# Use Cases

## for

# SpotEase

**Version 1.5 approved**

**Prepared by**
Lee Yun Jia,
Jan Chen Jie,
Manasi Singh,
Glynis Looi Xin Lin,
Lee Lin Yang Glenn,
Kathri Arachchige Don Mayukhi Nimesha Siriwardana

**SCSD C5, Nanyang Technological University**

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# Revision History

| Name | Date | Reason For Changes | Version |
|---|---|---|---|
| Mayukhi, Manasi | 31 January 2025 | Use cases 1,2 | 1.0 |
| Mayukhi, Manasi | 1 February 2025 | Use cases 3,4,5,6,7,8,9,10 | 1.1 |
| Mayukhi, Manasi | 2 February 2025 | Use cases 11,12 | 1.2 |
| Mayukhi, Manasi | 4 February 2025 | Use case 13 | 1.3 |
| Yun Jia | 2 April 2025 | Use case 14 | 1.4 |
| Glynis Looi | 8 April 2025 | Refine all use cases | 1.5 |

# Use Case Template

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|---|---|---|---|
| Use Case ID: | UC-001 | | |
| Use Case Name: | Login | | |
| Created By: | Mayukhi | Last Updated By: | Glynis |
| Date Created: | 31 January 2025 | Date Last Updated: | 8 April 2025 |

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|---|---|
| Actor: | User |
| Description: | User logs into the system to access personalized features. |
| Preconditions: | 1. User has an existing account.<br>2. User has a valid email and the corresponding password registered in the system. |
| Postconditions: | 1. Success: User is authenticated and gains access to the system's features.<br>2. Failure: The email and/or the password is invalid |
| Priority: | High |
| Frequency of Use: | Very frequent (multiple times a day) |
| Flow of Events: | 1. User opens the application.<br>2. The system displays a login interface requesting an email and password.<br>3. User enter their credentials.<br>4. The system validates the credentials by comparing them with the database.<br>5. If the credentials are correct, the system grants access to the home page. |
| Alternative Flows: | AF-S5: If the credentials are incorrect,<br>1. The interface displays the message “Failed to login”<br>2. The display returns to step 2. |
| Exceptions: | - |
| Includes: | None |
| Special Requirements: | - |
| Assumptions: | - |
| Notes and Issues: | - |

| Use Case ID: | UC-002 | | |
|---|---|---|---|
| Use Case Name: | Search Destination | | |
| Created By: | Manasi | Last Updated By: | Glynis |
| Date Created: | 31 January 2025 | Date Last Updated: | 8 April 2025 |

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|---|---|
| Actor: | User, and Guest User |
| Description: | Allows users to search for parking destinations and apply various filters such as sheltered parking and shortest distance to find suitable parking locations. Users can view more car park details as well. |
| Preconditions: | 1. User is logged in to account or accessing as guest user<br>2. Has location services (GPS) enabled<br>3. System is operational and accessible |
| Postconditions: | 1. Users can enter the location they want to go to.<br>2. Users can view more details about specific car parks |
| Priority: | High |
| Frequency of Use: | Very frequent (multiple times a day) |
| Flow of Events: | 1. User enters a destination in the search bar<br>2. The system displays a dropdown list of nearby addresses based on the user's input.<br>3. User selects an address destination from the dropdown list<br>4. System displays nearby car parks based on the selected destination.<br>5. Users can view car park details (UC-007) for specific parking locations.<br>6. User can click on the filter button and apply filter options to refine search results (UC-003)<br>7. System processes filter criteria<br>8. System displays filtered results, showing only car parks that match the selected filters<br>9. The system shows recommended car parks (UC-006) |
| Alternative Flows: | AF-S1: No destination found<br>1. System returns no car parks |
| Exceptions: | - |
| Includes: | 1. Apply Filters (UC-003)<br>2. View Car Park Details (UC-007)<br>3. Show Recommended Car Park (UC-006)<br>4. Get Distance Information (UC-005) |
| Special Requirements: | - |
| Assumptions: | - |
| Notes and Issues: | - |

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|---|---|---|---|
| Use Case ID: | UC-003 | | |
| Use Case Name: | Apply Filters | | |
| Created By: | Manasi | Last Updated By: | Glynis |
| Date Created: | 1 February 2025 | Date Last Updated: | 8 April 2025 |

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|---|---|
| Actor: | User, Guest |
| Description: | Enables users to apply specific filtering criteria to narrow down parking options based on various parameters including sheltered parking options, distance preferences and weather parking recommendations. |
| Preconditions: | 1. User has initiated a destination search<br>2. Search destination functionality is active<br>3. Filter options are available and loaded |
| Postconditions: | 1. Filtered results are displayed to user<br>2. All selected filter criteria are applied<br>3. Results show only relevant parking options |
| Priority: | High |
| Frequency of Use: | High (Multiple times per search) |
| Flow of Events: | 1. User clicks on filter button<br>2. System displays available filter options to user<br>3. User selects one or more filter criteria:<br>3.1. Sheltered parking<br>3.2. Distance preferences adjustable via slider<br>3.3. Weather parking recommendations<br>4. System processes selected filters and get relevant information (UC-006)<br>5. System applies filters to available parking options<br>6. System displays filtered results<br>6.1. System displays car parks that are sheltered if the sheltered parking needs filter is selected<br>6.2. System displays car parks within the selected distance radius<br>6.3. System recommends car parks based on the weather if the weather parking recommendations filter is selected<br>7. User can modify or clear filters as needed |
| Alternative Flows: | - |
| Exceptions: | - |
| Includes: | 1. Get Weather Parking Recommendations (UC-014)<br>2. Get Distance Information (UC-005)<br>3. Get Sheltered Parking Information (UC-004) |
| Special Requirements: | - |
| Assumptions: | - |
| Notes and Issues: | - |

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|---|---|---|---|
| Use Case ID: | UC-004 | | |
| Use Case Name: | Get Sheltered Parking Information | | |
| Created By: | Manasi | Last Updated By: | Glynis |
| Date Created: | 1 February 2025 | Date Last Updated: | 8 April 2025 |

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|---|---|
| Actor: | User, Guest |
| Description: | Provides users with comprehensive information about sheltered parking facilities, including covered parking spots, basement parking, multi-story car parks, and weather protection features. |
| Preconditions: | 1. Filter Features functionality is active<br>2. Sheltered parking data is available in the system<br>3. User has accessed the filter options |
| Postconditions: | 1. Sheltered parking options are displayed to user<br>2. Type of shelter/coverage is clearly indicated<br>3. Availability status of sheltered spots is shown |
| Priority: | High |
| Frequency of Use: | Frequent (Daily, especially during adverse weather - very applicable to Singapore which has prolonged monsoon seasons) |
| Flow of Events: | 1. System retrieves sheltered parking data<br>2. System displays available sheltered parking locations<br>3. System updates availability in real-time |
| Alternative Flows: | - |
| Exceptions: | - |
| Includes: | None |
| Special Requirements: | - |
| Assumptions: | - |
| Notes and Issues: | - |

| Use Case ID: | UC-005 | | |
|---|---|---|---|
| Use Case Name: | Get Distance Preferences | | |
| Created By: | Manasi | Last Updated By: | Glynis |
| Date Created: | 1 February 2025 | Date Last Updated: | 8 April 2025 |

| Actor: | User, Guest, Location Services |
|---|---|
| Description: | Provides users with accurate distance and travel time information between their location and parking facilities, to final destination and different route options. |
| Preconditions: | 1. Filter Features functionality is active<br>2. Location services (GPS) are enabled<br>3. User has accessed the filter options<br>4. Destination location is specified |
| Postconditions: | 1. Distance information is displayed to user<br>2. Alternative routes are available if applicable |
| Priority: | High |
| Frequency of Use: | Very frequent (Multiple times per search) |
| Flow of Events: | 1. User set a radius limit<br>2. System retrieves current location data<br>3. System filters and displays car parks based on the radius set by the user. |
| Alternative Flows: | - |
| Exceptions: | - |
| Includes: | None |
| Special Requirements: | - |
| Assumptions: | - |
| Notes and Issues: | - |

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|---|---|---|---|
| Use Case ID: | UC-006 | | |
| Use Case Name: | Show Recommended Car Park | | |
| Created By: | Manasi | Last Updated By: | Glynis |
| Date Created: | 1 February 2025 | Date Last Updated: | 8 April 2025 |

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|---|---|
| Actor: | User, Guest |
| Description: | Displays personalized car park recommendations based on user preferences, historical data, and current conditions including availability, distance, and facility features. |
| Preconditions: | 1. Search Destination functionality is active<br>2. User location is available<br>3. Car park data is accessible<br>4. Filter preferences are set (if any) |
| Postconditions: | 1. Recommended car parks are displayed<br>2. Recommendations are ranked by relevance<br>3. Key information for each recommendation is visible |
| Priority: | High |
| Frequency of Use: | Frequent (Multiple times per search) |
| Flow of Events: | 1. System analyzes available car parks based on filters (if any):<br>1.1. Distance preferences to nearby car parks<br>1.2. Weather parking recommendations<br>1.3. Sheltered parkings |
| Alternative Flows: | - |
| Exceptions: | - |
| Includes: | None |
| Special Requirements: | - |
| Assumptions: | - |
| Notes and Issues: | - |

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|---|---|---|---|
| Use Case ID: | UC-007 | | |
| Use Case Name: | View Car Park Details | | |
| Created By: | Manasi | Last Updated By: | Glynis |
| Date Created: | 1 February 2025 | Date Last Updated: | 8 April 2025 |

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|---|---|
| Actor: | User, Guest |
| Description: | Provides comprehensive details about a specific car park including real-time availability, facilities, entrance/exit points, operating hours, security features, and payment options. |
| Preconditions: | 1. Search Destination functionality is active<br>2. Car park data is available<br>3. User has selected a specific car park<br>4. System has access to real-time data |
| Postconditions: | 1. Detailed car park information is displayed<br>2. All available features are listed<br>3. Real-time status is shown<br>4. User can access navigation options |
| Priority: | High |
| Frequency of Use: | Frequent (a few times every search) |
| Flow of Events: | 1. User selects a specific car park<br>2. System retrieves comprehensive information:<br>2.1. Number of available parking spaces<br>2.2. Type of car park (Multi-storey car park, surface/multi- car park, covered car park, basement car park storey, mechanised car park)<br>2.3. Distance from user's current location<br>2.4. Address of car park<br>3. User can:<br>3.1. View real-time updates<br>3.2. Access navigation directions |
| Alternative Flows: | - |
| Exceptions: | - |
| Includes: | None |
| Special Requirements: | - |
| Assumptions: | - |
| Notes and Issues: | - |

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|---|---|---|---|
| Use Case ID: | UC-008 | | |
| Use Case Name: | Register Account | | |
| Created By: | Mayukhi | Last Updated By: | Glynis |
| Date Created: | 1 February 2025 | Date Last Updated: | 8 April 2025 |

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|---|---|
| Actor: | User |
| Description: | Allows a user to create a new account by providing necessary details such as email, password and confirm password. This enables the user to access personalized features of the system. |
| Preconditions: | 1. The user is on the registration page.<br>2. The system is connected to the database for storing account details. |
| Postconditions: | **Success:** The user's account is successfully created, and they are redirected to the login page.<br>**Failure:** The system informs the user of any errors through error messages. |
| Priority: | High |
| Frequency of Use: | Infrequent (only used when a new user registers) |
| Flow of Events: | 1. The user navigates to the "Register" page.<br>2. The user enters required information, including:<br>a. Email<br>b. Password<br>c. Confirm password<br>3. The system validates the input:<br>a. Checks if the email is unique<br>b. Checks if the password fits the security requirements<br>c. Ensure all mandatory fields are filled<br>d. Ensure that the entered password matches the confirmation password<br>4. If all inputs are valid:<br>a. The system stores the account details in the database.<br>b. A confirmation message “Account registered successfully” is displayed. |
| Alternative Flows: | AF-S3: If the inputs are invalid, it could be due to one of these 5<br><br>**Empty Input Fields:**<br><br>1. The system displays an error message that says “Email and Password cannot be empty”<br>2. The user fills up input fields.<br><br>**Invalid Email Format:**<br><br>1. The system displays an error message that says “Invalid email format. Please enter a valid email (e.g., example@domain.com)”<br>2. The user reenters a valid email format |

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| | **Email Already Taken:**<br><br>1. The system informs the user that the email is already registered.<br>2. The system displays “User already exists! Try logging in.”<br><br>**Weak Password:**<br><br>1. The system displays an error message that says “Password must be at least 8 characters long and contain at least one number and one special character.”<br>2. The user updates the password to meet requirements.<br><br>**Entered password does not match confirmation password:**<br><br>1. The system informs users that passwords do not match<br>2. The system displays “Passwords do not match! Please try again.”<br>3. The user reenters the passwords and ensures it matches. |
| Exceptions: | - |
| Includes: | None |
| Special Requirements: | - |
| Assumptions: | - |
| Notes and Issues: | - |

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|---|---|---|---|
| Use Case ID: | UC-009 | | |
| Use Case Name: | Forgot Password | | |
| Created By: | Manasi | Last Updated By: | Glynis |
| Date Created: | 1 February 2025 | Date Last Updated: | 8 April 2025 |

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|---|---|
| Actor: | User |
| Description: | Enables users to securely reset their forgotten password through a verification process, allowing them to regain access to their account. |
| Preconditions: | 1. User has an existing account in the system<br>2. User has access to their registered email<br>3. Login page is accessible |
| Postconditions: | 1. User's password is successfully reset<br>2. User can log in with new password<br>3. System sends confirmation of password change |
| Priority: | Low |
| Frequency of Use: | Occasional (Rarely needed by most users) |
| Flow of Events: | 1. User clicks "Forgot Password" option on login page<br>2. System prompts for user identification:<br>2.1. Registered email address<br>3. System verifies user exists<br>4. System generates and sends verification code:<br>4.1. Via email to registered email<br>5. User enters verification code<br>6. System validates code<br>7. System prompts for new password:<br>7.1. New password entry<br>7.2. Password confirmation<br>8. System validates password requirements<br>9. System updates password<br>10. System confirms successful password reset |
| Alternative Flows: | AF-S2: Empty input fields:<br>1. Display error message “Empty cannot be empty. Try again.”<br>2. The user clicks “Ok” and tries again.<br><br>AF-S2: Invalid email format:<br>1. The system displays an error message that says “Invalid email format. Please enter a valid email (e.g., example@domain.com)”<br>2. The user reenters a valid email format<br><br>AF-S2: Invalid email:<br>1. Display error message “User does not exists”<br>2. The user clicks “Ok” and tries again<br><br>AF-S5: Incorrect verification code:<br>1. Display error message “OTP is incorrect. Try again.”<br><br>AF-S6: Expired verification code: |

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| | 1. The system displays the message “OTP has expired. Please request a new one.”<br><br>AF-S7: Weak password:<br>1. The system displays an error message that says “Password must be at least 8 characters long and contain at least one number and one special character.”<br>2. The user updates the password to meet requirements.<br><br>AF-S8: Entered password does not match confirmation password:<br>1. The system informs users that passwords do not match<br>2. The system displays “Passwords do not match! Please try again.”<br>3. The user reenters the passwords and ensures it matches. |
| Exceptions: | - |
| Includes: | None |
| Special Requirements: | - |
| Assumptions: | - |
| Notes and Issues: | - |

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|---|---|---|---|
| Use Case ID: | UC-010 | | |
| Use Case Name: | Get Navigation | | |
| Created By: | Manasi | Last Updated By: | Glynis |
| Date Created: | 1 February 2025 | Date Last Updated: | 8 April 2025 |

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|---|---|
| Actor: | User, Guest, Location Service |
| Description: | Provides real-time navigation guidance to selected parking locations, including route optimization, turn-by-turn directions, alternative routes, and real-time traffic updates. Integrates with external location services for accurate navigation. |
| Preconditions: | 1. User has selected a destination car park<br>2. GPS/Location services are enabled<br>3. Device has internet connectivity<br>4. Location Service is operational<br>5. User has granted necessary location permissions |
| Postconditions: | 1. Navigation route is displayed to user<br>2. Turn-by-turn directions are available<br>3. Real-time updates are active<br>4. Route is optimized based on current conditions |
| Priority: | High |
| Frequency of Use: | Very Frequent (Multiple times daily) |
| Flow of Events: | 1. User requests navigation to selected car park<br>2. System initiates connection with Location Service<br>3. Location Service returns route data<br>4. System displays navigation interface:<br>4.1. Map view with current location<br>4.2. Selected car park location<br>4.3. Recommended route<br>4.4. Rerouting when user deviates<br>5. System begins turn-by-turn navigation:<br>5.1. Visual instructions<br>5.2. Distance to next turn<br>6. System provides continuous updates:<br>6.1. Real-time traffic updates<br>6.2. Route recalculation if needed<br>7. System monitors approach to destination:<br>7.1. Entrance approach guidance<br>7.2. Final parking instructions |
| Alternative Flows: | AF-S4.4: Better route becomes available:<br>1. Alert user of faster route<br>2. Offer route switch option<br><br>AF-6.2: User deviates from route:<br>1. Automatic route recalculation<br>2. Update navigation instructions |
| Exceptions: | - |
| Includes: | None (But interfaces with Location Services) |
| Special Requirements: | - |
| Assumptions: | - |

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| Notes and Issues: | - |

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|---|---|---|---|
| Use Case ID: | UC-011 | | |
| Use Case Name: | View History | | |
| Created By: | Mayukhi | Last Updated By: | Glynis |
| Date Created: | 2 February 2025 | Date Last Updated: | 8 April 2025 |

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|---|---|
| Actor: | User |
| Description: | Allows users to either select Search History or Parking Location |
| Preconditions: | 1. User is logged into the app.<br>2. Device has internet connectivity (for real-time data retrieval). |
| Postconditions: | 1. User successfully views the search history.<br>2. User successfully views the parking location |
| Priority: | Medium |
| Frequency of Use: | Occasional |
| Flow of Events: | 1. User selects the "History" tab from the bottom of the app.<br>2. System displays the following, including:<br>a. Search History<br>b. Parking Location |
| Alternative Flows: | - |
| Exceptions: | - |
| Includes: | None |
| Special Requirements: | - |
| Assumptions: | - |
| Notes and Issues: | - |

| Use Case ID: | UC-012 | | |
|---|---|---|---|
| Use Case Name: | View Search History | | |
| Created By: | Mayukhi | Last Updated By: | Glynis |
| Date Created: | 2 February 2025 | Date Last Updated: | 8 April 2025 |

| Actor: | User |
|---|---|
| Description: | Allows users to view their past searches, including details such as destination, timestamps, and date (if applicable). |
| Preconditions: | 1. User is logged into the app.<br>2. Device has internet connectivity (for real-time data retrieval). |
| Postconditions: | 1. User successfully views the search history.<br>2. History is displayed in an organized manner. |
| Priority: | Medium |
| Frequency of Use: | Occasional |
| Flow of Events: | 1. User selects the "Search History" option from the history page.<br>2. System retrieves search history from stored records.<br>3. System displays a list of past searches, including:<br>a. Date and time of search location<br>b. Destination |
| Alternative Flows: | AF-S2: No Parking History Available:<br>1. System displays a message: "No search history available." |
| Exceptions: | - |
| Includes: | None |
| Special Requirements: | - |
| Assumptions: | - |
| Notes and Issues: | - |

| Use Case ID: | UC-013 | | |
|---|---|---|---|
| Use Case Name: | Take Picture of Parking Location | | |
| Created By: | Mayukhi | Last Updated By: | Glynis |
| Date Created: | 4 February 2025 | Date Last Updated: | 8 April 2025 |

| Actor: | User, Guest |
|---|---|
| Description: | Allows users to save their parking location by choosing a photo from a photo album and writing a note within the app (optional). This helps users remember where they parked, especially in large or crowded parking areas. The stored information can be accessed later when retrieving the car. |
| Preconditions: | 1. User is logged into the app.<br>2. User has granted necessary permissions to access the gallery (photo album, location). |
| Postconditions: | 1. Parking location is successfully saved.<br>2. Users can retrieve the saved location, photo and note when needed.<br>3. The data is stored until the user deletes it or the user logs out. |
| Priority: | Medium |
| Frequency of Use: | Occasional |
| Flow of Events: | 1. User selects the "Parking Location" option in the history page.<br>2. System provides two options:<br>2.1. New location -> Upload Photo (picture is taken from photo album)<br>2.2. Add description (optional)<br>3. User inputs the relevant information.<br>4. User clicks on “Save Location” and the system stores the saved parking details.<br>5. Users can later access the saved location via the "View Saved Picture" section. |
| Alternative Flows: | AF-S5: User Deletes the Saved Location:<br>1. User clicks “Clear Saved Location” to remove the saved parking details. |
| Exceptions: | - |
| Includes: | None |
| Special Requirements: | - |
| Assumptions: | - |
| Notes and Issues: | - |

| Use Case ID: | UC-014 | | |
|---|---|---|---|
| Use Case Name: | Get weather parking recommendation | | |
| Created By: | Yun Jia | Last Updated By: | Glynis |
| Date Created: | 2 April 2025 | Date Last Updated: | 8 April 2025 |

| Actor: | User, Guest |
|---|---|
| Description: | Suggests users with sheltered car parks when it is raining. |
| Preconditions: | 1. Filter Features functionality is active<br>2. Sheltered parking data is available in the system<br>3. User has accessed the filter options |
| Postconditions: | 1. Sheltered parking options are displayed to user<br>2. Type of shelter/coverage is clearly indicated<br>3. Availability status of sheltered spots is shown |
| Priority: | High |
| Frequency of Use: | Frequent (Daily, especially during adverse weather - very applicable to Singapore which has prolonged monsoon seasons) |
| Flow of Events: | 1. System retrieves weather forecast<br>2. System retrieves and recommends sheltered parking data when the weather forecast is either light rain, moderate rain, heavy rain, passing showers, thundery showers, heavy thundery showers, heavy thundery showers with gusty winds, cloudy or showers.<br>3. System displays available sheltered parking locations<br>4. System updates availability in real-time |
| Alternative Flows: | - |
| Exceptions: | - |
| Includes: | None |
| Special Requirements: | - |
| Assumptions: | - |
| Notes and Issues: | - |