

# Product Description

**Project Name:** Loyalty Points and Reward System - Subproject 4 / Team 9

**Prepared by:** Ivan Chan, Peter Lee, Nathan Chan, Talha Hasan, Joseph Zhang

## Overview:

The Loyalty Points and Rewards System is an essential part of Ecofix Solutions' Client Engagement Web Portal. The system allows customers to collect points through a variety of methods such as purchasing Ecofix products and participating in green energy programs. These points can be redeemed for discounts, product upgrades and exclusive green technology.

## Key Features:

The key features of the Loyalty Points and Rewards System are as follows:

1. Point Accumulation - Clients have the ability to accumulate points in their accounts relative to the purchases that they have made of viable Ecofix brand products.
2. Reward Redemption - Points that clients have accumulated can be used to redeem certain types of rewards such as percent or price discounts on their next purchase, product upgrades, and access to exclusive Ecofix green technology. These rewards are redeemed on the web portal and must be used before the expiration date listed with the reward. If redeemed and used before expiry the reward will appear on the RewardTransaction page of the web portal, as proof of the reward being redeemed.
3. View Rewards for Redemption - Clients will be able to view the rewards that they are able to redeem on the Rewards page of the web portal. A reward can be redeemed if the client has a sufficient amount of points. If the client does not have sufficient points they will be directed to a popup that informs them of an error due to insufficient points. When successfully redeemed the client will be able to view the reward in the Rewards Transaction page where a QR code can be accessed to use the reward in store.
4. View Active and Inactive Rewards - Rewards that have been redeemed are viewable in the Active section of the RewardsTransaction page. Rewards that have been redeemed and used in store are viewable in the Inactive section of the RewardsTransaction page.

## Benefits:

The benefits of the Loyalty Points and Rewards are that it provides both new and returning clients with an incentive to buy Ecofix products and become part of the Ecofix community. This is due to the points that clients receive from purchasing Ecofix products and interacting with the Ecofix Web Portal, whether that be through doing surveys or participating in Ecofix's educational opportunities. Through this, Ecofix Solutions' market share will increase as word of mouth through clients will boost brand awareness and recognition.

# Development Process

## Database Report

**Project Name:** Loyalty Points and Reward System - Subproject 4 / Team 9

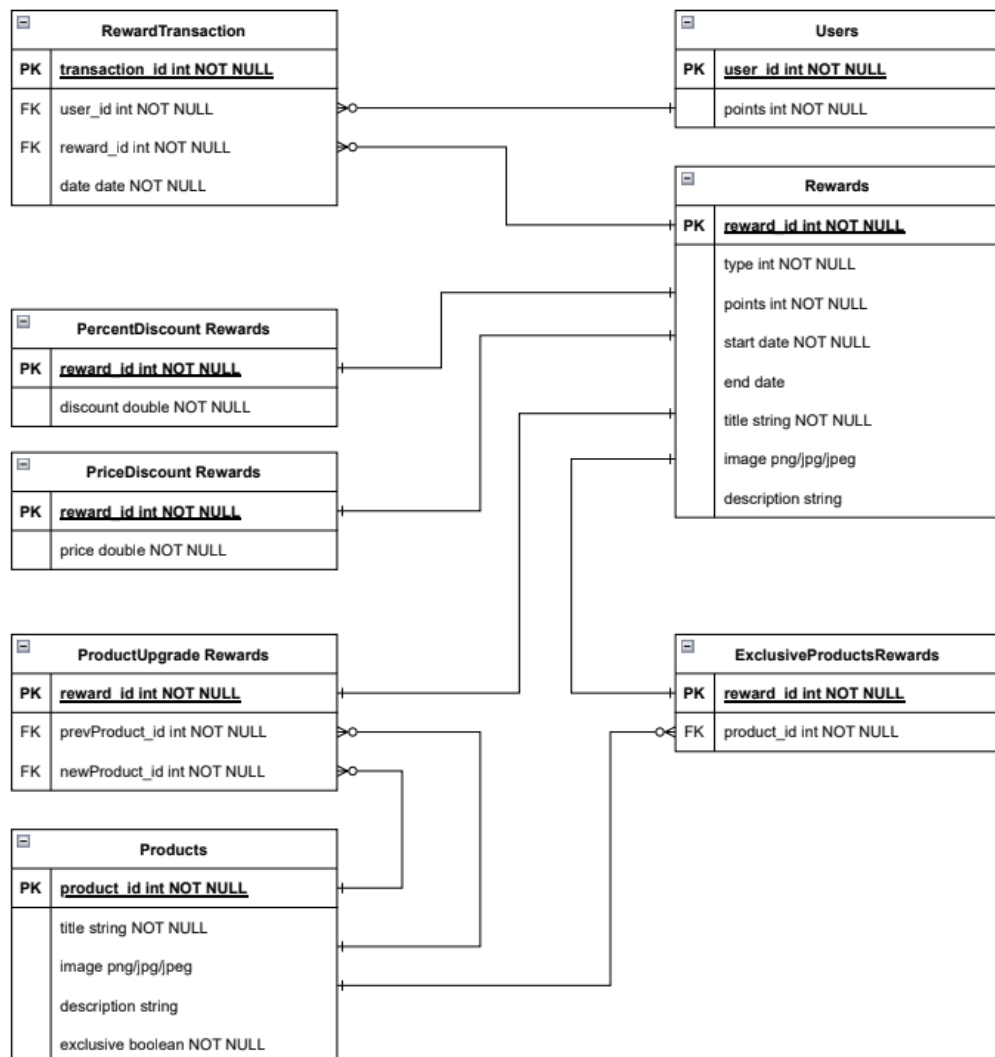
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**Date:** November 8, 2024

## README - Directive Notes

- **Create-Tables.sql** Fill the database with tables.
- **Drop-Tables.sql** Drop every table in order by hierarchy.
- **Insert-Data.sql** Fill tables with dummy entries.
- **Delete-Data.sql** Delete all data entries in order for all tables.

## EER Diagram



## Process of Creating the Logical Model

The loyalty points and rewards system focus on the interaction between users and rewards by exchanging points for discounts, upgrades, and exclusive products. Thus, three main tables of Users, Rewards, and Products are used and branched out to connect to Reward Transaction which is a history of point exchanges that the user has made for rewards.

### Table Description

**(PK)** = Primary Key

**(FK)** = Foreign Key

- **Users**
  - **UserID (PK)** - Identification for the user
  - **Points** - The amount of points that a user has
- **Products**
  - **ProductID (PK)** - Identification for the product
  - **Title** - Title of the product
  - **Image** - Image showcasing the product graphically
  - **Description** - Description about the product
  - **Exclusive** - A boolean which indicates whether this is an exclusive product
- **Rewards**
  - **RewardID (PK)** - Identification for the reward
  - **Type** - PercentDiscount = 0, PriceDiscount = 1, Upgrade = 2, Exclusive = 3
  - **Points** - Amount of points need to redeem reward
  - **StartDate** - The date of when the reward has been posted
  - **EndDate** - The expiry date of the reward
  - **Title** - Title of the reward
  - **Image** - Image showcasing the reward graphically
  - **Description** - Description about the reward
- **PercentDiscountReward**
  - **RewardID (PK)** - Identification for the reward
  - **Percent** - The percentage discount to reduce product price.

- **PriceDiscountReward**
  - **RewardID (PK)** - Identification for the reward
  - **Price** - The price discount to reduce product price.
- **ProductUpgradeReward**
  - **RewardID (PK)** - Identification for the reward
  - **PrevProductID (FK)** - Identification for the current product that will be exchanged
  - **NextProductID (FK)** - Identification for upgraded product that user will receive
- **ExclusiveProductReward**
  - **RewardID (PK)** - Identification for the reward
  - **ProductID (FK)** - Identification for the reward
- **RewardTransaction**
  - **TransactionID (PK)** - Identification of the transaction
  - **UserID (FK)** - Identification for the user
  - **RewardID (FK)** - Identification for the reward
  - **Date** - Date of when user has redeemed the reward

#### Table Relationship

- **Users – Rewards (N:N)**
  - **Users – RewardTransaction (1:N)**
  - **Rewards – RewardTransaction (1:N)**
- **Rewards – PercentDiscountReward (1:1)**
- **Rewards – PriceDiscountReward (1:1)**
- **Rewards – ProductUpgradeReward (1:1)**
- **Rewards – ExclusiveProductReward (1:1)**
- **ProductUpgradeReward – Product (1:1)**
- **ExclusiveProductReward – Product (1:1)**

## **Notes**

- The discount reward is split into 2 types of discounts, discounts that are a percentage off of the original price, and discounts that are an absolute amount off from the original price.
- Type of reward (Price Discount / Percentage Discount / Product Upgrade / Exclusive Product) will be too complex if added as part of the Rewards table. Therefore, four tables PriceDiscountReward, PercentageDiscountReward, ProductUpgradeReward, and ExclusiveProductReward were added to simplify database design. The Reward IDs of these tables will be mutually exclusive.
  - Changed to a type attribute on rewards to identify PriceDiscountReward, PercentageDiscountReward, ProductUpgradeReward, and ExclusiveProductReward.
- ProductUpgradeRewards requires 2 Product foreign keys, as these will reference different objects in the Products table.
- ExclusiveProductRewards will only contain foreign keys to the Products table that have the exclusive attribute set to True.
- RewardTransactions have a unique ID as their primary key due to the possibility of a single user redeeming 2 of the same reward on the same day

## **Functional Dependencies**

### **Users Relation**

$\{\text{user\_id}\} \rightarrow \text{points}$

### **Products Relation**

$\{\text{product\_id}\} \rightarrow \text{title, image, description, exclusive}$

### **Rewards Relation**

$\{\text{reward\_id}\} \rightarrow \text{type, points, start, end, title, image, description}$

### **PercentDiscountReward Relation**

$\{\text{reward\_id}\} \rightarrow \text{percent}$

### **PriceDiscountReward Relation**

$\{\text{reward\_id}\} \rightarrow \text{price}$

### **ProductUpgradeReward Relation**

$\{\text{reward\_id}\} \rightarrow \text{prevProduct\_id, newProduct\_id}$

### **ExclusiveProductReward Relation**

$\{\text{reward\_id}\} \rightarrow \text{product\_id}$

### **RewardTransaction Relation**

$\{\text{transaction\_id}\} \rightarrow \text{user\_id, reward\_id, date}$

## **Normal Forms**

- **1NF** - All tables are 1NF because every attribute accepts only atomic values. Atomic values are when only one value exists for every entry of the database. For instance, the attribute “exclusive” from table “Products” is represented as a boolean of true or false... where each option is a separate entry.

Note that there are no null or duplicate entries for all tables which is another factor to 1NF. DiscountReward used to have a price and percent attribute. However, the rule for the table was to only fill in one of the attributes which causes the entries to have a null value. Therefore the table is not 1NF. We have created a PercentDiscountReward and PriceDiscountReward table to fix the 1NF issue by only having one of the attributes (price or percent) in a separate table.

- **2NF** - All tables are 2NF because for each table, every non-key attribute is fully functionally dependent on the primary key. Also each table is already 1NF.
- **3NF** - All tables are 3NF because all non-key attributes are wholly dependent on the primary key, only the primary key, and nothing else. Notice how no non-key in all tables are transitively dependent on the primary key. Transitively dependent is when  $A \rightarrow B$  and  $B \rightarrow C$ , therefore  $A \rightarrow C$ .

It would be better to go for higher normalization forms like BCNF, 4NF, 5NF, etc. However we decided that 3NF is suitable for the database as we do not need a high level of data retention and its unlikely to have insert, update, delete anomalies for our case.

## **Integration Efforts and Effects**

- **Nov. 5 - Communication with Analysis Team for additional Products table**  
The question was if royalty point or the admin team will need to create the Products table since other subprojects rely on the Products table. We came to a conclusion that in general, we will be needing a products table for the rewards to refer off of.
- **Nov. 7 - Verify LoyaltyTransaction table with Subproject 2**  
Shared information with the database schema to make sure that our designs aligned.
- **Nov. 7 - Worked with Subproject 2, 5, 6, and 7b to merge SQL scripts**  
Shared information with different subprojects for database schema. Resulted in a completely merged database schema.

## User Cases

### Customer:

- They already know about us or have heard about us
- They are interested in helping the environment
- They want an easy time navigating through the web portal
  - Quickly finish a single task in a minimal amount of time
- They want a way to access the web portal anywhere at any time
- They are consumers
  - They do not want faulty products
  - They want a good selection of rewards
  - They want a fair deal for their reward transactions
  - FOMO (fear of missing out)
- All ages
- All genders

### Admin:

- They want management of the web portal to be easy
  - Easy to navigate admin dashboard
    - Able to find the reward to edit quickly
    - Able to add a new reward without hassle

### Cashier:

- Verify that reward has been redeemed

### Event Organizers:

- They want a fair deal for their points transactions

### Educators:

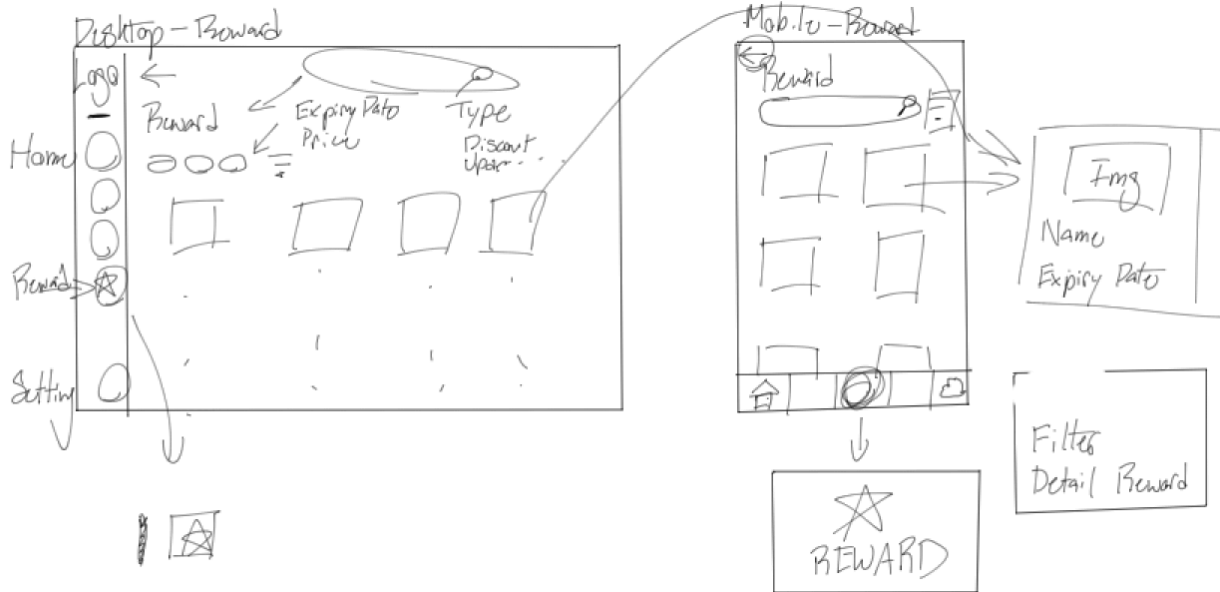
- They want a fair deal for their points transactions

### Project Sponsor (EcoFix)

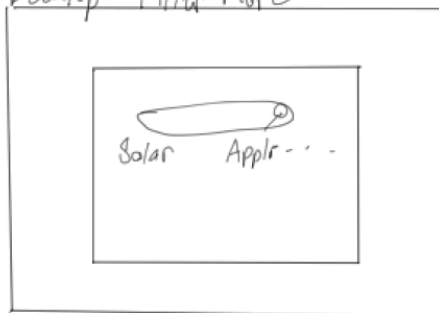
- They want a fair deal for their points transactions
- They want to promote environmental friendly attitudes



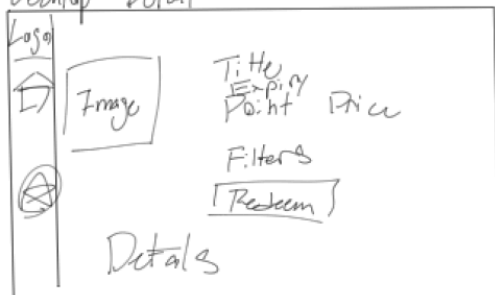
## UI Design Sketches



Desktop - Filter More

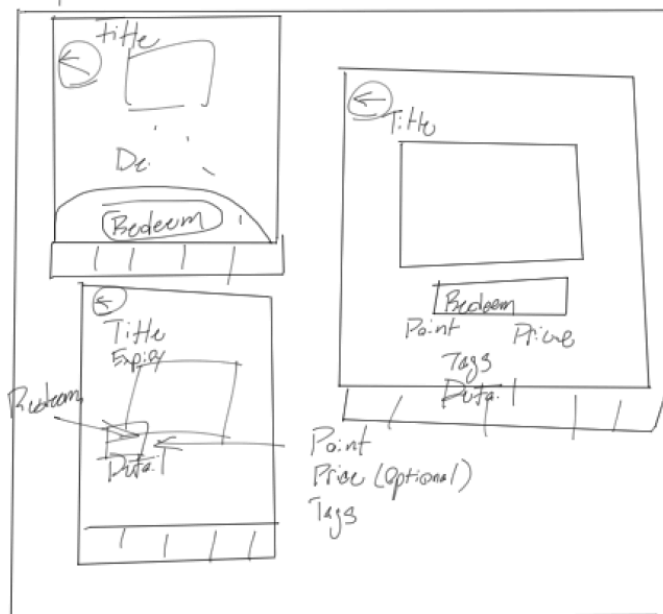


Desktop - Detail



QR Scan

Mobile Detail



# QR Code Verify Redeem

Mobile - QR Code

QR Code

Title  
Instruction

OK



Mobile - Success

✓  
Complete

OK

OR

Mobile - Fail

✗  
BAD

OK

Desktop - QR Code

Title  
Instruction

QR

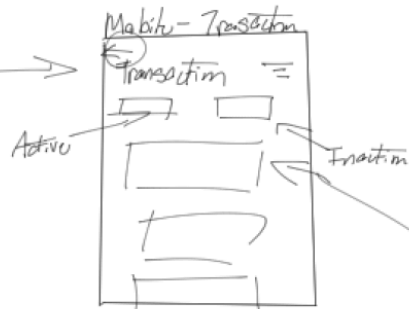
PDF

Email

PRINT

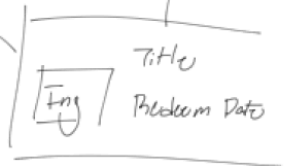
Reward Transaction

## Reward Transaction



QR Code Page

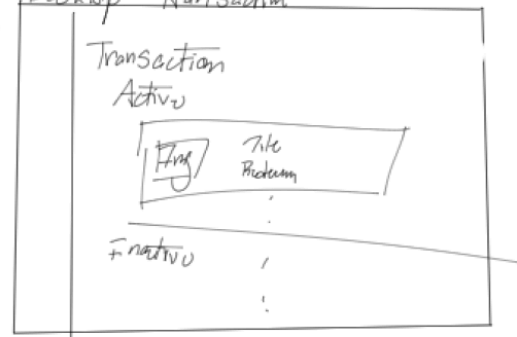
Click



## Desktop - Reward



## Desktop - Transaction



In summary:

Rewards tab icon

Rewards page

- Filter, search
  - Price, expiry date, type (discount, upgrade, exclusive)
- Rewards are in tiles
  - Title, image, tags
  - Price for desktop
- Rewards details page
  - Title, image, description, price, back button
  - Redeem button
    - Desktop: under title and price, next to image
    - Mobile: above the tabs, still there when scrolling
  - Rewards redeem page
    - Confirm redemption button, reward details, back button
    - Rewards redeem verification page
      - “Verified” or “Uh oh! Something went wrong.”
      - OK button
        - Sends them to QR code page
          - Hide back button
          - OK button sends them to Rewards page
- Rewards transactions page
  - Filter
    - Active / inactive, date range (i.e. from)
  - Transactions
    - Title, image, date reward was redeemed
    - Pressing on the transaction sends the user to the relevant QR code page
  - QR code page
    - QR code, email button, pdf button, show back button, hide OK button

## **Color and Font**

### Background: White

- Readability: Ecofix's solutions customers will have a variety of demographic and ages; therefore, Ecofix's website will have a background of white for easy readability for desktops, tablets and phones.

### Primary Color: Green hues of different shades.

- Green is universally associated with nature and growth. By using different colors of green, Ecofix's customers will experience energy and connection with nature. This complements Ecofix's goal of providing sustainable solutions to its customers.
- Different hues of green creates a robust, visually engaging experience. Adds to the design of Ecofix's web page and promotes sustainability.
- Green also has a calming effect for customers; therefore invoking a sense of peace from nature to Ecofix's customers. This will enhance the UI experience by making the transitions in the webpage feel smoother.

### Typography: Roboto

- This is a clean Sans-serif font that is used for readability. Ecofix's website will be integrated on all devices such as laptops, tablets and phones.
- The design of Roboto gives an innovative and progressive feeling. This aligns with Ecofix's solutions as sustainability is about thinking about the future, and how humans can innovate to reduce our carbon footprint for future generations.

## **Presentation ideas**

Type down the project deliverables that you want to present in the presentation. Afterwards, in a separate document, write a script describing what the deliverable is and its role in the project. Be sure that the script is only 1m ~ 1m10s long. Make sure that the deliverables you write down here are different from the deliverables written down by the other team members. Have fun!

Ivan:

- GitHub\CPS714\Backend\rewards\_backend\lprs\views\Rewardtransactions.py
- GitHub\CPS714\Backend\rewards\_backend\lprs\views\Rewards.py
  - PUT request
- Presentation intro
- Communication with User Profile and Surveys

Peter:

- SQL views
- API endpoints (in general)
- Scope adjustments

Talha:

- Explain database setup for rewards and loyalty points
- Explain changes made to comply for integration with other teams

Joseph:

- Frontend design simple design
- Modular and scalable
- Smooth, real-time updates
- User interface and user data

Nathan:

- Transaction page
- Work breakdown structure
- Gantt chart

### **Script - Ivan**

Hello! I'm Ivan, the project manager for team 9. We worked on subproject 4, dealing with the database, backend, and frontend for the Loyalty Points and Rewards Program.

I'm very proud of completing the API endpoint URL requests for the reward transaction table, where I learned how to use serializers to get, put, and post information from the database. For example, when getting information from the database, a reward transaction serializer and rewards serializer must be used for the front end to show the client the details of the transaction as well as the details of the reward. However, adding or posting a new transaction does not require inserting a new entry into the rewards table.

Another deliverable I'm proud of working on is the PUT request API endpoint for the rewards table. This job required me to deserialize the request data into two different tables, then retrieve the information from a view serializer to tell the front end that the data has been changed.

And although we did not learn any of the communication management processes yet, I'm proud of connecting and keeping up to date with team 5, who was working on subproject 2, the User Profile & Account Management. This allowed us to resolve a misunderstanding between our team and subproject 5, the team working on the client feedback and sustainability surveys. We helped point them towards the User Profiles team, who was implementing the points system.

### **Script - Talha**

The database for Loyalty Points and Rewards System mainly revolved around a rewards table and reward transaction table. We also had a users and products table to test the functionality of the database but these were managed by other teams. To classify rewards and make a distinction between them we also added tables for the different types of rewards such as price discounts, percent discount, exclusive products and product upgrades. These tables depended on the rewards table for their entries as rewards are only entered into the rewards table.

The rewards table had the type of reward, its exclusivity, duration and points needed to claim. The rewards transaction table acted as a way to document what rewards had been claimed, when they had been claimed and by who. We also normalized the tables to get rid of redundancies and reduce modification errors.

To comply with integration with the other teams the tables were altered to include more rows such as the users having a role and products having a sustainability level. Through communication with the survey team, we also implemented views in SQL so that the survey team would be able to gain the information they needed from the database. Along with this tables from other teams were also added into the database and a customer stats table was created to track important stats from various tables.



### **Peter - Backend Script** (1m 9s)

For our backend, the API endpoints are referenced off of our planned frontend and database design. Actors like the system, admin, and user can connect to and manipulate the data within our database based on the components that were used in frontend and the required API's needed for other teams to access our subset of the database.

Our team took the effort to communicate with other teams which helped us understand the requirements for the backend design and most importantly, the scope of the project. We met with the analytics team to talk about necessary graphs and statistics that they may need from our backend APIs and also talked with the surveys teams to decide on what the relationship should be between the backend and database.

Throughout the development phase of the backend, we have made many revisions to our database and frontend designs. Revisions like having .env files to enhance security measures for the backend to database connection and introducing an active and inactive transaction history which majorly change our backend code with database and frontend soon after.

To sum it up, our implementation for the backend and communication with other teams have improved our understanding of the overall project and changed our backend, frontend and database design accordingly.

### **Script - Nathan**

For our Ecofix solutions loyalty and rewards program, I created the transactions page where the customer would be able to see the history of their transactions of which transactions are active or inactive. The customers would also be able to redeem their transactions on that page. I also helped on creating the work breakdown structure for the project. I planned and organized team members and time in a robust way so that everything had a clear structure and there were no overlaps or overallocations. This made the execution, monitoring and controlling, and closing stages smoother as we did not waste too much time doing unnecessary things. We also found that the gantt chart from Microsoft project made it easier for us to figure out what deliverables we were supposed to do before the labs. Those are some of my deliverables I did.

### **Script - Joseph**

The frontend model of the Loyalty Points and Rewards System was developed with many different components that shaped its ease of use, scalability and data fetching. While brainstorming for our mockup, we focused on a simple design to ensure ease of access for all users. Our goal was to not only fulfill all stakeholder requirements, but also ensure a user friendly design. This includes clients familiar with our products, new clients, and our administrative personnel.

Additionally, our system remained modular and scalable through the use of components such as product cards to shape our reward catalog. These cards fetch and display data from the database to ensure real time updates to our system. The use of async and await allows for our system to update and fetch data smoothly, minimizing server delays.

To support integration, our system revolves around both the user interface and user data, ensuring accurate tracking of points and transaction history of all our clients. Our collaborations with the other teams have provided valuable insight for the full picture of the project.

# User Guide

## CPS714 - Loyalty Points And Rewards System

This subproject is a part of a larger project - EcoFix Solutions: Client Engagement Web Portal.

This project will use the Django Stack which is Python, Django, and MySQL.

The frontend will be using Django REST API (DRF) with React.js which uses JavaScript.

### Frontend Setup (React.js)

Install *Node.js* and *npm*. Visit <https://nodejs.org/en> to install Node.js.

Make sure that you are in version 14.x or newer.

Note that npm is a command which comes with the Node.js.

### Available Scripts

In the project directory, you can run:

**`npm install`**

Installs everything the project needs in the `node_modules` folder, creating it if it's not existing already. The installed dependencies when running `npm install` are stated in the Frontend directory as `package.json`.

You can state which `package.json` to apply when running `npm install` `<package-name>` where `package-name` is the specified package JSON file.

**`npm start`**

Runs the app in the development mode.

Open <http://localhost:3000> to view it in your browser.

The page will reload when you make changes.

You may also see any lint errors in the console.

### Backend Setup (Django)

Note: Make sure you are using a virtual environment.

Install the following packages:

**`pip install django`**

**`pip install djangorestframework`**

**`pip install django-cors-headers`**

Run the backend server:

**`python manage.py runserver`**

Create an app in the project:

`python manage.py startapp <app-name>` where `app-name` is replaced for what you want to name your app. For this case, I named the app `lprs`.

Find the config, go to `<app-name>/apps.py`. You will see a class named `<app-name>Config`. Add the app config to `INSTALLED_APPS` inside of `settings.py`. For this case, the added app config is `lprs.apps.LprsConfig`.

Follow the repo files to edit your `urlpatterns` in project `urls.py`.

Do the same for `urls.py` in your apps folder.

Remember to change the `<app-name>` for both `urls.py`.

Move on to database setup when you are done with backend setup.

## Database Setup (mySQL)

Note: Make sure you are using a virtual environment.

Install the following packages within the `Backend` directory:

`pip install mysqlclient`

mySQL Connection:

`pip install python-dotenv` to have environmental variables for credentials.

Add a `.env` file and store your credentials. (Do not share `.env` file)

Format of variables are `DB_<VAR> = <value>`.

Store this file at `Backend/rewards_backend/.env`.

This will modify the `settings.py` file for `DATABASES = {...}` to have your local database credentials.

## Available Scripts

`python manage.py inspectdb > models.py`

Auto-generate the models in order to prepare for migration.

Open the file in application `Notepad` and save the file with encoding `UTF-8`.

Replace `models.py` within your apps folder with the newly generated `models.py` file.

`python manage.py makemigrations`

Create new migrations based on the changes made to your models.

Follow the instructions in `models.py` to fix any errors with the generated model.

There will be some extra generated models not related to the database. Please delete those models. Don't worry about the `primary_key=True` issue since Django will add an IntegerField for the primary key. Refer to the database files for the structure of the database.

```
python manage.py migrate
```

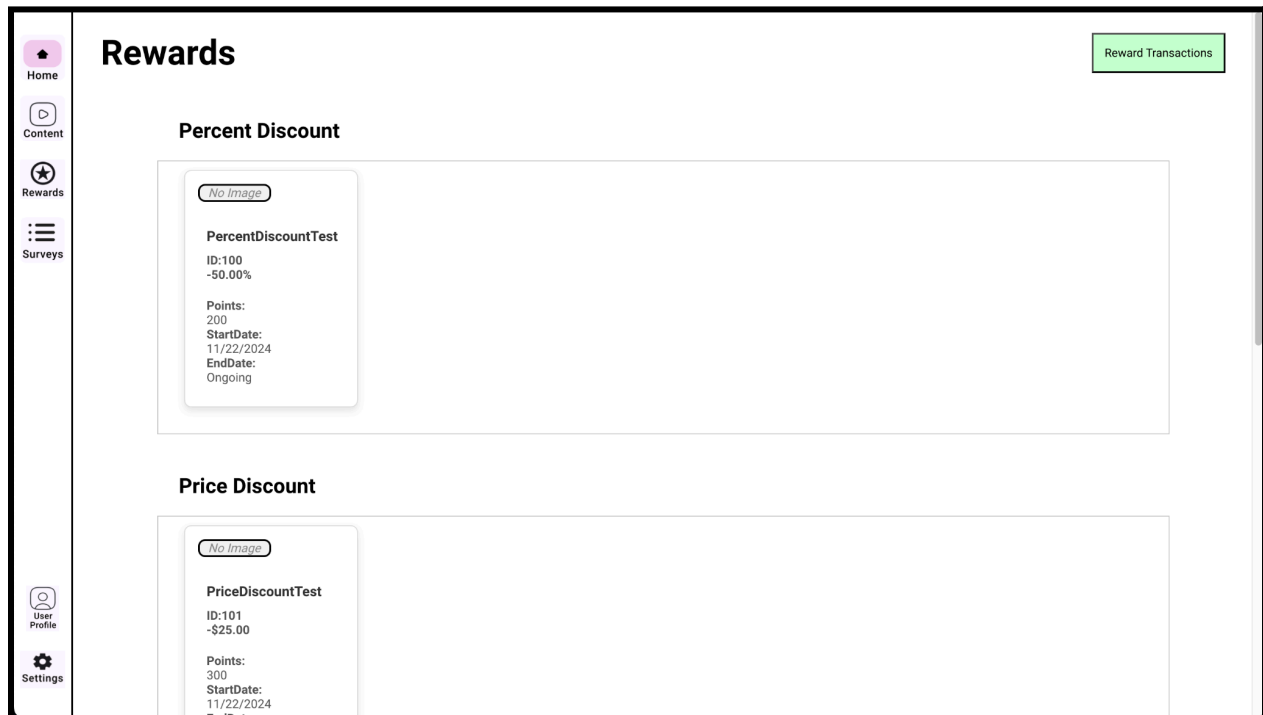
Apply/Unapply migrations.

```
python manage.py showmigrations
```

Show migrations and their status.

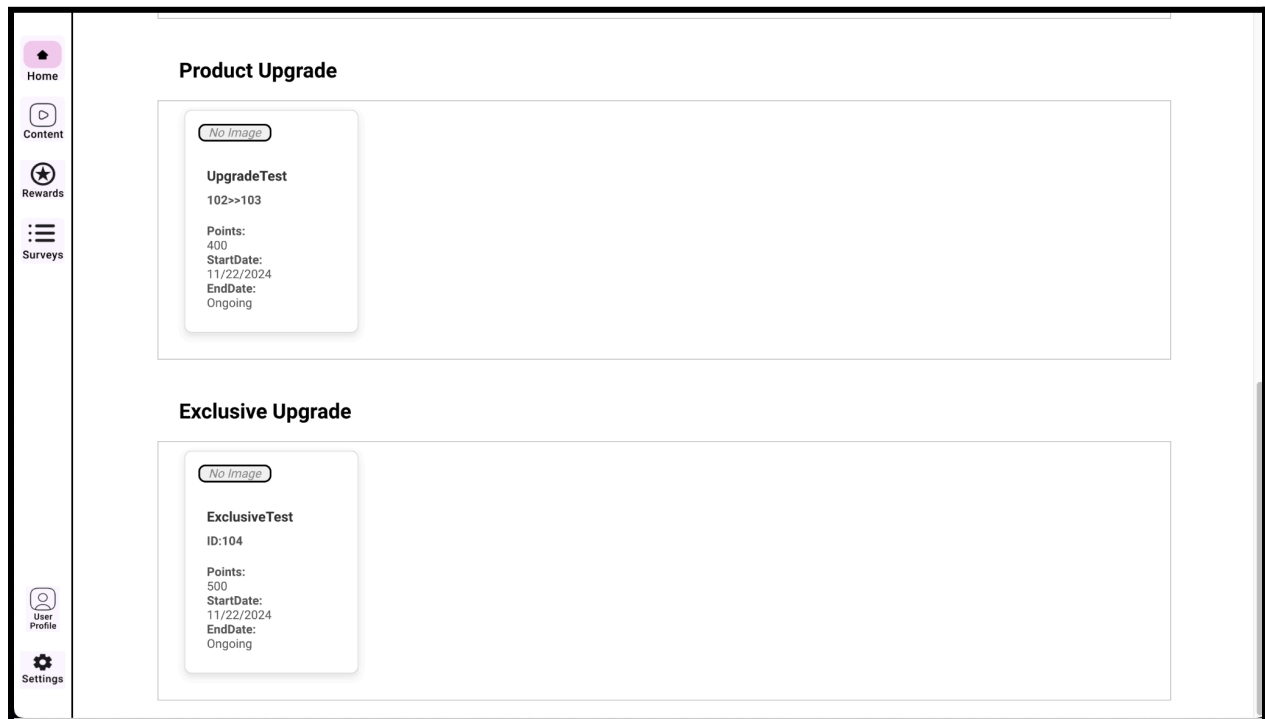
# User Interface

## Main Page (1)



- This is the main page for the Loyalty Points and Rewards System
- This page shows all the current rewards users have access to, grouped by their respective rewards category
- The rewards category include:
  - **Percent Discount** (on the specified product)
  - **Price Discount** (on the specified product)
  - **Product Upgrade** (on the specified product, to a different specified product)
  - and **Exclusive Upgrade**
- This page is scrollable to access the other reward categories
- Each of these rewards are clickable for more information and to make a transaction
- There is a rewards transactions button on the top right. When clicked, the user can see all of the history of their rewards.
- Each reward has the points needed, start date and end date of the reward.
- Displays reward details, such as for **productDiscountTest**, it shows the **ID: 100** and the how much the discount is.
- **PriceDiscountTest** is also a labeled product of the **Price Discount** category, showing the product of **ID: 200** applicable to \$25 off.

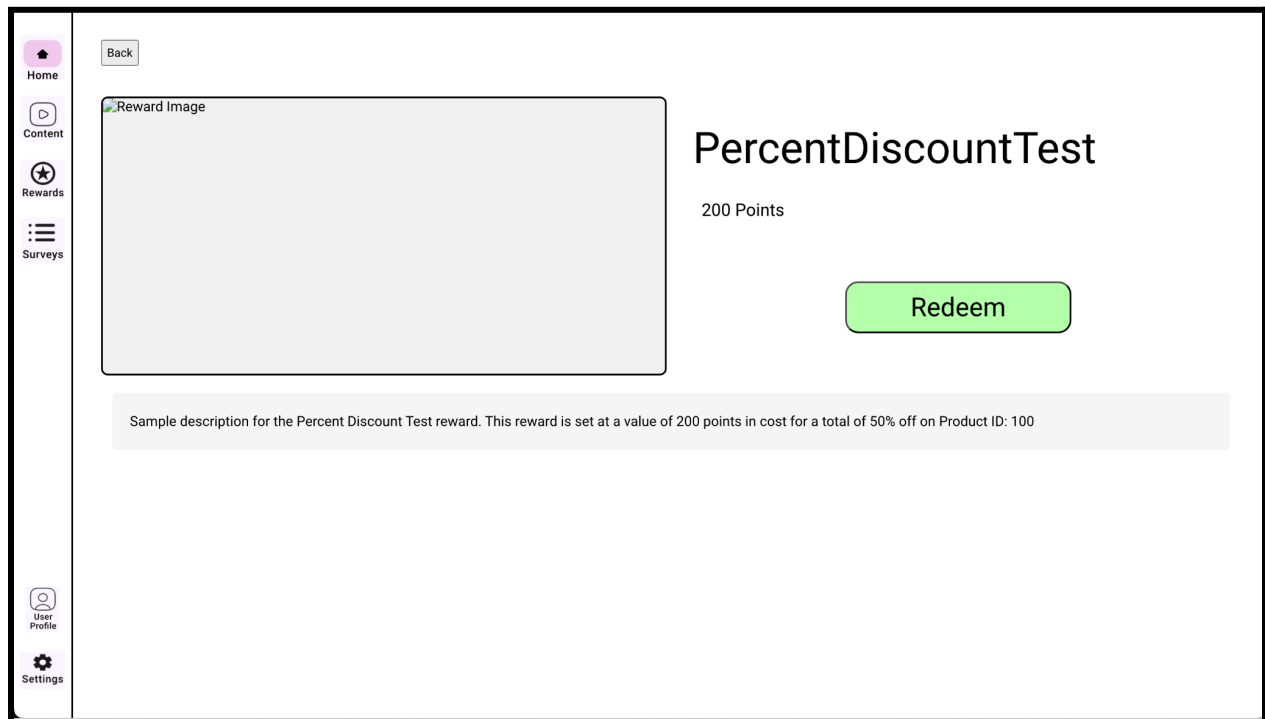
## Main Page (2)



- This page is scrollable to access the other reward categories
- Each of these rewards are clickable for more information and to make a transaction
- There is a rewards transactions button on the top right. When clicked, the user can see all of the history of their rewards.
- Each of these rewards are clickable for more information and to make a transaction
- This page displays reward details, such as for **productUpgradeTest** it upgrades product **ID: 102** to the product referenced from **ID: 103** and **ExclusiveTest**, the **ID: 104**.
- Each reward has the points needed, start date and end date of the reward.



## Rewards Details Page



- This is the rewards detail page, which pulls data from the reward selected/clicked from the main page.
- It pulls the image, title, description if there is any, the points needed to redeem the reward.
- There is a back button to go back to the rewards page, and also a redeem button for the user to redeem their rewards.

## Redemption Confirmation

Terms and Conditions

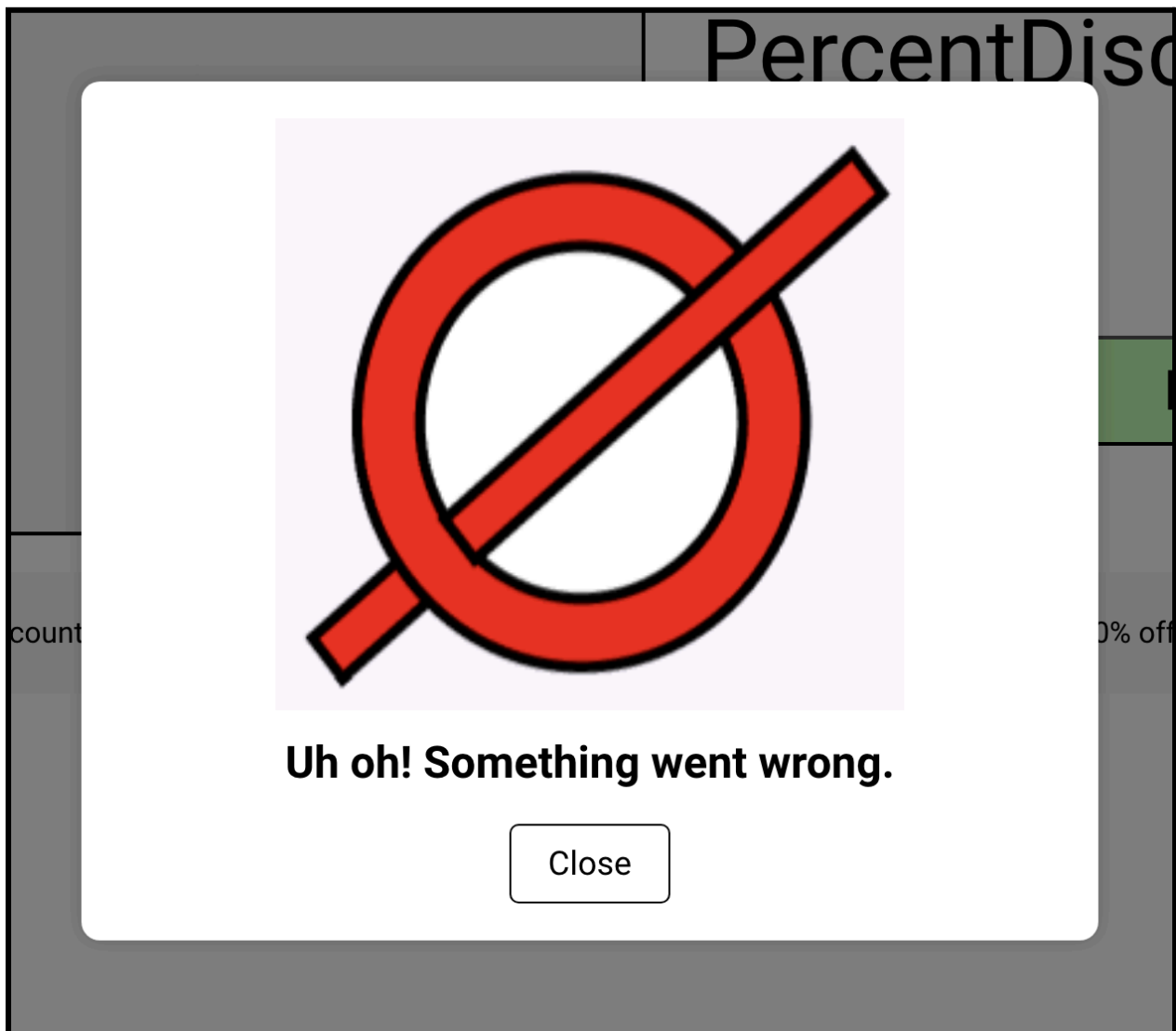
**Redemption Amount: 200**  
Current Points: 50

Reward Name	PercentDiscountTest
Reward Start Date	2024-11-22 01:17:15
Product Expiration Date	YYYY-MM-DD HH:MM:SS
Points After Redemption	-150 Pts

CancelRedeem

- When a reward is selected from the rewards details page, this popup comes up to verify what was selected by the user
- It shows information about the transaction, such as how many points the reward is worth and how many points the user currently has.
- It also shows the name of the selected reward, the reward start date, when the reward will expire, and the calculation of the amount of points remaining. In this case, there is a negative balance to the users points after the transaction.
- It has a cancel button in case the user wants to not redeem the reward
- It has a redeem button if the user wants to continue to redeem the reward.

### Verification 1: Redemption Error



- When the user tries to redeem a reward, this popup tells the user that the reward redemption failed, which can be due to multiple factors such as the user not having enough points (as shown on **Redemption Confirmation(1) Page**), or the reward has expired upon redemption
- It has a close button to close the popup to redirect the user back to the reward detail page

## Redemption Confirmation (2)

# Redemption Confirmation

Terms and Conditions

**Redemption Amount: 200**

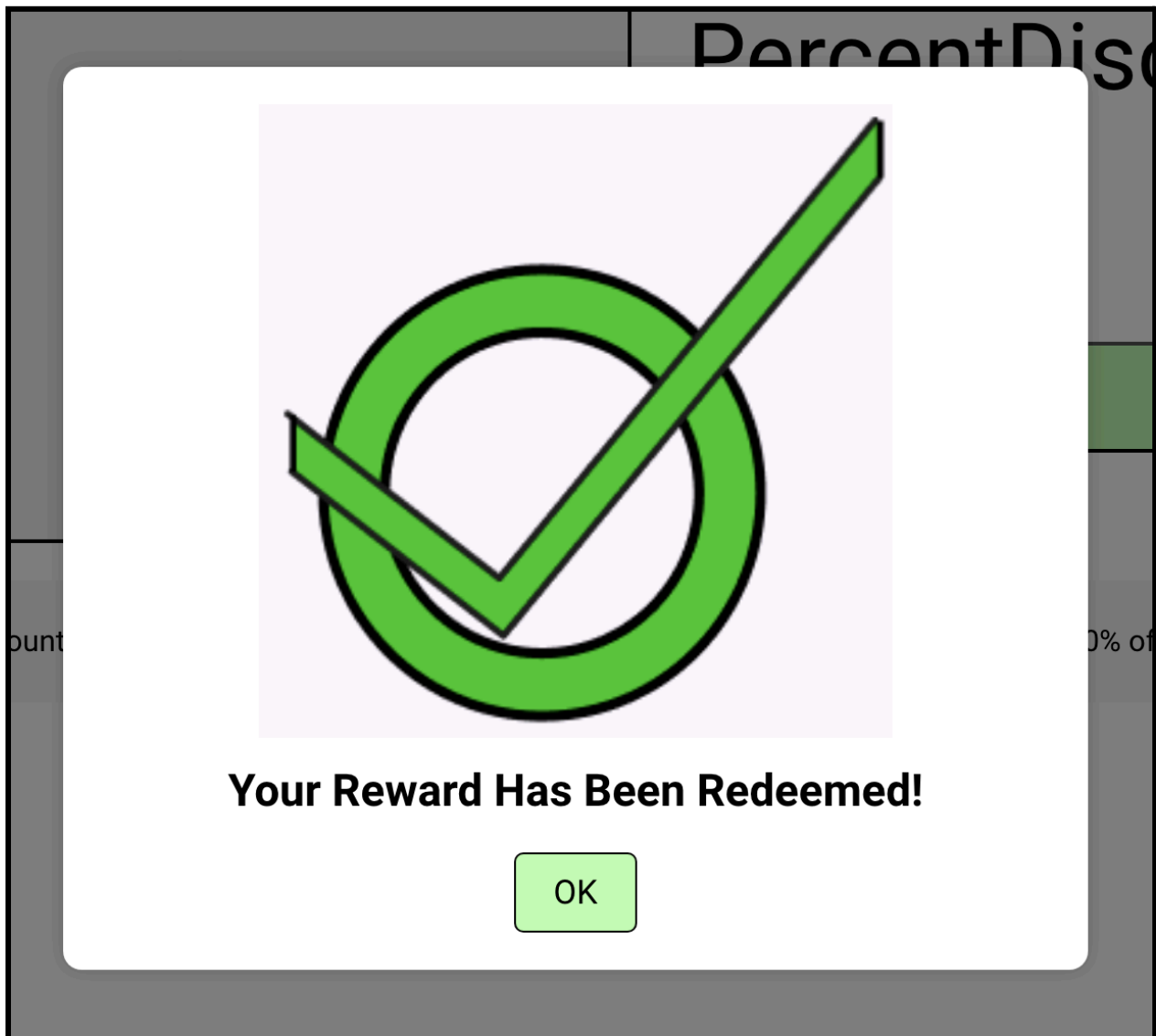
Current Points: 500

<b>Reward Name</b>	PercentDiscountTest
<b>Reward Start Date</b>	2024-11-22 18:19:01
<b>Product Expiration Date</b>	YYYY-MM-DD HH:MM:SS
<b>Points After Redemption</b>	300 Pts

CancelRedeem

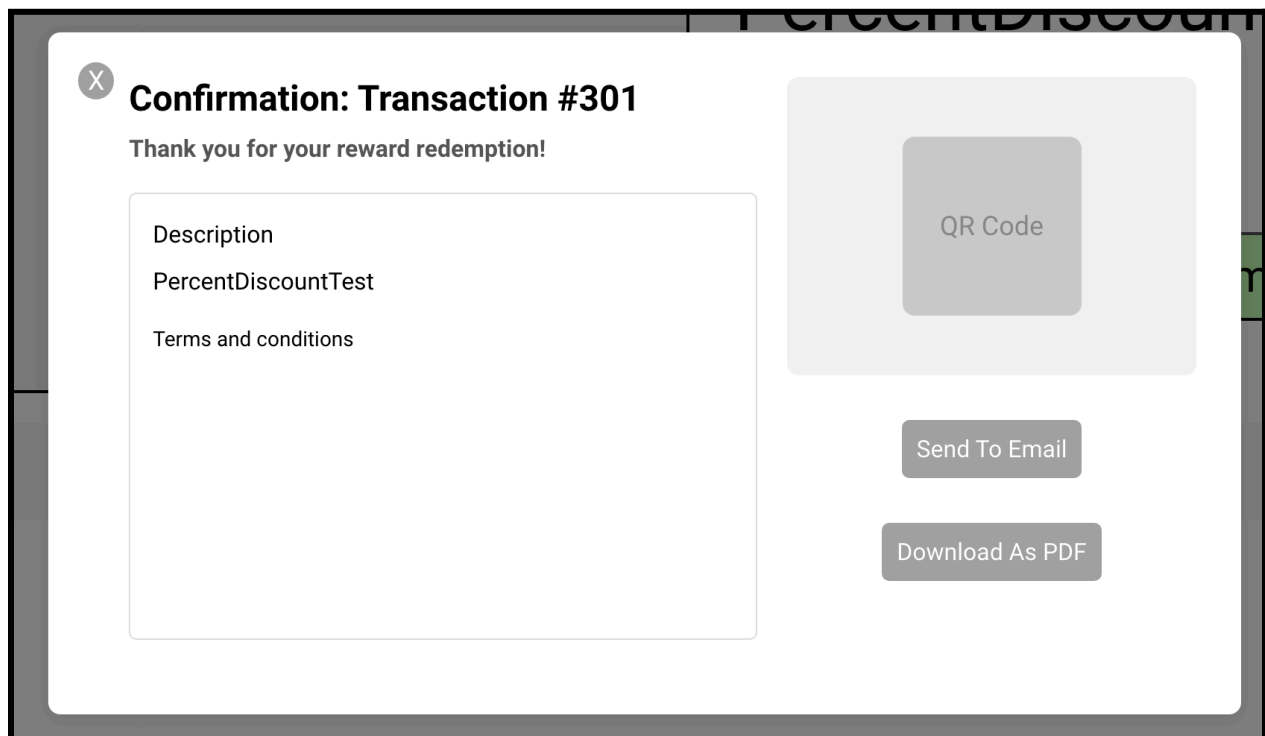
- In this example, the user has selected the same reward and has a positive balance
- Again, this popup references the reward information, such as reward name, start date, expiration date, and the amount of points the user will have after redeeming
- It has a cancel button in case the user wants to not redeem the reward
- It has a redeem button if the user wants to continue to redeem the reward.

Verification 2: Verification success page



- The user in **Redemption Confirmation (2)** had positive balance after the calculation of the points remaining; therefore, the verification succeeded.
- There is an ok button to close the window.

## Rewards Transactions QR Code page



- After the reward has been verified and redeemed in **Verification 2; Verification success** page, this popup shows up to show the user their transaction receipt, which can also be found in their **Transaction History**
- It pulls the transaction ID, description, terms and conditions which how many points the user has after the transaction and how many points it took to redeem the reward
- It shows a QR code so that when the user goes to Ecofix's store, they can scan the QR code to redeem the reward
- Once QR code is clicked at the Ecofix's store, it will deactivate the reward redemption in the reward transaction history, setting the reward to inactive in transactions page (refer to **Accessing Active Transaction History**)
- There is a send to email and download as pdf button to save the QR code on the user's phone for future use.

## Reward Transactions page

Home

Content

Rewards

Surveys

User Profile

Settings

### Reward Transactions

#### Active

No Image

**#301: PriceDiscountTest**  
Transaction Date: 2024-11-22 18:19:01  
End date: Ongoing

Redeem

No Image

**#303: ExclusiveTest**  
Transaction Date: 2024-11-22 18:19:01  
End date: Ongoing

Redeem

#### Inactive

No Image

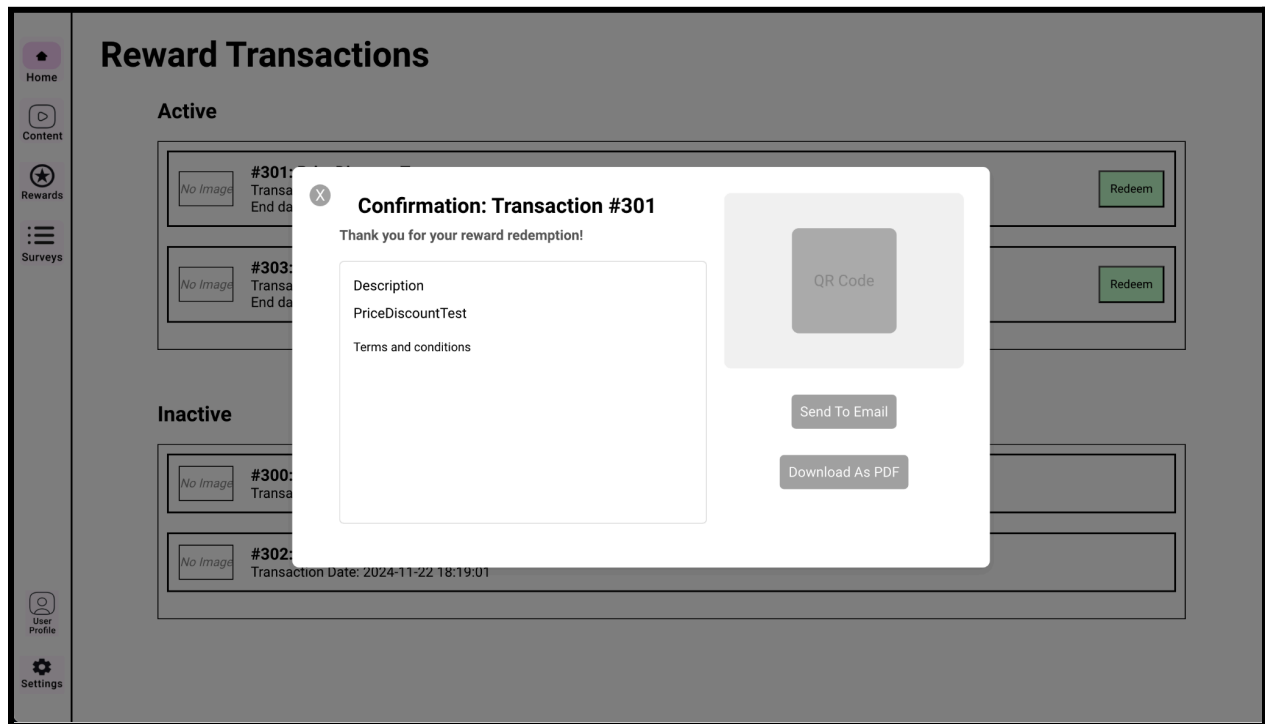
**#300: PercentDiscountTest**  
Transaction Date: 2024-11-22 18:19:01

No Image

**#302: UpgradeTest**  
Transaction Date: 2024-11-22 18:19:01

- It pulls the title of each reward, and the end date, expiration or redeemed date, and redeem buttons if the user can redeem the rewards
- This page shows the active rewards in the system that can be redeemed by the user
- This page shows the inactive, it shows the rewards if they have expired or the user has already redeemed the reward. There is no button at the end of the box for each reward if it is inactive

## Accessing Active Transaction History



- In the rewards transactions page, when a reward is redeemed, this popup shows up, which is the same as the popup shown after completing a transaction (in **Rewards Transactions QR Code page**)
- It pulls the transaction id, description, terms and conditions which how many points the user has after the transaction and how many points it took to redeem the reward
- Once QR code is clicked at the Ecofix's store, it will deactivate the reward redemption in the reward transaction history, setting the reward to inactive in transactions page (refer to **Accessing Active Transaction History**)
- There are also buttons to send the transaction as an email or to be downloaded as a pdf to save the QR code on the user's phone for future use.



## After Deactivating Reward Redemption

Home

Content

Rewards

Surveys

User Profile

Settings

### Reward Transactions

**Active**

No Image

**#303: ExclusiveTest**  
Transaction Date: 2024-11-22 18:19:01  
End date: Ongoing

Redeem

**Inactive**

No Image

**#300: PercentDiscountTest**  
Transaction Date: 2024-11-22 18:19:01

No Image

**#301: PriceDiscountTest**  
Transaction Date: 2024-11-22 18:19:01

No Image

**#302: UpgradeTest**  
Transaction Date: 2024-11-22 18:19:01

- After clicking on the QR code, the transaction is then set to **inactive**, in this case, transaction #301 is now moved from active to inactive through a **PUT** request

# Project Updates

## Change Request

### EcoFix Solutions - Loyalty Points and Rewards System

**Project Name:** Loyalty Points and Rewards System

**Date Request Submitted:** November 13, 2024

**Title of Change Request:** Request to add SQL Views for better way to list database entries

**Change Order Number:** 321

**Submitted by:** Ivan Chan (Project Manager) - (467) 911-9111, [ivan.chan@torontomu.ca](mailto:ivan.chan@torontomu.ca)

**Change Category:** Scope      Schedule      Cost      Technology      Other

#### **Description of change requested:**

This change involves the implementation of creating SQL views by making the create table script needed to run for MySQL and the drop views scripts to reset the views. Django will also need to be edited so that it can support these SQL views by including a model for every SQL view table. API endpoints can fetch the data from these views rather than from the database tables which may have incomplete information due to normal forms and functional dependency fixes.

#### **Events that made this change necessary or desirable:**

During our development, we noticed how the database did not have all of our required data in one table. When the data is in a single table, Django, our backend, will be able to fetch the data with all of the associated details from foreign keys for every entry. We suggest making SQL views where they can join many pieces of data from multiple different tables without affecting the normal forms and functional dependency fixes. Therefore we can have all data in one place while still maintaining reliable data that will not create null or duplicates from add, edit, and delete queries.

#### **Justification for the change/why it is needed/desired to continue/complete the project:**

Django cannot create a model without first having the related table available in SQL. The only way to display all information from multiple tables and link them to their proper foreign key was to use a view table that will concat everything. This solution is a lot better than, for instance, manually joining tables within Django because the views can be directly manipulated if necessary and the component way is closer to the database side rather than the backend side of implementation. This distinction between the two allows for a better understanding of the structure of the system.

#### **Impact of the proposed change on:**

##### **Scope:**

The scope will still be the same after this change. We are only changing the “behind-the-scenes” of the project which will not impact the scope.

##### **Schedule:**

Adding SQL views may require more time to implement and the act of integrating while the SQL database has already been merged will be complicated. But we find it necessary to make these changes this change would provide a smooth experience with development in the long run. We estimate that the development of the SQL views will require around 2 to 3 days to implement.

**Cost:**

Same reason as schedule, adding SQL views may require more time to implement. Thus, the cost of paying developers will increase as we will be allocating more of the budget to the developers. We estimate that the development of the SQL views will require around 2 to 3 days to implement.

**Staffing:**

The amount of staffing will still be the same. Our backend and database team are the same people so that they are able to closely work on backend to database. Frontend does not have as close of a connection to the backend as the connection is usually through the CRUD API URL endpoints.

**Risk:**

The integration with the backend and frontend will require more effort to understand for SQL views as this method is not common with Django. However, we still believe that the SQL views will provide more benefits than risks in the long run. Thus the risk is that with this new and unorthodox way of using SQL views will ideally create a better way to manage and display data compared to current conventional methods.

**Suggested implementation if the change request is approved:**

The team suggests that the SQL views can be implemented in mySQL first before handling the Django backend. We will first create a test version of the view to make sure it works before fully starting the implementation of the official SQL views and backend required to pass the “display entry” feature to frontend.

**Required approvals:**

Name/Title	Date	Approve/Reject
Wael Shabana - CEO	Nov. 3rd, 2024	Approved

**Change Request**  
**EcoFix Solutions - Loyalty Points and Rewards System**

**Project Name:** Loyalty Points and Rewards System

**Date Request Submitted:** November 21, 2024

**Title of Change Request:** Request to add Cashier as a Stakeholder

**Change Order Number:** 325

**Submitted by:** Ivan Chan (Project Manager) - (467) 911-9111, [ivan.chan@torontomu.ca](mailto:ivan.chan@torontomu.ca)

**Change Category:** Scope      Schedule      Cost      Technology      Other

**Description of change requested:**

This change involves introducing Cashier to the list of Stakeholders for the Loyalty Point and Rewards System subproject. The change will provide new insight into the wants and needs of a cashier in the system. The cashier will play an important role as they are the main form of interaction with customers in store. This insight will be needed to make changes to the system to ensure that cashiers can have a system that responds to their needs.

**Events that made this change necessary or desirable:**

The reason to add a cashier to the list of Stakeholders was mainly because the team came to an understanding that necessary information was missing as to how the system could be used in stores specifically when customers would interact with cashiers. The lack of this insight could lead to loss of market share to competitors and decrease brand recognition.

**Justification for the change/why it is needed/desired to continue/complete the project:**

The change will provide the team with insight that is greatly needed as to how cashiers interact with the system but also how cashiers can interact with customers in the store.

**Impact of the proposed change on:**

**Scope:**

The scope of the project will increase as cashiers will be able to provide necessary information about the system such as how it impacts them and how they can interact with it. We will gain information from meetings with our stakeholders and know what is within our team members capabilities with implementation to uphold the stakeholder's wants and needs. The company's success and standing is also taken into consideration to know what is our current line of EcoFix products and how do we provide further service with the use of the loyalty points and rewards system. This information will be gained from stakeholders as well.

**Schedule:**

Gaining insight from cashiers will delay the project but not by a significant amount. Depending on the insight gained, if any major changes have to take place this will be communicated with management and any parties involved.

**Cost:**

The staffing will still be the same after this change. We are only changing the scope of the project which will not impact the overall cost of the project.

**Staffing:**

The staffing will still be the same after this change. We are only changing the scope of the project which will not impact the staffing.

**Risk:**

Changing the scope may lead to scope creep which would delay the project.

**Suggested implementation if the change request is approved:**

The team will meet with all of the stakeholders and discuss the insight that can be gained from cashiers and how it will impact the overall scope of the project.

**Required approvals:**

Name/Title	Date	Approve/Reject
Wael Shabana - CEO	Nov 21, 2024	Approved

**Change Request**  
**EcoFix Solutions - Loyalty Points and Rewards System**

**Project Name:** Loyalty Points and Rewards System

**Date Request Submitted:** October 25, 2024

**Title of Change Request:** Request to add functions that help users to store QR Code

**Change Order Number:** 320

**Submitted by:** Ivan Chan (Project Manager) - (467) 911-9111, [ivan.chan@torontomu.ca](mailto:ivan.chan@torontomu.ca)

**Change Category:** Scope      Schedule      Cost      Technology      Other

**Description of change requested:**

This change involves the implementation of sending users emails or pdfs to the currently in progress loyalty points and rewards system for Ecofix's web application. The change will provide customers with a receipt that will tell the cashier at the physical store that their reward has been properly redeemed. We believe that this change will allow our cashiers to have an easier time handling reward redemptions, as well as allow customers the relief of knowing that the transaction has been recorded by the system.

**Events that made this change necessary or desirable:**

The development of a reward transaction to provide a receipt to customers has led to the need to implement a method for customers to physically cash in their rewards, especially for product upgrades, where products are exchanged between the company and the customer. The lack of this system could lead to customer confusion, while using a delivery service can have potential security risks during the delivery process.

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**Justification for the change/why it is needed/desired to continue/complete the project:**

The QR code serves as an API endpoint for the backend. This QR code can be generated from a URL that is normally mapped to the API endpoint. By using this code, the cashier will have an easier time accepting the validity of the reward.

**Impact of the proposed change on:**

**Scope:**

Understanding our current situation with the company is the first step before planning for the implementation. The scope must be defined by gaining information on staff, stakeholders, and current standing in the market. We will gain information from meetings with our stakeholders and know what is within our team members capabilities with implementation to uphold the stakeholder's wants and needs. The company's success and standing is also taken into consideration to know what is our current line of EcoFix products and how do we provide further service with the use of the loyalty points and rewards system. This information will be gained from stakeholders as well.

As this is a new technology platform for EcoFix, our current scope will change to fit the use of a points system to EcoFix products. Everything must be fully functional and meet user expectations on launch in order to keep the image of the company clean.

**Schedule:**

Since the loyalty points and rewards systems is likely to be the core functionality for enticing customers with using the web application of EcoFix, a lot of effort must be placed in this project to ensure that the core features will be fully operational on launch. Therefore, the schedule will provide staff and the project manager more opportunities to communicate and work with stakeholders and other integrating projects and their team members. That way the integration of this core feature will be smooth and successful.

**Cost:**

As the schedule of creating the loyal points and rewards system will be long, the amount of effort will require more pay for staff. Since they are paid hourly at \$43.33 for 300 hours total, the cost for paying developers will be \$13,000 for our internal team only. This amount excludes those in separate teams from the points and rewards system. The project manager will also be paid more for the same reason as the staff at \$80 per hour for 75 hours. This amounts to \$6,000 total by the end of the project. As these amounts are estimates, assume that prices may increase due to unforeseen events like sick days or debugging.

**Staffing:**

The amount of staffing will remain the same at around five members per team for the entire web application project. However, our points and rewards system team may be required to communicate more with other project members to ensure that development is within scope and integration is smoothly managed and executed.

**Risk:**

The points and rewards system is the core feature of the web application. As such, the risk of delaying or failing this project will be detrimental to the company in terms of delayed scheduled, overpaid expectations and underallocated staff resources. At this point, it may be necessary to rethink our scope and extend the project delivery date at the cost of increased pay and staffing or completely scrape the project.

**Other:**

The difficulty concerning this risk is the immovable plan that cannot be changed and thus, the scope cannot be changed as time goes on. This is why the planning process will be the most important and will be given ample time before implementation to ensure the project's success.

**Suggested implementation if the change request is approved:**

The team suggests that the royal points and rewards system will be supported on computers and mobile devices so that customers can track points and gain rewards from anywhere. This will give more convenience to the customer which in turn, makes them want to use the web application more.

**Required approvals:**

Name/Title	Date	Approve/Reject
Wael Shabana - CEO	Nov. 3rd, 2024	Approved

**Change Request**  
**EcoFix Solutions - Loyalty Points and Rewards System**

**Project Name:** Loyalty Points and Rewards System

**Date Request Submitted:** November 21, 2024

**Title of Change Request:** Request to remove Mobile Integrated Design

**Change Order Number:** 330

**Submitted by:** Ivan Chan (Project Manager) - (467) 911-9111, [ivan.chan@torontomu.ca](mailto:ivan.chan@torontomu.ca)

**Change Category:** Scope      Schedule      Cost      Technology      Other

**Description of change requested:**

This change involves removing the Mobile Integrated design for our system, which was initially designed for access to the Loyalty Points and Rewards System on mobile platforms. Users and clients will be unable to access such services once upon the approval of this change, and will be required to access the services through the web application. This includes redeeming rewards and accessing transaction history through downloading and emailing from web services only.

**Events that made this change necessary or desirable:**

The decision to continue without the development of mobile integration is due to conflict with the scope and other subproject groups as they have not accounted for such integration. This means that mobile integration will be solely for accessibility to the Loyalty Points and Rewards System, with little to no functionality for user login and data. To account for data integrity and prevent system redundancies, this design prototype is no longer desired.

**Justification for the change/why it is needed/desired to continue/complete the project:**

The system was initially designed to be used as a web application, which means that dropping this design will not affect the overall functionality of the project. Due to conflicts with the scope, removing the integration design will effectively help us complete the project by focusing more on other parts of the system.

**Impact of the proposed change on:**

**Scope:**

The scope will change to account for the system as a web application, which can be used through mobile devices. This change means that the project will no longer account for the development as a mobile application.

**Staffing:**

There may be an increase in staffing for monitoring the web application services to account for more users. An increase of staffing may also be required for handling any additional softwares required to manage the increased traffic to the web servers.

**Risk:**

This change risks hindering the experience for users that prefer mobile integration for our services. This includes the entirety of the project, including product transactions and points tracking. Possible scope creep could also affect the project timeline.

**Suggested implementation if the change request is approved:**



Some implementations to consider include optimization to saving reward transactions for redemptions. Users will be able to download or email their transaction history for redemption, which can be optimized through other means.

**Required approvals:**

<b>Name/Title</b>	<b>Date</b>	<b>Approve/Reject</b>
Wael Shabana - CEO	Nov 21, 2024	Approved

**Change Request**  
**EcoFix Solutions - Loyalty Points and Rewards System**

**Project Name:** Loyalty Points and Rewards System

**Date Request Submitted:** November 21, 2024

**Title of Change Request:** Request to remove QR code for Redemption

**Change Order Number:** 327

**Submitted by:** Ivan Chan (Project Manager) - (467) 911-9111, [ivan.chan@torontomu.ca](mailto:ivan.chan@torontomu.ca)

**Change Category:** Scope      Schedule      Cost      Technology      Other

**Description of change requested:**

This change involves removing the QR code functionality that was initially designed to validate user reward transaction history for reward redemption. Users and clients will no longer be able to download and present their transaction QR code for reward redemptions, and will be required to show their entire transaction slip for manual verification by staff in stores.

**Events that made this change necessary or desirable:**

The decision to move forward without the use of a QR code feature is due to security concerns for user data and system vulnerabilities. The use of unexpected redemption could potentially result in loss of data when switching between active and inactive transactions on redemption, as well as security concerns from fraudulent redemption attempts.

**Justification for the change/why it is needed/desired to continue/complete the project:**

The transition to transaction slips and verification by store associates ensures simplicity and protection to clients such that their redemption process will be simpler, along with ensuring their redemption requests are accurately verified. Additionally, shifting out of this redemption functionality gives time for the team to focus on other parts of the project to ensure smooth completion of heavier deliverables.

**Impact of the proposed change on:**

**Scope:**

The scope will change due to the removal of one of the key functionalities of reward verification to further improve in-store redemption operations, including efficiency and ease of both client and cashier interactions. This will also help those that are less knowledgeable about technical features.

**Schedule:**

As of the time of this request, the functionality of the QR code feature has not been fully implemented. This means that there won't be much of a schedule constraint from removing this feature and functionality from the overall system. Rather, there will be more time to focus on the overall interface and improving optimization of other parts of the system.

**Cost:**

The removal of the QR code feature will reduce costs heavily on in-store technology, as well as other softwares that would otherwise be required to ensure full functionality, security, and maintenance. However, there may be a cost in other parts of the system to make up for its optimization, such as staffing.

**Staffing:**

There may be an increase in staffing and cashiers to ensure smooth operations of reward redemptions in-store. Without the use of QR codes, new software and systems may be needed to speed up processes.

**Risk:**

Changing the scope may lead to scope creep which would delay the project. There is also a risk of hindering the user experience of specific demographics that would otherwise prefer the original QR code functionality.

**Suggested implementation if the change request is approved:**

Some suggested implementations include system adjustments to verify redemption transactions, whether it be through transaction slips or a software to increase efficiency.

**Required approvals:**

Name/Title	Date	Approve/Reject
Wael Shabana - CEO	Nov 21, 2024	Approved

**Change Request**  
**EcoFix Solutions - Loyalty Points and Rewards System**

**Project Name:** Loyalty Points and Rewards System

**Date Request Submitted:** November 22, 2024

**Title of Change Request:** Request to remove search bar and filters for rewards page

**Change Order Number:** 321

**Submitted by:** Ivan Chan (Project Manager) - (467) 911-9111, [ivan.chan@torontomu.ca](mailto:ivan.chan@torontomu.ca)

**Change Category:** Scope      Schedule      Cost      Technology      Other

**Description of change requested:**

This change involves removing the search bar and filters on the rewards page that was initially designed to help users find a specific reward that they want to redeem. Users and clients will no longer be able to search or filter for a set of rewards.

**Events that made this change necessary or desirable:**

During our development, we noticed how little time was left until the end of the project lifetime. We suggest instead that there will be containers to separate the 3-4 separate types of rewards: discount rewards - price and percent discounts, product upgrade rewards, and exclusive product upgrade rewards. Therefore, we can still have some functionality of allowing users to have an easier time searching for a reward while reducing the time needed to complete the project.

**Justification for the change/why it is needed/desired to continue/complete the project:**

There is too little time left until the project lifetime is done. Therefore, there will need to be changes to the scope of the project to complete the project on time.

**Impact of the proposed change on:**

**Scope:**

There will no longer be a search bar and filter on the rewards page for the finished product. Instead, there will be 3-4 separate containers, each displaying a different type of reward.

**Schedule:**

Maintaining a fixed filter of 3-4 containers for each type of reward will reduce the time needed to complete the project.

**Cost:**

No changes to the cost, as development for search bar and filters were not started.

**Staffing:**

The amount of staffing will still be the same. Our frontend team are the same people and so there will be no changes to the staff working on the reward containers.

**Risk:**

There may be unexpected problems when implementing functionality not planned in the initial planning stages. However, this can also be an opportunity to reduce time required for the project.

**Suggested implementation if the change request is approved:**

The team suggests the view container be implemented as soon as possible, so that the project can be completed on time.

**Required approvals:**

<b>Name/Title</b>	<b>Date</b>	<b>Approve/Reject</b>
Wael Shabana - CEO	Nov. 3rd, 2024	Approved

# **Assignment 1, with highlighted revisions**

## **Business Case**

### **EcoFix Solutions - Loyalty Points and Rewards System**

#### **1.0 Introduction/Background**

EcoFix Solutions promotes the use of energy-efficient products such as our line of EcoFix products. Our core business goal is to encourage customers to be eco-friendly and gain income mainly from consumer purchases for our product that will in turn, better help the environment.

#### **2.0 Business Objective**

EcoFix Solutions's strategic goal is to continue growing the company to help create a greener world. This is currently done by providing services such as education and events as well as promoting to customers to buy our line of EcoFix products. The project for a loyalty points and rewards system is to promote users to buy more of our products and reward customers for their purchase while also helping the environment. This will grow our customer-base and improve profitability by having customers engage with our new web portal in pair with buying our products.

#### **3.0 Current Situation and Problem/Opportunity Statement**

Ecofix currently sells their line of products, provides customer support, monitors customer satisfaction through retailers, and hosts events and webinars to promote eco-friendly habits to the public. The new client engagement web portal will create an opportunity to enhance customer engagement by providing client feedback and sustainability surveys. Also the web portal will have a support system that provides tracking through the system ticketing system and live chat where customers can have immediate access to support through the web portal. The web portal will advertise Ecofix's products and will encourage clients to buy products by our loyalty points and reward system. Clients will be able to redeem rewards which will give an incentive to clients to keep using our products. Ecofix client engagement web portal will boost the profit due to the increased customer satisfaction and engagement.

#### **4.0 Critical Assumptions and Constraints**

The proposed Loyalty Points and Rewards System must be a valuable asset for EcoFix. Current consultants and clients must actively support the project, and it must pay for itself within five years by enhancing customer interactions, promoting energy-efficient products, and encouraging client loyalty. The Project Manager must lead the effort, and the project team must include participants from the Marketing, Sales, IT, and Psycho-Analysis departments. The new system must run on existing hardware and software, and it should require minimal technical support.

#### **5.0 Analysis of Options and Recommendations**

There are three options for addressing this opportunity:

1. Do nothing. The business is lacking a Client Engagement Web Portal and is losing market share to competitors.

2. Hire outside consultants to develop a Web Portal requiring little to none in-house development.
  3. Design and implement a Web Portal in-house using mostly existing software.
- Based on discussions with stakeholders, we believe that option 3 is the best option.

## **6.0 Preliminary Project Requirements**

The main features of the Loyalty Points and Rewards System include the following:

1. Users must have access to loyalty points system and points earning functionality, through the purchasing of EcoFix products, subscribing to services, and participating in green energy programs. Users must be able to receive extra points for participating in EcoFix's sustainability campaigns
2. Users must have access to rewards redemption catalog with the ability to use accumulated points to redeem product upgrades, discounts, and exclusive rewards to green technology
3. Accurate data management of point balances derived from points calculation of transactional history and services to reflect upon redemption availability. Database schema must be able to track user profiles, points transactions, sustainability campaign participation, and subscription to EcoFix services.
4. Appropriate security protocols to protect user data includes transaction logging, reward redemption information, and additional security constraints to ensure data integrity
5. System operators should be able to adjust the loyalty points required for each product, adjust the amount of loyalty points given per dollar spent, and add limited-time promotions for either giving or receiving loyalty points (how many more points a customer gets per dollar spent or how many fewer points is required to buy a points-only on-sale product).
6. Other features suggested by users and/or operators, if they add value to the business.

## **7.0 Budget Estimate and Financial Analysis**

A preliminary estimate of costs for the entire project is \$19,000. This estimate is based on the project manager working about 75 hours for two months and other internal staff working a total of about 300 hours for two months. A project manager would earn \$80 per hour. The hourly rate for the other project members would be \$43.33 per hour.

Project benefits are based on research showing that the payback period of developing a web portal is 5 years. This means that, on average, the benefit each year is around \$4,000. The ROI is roughly 6.8%. Factoring in inflation and discount value, the net present value of the project in 7 years will be \$440. Notice that the discount rate is set to 10%. This rate is common for many businesses and is known as the hurdle rate.

## **8.0 Schedule Estimate**

The sponsor would like to see the project within two months. There is almost no flexibility in the schedule. We can also assume that the life of the new system would last for 5 years as the customers will accumulate points from our loyalty points and rewards system to exchange it for EcoFix product rewards.

## 9.0 Potential Risks

The project carries several risks. The foremost risk is a lack of interest in the new Loyalty Points and Rewards System from customers. Customer interest plays a heavy role in the success of the project and a lack of interest will indicate an unsuccessful project which can lead to loss of capital as well as brand damage and market share loss. There are technical risks with choosing what software to build the project with but all features use existing and proven technologies. The main business risk is investing the time and money into this project and not realizing the projected benefits.

## 10.0 Exhibits

Exhibit A: Payback Period for Loyalty Points and Rewards System Project

Year 0	(\$19,000 CAD)
Year 1	\$4,000 CAD
Year 2	\$4,000 CAD
Year 3	\$4,000 CAD
Year 4	\$4,000 CAD
Year 5	\$4,000 CAD
Year 6	\$4,000 CAD
Year 7	\$4,000 CAD
Expenses	(\$19,000 CAD)
Gains	\$28,000 CAD
Profit	\$9,000 CAD
Payback	5 years

Reasoning for yearly payback estimates: Based on research, we estimate that the payback period of the entire project (full integration with all teams) is 5 years. Therefore, annually, the company will earn \$32,000 for the entire project. As our subproject is given a budget of \$19,000 out of the original \$160,000, the Loyalty Points and Rewards System will earn \$4,000 annually, out of the total annual gains from the entire project.



## Exhibit B: Return on Investment (ROI) for Loyalty Points and Rewards System Project

$$\text{Profit} = \text{Returns} - \text{Investments}$$

$$\text{Profit} = \$28,000 - \$19,000$$

$$\text{Profit} = \$9,000$$

$$\text{Annual Profit} = \frac{\text{Profit}}{\text{Duration}}$$

$$\text{Annual Profit} = \frac{\$9,000}{7 \text{ years}}$$

$$\text{Annual Profit} \approx \$1,290/\text{year}$$

$$\text{ROI} = \frac{\text{Annual Profit}}{\text{Investments}}$$

$$\text{ROI} = \frac{\$1,290}{\$19,000}$$

$$\text{ROI} \approx \%6.79$$

## Exhibit C: Net Present Value (NPV) for Loyalty Points and Rewards System Project

Let the discount rate be  $i = 10\%$

$$\text{Discount Factor} = \frac{1}{(1+i)^n}$$

Year (n)	Cash Flow	Discount Factor	Present Value
0	(\$19,000 CAD)	1.00	(\$19,000 CAD)
1	\$4,000 CAD	0.91	\$3,640 CAD
2	\$4,000 CAD	0.83	\$3,320 CAD
3	\$4,000 CAD	0.75	\$3,000 CAD
4	\$4,000 CAD	0.68	\$2,720 CAD
5	\$4,000 CAD	0.62	\$2,480 CAD
6	\$4,000 CAD	0.56	\$2,240 CAD
7	\$4,000 CAD	0.51	\$2,040 CAD
Expenses	(\$19,000 CAD)		(\$19,000 CAD)
Gains	\$28,000 CAD		\$19,440 CAD
Profit	\$9,000 CAD		\$440 CAD

Discount rate: 10%									
Assume the project is done in about 2 months	Year								
	0	1	2	3	4	5	6	7	Total
Costs	19K	0	0	0	0	0	0	0	
Discount factor	1	0.91	0.83	0.75	0.68	0.62	0.56	0.51	
Discounted costs	19K	0	0	0	0	0	0	0	19.0K
Benefits	0	4K	4K	4K	4K	4K	4K	4K	
Discount factor	1	0.91	0.83	0.75	0.68	0.62	0.56	0.51	
Discounted benefits	0	3.6K	3.3K	3.0K	2.7K	2.5K	2.2K	2.0K	19.4K
Discounted benefits minus costs	(19K)	3.6K	3.3K	3.0K	2.7K	2.5K	2.2K	2.0K	
Cumulative benefits minus costs	(19K)	(15.7K)	(12.4K)	(9.4K)	(6.7K)	(4.2K)	(2.0K)	0	Approx. NPV ←
	Payback in Year 7								
Discounted life cycle ROI ----->	106.79%								

Assumptions	
Costs	# hours
PM (75 hours, \$80/hour)	\$6,000
Staff (300 hours, \$43.33/hour)	\$13,000
Outsourced software and services	\$0
Total project costs (all applied in year 0)	\$19,000
Benefits	
# consultants	8
Hours saved	0
\$/hour profit	0
Benefits from saving time	0
Benefits from 1% increase in profits	\$4,000
Total annual project benefits	\$4,000

Exhibit E: Score Matrix Loyalty Points and Rewards System Project

Factor	Value	Weight	SUM	Comment
The project aligns with the strategic objectives	YES	3	3	
The project has a profit > 20%	NO	4	0	Project has a ROI of 6.79%.
Payback period < 2 years	NO	5	0	Project has a payback period of 5 years.
Enlarges the customer base	YES	4	4	Project's main objective is to grow the customer base.
The project requires a standard technology	YES	3	3	
The quality constraints are simple to meet	YES	3	3	
The timing is not too tight	NO	4	0	
We have skilled personnel to do the work	YES	3	3	All team members are skilled in the needed technology.

Total SUM = 16

## Project Charter

**Project Title:** EcoFix Solutions - Loyalty Points and Rewards System

**Project Start Date:** Sept. 23, 2024

**Project End Date:** Nov. 29, 2024

**Key Schedule Milestones:**

- Complete project and ready for full integration by November 15.
- Complete production version of software by November 29.

**Budget Information:** Overall, a \$160,000 budget has been divided among nine teams where this project is considered to be one of the teams. The firm has allocated \$19,000 for this project. The majority of the costs for this project will be from internal labor.

**Project Manager:** Ivan Chan, (467) 911-9111, [ivan.chan@torontomu.ca](mailto:ivan.chan@torontomu.ca)

**Project Objective:** EcoFix Solutions promotes the use of energy-efficient products such as our line of EcoFix products. Our core business goal is to encourage customers to buy our product and promote services like webinars and events to better help the environment while also procuring points from our “loyalty points and rewards system”. Customers can then exchange their points for amazing rewards such as discounts or exclusive deals for EcoFix products and services.

**Main Project Success Criterion:** The software must meet all requirements and written specifications. The software must also be fully tested and ready for full integration before doing more testings with the entire software. The CEO must finally approve the project and all key stakeholders must be satisfied by the software’s completed state. In terms of schedule, the project must be completed by **Nov 29, 2024** and must pay for itself within five years after completion.

**Project Approach:**

- Consult with stakeholders to determine criteria for customer satisfaction through the use of surveys. The surveys will determine critical features for the web portal. Specifically the loyalty points and rewards system.
- Follow procedures and guidelines in accordance with template documents like the change control strategy or gantt chart, such that constraints in regards to time, scope, and cost are within bounds.
- Use an iterative approach to progressively verify and validate if the project is within constraints by referring to higher ups such as project manager, CEO, or stakeholders.

### ROLES AND RESPONSIBILITIES

Name	Role	Position	Contact Information
Wael Shabana	Sponsor	EcoFix, CEO	<a href="mailto:wael.shabana@torontomu.ca">wael.shabana@torontomu.ca</a>
Ivan Chan	Project Manager	EcoFix, Project Manager	<a href="mailto:ivan.chan@torontomu.ca">ivan.chan@torontomu.ca</a>
Peter Lee	Team Member	EcoFix, Software Engineer	<a href="mailto:peter.s.lee@torontomu.ca">peter.s.lee@torontomu.ca</a>
Nathan Chan	Team Member	EcoFix, Software Engineer	<a href="mailto:n12chan@torontomu.ca">n12chan@torontomu.ca</a>
Talha Hasan	Team Member	EcoFix, Software Engineer	<a href="mailto:talha1.hasan@torontomu.ca">talha1.hasan@torontomu.ca</a>
Joseph Zhang	Team Member	EcoFix, Software Engineer	<a href="mailto:joseph.zhang@torontomu.ca">joseph.zhang@torontomu.ca</a>

**Sign-Off:** (Signatures of all of the above stakeholders)

*Peter Lee*, Ivan Chan, *Joseph Zhang*, **Nathan Chan**, *Talha Hasan*

**Change Request**  
**EcoFix Solutions - Loyalty Points and Rewards System**

**Project Name:** Loyalty Points and Rewards System

**Date Request Submitted:** October 25, 2024

**Title of Change Request:** Request to add a point and reward system to web application

**Change Order Number:** 320

**Submitted by:** Ivan Chan (Project Manager) - (467) 911-9111, [ivan.chan@torontomu.ca](mailto:ivan.chan@torontomu.ca)

**Change Category:**    Scope            Schedule            Cost            Technology            Other

**Description of change requested:**

This change involves the implementation of a loyalty points and rewards system to the currently in progress web application for EcoFix. The change will provide customers with the benefit of gaining rewards such as discounts or services after purchasing a number of products from EcoFix or by participating in events and videos for education regarding how to be eco-friendly. We believe that this change will cause frequent customer purchases for the benefit of rewards and increase the amount of customers by word of mouth for the reward benefits. Customers will also be more knowledgeable about eco-friendly methods that can be implemented to their daily lives.

**Events that made this change necessary or desirable:**

The development of a new web application for EcoFix to provide existing and new services to a broader client base has led to the need to implement a points and rewards system. The lack of this system could lead to a loss in market share to competitors and decrease brand recognition.

**Justification for the change/why it is needed/desired to continue/complete the project:**

The change will attract new customers and have existing customers continually use and recommend our platform to others so that our overall market share can grow. Customers will want to use our platform to make purchases on products and services or attend tutorials or and events as they will be able to receive points and use rewards on future purchases.

**Impact of the proposed change on:**

**Scope:**

Understanding our current situation with the company is the first step before planning for the implementation. The scope must be defined by gaining information on staff, stakeholders, and current standing in the market. We will gain information from meetings with our stakeholders and know what is within our team members capabilities with implementation to uphold the stakeholder's wants and needs. The company's success and standing is also taken into consideration to know what is our current line of EcoFix products and how do we provide further service with the use of the loyalty points and rewards system. This information will be gained from stakeholders as well.

As this is a new technology platform for EcoFix, our current scope will change to fit the use of a points system to EcoFix products. Everything must be fully functional and meet user expectations on launch in order to keep the image of the company clean.

**Schedule:**

Since the loyalty points and rewards systems is likely to be the core functionality for enticing customers with using the web application of EcoFix, a lot of effort must be placed in this project to ensure that the core features will be fully operational on launch. Therefore, the schedule will provide staff and the project manager more opportunities to communicate and work with stakeholders and other integrating projects and their team members. That way the integration of this core feature will be smooth and successful.

**Cost:**

As the schedule of creating the loyal points and rewards system will be long, the amount of effort will require more pay for staff. Since they are paid hourly at \$43.33 for 300 hours total, the cost for paying developers will be \$13,000 for our internal team only. This amount excludes those in separate teams from the points and rewards system. The project manager will also be paid more for the same reason as the staff at \$80 per hour for 75 hours. This amounts to \$6,000 total by the end of the project. As these amounts are estimates, assume that prices may increase due to unforeseen events like sick days or debugging.

**Staffing:**

The amount of staffing will remain the same at around five members per team for the entire web application project. However, our points and rewards system team may be required to communicate more with other project members to ensure that development is within scope and integration is smoothly managed and executed.

**Risk:**

The points and rewards system is the core feature of the web application. As such, the risk of delaying or failing this project will be detrimental to the company in terms of delayed scheduled, overpaid expectations and underallocated staff resources. At this point, it may be necessary to rethink our scope and extend the project delivery date at the cost of increased pay and staffing or completely scrape the project.

**Other:**

The difficulty concerning this risk is the immovable plan that cannot be changed and thus, the scope cannot be changed as time goes on. This is why the planning process will be the most important and will be given ample time before implementation to ensure the project's success.

**Suggested implementation if the change request is approved:**

The team suggests that the royal points and rewards system will be supported on computers and mobile devices so that customers can track points and gain rewards from anywhere. This will give more convenience to the customer which in turn, makes them want to use the web application more.

**Required approvals:**

Name/Title	Date	Approve/Reject
Wael Shabana - CEO	Oct. 25, 2024	Approved

# Requirements Traceability Matrix

**Project Name:** Loyalty Points and Reward System

**Prepared by:** Ivan Chan, Peter Lee, Nathan Chan, Talha Hasan, Joseph Zhang

**Date:** October 25, 2024

**Requirements Collection Plan:** Ask the stakeholders what should be a requirement of the loyalty points and rewards system.

Requirement No.	Name	Category	Source & Relevance	Status
R01	Class Diagram	Non-Functional	This requirement is required by software project protocol. A class diagram allows the project team to organize and determine how to design the system to include stakeholders' ideas.	Not Started
R02	Requirements Backlog	Non-Functional	This requirement is required by software project protocol. A requirements backlog allows the project team to determine the scope of the current sprint.	Not Started
R03	Create Rewards Catalog System	Functional	This requirement outlined by the Stakeholder relates to the reward redemption feature of the system. This includes points redemption for discounts, product upgrades, and other	Not Started



			rewards outlined in the redemption catalog.	
R04	Create a Points Accumulation System	Functional	This requirement outlined by the Stakeholder relates to the points accumulation feature in the system. This includes points calculation from transactions, accumulation from sustainability bonuses, and administrative setter methods	Not Started
R05	Unit test for Modularity	Non-Functional	This requirement is required by software project protocol. Unit testing for modularity allows for flexible adjustments to a function without adjusting the rest of the code. This helps project team members debug more easily.	Not Started
R06	UI/UX Modelling	Functional	This requirement is outlined by the Stakeholder to ensure the functional representation of the front end model to effectively represent the overall points and reward system.	Not Started
R07	Unit test for UI Components	Non-Functional	This requirement is required by software project protocol to ensure fluidity of the UI model by	Not Started

			testing functionality of individual components to evaluate for the overall effectiveness of the front end model.	
R08	Subproject Integration	Integration	This requirement is outlined by the Stakeholder to integrate the Points Accumulation System with the Rewards Catalog system, ensuring that points are safely deducted without any errors.	Not Started
R09	User Profile Integration	Integration	This requirement is outlined by the Stakeholder to integrate the overall points system with the user profile, ensuring that points data is shared to the user dashboard	Not Started
R10	Admin Dashboard Integration	Integration	This requirement is outlined by the Stakeholder to integrate the points system with the admin dashboard, ensuring that data values can be changed through administrative actions to effectively reflect on the overall points and reward system	Not Started

# Scope Statement (Version 1.0)

**Project Title:** Loyalty Points and Rewards System

**Date:** October 25, 2024

**Prepared by:** Ivan Chan, Peter Lee, Nathan Chan, Talha Hasan, Joseph Zhang

**Project Justification:**

The EcoFix's solutions client engagement web portal aims to enhance customer interactions and loyalty by providing an engaging online experience. This portal will inform customers about Ecofix's sustainability practices and reward customers for purchasing products and services through Ecofix's loyalty points and rewards program. The loyalty points and rewards system will grow our customer-base and improve profitability by having customers engage with our new web portal in pair with buying our products.

**Product Characteristics and Requirements:**

1. Accumulating points from buying products and attending webinars and events.
2. Redeeming a reward from a catalog of discounted or exclusive products/services.
3. Integration with other subprojects to allow admin to modify the amount of points gained from products/services, what rewards can be redeemed with said points, as well as how many points are required to redeem each reward.

**Product User Acceptance Criteria:**

- Real-time update of points
- Receipt for redemption of rewards
- List of transactions for redeemed and gained points
- Ease of access for browsing through rewards catalog

**Summary of Project Deliverables**

**Project management-related deliverables:** business case, project charter, team contract, scope statement, WBS, Gantt Chart, change control strategy, cost baseline, stakeholder management plan, and any other documents required to manage the project.

**Product-related deliverables:** (i.e. research reports, design documents, software code, hardware, etc).

1. Class Diagram: A document that shows classes, variables, and functions required for the project.
2. Requirements backlog:
  - 2.1. Requirements to go over in the current sprint
3. Points accumulation system:
  - 3.1. Get points request: Users can see how many points they have.
  - 3.2. Add points request: Users can accumulate points. The system can verify if the transaction is valid for accumulating points.

- 3.3. Set rules request: Admins can set the quantity of points given per transaction.
4. Rewards catalog system:
  - 4.1. Get rewards request: Users can request to redeem a reward given that they have the required amount of points for the reward.
  - 4.2. Set rewards request: Admins can change the rewards as well as how many points can be redeemed for the rewards.
5. Unit test:
  - 5.1. Modularity: Subproject functionality must be modular to test. Minimal repeated code. Code is also decoupled from deeply integrated functions like database connections or fetch requests.
6. UI creation and testing:
  - 6.1. Design and test user interfaces to ensure that the system is user-friendly, visually appealing and meets the requirements of stakeholders.
  - 6.2. Model components must be functional to effectively reflect the overall design of the points and reward system.
7. Integration testing:
  - 7.1. Subproject Integration: Ensure that all modular parts of the program can operate together.
  - 7.2. Full Project Integration: Allow access points for other subprojects to access certain functionality within the subproject of loyalty points and rewards system. Test to ensure smooth operation between subprojects.
8. Verification and Validation:
  - 8.1. Meet stakeholder requirements: Check that the subproject matches the scope constraints defined from the software project management documentation template.
  - 8.2. Communicate with stakeholders: Talk with stakeholder to ensure that scope is aligned with subproject.

# Work Breakdown Structure (WBS)

**Date: Oct 25, 2024**

**Project Name: Loyalty Points and Reward System**

1. Initiation
  - 1.1. Business Case
    - 1.1.1. Business Objective
    - 1.1.2. Opportunity Statement
    - 1.1.3. Critical Assumptions and Constraints
    - 1.1.4. Analysis of Options
    - 1.1.5. Preliminary Project Requirements
    - 1.1.6. Financial Analysis
      - 1.1.6.1. Payback Period
      - 1.1.6.2. Return On Investment
      - 1.1.6.3. Net Present Value
      - 1.1.6.4. Financial Analysis
    - 1.1.7. Schedule Estimate
    - 1.1.8. Potential Risks
  - 1.2. Project Charter
    - 1.2.1. Project title
    - 1.2.2. Project Start and End Date
    - 1.2.3. Budget Information
    - 1.2.4. Project Manager
    - 1.2.5. Project Objective
    - 1.2.6. Project Approach
    - 1.2.7. Roles and Responsibilities
    - 1.2.8. Sign Offs
  - 1.3. Change Request
    - 1.3.1. Project Name
    - 1.3.2. Change Request Submission Details
      - 1.3.2.1. Date Request Submitted
      - 1.3.2.2. Title of Change Request
      - 1.3.2.3. Change Order Number
      - 1.3.2.4. Person who submitted the Change Request
      - 1.3.2.5. Change Category
    - 1.3.3. Description for Change
    - 1.3.4. Events Leading Up to Desire for Change
    - 1.3.5. Justification for Change
    - 1.3.6. Impacts of the Change
      - 1.3.6.1. Scope Impacts
      - 1.3.6.2. Schedule Impacts
      - 1.3.6.3. Cost Impacts
      - 1.3.6.4. Staffing Impacts
      - 1.3.6.5. Risk Impacts

- 1.3.6.6. Other Impacts
  - 1.3.7. Suggested Implementation
  - 1.3.8. Approvals
- 1.4. Identify Stakeholders

## 2. Planning

- 2.1. Integration Management Plan
  - 2.1.1. Project Management Plan
  - 2.1.2. Determine Change Control Strategy
- 2.2. Scope Management Plan
  - 2.2.1. Requirements Traceability Matrix
  - 2.2.2. Scope Statement
    - 2.2.2.1. Project Details and Justification
    - 2.2.2.2. Product Characteristics and Requirements
    - 2.2.2.3. Product User Acceptance Criteria
    - 2.2.2.4. Summary of Project Deliverables
  - 2.2.3. Work Breakdown Structure
  - 2.2.4. Determine Scope Validation Strategy
- 2.3. Time Management Plan
  - 2.3.1. Define activities
  - 2.3.2. Sequence Activities
  - 2.3.3. Estimate Activity Resources
  - 2.3.4. Estimate Activity Duration
  - 2.3.5. Develop Schedule
    - 2.3.5.1. Gantt Chart
    - 2.3.5.1. Cost Management Plan
  - 2.3.6. Estimate Costs
  - 2.3.7. Determine Budget
- 2.4. Cost Management Plan
- 2.5. Quality Management Plan
- 2.6. Human Resource Management Plan
- 2.7. Communications Management Plan
- 2.8. Risk Management Plan
  - 2.8.1. Identify Risks
  - 2.8.2. Perform Qualitative Risk Analysis
  - 2.8.3. Perform Quantitative Risk Analysis
  - 2.8.4. Plan Risk Responses
- 2.9. Procurement Management Plan
- 2.10. Stakeholder Management Plan

## 3. Executing

- 3.1. Deliverables
  - 3.1.1. Class Diagram
    - 3.1.1.1. Classes
    - 3.1.1.2. Variables
    - 3.1.1.3. Functions

- 3.1.2. Requirements backlog
    - 3.1.3. Points Accumulation System
      - 3.1.3.1. Get Points Request
      - 3.1.3.2. Add Points Request
      - 3.1.3.3. Set Rules Request
    - 3.1.4. Rewards Catalog System
      - 3.1.4.1. Get Rewards Request
      - 3.1.4.2. Set Rewards Request
    - 3.1.5. UI/UX Modeling
    - 3.1.6. Unit Testing
      - 3.1.6.1. Modularity
      - 3.1.6.2. UI Components
  - 3.2. Management
    - 3.2.1. Perform Quality Assurance
      - 3.2.1.1. Unit testing
      - 3.2.1.2. Integration Testing
        - 3.2.1.2.1. Subproject Integration
        - 3.2.1.2.2. Full Project Integration
    - 3.2.2. Manage Human Resources
      - 3.2.2.1. Acquire Project Team
      - 3.2.2.2. Develop Project Team
      - 3.2.2.3. Manage Project Team
    - 3.2.3. Manage Communications
    - 3.2.4. Manage Stakeholder Engagement
      - 3.2.4.1. Stakeholder Needs
        - 3.2.4.1.1. Validation
- 4. Monitoring
  - 4.1. Integration Management
    - 4.1.1. Monitor and Control Project Work
    - 4.1.2. Perform Integrated Change Control
  - 4.2. Scope Management
    - 4.2.1. Validate and Control Scope
  - 4.3. Time Management
    - 4.3.1. Assess Schedule
    - 4.3.2. Control Schedule
  - 4.4. Cost Management
    - 4.4.1. Assess Costs
    - 4.4.2. Control Costs
  - 4.5. Quality Management
    - 4.5.1. Assess Quality
      - 4.5.1.1. Verification
    - 4.5.2. Control Quality
  - 4.6. Communications Management
    - 4.6.1. Assess Communications
    - 4.6.2. Control Communications

- 4.7. Risk Management
  - 4.7.1. Assess Risks
  - 4.7.2. Control Risks
- 4.8. Procurements Management
  - 4.8.1. Assess Procurements
  - 4.8.2. Control Procurements
- 4.9. Stakeholder Management
  - 4.9.1. Control Stakeholder Engagement
- 5. Closing
  - 5.1. Close Procurements
  - 5.2. Close Project



## **Scope Validation & Change Control Strategy**

**Project Title:** Loyalty Points and Rewards System

**Date:** October 25, 2024

**Prepared by:** Ivan Chan, Peter Lee, Nathan Chan, Talha Hasan, Joseph Zhang

### **Scope Validation**

To make sure that the project is inline with customer needs, the team will be reviewing the scope with key stakeholders. Stakeholders will provide the final feedback with the project manager being the first to review on project deliverables, change requests, and any recommended action required. Many of the forms will require a sign-off by the stakeholders to state that they agree upon the decided topic. If any of the above are not accepted by either the stakeholders or project manager, the team will be required to create a new proposed change request or to scrap the idea for the change entirely.

#### **Validation:**

It is important to properly validate and verify any scope changes in order to avoid scope creep issues. Any risk must be clearly defined by the change request form. These changes must be reviewed by the project manager first then negotiated and approved by the stakeholders through proper scope validation processes.

The following relates to the process needed to avoid scope creeping using scope validation when performing a change request:

#### **Scope Validation Processes:**

1. Deliverables must adhere to the project scope statement and guidelines.
2. Inspection and testing must be carried out to ensure project satisfaction in aligning with customer and stakeholder needs.
3. The reviewed deliverables will be compared with previous deliverables to understand the scale of the change requested, and thus the level of risk associated with the change if it fails to follow constraints.
4. Through every process of reviewing, feedback must be provided if any key members disagree with the requested change. Unapproved change requests must be revised with the recommended changes and be reprocessed for scope validity.
5. When inspection and testing is complete with an approval by the subproject team, integration teams, and project manager, the request will be sent to key stakeholders and the head of the company for further reviewing.
6. When the CEO and key stakeholders have deemed that the change request is acceptable and approved with signature, the plan will be logged within the change control log and prepared for implementation by the team.

## **Change Control**

The team strategy for the EcoFix loyalty points and rewards system is to make sure that all changes are aligned with the key requirements that must be met from the stakeholder, customer needs, and team members. We will achieve this strategy by maintaining communication and updating our requirements if necessary to match with our project scope. As change is likely to cause the risk of leaving constraints, the project manager will ensure that all changes are verified by all major parties and that the change request follows the proper procedures that will validate the change and adjust accordingly with minimal risk.

The following relates to the procedure related to maintaining low risk when performing a change request:

### **Planned Steps for Change Control:**

#### **1. Change Control Management Plan:**

- Keep record of every change request both accepted and rejected.
- Evaluate risk by measuring difference between scope baseline and the current performance of the subproject.

#### **2. Change Request Form:**

- Cover aspects of the category and nature of the change requested.
- Explanation for the need to make this change.
- Provide the change impacts for the scope, schedule, cost, staffing, and risks when changing.
- Ensure that the change request has been approved by other teams and higher ups before submission.

#### **3. Change Control Log:**

- Identify urgency in change request and provide the expected resources as defined from the change request form.
- Update the main constraints of cost, scope, and time in a way that will reflect the changes made to the officially defined constraint statements.
- Track changes made using the change control log.

#### **4. Communication Strategy:**

- Communicate with stakeholders and integration subproject teams to ensure change request plans are notified to all major contributors.
- Communicating with other teams is vital to determine if changes are feasible and have low amount of risk when ensuring all subprojects are aligned together in scope. This ensures that integration is smooth from the change and that all teams are able to adapt to change requests.

# **New Activities Proposal**

**Date: Oct 25, 2024**

**Subproject Name: Loyalty Points and Reward System**

## **Purpose of New Activities Proposal**

The following activities are meant to evaluate the current position of the subproject. The position of the subproject is based on the current alignment to predetermined constraints. These constraints are mainly budget, schedule, and cost but can also include staffing and risk. These new activities are a very important aspect of the subproject as it is the activity which deems if a change request is necessary to improve the position of the subproject and satisfy stakeholders by either fixing misalignments to be within constraint bounds or negotiating with the stakeholders for alternatives. Please refer to the change control strategy document for more details about managing change request forms.

## **Activity Estimating Resources and Durations:**

### **1. Backend Early Constraint Evaluation**

#### **1.1. Resource Management of Effort Required**

The early stage of backend development is important for its clear impact to the overall design of the subproject and its integration with other subprojects. The team will first understand the scale of the backend design before making a decision for adding more effort during backend implementation.

#### **1.2. Backend Design to Align with Frontend and Database**

The planning on aligning the features and functionality between the three subproject parts of frontend, backend, and database, is crucial to ensure the success of maintaining the subproject's constraints. And as such, communication is required to make an agreement on the integration between these three large parts of the subproject. On top of the internal communication to align features and functionality between frontend and backend for our personal subproject, backend will communicate with other subprojects to discuss the layout of the database and tables required to align with other features and functionalities needed from other subprojects.

### **1.3. Development of Test Cases For Backend**

Test cases are very important to evaluate the functionality of certain components in the API. Thus it is crucial to prepare the test cases before the late stage of developing the backend. These test cases will be used as a baseline reference for the initial expectations from the backend. The test cases are subject to change if a change request is required to make compromises to the backend in regards to its constraints.

### **1.4. Duration Decision Based on Resource Allocation**

Unfortunately, the backend cannot fall behind from the hard deadline before integration. The team will first understand the scale of the backend design before making a decision for adding more effort to backend implementation. Our plan is to create a buffer of two weeks. Thus requiring around four business weeks including buffer to reach the deadline for the backend.

## **2. Backend Late Constraint Evaluation**

### **2.1. Resource Management of Effort Required**

The late stage of backend development has barely any leeway to adjust the current subproject template backend. During this stage, if a change request with a large amount of adjustments is required to realign to the baseline constraints, negotiation would be the only way to resolve the situation. Thus, adding more effort and allocating resources from other sections of the team such as frontend developers, is the only way of hopefully meeting a satisfactory result based on the stakeholders thoughts of the current backend development progress.

### **2.2. Duration Requirements Based on Backend Deadline**

As referred in activity (1.4.), the backend cannot fall behind from the hard deadline before integration. Since our plan has a buffer of two weeks as planned in case of an emergency or falling behind schedule, the team must utilize the most effort needed to meet activity duration requirements. Failing to do so will affect the entire chain of tasks including the delayed delivery date as other subprojects would not be able to integrate fully without the completion of the points and rewards system subproject.

## **3. Frontend Early Constraint Evaluation**

### **3.1. Resource Allocation of Team Members**

Frontend does not require a large team to complete. Especially since some team members have experience with developing in our chosen frontend technology, React.js. Therefore, we will allocate more resources to backend development while a smaller part of the team will focus on the frontend.

### **3.2. Frontend Design to Align with Backend**

As mentioned in activity (1.2), the planning on aligning the features and functionality between the three subproject parts of frontend, backend, and database, is crucial to ensure the success of maintaining the subproject's constraints. And as such, communication is required to make an agreement on the integration between these three large parts of the subproject. Frontend design will communicate with mainly the UI teams from other subprojects for the overall project. The topics may be related to maintaining similar themes or smooth transitions for user interaction between the different webpages.

### **3.3. Duration Decision Based on Resource Allocation**

The same plan for the backend in activity (1.4.) will be implemented for the frontend. The situation is that the frontend cannot fall behind from the hard deadline before integration. The plan is to create a buffer of two weeks. Thus requiring around four business weeks, including buffer to complete the frontend.

## **4. Frontend Late Constraint Evaluation**

### **4.1. Resource Management of Effort Required**

The late stage of frontend development is very similar to the situation as the backend for activity (2.1.). As that it has barely any leeway to adjust the current subproject template frontend. The team will apply similar techniques as backend in (2.1.) to resolve constraint issues. These techniques include allocating more resources from other sections of the team or negotiating with the stakeholders for depleted results in subproject deliverables.

### **4.2. Duration Requirements Based on Frontend Deadline**

As referred in activity (3.3.), the frontend cannot fall behind from the hard deadline before integration. Since our plan has a buffer of two weeks as planned in case of an emergency or falling behind schedule, the team must utilize the most effort needed to meet activity duration requirements. Consequences for failing to meet deliverable deadlines will be like the consequences mentioned in the backend activity (2.2). However, the team is also confident that the frontend will have fewer issues in comparison to the development of the backend. Thus we are willing to take the risk in allocating less resources for frontend.

# Milestone List

## Date: Oct 25, 2024

**Project Name:** Loyalty Points and Rewards System

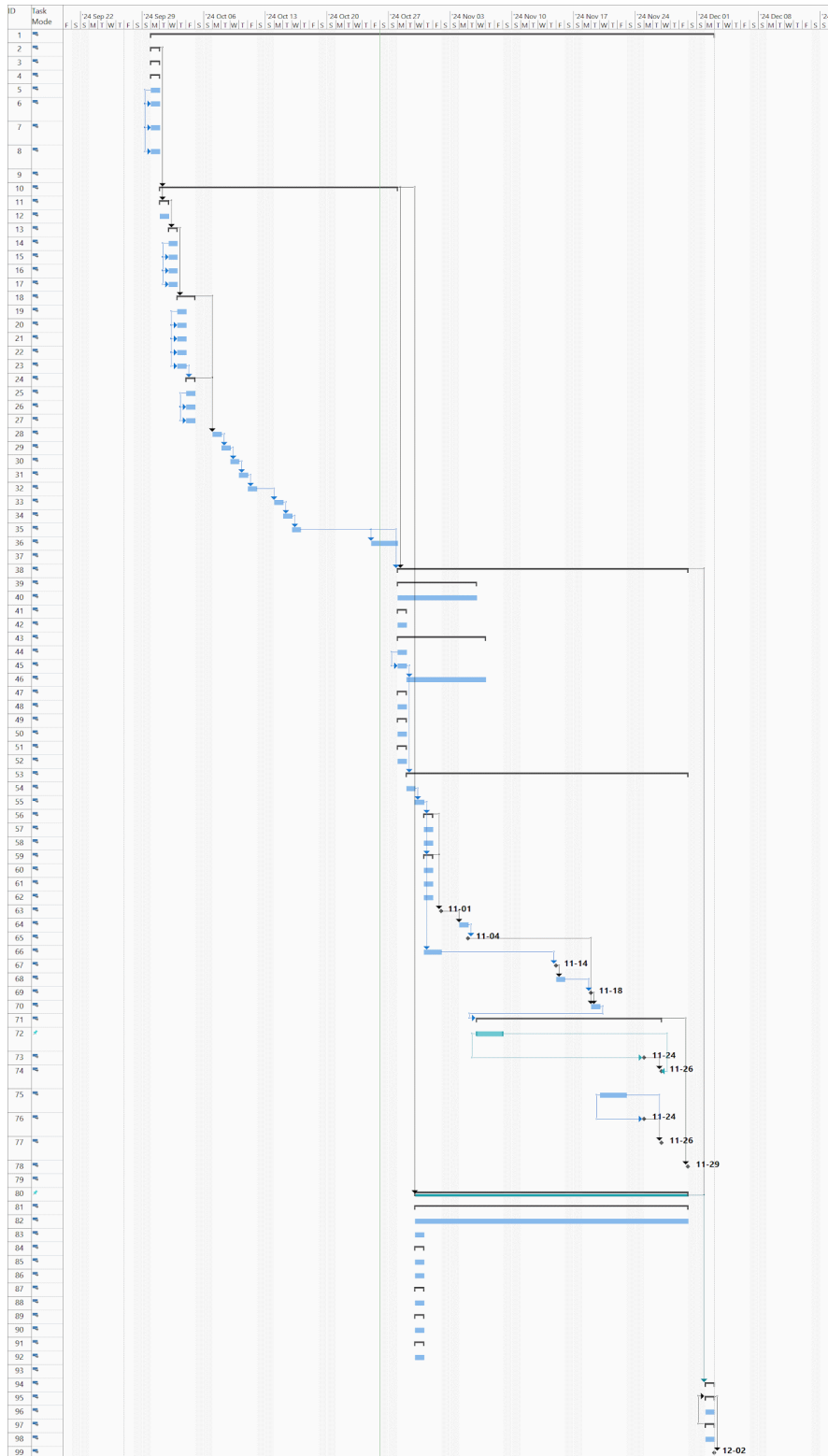
Milestone	Estimated Completion Date
Complete Planning Phase	October 25th
Complete Loyalty Points and Reward System Back-end Creation	November 1st
Complete Loyalty Points and Reward System Back-end Testing	November 2nd
Complete Loyalty Points and Reward System Front-end Creation	November 14th
Complete Loyalty Points and Reward System Front-end Testing	November 18th
Complete Integration with User Profile & Account Management Team	November 24th
Complete Integration Testing with User Profile & Account Management Team	November 26th
Complete Integration with Admin Dashboard for ExoFix Solutions Team	November 24th
Complete Integration Testing with Admin Dashboard for ExoFix Solutions Team	November 26th
Complete Testing for Entire Project	November 29th
Close Project	November 30th

### Impact on Gantt Chart and schedule:

Clearly specified, measurable, realistic, and time-bound milestones as agreed upon by the team can help with setting up the network diagram and creating a well detailed yet flexible schedule. This can then help with leveling the Gantt chart and ensuring that enough resources are assigned to the relevant tasks.

# Gantt Chart

## Date: Oct 25, 2024



# Task Duration and Dependencies

Date: Oct 25, 2024

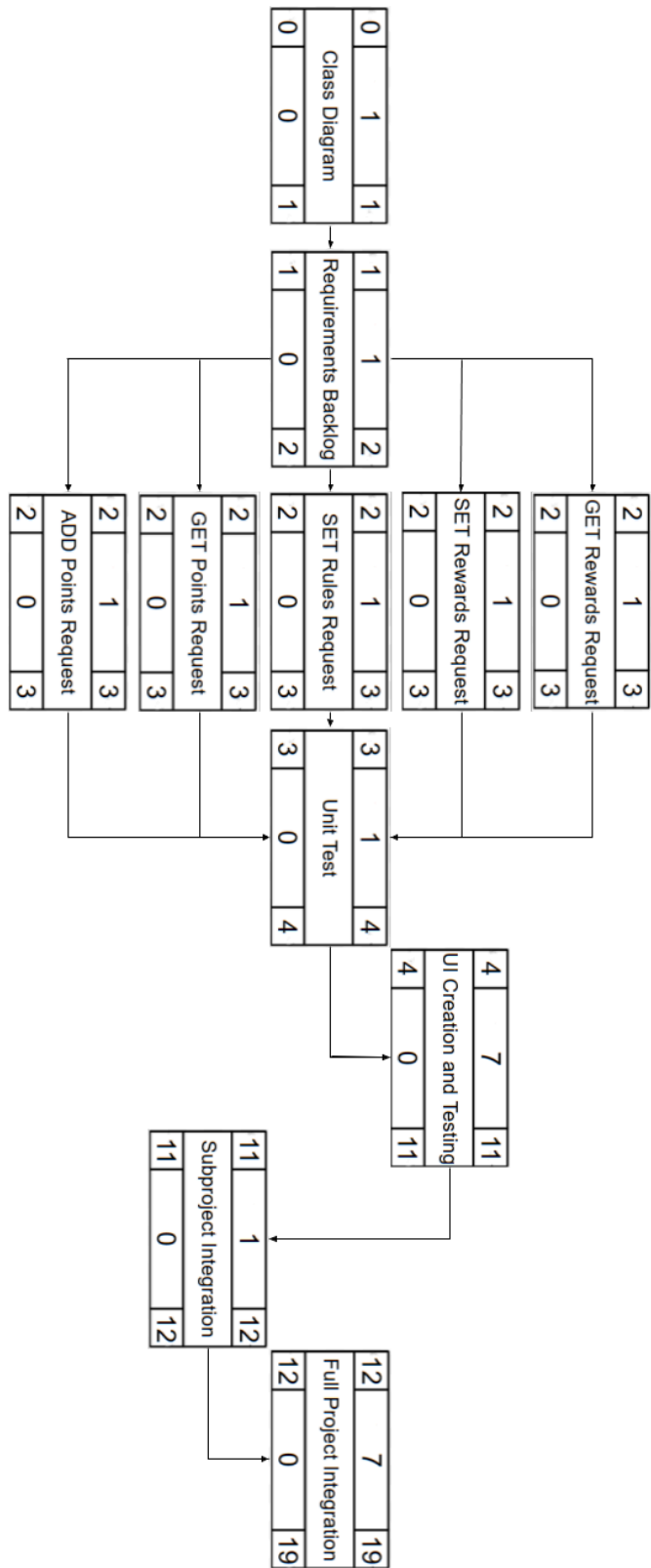
Project Name: Loyalty Points and Reward System

Task ID	Task Name	Task Duration	Task Predecessor	Task Successor	Comments
1	Estimate Activity Durations	1 day		2	2 hours
2	Estimate Activity Resources	1 day	1	3	1 hour
3	Sequence Activities	1 day	2	4	1 hour
4	Determine Critical Path	1 day	3	5	1 hour
5	Develop Schedule	1 day	4	6	1 hour
6	Allocate Resources and Level	1 day	5	12	2 hours
7	Create a Human Resource Management Plan	1 day		12	8 hours
8	Create a Communications Management Plan	1 day		12	8 hours
9	Create a Risk Management Plan	1 day		12	8 hours
10	Create a Procurement Management Plan	1 day		12	8 hours
11	Create a Stakeholders Management Plan	1 day		12	8 hours
12	Acquire Project Team	1 day	6, 7, 8, 9, 10, 11	13	
13	Develop Project Team	1 day	12	14	
14	Class Diagram	1 day	13	15	2 hours
15	Requirements Backlog	1 day	14	16, 19	1 hour
16	Create Rewards Catalog System	1 day	15	22	2 hours
17	- Add a Get Rewards request	1 day			1 hour
18	- Add a Set Rewards request	1 day			1 hour
19	Create a Points Accumulation System	1 day	15	22	4 hours



20	- Add a Add Points request	1 day			1 hour
21	- Add a Set Points request	1 day			1 hour
22	- Add a Set Rules request	1 day			2 hours
23	Unit test for Modularity	1 day	16, 19	24, 25	
24	UI Creation and Testing	7 days	23	25	20 hours
25	Integration Testing	8 days		23	
26	- Subproject integration	1 day	23	27	
27	- Full Project integration	7 days	26		

Network Diagram for Project Execution Deliverables:



# Resource Assignment

**Date: Oct 25, 2024**

**Project Name: Loyalty Points and Reward System**

Task ID	Task Name	Task Duration	Hours	Resource	Assigned to:
1	Estimate Activity Durations	1 day	2	1 project manager @ 20%	Project Manager
2	Estimate Activity Resources	1 day	1	1 project manager @ 10%	Project Manager
3	Sequence Activities	1 day	1	1 project manager @ 10%	Project Manager
4	Determine Critical Path	1 day	1	1 project manager @ 10%	Project Manager
5	Develop Schedule	1 day	1	1 project manager @ 10%	Project Manager
6	Allocate Resources and Level	1 day	2	1 project manager @ 20%	Project Manager
7	Create a Human Resource Management Plan	1 day	8	1 project manager @ 100%	Project Manager
8	Create a Communications Management Plan	1 day	8	1 project manager @ 100%	Project Manager
9	Create a Risk Management Plan	1 day	8	1 project manager @ 100%	Project Manager
10	Create a Procurement Management Plan	1 day	8	1 project manager @ 100%	Project Manager
11	Create a Stakeholders Management Plan	1 day	8	1 project manager @ 100%	Project Manager
12	Acquire Project Team	1 day	8	1 project manager @ 100%	Project Manager
13	Develop Project Team	1 day	8	1 project manager @ 100%	Project Manager
14	Class Diagram	1 day	1	All project members @ 20%	Project team
15	Requirements Backlog	1 day	1	All project members @ 10%	Project team
16	Create Rewards Catalog System	1 day			

17	- Add a Get Rewards request	1 day	1	1 project member @ 10%	Nathan
18	- Add a Set Rewards request	1 day	1	1 project member @ 10%	Peter
19	Create a Points Accumulation System	1 day			
20	- Add a Get Points request	1 day	1	1 project member @ 10%	Talha
21	- Add a Set Points request	1 day	1	1 project member @ 10%	Joseph
22	- Add a Set Rules request	1 day	2	1 project member @ 20%	Ivan
23	Unit test for Modularity	1 day	2	All project members @ 20%	Project team
24	UI Creation and Testing	7 day	20	2 project member @ 40%	Project team
25	Integration Testing	8 days		All project members @ 100%	Project team
26	- Subproject integration	1 day	4	All project members @ 100%	Project team
27	- Full Project integration	7 days	36	All project members @ 100%	Project team