DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
THE UNIVERSITY OF TEXAS AT ARLINGTON

SYSTEM REQUIREMENTS SPECIFICATION
CSE 4317: SENIOR DESIGN II
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UTA STEAM
GROCO

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1 Product Concept

This section describes the purpose, use, and intended user audience for the Groco product. Groco is a grocery shopping web application that is accessible on PC, smartphones, and tablets. The user of Groco will be able to search for the grocery items and based on the their preference, the system will suggest the optimal grocery items. The system also allows users to search for recipes, add their recipes and meal plans into their shopping list to perform the optimization and navigation route.

1.1 Purpose and Use

The purpose of this product is to help users with grocery shopping. The product can:

- look for the item's availability in nearby stores
- save money by comparing prices of the item in different stores
- save traveling time for shopping by comparing the distance to stores
- provide the convenience in planning meals

1.2 Intended Audience

The application is a web application and users can access the application from multiple devices. The product is made available publicly and free of charge. The product contains no objectionable material; therefore it is suitable for general grocery shoppers.

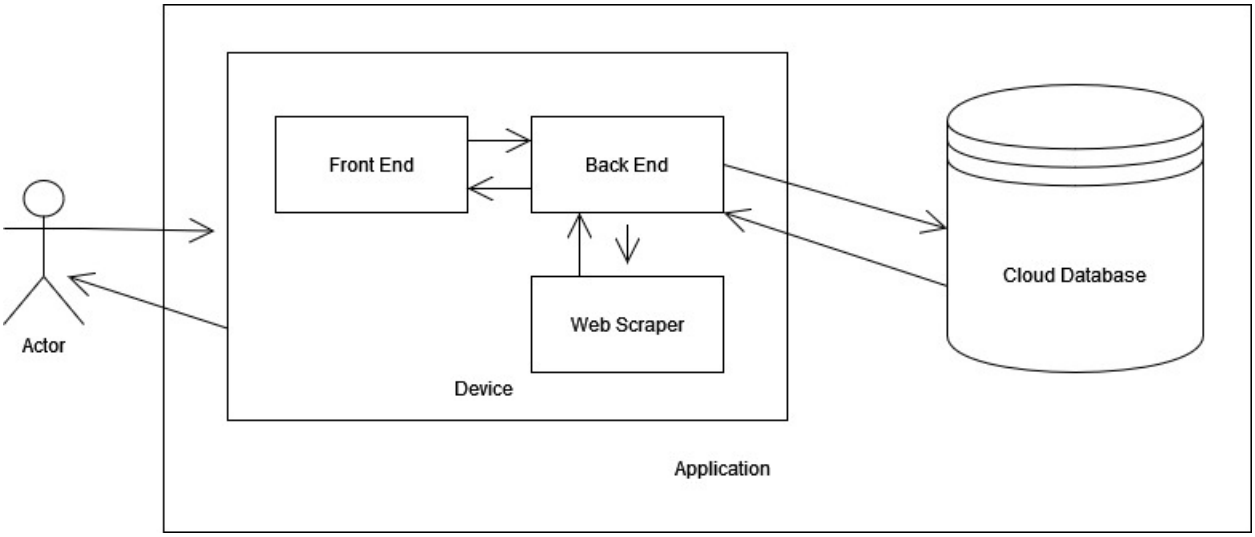

Figure 1: High level overview of the system

2 PRODUCT DESCRIPTION

Groco is a shopping application that provides the optimal suggestion to shop for groceries. The optimization is based on the user's preferences such as brands, prices, and distance. Groco includes five main components: item search, recipes search, adding recipes, adding meal plan, and navigation.

2.1 FEATURES & FUNCTIONS

The product suggests the optimal grocery items based on the user's preference. The product consists of five main components:

- Atomic item search: A user can search for each item to check its availability and prices.
- Recipes search: A user can search for a specific recipe and add its ingredients to a shopping list.
- Adding customized recipes: A user can add his or her recipes for later use or share with other users.
- Adding meal plans: A user can add recipes to create meal plans. The product will aggregate all items and amounts for shopping.
- Store navigation: A user can use the provided addresses to take their optimized shopping trip.

The product provides the optimal suggestion based on the database and is not responsible for the accuracy or changes regarding prices or availability and discounts at the actual stores. The product does not provide online purchases and online reservation services.

The external requirements for this product include the web browser, internet, a map application, and a Gmail account.

2.2 EXTERNAL INPUTS & OUTPUTS

The following table describes critical external data flows regarding external inputs and outputs.

Data	**Description and use**	**In/Out**
Password	Input associated with UserID for authentication	In
Email	Input associated with UserID to retrieve password	In
Recipe	Search for recipe	In
Recipe	Add customized recipe	In
Recipe	Display found recipe	Out
Ingredients	Ingredients of some recipe	Out
Grocery	Search for item by keyword	In
Grocery price	Display price of the item	Out
Store's name	Display store that carries the item	Out
Store's distance	Display distance from user's location to store	Out
Total price	Display total price of shopping list	Out
Meal plan	Add meal plan to shopping list	In
Meal plan	Display saved meal plan	Out
Shopping list	Display all items for shopping	Out

Table 2: External inputs and outputs

2.3 PRODUCT INTERFACES

The product is a web application with a user-friendly interface. Below are the sample screenshots of the operational (visible) interfaces for end-user.

Figure 2: Product logo

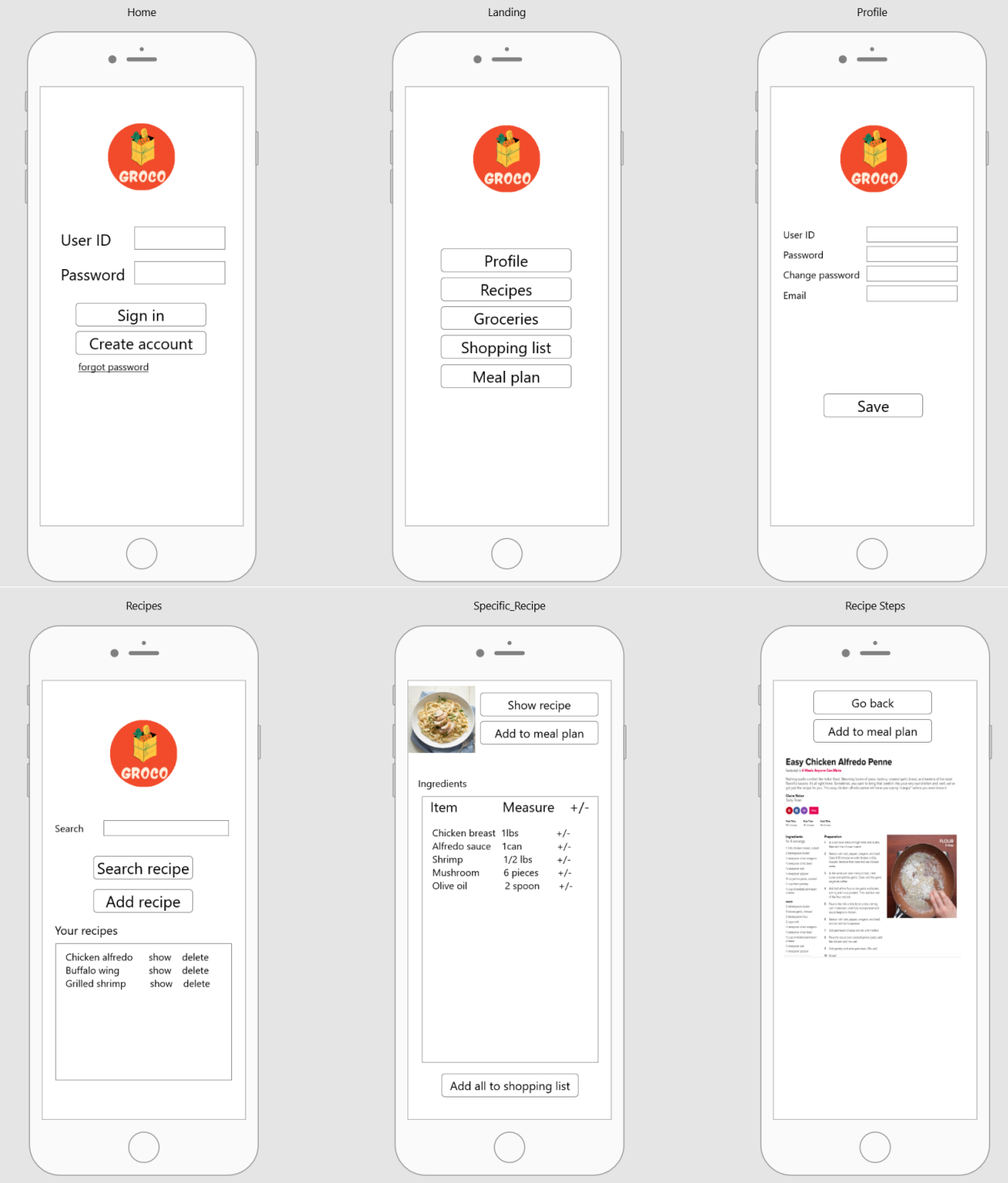
Home
GROCO
User ID
Password
Sign in
Create account
forgot password
Landing
GROCO
Profile
Recipes
Groceries
Shopping list
Meal plan
Profile
GROCO
User ID
Password
Change password
Email
Save
Recipes
GROCO
Search
Search recipe
Add recipe
Your recipes
Chicken alfredo show delete
Buffalo wing show delete
Grilled shrimp show delete
Specific_Recipe
Show recipe
Add to meal plan
Ingredients
Item Measure +/-
Chicken breast 1lbs +/-
Alfredo sauce 1can +/-
Shrimp 1/2 lbs +/-
Mushroom 6 pieces +/-
Olive oil 2 spoon +/-
Add all to shopping list
Recipe Steps
Go back
Add to meal plan
Easy Chicken Alfredo Penne

Figure 3: End-user product interface

3 Customer Requirements

The customer requirements for this application have been procured directly from the client, Tim Dockins. The client has a good idea about end-user functionality of this application and has provided us with requirements that he thinks should be a part of the application.

3.1 The application must allow user to search grocery items

3.1.1 Description

A search functionality must be implemented into the application which will allow the user to search for a specific grocery item and then allows the user to add that item to their shopping/grocery list. The user must be allowed to type in the grocery item they are looking for and the search should find the matching item for the user to add to list.

3.1.2 Source

Customer

3.1.3 Constraints

There are chances that the search functionality may not be able to find the item that user is looking for.

3.1.4 Priority

High

3.2 The application must present user with the best grocery item

3.2.1 Description

Based on the item that the user searched for, the application should go and look for the best possible match for that item based on the price of the item and location of the stores that item is available in. The application may list multiple options for the same item depending on the item's price and store's location.

3.2.2 Source

Customer

3.2.3 Constraints

The item searched for may not be available at any nearby store. Have to deal with the legality of web scraping from big stores.

3.2.4 Priority

High

3.3 The application must allow users to create grocery lists

3.3.1 Description

The application must allow users to create shopping lists. The shopping list must store multiple items. The user should be able to add items to their shopping list by searching for the item.

3.3.2 Source

Customer

3.3.3 Constraints

No applicable constraints.

3.3.4 Priority

High

3.4 The application must search for all items in the shopping list

3.4.1 Description

The application must search for all items in the shopping list and return the optimal items, their stores and their prices based on user specified preferences.

3.4.2 Source

Customer

3.4.3 Constraints

No applicable constraints.

3.4.4 Priority

High

3.5 The application must allow users to choose references that define optimal items

3.5.1 Description

The user should be able to choose brand, price, distance, and maximum stores preferences for certain grocery item.

3.5.2 Source

Customer

3.5.3 Constraints

There might be just one option available, not allowing the user to filter their search.

3.5.4 Priority

Moderate

3.6 The application must search for optimal items from more than one store.

3.6.1 Description

When the user does a search on their entire grocery list, the application must search for the optimal results from more than one store.

3.6.2 Source

Customer

3.6.3 Constraints

The search will be limited to stores within a user specified distance.

3.6.4 Priority

Moderate

3.7 The application must provide the optimal route to the user

3.7.1 Description

If the user opts to visit multiple stores to get their groceries then the application should provide the user with an optimal route and the order in which the user should visit those stores. The application must consider multiple factors in deciding the route.

3.7.2 Source

Customer

3.7.3 Constraints

No applicable constraints.

3.7.4 Priority

Moderate

3.8 The application must allow users to view and share recipes

3.8.1 Description

Users should be able to look up recipes in the application. Users must also be allowed to create their own recipes and save them. The recipes will store both the ingredients for that recipe and the procedure to follow. Users must be able to view and share recipes with other users.

3.8.2 Source

Customer

3.8.3 Constraints

There must be a database available with recipes of common dishes.

3.8.4 Priority

Low

3.9 The application must allow users to add all ingredients from a recipe to their shopping list

3.9.1 Description

The application must allow the user to add all the ingredients of a recipe to their shopping list.

3.9.2 Source

Customer

3.9.3 Constraints

No applicable constraints.

3.9.4 Priority

Low

3.10 The application must allow users to keep a list of favorite grocery items

3.10.1 Description

The application must allow users to add and remove a grocery items to a favorites list. This will allow users to quickly add certain grocery items to their shopping list.

3.10.2 Source

Customer

3.10.3 Constraints

No applicable constraints.

3.10.4 Priority

Low

3.11 There must be Android and iOS Applications

3.11.1 Description

The prototype version, though accessible on Android and iOS devices, will only be accessible through the browser. Having applications for each type of mobile device is the highest priority of all future requirements. Having these applications will allow users to more easily access the application while creating a more efficient User Interface for mobile devices. The mobile applications should function exactly the same way on both mobile operating systems while looking as close to the same as possible, all of which should be the same as the web application.

3.11.2 Source

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3.11.3 Constraints

The application will have to be developed for each operating system at the same time to ensure they perform and look the same. After completion of the mobile applications, they should be made available on both the Apple App Store and Google Play Store. If any updates occur to the system, the team will have to ensure that they work and are pushed to the web, Android, and iOS applications at the same time.

3.11.4 Priority

Future

3.12 The application must generate revenue

3.12.1 Description

This application has a lot of potential to generate revenue. The two main ways this can be done would be through data collection or membership access. Data collection could be useful to companies that want to track what certain demographics are shopping for, which zip codes people are shopping in, or how far people are will to drive for certain stores, etc. Memberships could allow for partnerships with other companies. This could allow certain people or companies to release cookbooks in the application,

dietitians to create personalized meal plans for users, or allow stores to offer exclusive deals all of which would only be accessible to members.

3.12.2 Source

Customer

3.12.3 Constraints

The stakeholders must come to an agreement on how the application will generate revenue. If data collection is decided upon, the development team must ensure that all laws and regulations are followed and allow users to opt out of collection. If membership is chosen, the stakeholders must find partners that could make a membership worth the user's money.

3.12.4 Priority

Future

3.13 The application must allow users to rate recipes

3.13.1 Description

Users will have the ability to rate recipes. The rating system will be a standard five-star system. This rating system will allow users to make the best choice when looking at similar recipes.

3.13.2 Source

UTA STeam

3.13.3 Constraints

The development team will have to find a way to prevent users from spamming recipes with five-star ratings to boost traffic to a recipe. There will also need to be a way to prevent users from spamming a recipe with bad reviews for illegitimate reasons.

3.13.4 Priority

Future

3.14 The application must allow users to review recipes

3.14.1 Description

The review system will allow user to give any general comments about the recipe. This will also allow users to share their critiques, helpful tips, and recommendations.

3.14.2 Source

UTA STeam

3.14.3 Constraints

There will have to be a way to regulate these comments to ensure that nothing offensive is said in the reviews. There should also be a way to ensure that these reviews are only relevant to the recipe.

3.14.4 Priority

Future

3.15 The application must allow users to report recipes

3.15.1 Description

The recipe reporting system will allow users to report recipes. Once they are reported, someone within the team should be tasked with screening these reports to ensure their legitimacy. This reporting system will help the team ensure that shared recipes are in fact recipes, that recipes do not contain or create anything harmful or illegal, while also regulating any vulgar or offensive language that might appear in the recipes.

3.15.2 Source

UTA STeam

3.15.3 Constraints

The team will have to regulate reporting to ensure that they are legitimate.

3.15.4 Priority

Future

3.16 The application will have an enhanced search algorithm

3.16.1 Description

The algorithm for the prototype version of this application will provide the most optimal grocery item based only on price and location. In the future, customers will be able to choose the criteria that chooses the optimal grocery item. This will allow users to give their own priority to brand, price, or location. The user will give a list of weights to each priority and the algorithm will prioritize based on those weights to give the optimal locations, items, and path.

3.16.2 Source

Customer

3.16.3 Constraints

The team will have to create an algorithm that is able to change based on user preference.

3.16.4 Priority

Future

4 Packaging Requirements

One of the goals is to make this application easily accessible to all users. With this in mind, the application will be presented via a web browser. This will eliminate the need for instillation files or hardware and access to certain application stores.

4.1 Web Accessible

4.1.1 Description

This product will be a web application and will be accessible to all users via web browsers on smartphones, tablets, PC, and Mac at a URL that will be specified at a later date.

4.1.2 Source

Customer

4.1.3 Constraints

An internet connection will be required.

4.1.4 Priority

Critical

5 Performance Requirements

The following is a list of requirements regarding performance for the application. For the most part, these requirements are particular for load and query time. The list is not all inclusive, but covers the main features for the application regarding menus and data flows.

5.1 Grocery or Recipe Search Action

5.1.1 Description

The amount of time to perform a recipe or grocery search and print out the results to the user.

5.1.2 Source

UTA STeam

5.1.3 Constraints

Once a query is submitted, it can take no longer than four seconds. While the down time on the client can vary, on an average device in a cellular network it should take no more than two seconds, totalling at six seconds to complete. In practice, caching will be an issue so it will not be uncommon for queries to take longer, but the average should be no less than six seconds.

5.1.4 Priority

Low

5.2 Time to Load A Menu

5.2.1 Description

The amount of time required to load any menu, not including time required to load the contents of any query tables.

5.2.2 Source

UTA STeam

5.2.3 Constraints

This action should average no more than 2 seconds and should exceed 5 seconds no more than 5% of the time.

5.2.4 Priority

Low

5.3 Add Item to List Action

5.3.1 Description

The amount of time required to add an item to a shopping list.

5.3.2 Source

UTA STeam

5.3.3 Constraints

This action should average no more than 500 milliseconds.

5.3.4 Priority

Low

5.4 Compile Shopping Plan Action

5.4.1 Description

The amount of time required to take a shopping list and choose stores and a travel route for the user.

5.4.2 Source

UTA STeam

5.4.3 Constraints

This action should average no more than twenty seconds for lists containing twenty items or less.

5.4.4 Priority

Moderate

5.5 Load Meal Plan Action

5.5.1 Description

The amount of time required to import a meal plan into the current shopping list.

5.5.2 Source

UTA STeam

5.5.3 Constraints

This action should average no more than 500 milliseconds.

5.5.4 Priority

Moderate

6 Safety Requirements

Due to the nature of this project, the team will only be working on software and will not need access to any labs. The team does conduct weekly meetings in the university's group study rooms and the specific policy is listed below.

6.1 University Group Study Room Policy

6.1.1 Description

All group study room users must conform to the University's policies for personal conduct: Visitor Conduct Policy. Damage to equipment in the rooms will result in the loss of the ability to reserve and/or occupy any of these rooms. Noise levels from any conversations and/or equipment must not disturb others. All group study room users are expected to be courteous and leave the room ready for the next group. Unattended personal property may not be used to "hold" a room by any individual or group and may be removed by Libraries' staff to allow others to use the space. Staff reserves the right to enter any group study room at any time. Any obstruction to the windows is prohibited. The University and its staff are not responsible for unattended, lost, stolen, or damaged personal items. [1]

6.1.2 Source

University of Texas - Arlington Group Study Room Policy

6.1.3 Constraints

Current UTA students, faculty, and staff may reserve group study rooms with a valid UTA NetID (reserve now). A person may reserve a study room in 30-minute increments up to a maximum of 3 hours per individual per day. Reservations can be made up to 14 days in advance.

6.1.4 Priority

Critical

7 Maintenance & Support Requirements

For maintenance on this project, the team at present has no expectation for continuing support on this project after its completion. The following are a list of deliverables and notes for the support team, which the customer may choose to appoint at a later date.

7.1 Source Code Documentation

7.1.1 Description

The documentation within and possibly extracted from the source code, which will define how each class and public method behaves.

7.1.2 Source

UTA STeam

7.1.3 Constraints

Can only be implemented as time allows for this project and given the development process.

7.1.4 Priority

Low

7.2 Heroku Maintenance

7.2.1 Description

For the application to remain active and usable, Heroku must remain running.

7.2.2 Source

UTA STeam

7.2.3 Constraints

If no activity is performed on the website or on the Heroku Interface, it will be deleted by the system.

7.2.4 Priority

Low

8 Other Requirements

8.1 Programming Language

8.1.1 Description

The application will be created using a PERN stack. That is, PostgreSQL for the database, Express, React.js for the front-end, and Node.js for the back-end.

8.1.2 Source

UTA STeam

8.1.3 Constraints

All team members must become familiar with these languages

8.1.4 Priority

High

8.2 Cloud Database

8.2.1 Description

The project will use Heroku to store the entire database.

8.2.2 Source

UTA STeam

8.2.3 Constraints

N/A

8.2.4 Priority

High

8.3 Registering an account

8.3.1 Description

The application should be able to register a new user. The application will provide a form based interface for the user to enter credentials.

8.3.2 Source

UTA STeam

8.3.3 Constraints

N/A

8.3.4 Priority

High

8.4 Deleting an account

8.4.1 Description

The application should be able to delete an existing user account. After a successful deletion the user shall be able to register again using the previous credentials.

8.4.2 Source

UTA STeam

8.4.3 Constraints

N/A

8.4.4 Priority

Moderate

8.5 Data collect from a store's website.

8.5.1 Description

The application shall gather information like price of groceries from a store's website.

8.5.2 Source

UTA STeam

8.5.3 Constraints

Stores must allow the collection of their data.

8.5.4 Priority

Future

8.6 Update grocery data once a week

8.6.1 Description

The application shall use the data to find deals for a period of 1 week. After a week is completed the system shall update the price of groceries.

8.6.2 Source

UTA STeam

8.6.3 Constraints

N/A

8.6.4 Priority

Future

9 Future Items

This section will cover all future requirements for this application. There is currently no plan to complete these requirements for the prototype version that will be completed for the scope of CSE 4316 and CSE 4317.

9.1 There must be Android and iOS Applications

9.1.1 Description

The prototype version, though accessible on Android and iOS devices, will only be accessible through the browser. Having applications for each type of mobile device is the highest priority of all future requirements. Having these applications will allow users to more easily access the application while creating a more efficient User Interface for mobile devices. The mobile applications should function exactly the same way on both mobile operating systems while looking as close to the same as possible, all of which should be the same as the web application.

9.1.2 Source

UTA STeam

9.1.3 Constraints

The application will have to be developed for each operating system at the same time to ensure they perform and look the same. After completion of the mobile applications, they should be made available on both the Apple App Store and Google Play Store. If any updates occur to the system, the team will have to ensure that they work and are pushed to the web, Android, and iOS applications at the same time.

9.1.4 Priority

Future

9.2 The application must generate revenue

9.2.1 Description

This application has a lot of potential to generate revenue. The two main ways this can be done would be through data collection or membership access. Data collection could be useful to companies that want to track what certain demographics are shopping for, which zip codes people are shopping in, or how far people are will to drive for certain stores, etc. Memberships could allow for partnerships with other companies. This could allow certain people or companies to release cookbooks in the application, dietitians to create personalized meal plans for users, or allow stores to offer exclusive deals all of which would only be accessible to members.

9.2.2 Source

Customer

9.2.3 Constraints

The stakeholders must come to an agreement on how the application will generate revenue. If data collection is decided upon, the development team must ensure that all laws and regulations are followed and allow users to opt out of collection. If membership is chosen, the stakeholders must find partners that could make a membership worth the user's money.

9.2.4 Priority

Future

9.3 The application must allow users to rate recipes

9.3.1 Description

Users will have the ability to rate recipes. The rating system will be a standard five-star system. This rating system will allow users to make the best choice when looking at similar recipes.

9.3.2 Source

UTA STeam

9.3.3 Constraints

The development team will have to find a way to prevent users from spamming recipes with five-star ratings to boost traffic to a recipe. There will also need to be a way to prevent users from spamming a recipe with bad reviews for illegitimate reasons.

9.3.4 Priority

Future

9.4 The application must allow users to review recipes

9.4.1 Description

The review system will allow user to give any general comments about the recipe. This will also allow users to share their critiques, helpful tips, and recommendations.

9.4.2 Source

UTA STeam

9.4.3 Constraints

There will have to be a way to regulate these comments to ensure that nothing offensive is said in the reviews. There should also be a way to ensure that these reviews are only relevant to the recipe.

9.4.4 Priority

Future

9.5 The application must allow users to report recipes

9.5.1 Description

The recipe reporting system will allow users to report recipes. Once they are reported, someone within the team should be tasked with screening these reports to ensure their legitimacy. This reporting system will help the team ensure that shared recipes are in fact recipes, that recipes do not contain or create anything harmful or illegal, while also regulating any vulgar or offensive language that might appear in the recipes.

9.5.2 Source

UTA STeam

9.5.3 Constraints

The team will have to regulate reporting to ensure that they are legitimate.

9.5.4 Priority

Future

9.6 The application will have an enhanced search algorithm

9.6.1 Description

The algorithm for the prototype version of this application will provide the most optimal grocery item based only on price and location. In the future, customers will be able to choose the criteria that chooses the optimal grocery item. This will allow users to give their own priority to brand, price, or location. The user will give a list of weights to each priority and the algorithm will prioritize based on those weights to give the optimal locations, items, and path.

9.6.2 Source

Customer

9.6.3 Constraints

The team will have to create an algorithm that is able to change based on user preference.

9.6.4 Priority

Future

9.7 Data collect from a store's website.

9.7.1 Description

The application shall gather information like price of groceries from a store's website.

9.7.2 Source

UTA STeam

9.7.3 Constraints

Stores must allow the collection of their data.

9.7.4 Priority

Future

9.8 Update grocery data once a week

9.8.1 Description

The application shall use the data to find deals for a period of 1 week. After a week is completed the system shall update the price of groceries.

9.8.2 Source

UTA STeam

9.8.3 Constraints

N/A

9.8.4 Priority

Future

REFERENCES

[1] Group study room policy.