Project Name: Lab 2 Deliverables
Course Name: SC2006 Software Engineering
Lab Group: SCSA
Group Number: 2

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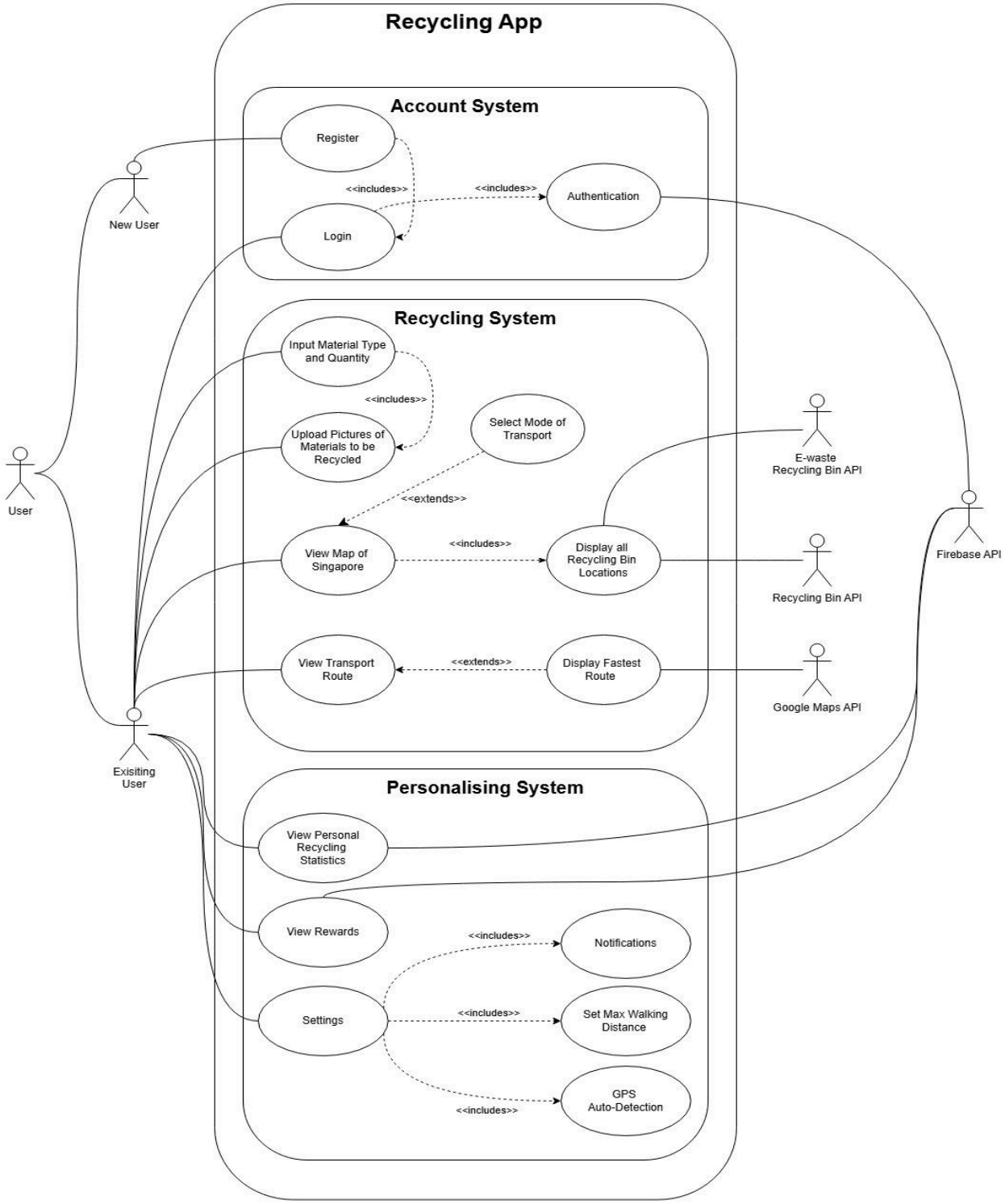
Refined Use Case Model & Descriptions

1. Use Case Diagram



2. Use Case Descriptions

I. Account Management

A. Register

Use Case ID:	#1-1		
Use Case Name:	Register		
Created By:	Ngo Zong Han	Last Updated By:	Ngo Zong Han
Date Created:	17 February 2025	Date Last Updated:	17 February 2025

Actor:	User.
Description:	The user creates a new account by providing necessary personal details (such as username, email, and password).
Preconditions:	The user has basic knowledge of digital form inputs.
Postconditions:	The system stores the user's registration details securely in the database. A confirmation message is displayed to the user, and an verification email is sent. The user is redirected to the login page.
Priority:	High
Frequency of Use:	Medium
Flow of Events:	1. The user launches the application and selects the option to register a new account. 2. The system displays the registration form, including fields for username, email, password, and any other required details. 3. The user fills in the registration form with valid and complete information.

	4. The system validates the input, checking for proper email format, password strength, and username uniqueness. 5. Upon successful validation, the system creates the new user account and securely stores the provided data. 6. The system sends a confirmation email or displays an on-screen success message. 7. The user is directed to the login page.
Alternative Flows:	If the user enters an invalid email address or weak password, the system displays an error message and prompts for correction. If the chosen username already exists, the system requests the user to select a different username. If the user decides to cancel the registration process, they can exit and be redirected to the home page.
Exceptions:	If connectivity issues occur during registration, the system displays an error message with an option to retry the registration process.
Includes:	Login
Special Requirements:	User credentials must be securely encrypted during transmission and storage.
Assumptions:	The user does not already have an existing account with the system. The user is familiar with basic digital form operations.
Notes and Issues:	Adding social media registration options to enhance user convenience.

B. Login

Use Case ID:	#1-2		
Use Case Name:	Login		
Created By:	Ngo Zong Han	Last Updated By:	Ngo Zong Han
Date Created:	17 February 2025	Date Last Updated:	17 February 2025

Actor:	User.
Description:	The user logs into the application by providing valid credentials (such as username or email and password). This process ensures that personalized settings and account data are securely loaded for the authenticated user.
Preconditions:	The user must have an existing account with the system. The user has navigated to the login page.
Postconditions:	The system authenticates the user's credentials and grants access to their account. The user’s personalized settings and data are loaded into the session.
Priority:	High
Frequency of Use:	High
Flow of Events:	1. The user navigates to the login page. 2. The system displays the login form with fields for username/email and password. 3. The user enters their valid login credentials. 4. The system validates the credentials against stored data. 5. Upon successful validation, the system logs the user in and redirects them to the homepage.

	6. The system loads and displays the user's personalized settings and account information.
Alternative Flows:	If the user enters invalid credentials (e.g., incorrect password or unrecognized username/email), the system displays an error message prompting the user to re-enter the correct information.
Exceptions:	If connectivity issues occur during the login process, the system displays an error message and provides an option to retry the login. If multiple unsuccessful login attempts are detected, the system may temporarily lock the account for security purposes.
Includes:	Authentication
Special Requirements:	User credentials must be securely transmitted and stored using encryption.
Assumptions:	The user already has an existing account with valid login credentials. The system is functioning normally with stable connectivity to the server and database.
Notes and Issues:	Implementing social media login options to streamline the login process.

C. Authentication

Use Case ID:	#1-3		
Use Case Name:	Authentication		
Created By:	Ngo Zong Han	Last Updated By:	Ngo Zong Han
Date Created:	17 February 2025	Date Last Updated:	17 February 2025

Actor:	User.
Description:	The system authenticates the user by verifying their credentials using Firebase Authentication. This service securely validates the user's identity and issues an authentication token that allows the user to access the application's protected areas.
Preconditions:	The user has an existing account with valid credentials stored in Firebase. The user has successfully submitted their credentials via the login interface. The application has an active internet connection.
Postconditions:	The user's identity is verified, and an authentication token is generated. The authentication token is stored for session management.
Priority:	High
Frequency of Use:	High
Flow of Events:	1. The user submits their login credentials through the login interface. 2. The application sends the credentials to Firebase Authentication.

	3. Firebase Auth validates the credentials against its stored user data. 4. On successful validation, Firebase Auth returns an authentication token and user details. 5. The system stores the authentication token and establishes a user session. 6. The user is redirected to the secure section of the application.
Alternative Flows:	If the user's credentials are invalid, Firebase Auth returns an error, prompting the system to display an error message and offer options to retry or initiate password recovery.
Exceptions:	If connectivity issues occur during the authentication process, the system displays an error message and offers a retry option. If Firebase Auth is temporarily unavailable, the system notifies the user and advises them to try again later.
Includes:	None
Special Requirements:	None
Assumptions:	The user has an active internet connection to reach Firebase Auth. Firebase Auth is correctly configured and integrated with the application.
Notes and Issues:	None

II. Establishing Material Type and Quantity

A. Input Material Type and Quantity

Use Case ID:	#2-1		
Use Case Name:	Input Material Type and Quantity		
Created By:	Ngo Zong Han	Last Updated By:	Ngo Zong Han
Date Created:	31 January 2025	Date Last Updated:	7 February 2025

Actor:	User
Description:	The user selects the material type and quantity they would like to recycle. This information is used to display the recycling bins that accept these materials.
Preconditions:	The user must have the application open. The user must be signed in.
Postconditions:	The system stores the user's entered material parameters. The system prepares to compute an optimised route to the nearest recycling bin.
Priority:	High
Frequency of Use:	High
Flow of Events:	1. The user launches the app. 2. The system prompts the user to select the material type from a predefined list. 3. The user selects the material type. 4. The system prompts the user to enter their material quantity in pieces (1-2 bottles etc.). 5. The system validates the material type and quantity.

	6. Upon successful validation, the system stores the entered data. 7. The system redirects the user to the map that shows the route to the nearest recycling bin from the user's location.
Alternative Flows:	If the user enters an invalid quantity (e.g., negative numbers, non-numeric characters), the system displays an error message and requests correction. If the user opts to skip entering a quantity, the system prompts the user to enter a quantity continuously until done so. If at any point during this process, the user chooses to stop entering the material quantity or type, they can press the back button and be redirected to the home page.
Exceptions:	If the system fails to load the material type list due to connectivity issues, an error message is displayed, and the user can retry. If the system encounters an unexpected error during validation, an error message is displayed with an option to restart the process.
Includes:	Upload Pictures of Materials to be Recycled
Special Requirements:	The material type list must be regularly updated to adapt to new materials supported by recycling bins.
Assumptions:	The user knows the type and approximate quantity of materials they intend to recycle.
Notes and Issues:	Implement a feature that auto-completes user's material type entry with their most frequent recycled material.

B. Image Material Recognition

Use Case ID:	#2-2		
Use Case Name:	Upload Pictures of Materials to be Recycled		
Created By:	Ngo Zong Han	Last Updated By:	Ngo Zong Han
Date Created:	31 January 2025	Date Last Updated:	7 February 2025

Actor:	User
Description:	The user uploads pictures of the material they would like to recycle. The system will then detect the material type and quantity they would like to cycle. This information is used to display the recycling bins that accept these materials.
Preconditions:	The user must have the application open. The user must be signed in.
Postconditions:	The system stores the user's entered material parameters. The system prepares to compute an optimised route to the nearest recycling bin.
Priority:	High
Frequency of Use:	High
Flow of Events:	1. The user launches the app. 2. The user uploads pictures of the materials they would like to recycle. 3. The system will identify the type and amount of materials to be recycled 4. The system validates the material type and quantity. 5. Upon successful validation, the system stores the entered data.

	6. The system redirects the user to the map that shows the route to the nearest recycling bin from the user's location.
Alternative Flows:	If the system detects an unsupported recyclable material, it will flag the issue and not allow the user to proceed with finding the nearest recycling bin until they upload a new picture of a valid material type. If at any point during this process, the user chooses to not upload the picture, they can press the back button and be redirected to the home page.
Exceptions:	If the system fails to process the image due to poor quality or unrecognized material, an error message is displayed, and the user is prompted to upload a clearer image. If the system encounters an unexpected error during validation, an error message is displayed with an option to restart the process.
Includes:	None
Special Requirements:	The system should support image recognition for various recyclable materials. The system should allow users to retake or re-upload images whenever necessary.
Assumptions:	The user has a camera or access to stored images for uploading. The system has access to an updated database of recyclable materials.
Notes and Issues:	Consider integrating AI-powered image recognition to improve material detection accuracy. Explore implementing a guide or tips for users to take clear images for better recognition.

III. Display Recycling Bins

A. View Map

Use Case ID:	#3-1		
Use Case Name:	View Map of Singapore		
Created By:	Ngo Zong Han	Last Updated By:	Ngo Zong Han
Date Created:	1 February 2025	Date Last Updated:	7 February 2025

Actor:	User
Description:	The app will display a map of Singapore. The system will automatically display all available recycling bin locations on the map.
Preconditions:	The system has access to real-time locations of recycling bins via the API. The user must have an active internet connection to load the locations of recycling bins.
Postconditions:	The system successfully displays the map of Singapore with all available recycling bins. If the user selects a recycling bin, the system prepares to compute an optimised route to the recycling bin.
Priority:	High
Frequency of Use:	High
Flow of Events:	1. The user navigates to the View Map feature. 2. The system retrieves recycling bin locations from an API 3. The system loads and displays a map of Singapore 4. The system overlays all available recycling bin locations on the map

	5. The user can tap on a bin location and view specific information about the selected recycling bin 6. The system will prepare to calculate the optimised route for the specific recycling bin
Alternative Flows:	**Filtering:** The user applies filtering 1. The system will reload the recycling bin locations based on the filters selected by the user - material type - distance etc. 2. The user can tap on a bin location and view specific information about the selected recycling bin 3. The system will prepare to calculate the optimised route for the specific recycling bin
Exceptions:	If the API fails to retrieve the recycling bin locations, the system will display an error message. If there is no internet connection, the system will display a prompt asking the user to check their network connection. If no bins are found after applying filters, the system will display a message indicating no bins are found.
Includes:	Display All Recycling Bin Locations
Special Requirements:	The app must support interactive map features (zoom, pan, and search). The API should provide real-time recycling bin data.
Assumptions:	The recycling bin data is updated regularly from the API. The user has enabled location services for accurate filtering by distance.
Notes and Issues:	Consider implementing caching - on nearby bins so that bins are available to the user even without internet access. - on the last successful API response so users can still view bin locations if they lose internet access.

B. Recycling Bin Locations

Use Case ID:	#3-2		
Use Case Name:	Display all Recycling Bin Locations		
Created By:	Ngo Zong Han	Last Updated By:	Ngo Zong Han
Date Created:	1 February 2025	Date Last Updated:	7 February 2025

Actor:	User
Description:	The app will display a list of all recycling bin locations in a table, where each bin is depicted in a card view. Users can scroll through the list and tap on a bin to view detailed information such as location, accepted materials, and images.
Preconditions:	The system has access to real-time locations of recycling bins via the API. The user must have an active internet connection to load the locations of recycling bins.
Postconditions:	The system displays specific information (images etc.) about the selected bin. The system prepares to compute an optimised route if the user chooses to navigate to the selected bin.
Priority:	Medium
Frequency of Use:	Medium
Flow of Events:	1. The user navigates to the View List of Recycling Bins feature 2. The system fetches real-time recycling bin locations from the API. 3. The system loads and displays all recycling bins in a list format

	4. The user scrolls through the list and selects a bin to view more details 5. The system displays the selected bin's information
Alternative Flows:	**Filtering:** The user applies filtering 1. The system will reload the recycling bin based on the filters selected by the user 2. The user then selects a bin and can view specific information about the selected recycling bin
Exceptions:	If the API fails to retrieve the recycling bin locations, the system will display an error message. If there is no internet connection, the system will display a prompt asking the user to check their network connection. If no bins are found after applying filters, the system will display a message indicating no bins are found.
Includes:	Display Nearest Recycling Bin
Special Requirements:	The app must support interactive sorting and filtering of the list. The card view should be visually clear with key details visible at a glance.
Assumptions:	The recycling bin data is updated regularly from the API. The user has enabled location services for accurate filtering by distance.
Notes and Issues:	Consider adding a feature that implements caching on the user's "favourite" recycling bin to allow them to view it without internet access Implement a search bar to allow users to quickly find a recycling bin by name or address to enhance user experience.

IV. Display Routes

A. Mode of Transport

Use Case ID:	#4-1		
Use Case Name:	Select Mode of Transport		
Created By:	Ngo Zong Han	Last Updated By:	Ngo Zong Han
Date Created:	2 February 2025	Date Last Updated:	7 February 2025

Actor:	User
Description:	The user selects their mode of transport towards the recycling bins (car, public transport, walking). This will determine how the system computes the route.
Preconditions:	The user must have successfully selected a recycling bin location. The system must have access to routing data for all available transport modes. The user must have an active internet connection to retrieve route information.
Postconditions:	The system stores the selected transport mode. The system computes and displays the optimal route to the recycling bin based on the chosen mode of transport.
Priority:	High
Frequency of Use:	High
Flow of Events:	1. The system presents the transport modes available to get to the selected destination 2. The user selects a transport mode

Alternative Flows:	**User Changes Transport Mode:** 1. The user selects a different transport mode after the route has been displayed. 2. The system recomputes and updates the route accordingly.
Exceptions:	If the system cannot retrieve route data (e.g., due to an API failure or internet issues), an error message is displayed, and the user is prompted to try again. If no valid route is found for the selected mode of transport, the system suggests an alternative mode.
Includes:	None
Special Requirements:	The system should allow switching of transport modes in other use cases if the user decides to change.
Assumptions:	Routing data from Google Maps API is retrievable and up to date.
Notes and Issues:	Ensure that walking and public transport routes consider accessibility factors (e.g., pedestrian paths, bus interchanges). Ensure that real-time transport updates (ex. MRT breakdowns and Bus Delays) are accounted for if available.

B. Transport Route

Use Case ID:	#4-2		
Use Case Name:	View Transport Route		
Created By:	Ngo Zong Han	Last Updated By:	Ngo Zong Han
Date Created:	2 February 2025	Date Last Updated:	7 February 2025

Actor:	User
Description:	The system computes all possible routes based on the user's selected mode of transport and presents them to the user. The user selects their preferred transport route, which will be displayed on the map.
Preconditions:	The user must have selected their mode of transport. The user must have selected their preferred recycling bin. The user must have enabled location services for real-time positioning and navigation. The system must have access to the routing APIs.
Postconditions:	The system displays multiple route options based on the user's selected transport mode. The system overlays the selected route on the map for navigation.
Priority:	High
Frequency of Use:	High
Flow of Events:	1. The user selects a recycling bin 2. The system retrieves routing data and computes all the possible routes to the recycling bin 3. After computation, the system displays these routes to the user

	4. The user selects their desired route. 5. The user follows the suggested route.
Alternative Flows:	**User Changes Transport Mode Midway:** 1. The user decides to switch to a different mode of transport. 2. The system recalculates the route and updates the display accordingly. **User Requests Route Filtering:** 1. The user applies filters (ex. preferring sheltered paths, fewer transfers for public transport). 2. The system recalculates and updates the list of possible routes accordingly.
Exceptions:	**Location Services Disabled:** - If the user has not enabled location services, the system prompts them to enable it. - If the user refuses, the system cannot provide real-time navigation but can still display a static route.
Includes:	None
Special Requirements:	The system should integrate with Google Maps for accurate navigation.
Assumptions:	The routing APIs used must provide accurate and up-to-date transport information. The user has a stable internet connection to load and update route data.
Notes and Issues:	Adding an offline mode to store the last known route if the user loses internet connectivity. Implementing saved routes so users can reuse preferred transport options.

C. Fastest Route

Use Case ID:	#4-3		
Use Case Name:	Display Fastest Route to Recycling Bin		
Created By:	Ngo Zong Han	Last Updated By:	Ngo Zong Han
Date Created:	2 February 2025	Date Last Updated:	7 February 2025

Actor:	User
Description:	The system computes and displays the fastest possible route to the selected recycling bin based on real-time traffic, transport schedules, and walking conditions. This allows the user to take the most efficient route available without manually selecting a transport path.
Preconditions:	The user must have selected a recycling bin. The user must have enabled location services to determine their current position. The user must have an internet connection. The system must have access to the routing API.
Postconditions:	The system displays the fastest route to the selected recycling bin. The system continuously updates the route if any changes occur.
Priority:	High
Frequency of Use:	High
Flow of Events:	1. The user selects a recycling bin from the map or list. 2. The user selects a mode of transport. 3. The system calculates the fastest available route to the recycling bin.

	4. The system overlays the fastest route on the map. 5. The user follows the fastest route.
Alternative Flows:	**User Decides to Switch Transport Mode:** 1. The user selects a different transport mode (e.g., from walking to public transport). 2. The system recalculates the fastest route based on the new transport mode. 3. The user follows the new route. **User Overrides the Fastest Route:** 1. The user may choose to take an alternative route instead of the fastest one. 2. The system continues to provide navigation but does not enforce route adherence.
Exceptions:	If the user loses their internet connection, the system warns them that real-time updates are unavailable but continues displaying the route. If the external routing API fails to calculate the distance, the system will prompt the user to try again.
Includes:	None
Special Requirements:	The system must support real-time navigation and updates for the fastest route. The system should offer other routes in case the fastest route computing fails.
Assumptions:	The API used can provide accurate transport and traffic data.
Notes and Issues:	Implementing offline mode support by caching the last-known fastest route.

V. Display Personal Contributions

A. View Personal Statistics

Use Case ID:	#5-1		
Use Case Name:	View Personal Recycling Statistics		
Created By:	Ngo Zong Han	Last Updated By:	Ngo Zong Han
Date Created:	3 February 2025	Date Last Updated:	7 February 2025

Actor:	User
Description:	The user can view their personal recycling statistics in the form of graphs and pie charts. The system tracks and visualises data such as total materials recycled, material types, and recycling frequency over time.
Preconditions:	The user must be logged into their account. The user must have an active internet connection to fetch updated statistics from the database
Postconditions:	The system successfully displays the user's personal recycling statistics in a visual format. If the user has no recycling history, the system prompts them to start recycling.
Priority:	Medium
Frequency of Use:	Medium
Flow of Events:	1. The user navigates to their recycling statistics page. 2. The system directs the user to their personal statistics and recycling history. 3. The system retrieves the user's recycling data from the database. 4. The system displays the user's recycling data into graphs and pie charts.

Alternative Flows	**User Has No Recycling History:** 1. The system informs the user that no data is available yet. 2. The system provides suggestions on materials to recycle and prompt messages encouraging them to recycle. **User Applies Filters on Data:** 1. The user selects specific filters (ex. last 7 days, monthly, yearly, material type). 2. The system reloads and updates the graphs accordingly.
Exceptions:	If the system fails to retrieve the user's data from the database, an error message is displayed. If the user does not have an internet connection, a prompt is displayed asking the user to check their internet.
Includes:	None
Special Requirements:	The system must provide interactive and easy to understand visualisations.
Assumptions:	The user has engaged in recycling activities and their data has been stored in the database. The database can store the user's recycling data.
Notes and Issues:	Ensuring that the system updates statistics in real-time whenever the user recycles new materials.

VI. Rewards

A. View Rewards

Use Case ID:	#6-1		
Use Case Name:	View Rewards		
Created By:	Ngo Zong Han	Last Updated By:	Ngo Zong Han
Date Created:	17 February 2025	Date Last Updated:	17 February 2025

Actor:	User.
Description:	The user accesses the rewards section to view their current point balance, explore available rewards, and review details about each voucher.
Preconditions:	The user is logged into their account. The user has accumulated recycling points from previous recycling activities. The rewards catalog is available and updated in the system.
Postconditions:	The user's current point balance and available rewards are displayed. The user is informed of any additional points needed for certain rewards.
Priority:	Medium
Frequency of Use:	Medium
Flow of Events:	1. The user navigates to the rewards section from the main dashboard or menu. 2. The system retrieves the user's current recycling points and the rewards catalog from the database.

	3. The system displays a list of available rewards, including details such as reward descriptions, required points for redemption, and voucher validity. 4. The user browses the rewards list and may select a reward to view additional details. 5. The system presents detailed information for the selected reward, including terms and conditions for redemption.
Alternative Flows	If the user does not have sufficient points to redeem any rewards, the system displays a message indicating the number of additional points needed and may offer suggestions on how to earn more points. If the user selects a reward, the system provides an expanded view with comprehensive details and instructions for redemption.
Exceptions:	If there is a connectivity issue or failure to retrieve the rewards data, the system displays an error message and prompts the user to retry.
Includes:	None
Special Requirements:	The rewards catalog must update in real-time to reflect any changes in available rewards and user point balances.
Assumptions:	The user understands how recycling activities contribute to earning points.
Notes and Issues:	None

VII. Settings

A. Configure Settings

Use Case ID:	#7-1		
Use Case Name:	View Personal Recycling Statistics		
Created By:	Ngo Zong Han	Last Updated By:	Ngo Zong Han
Date Created:	3 February 2025	Date Last Updated:	7 February 2025

Actor:	User.
Description:	The user can customise their preferences such as notifications, max walking distance to their preferred recycling bin, and GPS detection.
Preconditions:	The user has launched the app and signed in. The system has loaded the default or previously saved settings.
Postconditions:	The user preferences are saved and applied to the app.
Priority:	Medium
Frequency of Use:	Medium
Flow of Events:	1. The user navigates to the settings page. 2. The system will display a list of settings the user can customise. 3. The user changes their settings. 4. The system updates the settings and applies them to the app. 5. The user receives confirmation that their preferences have been updated.

Alternative Flows	**User Cancels Changes:** 1. The user navigates away from the settings page without saving the changes 2. The system tells the user that their settings weren't updated. **User Reset Settings:** 1. The user clicks on the reset settings button 2. The system will reset all preferences to default/factory settings
Exceptions:	If the user is offline, the system prompts the user to try again before trying to save settings.
Includes:	Notifications Max Walking Distance GPS Auto-Detection
Special Requirements:	Settings should be stored in a cloud database so that changes remain active even after restarting the app.
Assumptions:	The user understands how the settings listed in the app operate.
Notes and Issues:	Implement a feature that allows the user to preview how certain changes will affect the app.

B. Notifications

Use Case ID:	#7-2		
Use Case Name:	Notifications		
Created By:	Ngo Zong Han	Last Updated By:	Ngo Zong Han
Date Created:	3 February 2025	Date Last Updated:	7 February 2025

Actor:	User
Description:	The user can set their preferences for notifications (allow/disallow). The app will send notifications such as encouraging the user to recycle and route notifications when navigating to a recycling bin.
Preconditions:	The user has launched the app and signed in.
Postconditions:	The system saves the user's notification preferences.
Priority:	Medium
Frequency of Use:	Medium
Flow of Events:	1. The user navigates to the settings page. 2. The system displays the notification settings. 3. The user toggles options to enable or disable notifications. 4. The system saves the updated notification preferences.
Alternative Flows	**User Cancels Changes:** 1. The user navigates away from the settings page without saving the changes 2. The system tells the user that their settings weren't updated. 3. Notifications will automatically be enabled for the user.

Exceptions:	If the user enables notifications but has denied app permissions, the system prompts them to enable notifications in system settings.
Includes:	None
Special Requirements:	None
Assumptions:	The user has their preferences on which type of notifications they prefer.
Notes and Issues:	None.

C. Max Walking Distance

Use Case ID:	#7-3		
Use Case Name:	Max Walking Distance		
Created By:	Ngo Zong Han	Last Updated By:	Ngo Zong Han
Date Created:	3 February 2025	Date Last Updated:	7 February 2025

Actor:	User
Description:	The user sets a maximum walking distance they prefer to the location of the recycling bin. If the user selects "walking" as their mode of transport, the system will only suggest bins within the defined distance during route optimisation.
Preconditions:	The user has launched the app and is signed in
Postconditions:	The system stores the walking distance preferred by the user.

	Future “walking” routes will take into consideration the walking limit of the user.
Priority:	Medium
Frequency of Use:	Medium
Flow of Events:	1. The user navigates to the settings page. 2. The system displays an option to set the max walking distance. 3. The user selects their preferred walking limit (ex. 500m, 1km). 4. The system saves the updated preference. 5. The user navigates to view map and selects “walking” as their mode of transport. 6. The system shows recycling bins that are within the preferred walking distance.
Alternative Flows	**User Cancels Changes:** 1. The user navigates away from the settings page without saving the changes 2. The system tells the user that their settings weren’t updated.
Exceptions:	If no recycling bins exist within the user’s max walking distance, the system will prompt the user to expand their distance range.
Includes:	None
Special Requirements:	None
Assumptions:	The user prefers nearer recycling bins which are walkable. The system can accurately calculate walking distances.
Notes and Issues:	None

D. GPS

Use Case ID:	#7-4		
Use Case Name:	GPS Auto-Detection		
Created By:	Ngo Zong Han	Last Updated By:	Ngo Zong Han
Date Created:	3 February 2025	Date Last Updated:	7 February 2025

Actor:	User
Description:	The user enables or disables GPS auto-detection in the app settings. If enabled, the system will automatically detect the user's location when selecting a recycling bin, removing the need for manual location input.
Preconditions:	The user has launched the app and signed in. The user's device supports GPS functionality. The app has permission to access the device's location.
Postconditions:	The system stores the GPS auto-detect preference. When the user selects a recycling bin, the system will attempt to auto-detect the user's location before requiring manual input.
Priority:	Medium
Frequency of Use:	Medium
Flow of Events:	1. The user navigates to the settings page. 2. The system displays an option to allow GPS autodetection. 3. The user allows GPS auto-detect. 4. The system saves the setting. 5. The user navigates to the view map page and selects a recycling bin.

	6. The system auto-detects the user's current location and computes routes based on the user's selected mode of transport.
Alternative Flows	**The user disables GPS auto-detect:** 1. The user disallows GPS auto-detect. 2. The user navigates to the view map page and selects a recycling bin. 3. The system prompts the user to enter a starting location before computing routes.
Exceptions:	If the system fails to detect the user's location, an error message is displayed, and the user is prompted to enter their location manually. If the user's device does not support GPS functionality, the system will disable the GPS setting and require manual location input.
Includes:	None
Special Requirements:	The app must comply with privacy regulations regarding location tracking and permissions.
Assumptions:	The user's device has GPS functionality.
Notes and Issues:	GPS accuracy may vary underground or in areas with poor signal reception.