Team Iron

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Table of Contents

List of Figures

List of Tables

1. Introduction

1.1 Purpose

Refill.ME is a mobile application made for shoppers who want to participate in package free shopping. The application will have a version that is optimized for shoppers as well as a version that is optimized for tablets for the store owners. The goal of Refill.ME is to connect package free shoppers with package free stores, and reduce packaging waste. This will help people who are interested in package free shopping but do not have information on which stores

around them offer package free options as wells as what products the individual stores offer

package free. Refill.ME will help both novice package-free shoppers get into package-free

shopping, as well as help experienced package free soppers maintain their shopping habits. This

application will support local businesses by giving them a new way to connect with their

package free sopper base. Refill.ME will provide practical information regarding package-free

shopping. This application will also collect data to help store owners optimize their offerings for

package-free shoppers. The application will keep users engaged by having a reward feature

called Reward.Me that will enable shoppers to collect points for package-free purchases and use

these collected points to redeem certain benefits, which will depend on the store.

1.2 Scope

The Refill.ME prototype will show a proof of concept for our final product.The prototype will

have all of the functionality that the real-world product will have.. This functionality includes

the ability for shoppers to find package free stores or stores with package free options near

them, search for package free products and get container guide recommendations. The

prototype may not have some features of the real world product available but it will have all

functionality needed to show the proof of concept for Refill.ME.

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1.3 Definitions, Acronyms, and Abbreviations

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Amazon Relational Database Services (Amazon RDS): a web service to set up, maintain, and

scale a relational database in the cloud.

Android: an open-source mobile phone operating system used on mobile devices such as

smartphones and tablets.

Application Programming Interface (API): a set of rules for two different programs to communicate with each other.

Amazon Web Services (AWS): a cloud computing platform.

Amazon Maps API: a programming interface that allows developers to add mapping capabilities like interactive maps and custom overlays to android applications.

Application Layer: a layer where an application can effectively communicate with other applications on different computer systems and networks.

Backend: a computer system or application that is not directly accessed by the users but rather responsible for storing and manipulating data.

Bauxite: a naturally occurring mineral.

Biodegrade: to decompose and become incorporated back into the environment. **Bulk section:** an aisle where products are available in dispensers or bins, and the shoppers can buy the exact amount they desire.

Bring Your Own Container (BYOC): an initiative to encourage shoppers to bring their own containers with them to the store in order to avoid creating packaging waste. **Cascading Style Sheets (CSS):** a stylesheet language used to create the design (fonts, colors, borders, etc.) of webpages.

Compostable: breaking down into organic matter and not producing any harmful chemicals during that process.

Container: tote bag, produce bag, glass or plastic jar, glass or plastic box, glass or plastic bottle that can be used for package-free shopping.

Container Guide: a small lexicon providing an overview of different types of containers and the types of products that could be stored in them.

Container Recommendation Feature: a feature of Refill.Me that suggests specific containers

for products based on the type of product such as liquid or solid.

Continuous Integration and Delivery (CI/CD): a method for automatically merging contributions and deploying new stable software to a production environment. **Customized Container Recommendation Feature:** a feature of Refill.Me that suggests all needed containers for a particular shopping list based on the items added to the list by the shopper.

Crowdsourcing: a way to solicit user feedback using surveys (either paper based or online).

Database: an organized collection of structured information, typically stored electronically in a computer system.

Data Layer: a layer of the application/website which contains all of the data that is generated by users engaging with the application/website.

Django: a high-level Python web framework that enables rapid development of secure and maintainable websites.

Docker: a platform designed to help developers build, share, and run development processes.

EPA: United States Environmental Protection Agency.

Experienced package-free shopper: a shopper who has knowledge of package-free shopping.

Expo: an open source framework for creating mobile apps.

Farmers' market: a market where local farmers sell their products directly to consumers.

Frontend: a computer system of the website/application which is exposed to users for direct interaction.

GitHub: a hosting service for version control and development of software. **GitHub Issues:** a GitHub repository feature that tracks issues, team-members' work, and development process of an application.

Google Maps: a web mapping platform and application that provides street maps, satellite

imagery, and real-time traffic information.

Greenhouse gas emissions: gasses (such as carbon dioxide and methane) predominantly emitted through human activities that trap heat in the earth's atmosphere, and thus directly contribute to climate change.

Hyper Text Markup Language (HTML): a programming language used to create websites.

Integrated Development Environment (IDE): an advanced code editor with syntax highlighting, built-in debugger, and compiler.

iOS: a closed source mobile operating system used in iPhones and iPads from Apple Inc.

Javascript: a high-level client-side scripting language to implement functionality on websites.

Loose product: product sold without any packaging.

Mainstream grocery shopping: grocery shopping that does not follow sustainable practices, thus, it entails buying packaged items, using plastic, and not considering environmental aspects.

Microplastics: tiny plastic particles that are less than five millimeters long and are created when larger plastic pieces break down.

MySQL: a relational database that uses SQL as its database language.

Node Package Manager (npm): a software-sharing repository for software and packages that are used for software development, especially software written in Javascript. **Novice package-free shopper:** a shopper who has no experience with, and thus, no knowledge of package-free shopping.

Optical Character Recognition (OCR): a software that recognizes and converts text from images to machine-readable format.

Package-free: without any packaging materials such as plastic, paper, cardboard, aluminum, or glass.

Package-free store (in the context of Refill.Me): a supermarket with a bulk section, a store exclusively selling loose products, and a vendor at farmers' markets.

Package-free shopper: a shopper who prefers to buy loose products by filling them into their own containers.

Package-free shopping: shopping using one's own containers, thus, shopping without creating packaging waste.

Package Manager: a set of software tools that automates the installation, updating, configuration, and deletion of programs in a systematic way.

Packaging: material used to protect a product from any damage during transportation or storage. **Presentation Layer:** a layer where functions like data conversion, data encryption and decryption as well as data translation take place.

Produce bag: a reusable bag, usually with a window and tare weight label, that is used for buying fruits/vegetables.

Python: a high-level programming language that supports multiple programming paradigms, including structured, and functional programming.

React Native: a framework that allows for the building of native mobile apps using the programming language React.

Relational Database: a type of database that stores and provides access to data points that are related to one another.

Rest Framework(s): an application programming interface that conforms to the constraints of REST architecture.

Single-use: designed to be used only once, and then to be discarded.

Structured Query Language (SQL): a widely used database language used for inserting, querying, and retrieving data from relational databases.

Tare weight: the weight of an empty container that should not be included when the price of the product is calculated.

Tote bag: a large bag, often made of cotton, used to carry many items.

Virtual Machine (VM): a digital version of a physical computer.

Visual Studio Code (VS Code): a source-code editor that can be used with a variety of programming languages.

Webpack: a software tool that bundles Javascript files to be used in a web browser. **Web Server:** computer software and hardware that stores content for a website such as images, videos, and other data, and it operates on HTTP and other protocols to deliver the files for a website to clients who request it.

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1.4 References

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1.5 Overview

The prototype for ReFill.ME will include several features and capabilities that will allow for the user to better be able to do package-free shopping. The application will let users search for information about containers, and give them access to a container guide. Users will be able to search for package free products by icon, or name. Refill.ME will also implement a shopping list, reward points for users, suggest edits for products, and provide the option to connect shoppers to advocacy and petition sites. We will not be implementing coupons and search by barcode in the prototype. Search by icon, store rating, and the search information dashboard will be partially implemented.

2 General Description

The stores Refill.Me will target are supermarkets with bulk sections, package-free stores and farmers markets. Shoppers will use Refill.Me to search for product, store and container

information. Shoppers will also use Refill.ME to create shopping lists as well as collections as redeeming rewards from Reward.ME. Store owners will use Refill.ME to display package free products and their prices to customers, increase their digital presence and get the search information from customers in their area. In the future grocery shopping apps as well as trucks that sell package-free products on the go can use Refill.ME.

2.1 Prototype Architecture Description

The key features offered by the application to the customer will be a container guide, container recommendation, shopping List and Reward.Me. It will give customers the ability to search by icon, scan barcodes or enter the product name. The feature Refill.Me will offer store owners include, product and price dashboard, reward point conversion, coupon dashboard, store rating, store analytics, store search, and product search. The store owner will also have the option to search by icon, scan barcodes or enter the product name.

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Feature	Real World Product	CS411W Prototype
Account Creation	Fully Implemented	Fully Implemented
Store Search	Fully Implemented	Fully Implemented
Search by Icon	Fully Implemented	Partially Implemented
Scan Products Barcode	Fully Implemented	
Scan Products Name	Fully Implemented	Fully Implemented
Container Guide	Fully Implemented	Fully Implemented
Container Recommendation	Fully Implemented	Fully Implemented

ReFill.ME will have a three-tier architecture as shown in Figure 1. Firstly, hardware which for shoppers will be mobile phones and for store owners a tablet. The application layer will have a web server, and we will integrate various API's which will link with the database. The data layer will have relational tabs for storing product, store and user information as well as relational tabs for data analytics.

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Figure 1 Prototype Architecture Diagram
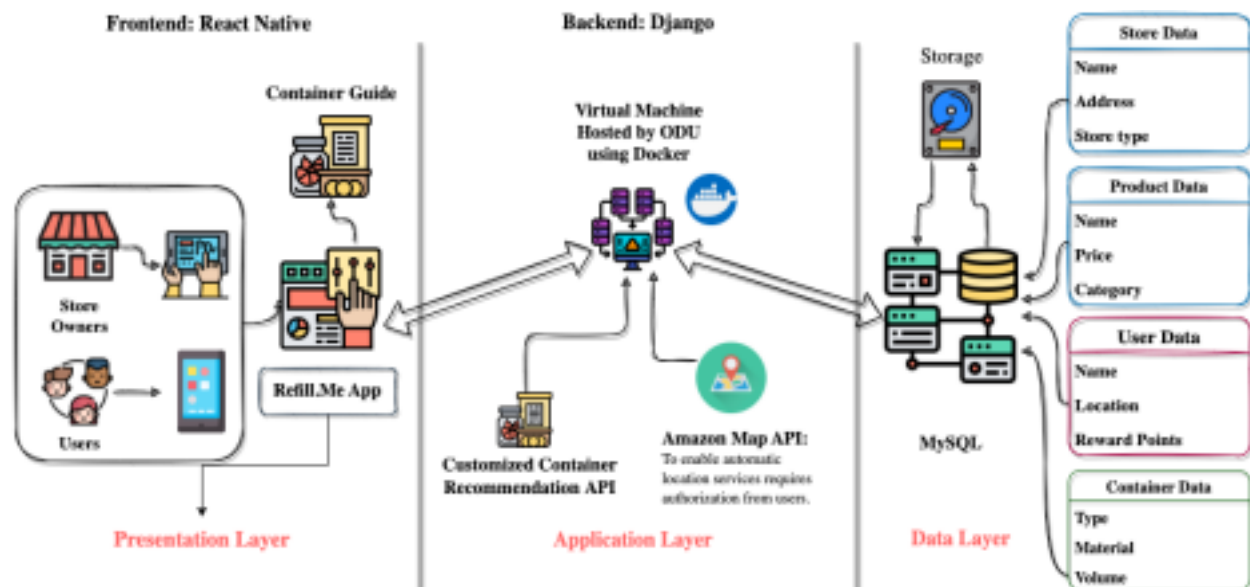
2.2 Prototype Functional Description

The prototype for ReFill.ME will include several features and capabilities that will let the user do package free shopping. The application will let users search for information about containers, and give them access to a container guide. Users will be able to search for package free products by icon, or name. We will also implement a shopping list, reward points for users, suggested edits for products, and the option to connect shoppers to advocacy and petition sites. We will not be implementing coupons and search by barcode in the prototype. Search by icon, store rating,

and the search information dashboard will be partially implemented.

2.2.1 Hardware Interfaces

Describe any hardware interfaces that are implemented in the prototype. This could include connectivity to modems, routers, or other external devices. These hardware interfaces should be apparent in the information provided in subsequent sections of this specification.

2.2.2 Software Interfaces

- SQL Database
- Django
- Amazon Maps API
- React Native
  .

2.2.3 User Interfaces

- Phone for maneuvering trough the application.

2.2.4 Communications Protocols and Interfaces