TED UNIVERSITY

CMPE 491 High Level Design Report

EcoFriends Application

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Table of Contents

1. Introduction

1.1 Purpose of the system

EcoFriends is an idea that seeks to help nature and recycling. Our aim is to encourage people to save nature and make recycling funnier. We thought that if we build our application like a game and turn recycling into a competition, people will use this app more and be more thoughtful. The mechanism behind the app is a user should insert what have he/she done to save the future. After that, depending on the act that he/she made, they will earn EcoPoint and EcoCoins. The reason why we made 2 different options is EcoPoint is used for competition with other players and EcoCoins is used for customization for your avatar. The funny part of the app is, you will have an avatar that is completely customizable and with your EcoCoins, you can buy some features and customize your avatar. It is easy to trick the system by inserting false information, for example, inserting an activity like you completed that you didn't but our aim is to reach people who are concerned about nature.

Figure 1:Our Application's logo which we designed.

1.2 Design goals

- Functionality: Our first design goal is to make our application functional. These functionalities should depend on users' expectations and needs. For now, our first concern is to make this application user-friendly and create an application as functional as it can be.
- Performance: We aim to make our app work on high performance. This high performance requires fast operations, low delays, and making operations productive.

- Security: We will try to make our app as secure as it should be. The data should be stored safely from cyber-attacks. Also, to avoid multiple fake accounts, we will make log-in and sign-up operations via e-mail.
- Sustainability: To make our app sustainable, we aim to write code clean, we're planning to facilitate the maintenance of the project. Also, we're planning to minimize the environmental effects that can affect both users and apps badly.

1.3 Definitions, acronyms, and abbreviations

We are trying to develop our system easy to use and easy to understand. That's why our application will not include some words that only can be understood by some people. Every word, definition, and explanation will be simple as the app itself. However, as we mentioned in previous reports, the user should discriminate between these 2 words that look similar.

EcoPoint, also known as EP, represents the points you earn when you perform certain actions. These points reflect your overall status and allow you to compete with your friends.

On the other hand, EcoCoins, or EC, are a currency that can be earned by completing actions. Unlike EcoPoints, EcoCoins can be used to purchase items for customizing your avatar.

In summary, EcoPoints are for competition, while EcoCoins are for acquiring avatar customization options.

1.4 Overview

EcoFriends is a mobile application designed to promote and support sustainable behavior by encouraging users to reduce their carbon footprint through ethical recycling practices. By using this app, individuals can earn virtual coins by recycling various materials like paper, plastic bottles, and metal cans. Users have the option to manually enter their recycling activities into the app, allowing them to track their progress and earn rewards. The competitive aspect of the app enables users to compete with their peers based on their recycling activity and currency balance. Another incentive for users to recycle is the ability to customize their avatar using the coins they earn, making the app more interactive and game-like.

Privacy and security are paramount in EcoFriends, as the app is designed to safeguard users' private information from online threats. The app's scalability and availability on both iOS and Android operating systems allow users to access it conveniently from anywhere and at any time using their mobile devices. With its user-friendly and intuitive design, EcoFriends aims to attract and engage users while promoting sustainability.

In summary, EcoFriends is a user-centric, accessible, and enjoyable app that motivates individuals to recycle responsibly while providing rewards for their eco-friendly efforts.

2. Current software architecture (if any)

Since we did not start our project's development side, there is no current software architecture. Currently, the EcoFriends app has a basic user interface (UI) prototype developed for the front-end component. However, no backend functionality has been implemented yet.

3. Proposed software architecture

3.1 Overview

The proposed software architecture for the EcoFriends app is a client-server architecture that comprises a mobile application as the client and a server-side backend to handle the app's functionality.

3.2 Subsystem decomposition

User Interface (UI): The User Interface component is responsible for creating and presenting the screens and interfaces that allow users to interact with the recycling application. It handles the display of information related to recycling activities, such as instructions, progress, and rewards. The UI component provides a visually appealing and user-friendly interface that enables seamless navigation and intuitive interaction with the application's features. It incorporates design principles and usability considerations to enhance the overall user experience.

Server-Side: The Server-Side component serves as the backbone of the recycling application, handling the backend logic and managing data. It receives and processes user requests, performs necessary computations, and interacts with databases or external APIs for data storage and retrieval. The Server-Side component ensures the secure and efficient functioning of the application, implementing algorithms and business rules that drive the recycling activities, leaderboard calculations, and management of cosmetic rewards. It also incorporates error handling mechanisms and implements security measures to protect user data and ensure reliable operation. The Server-Side component plays a critical role in maintaining the integrity and responsiveness of the application's backend infrastructure.

3.3 Hardware/software mapping

Client-Side (Mobile App): Deployed on iOS and Android platforms.

Server-Side (Backend): Built using Flutter and hosted within a cloud-based service like Firebase. This backend component handles user management, recycling process management, leaderboard management, and cosmetics management.

3.4 Persistent data management

Database Management System: The Database Management System component serves as the storage and management system for various types of data within the recycling application. It efficiently stores and organizes user profiles, recycling activities, eco-points, and eco-coins.

Server-Side Data Management: The Server-Side Data Management component is responsible for implementing Create, Read, Update, and Delete (CRUD) operations for various data entities within the recycling application. It handles the processing and manipulation of user data, recycling data, and leaderboard data. The component allows users to create and update their profiles, track their recycling activities, and earn eco-points and eco-coins.

3.5 Access control and security

User Authentication: The User Authentication component is responsible for implementing secure user registration and login processes within the recycling application. It ensures that only authorized individuals can access the application by verifying their identity through username and password credentials. The User Authentication component works closely with the server-side data management.

Role-Based Access Control: The Role-Based Access Control component manages user roles and permissions within the recycling application. This ensures that users can only access features and data that are relevant to their assigned role.

3.6 Global software control

Server Monitoring and Control: The Server Monitoring and Control component is responsible for continuously monitoring the health and performance of the server hosting the recycling application. It collects and analyzes various system metrics, such as CPU usage, memory utilization, network traffic, and disk space, to ensure optimal performance and detect any anomalies or potential issues. The component also monitors server uptime, response times

Error Handling: The Error Handling component within the recycling application is responsible for detecting and managing errors, exceptions, and unexpected events that may occur during the system's operation.

3.7 Boundary conditions

Payment Gateway: The Payment Gateway is an external system integrated into the recycling application to facilitate secure and seamless transactions. It allows users to perform monetary transactions involving the virtual currency used within the app, such as eco-coins. The Payment Gateway ensures the security of payment transactions, encrypting sensitive user data and complying with industry standards for secure financial transactions.

Leaderboard API: The Leaderboard API integrated into the recycling application to retrieve and update leaderboard data. The Leaderboard API enables the application updated information about user rankings and scores. It also allows the application to update user scores and rankings based on their EcoPoints.

4. Subsystem services

User Interface: The User Interface component of the recycling application is responsible for managing app and provide better User Experience. We wanted our UI user friendly. The UI also includes user input validation, the data entered by users is valid. It provides real-time feedback to users, such as error messages or success notifications, to enhance usability and guide users in their interactions with the application.

Server-Side: The Server-Side component includes user management, recycling process management, leaderboard management, and cosmetics management.

User Management: This component handles user registration, login, and profile management. It ensures secure authentication and authorization.

Recycling Process Management: The Server-Side component is responsible for recording and managing recycling activities. It tracks user interactions and records relevant data, such as the types and quantities of recycled materials. It calculates and updates eco-points and eco-coins.

Leaderboard Management: This component aggregates user scores and determines their rankings on the leaderboard. It collects data from the recycling process management component and updates the leaderboard.

Cosmetics Management: This component handles transactions related to purchasing avatar cosmetics. It allows users to browse available cosmetics, view details and prices, and initiate transactions for acquiring them.

The Server-Side component plays a vital role in the overall functionality of the recycling application by managing user-related data, facilitating the recycling process, maintaining the leaderboard, and enabling users to customize their avatars with cosmetic items.

5. Glossary

1. Carbon Footprint: The total amount of greenhouse gas emissions, primarily carbon dioxide, produced directly and indirectly by an individual, organization, or activity.

2. EcoCoins: Digital currency earned by users through recycling activities in the EcoFriends app, which can be used to unlock rewards and customize avatars.

3. Progress Tracking: The ability for users to monitor and assess their recycling efforts over time through the app's tracking functionality.

4. Rewards: Benefits given to users for their recycling activity, which can be redeemed using virtual coins and points

5. Competitive Aspect: The feature that allows users to compete with their peers based on their recycling activity and currency balance, fostering engagement and motivation.

6. Sustainability: The focus on promoting environmentally sustainable behaviors and practices, such as recycling, within the EcoFriends app.

7. Game-Like: Referring to the interactive and engaging elements incorporated into the EcoFriends app, making the recycling experience more enjoyable and motivating for users.

6. References

https://www.conserve-energy-future.com/recyclingmaterial.php

https://www.nytimes.com/guides/year-of-living-better/how-to-reduce-your-carbon-footprint