

Use Case ID:	1		
Use Case Name:	Search Location		
Created By:	Haozheng	Last Updated By:	Jin Min
Date Created:	30/08/2023	Date Last Updated:	13/09/2023

Actor:	User, Google Maps API
Description:	To search for car parks near the user's searched location
Preconditions:	1. Device must be connected to Wi-Fi/Mobile Data
Postconditions:	1. Car parks that fall within the radius of the searched location will be found and saved.
Priority:	High
Frequency of Use:	0-20 times per day
Flow of Events:	<ol style="list-style-type: none"> 1. User navigate to the Search page from the sidebar 2. User will enter the 6-digit postal code or street name of his desired location 3. System will search for car parks that are near the location 4. Nearby car parks will be saved as a search result.
Alternative Flows:	-
Exceptions:	-
Includes:	Recommend nearby car park
Special Requirements:	-
Assumptions:	-
Notes and Issues:	-

Use Case ID:	2		
Use Case Name:	Favourite Carpark		
Created By:	Haozheng	Last Updated By:	Jia Ying
Date Created:	30/08/2023	Date Last Updated:	14/09/2023

Actor:	User
Description:	To add the carpark to user's favourite list of car parks
Preconditions:	<ol style="list-style-type: none"> 1. Device must be connected to Wi-Fi/Mobile Data 2. User has already searched a location
Postconditions:	<ol style="list-style-type: none"> 1. User will be able to save their favourite carpark 2. Carpark information will be added to 'View Favourite Carpark' list
Priority:	Medium
Frequency of Use:	1-10 times per lifetime
Flow of Events:	<ol style="list-style-type: none"> 1. User have selected a carpark 2. DetailsPage will display carpark information and hollow star icon 3. User clicks on the hollow star icon on DetailsPage 4. FavouritesHandler will add carpark into UserInfo 5. UserInfo favourites list now contains the selected carpark
Alternative Flows:	-
Exceptions:	-
Includes:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	-

Use Case ID:	3		
Use Case Name:	View Favourite Carpark		
Created By:	Haozheng	Last Updated By:	Jin Min
Date Created:	30/08/2023	Date Last Updated:	09/09/2023

Actor:	User
Description:	To view user's favourite car parks
Preconditions:	1. Device must be connected to Wi-Fi/Mobile Data
Postconditions:	1. User will be able to see their favourite carpark
Priority:	Medium
Frequency of Use:	0-10 times per day
Flow of Events:	<ol style="list-style-type: none"> 1. User clicks on View Favourite Page from the Sidebar 2. FavouritePage gets the user's favourite car parks from the FavouritesHandler 3. FavouritesHandler retrieves the user's list of favourite car parks 4. FavouritesHandler returns the user's list of favourite car parks to FavouritePage 5. FavouritePage will display user's favourite car parks to the User
Alternative Flows:	-
Exceptions:	-
Includes:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	<p>User can have no favourite carpark</p> <p>If user has no favourite carpark, system will display empty page</p>

Use Case ID:	4		
Use Case Name:	Remove Favourite Carpark		
Created By:	Haozheng	Last Updated By:	Haozheng
Date Created:	30/08/2023	Date Last Updated:	01/09/2023

Actor:	User
Description:	To remove the user's favourite carpark
Preconditions:	<ol style="list-style-type: none"> 1. Device must be connected to Wi-Fi/Mobile Data 2. User must have at least one favourite carpark.
Postconditions:	<ol style="list-style-type: none"> 1. The favourite carpark selected by the user will be removed from the system
Priority:	Medium
Frequency of Use:	0-10 times per lifetime
Flow of Events:	<ol style="list-style-type: none"> 1. User navigate to the view favourite page from the sidebar 2. System will retrieve the list of user's favourite carpark from the system 3. System will display all the favourite carpark to the favourite page 4. User select the carpark that he wish to remove from favourite list 5. System will display the carpark details 6. User click on the coloured star icon 7. System will display a hollow star icon 8. System will remove the carpark from the system
Alternative Flows:	-
Exceptions:	-
Includes:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	-

Use Case ID:	5		
Use Case Name:	Retrieve Carpark Locations		
Created By:	Wei Hong	Last Updated By:	Wei Hong
Date Created:	01/09/2023	Date Last Updated:	01/09/2023

Actor:	Google Maps API
Description:	To retrieve and display the locations of carpark in Singapore on a digital map.
Preconditions:	<ol style="list-style-type: none"> 1. The list of carpark in Singapore must be obtained 2. The Google Maps API must be reachable.
Postconditions:	<ol style="list-style-type: none"> 1. The locations of the carpark in Singapore are displayed on the digital map
Priority:	High
Frequency of Use:	1 time per backend startup
Flow of Events:	<ol style="list-style-type: none"> 1. The locations of the carpark are queried from the Google Maps API using the coordinates. 2. The Google Maps API maps the coordinates to points on a digital map. 3. The Google Maps API pinpoints the carpark locations in Singapore on the digital map with a parking logo.
Alternative Flows:	-
Exceptions:	EX.5: If the Google Maps API does not respond to the query <ol style="list-style-type: none"> 1. A “Google Maps API is unreachable” error is shown on the screen.
Includes:	Retrieve Carpark Information
Special Requirements:	-
Assumptions:	The Google Maps API is in an operational state.
Notes and Issues:	-

Use Case ID:	6		
Use Case Name:	Retrieve Carpark Information		
Created By:	Wei Hong	Last Updated By:	Wei Hong
Date Created:	01/09/2023	Date Last Updated:	01/09/2023

Actor:	System
Description:	To get the coordinates of all the carpark in Singapore, along with their ID for cross-referencing with its availability.
Preconditions:	1. The dataset containing Singapore's carpark coordinates and IDs must be available.
Postconditions:	1. The system obtains information on Singapore's carpark coordinates and IDs.
Priority:	High
Frequency of Use:	1 time per backend startup
Flow of Events:	<ol style="list-style-type: none"> 1. The system retrieves the carpark dataset from data.gov.sg. 2. The system unpacks the dataset. 3. System retrieves list of carpark alongside with their IDs through its internal dataset.
Alternative Flows:	-
Exceptions:	EX.6: The data.gov.sg dataset cannot be retrieved. <ol style="list-style-type: none"> 1. A "The carpark dataset could not be retrieved." error is shown.
Includes:	-
Special Requirements:	-
Assumptions:	The dataset from data.gov.sg is available.
Notes and Issues:	-

Use Case ID:	7		
Use Case Name:	Unselect Carpark to Visit		
Created By:	Wei Hong	Last Updated By:	Wei Hong
Date Created:	01/09/2023	Date Last Updated:	01/09/2023

Actor:	User
Description:	To unselect a previously selected carpark
Preconditions:	<ol style="list-style-type: none"> 1. The user must have previously selected a carpark to visit. 2. Device must be connected to Wi-Fi/Mobile Data
Postconditions:	<ol style="list-style-type: none"> 1. The carpark previously selected by the user to park at will be unselected in the system.
Priority:	High
Frequency of Use:	0-10 times per day
Flow of Events:	<ol style="list-style-type: none"> 1. The user searches for the carpack previously selected. 2. The system returns the result of the search. 3. The user enters the carpark details page. 4. The user selects the “Unselect” button on the carpark details page.
Alternative Flows:	-
Exceptions:	-
Includes:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	-

Use Case ID:	8		
Use Case Name:	Check radius of location		
Created By:	Wei Hong	Last Updated By:	Wei Hong
Date Created:	01/09/2023	Date Last Updated:	01/09/2023

Actor:	Google Maps API
Description:	To search for other locations within a radius of a specific point on the map. This is used for searching car parks from the user's selected location.
Preconditions:	1. A location must be selected by the user
Postconditions:	1. A list of car parks within 1 kilometre is given as a list to the user with the exact distance from the location.
Priority:	High
Frequency of Use:	0-20 times per day
Flow of Events:	<ol style="list-style-type: none"> 1. The user chooses a location. 2. The chosen location is given to the Google Maps API. 3. The Google Maps API to search within a 1 kilometre radius of the chosen location. 4. If at least one car park is found, the list of car parks nearby is shown to the user.
Alternative Flows:	AF-S4: If no car park is within a 1 kilometre radius of the location. <ol style="list-style-type: none"> 1. Display a "No car parks found nearby" error message. 2. The Google Maps API returns to the step 1.
Exceptions:	-
Includes:	-
Special Requirements:	-
Assumptions:	The Google Maps API is in an operational state.
Notes and Issues:	-

Use Case ID:	9		
Use Case Name:	Recommend Nearby Carparks		
Created By:	Jia Ying	Last Updated By:	Wei Hong
Date Created:	30/08/2023	Date Last Updated:	13/09/2023

Actor:	System
Description:	To sort the nearby carparks from the location by distance in ascending order and display the list of sorted carparks.
Preconditions:	<ol style="list-style-type: none"> 1. User must key in a search location 2. Google Maps API must be operational 3. User has already searched for a location 4. Nearby carparks of the location has been found
Postconditions:	<ol style="list-style-type: none"> 1. System will display a list of carparks within 1km radius of search location 2. System will display the carpark availability for the corresponding carparks
Priority:	High
Frequency of Use:	0-20 times per day
Flow of Events:	<ol style="list-style-type: none"> 1. SearchHandler has nearby carparks found from searching location 2. SearchHandler loop through each carpark 3. For each carpark, use GoogleMapAPI to compute distance between carpark and location 4. Sort the carparks by distance in ascending order. 5. Display the sorted list of carparks on SearchPage.
Alternative Flows:	-
Exceptions:	-
Includes:	Check radius of location
Special Requirements:	-
Assumptions:	-
Notes and Issues:	-

- [From search location -> nearby carparks (unsorted)] -> *sorting of nearby carparks*
-> displaying to user

Use Case ID:	10		
Use Case Name:	Select Carpark To Visit		
Created By:	Jia Ying	Last Updated By:	Jia Ying
Date Created:	30/08/2023	Date Last Updated:	01/09/2023

Actor:	User
Description:	To select which carpark they would like to visit, and see more information regarding that carpark.
Preconditions:	1. Device must be connected to Wi-Fi/Mobile Data
Postconditions:	1. The selected carpark details will be displayed on the web
Priority:	High
Frequency of Use:	0-20 times per day
Flow of Events:	<ol style="list-style-type: none"> 1. User will search for a location 2. System will recommend nearby carpark 3. System will display a few options of carpark for user to choose from 4. User will select their choice of carpark
Alternative Flows:	AF-S1: User selects from list of favourited carpark <ol style="list-style-type: none"> 1. User selects view favourite carpark 2. System display the list of user's favourite carpark 3. User selects their choice of carpark
Exceptions:	-
Includes:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	-

Use Case ID:	11		
Use Case Name:	Send Low availability notification		
Created By:	Jia Ying	Last Updated By:	Jia Ying
Date Created:	30/08/2023	Date Last Updated:	01/09/2023

Actor:	System
Description:	To send a low carpark availability notification to user
Preconditions:	<ol style="list-style-type: none"> 1. Queried the data.gov.sg API 2. User has selected a carpark 3. Carpark availability for the chosen carpark is less than 5
Postconditions:	<ol style="list-style-type: none"> 1. System will send a notification to users, informing them that the carpark availability for chosen carpark is running low 2. Notification will also display the current updated parking lot availability for chosen carpark
Priority:	Low
Frequency of Use:	0-5 times per day
Flow of Events:	<ol style="list-style-type: none"> 1. System will continuously retrieve data via carpark availability API every minute 2. System will output the updated carpark availability 3. System will check if user has a selected carpark 4. System will retrieve the data and checks if the selected carpark has carpark availability less than 5 5. If the carpark availability is less than 5, system will display a low availability notification
Alternative Flows:	-
Exceptions:	-
Includes:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	-

Use Case ID:	12		
Use Case Name:	Retrieve Carpark Availability		
Created By:	Jia Ying	Last Updated By:	Jia Ying
Date Created:	30/08/2023	Date Last Updated:	01/09/2023

Actor:	Data.gov.sg API
Description:	To retrieve the number of available parking lots across all carpark in Singapore
Preconditions:	1. The Carpark Availability API must be reachable
Postconditions:	1. The carpark availability for all carpark will be updated in the list of recommended carpark
Priority:	High
Frequency of Use:	1 time per minute
Flow of Events:	<ol style="list-style-type: none"> 1. The data is queried from data.gov.sg API 2. The corresponding carpark availability along with the carpark number will be updated in the list of recommended carpark
Alternative Flows:	-
Exceptions:	EX.1: The Carpark Availability API is inaccessible <ol style="list-style-type: none"> 1. System will display the last updated carpark availability 2. System will show time for the last updated information
Includes:	-
Special Requirements:	-
Assumptions:	The Carpark Availability API is in an operational state.
Notes and Issues:	-

Use Case ID:	13		
Use Case Name:	Get Location of User		
Created By:	Wei Hong	Last Updated By:	Wei Hong
Date Created:	05/09/2023	Date Last Updated:	05/09/2023

Actor:	Google Maps API, Device GPS Module
Description:	To get the current location of the user through the user device's GPS module and pinpoint it on the map using the Google Maps API.
Preconditions:	<ol style="list-style-type: none"> 1. User must have granted the application permission to precisely access the device GPS module. 2. Device must be connected to Wi-Fi/Mobile Data
Postconditions:	<ol style="list-style-type: none"> 1. The location of the user is determined and shown on the map.
Priority:	High
Frequency of Use:	1-30 times per minute
Flow of Events:	<ol style="list-style-type: none"> 1. Device GPS module gathers information on the coordinates of the device's location. 2. The coordinates are passed onto the Google Maps API. 3. The Google Maps API pinpoints the location of the device on the map using the coordinates obtained.
Alternative Flows:	-
Exceptions:	-
Includes:	-
Special Requirements:	-
Assumptions:	The device GPS module is in operational condition and able to retrieve the exact location of the device.
Notes and Issues:	User may only grant approximate location permission instead of precise location which can lead to an inaccurate pinpoint of the user's location.

Use Case ID:	14		
Use Case Name:	Navigate to Carpark		
Created By:	Wei Hong	Last Updated By:	Haozheng
Date Created:	05/09/2023	Date Last Updated:	12/09/2023

Actor:	Google Maps API, User
Description:	To search for a route to the carpark and display the resulting route using on the map.
Preconditions:	<ol style="list-style-type: none"> 1. A destination carpark has been selected by the user. 2. Device must be connected to Wi-Fi/Mobile Data
Postconditions:	<ol style="list-style-type: none"> 1. A route to the destination carpark is computed by the Google Maps API.
Priority:	High
Frequency of Use:	1-20 times per day
Flow of Events:	<ol style="list-style-type: none"> 1. User selects a destination carpark on the NavigatePage Interface 2. Google Maps API retrieves the location of the user from Use Case ID 13: "Get Location of User" 3. Google Maps API calculates the route to the destination carpark from the current location of user. 4. Use Case ID 15: "Display Route" displays the route to the destination on the map.
Alternative Flows:	-
Exceptions:	-
Includes:	Get Location of User, Display Route
Special Requirements:	-
Assumptions:	The device GPS module is in operational condition and able to retrieve the exact location of the device.
Notes and Issues:	User may only grant approximate location permission instead of precise location which can lead to an inaccurate pinpoint of the user's location.

Use Case ID:	15		
Use Case Name:	Display Route		
Created By:	Wei Hong	Last Updated By:	Wei Hong
Date Created:	05/09/2023	Date Last Updated:	05/09/2023

Actor:	Google Maps API
Description:	To display the navigation route to a chosen destination.
Preconditions:	<ol style="list-style-type: none"> 1. A route to the destination has been computed. 2. Device must be connected to Wi-Fi/Mobile Data
Postconditions:	<ol style="list-style-type: none"> 1. A route with directions to the destination carpark is shown visually to the user on the map.
Priority:	High
Frequency of Use:	1-20 times per day
Flow of Events:	<ol style="list-style-type: none"> 1. The Google Maps API computes the route to the destination. 2. The route to the destination is shown visually on the user on the map.
Alternative Flows:	-
Exceptions:	-
Includes:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	The route provided by the Google Maps API might not be the most optimal route, but that is up to the Google Maps API.

Use Case ID:	16		
Use Case Name:	Filter by vehicle type		
Created By:	Haozheng	Last Updated By:	Haozheng
Date Created:	05/09/2023	Date Last Updated:	05/09/2023

Actor:	User
Description:	To display number of available carpark lot based on the vehicle type specified by the user
Preconditions:	1. Device must be connected to Wi-Fi/Mobile Data
Postconditions:	1. System will search for the availability of carpark lots based on the vehicle type specified by the user 2. User will be able to see the number of lots available based on the type of vehicle specified
Priority:	High
Frequency of Use:	1-20 times per day
Flow of Events:	1. User navigate to the Search page from the sidebar 2. User will select the type of vehicle that he is interested
Alternative Flows:	-
Exceptions:	-
Includes:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	There will only be three type of vehicles that user can choose from. They are Car, Motorcycle and Heavy vehicles

Use Case ID:	17		
Use Case Name:	Get carpark rates		
Created By:	Haozheng	Last Updated By:	Haozheng
Date Created:	05/09/2023	Date Last Updated:	06/09/2023

Actor:	URA API
Description:	To display the carpark rates for the carpark that was selected by the user
Preconditions:	<ol style="list-style-type: none"> 1. Device must be connected to Wi-Fi/Mobile Data 2. The URA API must be reachable. 3. User must have selected a carpark
Postconditions:	<ol style="list-style-type: none"> 1. System will display the parking rate for the carpark selected by the user.
Priority:	High
Frequency of Use:	1-20 times per day
Flow of Events:	<ol style="list-style-type: none"> 1. User selects a carpark. 2. URA API retrieves the carpark rate for that specific carpark 3. System will display the carpark rate onto the carpark detail's page
Alternative Flows:	-
Exceptions:	Ex 17: The URA'S API is not operational. <ol style="list-style-type: none"> 1. A "URA's API could not be reached." error is shown.
Includes:	-
Special Requirements:	-
Assumptions:	The URA's API is in an operational state.
Notes and Issues:	-