

ITSMAP Smartphone Applikationer

Garbage monitoring App

App Project Report

ITSMAP 16 – 02

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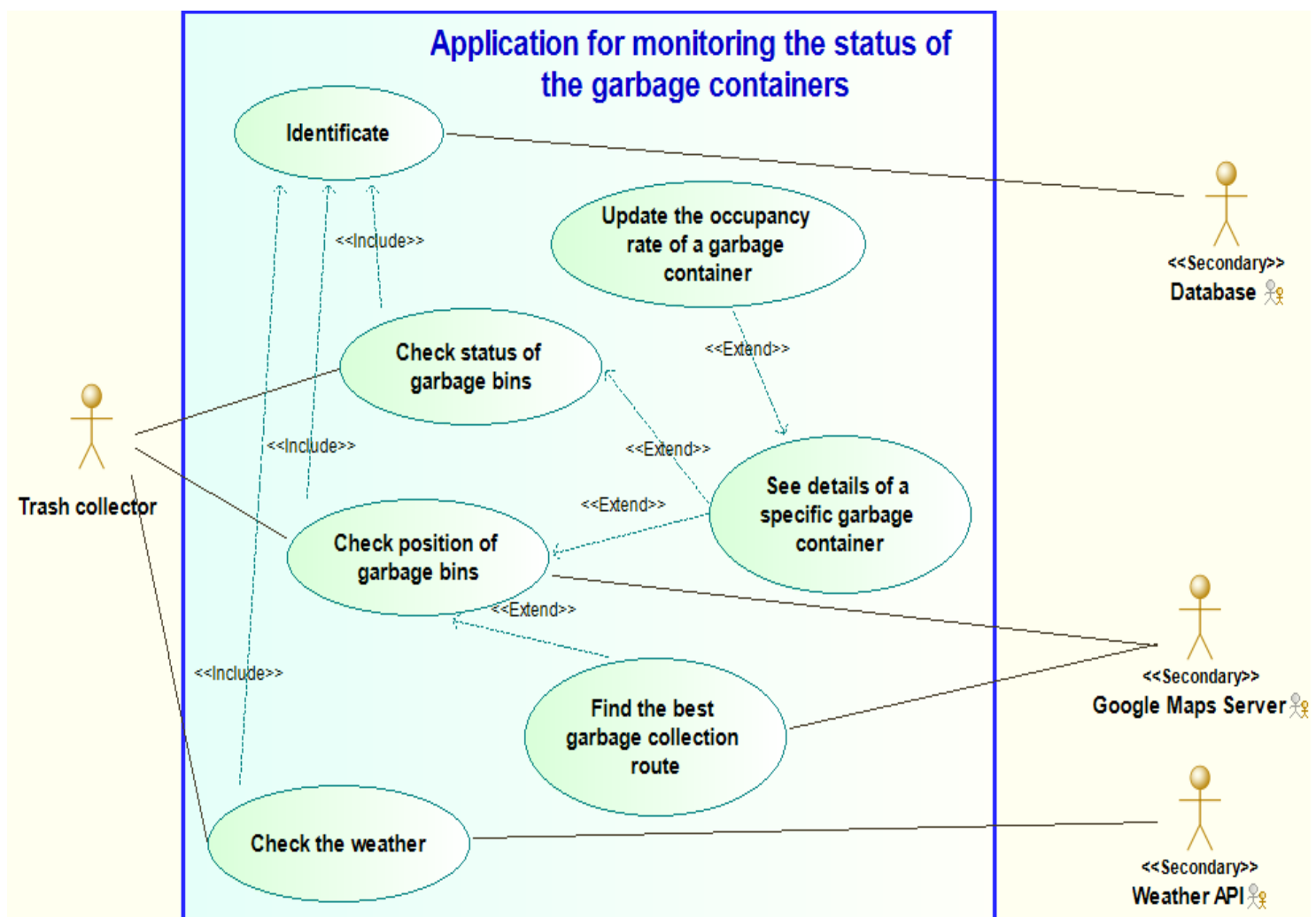
1. General Overview

A. Summary

The purpose of this application is to serve as an intermediate between our iot garbage bin and the user. The main features are the authentication system, a visual localization of the bins with a map, and checking the bin's statuses, which can be achieved either through a textual overview, or through the map API.

B. Use case view

Diagram



Use cases specifics

Name	Authenticate
Goals	Access the application
Preconditions	Have an internet connection
	Trash collector needs a smartphone
Post-condition	The user's smartphone and the server are connected
Nominal Scenario	1: The app opens the activity of the authentication
	2: User fills his login and his password
	3: User chooses the button "Log in"
	4: The server checks his login and his password
	5: The server allows the app to open the next activity
Alternative Scenario	2.a User decides to quite the app
Error Scenario	4.a The login or the password is incorrect -> The app shows the message "Invalid password" or "Invalid login"

Name	Check status of garbage bins
Goals	Know how full are garbage bins emptied
Preconditions	All the system has to work
	Have an internet connection
	Trash collector needs a smartphone
Post-condition	The user's smartphone and the system are connected
Nominal Scenario	1: The app opens the activity of the main menu
	2: User select "Check the status"
	3: The app opens the list of garbage bins
	4: User consults the list
Alternative Scenario	2.a User decides to log out
	2.b User chooses another option of the menu
	4.a User decides to return to the menu

Name	Check position of garbage bins
Goals	See on a map the position of trash containers
Preconditions	All the system has to work
	Have an internet connection
	Trash collector needs a smartphone
Post-condition	The user's smartphone and the system are connected
Nominal Scenario	1: The app opens the activity of the main menu
	2: User select "Show on map"
	3: The app opens the map with the location of the garbage bins
	4: User consults the map
Alternative Scenario	2.a User decides to log out
	2.b User chooses another option of the menu
	4.a User decides to return to the menu
Error Scenario	3.a App can't find your position

Name	See details of a specific garbage container
Goals	See a description of a specific garbage bin with many details
Preconditions	All the system has to work
	Have an internet connection
	Trash collector needs a smartphone
Post-condition	The user's smartphone and the system are connected
Nominal Scenario	1: The app is running the list of garbage bins
	2: User select a garbage bin in the list
	3: The app opens the activity "Details" of the garbage bin selected
	4: User consults details
Alternative Scenario	2.a User doesn't choose any garbage bin
	4.a User decides to return to the menu

Name	Find the garbage collection route
Goals	Check the route to go to the selected garbage
Preconditions	Have an internet connection
	Trash collector needs a smartphone
	The app is running the activity details
	Have selected a garbage bin
Post-condition	The user's smartphone and the system are connected
Nominal Scenario	1: The app is running the activity details
	2: User selects "View on Map"
	3: The app opens the map on the garbage bin's location
	4: User selects "Go"
	5: The map shows the route
	6: User consults the map
Alternative Scenario	2.a User chooses another option of the menu
	4.a User decides to return to the activity details
Error Scenario	3.a App can't find your position

Name	Update the occupancy rate of a garbage container
Goals	Mark the containers that have been emptied
Preconditions	Have an internet connection
	Trash collector needs a smartphone
	The app is running the activity details
	Have selected a garbage bin
Post-condition	The user's smartphone and the system are connected
Nominal Scenario	1: The app is running the activity details
	2: User select "Emptied"
	3: The app updates and displays new information
Alternative Scenario	2.a User chooses another option of the menu

Name	Check the weather
Goals	See the current weather
Preconditions	Have an internet connection
Post-condition	Trash collector needs a smartphone
	The user's smartphone and the system are connected
Nominal Scenario	1: The app opens the activity of the main menu
	2: User select "Check the Weather"
	3: The app opens the activity weather using JSON
	4: User consults the weather
Alternative Scenario	2.a User doesn't choose any garbage bin
	4.a User decides to return to the menu

2. Requirements specification

A. Overview

Requirement	Comment
<ul style="list-style-type: none">At least two Activities	Many activities are used, c.f. next part
<ul style="list-style-type: none">Use of Intents to send data between components	Used for instance in the details activity
<ul style="list-style-type: none">Persisting data through Shared Preferences and/or an SQLite database	Used for the login system
<ul style="list-style-type: none">Some element of communication using internet, Bluetooth and/or WIFI	Using google maps online is the backbone of the localization system
<ul style="list-style-type: none">Background tasking	The weather activity downloads the data in background tasking
<ul style="list-style-type: none">Use at least one Service	Service started with main activity and sends broadcast message which is reacted to.
<ul style="list-style-type: none">Use Asynchronous processing	Used in the map updating process
<ul style="list-style-type: none">Use proper resource externalization	Each needed resource is in an appropriate folder
<ul style="list-style-type: none">Use Layouts that adapt to at least two different screen sizes (phones and tablets)	Done for tablet and phones

B. Functional requirements

Login activity

As one would expect, the activity features a form with username and password fields, and compares the user input with the database, holding the uid and encrypted passwords.

The login activity occurs first in the app, then leads to the main.

Main activity

Main activity occurs after a successful login. It features the menu, in which you can select either the map to see all garbage bins, the current weather, the list view of garbage bins or logout.



Maps activity

The purpose of this activity is to generate, using google maps, the surroundings of the user to help him localize and check the bin's status through the conveniently color-coded garbage pointers. After a connection check, and a permission check, the map with the aforementioned markers.

Weather Activity

The goal of this activity is to give the current weather. This is an additional feature, similar to which we developed in the previous assignment, a weather information system. It uses the API OpenWeatherMap to download data in JSON format like temperature, humidity, description depending on your city.

We use a Weather package to simplify the code with model, JSON to download data and WeatherHttpClient to get and read the URL.

Status activity

This activity is to show the bin list. Information on whether the bins are full or empty is displayed here. Fragments and listview were used for this layout. We made a custom view to put in listview. If you select one garbage bin, you can see the detail information about the bin.

Details Activity

This activity shows detail information of each individual bin, such as location with latitude and longitude, status, id and the time when its status has changed. If you click the 'Empty' button, status data is updated. You can also click the "View on Map" to see the garbage on the map, and if you select "Go" it will give you the way to go to the bin chosen.

Garbage adapter

This class is responsible to create a view for each item and also give the image status.

Garbage Bin

This class allows to create, set and get instances of the bin with their specific details, which are their ID, position with latitude and longitude, and their status.

Security Database

This class is a database which stores username and password of the login activity.

Direction Package

The goal of this tool is to help the user find a route to the bin, with some additional information like the distance in-between the user and the bin, and the travelling duration.

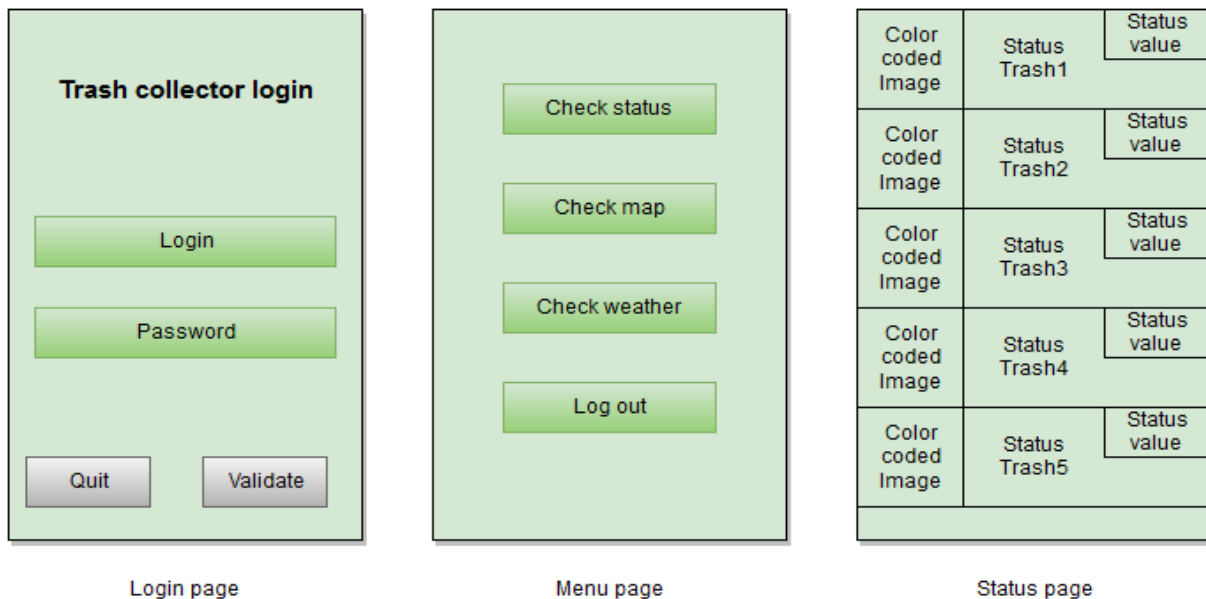


Weather Package

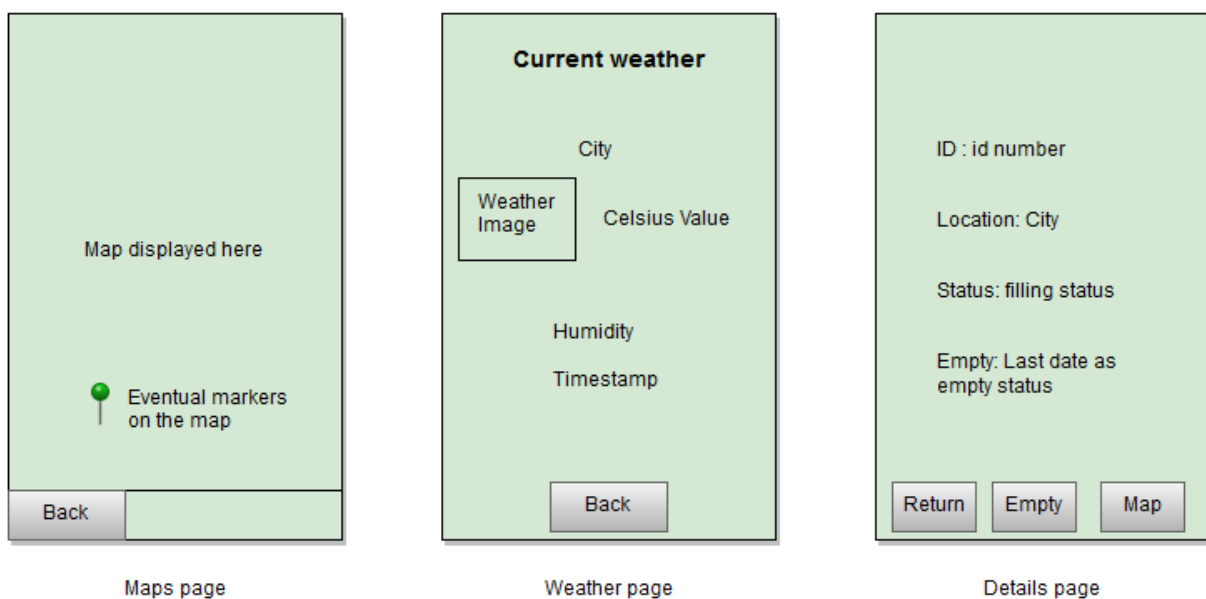
The purpose of this package is to organize the weather according to the response URL with models, try to establish a connection and read the URL.

C. Architectural requirements

This application was developed to work on API 24 (Nougat) if not you can't use the DirectionFinder. Here, you can see the GUI on a smartphone:



The colour coded image from the status page displays either green for empty, yellow for intermediate, and red for full.



On a tablet, the GUI looks like the same but bigger:



The only modification is for the display of the list and details of a garbage bin, now it's on the same screen.

Color coded Image	Status Trash1	Status value	ID : id number Location: City Status: filling status Empty: Last date as empty status Return Empty Map
Color coded Image	Status Trash2	Status value	
Color coded Image	Status page Status Trash3	Status value	
Color coded Image	Status Trash4	Status value	
Color coded Image	Status Trash5	Status value	

3. Design

Aesthetic design

Since our application does not feature overcomplicated interface needs, we have chosen a straightforward approach. Most pages use classical buttons, form fields and text fields.

The map is the one from google, used as a fragment.

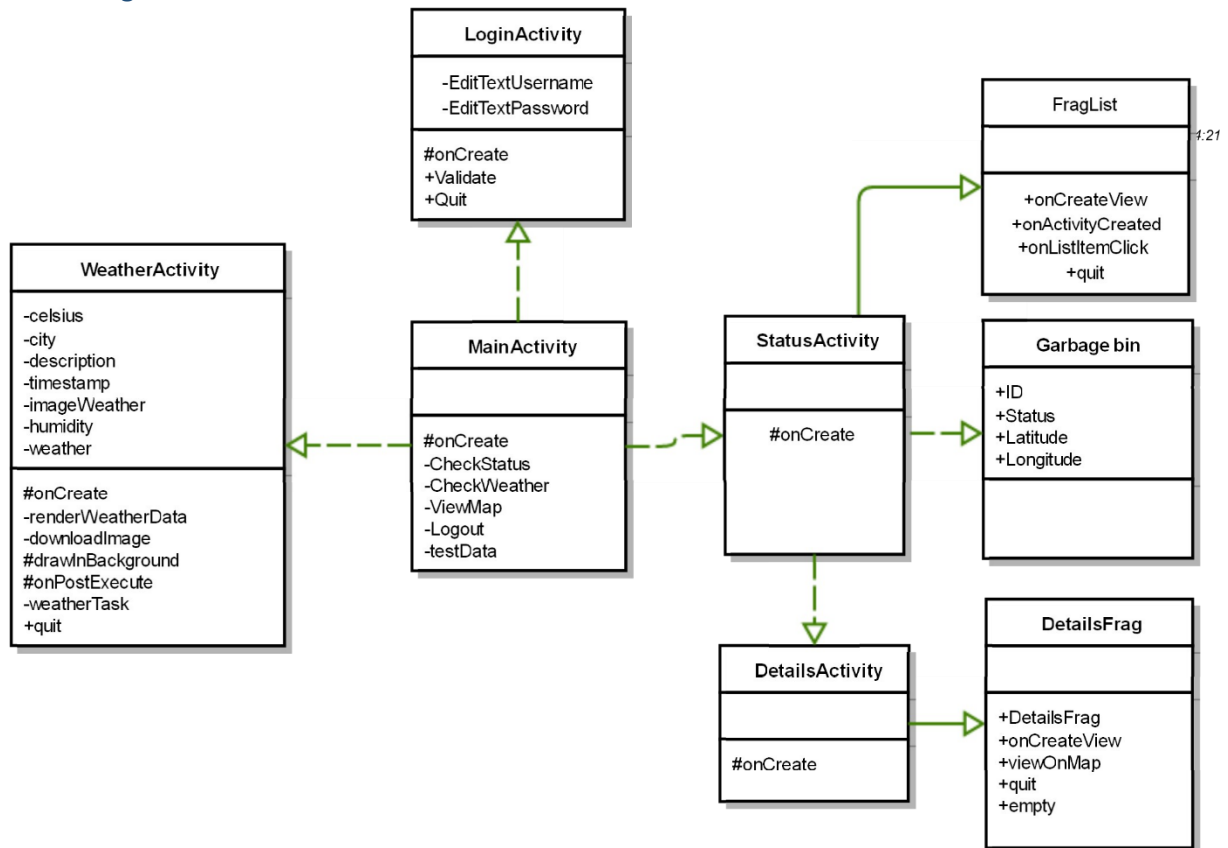
We also used some parts as fragments, like a quick overview of the garbage's status, used to have a quick overview of the bins.

We chose green as a main colour motif, as it seemed to fit the theme.

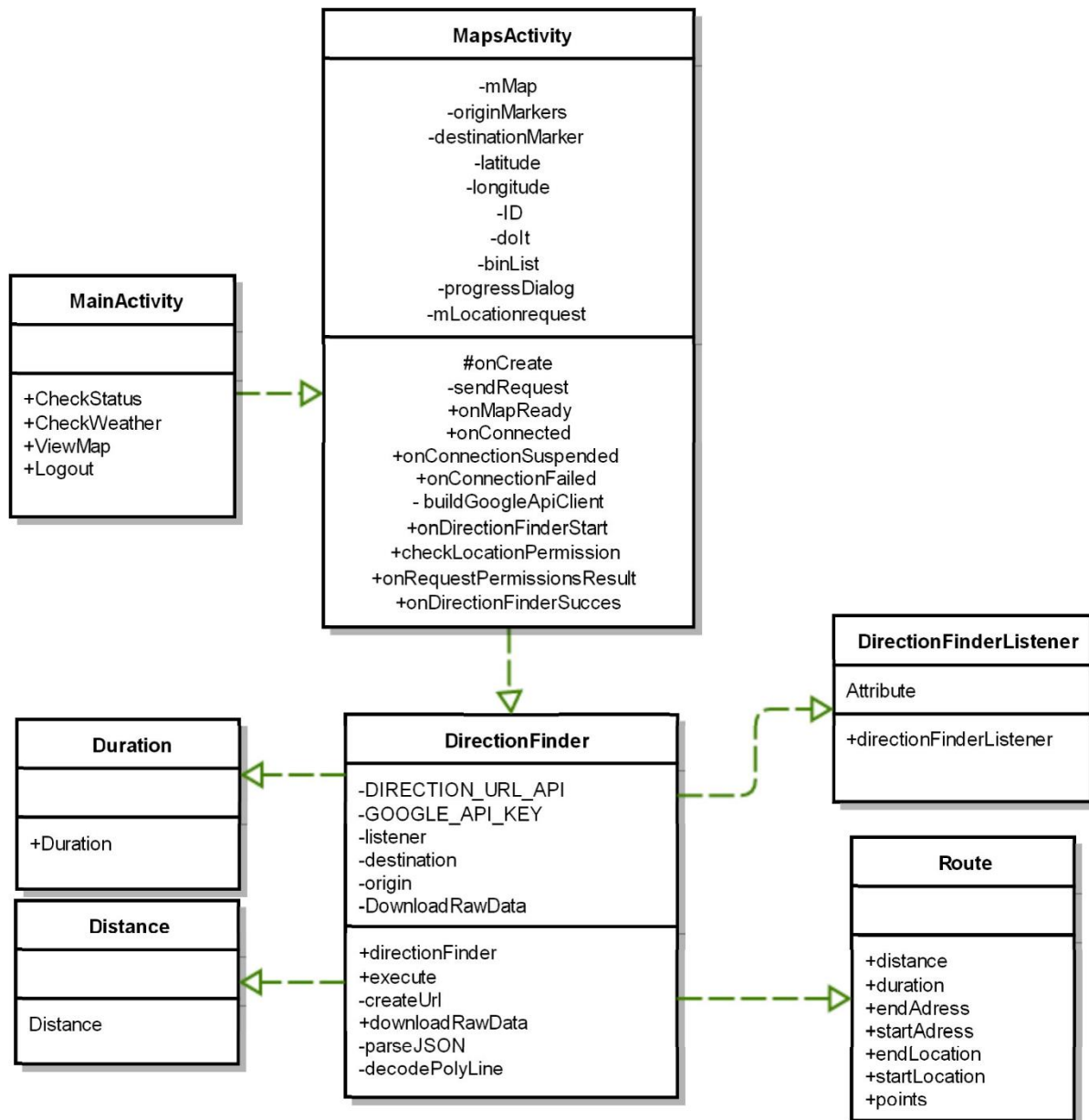


4. UML diagrams

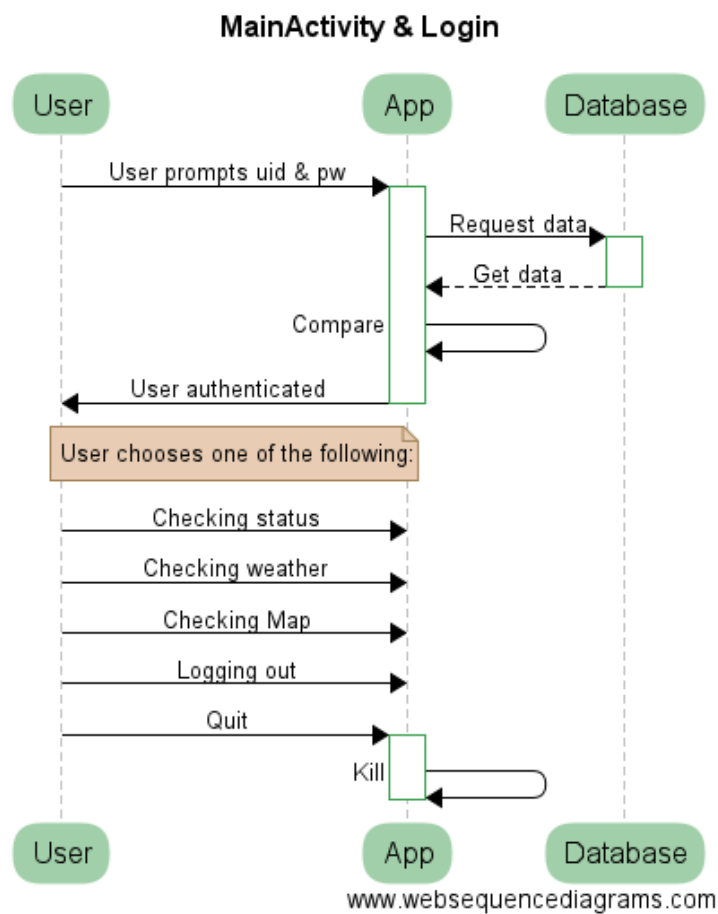
Class diagram



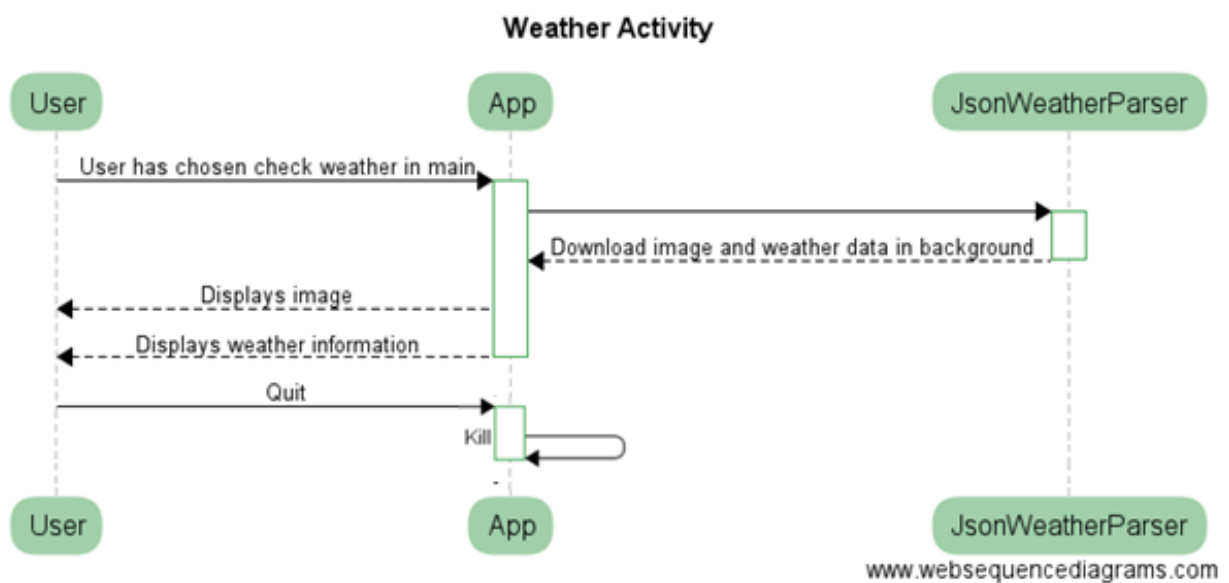
This one is an overview without the map activity, which is represented on next page



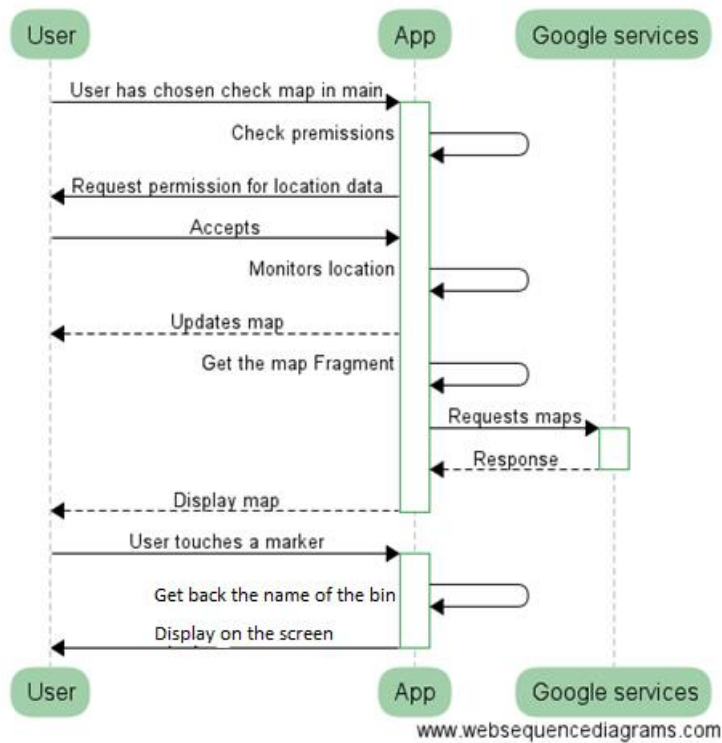
Sequence diagram: Main Activity & login system



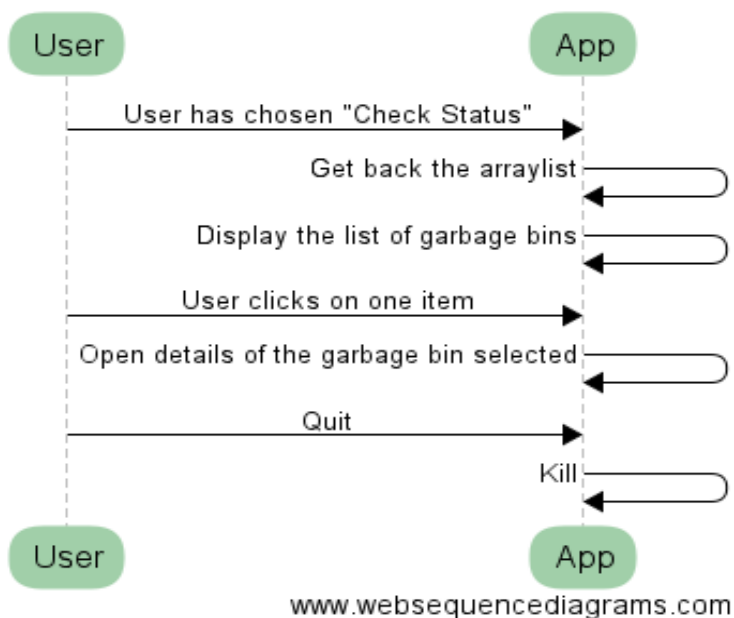
Sequence diagram: Weather activity



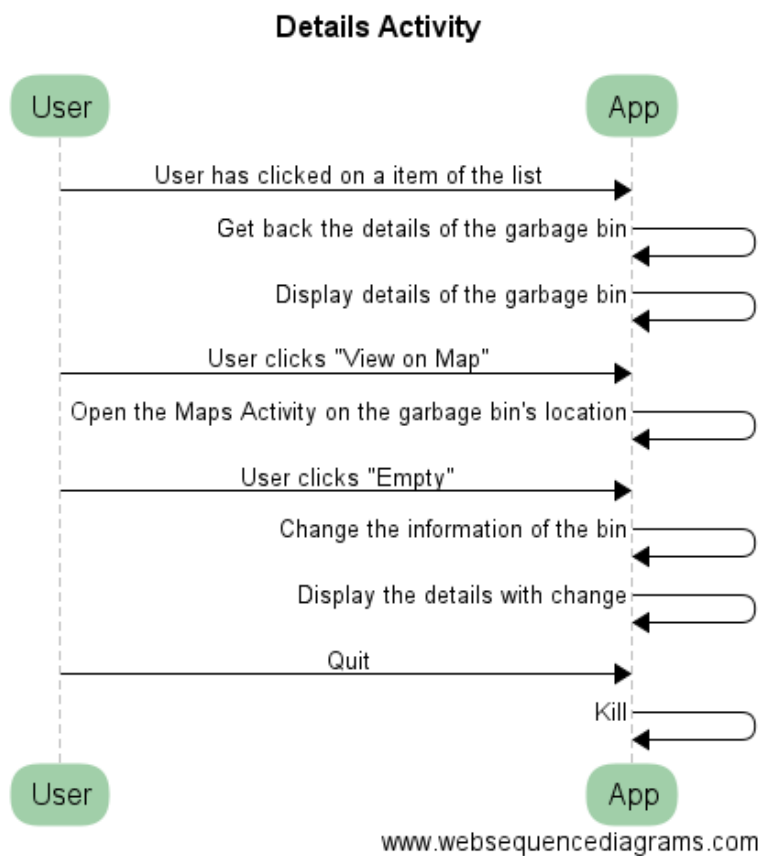
Sequence diagram: Maps Activity



Sequence diagram: Status Activity (Fragment)

Status Activity

Sequence diagram: Details Activity (Fragment)



5. Conclusion

Features

The main purpose of our application was to handle information, and more specifically the status of any given garbage bin. This part is achieved both in the map part, with colour coded bins, and in the check status part.

The map part is used both to give the bins location, and to give directions and route information.

The application has a login system as well, using the database to store users and secure the system.

The weather module serves to give updates about the current weather for the user.

Difficulties

We encountered some difficulties when implementing the map API, because there was a lot going on at the same time. Moreover, we had some troubles with the `getIntent()` from the Details Activity.

We had some conversion problem for the weather module as well, where time wouldn't adjust to the right settings.

6. Work plan

TASK	RESPONSIBLE
Layout	Junyoung Bang
Google map API	Pierre Biojoux
Authentication & Main	Pierre Biojoux
Fragments	Joonas Luukkanen
Database	Joonas Luukkanen
Check weather	Pierre Biojoux
Report, data record	Quentin Studeny