

# **Software Requirements Specification**

for

## **ParkNow**

**Prepared by Daryl, Devlin, Wei Hsuen, Zheng Wei**

**QuadCode**

**12 November 2023**

# Table of Contents

Table of Contents.....	2
1. Introduction.....	4
1.1 Purpose.....	4
1.2 Intended Audience and Reading Suggestions.....	4
1.3 Product Scope.....	4
2. Overall Description.....	5
2.1 Product Perspective.....	5
2.2 Product Functions.....	6
2.3 User Classes and Characteristics.....	8
2.4 Operating Environment.....	8
2.5 Design and Implementation Constraints.....	8
2.6 Assumptions and Dependencies.....	9
3. External Interface Requirements.....	9
3.1 User Interfaces.....	9
4. System Features.....	12
4.1 Functional Requirements .....	12
4.2 Use Case Descriptions.....	13
4.3 Sequence Diagrams.....	26
5. Other Nonfunctional Requirements.....	30
5.1 Performance Requirements.....	30
5.2 Security Requirements.....	31

5.3 Software Quality Attributes.....	31
6. Other Requirements.....	31
7. Testing .....	31
7.1 Black Box Testing .....	32
7.2 White Box Testing .....	34
Appendix A: Glossary/Data Dictionary.....	38

# **1. Introduction**

## **1.1 Purpose**

ParkNow is a platform-independent mobile application that provides Singapore car owners with real-time information about the parking costs and availability of car parks across Singapore. In alignment with the Smart Nation movement, ParkNow utilizes APIs and a range of publicly available data to deliver an innovative, practical, and useful application that will undoubtedly improve the quality of life of all Singapore car users.

## **1.2 Intended Audience and Reading Suggestions**

This document is intended for developers, project managers, marketing staff, testers, and documentation writers. While the app was being developed, developers and documentation writers constantly updated the information here such that future developers can understand and expand on the preexisting code. This documentation was also used by project managers to monitor the status of the app development, marketing staff to find unique features that are advertisable, and testers to test all the different features of the software.

This SRS contains functional and non-functional requirements of our application, a use case diagram with use case descriptions and sequence diagrams for each use case, the class diagram, a dialog map, system architecture, and our testing cases and results. Readers should follow the sequence of the document and read it in its entirety at least once before focusing on the respective sections that interest them.

## **1.3 Product Scope**

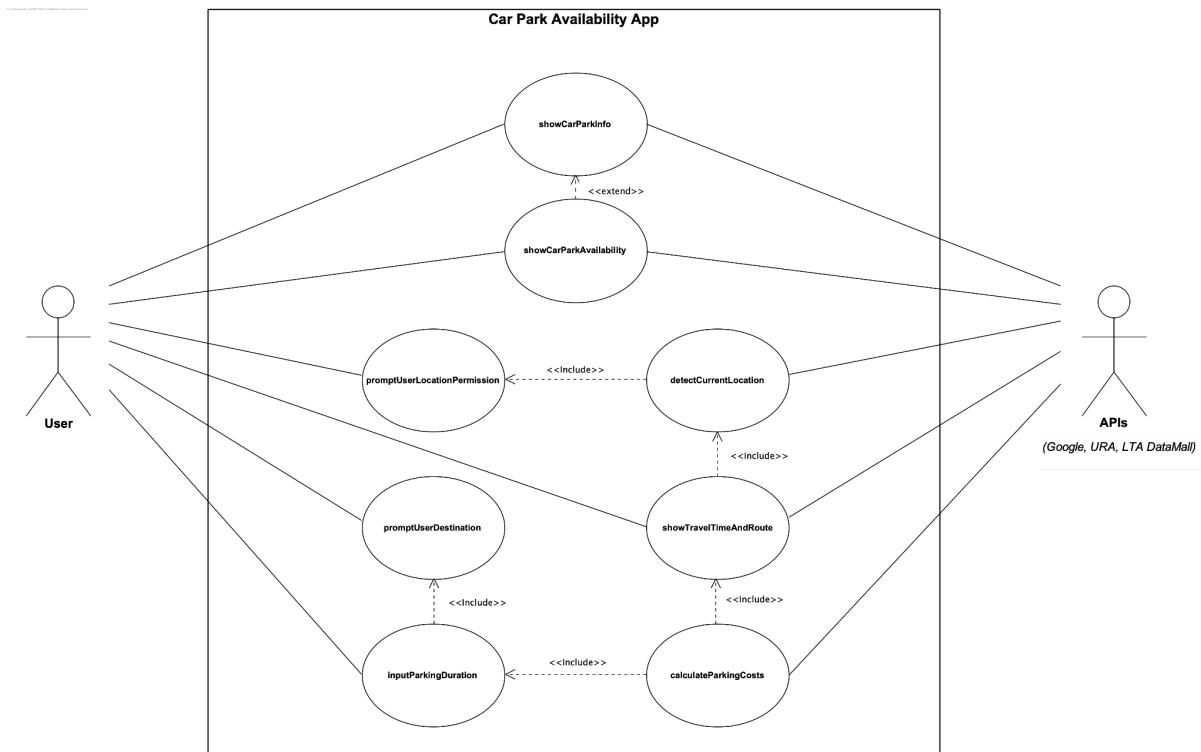
On weekday mornings, it is often difficult to locate parking spots in the Central Business District. At night, it may be difficult to find parking spots in residential areas, particularly if car drivers return home very late at night. Also, different car parks have different parking rates which even change based on the time and day. With ParkNow, car users will be able to plan their trips by knowing which car park has available lots and how much it will cost them to park at a specific car park.

## 2. Overall Description

### 2.1 Product Perspective

ParkNow is a new, self-contained product that fuses both the features of car park availability, a map interface, and a parking cost calculator to allow car users to plan their trips and easily find and navigate to available parking lots in Singapore.

#### 2.1.1 Use Case Diagram

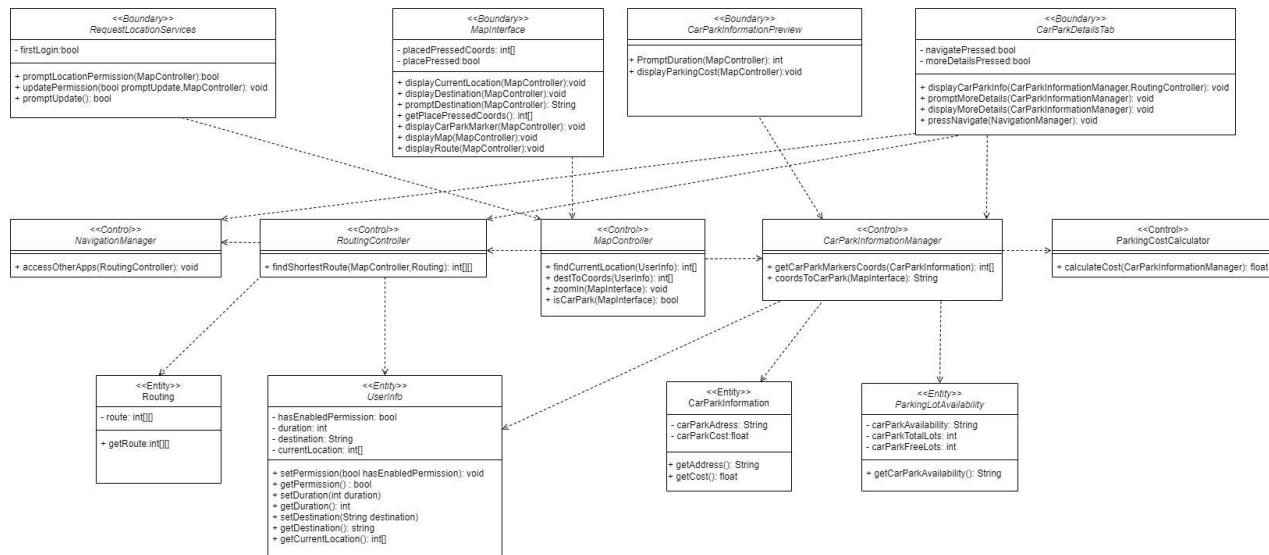


Use Cases	Priority
001:showCarParkAvailability	2
002:showTravelTimeAndRoute	4
003:calculateParkingCosts	5
004:promptUserLocationPermission	2
005:detectCurrentLocation	1
006:promptUserDestination	3

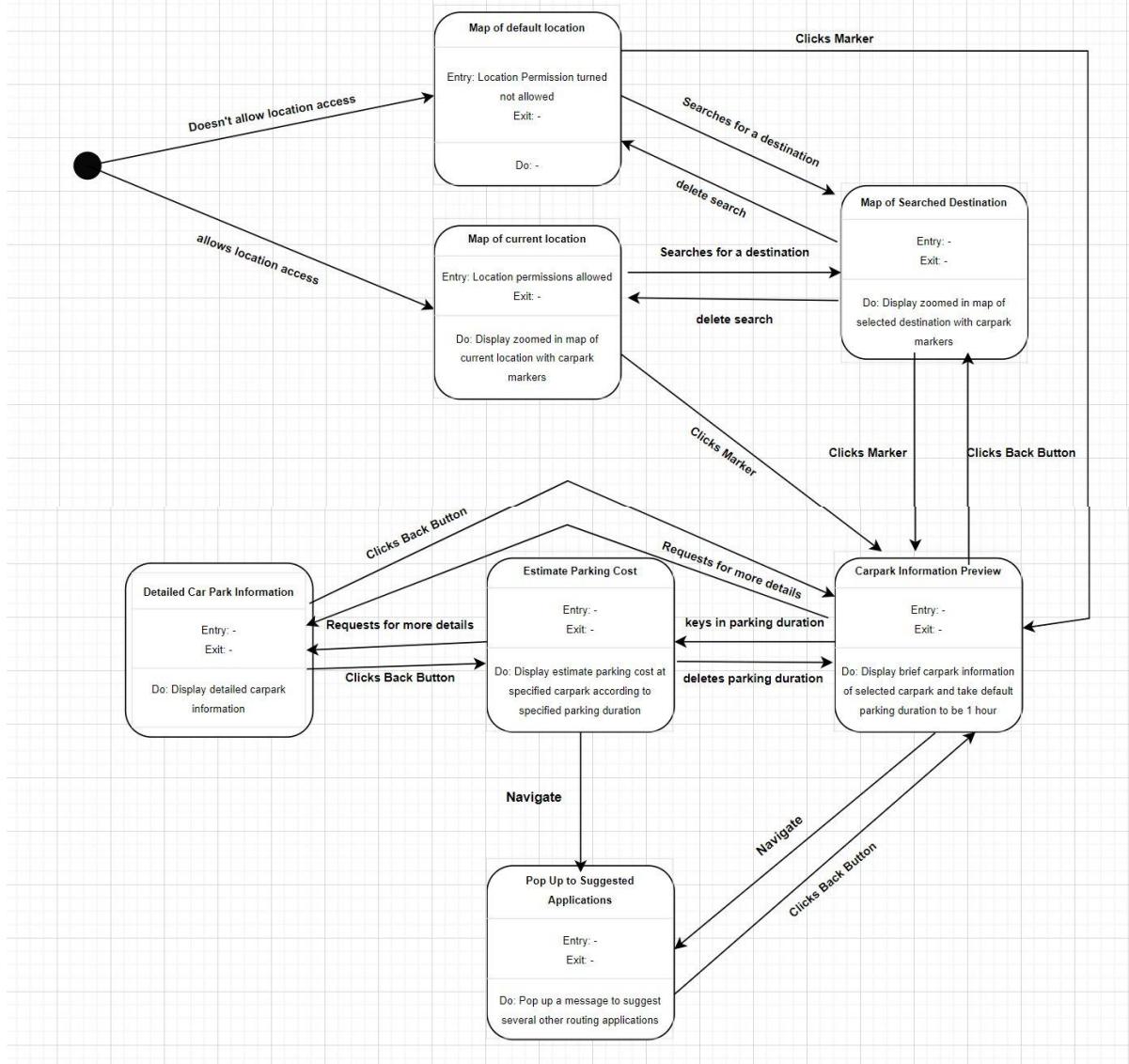
007:showCarParkInfo	1 (Highest Priority)
008:inputParkingDuration	5 (Lowest Priority)

## 2.2 Product Functions

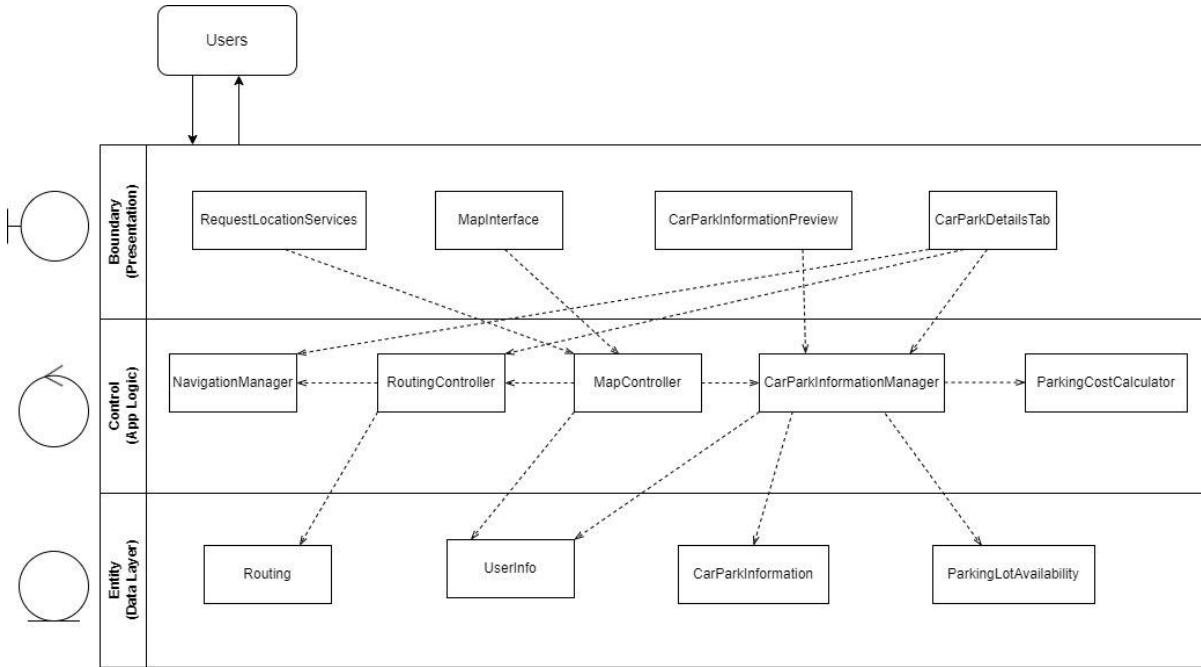
### 2.2.1 Class Diagram



## 2.2.2 Dialog Map



### 2.2.3 System Architecture



## 2.3 User Classes and Characteristics

The majority of ParkNow users are expected to be car owners. ParkNow helps these users find the available parking lots near their destination, while also giving travel time and parking cost estimates along with redirecting them to their favourite navigation app for step-by-step navigation toward their selected carpark. Car owners will use this application as they often do not know if a car park is full until they have arrived, which will usually result in unnecessary delays to their trip.

## 2.4 Operating Environment

ParkNow operates on both IOS (IOS 14 and above) and Android (OS 7 and above ) devices. To get the most out of ParkNow, users are encouraged to have their favourite navigation apps installed (e.g. Google Maps, Apple Maps, Waze, etc).

## 2.5 Design and Implementation Constraints

The software should be developed using proper code naming conventions in Javascript using React Native, with Supabase as the database. The app should be able to run on both Android and IOS. The APIs used are Geolocation, Places, Routes, Maps SDK from Google,

Carpark List, Rates and Types of Lots from URA, and Car Park Availability from LTA Datamall. ZEA, the customer's organisation, will be responsible for maintaining the delivered software

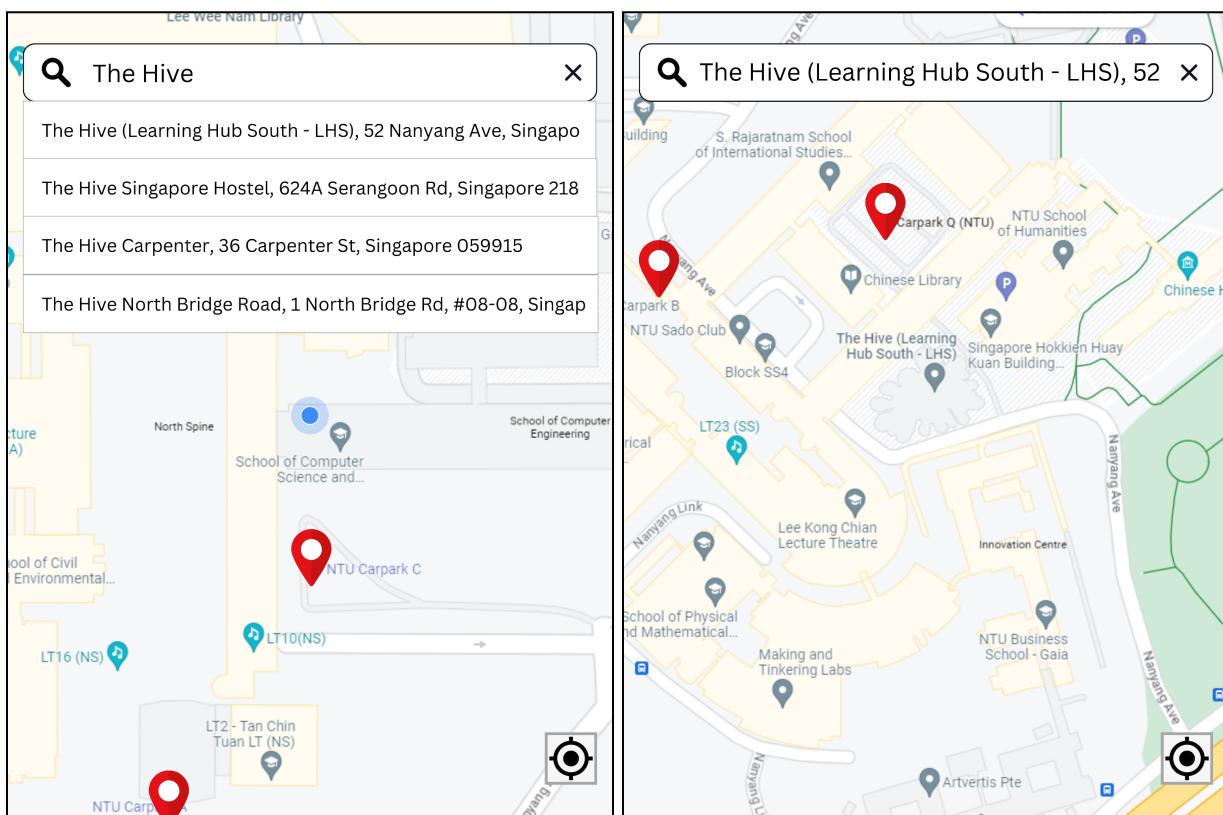
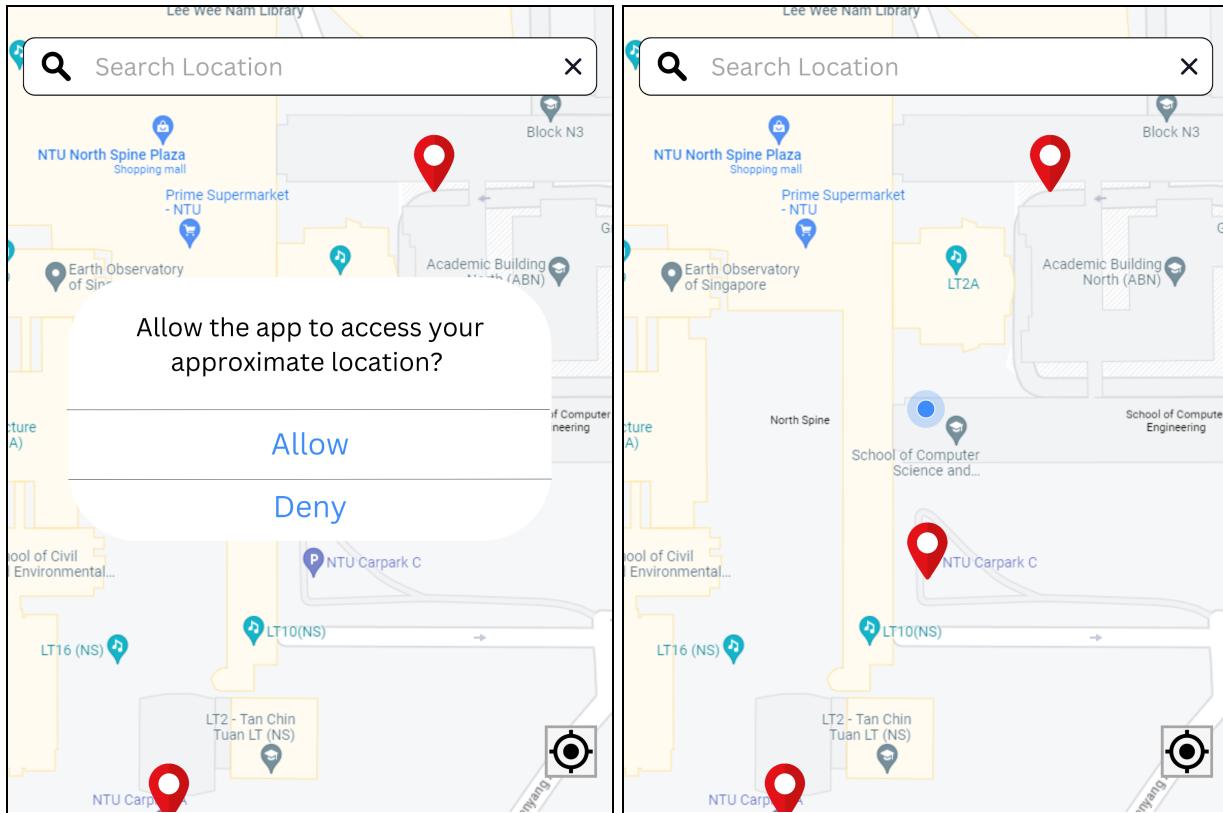
## **2.6 Assumptions and Dependencies**

ParkNow relies on third-party APIs from Google, LTA Datamall, and URA. The application may not work as intended if any one of these services goes down. ParkNow also assumes that the user has a good internet connection.

# **3. External Interface Requirements**

## **3.1 User Interfaces**

Below are some UI mockups for ParkNow. ParkNow is designed to be simple and elegant, allowing car owners to easily and conveniently find car parks to park at.



The image shows two side-by-side screenshots of a mobile application interface. Both screenshots feature a map at the top with various locations labeled: North Spine Plaza Shopping mall, Block N3, School of Materials Science and Engineering, North Spine School of Computer Science and..., Student Services Centre (SSC), TCT LT [Admin Bldg], and Nanyang Auditorium. A red location pin marks 'NTU Carpark A' on the map.

**Screenshot 1 (Left):**

- Address:** 50 Nanyang Ave, Block N3.1, Singapore 639798
- Estimated Driving Time:** 21mins
- Parking Time:** 30mins (dropdown menu)
- Estimated Parking Cost:** \$0.50
- Buttons:** A green 'Navigate' button and three vertical dots on the right.

**Screenshot 2 (Right):**

- Address:** 50 Nanyang Ave, Block N3.1, Singapore 639798
- Open with:** Icons for Google Maps (G) and Waze (blue smiley face), followed by three vertical dots.

**NTU Carpark A** Bookmark

**Address:**  
50 Nanyang Ave, Block N3.1, Singapore 639798

**Available Lots:**  
49/51

**Car Park Rates:**

Mon-Fri:  
0800-1800hrs:  
\$0.033/min (No cap)

Mon-Fri:  
1800-0800hrs &  
Sat, Sun & Pub. Holidays:  
Free

Back ?

# **4. System Features**

## **4.1 Functional Requirements**

### **4.1.1 Map Services**

1. The system shall provide a map display feature that allows user interaction for navigation with the following features:
  - a. Pan - The user should be able to move the map horizontally and vertically by dragging it through touch gestures on a touchscreen.
  - b. Zoom In/Out: The user should have the ability to zoom in and out on the displayed map using standard controls such as pinch-to-zoom gestures on a touchscreen.
2. Users are able to search for places of interest on the map with text-based queries

### **4.1.2 Car Park Information**

1. The system displays all available car parks on the map
2. The system displays the number of available car park lots in the car park selected by the user
3. Car parks must be clearly marked by red markers on the map

### **4.1.3 Location Services**

1. The system needs to utilise geolocation services to pinpoint the user's current location

### **4.1.4 Routing Services**

1. The system displays the route from the current location to the selected car park.
2. The system redirects to a preferred step-by-step route navigation app of the user's choice to the selected car park.
3. The system displays the time duration required to travel from the current location to the selected car park
4. Real-time traffic conditions are factored into calculations for estimated time of arrival.

### **4.1.5 Estimated Parking Cost Calculation**

1. Calculate the estimated cost of parking based on parking duration inputted by the user
2. Based on the user's input duration, the system must compute the estimated cost of parking

- a. The cost calculation must take into account the car park's pricing structure.
- b. The cost calculation must take into account the time taken for the User to travel to the specific car park

## 4.2 Use Case Descriptions

Use Case ID:	001		
Use Case Name:	showCarParkAvailability		
Created By:	Zheng Wei	Last Updated By:	Zheng Wei
Date Created:	31/8/23	Date Last Updated:	10/9/23

Actor:	User, APIs
Description:	Using the car park selection of the user, the app displays the car park lot availability for that car park alongside the address and pricing structure.
Preconditions:	User selects a car park from showCarparkInfo
Postconditions:	The app shows the number of available car park lots for that car park
Priority:	2
Frequency of Use:	One-off

Flow of Events:	<ol style="list-style-type: none"><li>1. User presses an icon for more details and the API retrieves the car park lot availability data and the car park pricing structure.</li><li>2. The car park lot availability is displayed along with the car park address and pricing structure.</li></ol>
Alternative Flows:	<ol style="list-style-type: none"><li>1.1 If the user selects another car park, step 1 of event flow is repeated.</li></ol>
Exceptions:	<ol style="list-style-type: none"><li>1. API Fails to retrieve data<ol style="list-style-type: none"><li>1.1 An error message is displayed to inform the User that car park availability services are unavailable</li></ol></li></ol>
Includes:	-
Extends:	-
Special Requirements:	-
Assumptions:	<ol style="list-style-type: none"><li>1. Network is available</li></ol>
Notes and Issues:	-

100% Polyester

Use Case ID:	002		
Use Case Name:	showTravelTimeAndRoute		
Created By:	Zheng Wei	Last Updated By:	Zheng Wei

Date Created:	31/8/23	Date Last Updated:	10/9/23
---------------	---------	--------------------	---------

Actor:	User, APIs
Description:	User selects a car park and the app displays the route from current location to destination and also the estimated travel time
Preconditions:	User selects a car park from showCarparkInfo
Postconditions:	The app shows the route from current location to destination and the estimated travel time.
Priority:	4
Frequency of Use:	Route shown in constant use while estimated travel time is displayed once
Flow of Events:	<p>1. Use case 005, detectCurrentLocation is called to determine the user's current location</p> <p>2. The app uses google maps routing API to show the route from current location to the selected car park and displays the estimated travel time</p> <p>3. After pressing the 'Navigate' button, the app redirects the user to other navigation apps which will provide a step by step navigation guide to the destination.</p>
Alternative Flows:	<p>2.1 The user presses on another marker the map instead of pressing the "Navigate" button</p> <p>2.2 Return to Step 1 of event flow</p>

Exceptions:	1. API Fails to retrieve data  1.1 An error message is displayed to inform the User that time and routing services are unavailable
Includes:	detectCurrentLocation
Extends:	-
Special Requirements:	-
Assumptions:	1. User's phone can support other navigation apps  2. User has downloaded the other navigation apps  3. Network is available
Notes and Issues:	-

Use Case ID:	003		
Use Case Name:	calculateParkingCosts		
Created By:	Zheng Wei	Last Updated By:	Zheng Wei
Date Created:	31/8/23	Date Last Updated:	10/9/23

Actor:	APIs
Description:	After selecting a car park near his destination, the user selects his parking duration. Using the phone's current time, the estimated travel time and car park pricing structure of nearby car parks, the cost of parking is determined and displayed.
Preconditions:	User selects a car park from showCarparkInfo
Postconditions:	App calculates estimated cost of parking based on parking duration and car park pricing structure
Priority:	5
Frequency of Use:	Selection based
Flow of Events:	<ol style="list-style-type: none"> <li>1. Use Case 002, showTravelTimeAndRoute, is triggered to retrieve the travel time from the user</li> <li>2. Use Case 008, inputParkingDuration is triggered to retrieve the parking duration from the user.</li> <li>3. The car park pricing structure for the selected car park is retrieved from a database</li> <li>4. The parking duration, estimated travel time and car park pricing structure are used to calculate the cost of parking.</li> <li>5. The estimated cost of parking is displayed to the user.</li> </ol>
Alternative Flows:	-
Exceptions:	<ol style="list-style-type: none"> <li>1. API fails to retrieve data             <ol style="list-style-type: none"> <li>1.1 An error message is displayed to inform the User that calculate parking costs services are unavailable</li> </ol> </li> </ol>

Includes:	inputParkingDuration, showTravelTimeAndRoute
Extends:	-
Special Requirements:	1. Time of Phone is accurately set and in correct timezone of Singapore Time (GMT +8)
Assumptions:	1. Network is available
Notes and Issues:	-

//

Use Case ID:	004		
Use Case Name:	promptUserLocationPermission		
Created By:	Zheng Wei	Last Updated By:	Zheng Wei
Date Created:	31/8/23	Date Last Updated:	10/9/23

Actor:	User
Description:	For first time users, access to location services needs to be granted by users to access parking costs estimation, travel time and optimal travel route features.
Preconditions:	The system requests for the user's current location

Postconditions:	Location permission is authorised
Priority:	2
Frequency of Use:	One-off
Flow of Events:	<p>1. The system checks whether location permission is authorised</p> <p>2. The user is prompted to grant access to location services (Allow/Deny)</p>
Alternative Flows:	<p>2.1 User does not grant permission to access location services.</p> <p>2.2 The app continues to run without features that use location services. Only Use Case 001 (showCarParkAvailability) and 007 (showCarparkInfo) can be used.</p>
Exceptions:	-
Includes:	-
Extends:	-
Special Requirements:	-
Assumptions:	<p>1. Network is available</p> <p>2. The phone supports geolocation services</p>
Notes and Issues:	-

100% Polyester

Use Case ID:	005		
Use Case Name:	detectCurrentLocation		
Created By:	Zheng Wei	Last Updated By:	Zheng Wei
Date Created:	31/8/23	Date Last Updated:	10/9/23

Actor:	APIs
Description:	Displays the user's current location
Preconditions:	The map is currently displayed on the app
Postconditions:	The user's current location is displayed by a blue dot on the map
Priority:	1
Frequency of Use:	Constant use
Flow of Events:	<ol style="list-style-type: none"> <li>1. The system checks if location services are enabled on the phone</li> <li>2. The user's current location is retrieved</li> <li>3. The user's current location is displayed on the map</li> </ol>
Alternative Flows:	1.1 If location services are not enabled, go to use case 004, promptUserLocationPermission

	1.2 Return to step 2 of event flow
Exceptions:	<ul style="list-style-type: none"><li>1. API Fails to retrieve data<ul style="list-style-type: none"><li>1.1 An error message is displayed to inform the User that detect current location services are unavailable</li></ul></li></ul>
Includes:	promptUserLocationPermission
Extends:	-
Special Requirements:	-
Assumptions:	<ul style="list-style-type: none"><li>1. Network is available</li></ul>
Notes and Issues:	-

100% Polyester

Use Case ID:	006		
Use Case Name:	promptUserDestination		
Created By:	Zheng Wei	Last Updated By:	Devlin
Date Created:	31/8/23	Date Last Updated:	17/9/23

Actor:	User
--------	------

Description:	The user can enter his destination in a search bar and continue the execution of User Case ID 002
Preconditions:	User has pressed the search bar
Postconditions:	The map pans to show the selected destination with its surrounding areas
Priority:	3
Frequency of Use:	Use-based
Flow of Events:	<p>1. After the user presses the search bar, a keyboard is presented to the user</p> <p>2. The user keys in his destination on the search box</p> <p>3. The user selects the preferred option from the list of places of interests displayed.</p> <p>4. The map pans to show the selected destination such that nearby car parks (indicated clearly by red markers) are shown</p> <p>5. Destination (selected car park) is returned</p>
Alternative Flows:	<p>1.1.The user chooses to press 'X' instead of entering the destination</p> <p>1.2. Return to step 1 of event flow</p>
Exceptions:	<p>1. API Fails to retrieve data</p> <p>1.1 An error message is displayed to inform the User that search location services are unavailable</p>
Includes:	-

Extends:	-
Special Requirements:	-
Assumptions:	1. Network is available
Notes and Issues:	-

Use Case ID:	007		
Use Case Name:	showCarParkInfo		
Created By:	Zheng Wei	Last Updated By:	Devlin
Date Created:	31/8/23	Date Last Updated:	17/9/23

Actor:	User, APIs
Description:	The app will display the car parks on the Singapore map with data retrieved from a database
Preconditions:	The map is currently displayed on the app
Postconditions:	Car parks are clearly marked on the map by red markers

Priority:	1
Frequency of Use:	Constant
Flow of Events:	<p>1. When the user opens the map, car park data is retrieved from an API.</p> <p>2. Car Parks are clearly marked on the map with red markers at specific coordinates.</p> <p>3. When a user clicks on a marker, information about the car park is displayed. Go to use case 001,showCarParkAvailability.</p>
Alternative Flows:	-
Exceptions:	<p>1.1 Unable to retrieve data from car park Database</p> <p>1.2 An error message is displayed to inform the User that car park information services are unavailable</p>
Includes:	-
Extends:	showCarParkAvailability
Special Requirements:	-
Assumptions:	<p>1. Network is available</p>
Notes and Issues:	-

Use Case ID:	008
--------------	-----

Use Case Name:	inputParkingDuration		
Created By:	Zheng Wei	Last Updated By:	Zheng Wei
Date Created:	31/8/23	Date Last Updated:	10/9/23

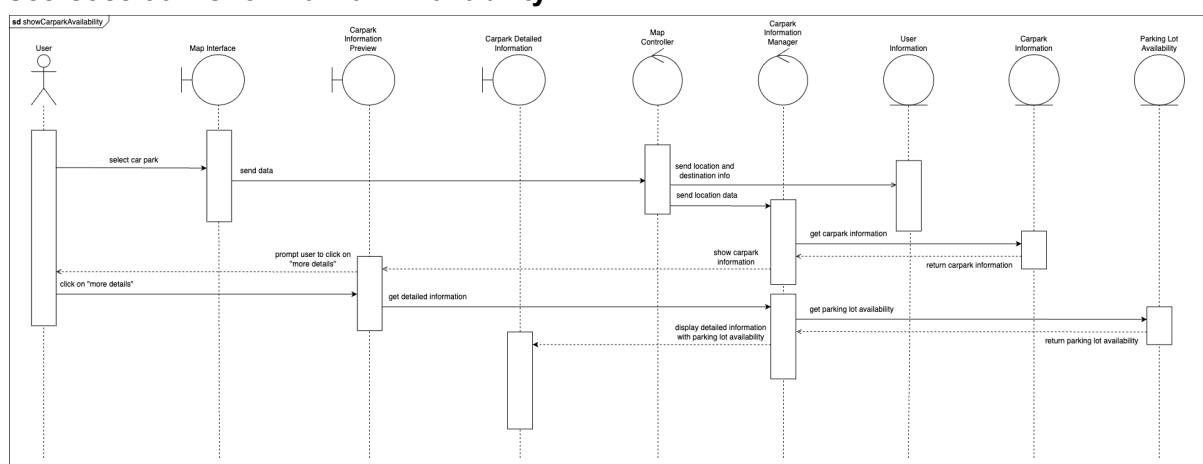
Actor:	User
Description:	After choosing a specific car park, users can specify their parking duration using a drop bar for calculating parking costs.
Preconditions:	The user has selected a car park on the map by pressing on one of the red markers.
Postconditions:	The system returns the parking duration input by the user
Priority:	5
Frequency of Use:	Use-based
Flow of Events:	<ol style="list-style-type: none"> <li>1. A drop bar is displayed for the user to input his estimated parking duration.</li> <li>2. The user presses on the drop arrow and selects his estimated parking duration.</li> <li>3. Use case 006, promptUserDestination is called to retrieve information about the user's selected carpark.</li> <li>4. The estimated parking duration is stored by the system to be used in other use cases.</li> </ol>

Alternative Flows:	2.1 If the user does not select any parking duration, the parking duration is set to 1 hour.  2.2 Flow continues to step 3 with the parking duration set at 1 hour.
Exceptions:	-
Includes:	promptUserDestination
Extends:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	-

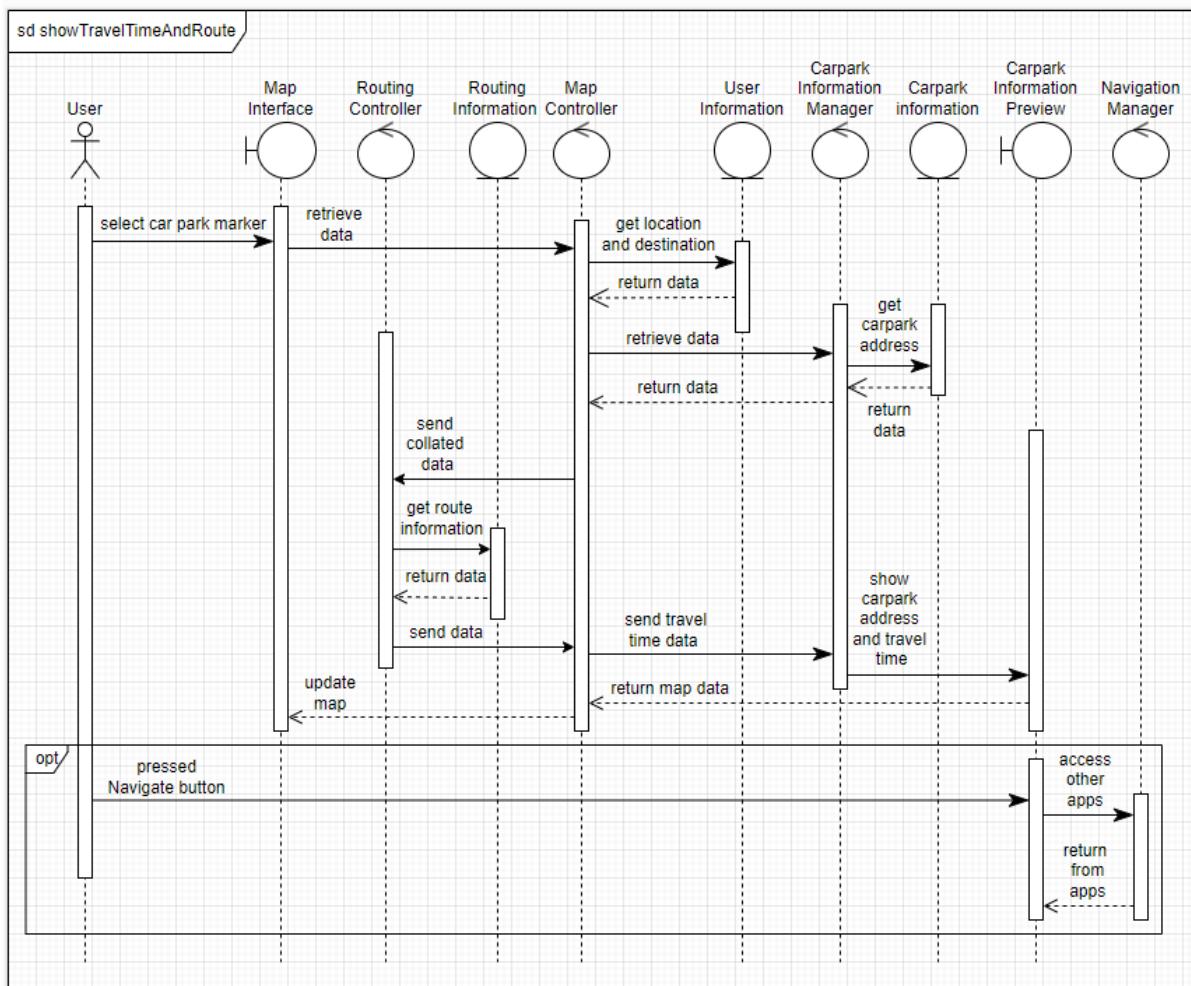


## 4.3 Sequence Diagrams

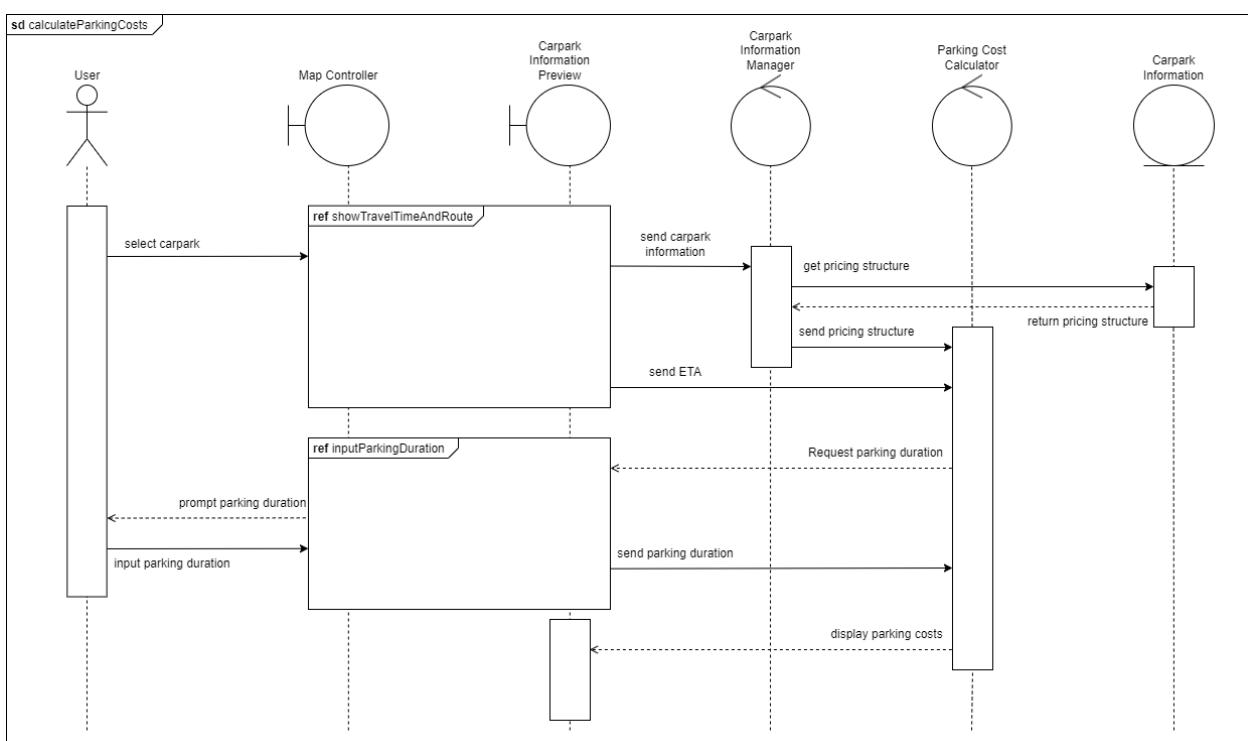
## Use Case 001: showCarParkAvailability



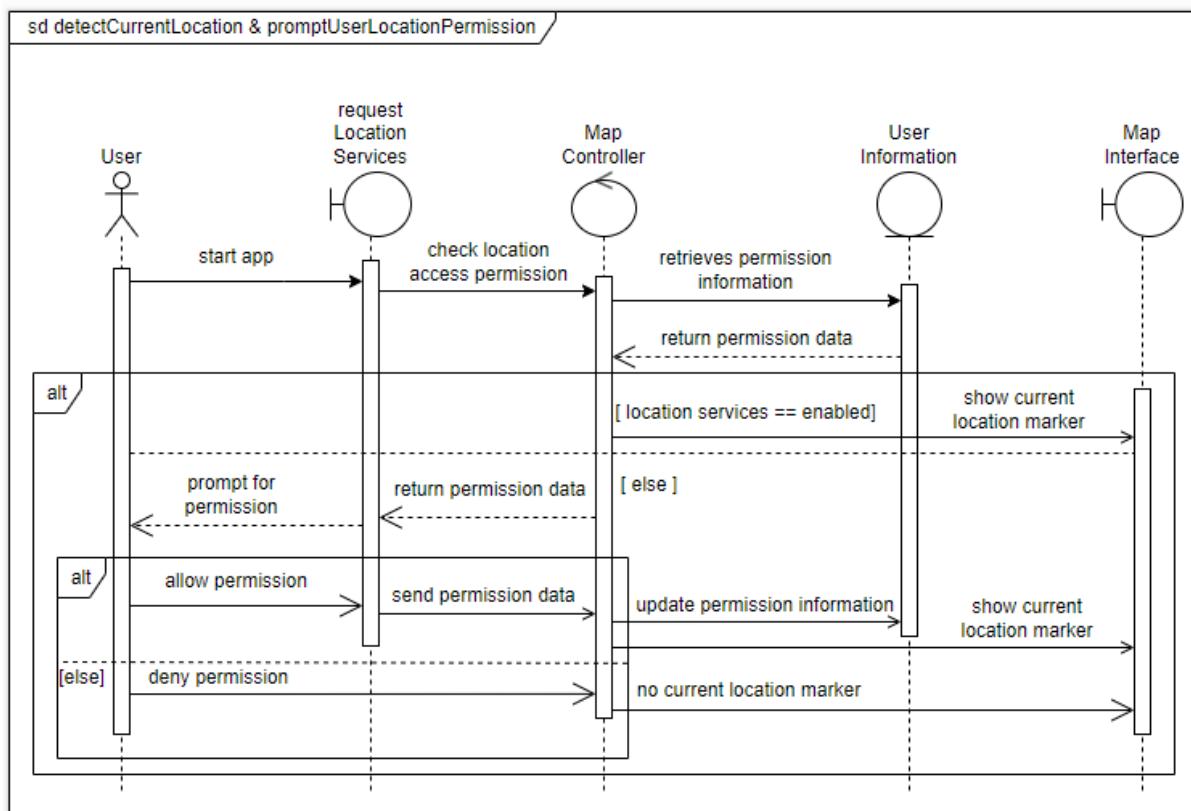
## Use Case 002: showTravelTimeAndRoute



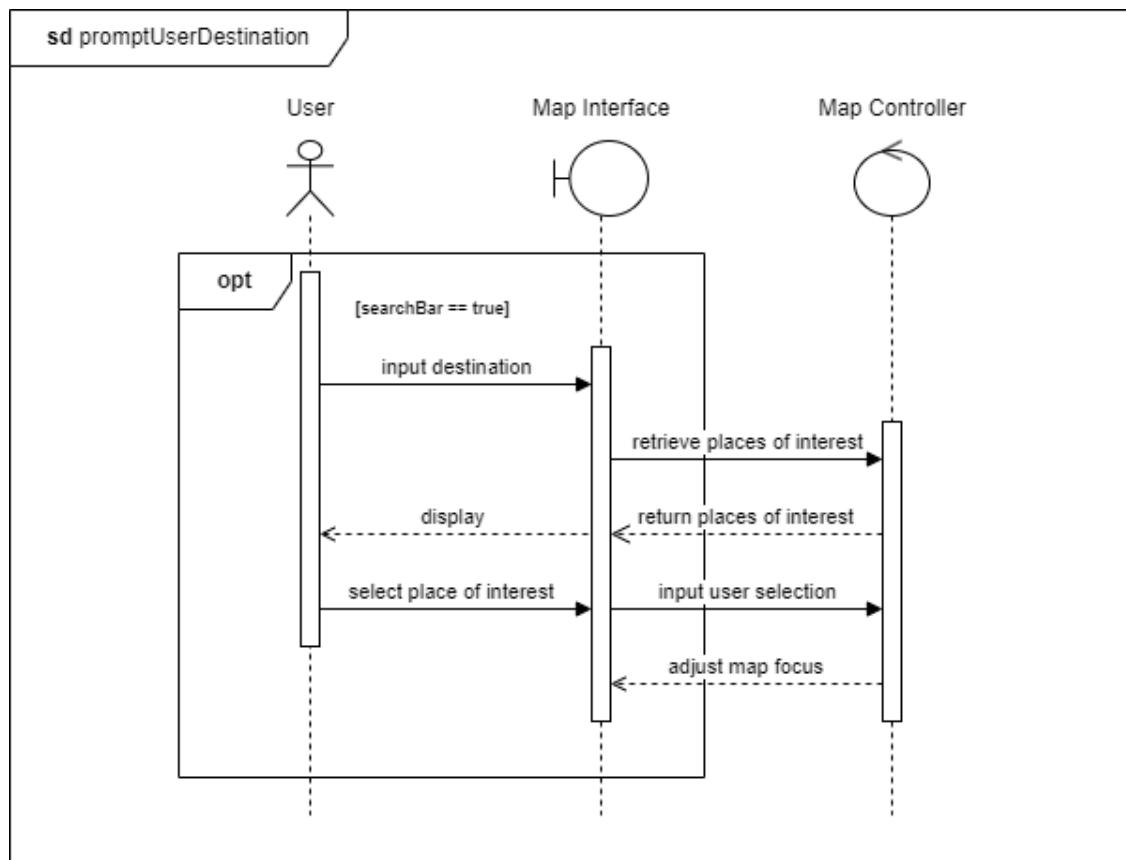
## Use Case 003: calculateParkingCosts



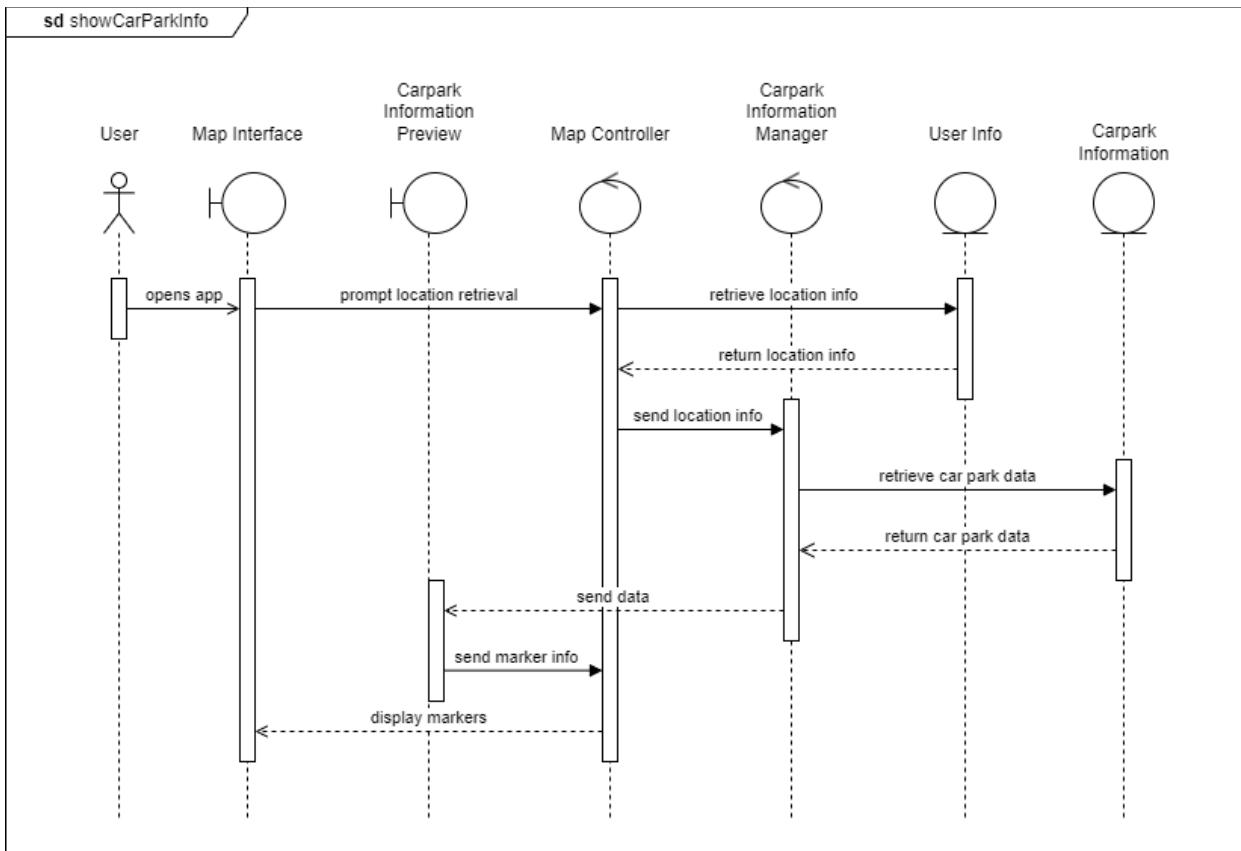
## Use Case 004 & 005: promptUserLocationPermission & detectCurrentLocation



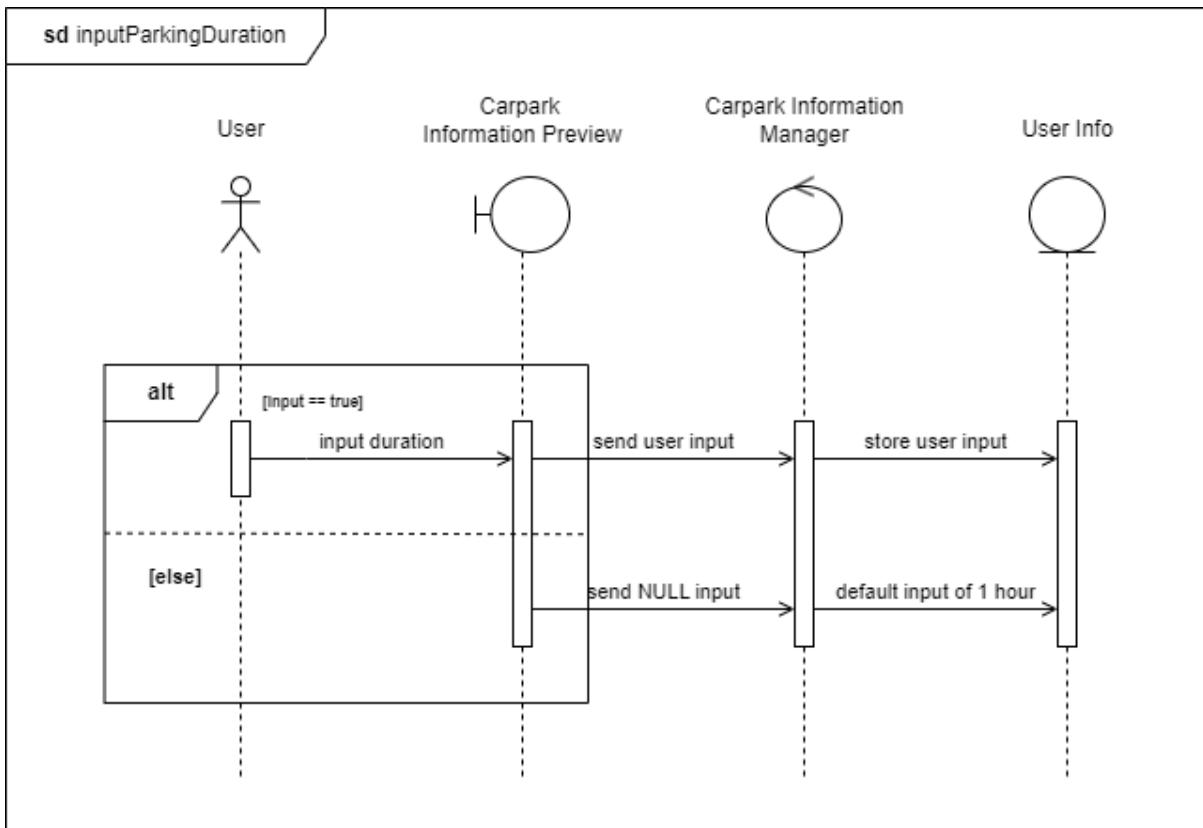
## Use Case 006: promptUserDestination



### Use Case 007: showCarParkInfo



### Use Case 008: inputParkingDuration



# **5. Other Nonfunctional Requirements**

## **5.1 Performance Requirements**

### **5.1.1 Maintainability and Platform**

The system must run on the IOS (IOS 14 and above) and Android (OS 7 and above) mobile operating system

### **5.1.2 Performance**

- The system should load the interactive map within 5 seconds after user initiation.
- The car parks should be displayed on the interactive map within 5 seconds after user initiation.
- The system should not take more than 2 seconds to display the route, even during peak usage.
- Car park availability should be fetched and integrated into the system's calculations every 2 minutes.
- The location search functionality should present relevant results within 2 seconds of the user's query.
- The estimated parking cost calculation should not deviate by more than 10% from the actual cost for at least 95% of cases.
- The system should be able to handle a concurrent user load of at least 1000 users without significant performance degradation.

## **5.2 Security Requirements**

### **5.2.1 Security**

- The database must not store any personal information
- The system must not track the location of users without consent from the user

## **5.3 Software Quality Attributes**

### **5.3.1 Usability**

- Texts must be displayed in the local language according to the user's locale

### **5.3.2 Accuracy of Geolocation**

- The system's geolocation accuracy should be within a radius of 50 metres for 95% of the user's requests.

- The geolocation data should be updated at least every 10 seconds for real-time user tracking.

## 6. Other Requirements

### 6.1 Database Requirements

- The database must be large enough to store the information of at least 2000 car parks
- The database must be easily replaceable with any commercial product supporting standard SQL queries.

## 7. Testing

### 7.1 Black Box Testing

Black box testing was conducted on our car park information manager control class. It uses the input parking duration, estimated time of arrival, and pricing structure of a car park to calculate an estimated parking cost. We identified a valid equivalence class from 0h0mins to 23h45mins, with two invalid equivalence classes: below 0h0mins and above 23h45mins respectively.

Time/Day	Parking Duration	Carpark	Expected Output	Actual Output
Monday 1pm	No Input (default 1h0mins)	Blk 181A Jelebu Road	Estimated Parking Cost: \$1.20	Estimated Parking Cost: \$1.20
Monday 1pm	0h0mins	Blk 181A Jelebu Road	Estimated Parking Cost: \$0.00	Estimated Parking Cost: \$0.00
Monday 1pm	23h45mins	Blk 181A Jelebu Road	Estimated Parking Cost: \$28.50	Estimated Parking Cost: \$28.50
Monday 1pm	-1h0mins	Blk 181A Jelebu Road	Parking Duration selected is invalid. Select another Parking Duration	Parking Duration selected is invalid. Select another Parking Duration
Monday 1pm	25h0mins	Blk 181A Jelebu Road	Parking Duration selected is	Parking Duration selected is

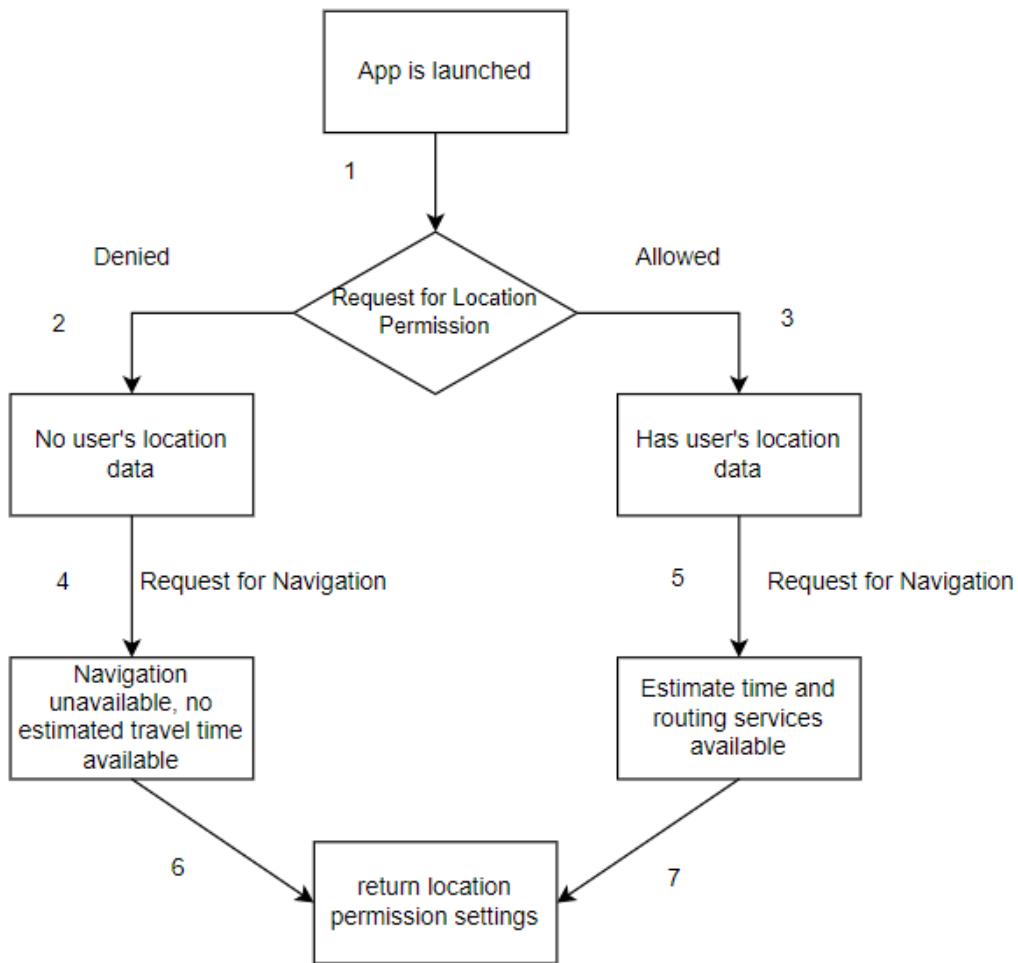
			invalid. Select another Parking Duration	invalid. Select another Parking Duration
Sunday 10am	No Input (default 1h0mins)	Blk 181A Jelebu Road	Estimated Parking Cost: \$0.00	Estimated Parking Cost: \$0.00
Sunday 10am	0h0mins	Blk 181A Jelebu Road	Estimated Parking Cost: \$0.00	Estimated Parking Cost: \$0.00
Sunday 10am	23h45mins	Blk 181A Jelebu Road	Estimated Parking Cost: \$0.00	Estimated ParkingCost: \$0.00
Sunday 10am	-1h0mins	Blk 181A Jelebu Road	Parking Duration selected is invalid. Select another Parking Duration	Parking Duration selected is invalid. Select another Parking Duration
Sunday 10am	25h0mins	Blk 181A Jelebu Road	Parking Duration selected is invalid. Select another Parking Duration	Parking Duration selected is invalid. Select another Parking Duration

Time/Day	Parking Duration	Carpark	Expected Output	Actual Output
Monday 1pm	No Input (default 1h0mins)	Blk 163A Gangsa Road	Estimated Parking Cost: \$1.50	Estimated Parking Cost: \$1.50
Monday 1pm	0h0mins	Blk 163A Gangsa Road	Estimated Parking Cost: \$0.00	Estimated Parking Cost: \$0.00
Monday 1pm	23h45mins	Blk 163A Gangsa Road	Estimated Parking Cost: \$35.63	Estimated Parking Cost: \$35.63
Monday 1pm	-1h0mins	Blk 163A Gangsa Road	Parking Duration selected is invalid. Select another Parking Duration	Parking Duration selected is invalid. Select another Parking Duration
Monday 1pm	25h0mins	Blk 163A Gangsa Road	Parking Duration selected is	Parking Duration selected is

			invalid. Select another Parking Duration	invalid. Select another Parking Duration
Sunday 10am	No Input (default 1h0mins)	Blk 163A Gangsa Road	Estimated Parking Cost: \$0.00	Estimated Parking Cost: \$0.00
Sunday 10am	0h0mins	Blk 163A Gangsa Road	Estimated Parking Cost: \$0.00	Estimated Parking Cost: \$0.00
Sunday 10am	23h45mins	Blk 163A Gangsa Road	Estimated Parking Cost: \$0.00	Estimated Parking Cost: \$0.00
Sunday 10am	-1h0mins	Blk 163A Gangsa Road	Parking Duration selected is invalid. Select another Parking Duration	Parking Duration selected is invalid. Select another Parking Duration
Sunday 10am	25h0mins	Blk 163A Gangsa Road	Parking Duration selected is invalid. Select another Parking Duration	Parking Duration selected is invalid. Select another Parking Duration

## 7.2 White Box Testing

White box testing was done on methods “promptLocationPermission” and “calculateParkingCost”.



For “promptLocationPermission”, the Cyclomatic Complexity value of its control flow diagram is 2.

Basis Paths:

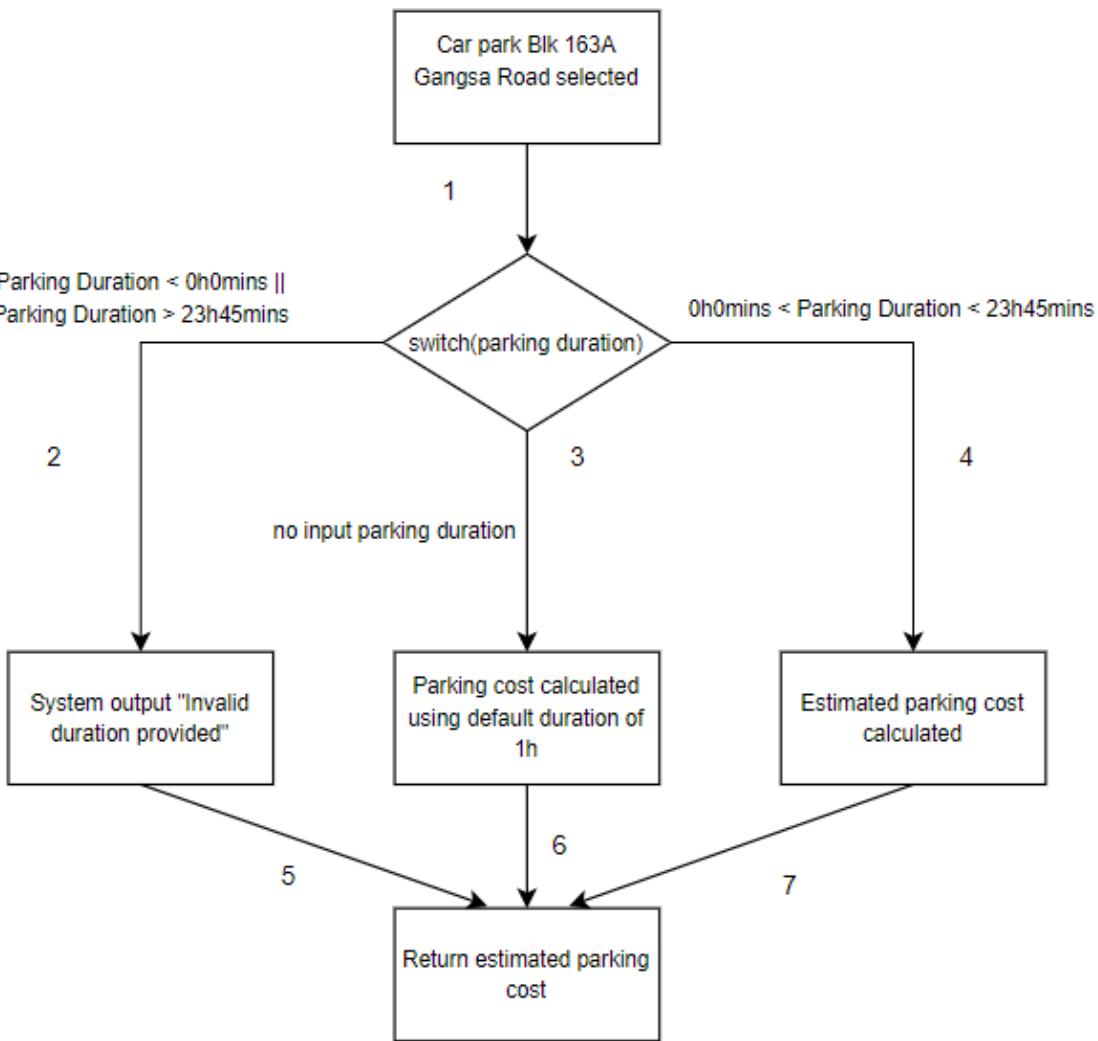
- I. 1, 3, 5, 7
- II. 1, 2, 4, 6

Test Cases:

- I. Allowed, Request for Navigation
- II. Denied, Request for Navigation

Real Execution Path:

- I. 1, 3, 5, 7
- II. 1, 2, 4, 6



For “calculateParkingCost”, the Cyclomatic Complexity value of its control flow diagram is 3.

Basis Paths:

- I. 1, 2, 5
- II. 1, 3, 6
- III. 1, 4, 7

Test Cases:

- I. Parking duration = -1h0mins
- II. Parking duration = null
- III. Parking duration = 2h0mins

Real Execution Path:

- I. "Invalid duration provided", return estimated parking cost
- II. Parking cost calculated with default duration of 1h, return estimated parking cost
- III. Estimated parking cost calculated, return estimated parking cost

## 8. Appendix

### Appendix A: Glossary/Data Dictionary

Terms	Description
User	Car owners (Car Park Availability App users)
Device	The app is intended for use on both Android and iOS mobile phones
Current location	When the app is launched, Geolocation will be used to determine the user's current position. This will then be displayed on the map for the user to see.
Destination	The user will be prompted to input their desired destination in the search bar.
Available car parks	The app will display available car parks that are within an X metre radius of the user's destination. The user will then be prompted to select one of these car parks.
Duration of parking	The app will prompt the user to enter the duration for which the user intends to stay at the selected parking lot.
Optimal route	Taking into account factors such as traffic congestion, incidents, weather, and speed limit, the app displays the fastest route that the user can take to arrive at the selected car park.
Travel time	The estimated time it takes for the user to arrive at their destination via the optimal route is calculated and displayed.
Cost of parking	The Cost of parking is calculated based on the rates of the selected car park (provided by a URA API) and the Duration of parking specified by the user.
Available lots	The number of available lots at the selected car park.
Landmarks	Important landmarks that the user passes while travelling from

their current location to their destination via the optimal route.