test case id	TC 01
Test case description	Login
Test procedure	To get access of the application to book the parking slot
Expected result	Access to application
Actually result	Successfully access
Status	Pass
Author	Kainat kanwal
Date	15-8-2021

6.1.2. Logout testing case

Test case id	TC 02
Test case description	Logout
Test procedure	Take out user form application
Expected result	Logout from application
Actually result	Successfully logout
Status	Pass
Author	Kainat kanwal
Date	15-8-2021

6.1.3. Search nearest parking testing case

Test case id	TC 03
Test case description	Search nearest parking slot
Test procedure	To check suitable nearest point for parking of vehicle
Expected result	Search nearest parking
Actually result	Successfully search nearest parking
Status	Pass
Author	Kainat kanwal
Date	15-8-2021

6.1.4. Book parking slot testing case

Test case id	TC 04
Test case description	Book parking slot
Test procedure	To book suitable nearest point for parking
Expected result	Book parking slot
Actually result	Successfully book
Status	Pass
Author	Kainat kanwal
Date	15-8-2021

6.1.5. Adjust time slot testing case

Test case id	TC 05
Test case description	Adjust time slot
Test procedure	To adjust starting and ending time period for parking during booking the parking slot.
Expected result	Adjust start and end time
Actually result	Successfully time adjust
Status	Pass
Author	Kainat kanwal
Date	15-8-2021

6.1.6. Extra time charges testing case

Test case id	TC 06
Test case description	Extra time charges
Test procedure	To double charged if time limit exceeds and vehicle not leave parking slot would be fined double charges.
Expected result	Charged double
Actually result	Successfully double charged
Status	Pass
Author	Kainat kanwal
Date	15-8-2021

6.1.7. Update parking time testing case

Test case id	TC 07
Test case description	Update parking time
Test procedure	To update parking time if needed.
Expected result	Parking time update
Actually result	Successfully updated
Status	Pass
Author	Kainat kanwal
Date	15-8-2021

6.2. Data flow testing

Data flow testing is a family of test strategies based on selecting paths through the program's control flow in order to explore sequences of events related to the status of variables or data objects. Dataflow testing focuses on the points at which variables receive values and the points at which these values are used. It is performed at two abstract levels: Static data flow testing and dynamic data flow testing.

The static data flow testing process involves analyzing the source code without executing it. Static data flow testing exposes possible defects known as data flow anomaly. Dynamic data flow identifies program paths from source code. Data Flow testing helps us to pinpoint any of the following issues:

- A variable that used but never declared.
- Variable which is declared but never used in the program.
- A variable that is defined multiple times before it is used
- Deal locating a variable before it is used.

6.3. Unit testing

Unit testing is a type of software testing where individual units or components of software are tested. Unit testing of software applications is done during the development (coding) of an application. Unit Tests isolate a section of code and verify its correctness. In procedural programming, a unit may be an individual function or procedure. Unit testing is usually performed by the developer. Unit testing increases confidence in changing/ maintaining code. If good unit tests are written and if they are run every time any code is changed, we will be able to promptly catch any defects introduced due to the change. Also, if codes are already made less interdependent to make unit testing possible, the unintended impact of changes to any code is less.

6.4. Integration testing

Integration testing is a systematic technique for constructing the program structure while at the same time conducting tests to uncover errors associated with interfacing. The objective is to take unit tested components and build a program structure that has been dictated by design. Incremental integration is the antithesis of the big bang approach. The program is constructed and tested in small increments, where errors are easier to isolate and correct, interfaces are more likely to be tested incompletely, and a systematic test approach may be applied. Register Module and Login Module is Integrated.

Register Module

Firstly when install the app first page is for register the app, if you already register the app then you directly login the application.

Login Module

If you register the app then you direct login the application and use its function to connect with personal computers.

6.5. Performance testing

Performance testing, a non-functional testing technique performed to determine the system parameters in terms of responsiveness and stability under various workload. Performance testing measures the quality attributes of the system, such as scalability, reliability and resource usage. This sort of testing is particularly useful to identify performance bottlenecks in high use applications. Performance testing generally involves an automated test suite as this allows easy simulation of a variety of normal, peak, and exceptional load conditions.

6.6. Stress Testing

Stress testing refers to the testing of software or hardware to determine whether its performance is satisfactory under any extreme and unfavorable conditions, which may occur as a result of heavy network traffic, process loading, under clocking, over clocking and maximum requests for resource utilization. Most systems are developed under the assumption of normal operating conditions.

Thus, even if a limit is crossed, errors are negligible if the system undergoes stress testing during development. Testing conducted to evaluate a system or component at or beyond the limits of its specified requirements to determine the load under which it fails and how.

Chapter 7

Summary, Conclusion and Future Enhancements

Chapter 7: Summary, Conclusion & Future Enhancements

7.1. Project Summary

The purpose of this project is to reduce the difficulties of the visually impaired people during travelling. Park at Ease provides parking slots before they reach and easy to pay for it, This Project is android based. This project has one user i: e app user. User has its own login and new users can be registered as well. My target audience is general public. First of all user must have an account and select parking slot and book it. A person who wants to confirmed the parking slot for specific time he/she request for it and if place is available the system will allocate the slot for parking. After leaving the parking slot his/her record will be saved in database including mobile number and name with date and time.

7.2. Achievements and Improvements

During the process of mobile application, I have learned a lot of skills and achieve many things like:

- Creative thinking
- Best coding practice
- Graphic designing
- UI designing
- Unity

These are all improvements and achievements, which I have gain during building our FYP project. In addition, after building this, I got more interest about mobile application.

7.3. Critical Review

This app is use for booking parking slot online. This app will save user's time and provides safe and easy parking slot which will be nearest to user. Park at Ease book parking slot for user's vehicles and charge according to parking periods if ending time exceeds so system will fine be double charged.

7.4. Lessons Learnt

After completing this project, I came to a conclusion that the computer programming appears catchy if and only if the problem is difficult. I concluded that the approach, which is predefined and presumed. From a proper analysis of positive points and constraints on the component, it can be safely concluded that the product is a highly efficient GUI based component.

7.5. Future Enhancements/Recommendations

Now this is a limited version of Park at Ease application. In future I will upgrade this application. I will add more features in it and also upgrade performance of application and I will add more environments. I will add QR code scanner, QR code generator, online paying system, etc. Then I will upload this application on Android and IOS Operating Systems.

Appendices

Appendix A: User Manual

In this appendix section I describe the different phases of user interface and also describe how user can use this application.

Appendix A: Park at Ease

A.1. Login

User can login by entering phone number and password.

Jazz 2G 83% 12:18 PM

P

LOGIN

Sign in to continue

Phone no

Password

SIGN IN

[FORGOT PASSWORD?](#)

[NEW USER? SIGN UP NOW](#)

Figure 29. Log in

A.1.1 Login

In case if user is not valid and enter wrong phone number and password it will show an authentication warning.

The screenshot shows a mobile application interface for login. At the top, there is a status bar with the carrier name 'Jazz', signal strength, Wi-Fi, 2G network, 77% battery, and the time '5:37 PM'. Below the status bar is a red circular icon with a white letter 'P'. The main heading is 'LOGIN' in large, bold, black letters, followed by the subtitle 'Sign in to continue' in a smaller, grey font. There are two input fields: the first is labeled 'Phone no' and contains the number '03094510592', with a red exclamation mark icon to its right; the second is labeled 'Password' and is currently empty, with a grey eye icon to its right. Below the input fields is a large orange button with the text 'SIGN IN' in white. Underneath the button are two links: 'FORGOT PASSWORD?' and 'NEW USER? SIGN UP NOW', both in a small, grey font. At the bottom of the screen is a black navigation bar with three white icons: a square, a circle, and a triangle.

Figure 30. Log In

A.2 Signup

User must have signup before using it.

Jazz 2G 83% 12:18 PM

P

SIGN UP

Enter Name

Phone No

Password

Confirm Password

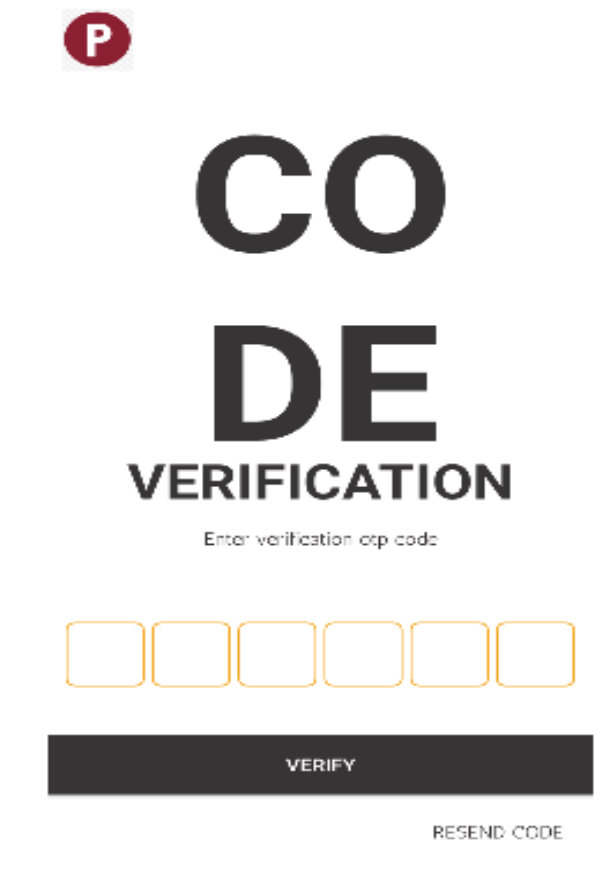
SIGNUP

ALREADY HAVE AN ACCOUNT LOGIN

Figure 31. Sign Up

A.3 Verification code

System will send verification code.

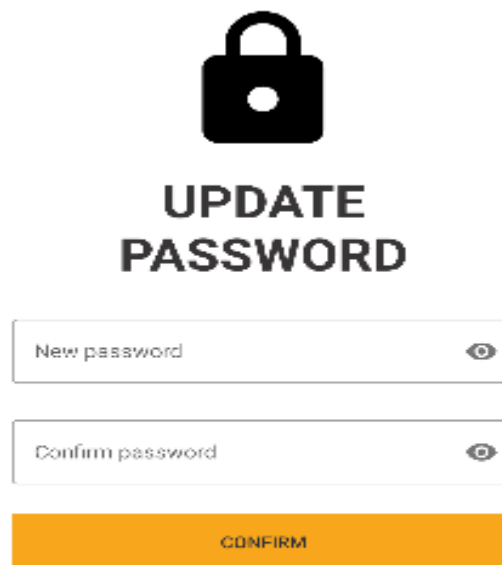


The image shows a verification code screen. At the top left, there is a red circular icon with a white letter 'P'. Below this, the text 'CODE' is displayed in large, bold, black letters, followed by 'DE' in the same style. Underneath, the word 'VERIFICATION' is written in a smaller, bold, black font. Below the text, there is a prompt 'Enter verification otp code' in a small, grey font. This is followed by a row of six empty, orange-outlined square boxes for entering the code. At the bottom, there is a dark grey rectangular button with the word 'VERIFY' in white, and a smaller, grey text link 'RESEND CODE' to its right.

Figure 32. Verification Code

A.4 Forget password

If user forgets his/her password so he/she can change password.



The image shows a user interface for updating a password. At the top center is a black padlock icon. Below it, the text "UPDATE PASSWORD" is displayed in a bold, black, sans-serif font. Underneath the text are two input fields. The first field is labeled "New password" and the second is labeled "Confirm password". Both fields have a small eye icon on the right side, indicating a toggle for password visibility. Below the input fields is a prominent orange button with the text "CONFIRM" in white, uppercase letters.

Figure 33. Verification Code

A.5 Internet dialogue

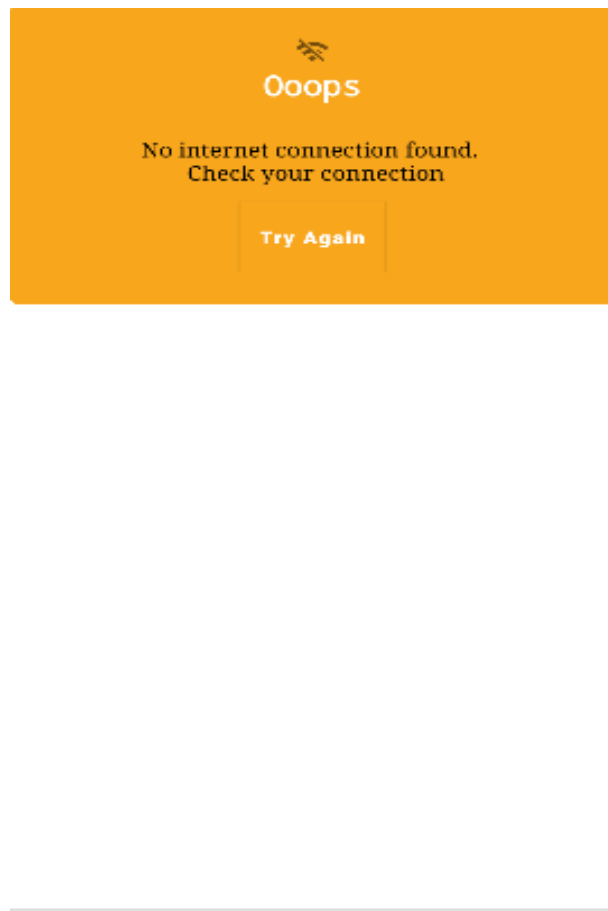


Figure 34. Internet Dialogue.

A.6 Select parking slot

User selects the parking slot.

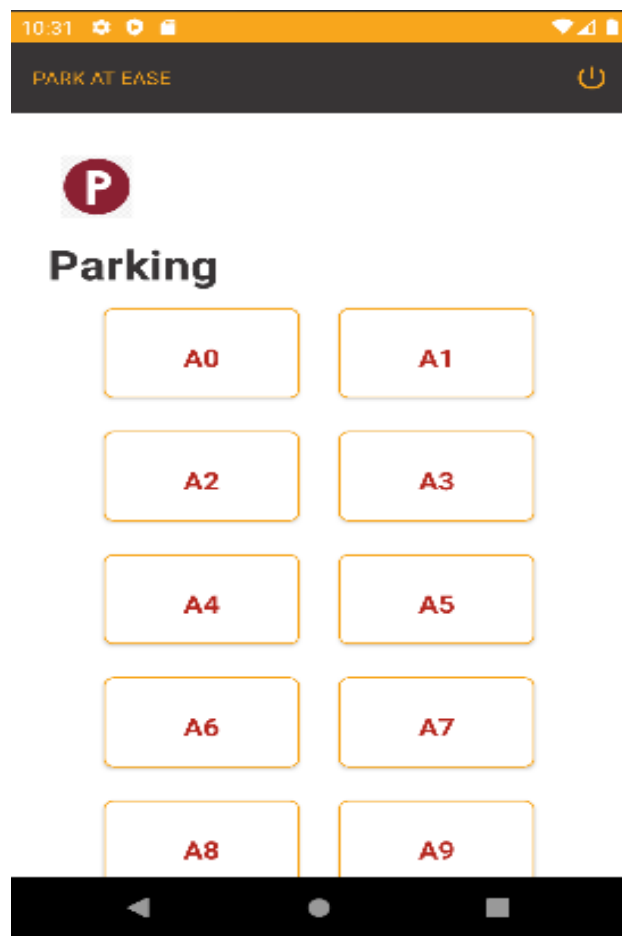


Figure 35 Selecting Parking Slot

A.7 Book parking slot

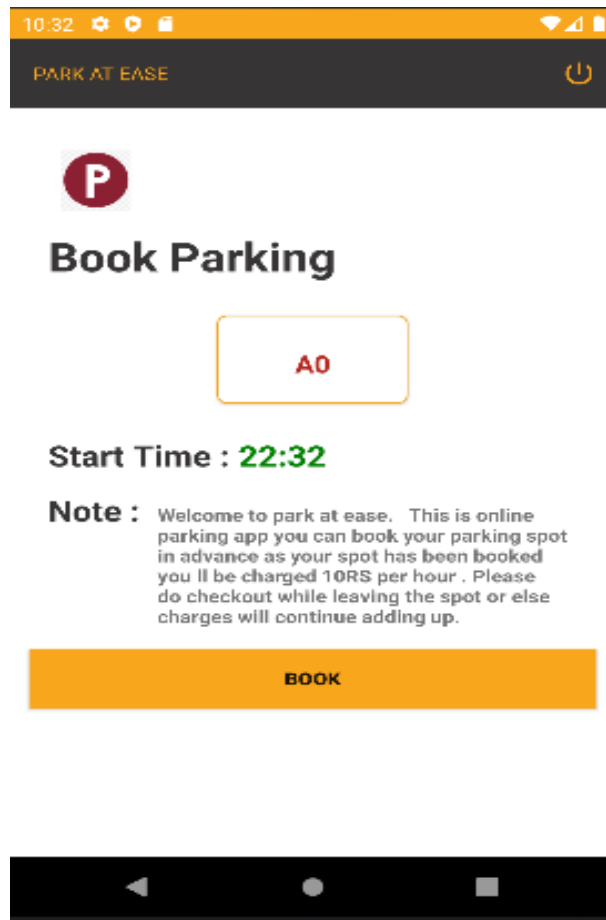


Figure 36. Book Parking Slot

A.8 Check out/in parking slot

User can check his parking slot.

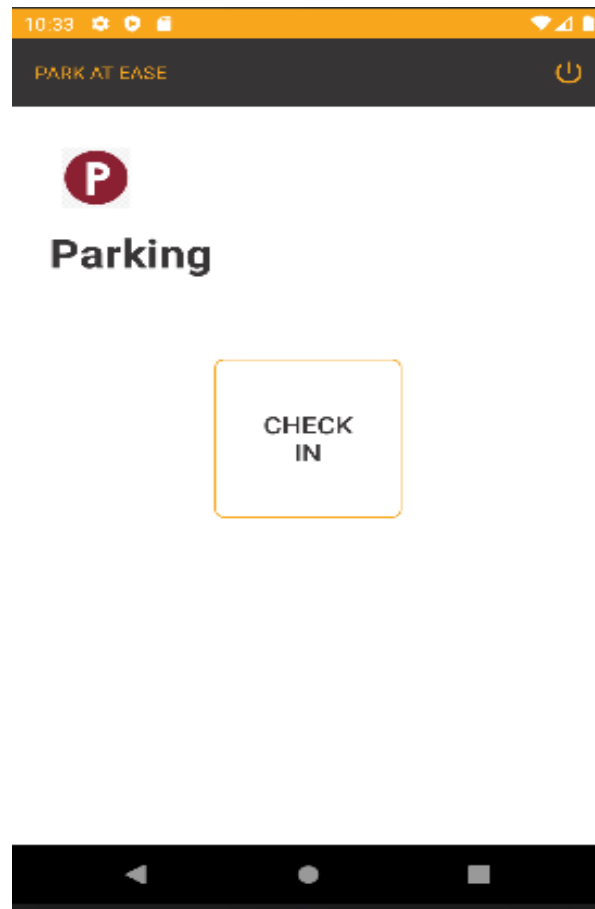
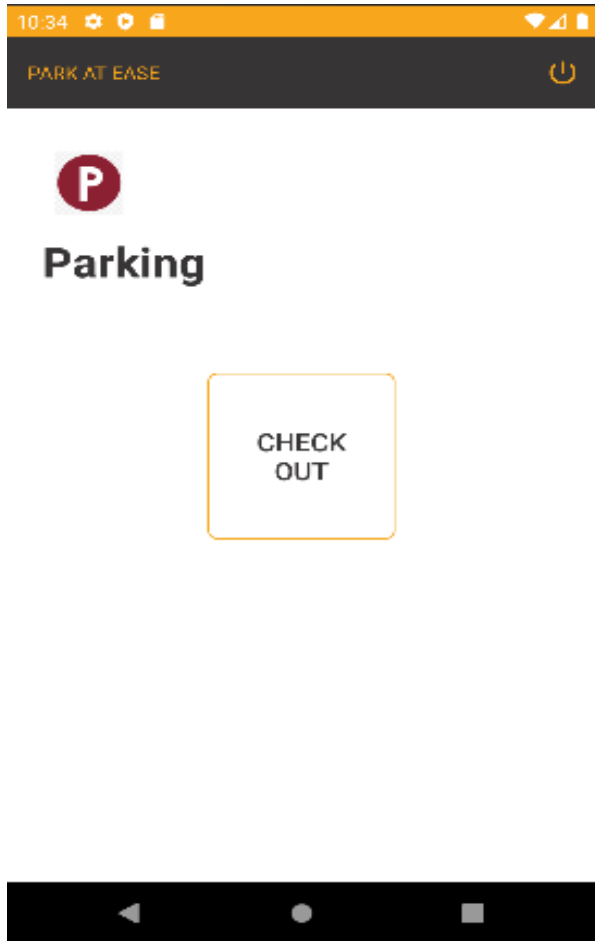
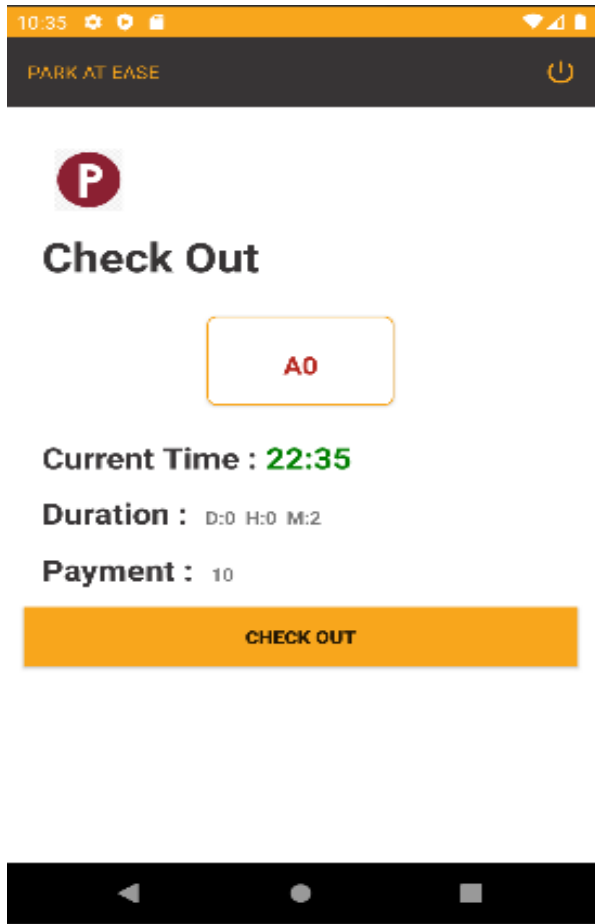


Figure 37. Check Out





Appendix C: Information / Promotional Material

In appendix I add promotional materials about my application which are very useful. These materials use for promotion of my application.

C.1. Broacher

Page .1

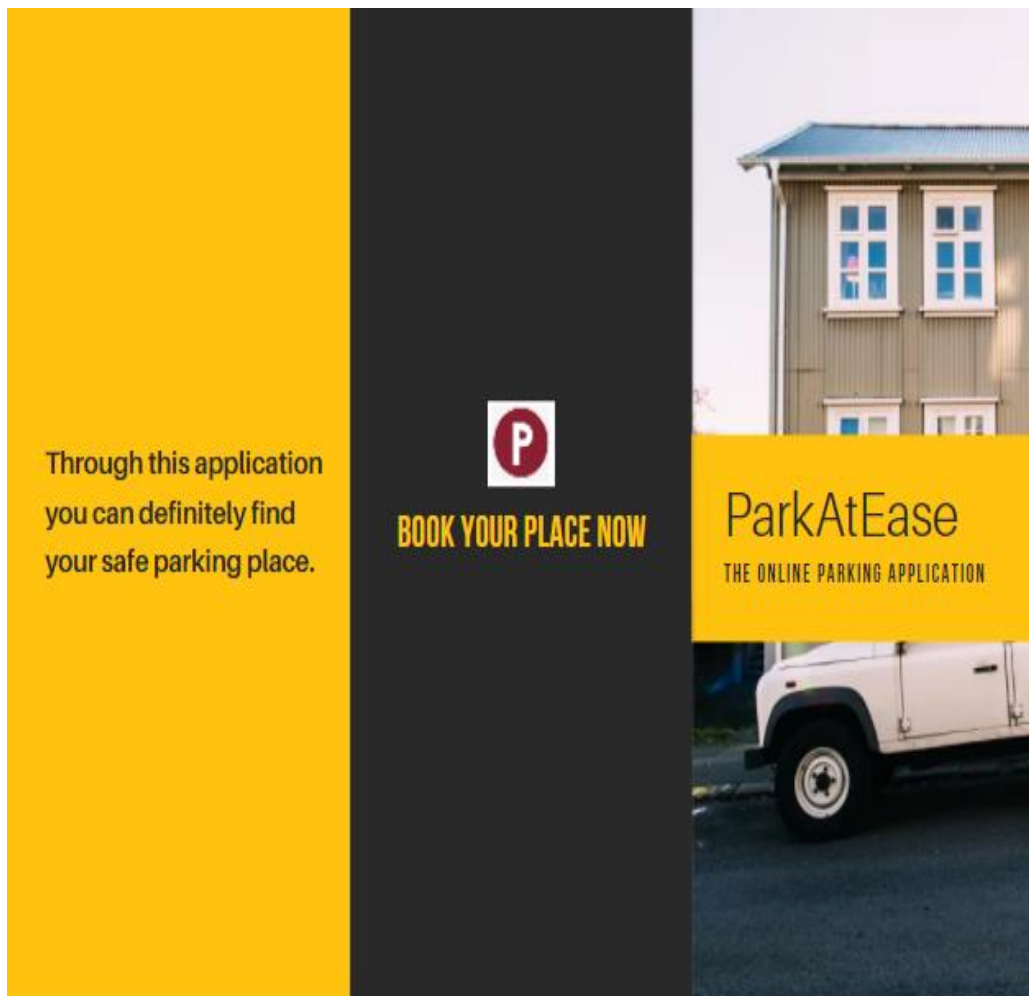


Figure 38. Broacher



ParkAtEase

- SAFE PARKING
- EASY BOOKING
- NEAREST PARKING
- ONLY 10RS CHARGES PER HOUR

ABOUT PARKATEASE

This is online parking app you can book your parking spot in advance as your spot has been booked you will be charged 10RS per hour. Please do checkout while leaving the spot or else charges will continue adding up.

MAKE YOUR PARKING EASY AND SAFE.

C.2. Banner



Reference and Bibliography

Reference and Bibliography

- [1] Livingston, Smartphone's and other Mobile Devices: the Swiss army knives of the 21st Century. Educate Quarterly (EQ), 27(2) (2004).
- [2] (Khadka, 2013, p. 47)
- [3] (Chauhan Jitendra, 2106, p. 5)
- [4]https://www.google.com/search?sxsrf=ALeKk01PKf43TXUBJLh5A_YctQqPH1D4A:1591122446791&source=univ&tbm=isch&q=remote+mouse+application+template&sa=X&ved=2ahUKEwiwqvCB4ePpAhWATRUIHf8mB5MQsAR6BAgLEAE&biw=1366&bih=576.
- [5]<https://stackoverflow.com/questions/47165622/android-studio-ide-error-occured-oncreate-new-activity>.
- [6]<https://www.youtube.com/watch?v=Y6gmmQZsuLE>
- [7]https://www.tutorialspoint.com/android/android_network_connection.htm
- [8]<https://devblogs.microsoft.com/xamarin/building-remote-control-companion-appandroidproject-rome/>
- [9] <https://developer.android.com/training/connect-devices-wirelessly>

