Requirements Specification

# Project Mission Statement

Finding a free parking spot in a city is one of the most frequent traffic frustrations, and that is what this proposed idea is intended to solve. with the increasing number of cars and Singapore's constrained space. The parking capacity remains limited, resulting in challenges in finding empty spaces. Our application will be designed to help drivers be able to locate empty parking spots around the destination beforehand, which will prevent having a wasted trip or having to spend more time finding a parking spot somewhere else.

**Objectives**

* To provide an easy-to-use application where user can find whether there is a available parking spot in nearby location
* Our system will be able to show the parking fare based off of user’s input details, and it will be able to provide the best and optimal available parking spot
* Users will be able to view the parking spots situation of all available car parks located in Singapore
* Provide an Android phone application ( prototype )

**Target Users**

* Singaporean Drivers - Many people drive in order to get to their destination in the fastest time possible, and being able to find a parking spot just as fast will be of great help

## Functional and Non-Functional Requirements

### Functional Graphical user interface, application Description automatically generated

1. The System shall display the Car Park information in a fixed format
   1. The System shall display whether the Car Park is Public or Private Car Park
   2. The System shall display Address
   3. The System shall display Car Park Type
   4. The System shall display Type of Parking System
   5. The System shall display Short Term Parking
   6. The System shall display Free Parking
   7. The System shall display Night Parking
   8. The System shall display Car Park decks
   9. The System shall display Gantry Height
   10. The System shall display Car Park Basement
2. Users shall be able to query the System.
   1. Users must query the System with a destination location or a car park No or through panning the map.
      1. The results for car park No. queries must only report about the queried car park
      2. The results for destination location queries must report the top 5 car parks
   2. Users can choose to include parking duration in the query.
      * 1. The results for queries containing parking duration must include parking fare calculation.
   3. The System query results will have different formats
      1. If only the destination location is provided, the System must return the top 5 car parks
         1. Retrieve car parks in a certain distance and filter afterwards
         2. The System must recommend the car parks based on distance from the destination
         3. The System must recommend the car parks based on parking lot availability
         4. The System must recommend the car parks based on parking fare
         5. If parking duration is provided, the System must calculate the total cost of parking
      2. If only car park No. is provided, the System must return information about the selected car park
         1. The System must be able to display car park No.
         2. The System must be able to display the car park address
         3. The System must be able to display car park parking rates
         4. The System must be able to display car park lot availability
         5. The System must show the last update time if possible
3. The System must be able to display all available car parks in Singapore
   1. The System must be able to display the car parks in a list format
      1. The System must be able to display car park No.
      2. The System must be able to display the car park address
      3. The System must be able to display car park parking rates
      4. The System must be able to display car park lot availability
      5. The System must show the last update time if possible
   2. The System must be able to display the map of Singapore with all car parks pinned (Use Distance to determine pan and pins visibility)
      1. Users will be able to select a car park to view the details

### Non-Functional

**Usability:**

* The System shall display text with font size greater than 14

**Reliability**:

* The System/server must be able to handle at least 5 concurrent requests from different users
* The System shall have a 95% uptime
* The System shall be accurate in locating the different car parks 99% of the time

**Performance** :

* Parking lot availability database shall be updated every minute
* The System must be able respond to a query from a user within 5 seconds
* System start-up should not take longer than 5 seconds

**Security**:

* The System shall not store any personal identifiable data from the users.

**Maintainability** :

* The mean time to recover the System following a System failure must not be longer than 15 minutes

**Scalability** :

* The System must be scalable enough to support 10,000 users’ request concurrently while maintaining response time within 5 seconds

**Supportability**:

* Current System will only be able to run on Android OS
* With plans to expand compatibility to iOS

## Data Dictionary

| **Term** | **Definition** |
| --- | --- |
| Car Park | An area dedicated for vehicles to be left temporarily |
| Parking Coupon | A form of payment for the use of coupon car parks. Only required if there is no valid season parking. Available in hourly, half-hourly and per night |
| Parking Rates | Rates of car parks that may differ based on day and time. Usually split into   * Weekdays before 5/6pm * Weekdays after 5/6pm * Saturday * Sundays/ Public Holidays |
| Query | A form of request for the System to execute functions that it provides |
| Uptime | Time whereby the System is in operation and functional versus time whereby the System is unresponsive and not operational |

## Use Case Model

### Use Case Diagram

Diagram

Description automatically generated

### Use Case Description

| Use Case ID: | 1 | | |
| --- | --- | --- | --- |
| Use Case Name: | Search Car Park | | |
| Created By: | Ong Jun Heng | Last Updated By: | Samuel Ong Jing Siang |
| Date Created: | 26/08/2022 | Date Last Updated: | 26/08/2022 |

| Actor: | User |
| --- | --- |
| Description: | The use case awaits for the user to search for car parks in Singapore using either maps, car park no. or destination address. |
| Preconditions: | N.A. |
| Postconditions: | N.A. |
| Priority: | 1 |
| Frequency of use: | 1 to 3 times per app launch |
| Flow of Events: | 1. System displays the map 2. System prompts for a destination or a car park number |
| Alternative Flows: | N.A. |
| Exceptions: | N.A |
| Includes: | Search car park via car park number  Search car park via the map  Search car park via a destination  Display Map  Display Car park details |
| Special Requirements: |  |
| Assumptions: |  |
| Notes and Issues: |  |

| Use Case ID: | 1.1 | | |
| --- | --- | --- | --- |
| Use Case Name: | Search car park via car park number. | | |
| Created By: | Samuel Ong Jing Siang | Last Updated By: | Samuel Ong Jing Siang |
| Date Created: | 26/08/2022 | Date Last Updated: | 26/08/2022 |

| Actor: | User |
| --- | --- |
| Description: | Search for a car park in Singapore using a car park number |
| Preconditions: | N.A. |
| Postconditions: | N.A. |
| Priority: | 1 |
| Frequency of use: | Once per app launch |
| Flow of Events: | 1. User inputs the car park number 2. System uses Google Map API to locate the car park 3. System pans to the car park surroundings 4. User presses on the pin 5. System displays the car park details 6. User closes the program |
| Alternative Flows: | User provides duration of stay at the car park  6.1 User inputs the duration of stay at the car park  6.2 System calculate cost of stay at the car park  6.3 System displays the cost of stay at the car park  6.4 Go to Step 6  Car park number not found  2.1 System uses the Google Map API to find the most relevant location.  2.2 Go to step 3 |
| Exceptions: | Google API unable to locate car park  2.1 System alerts user that the car park is not found  2.2 Go to step 1  User decides to search for another car park  5.1 User clicks on the back button  5.2 Go to step 1  Google API is unavailable  2.1 System is unable to query Google API due to maintenance or service unavailable.  2.2 System displays an error message to the user “Service currently unavailable, please try again later”  2.3 Go to step 1 |
| Includes: | Display Map  Display Car park details |
| Special Requirements: |  |
| Assumptions: |  |
| Notes and Issues: |  |

| Use Case ID: | 1.2 | | |
| --- | --- | --- | --- |
| Use Case Name: | Search car park via the map | | |
| Created By: | Samuel Ong Jing Siang | Last Updated By: | Samuel Ong Jing Siang |
| Date Created: | 26/08/2022 | Date Last Updated: | 26/08/2022 |

| Actor: | User |
| --- | --- |
| Description: | Search for a car park in Singapore using the map |
| Preconditions: | N.A. |
| Postconditions: | N.A. |
| Priority: | 1 |
| Frequency of use: | Once per app launch |
| Flow of Events: | 1. User pans the map to desired location 2. System displays updated map 3. User presses on a pin 4. System displays the car park details 5. User closes the program |
| Alternative Flows: | User provides duration of stay at the car park  5.1 User inputs the duration of stay at the car park  5.2 System calculate cost of stay at the car park  5.3 System displays the cost of stay at the car park  5.4 Go to Step 5 |
| Exceptions: | User decides to search for another car park  4.1 User clicks on the back button  4.2 Go to step 1 |
| Includes: | Display Map  Display Car park details |
| Special Requirements: |  |
| Assumptions: |  |
| Notes and Issues: |  |

| Use Case ID: | 1.3 | | |
| --- | --- | --- | --- |
| Use Case Name: | Search car park via destination | | |
| Created By: | Samuel Ong Jing Siang | Last Updated By: | Samuel Ong Jing Siang |
| Date Created: | 26/08/2022 | Date Last Updated: | 26/08/2022 |

| Actor: | User |
| --- | --- |
| Description: | Search for a car park in Singapore using a location |
| Preconditions: | N.A. |
| Postconditions: | N.A. |
| Priority: | 1 |
| Frequency of use: | Once per app launch |
| Flow of Events: | Normal flow whereby User picks a pin.   1. User inputs the location 2. System uses Google Map API to locate the nearby car parks 3. System pans to the location with the nearby car parks in view 4. User presses on the pin 5. System displays the car park details 6. User closes the program |
| Alternative Flows: | User opens the list of car parks and sorts them based on certain factors  4.1 User opens list of car parks  4.2 System provides a Sort Button to sort based on Price, Distance and Availability  4.3 User picks a sorting function  4.4 System sorts the car parks  4.5 User picks a car park  4.6 Go to step 5  User provides duration of stay at the car park  6.1 User inputs the duration of stay at the car park  6.2 System calculate cost of stay at the car park  6.3 System displays the cost of stay at the car park  6.4 Go to Step 6 |
| Exceptions: | Google API unable to locate car park  2.1 System alerts user that the car park is not found  2.2 Go to step 1  User decides to search for another car park  5.1 User clicks on the back button  5.2 Go to step 1 |
| Includes: | Display Map  Display Car park details |
| Special Requirements: |  |
| Assumptions: |  |
| Notes and Issues: |  |

| Use Case ID: | 2 | | |
| --- | --- | --- | --- |
| Use Case Name: | Display Map | | |
| Created By: | Samuel Ong Jing Siang | Last Updated By: | Samuel Ong Jing Siang |
| Date Created: | 26/08/2022 | Date Last Updated: | 26/08/2022 |

| Actor: | User |
| --- | --- |
| Description: | Display the map |
| Preconditions: | N.A. |
| Postconditions: | Car park pins are updated |
| Priority: |  |
| Frequency of use: | Every time the map has to be updated due to new inputs |
| Flow of Events: | 1. System displays the map via the Google Map API 2. System updates the pins for the car parks located |
| Alternative Flows: | N.A. |
| Exceptions: | N.A. |
| Includes: |  |
| Special Requirements: |  |
| Assumptions: |  |
| Notes and Issues: |  |

| Use Case ID: | 3 | | |
| --- | --- | --- | --- |
| Use Case Name: | Display Car Park Details | | |
| Created By: | Ong Jun Heng | Last Updated By: | Ong Jun Heng |
| Date Created: | 27/08/2022 | Date Last Updated: | 27/08/2022 |

| Actor: | Car Park Availability API, Car Park Rate API |
| --- | --- |
| Description: | Displays information on the car park provided by the APIs. Information will always be in the same format, containing car park number, location, parking rates, availability/ occupancy of the car park and the last updated date and time. It will also include the cost of parking if duration of stay is provided. If any information is not applicable, the system will display N.A. instead. |
| Preconditions: | 1. User must have selected a car park |
| Postconditions: | 1. System must have displayed information on the car park |
| Priority: |  |
| Frequency of use: | Once per app launch |
| Flow of Events: | Normal flow whereby User has provided a car park   1. System retrieves information on the availability/ occupancy of the car park and the last updated date and time and the rates of the car park using the car park number provided. 2. System displays the information in a fixed format. |
| Alternative Flows: | User provides duration of stay at the car park  2.1 System calculates the cost of the parking for the duration provided.  2.2 System displays the information in the same format, replacing the parking rates with the cost of parking.  System is unable to retrieve the availability or the rates of the car park  2.1 System displays the information retrieved in the same format, while using N.A. for information that was unable to be retrieved. |
| Exceptions: | N.A. |
| Includes: |  |
| Special Requirements: |  |
| Assumptions: | The database is assumed to have the information of all the car parks that the Google Map API has. |
| Notes and Issues: |  |

| Use Case ID: | 4 | | |
| --- | --- | --- | --- |
| Use Case Name: | Calculate Cost | | |
| Created By: | Ong Jun Heng | Last Updated By: | Ong Jun Heng |
| Date Created: | 27/08/2022 | Date Last Updated: | 27/08/2022 |

| Actor: |  |
| --- | --- |
| Description: | Calculate the cost of the parking fee given the car park number and the start and end time of parking. |
| Preconditions: | 1. User must have selected a car park 2. User must have indicated a start and end time |
| Postconditions: |  |
| Priority: |  |
| Frequency of use: | Once per app launch |
| Flow of Events: | Normal flow whereby User has provided a car park and the start and end time   1. System calculates the cost of the parking for the duration provided. 2. System displays the information in the same format, replacing the parking rates with the cost of parking. |
| Alternative Flows: | N.A. |
| Exceptions: | N.A. |
| Includes: |  |
| Special Requirements: |  |
| Assumptions: |  |
| Notes and Issues: |  |

## UI MockUp

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