

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

**SYSTEM REQUIREMENTS SPECIFICATION  
CSE 4316: SENIOR DESIGN I  
FALL 2021**



**UTA STEAM  
GROCO**

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## REVISION HISTORY

Revision	Date	Author(s)	Description
0.1	10.07.2021	PF	document creation
0.2	10.15.2021	PF, HT, AH, KK, UD	first draft
0.3	10.12.2015	PF, HT, AH, KK, UD	second draft
1.0	10.20.2015	PF, HT, AH, KK, UD	version 1 official release

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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 user's 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.

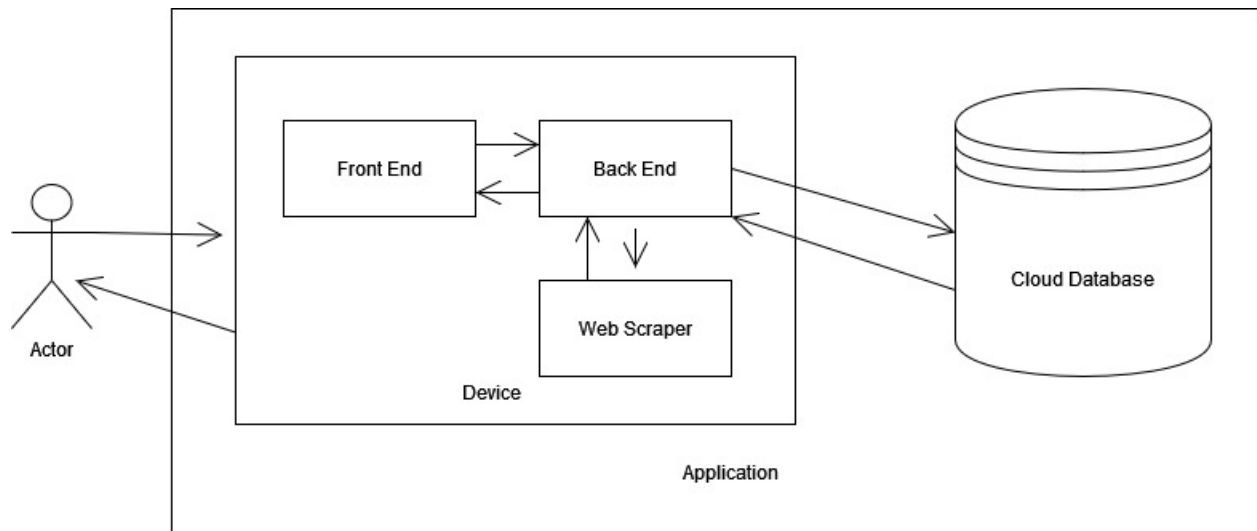


Figure 1: High level overview of the system

## 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 click on the map link to navigate to stores.

The product provides the optimal suggestion based on the database and is not responsible for the accuracy or changes regarding prices 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 GPS satellite.

### 2.2 EXTERNAL INPUTS & OUTPUTS

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

Data	Description and use	In/Out
UserID	Unique username to identify user	In
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

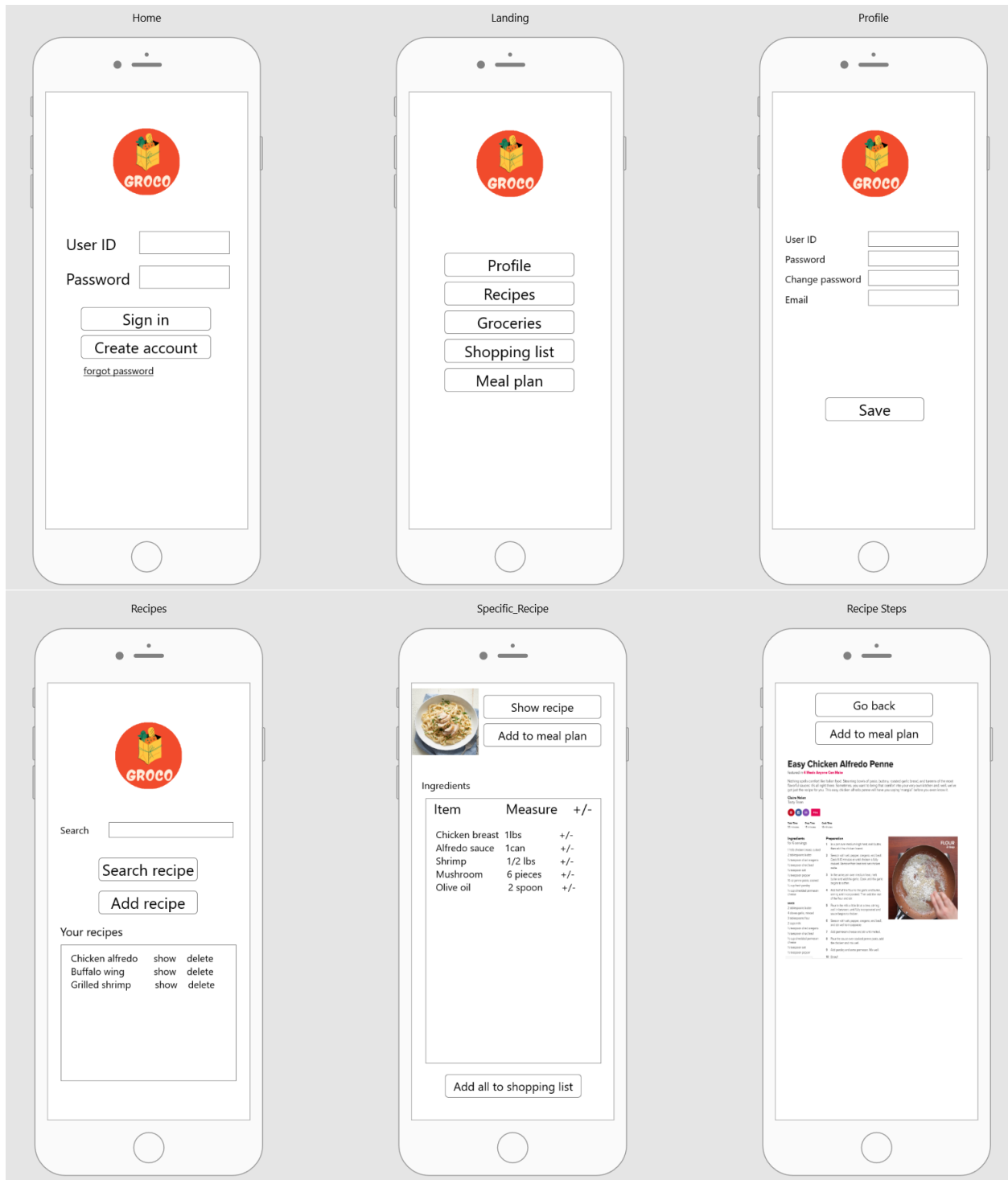




Figure 3: End-user product interface

### **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 CHOOSE REFERENCES THAT DEFINE OPTIMAL ITEMS**

##### **3.3.1 DESCRIPTION**

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

##### **3.3.2 SOURCE**

Customer

### **3.3.3 CONSTRAINTS**

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

### **3.3.4 PRIORITY**

Moderate

## **3.4 THE APPLICATION MUST ALLOW USERS TO CREATE GROCERY LISTS**

### **3.4.1 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.

### **3.4.2 SOURCE**

Customer

### **3.4.3 CONSTRAINTS**

No applicable constraints.

### **3.4.4 PRIORITY**

High

## **3.5 THE APPLICATION MUST SEARCH FOR ALL ITEMS IN THE SHOPPING LIST**

### **3.5.1 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.

### **3.5.2 SOURCE**

Customer

### **3.5.3 CONSTRAINTS**

No applicable constraints.

### **3.5.4 PRIORITY**

High

## **3.6 THE APPLICATION 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 MOST 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**

UTA STeam

### **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 installation 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 dataflows.

### **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, discluding 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 AMAZON WEB SERVICES MAINTENANCE**

#### **7.2.1 DESCRIPTION**

For the application to remain active and usable, Amazon Web Services (AWS) payments must be maintained and monitored for cloud features.

#### **7.2.2 SOURCE**

UTA STeam

#### **7.2.3 CONSTRAINTS**

Must be continually paid depending on user traffic and application overhead.

#### **7.2.4 PRIORITY**

Low



## **8 OTHER REQUIREMENTS**

### **8.1 PROGRAMMING LANGUAGE**

#### **8.1.1 DESCRIPTION**

The project code will be written in react native.

#### **8.1.2 SOURCE**

UTA STeam

#### **8.1.3 CONSTRAINTS**

N/A

#### **8.1.4 PRIORITY**

High

### **8.2 CLOUD DATABASE**

#### **8.2.1 DESCRIPTION**

The project will use AWS EC2 to store user data, grocery list, etc.

#### **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**

High

### **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**

Moderate

## **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

## REFERENCES

- [1] Group study room policy.