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 carparks near the user's searched location
Preconditions:	1. Device must be connected to Wi-Fi/Mobile Data
Postconditions:	1. Carparks 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:	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 carparks that are near the location 4. Nearby carparks will be saved as a search result.
Alternative Flows:	-
Exceptions:	-
Includes:	Recommend nearby carpark
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:	19/10/2023

Actor:	User
Description:	To add the carpark to user's favourite list of carparks
Preconditions:	1. Device must be connected to Wi-Fi/Mobile Data 2. User has already searched a location
Postconditions:	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:	1. User have selects a carpark 2. DetailsPage will get the carpark information and display page 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 carparks
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:	1. User clicks on View Favourite Page from the Sidebar 2. FavouritePage gets the user's favourite carparks from the FavouritesHandler 3. FavouritesHandler retrieves the user's list of favourite carparks 4. FavouritesHandler returns the user's list of favourite carparks to FavouritePage 5. FavouritePage will display user's favourite carparks to the User
Alternative Flows:	-
Exceptions:	-
Includes:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	User can have no favourite carpark If user has no favourite carpark, system will display empty page

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

Created By:	Haozheng	Last Updated By:	Jin Min
Date Created:	30/08/2023	Date Last Updated:	11/10/2023

Actor:	User
Description:	To remove the user's favourite carpark
Preconditions:	1. Device must be connected to Wi-Fi/Mobile Data 2. User must have at least one favourite carpark.
Postconditions:	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:	1. User select the carpark that he wish to remove from favourite list 2. User will be redirected to the details page of the selected carpark 3. User click on the solid star icon 4. DetailsPage invoke removeFavouriteCarpark() of the FavouritesHandler 5. FavouritesHandler removes the carpark from UserInfo's favourites list
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:	Jin Min
Date Created:	01/09/2023	Date Last Updated:	22/10/2023

Actor:	Google Maps API
Description:	To retrieve and display the locations of carparks in Singapore on a digital map.
Preconditions:	1. The list of carparks in Singapore must be obtained 2. The Google Maps API must be reachable.
Postconditions:	1. The locations of the carparks in Singapore are displayed on the digital map
Priority:	High
Frequency of Use:	1 time per backend startup
Flow of Events:	1. The locations of the carparks are queried from the Google Maps API using the coordinates. 2. The Google Maps API marks the locations 3. The markers are displayed on the map
Alternative Flows:	-
Exceptions:	EX.5: If the Google Maps API does not respond to the query 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:	Jia Ying
Date Created:	01/09/2023	Date Last Updated:	19/10/2023

Actor:	System
Description:	To get the coordinates of all the carparks 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:	1. The system retrieves the carpark dataset from data.gov.sg API 2. The system unpacks the dataset. 3. System retrieves list of carparks alongside with their IDs from Carpark List
Alternative Flows:	-
Exceptions:	EX.6: The data.gov.sg dataset cannot be retrieved. 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:	Jin Min
Date Created:	01/09/2023	Date Last Updated:	11/10/2023

Actor:	User
Description:	To unselect a previously selected carpark
Preconditions:	1. The user must have previously selected a carpark to visit. 2. Device must be connected to Wi-Fi/Mobile Data
Postconditions:	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:	1. User presses unselect carpark button 2. SelectionHandler's unselectCarpark() is invoked 3. The green tick indicating carpark is selected on the ResultsPage is removed
Alternative Flows:	-
Exceptions:	-
Includes:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	-

Use Case ID:	8		
Use Case Name:	Check radius		
Created By:	Wei Hong	Last Updated By:	Jia Ying
Date Created:	01/09/2023	Date Last Updated:	19/10/2023

Actor:	Google Maps API
Description:	To search for carparks within 1 kilometre of user's searched location
Preconditions:	1. A location has been entered by the user
Postconditions:	1. A list of carparks within 1 kilometre is saved in Carpark List
Priority:	High
Frequency of Use:	0-20 times per day
Flow of Events:	1. The user chooses a location from the Search Page. 2. Search Page sends the location to Google Maps API 3. Google Maps API query the Data.gov.sg API for the list of carparks within 500 metre radius 4. Data.gov.sg API adds the list of carparks to Carpark List
Alternative Flows:	-
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:	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:	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:	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:	19/10/2023

Actor:	User
Description:	To select which carpark they would like to visit, and view the information regarding that carpark.
Preconditions:	1. Device must be connected to Wi-Fi/Mobile Data
Postconditions:	1. The information of selected carpark will be displayed on the web
Priority:	High
Frequency of Use:	0-20 times per day
Flow of Events:	1. User will search for a location 2. Search Handler will return a list of nearby carparks 3. User selects the carpark and the Selection Handler will return the information of selected carpark 4. Search Page will display the information
Alternative Flows:	AF-S1: User enters selects from list of favourited carparks 1. User enters Favourite Page 2. FavouritesHandler returns a list of user's favourite carparks 3. User selects the carpark and the Selection Handler will return the information of selected carpark 4. Search Page will display the information
Exceptions:	-
Includes:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	-

Use Case ID:	11
Use Case Name:	Low availability warning

Created By:	Jia Ying	Last Updated By:	Jia Ying
Date Created:	30/08/2023	Date Last Updated:	01/09/2023

Actor:	System
Description:	To display a low carpark availability warning to user
Preconditions:	1. User has selected a carpark 2. Carpark availability for the chosen carpark is less than 5
Postconditions:	1. System will display a notification to users, informing them that the carpark availability for chosen carpark is running low
Priority:	Low
Frequency of Use:	0-5 times per day
Flow of Events:	1. User selects a carpark 2. If the selected 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:	Jin Min
Date Created:	30/08/2023	Date Last Updated:	11/10/2023

Actor:	Data.gov.sg API
Description:	To retrieve the number of available parking lots across all carparks in Singapore
Preconditions:	1. The Carpark Availability API must be reachable
Postconditions:	1. The carpark availability for all carparks will be updated in the list of recommended carparks
Priority:	High
Frequency of Use:	1 time per minute
Flow of Events:	1. The data is queried from data.gov.sg API 2. Data.gov.sg API returns the carpark availability data 3. The corresponding carpark availability along with the carpark number will be updated in CarparkList
Alternative Flows:	-
Exceptions:	EX.1: The Carpark Availability API is inaccessible 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
Date Created:	05/09/2023

Created By:	Wei Hong	Last Updated By:	Jin Min
Date Created:	05/09/2023	Date Last Updated:	11/10/2023

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:	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:	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:	1. Google Maps API gets location of the user from GPS Module 2. GPS Module returns user's coordinates to the Google Maps API 3. Google Maps API searches the location based on user's coordinates 4. The location is marked on the map.
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:	1. A destination carpark has been selected by the user. 2. Device must be connected to Wi-Fi/Mobile Data
Postconditions:	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:	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:	Jia Ying
Date Created:	05/09/2023	Date Last Updated:	19/10/2023

Actor:	Google Maps API
Description:	To display the navigation route to a chosen destination.
Preconditions:	1. Device must be connected to Wi-Fi/Mobile Data
Postconditions:	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:	1. Google Maps API retrieves the route from RouteHandler 2. RouteHandler will compute the best route and return it to Google Maps API 3. Google Maps API will display the route on Maps.
Alternative Flows:	-
Exceptions:	-
Includes:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	-

Use Case ID:	16		
Use Case Name:	Sort Results		
Created By:	Haozheng	Last Updated By:	Jia Ying
Date Created:	05/09/2023	Date Last Updated:	19/10/2023

Actor:	User
Description:	To sort the result of carparks recommended by either distance or percentage of availability
Preconditions:	1. User has keyed in a search location
Postconditions:	1. System will search display the carpark results based on user's selection
Priority:	High
Frequency of Use:	1-20 times per day
Flow of Events:	1. User selects to sort the results by distance or percentage of availability via the dropdown on SearchPage 2. SortHandler will apply the filter 3. SortHandler will sort the carparks according to the filter applied
Alternative Flows:	-
Exceptions:	-
Includes:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	The default selection will be sort by distance.

Use Case ID:	17		
Use Case Name:	Get carpark rates		
Created By:	Haozheng	Last Updated By:	Jia Ying
Date Created:	05/09/2023	Date Last Updated:	19/10/2023

Actor:	URA API
Description:	To display the carpark rates for the carpark that was selected by the user
Preconditions:	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:	1. System will display the parking rates for the carpark selected by the user.
Priority:	High
Frequency of Use:	1-20 times per day
Flow of Events:	1. URA API retrieves the carpark rates for selected carpark 2. System will display the carpark rate onto the Details Page
Alternative Flows:	-
Exceptions:	Ex 17: The URA'S API is not operational. 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:	-