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Application Green Quake



Green Quake

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Github Link:

<https://github.com/PeterX12/Application-Green-Quake.git>

APK Github Link:

<https://github.com/PeterX12/Application-Green-Quake/blob/master/ApplicationGreenQuake.apk>

APK Google Drive Link:

https://drive.google.com/file/d/1MIPChFA_Z_XOzcy3yi_Q1Gt6JyNJcC1e/view?usp=sharing

Abstract

This is the Functional Documentation for the Green Quake Mobile Application final year software development project. It specifies all the functional requirements necessary for the final deliverable to meet. This specification was designed at the beginning of the project and was followed and implemented throughout the development of the project. It was updated throughout the development of the project as new discoveries have been made. A successful project was developed and all the final functionality specified in this specification have been implemented in the final deliverable.

Table of Contents

1 Introduction	5
1.1 Application Green Quake: Description (Proposal)	5
1.2 Application Green Quake: What it does (Proposal)	5
1.2.1 Normal Version	5
1.2.2 Business Version	5
1.3 Application Green Quakes Users (Proposal)	5
1.3.1 People Who Want To Start Helping The Environment	5
1.3.2 People Who Already Are Helping The Environment	6
1.3.3 Businesses Who Wish To Be Environmentally Friendly	6
2 Proposed Use Case Diagram	6
3 Proposed Brief Use Cases	7
3.1 Application Green Quake Web Application	7
3.1.1 Login	7
3.1.2 CRUD Employee Account	7
3.1.3 View Team	8
3.1.4 View Employee	8
3.1.5 View Report	8
3.1.6 Send Reward	8
3.1.7 Log Out	9
3.2 Application Green Quake Mobile Application	9
3.2.1 CRUD Account	9
3.2.2 Login	9
3.2.3 Log Action	9
3.2.4 View Statistics	9
3.2.5 CRUD Friend	10
3.2.6 CRUD Food Inventory	10
3.2.7 CRUD Shopping List	10
3.2.8 Find Refill Station	10
3.2.9 CRUD Refill Station	11
3.2.10 Browse Catalogue	11
3.2.11 View Colleague	11
3.2.12 View Team	11
3.2.13 View Report	11
3.2.14 Edit Account	12
3.2.15 View Reward	12
3.2.16 Change Password	12
3.2.17 Log Out	12
4 Proposed Detailed Use Cases	13
4.1 Application Green Quake Web Application	13
4.1.1 Login	13
4.1.2 CRUD Employee Account	13

4.1.3 View Team	14
4.1.4 View Employee	14
4.1.5 View Report	14
4.1.6 Send Reward	14
4.1.7 Log Out	15
4.2 Application Green Quake Mobile Application	15
4.2.1 CRUD Account	15
4.2.2 Login	16
4.2.3 Log Action	16
4.2.4 View Statistics	17
4.2.5 CRUD Friend	17
4.2.6 CRUD Food Inventory	17
4.2.7 CRUD Shopping List	18
4.2.8 Find Refill Station	18
4.2.9 CRUD Refill Station	18
4.2.10 Browse Catalogue	19
4.2.11 View Colleague	19
4.2.12 View Team	19
4.2.13 View Report	20
4.2.14 Edit Account	20
4.2.15 View Reward	20
4.2.16 Change Password	20
4.2.17 Log Out	21
5 Application Green Quake (Final)	21
5.1 Application Green Quake: Description (Final)	21
5.2 Application Green Quake: What it does (Final)	22
5.2.1 Final Version	22
5.3 Application Green Quakes Users (Final)	22
5.3.1 People Who Want To Start Helping The Environment	22
5.3.2 People Who Already Are Helping The Environment	22
5.3 Application Precedents	23
5.3.1 Green Me	23
5.3.2 Joulebug	25
5.3.3 Refill	30
5.3.4 Conclusion	34
6 Final Use Case Diagram	35
7 Final Brief Use Cases	35
7.1 CRUD Account	35
7.2 Login	36
7.3 Log Action	36
7.4 View Leaderboard	36
7.5 Filter Leaderboard	36
7.6 View/Edit Profile	37

7.7 Upload Profile Pic	37
7.8 From Storage	37
7.9 Capturing Image	37
7.10 Edit Bio	37
7.11 View Badges	38
7.12 View Achievements	38
7.13 View Trophies	38
7.14 Find Refill Station	38
7.15 Change Password	38
7.16 Log Out	39
8 Final Detailed Use Cases	39
8.1 CRUD Account	39
8.2 Login	39
8.3 Log Action	40
8.4 View Leaderboard	40
8.5 Filter Leaderboard	41
8.6 View/Edit Profile	41
8.7 Upload Profile Pic	41
8.8 From Storage	42
8.9 Capturing Image	42
8.10 Edit Bio	42
8.11 View Badges	43
8.12 View Achievements	43
8.13 View Trophies	43
8.14 Find Refill Station	44
8.15 Change Password	44
8.16 Log Out	44
9 Supplementary Specification (FURPS+)	45
9.1 Functionality	45
9.2 Usability	45
9.3 Reliability	46
9.4 Performance	46
9.5 Supportability	46
9.6 Security	46
12 Conclusion	47
11 References	47

1 Introduction

This document contains the full specification of functionality to be implemented and delivered in the final version of the Green Quake application. It contains all the use cases and additional requirements that are to be implemented and delivered by the final deliverable.

1.1 Application Green Quake: Description (Proposal)

The aim of Application Green Quake is to help the environment and help Europe achieve the Green Deal by 2050 by motivating people to be environmentally friendly and keeping them motivated along the way while making being eco friendly fun and easy. It will achieve this by using gamification to keep it's users motivated and by providing them with the necessary tools and information.

1.2 Application Green Quake: What it does (Proposal)

Application Green Quake will be a Cross platform application with two versions. A normal version and a company version.

1.2.1 Normal Version

Application Green Quakes goals are:

1. To motivate people and keep them motivated to be environmentally friendly through the use of gamification including points, badges, trophies and leaderboards.
2. To provide the necessary tools to aid users to be environmentally friendly such as showing them the nearest water refill station or giving them the ability to track what food of theirs is about to expire. Using these tools will also earn points.
3. To provide them with interesting facts and information about the environment.

1.2.2 Business Version

The Business will be the same as the normal version with the ability for an Administrative user to be able to reward an employee with an outside of the application reward such as a gift card once they reach a certain amount of points, trophies or badges.

1.3 Application Green Quakes Users (Proposal)

As we are trying to save the planet. Application Green Quake is for everyone but naturally has a few target groups of users.

1.3.1 People Who Want To Start Helping The Environment

This application is perfect for people who want to start helping the environment. Such people will look for help and guidance and will be able to find this app on the playstore. This application will make it fun and easy to stay environmentally friendly while equipping them with the tools and information to do so.

1.3.2 People Who Already Are Helping The Environment

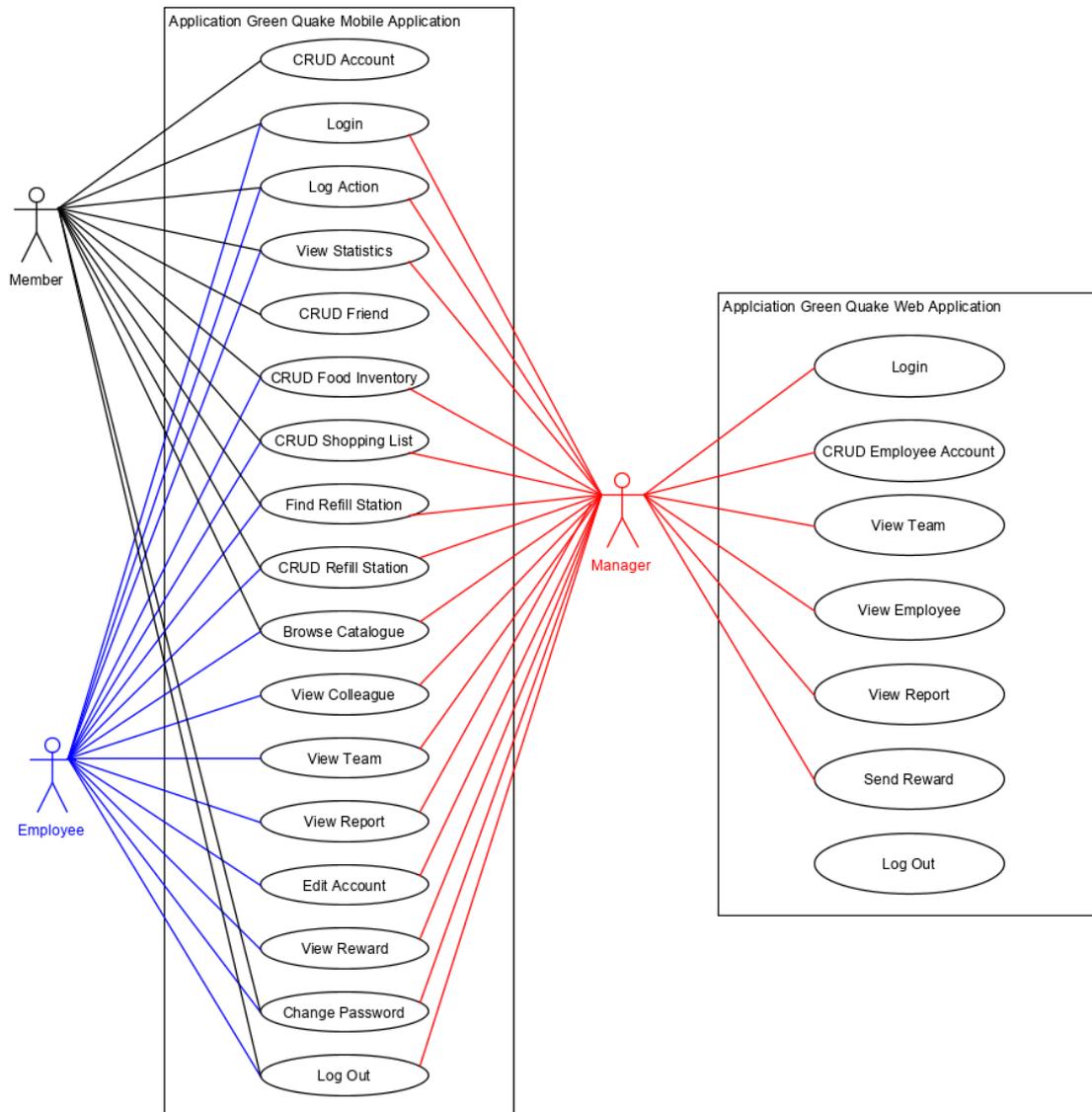
People who are already helping the environment are also a suitable target audience for this application. This is so because just because you already do something does not mean that you are not looking for better applications out there and Application Green Quake is just that.

1.3.3 Businesses Who Wish To Be Environmentally Friendly

This version of the application is perfect for businesses who wish to be environmentally friendly and have such a workforce. This will allow them to brand themselves as a green business increasing their reputation and getting an edge over their competitors.

2 Proposed Use Case Diagram

The Green Quake mobile application will have three main aspects. These aspects are the Green Actions section, Food section and the Water Refill Stations Section. In the Green Actions section the user will be able to log their green actions and earn points. In the Food section the user will be able to log food items and the application will keep their food expiry dates for the user and notify them when the food item is approaching its expiration date. This is to reduce food waste which is a huge environmental problem. The final section will be the Water Refill section which will display water refill stations where users can refill reusable water bottles instead of using plastic ones. They will also be able to add water refill station locations.



3 Proposed Brief Use Cases

3.1 Application Green Quake Web Application

3.1.1 Login

Use Case Name: Login

Actor(s): Manager

Description: This Use case begins when a Manager wishes to log into the web application. The manager enters their email and password. After successful Login the manager is brought to the Main Menu page.

3.1.2 CRUD Employee Account

Use Case Name: CRUD Employee Account

Actor(s): Manager

Description: This Use case begins when a Manager wishes to create/read/update or delete an employee's account or a managers account. The manager logs into the web application and chooses to create an account from the main menu. The Manager can create and employee account so an employee can use the mobile application and they can also create an account for a manager which works for both the web application and the mobile application.

3.1.3 View Team

Use Case Name: View Team

Actor(s): Manager

Description: This Use case begins when a manager wishes to view the statistics of the teams in the company using this application. The manager chooses the View Team option in the main menu. The manager then sees a ranked list of teams and can choose a team from a list. Statistics about the team are then displayed.

3.1.4 View Employee

Use Case Name: View Employee

Actor(s): Manager

Description: This Use case begins when a manager wishes to view the statistics of an individual employee in the company using this application. The manager chooses the View Employee option in the main menu. The manager then sees a ranked list of Employees and can choose an employee from a list. Statistics about the employee are then displayed.

3.1.5 View Report

Use Case Name: View Report

Actor(s): Manager

Description: This Use case begins when a manager wishes to view the monthly report of the teams and employees using this application. The manager chooses the View Report option in the main menu. The monthly report specifies who the most prolific team and users were that month and provides statistics.

3.1.6 Send Reward

Use Case Name: Send Reward

Actor(s): Manager

Description: This Use case begins when a manager is notified that an employee earned a reward or if the manager wishes to send them an award. The manager chooses the send Reward from the main menu. The manager chooses a reward of their choice and sends it to the employee. The reward is sent to the employee's application and their email.

3.1.7 Log Out

Use Case Name: Log Out

Actor(s): Manager

Description: This Use case begins when a manager wishes to Log out. The web application redirects to the login page.

3.2 Application Green Quake Mobile Application

3.2.1 CRUD Account

Use Case Name: CRUD Account

Actor(s): Member

Description: The use case begins when the member wishes to create, read, update or delete their account. To create an account when a member downloads the app and launches it for the first time. The member chooses the Sign up option and the member fills in their credentials and presses the Create Account button where upon successful login they are brought to the main menu page. The member can then navigate to the account page where they can read, update or choose to delete their account.

3.2.2 Login

Use Case Name: Login

Actor(s): Member, Employee, Manager

Description: This use case begins when an actor wishes to log into the application. The actor navigates to the login screen and fills in their credentials. After a successful login the main menu page is displayed.

3.2.3 Log Action

Use Case Name: Log Action

Actor(s): Member, Employee, Manager

Description: This use case begins when an actor wishes to log an eco-friendly action they have performed. An action such as planting a tree or using a reusable bag instead of a plastic one. The actor chooses the Log Action button from the main menu where they get brought to the categories section. Here the actor chooses a category to which their action belongs to and then the action that they have performed. The actor confirms the action and their points and or achievements, badges or trophies are added. If the actor reaches a certain mark a message is sent to the manager saying they have earned a reward.

3.2.4 View Statistics

Use Case Name: View Statistics

Actor(s): Member, Employee, Manager

Description: This use case begins when an actor wishes to view statistics such as their points, badges or trophies. The actor navigates here from the main menu. The actor can choose to view the global leaderboard or the leaderboard of their friends/colleagues. The actor can also view their statistics.

3.2.5 CRUD Friend

Use Case Name: CRUD Friend

Actor(s): Member

Description: This use case begins when a member wishes to create, read, update, or delete a friend. A member can add a friend by going to the friends page from the main menu. The member can then search a username and click on their profile and send them a friend request. A member can also be a friend by clicking on profiles on leaderboards and sending friend requests or by accepting friend requests. The member can read, update and delete friends by clicking on their names and choosing the desired options.

3.2.6 CRUD Food Inventory

Use Case Name: CRUD Food Inventory

Actor(s): Member, Employee, Manager

Description: This use case begins when an actor wishes to create, read, update or delete items in the food inventory. An actor navigates to the add food page from the main menu where they can pick the food inventory page and then manually enter a food item or use the barcode scanner. The actor can also read, update and delete items from here by choosing the correct buttons.

3.2.7 CRUD Shopping List

Use Case Name: CRUD Shopping List

Actor(s): Member, Employee, Manager

Description: This use case begins when an actor wishes to create, read, update or delete items in the shopping list. An actor navigates to the add food page from the main menu where they can choose the shopping list page where they can manually input their desired shopping items in a list. The actor can also read, update and delete items from here by choosing the correct buttons.

3.2.8 Find Refill Station

Use Case Name: Find Refill Station

Actor(s): Member, Employee, Manager

Description: This use case begins when an actor wishes to find the nearest water refill station to refill their water bottle. The user navigates to the water refill page from the main menu. The user chooses the Find Nearest Refill Station button. The nearest water refill station is displayed using google maps.

3.2.9 CRUD Refill Station

Use Case Name: CRUD Refill Station

Actor(s): Member, Employee, Manager

Description: This use case begins when an actor wishes to create, read, update or delete a water refill station. The user navigates to the water refill page from the main menu. The user chooses the Refill Station button. The actor can add a water refill station by pinning it on the map. The actor can read, update and delete the water refill station that they have added to the map.

3.2.10 Browse Catalogue

Use Case Name: Browse Catalogue

Actor(s): Member, Employee, Manager

Description: This use case begins when an actor wishes to browse the catalogue. The catalogue contains tips, facts and information related to the environment and pollution. The actor navigates to the catalogue page from the main menu and chooses which category they wish to browse.

3.2.11 View Colleague

Use Case Name: View Colleague

Actor(s): Employee, Manager

Description: This use case begins when an actor wishes to view the profiles and statistics of their colleagues. The actor navigates to the Colleagues page from the main menu and is able to view the statistics of the colleagues by clicking their name and viewing their account or by searching their name.

3.2.12 View Team

Use Case Name: View Team

Actor(s): Employee, Manager

Description: This use case begins when an actor wishes to view the statistics of the different teams. The actor navigates to the Colleagues page from the main menu and is able to view the statistics of the different teams by clicking on them.

3.2.13 View Report

Use Case Name: View Report

Actor(s): Employee, Manager

Description: This Use case begins when the actor wishes to view the monthly report. The actor navigates here from the main menu. The report contains the month's rankings and stand out users.

3.2.14 Edit Account

Use Case Name: Edit Account

Actor(s): Employee, Manager

Description: This Use case begins when an actor wishes to edit their account that a manager created. The actor navigates to the edit account page from the main menu. The actor fills in the credentials they would like to change and can upload a picture.

3.2.15 View Reward

Use Case Name: View Reward

Actor(s): Employee, Manager

Description: This use case begins when an actor wishes to view their reward(s) or if the actor receives a notification that they have received an award. The actor navigates to the rewards page from the main menu where they can view their reward.

3.2.16 Change Password

Use Case Name: Change Password

Actor(s): Employee, Manager

Description: This use case begins when an actor wishes to change their password. The actor navigates to the change password screen by choosing the correct button. The actor enters the new password twice and chooses the change password button. Upon successful password change a popup appears saying the password was changed where the actor can choose to navigate to the main menu.

3.2.17 Log Out

Use Case Name: Log Out

Actor(s): Member, Manger, Employee

Description: This Use case begins when an actor wishes to Log out. The web application redirects to the login page.

4 Proposed Detailed Use Cases

4.1 Application Green Quake Web Application

4.1.1 Login

Use Case Name: Login

Actor(s): Manager

Main Success Scenario: This use case begins when a Manager wishes to log into the web application.

1. The manager loads the web application
2. The application displays a login form to the manager requesting their email and password
3. The manager enters their email and submits the form
4. Upon successful account verification the manager is redirected to the main menu

Alternative(s):

4a. If the login was unsuccessful then the page is reloaded and an error message is displayed.

4.1.2 CRUD Employee Account

Use Case Name: CRUD Employee Account

Actor(s): Manager

Main Success Scenario: This Use case begins when a Manager wishes to create/read/update or delete an employee's account or a managers account.

1. The manager navigates to the Employees section of the Web application.
2. The manager selects the Add and employee option.
3. The application loads a page with a form for the Manager to fill in.
4. The manager fills in the form and clicks the submit button.
5. The application verifies the details and saves and creates the account and returns to the Employees page.
6. The manager chooses to view an employee section.
7. The manager sees a list of employees and searches for an employee.
8. The manager can read, update or delete the employee.
9. The application displays a corresponding message to the manager, confirming the action has been carried out.

Alternative(s):

5.a The verification fails and an error message is displayed to the manager.

1. The manager closes the error message.
2. The manager re-enters the details.

4.1.3 View Team

Use Case Name: View Team

Actor(s): Manager

Main Success Scenario: This Use case begins when a manager wishes to view the statistics of the teams in the company using this application.

1. The manager navigates to the Teams section of the Web application.
2. The application displays a ranked list of teams.
3. The manager chooses a team.
4. The application displays statistics about that particular team.

Alternative(s): No alternatives.

4.1.4 View Employee

Use Case Name: View Employee

Actor(s): Manager

Main Success Scenario: This Use case begins when a manager wishes to view the statistics of an individual employee in the company using this application.

1. The manager navigates to the Employee section of the Web application.
2. The application displays a ranked list of employees.
3. The manager chooses an employee from the list.
4. The application displays statistics about that particular employee.

Alternative(s): No alternatives.

4.1.5 View Report

Use Case Name: View Report

Actor(s): Manager

Main Success Scenario: This Use case begins when a manager wishes to view the monthly report of the teams and employees using this application.

1. The manager navigates to the Report section of the Web application.
2. The application displays a page with the report.

Alternative(s): No alternatives.

4.1.6 Send Reward

Use Case Name: Send Reward

Actor(s): Manager

Main Success Scenario: This Use case begins when a manager is notified that an employee earned a reward or if the manager wishes to send them an award.

1. The manager navigates the Rewards page.
2. The manager selects an employee.
3. The application loads the employees details.
4. The manager chooses the reward and clicks send.
5. The application sends the reward and an email to the employee.

Alternative(s): No alternatives.

4.1.7 Log Out

Use Case Name: Log Out

Actor(s): Manager

Main Success Scenario: This Use case begins when a manager wishes to Log out.

1. The Manager clicks Logout.
2. The web application ends the session.
3. The web application loads the Login page.

Alternative(s): No alternatives.

4.2 Application Green Quake Mobile Application

4.2.1 CRUD Account

Use Case Name: CRUD Account

Actor(s): Member

Main Success Scenario: The use case begins when the member wishes to create, read, update or delete their account.

1. A member that is not logged in launches the application.
2. The application displays and option to log in or create an account.
3. The member chooses the create an account option and the application loads the create and account page with a form for the member to fill in.
4. The member enters their username, email and password into the form and submits it.
5. The application validates the fields and creates the members account and redirects them to the main menu page.
6. The member clicks their profile icon where they can perform the read, update or delete option.
7. The member can input a profile description, their age and upload an image and press save.
8. The member can choose to delete their account by choosing the "Delete Account Option" and confirming their decision.

Alternative(s):

5a. Validation fails and the account is not created

1. An error message is displayed to the member .

2. The form is reset and the member can try again.

4.2.2 Login

Use Case Name: Login

Actor(s): Member, Employee, Manager

Main Success Scenario: This use case begins when an actor wishes to log into the application.

1. The actor launches the application.
2. The application displays two options. One to create an account and one to login.
3. The actor chooses the login option and is redirected to a page where application displays a form requesting login information from the actor.
4. The actor enters their email and password and submits the form.
5. The application verifies the user.
6. The actor is then logged into the application and is redirected to the main menu.

Alternative(s):

5a. The verification fails and the actor does not get logged in

1. An error message is displayed to the member
2. The form is reset and the member can try again.

4.2.3 Log Action

Use Case Name: Log Action

Actor(s): Member, Employee, Manager

Main Success Scenario: This use case begins when an actor wishes to log eco-friendly actions they have performed such as planting a tree or using a reusable bag instead of a plastic bag.

1. The actor chooses the log activity option.
2. The application loads a page of categories for the actor to choose.
3. The actor chooses a category in which their activity belongs to.
4. The application loads a page with a list of eco friendly activities.
5. The actor chooses an activity they wish to log.
6. The application displays the activity and it's details.
7. The actor clicks log activity.
8. The application displays the subcategories page.
9. The application saves and calculates the actors points, achievements, badges and trophies.
10. The application displays the new rewards to the actor.

Alternative(s): No Alternatives.

4.2.4 View Statistics

Use Case Name: View Statistics

Actor(s): Member, Employee, Manager

Main Success Scenario: This use case begins when an actor wishes to view statistics.

1. The actor chooses the view statistics option from the main menu.
2. The application launches the view statistics page and displays the information to the actor.
3. The actor can choose to view the global leaderboard or the leaderboard of his social circle and also his own statistics by clicking the relevant buttons.

Alternative(s): No alternatives.

4.2.5 CRUD Friend

Use Case Name: CRUD Friend

Actor(s): Member

Main Success Scenario: This use case begins when a member wishes to create, read, update, or delete a friend.

1. The Member chooses the add a friend option from the main menu.
2. The application displays the add a friend page with a searchfield.
3. The actor searches for the friend's username in the searchfield.
4. The actor chooses the friends profile.
5. The actor chooses the add friend button on their profile.
6. The application redirects the actor to the main menu.
7. The actor can then click on the friends profile in various sections in the app and read their profile, update their profile or delete them as a friend.

Alternative(s):

- 1a. The actor clicks on a profile on the leaderboard and chooses the add friend option.

4.2.6 CRUD Food Inventory

Use Case Name: CRUD Food Inventory

Actor(s): Member, Employee, Manager

Main Success Scenario: This use case begins when an actor wishes to create, read, update or delete items in the food inventory.

1. The actor chooses the food section from the main menu.
2. The application displays the food section page with two options.
3. The actor chooses the Food Inventory section.
4. The application displays the Food Inventory page where the actor can add items or view items.

5. The actor clicks the scan barcode icon.
6. The application loads the barcode scanner.
7. The actor scans the barcode.
8. The application reads the barcode and saves the food item with its date of expiry and displays it in the list.
9. The actor clicks the food item on the list.
10. The application displays the food items details.

Alternative(s):

5a. The actor clicks the + icon to add a food item.

1. The application displays a form for the actor to fill in.
2. The actor fills in the form with details about the food item.
3. The application saves the food item and loads the original page

8a. The barcode is invalid and the details are not saved.

1. An error message is displayed to the user.
2. The actor closes the error message and can try to scan again.

4.2.7 CRUD Shopping List

Use Case Name: CRUD Shopping List

Actor(s): Member, Employee, Manager

Main Success Scenario: This use case begins when an actor wishes to create, read, update or delete items in the shopping list.

Alternative(s):

4.2.8 Find Refill Station

Use Case Name: Find Refill Station

Actor(s): Member, Employee, Manager

Main Success Scenario: This use case begins when an actor wishes to find the nearest water refill station to refill their water bottle.

1. The actor navigates to the refill page.
2. The actor presses the find nearest refill station button.
3. The application finds the nearest water refill station and displays it on the map.

Alternative(s):

4.2.9 CRUD Refill Station

Use Case Name: CRUD Refill Station

Actor(s): Member, Employee, Manager

Main Success Scenario: This use case begins when an actor wishes to create, read, update or delete a water refill station.

1. The actor navigates to the reifl page.
2. The actor chooses the pin refill station option.
3. The application loads a page with a map.
4. The actor pins the water refill station location on the map and clicks save.
5. The application saves the water refill station.
6. The user can also delete or update the refill stations they have added by clicking on them and choosing the desired options.

Alternative(s): No alternatives.

4.2.10 Browse Catalogue

Use Case Name: Browse Catalogue

Actor(s): Member, Employee, Manager

Main Success Scenario: This use case begins when an actor wishes to browse the catalogue.

1. The actor navigates to the catalogue section.
2. The application displays a number of categories.
3. The actor chooses a category by clicking the relevant icon.
4. The application displays cards containing information or tips relating to the category chosen by the actor.

Alternative(s): No alternatives.

4.2.11 View Colleague

Use Case Name: View Colleague

Actor(s): Employee, Manager

Main Success Scenario: This use case begins when an actor wishes to view the profiles and statistics of their colleagues.

1. The actor navigates to the Colleagues section of the application.
2. The application displays a ranked list of colleagues.
3. The actor chooses a colleague from the list by clicking on them.
4. The application displays statistics about that particular colleague.

Alternative(s): No alternatives.

4.2.12 View Team

Use Case Name: View Team

Actor(s): Employee, Manager

Main Success Scenario: This use case begins when an actor wishes to view the statistics of the different teams.

1. The actor navigates to the Teams section of the application.
2. The application displays a ranked list of teams.
3. The actor chooses a team from the list by clicking on it.
4. The application displays statistics about that particular team.

Alternative(s):

4.2.13 View Report

Use Case Name: View Report

Actor(s): Employee, Manager

Main Success Scenario: This Use case begins when the actor wishes to view the monthly report.

1. The actor navigates to the Report section of the Web application.
2. The application displays a page with the report.

Alternative(s): No alternatives.

4.2.14 Edit Account

Use Case Name: Edit Account

Actor(s): Employee, Manager

Main Success Scenario: This Use case begins when an actor wishes to edit their account that a manager created.

1. The actor navigates to the edit account page.
2. The actor changes their details and presses the save button.
3. The system verifies the details and saves the changes and displays the corresponding message.

Alternative(s): No alternatives.

4.2.15 View Reward

Use Case Name: View Reward

Actor(s): Employee, Manager

Main Success Scenario: This use case begins when an actor wishes to view their reward(s) or if the actor receives a notification that they have received an award.

Alternative(s):

4.2.16 Change Password

Use Case Name: Change Password

Actor(s): Employee, Manager

Main Success Scenario: This use case begins when an actor wishes to change their password.

1. The actor navigates to the change password screen.
2. The application displays a page with a form.
3. The actor fills in the form and clicks the save button.
4. The system validates the input fields and saves the new password and displays the corresponding message.
5. The actor closes the message and goes back to the main menu.

Alternative(s):

4a. The system validation fails and an error message displays to the actor.

1. The actor closes the error message.
2. The actor can try to fill out the form again.

4.2.17 Log Out

Use Case Name: Log Out

Actor(s): Member, Manager, Employee
Main Success Scenario: This Use case begins when an actor wishes to Log out.

1. The Manager clicks Logout.
2. The web application ends the session.
3. The web application loads the Login page.

Alternative(s): No alternatives.

5 Application Green Quake (Final)

Due to time constraints the above design was far too ambitious and major overhauls for the application were needed. These overhauls included removing the creation of the business version of the application and also removing the food inventory section from the application. These changes were a necessity as this was too much work for a single student. The application was developed to be Cross Platform but could only be tested for Android as I was unable to obtain an iOS device, a Mac and a developer licence as these would have cost too much and due to the pandemic I had not been able to resource this project as I had originally planned as I have lost my job as a result of it. Therefore the final deliverable will be for Android only but only little amounts of work are needed to make it work on iOS. At most a few days of work but a Mac is needed with a developer licence to do so.

5.1 Application Green Quake: Description (Final)

The aim of Application Green Quake is to help the environment and help Europe achieve the Green Deal by 2050 by motivating people to be environmentally friendly and keeping them motivated along the way while making being eco friendly fun and easy. It will achieve this by

using gamification to keep it's users motivated and by providing them with the necessary tools and information.

5.2 Application Green Quake: What it does (Final)

Application Green Quake will be a Cross platform application but the final deliverable will be for Android only with a couple of days work needed to make it function on iOS. This was due to the lack of Apple devices to be able to do so.

5.2.1 Final Version

Application Green Quakes goals are:

1. To motivate people and keep them motivated to be environmentally friendly through the use of gamification. These gamification features will be the following. Points and a leaderboard which can be filtered by Global or by nation and the user can find their rank. The leaderboard will have pages of 10 rows per page. The application will also contain Trophies, Live Bages, Live Achievements, A Level and a progress bar and finally a live avatar. The Live Badges, Live Achievements, Level and progress bar and the Live avatar will change depending on the progress that will be made in either points or the number of entries in a particular category or of a particular action. The user will also be able to take or choose an image from their storage and upload it as their profile picture and also edit their bio. These will be displayed in the leaderboard once their profile is tapped on.
2. To provide the necessary tools to aid users to be environmentally friendly such as showing them the nearest water refill station. This feature will encourage people to use reusable water bottles instead of buying plastic ones and throwing them away. This tool will load a map at the user's current location and then display pins of reusable water refill stations closest to them.
3. To provide them with interesting facts and information about the environment when logging the actions.

5.3 Application Green Quakes Users (Final)

As we are trying to save the planet. Application Green Quake is for everyone but naturally has a few target groups of users.

5.3.1 People Who Want To Start Helping The Environment

This application is perfect for people who want to start helping the environment. Such people will look for help and guidance and will be able to find this app on the playstore. This application will make it fun and easy to stay environmentally friendly while equipping them with the tools and information to do so.

5.3.2 People Who Already Are Helping The Environment

People who are already helping the environment are also a suitable target audience for this application. This is so because just because you already do something does not mean that you are not looking for better applications out there and Application Green Quake is just that.

5.3 Application Precedents

5.3.1 Green Me

The first application we will look at is Green Me [1]. This application provides many suggestions for things you can do to be environmentally friendly and then asks you at the end of the day to list 5 eco friendly things that you did. The application is very simple. It has a menu where you click icons to enter categories and then you can choose from a list of sub headings and get a tip on that topic on how to be environmentally friendly. The positives I found with this application is that it is simple to use and provides good information. On the other hand it has plenty of negatives. The UX design of the application is pretty poor. It is mostly green with a white background and looks quite ugly. Upon opening the application I didn't feel like using it as it looks unprofessional. When clicking onto each category the amount of items on the list felt overwhelming and the small text was hard to read. Upon clicking on the sub heading the tips are laid out in simple bullet points on white background and again this screen looks very unappealing. Finally it asks you to submit your 5 things you did to be eco friendly but I don't see why anyone would do this or stay doing this as the app simply offers no reason to do it other than you can share it on social media. This application has a lot it could improve. It is too simple and does not have a lot of features.



Figure 1: Green Me, Choose Category [1]



Figure 2: Green Me, Chose Sub Category [1]



Figure 3: Details [1]

5.3.2 Joulebug

This app focuses on gamification of eco friendly activities [13]. It uses points, badges and trophies to reward people for doing environmentally friendly actions. It uses text and video tutorials to help the user along the way. This app begins with asking you to create an account but you can continue without creating one. This application let's you choose from a variety of actions and buzz when you do it. It then lets you post about it on social media. This in turn earns you points. This app also allows you to follow people using the app. This application also has a leaderboard. Overall this application is pretty good. It has a nice system and works smoothly. Saying that the application does seem a bit overwhelming and the UX design could be better in that sense. A user cannot view their badges, trophies or statistics. All a user sees is their point total and how many of each they have. This is a big flaw of this application.

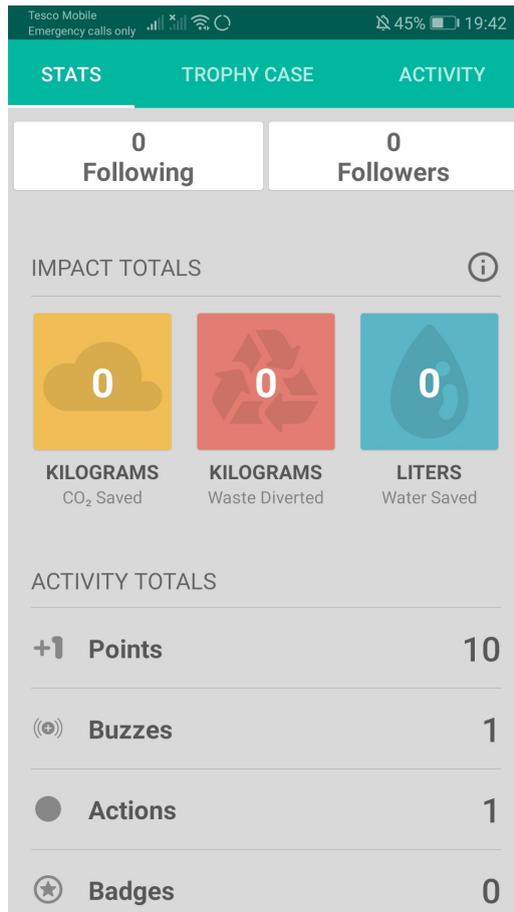


Figure 4: Profile View of Points [2]

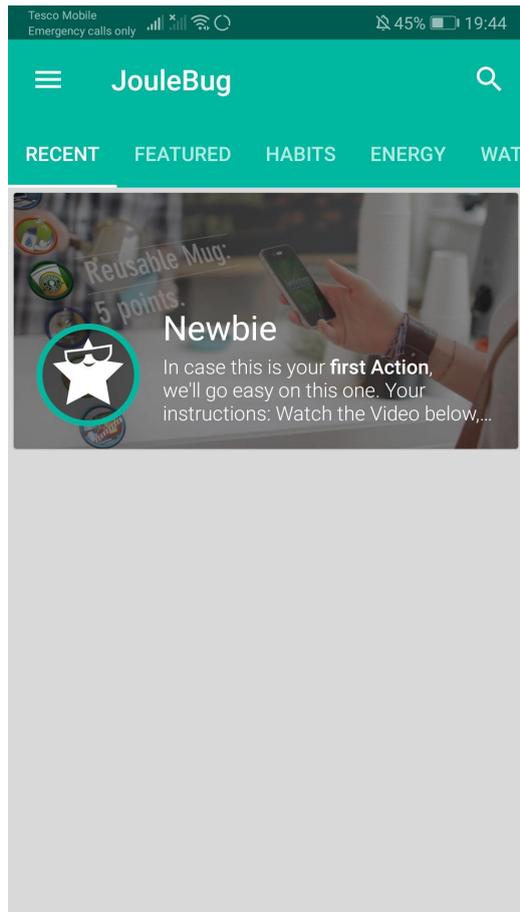


Figure 5: View Of Recently Completed Challenges [2]

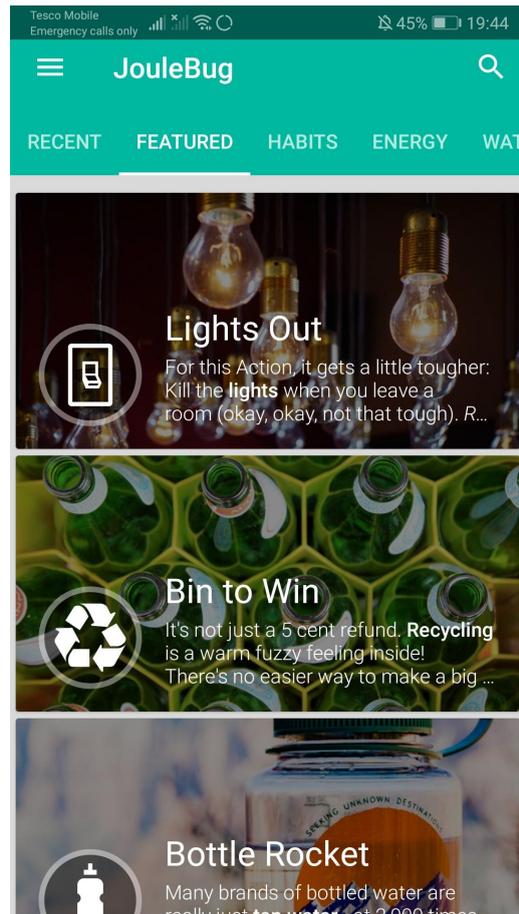


Figure 6: View Of A Category Of Challenges [2]

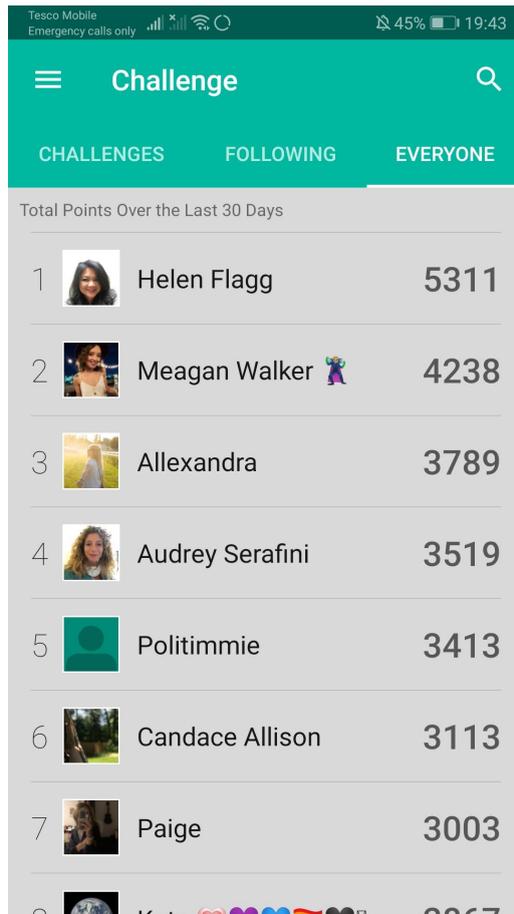


Figure 7: Leaderboard Of Top Users [2]



Figure 8: Posts Of Apps Users [13]

5.3.3 Refill

This application is simple but quite brilliant. This app's goal is to get rid of plastic bottle waste by using refillable bottles instead of plastic bottles. The app has a few features but the main one being able to find the nearest refill station on google maps. A nice number is displayed of how many bottles were saved by this app. This application also lets you pin water refill stations on the map and view your statistics but one has to create an account in order to do this. You are also allowed to make in-app purchases of bottles which is a great idea. This application also has a very nice design and is straightforward to use. This application is mostly based in the UK and mainly England with only a tiny amount of Users elsewhere. I would like to implement something like this into my application but for Ireland [14]. I have also noticed some major issues with this application. Such as some features do not work and crash the app. I have also noticed minor issues such as the app not loading properly or displaying the correct things. This is definitely something Application Green Quake will try and improve upon. As this application crashes quite often.



Ready to reduce plastic pollution?

Log your Refills to measure your impact. Or sign up a Refill Station to help others reduce plastic pollution too.

Find a Refill Station

Add a Refill Station



Refill



Get Involved



Account

Figure 9: Home Screen [3]

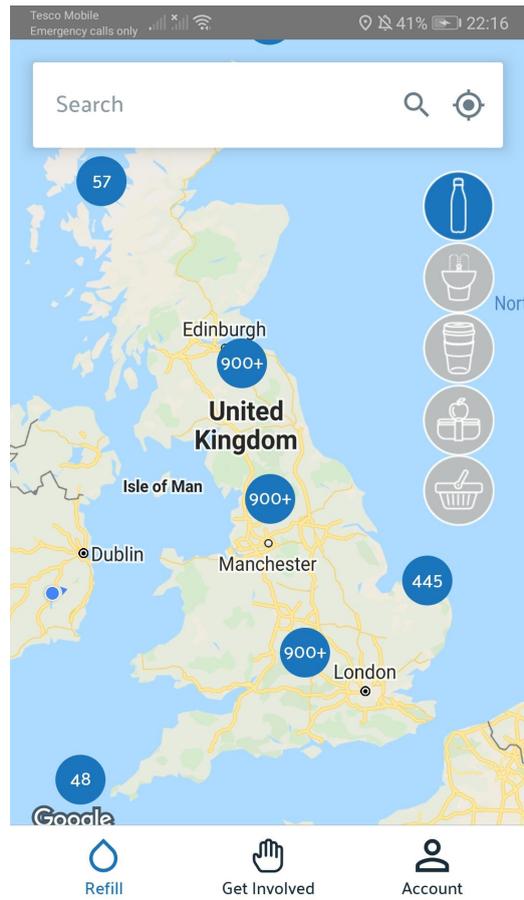


Figure 10: Map Of Water Refill Station [3]

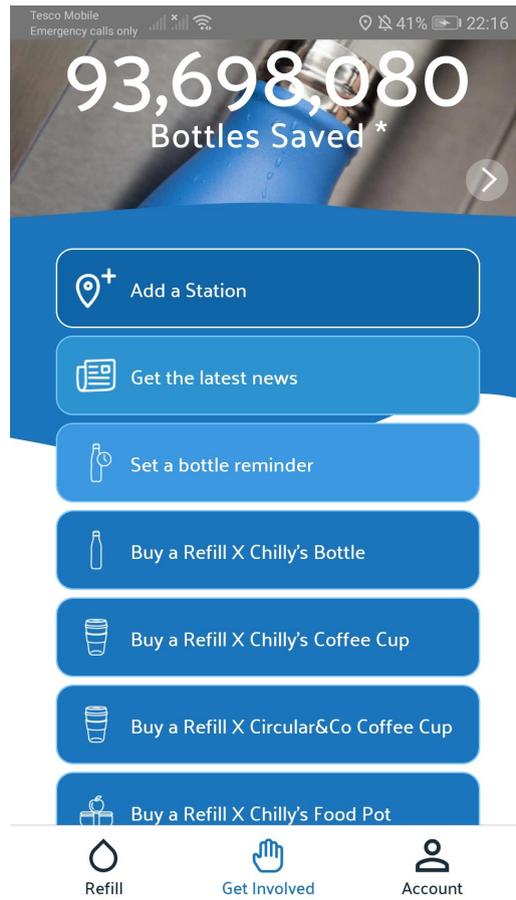


Figure 11: More Options [3]

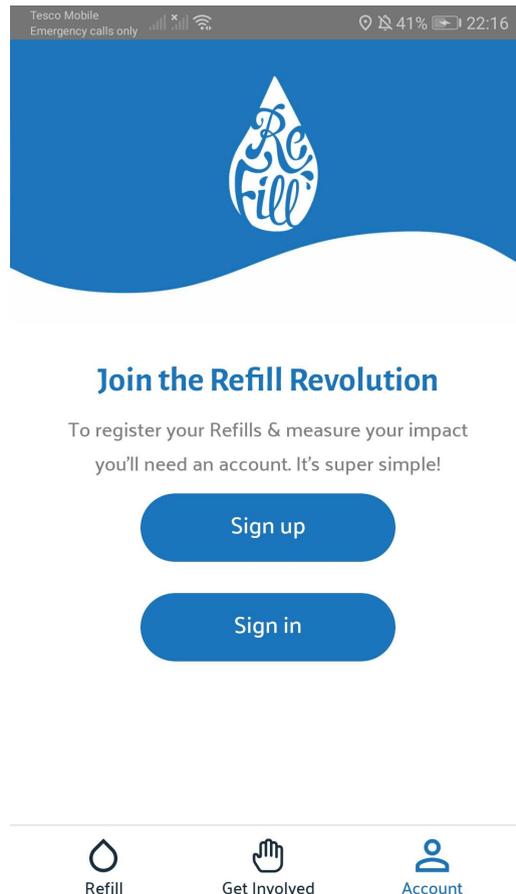


Figure 12: Create An Account Or Log In [3]

5.3.4 Conclusion

In Conclusion all these applications have something to offer but all have flaws which could be fixed. In addition to that some of these applications are too lightweight with too few features for someone to bother to download them or keep them. When a person looks for an application they look for an application that can do all that they want or many things that they want as opposed to having many apps on their phones. My solution is to create an application that focuses on gamification of eco friendly actions and also implements some of the features of the other applications in improved ways. With nicer design and better user experience. Application Green Quake will have most of the things you need to become environmentally friendly and will make it easy to stay so.

From the similar applications I have learnt how to implement a user interface and how not to. For example Green Me's user interface is too green, JouleBugs interface is too overwhelming and the points system isn't great. All of these aspects can be improved in Application Green Quake to make the application attractive, easy to use and use gamification like Joulebug to make being eco friendly fun and rewarding. From this research I have also acquired ideas and inspirations on how to implement certain features. When it comes to Air Plume it shows air pollution levels in areas that you search for but that is it. Refills can also be improved and some similar features will be applied to Application Green Quake. In

addition Refills performance is a huge issue as it is slow and crashes a lot. Application Green Quake will not have these issues and will be a major improvement on Refill.

6 Final Use Case Diagram

The user will be able to log the eco friendly activities that they perform and earn points, trophies, badges, achievements, level progress and avatars for them. The second section will be the Water Refill section which will display water refill stations where users can refill reusable water bottles instead of using plastic ones. They will also be able to see water refill station locations where they can refill their water bottles. The users will also be able to enter a bio and upload a profile picture which will be displayed on the profile page and on the leaderboard pop ups when a user taps on an entry in the leaderboard.



7 Final Brief Use Cases

7.1 CRUD Account

Use Case Name: CRUD Account

Actor(s): Member

Description: The use case begins when the member wishes to create, read, update or delete their account. To create an account when a member downloads the app and launches it for the first time. The member chooses the Sign up option and the member fills in their credentials and presses the Create Account button where upon successful login they are brought to the main menu page. The member can then navigate to the account page where they can read, update or choose to delete their account.

7.2 Login

Use Case Name: Login

Actor(s): Member

Description: This use case begins when an actor wishes to log into the application. The actor navigates to the login screen and fills in their credentials. After a successful login the main menu page is displayed.

7.3 Log Action

Use Case Name: Log Action

Actor(s): Member

Description: This use case begins when an actor wishes to log an eco-friendly action they have performed. An action such as planting a tree or using a reusable bag instead of a plastic one. The actor chooses the Log Action button from the main menu where they get brought to the categories section. Here the actor chooses a category to which their action belongs to and then the action that they have performed. The actor confirms the action and their points and or achievements, badges or trophies are added. If the actor reaches a certain mark a message is sent to the manager saying they have earned a reward.

7.4 View Leaderboard

Use Case Name: View Leaderboard

Actor(s): Member

Description: This use case begins when an actor wishes to view the leaderboard. The member chooses the leaderboard from the tab at the bottom of the page. The leaderboard loads the first 10 users and the user can click next page to view the next 10 users or the back to the first page button. The user can tap an entry and display details about that user.

7.5 Filter Leaderboard

Use Case Name: Filter Leaderboard

Actor(s): Member

Description: This use case begins when an actor wishes to filter the leaderboard. The member chooses the leaderboard from the tab at the bottom of the page. The user can click the filter button in the top right and select to filter the leaderboard by nation, view their position or view the global leaderboard.

7.6 View/Edit Profile

Use Case Name: View/Edit Profile

Actor(s): Member

Description: This use case begins when a member wishes to view/edit their profile. A member navigates to the profile page by choosing it from the bottom tab. The user can enter their bio or upload a new profile picture by tapping on them.

7.7 Upload Profile Pic

Use Case Name: Upload Profile Pic

Actor(s): Member

Description: This use case begins when an actor wishes to upload a profile pic. A member navigates to the profile page by choosing it from the bottom tab. The user can upload a new profile picture by tapping on the image.

7.8 From Storage

Use Case Name: From Storage

Actor(s): Member

Description: This use case begins when an actor wishes to upload a profile pic from storage. A member navigates to the profile page by choosing it from the bottom tab. A member taps on the photo and selects From Storage and chooses an image and then clicks save.

7.9 Capturing Image

Use Case Name: Capturing Image

Actor(s): Member

Description: This use case begins when an actor wishes to upload a profile by taking a photo. A member navigates to the profile page by choosing it from the bottom tab. A member taps on the photo and selects Take Photo and chooses takes an image and then clicks save.

7.10 Edit Bio

Use Case Name: Edit Bio

Actor(s): Member

Description: This use case begins when a user wishes to change their bio. A member navigates to the profile page by choosing it from the bottom tab. They tap their bio, enter a new bio and press back on their keyboard.

7.11 View Badges

Use Case Name: View Badges

Actor(s): Member

Description: This use case begins when a user wishes to view their badges. A member navigates to the profile page by choosing it from the bottom tab. The user taps on the badge icon. The badges are then displayed.

7.12 View Achievements

Use Case Name: View Achievements

Actor(s): Member

Description: This use case begins when a user wishes to view their achievements. A member navigates to the profile page by choosing it from the bottom tab. The user taps on the achievements icon. The achievements are then displayed.

7.13 View Trophies

Use Case Name: View Trophies

Actor(s): Member

Description: This use case begins when a user wishes to view their trophies. A member navigates to the profile page by choosing it from the bottom tab. The user taps on the trophies icon. The achievements are then trophies.

7.14 Find Refill Station

Use Case Name: Find Refill Station

Actor(s): Member

Description: This use case begins when an actor wishes to find the nearest water refill station to refill their water bottle. The user navigates to the water refill page from the main menu. The user chooses the Find Nearest Refill Station button. The nearest water refill station is displayed using google maps.

7.15 Change Password

Use Case Name: Change Password

Actor(s): Member

Description: This use case begins when an actor wishes to change their password. The user clicks the forgot password text on the login page. The user enters their email and a password reset email is sent to their email.

7.16 Log Out

Use Case Name: Log Out

Actor(s): Member

Description: This Use case begins when an actor wishes to Log out. The web application redirects to the login page.

8 Final Detailed Use Cases

8.1 CRUD Account

Use Case Name: CRUD Account

Actor(s): Member

Main Success Scenario: The use case begins when the member wishes to create, read or update their account.

1. A member that is not logged in launches the application.
2. The application displays an option to log in or create an account.
3. The member chooses the create an account option and the application loads the create and account page with a form for the member to fill in.
4. The member enters their username, email and password into the form and submits it.
5. The application validates the fields and creates the members account and redirects them to the main menu page.
6. The member clicks their profile icon where they can perform the read or update option.
7. The members can input their bio and upload an image.
8. The member can choose to delete their account by choosing the "Delete Account Option" and confirming their decision.

Alternative(s):

5a. Validation fails and the account is not created

1. An error message is displayed to the member .
2. The form is reset and the member can try again.

8.2 Login

Use Case Name: Login

Actor(s): Member

Main Success Scenario: This use case begins when an actor wishes to log into the application.

1. The actor launches the application.
2. The application displays an option to log in or create an account.

3. The actor enters their email and password and submits the form.
4. The application verifies the user.
5. The actor is then logged into the application and is redirected to the main menu.

Alternative(s):

5a. The verification fails and the actor does not get logged in

1. An error message is displayed to the member
2. The form is reset and the member can try again.

8.3 Log Action

Use Case Name: Log Action

Actor(s): Member

Main Success Scenario: This use case begins when an actor wishes to log eco-friendly actions they have performed such as planting a tree or using a reusable bag instead of a plastic bag.

1. The actor chooses the Eco Actions option from the main menu.
2. The application loads a page of categories for the actor to choose.
3. The actor chooses a category in which they want to log an activity.
4. The application loads a page with a list of eco friendly activities.
5. The actor chooses an activity they wish to log.
6. The application displays the activity and it's details.
7. The actor clicks log activity.
8. The application redirects to the main menu page.
9. The application saves and calculates the actors points, achievements, badges and trophies.

Alternative(s):

8a. The log activity action is stopped because the user tries to log more than 15 actions in a day.

1. An error message is displayed to the member.

9a. The log activity action is stopped because the user tries to log more than 1 action in less than a minute.

1. An error message is displayed to the member.

8.4 View Leaderboard

Use Case Name: View Leaderboard

Actor(s): Member

Main Success Scenario: This use case begins when an actor wishes to view the leaderboard and more details about individual entries in it.

1. The actor navigates to the leaderboard section using the navigation bar..
2. The leaderboard is displayed.
3. The leaderboard taps on an entry.
4. The tapped users details are displayed.

Alternative(s): No Alternatives.

8.5 Filter Leaderboard

Use Case Name: Filter Leaderboard

Actor(s): Member

Main Success Scenario: This use case begins when an actor wishes to filter the leaderboard.

1. The actor navigates to the leaderboard section using the navigation bar.
2. The leaderboard is displayed.
3. The actor chooses the filter on the top right of the pages.
4. The actor selects a nation from the dropdown.
5. The leaderboard with entries from only that nation are displayed.
6. The actor selects "Me" from the dropdown.
7. The leaderboard with only the user's details is displayed indicating their rank and details.

Alternative(s): No Alternatives.

8.6 View/Edit Profile

Use Case Name: View/Edit Profile

Actor(s): Member

Main Success Scenario: This use case begins when an actor wishes to view or edit their profile.

1. The actor navigates to the profile section using the navigation bar.
2. The profile is displayed.
3. The user can tap on the image to change it.
4. The user can tap on the bio to change it.

Alternative(s): No Alternatives.

8.7 Upload Profile Pic

Use Case Name: Upload Profile Pic

Actor(s): Member

Main Success Scenario: This use case begins when an actor wishes to

1. The actor taps on the profile picture on the profile page

2. The application displays an option to Take a photo or choose on from storage.

Alternative(s): No Alternatives.

8.8 From Storage

Use Case Name: From Storage

Actor(s): Member

Main Success Scenario: This use case begins when an actor wishes to upload a profile picture from their gallery.

1. The actor taps on the profile picture on the profile page.
2. The application displays an option to Take a photo or choose on from storage.
3. The actor chooses the From Storage option.
4. The application redirects to the phones gallery.
5. The user selects an image and presses Save.
6. The app saves the image to the database and redirects to the profile page where the new image is now displayed.

Alternative(s): No Alternatives.

8.9 Capturing Image

Use Case Name: Capturing Image

Actor(s): Member

Main Success Scenario: This use case begins when an actor wishes to log

1. The actor taps on the profile picture on the profile page.
2. The application displays an option to Take a photo or choose on from storage.
3. The actor chooses the Take Photo option.
4. The application opens the users camera.
5. The actor takes an image and presses save.
6. The app saves the image to the Firebase database and redirects to the profile page where the new image is now displayed.

Alternative(s): No Alternatives.

8.10 Edit Bio

Use Case Name: Edit Bio

Actor(s): Member

Main Success Scenario: This use case begins when an actor wishes to edit their bio.

1. The actor navigates to the profile section using the navigation bar.
2. The profile is displayed.
3. The user taps on the bio.

4. The user enters their bio and presses the back button on their keyboard
5. The system saves the bio and saves it to Firebase.

Alternative(s): No Alternatives.

8.11 View Badges

Use Case Name: View Badges

Actor(s): Member

Main Success Scenario: This use case begins when an actor wishes to view their badges.

1. The actor navigates to the profile section using the navigation bar.
2. The profile is displayed.
3. The user taps on the badges icon or text.
4. The system displays the badges page.

Alternative(s): No Alternatives.

8.12 View Achievements

Use Case Name: View Achievements

Actor(s): Member, Employee, Manager

Main Success Scenario: This use case begins when an actor wishes to view their achievements.

1. The actor navigates to the profile section using the navigation bar.
2. The profile is displayed.
3. The user taps on the achievements icon or text.
4. The system displays the achievements page.

Alternative(s): No Alternatives.

8.13 View Trophies

Use Case Name: View Trophies

Actor(s): Member

Main Success Scenario: This use case begins when an actor wishes to view their trophies.

1. The actor navigates to the profile section using the navigation bar.
2. The profile is displayed.
3. The user taps on the trophies icon or text.
4. The system displays the trophies page.

Alternative(s): No Alternatives.

8.14 Find Refill Station

Use Case Name: Find Refill Station

Actor(s): Member

Main Success Scenario: This use case begins when an actor wishes to find the nearest refill station to them.

1. The actor navigates to the reifl page.
2. The application finds the nearest water refill stations and displays them on the map.

Alternative(s):

8.15 Change Password

Use Case Name: Change Password

Actor(s): Member

Main Success Scenario: This use case begins when an actor wishes to change their password.

1. The actor navigates to the forgot password screen for the login page.
2. The application displays a page with a form.
3. The actor fills in the form and clicks the send button.
4. The system validates the input fields and sends a password reset email to the users email address and displays the corresponding message.
5. The actor closes the message and goes back to the main menu.

Alternative(s):

- 4a. The system validation fails and an error message displays to the actor.
 3. The actor closes the error message.
 4. The actor can try to fill out the form again.

8.16 Log Out

Use Case Name: Log Out

Actor(s): Member

Main Success Scenario: This Use case begins when an actor wishes to Log out.

1. The actor taps the Logout button in the main menu.
2. The web application ends the session.
3. The web application loads the Login page.

Alternative(s): No alternatives.

9 Supplementary Specification (FURPS+)

9.1 Functionality

The functionality of this application has been fully showcased and demonstrated across the many different use cases. Therefore there are no further supplementary functionalities to disclose here.

9.2 Usability

- A logged out user should be able to log an eco friendly action that they have performed in under 25 seconds 95% of the time.
- A logged out user should be able to create an account in under 25 seconds 85% of the time.
- A logged out user should be able to login under 10 seconds 95% of the time.
- A logged out user should be able to view their Trophies/Achievements and Badges in 25 seconds 95% of the time.
- A logged out user should be able to upload an image in under 30 seconds 93% of the time.
- A logged out user should be able to view the Refill Station map in under 15 seconds 95% of the time.
- A logged out user should be able to view the leaderboard in under 25 seconds 90% of the time.
- A logged out user should be able to view the leaderboard and filter it in under 35 seconds 90% of the time.
- The next page of the leaderboard should load in under 5 seconds 90% of the time.
- A logged in user should be able to log an eco friendly action that they have performed in under 10 seconds 95% of the time.
- A logged in user should be able to log an eco friendly action that they have performed in under 10 seconds 95% of the time.
- A logged in user should be able to view their Trophies/Achievements and Badges in 10 seconds 95% of the time.
- A logged in user should be able to upload an image in under 15 seconds 93% of the time.
- A logged in user should be able to view the Refill Station map in under 5 seconds 95% of the time.
- A logged in user should be able to view the leaderboard in under 10 seconds 90% of the time.
- A logged in user should be able to view the leaderboard and filter it in under 20 seconds 90% of the time.
- A logged in user should be able to sign out in under 5 seconds 90% of the time.
- A logged in user should be able to edit their bio in under 8 seconds 90% of the time.
- A logged out user should be able to change their password in under 30 seconds 85% of the time.

9.3 Reliability

The application must store the data of its users securely as it deals with people's progress and people would not like to lose what they have earned. With this in mind Firebase has been chosen as a Backend Technology to store the data in realtime in a database. This database is very reliable and that is the reason it was chosen.

- This application should be reliable and function for at least 7 days with no errors.
- When the app is uninstalled and reinstalled the user should keep all their data.
- When the app is terminated the users data should be backed up and cause no issue on reinstall.

9.4 Performance

This application must be convenient for the user with a fast and smooth user experience where possible.

- The login process should not take longer than 4 seconds 90% of the time.
- The application should take less than 1 second to load most pages 95% of the time.
- The change email should arrive in 30 seconds 90% of the time upon sending the password reset request.
- The signup process should not take longer than 5 seconds 92% of the time.
- The leaderboard should load in under 10 seconds 90% of the time.
- An image should be uploaded in under 4 seconds 95% of the time.
- The trophies, achievements and badges should load in under 2 second 90% of the time.
- The logged action should be sent and updated in the database in under 2 second 90% of the time.
- The Level should update in under 1 second 97% of the time.
- The bio should be updated in under 1 second 95% of the time.

9.5 Supportability

This application will be supported on both iOS and Android. Both of these applications will have the same functionalities. This application will be easily customizable with the ability to add more functions if so desired.

The application will support the **Android** version 5.1 and upwards and iOS 8.1 and upwards. This decision was concluded as any older versions than the ones aforementioned ones selected are too old and these will cover most of the market.

9.6 Security

After careful consideration of feedback from Paul Barry it was clear that security features have to be implemented to protect the app from malicious users. This will be done by putting a limit on the amount of activities a single account can make per day and by only allowing one log every 60 seconds to prevent the spamming of actions. This will be achieved by storing the current date, count and time in milliseconds in the database each time an action is made and making the comparison on the client side. If the count will be 15 and the current date will be the same as the date in the database then the user will be prevented

from logging any actions. If the date is different then the count will be set back to zero and the date will be updated in the database and the process will be repeated again. For the time, the time in the database will be compared to the current time and if it is less than 60 seconds that the user will be prevented from logging and action.

A daily limit of 15 and a limit of 1 log for every minute was chosen after carrying out an experiment to see what the optimal values would be. 15 was chosen as it is in the higher spectrum on the amount of eco activities a person is able to do per day while 60 seconds seems like a good time gap as some users will want to log things in a row.

In addition strong password validation will be implemented to mitigate brute force attacks while also using a hash and salt. Only passwords of minimum 8 characters, containing an uppercase letter, a lower case letter, a number and a symbol will be permitted. Firebase hashes the password using a salt and stores it automatically making it even harder to hack. Furthermore error messages will be written in such a way as to not give too much information to the attacker. Only logged in users will be able to use the application.

Broken Authentication will be mitigated by making it impossible to access other pages of the app without being logged in and by preventing the back button after logged going back into the app.

The password reset email will come from firebase itself and is also very secure.

12 Conclusion

In conclusion, this document has provided the full functional specification for the Green Quake application. This specification has been followed in detail during the development of the Green Quake mobile application and this document has been updated as new discoveries were made.

11 References

- [1] Inc, I, 2020. Green Me. [online] Play.google.com. Available at:
<<https://play.google.com/store/apps/details?id=com.incelligence.greenme&gl=IE>>
[Accessed 10 November 2020].
- [2] Play.google.com. 2020. Joulebug. [online] Available at:
<https://play.google.com/store/apps/details?id=com.cleanbit.joulebug&hl=en_IE&gl=US>
[Accessed 10 November 2020].
- [3] Play.google.com. 2020. Refill. [online] Available at:
<https://play.google.com/store/apps/details?id=uk.geovation.refill&hl=en_GB> [Accessed 10 November 2020].