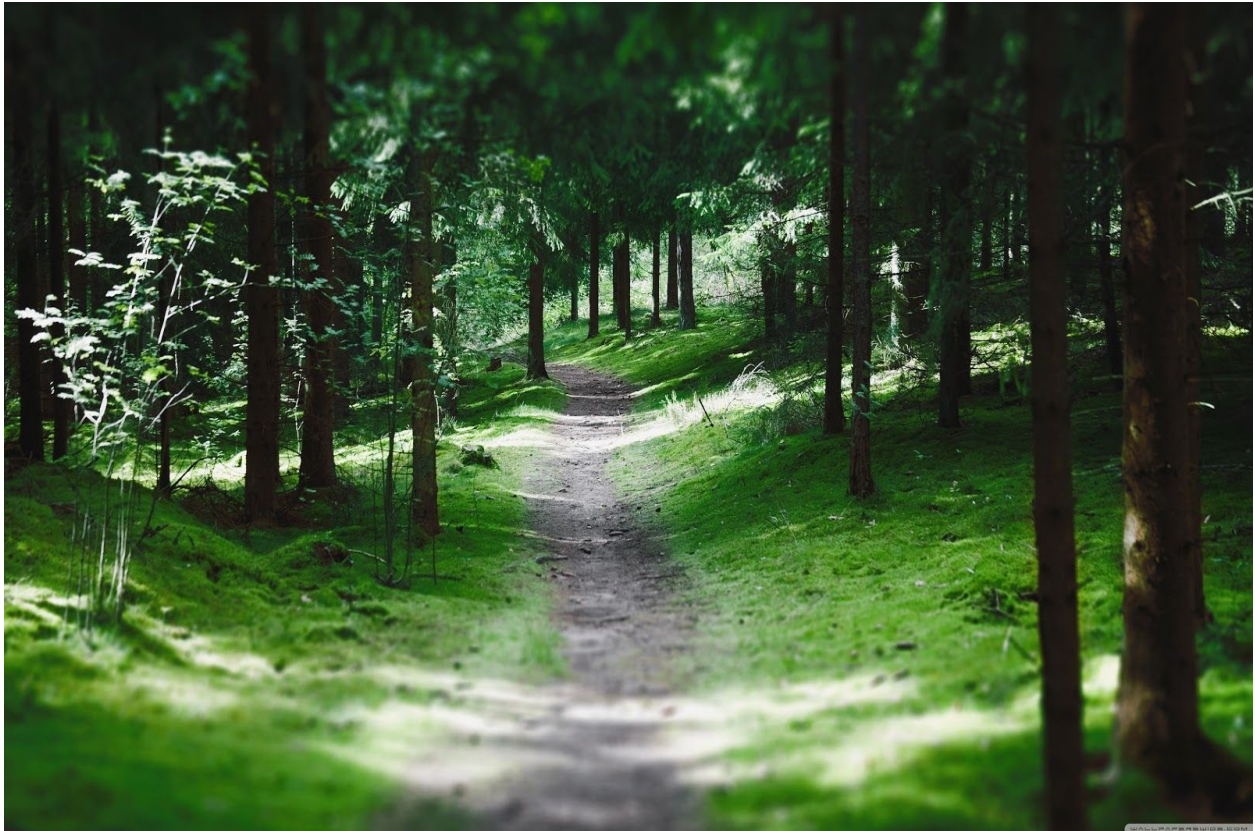


# Group-82 Report

## Project GoGreen

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### Introduction

Environmental issues are harmful effects of human activity on the biophysical environment. Environmental protection is a practice of protecting the natural environment on individual, organizational or governmental levels, for the benefit of both the environment and humans. Our project is focused on each individual person and especially on the ecological footprint per person, as its level in the Netherlands is particularly high. We are building Java application that enables users to enter their ecological choices. They get an overview of what they can do and see how much greener they can still go. To stimulate more green activities, we are integrating a gamification aspect to the application. Through it the users will be able to compare their progress with their friends. Based on

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your score and your achievements you will be placed in a rank group, which differentiate from each other on specially created badges

### **The team :**

- Alin Prundeanu
  - Student number : 4925262
  - Testing engineer and client-side developer
- Atanas Marinov
  - Student number : 4946251
  - GUI and client-side developer
- Chengrui Zhao
  - Student number : 4859693
  - Client-side Developer
- Giovanni Fincato de Loureiro
  - Student number : 4926854
  - DataBase and GUI developer
- Jan Pieter Kroeb
  - Student number : 4961307
  - Client-side Developer
- Nik Kapitonenko
  - Student number : 4899660
  - Server-side developer and tester
- Rahul Crunal Kalaria
  - Student number : 4770110
  - Server-side and Android app developer

### **Content :**

1. Product : (2 pages)
2. Process : (1.5 pages)
  - 2.1. Week 1-3
  - 2.2. Week 3 - 6

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- 2.3. Week 6 - 8
  - 2.4. Week 8 - 9
  - 3. Reflection (0.5 pages)
  - 4. Individual FeedBack (2 pages):
    - 4.1. Alin
    - 4.2. Atanas
    - 4.3. Zhao
    - 4.4. Giovanni
    - 4.5. Jan
    - 4.6. Nik
    - 4.7. Rahul
  - 5. Value Sensitive Design (1page):

## **Product**

### **Project Architecture :**

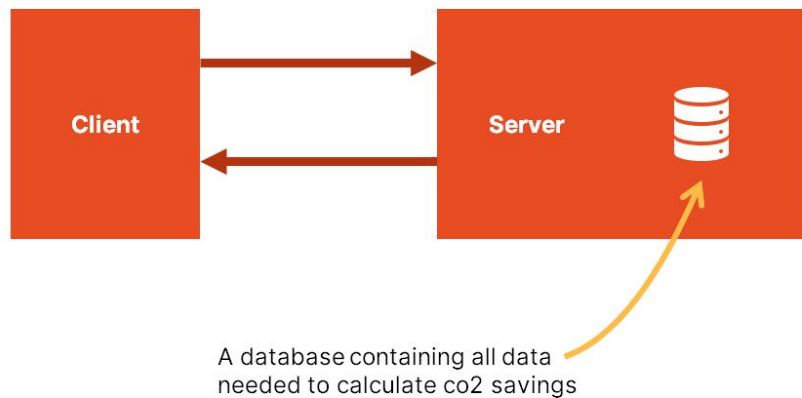


Figure 1.0

We decided to use the architecture displayed in figure 1.0 in our project as this allows us to have complete control over our entire project whilst still being relatively modern and scalable.

### Technological Choices :

- GUI
  - For the GUI we used JavaFx for the following reasons
  - It uses uses FXML and CSS, which:
    - enabled us to create the GUI in the application separately from the implementation of its logic and therefore made it much more maintainable and easier to use. A competitor such as Swing don't offer a declarative approach.
    - gave us more styling options such as themes and animations, which are hard to produce with Swing and Java AWT.
  - There are plenty of open-source libraries, which can enrich the already various selection of features that JavaFX provides.
  - The documentation of JavaFX is easily accessible and well written. You can also find loads of topics and tutorials related to it.

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- Database
    - MySQL was used to make the database for the following reasons:
    - MySQL triggers and foreign keys can be easily designed to perform a wide range of functionalities, allowing us to put much of the calculation and feature implementation of the application within the database itself
    - Our group found MySQL to be one of the most efficient DBMS's to establish effective server communication to
  - Server side
    - For the server we used the Spring Rest framework, Spring basic security over [ABC, PQR, XYZ] for the following reasons
    - Reason 1
    - Reason 2
  - Testing
    - For the purposes of testing our project we used Mockito and JUnit libraries for the following reasons
    - Reason 1
    - Reason 2
  - Android Application
    - For our android (and ios?) application we used Google's Flutter SDK and FireBase hosting service for the following reasons
    - With the help of the Flutter SDK, we (developers) are able to create applications that cater to both android and IOS with a single codebase written in the Dart programming language. This enables developers to create mobile applications for 2 of the largest mobile operating systems without going through the hassle of learning 2 different programming languages.
    - We used Google's FireBase and FireStore for the Authentication and Authorization of our users because with their services we are able to guarantee that our users information is kept secure at all times.
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## Process

- Week 1 - 3
  - Highlight 1
  - Highlight 2
  - Summary

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- Week 3 - 6
    - Highlight 1
    - Highlight 2
    - Summary
  - Week 6 - 8
    - Highlight 1
    - Highlight 2
    - Summary
  - Week 8 - 9
    - Highlight 1
    - Highlight 2
    - Summary

## Reflection

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Individual Feedback

### Alin :

Exciting, immersive and full of unexpected intricacies is how I would describe my experience during this project. Started with enthusiasm, it has been a curved road full of surprises, from trying to find the right, relevant documentation to study and eventually implement, to working with complex integration tools like maven and git, up to implementing logical schemas into actual functionality, while sometimes having to firstly deal with strange, new lines of code. Being an inquisitive and methodical person, I handled the task of testing, therefore being able to delve into server side logic as much as into client side one and their connection. I changed my approach on the project quickly, switching from gathering all information on Spring and JavaFX beforehand to focusing on the useful,

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urgent aspects of those new technologies. The testing process went on fairly well, considering times when I had to rush by deadline to understand and properly test new implemented classes. As I eventually found myself comfortable with the testing strategy, I took care of the application and added some features, like achievements and profile photo. The lack of good communication in the beginning has greatly improved as the project went on and I learned how to work in a collaborative environment and merge my contributions with those of others in order to build on top of them. The group meetings were lovely and efficient, while brainstorming future ideas and solutions was indeed compelling. It has been challenging and at times even overwhelming, but all in all I managed to pull it off and bring my skills to the project team.

**Atanas :**

For me the project was an exciting time, in which I have improved myself in both personal and professional manner. Before the start I was not confident in my communication skills as my level of English is not as great as I would like it to be. However, yet after the first week I knew that it won't be as much of a problem, seeing how open and friendly my teammates are. With the time passing by we have become more and more closer and our discussions weren't explicitly professional, but they were including side-talks about our interests outside the university, which made us form a solid working community. We have all never faced such a big software problem in which we had to also use unfamiliar for us technologies such as version control and maven, so in the beginning everybody was wondering how to separate the tasks and where to begin from. After a week of considering the options, I just took a spontaneous decision to start learning about the developing of a GUI. The start was a research of the options that are offered, after which I've chosen the JavaFX. As a widely used platform it offered a lot of reading materials, giving me the possibility to see how develop an application from the point of view of multiple different developers. As I main engineer of the GUI, I was the one, who interpreted the ideas of the teammates and rendered them in an actual user stories.

**Zhao :**

Being a highly goal oriented person, I'm self-motivated, and good at learning new skills and solving problems. My role in our team was to build the backend of the client which will martialize part of the business logic and connect the GUI to the Web API. To be specific, there was a task that I need to merge Spring into a JavaFX application to take advantage of the features provided by Spring, such as dependency injection, Spring security, and JSON parsing. It was surprisingly hard for a fresher like me. After reading tons of lines of code and solving dozens of problems, I accomplished it. So even though I knew nothing more than the basic coding skills that learned in OOP in the first quarter, I

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managed to gain a comprehensive understanding of our project and being able to help my team. My weaker point comes to my communication skills. Since my English is not as good as my teammates and we all have different cultural backgrounds, lacking communication and misunderstandings caused several conflicts. A typical one was that I thought the endpoints of our will always return an HTTP.200 as the response status, according to which the behavior of the client was designed. But actually, the endpoint will return a 40X status code if something went wrong inside the server. This conflict caused several unhandled exceptions on the client side. We solved this conflict by handling the exceptions on the client side, after a discussion with the server team, because their design was more reasonable. After this, I realized that the most important part of teamwork is communication. And most of the conflicts can be saved by good communication.

**Giovanni :**

My weaker point in this project was that I was completely new to most of the technology involved. I was familiar with the Java language, but the concept of the API, GUI, and connecting it to a database was new to me. The beginning of the project was therefore difficult for me, since I had to learn things from the beginning. Once I got more comfortable with the way the software worked, I discovered that one of my strengths was developing intricate database logic and implementation of features. I capitalized on this, and made a MySQL database that performed the CO2 and price calculations with minimal complexity of querying from the server. I initially had conflict with other team members as I failed to properly communicate with them the database details, making implementation for them more difficult. I learned from this experience the importance of communicating with your group members to maximise efficiency. I applied my learning throughout the rest of the project, and with consistent communication the new developments were smooth to implement. We developed the application much more efficiently once proper communication was established, especially at the group meetings. Once the database was further developed, I went on to help Atanas work on the GUI screens and client side code. Initially this caused some conflict in who was delivering which part, but we quickly learned to coordinate properly and deliver the separate GUI parts and combine them efficiently, and the GUI developed much more quickly.

**Jan :**

My contribution towards the project

When I think about what I contributed towards the project, I also want to think about how the project developed me further as a person. And I can say that I have grown when I had to make these contributions.



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These thoughts of my advancement are mainly risen due to the fact that I had to figure stuff out on my own, instead of reading it all from a book. Browsing Stack-Overflow was at first pretty tedious, but eventually you see what was wrong with your own code / what your own code needed.

What I coded in the OOPP Project was mainly connecting the client methods with the GUI and writing those client methods to transfer the inserted data towards the database. I also coded some server-side in the beginning to make a few end-points and entities. But in the end I fully moved towards client coding. Client-wise there weren't many difficulties at first, I would argue that the first transfer that I had to make for demo 2 was quite easy. However when we switched to a more complex database, a bit had to change. Fortunately Zhao's code showed me new way of implementing this, so I was quick to adapt.

### Stronger/weaker points

When I first started with the project, I knew a few of my shortcomings that could harm the project. Mainly working without a schedule, this was not really a problem with this project. Since everyone made sure that everyone did their work; lacking was not an option.

I also benefited from one of my strong points with the project: Being flexible. This was useful cause I was able to give other people also a share of potential java code and switch over fully to client. That way everyone was able to make their own contribution.

There was only one problem that I have experienced and that was when I was committing my code for demo 2 and we accidentally deleted some conflicting code, causing the whole thing to not work anymore. Zhao was fortunately able to recover it and was able to correctly merge it with the master. In the end I can proudly say that I also understand how to use GitHub in the end.

### **Nik :**

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**Rahul :**

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## **Value Sensitive Design**

In order to initiate our value-sensitive analysis of our design, we first identified the stakeholders of our application, beyond the obvious clients and shareholders. On a broader scale, the app is meant to help preserve the environment, making future generations all stakeholders. More directly influenced though are the consumers and producers of the products mentioned in the app. Solar panels producers, local produce farmers, public transport systems, etc. are all encouraged by the application on to the

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client; meanwhile, foreign produce, private transport (cars, motorbikes, etc.), meats, etc. are discouraged. The application “shifts” consumer interests in the direction of the more environmentally responsible products. From a moral perspective, although there is potential harm to the discouraged businesses, this is acceptable in return for the sake of future generations’ environment well-being; promoting eco-friendly products and behaviours is done for the sake of a more sustainable world. At the level of local government and society, the application encourages usage of public transport and low electricity/power consumption. Since these services are generally provided by the local government rather than private businesses, this unfortunately means a higher need for funding in public transport, but much lower funding required for other services which the government provides (less public parking space required due to reduced car usage, lower need to import car fuel, lower electricity consumption means less imported fossil fuels to produce it, etc.). For clients of this application, the application promotes a lifestyle with lower consumption of money and CO<sub>2</sub>, which is a healthy contrast to today’s society promotion of consumerism. The clients’ privacy being taken into respect, since all the information comes only from the user’s own input, we have avoided making the app unnecessarily invasive. Our application contains a history of the clients’ activities which they chose to input. This makes our database a repository of sensitive information, as a data breach would make it easy to analyze and possibly exploit an individual’s purchase patterns and habits. The application only requires a username to register, so no users are at risk of being discriminated against in any way.