

**MakanForFree**  
SAVE FOOD, SAVE THE WORLD

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# WRITTEN REPORT

MakanForFree (9-07)

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# 1. Introduction

## 1.1 Description of Idea

MakanForFree is an app that allows buffet organisers to inform the student population of completed buffets, so as to allow them to finish a leftover buffet after it has ended, for no charge. Using MakanForFree, event organisers will neither worry about food wastage nor food over-ordering as many participants will willingly prevent any wastage by eating leftover food. All that is required of an organiser is to, when the buffet ends, send out a request for teachers and students in the school, allowing them to head to the buffet venue and finish the leftover food.

## 1.2 Rationale of Project

Currently, it is known that many buffets held in Hwa Chong Institution (HCI) go to waste as event organisers tend to order slightly more than they need in order to prevent a situation in which there is a lack of food for event participants. However, as a result, many buffets have leftovers which end up being thrown away after the food expires. Furthermore, many students sometimes hang around the buffet venue while the buffet is still undergoing in order to partake in the food later, disturbing participants of the buffet.

## 1.3 Focus and Significance of Project

MakanForFree aims to reduce the amount of food waste produced by HCI. Although there are alternative options which will be mentioned in **Section (2.1)**, MakanForFree is fully tailored for our target audience and fully solves all the issues associated with the other systems by creating a more efficient and convenient system to replace them.

## 1.4 Scope of Project

MakanForFree will benefit all of the students and teachers in HCI's High School, Junior College, and International School sections. They, the target audience, will be provided with free finger food or even meals. It also helps event organising teams by allowing them to inconveniently reduce the amount of food waste generated by the meals prepared for their event attendees. Flutter, a toolkit for making native apps, and Firebase, a powerful backend, are used hand-in-hand to code the app, allowing our app to be fully supported on both iOS and Android.

## 2. Literature Review

### 2.1 Case Studies

MakanForFree protects the environment by reducing food waste. In a study conducted by Michael von Massow et. al (“Valuing the Multiple Impacts of Household Food Waste”), weekly avoidable food waste per household in Canada resulted in 23.3 kilograms of carbon dioxide being released into the atmosphere, per household. This stunning environmental impact is only exacerbated by buffets, especially when it is in the best interests of the industry to buy excess food and throw it away. In a study by Emil Juvan, Bettina Grün, and Sara Dolnicar (“Biting Off More Than They Can Chew: Food Waste at Hotel Breakfast Buffets”), it was found that the amount of food left behind per person per day on average was 15.2 g in a buffet restaurant. In a 2009 study conducted by Edgar G. Hertwich and Glen P. Peters (“Carbon Footprint of Nations: A Global, Trade-Linked Analysis”), it was found that food waste accounted for 20 percent of global greenhouse gas emissions. This figure has only worsened steadily since. As shown, food wastage is a real problem, and MakanForFree solves this problem in HCI for buffets, the one event that generates the greatest amount of food waste.

MakanForFree contains the ideas and functions of many preexisting Telegram chat groups - to inform users when a buffet has ended and the food could be cleared. (“Chat groups in local universities help organise hungry hordes to clear buffets on campuses”, 2017) However, such Telegram chat groups tend to have a lot of spam and can be unrelated at times as there is no specialised chat group which reports buffets in a centralised area or in a specific school, such as NTU. Thus, many users end up leaving or muting such chats and miss out on buffets, and the buffets often are not cleared at all, contributing to the food waste problem in Singapore.

### 2.2 References Cited to Support the Issues Raised

*All references to necessary materials were quoted in-line in **Section (2.1)**. Detailed references can be found in **Section (7) Bibliography**.*

### 3. The Study & Methodology

#### 3.1 Ideation, Description of Study

The idea for our project came up when our leader was dining in NTU and realised that there was a buffet that had just ended but was not finished. The unfinished food was then thrown away by the caterers. Our leader raised this incident to his father, who is an employee at SMU. His father mentioned that there were already systems in place such as Telegram group chats at his workplace to invite people to clear up a buffet after it has ended. However, further investigations showed that such systems come with many flaws, as seen in **Section (2.1)**. He also realised that HCI faces a similar problem and discussed this issue with his team members. This app emerged as the best solution.

#### 3.2 Needs Analysis

A survey we conducted, with 106 respondents, showed that 99.1% of respondents found that food waste was a pressing issue, 97.2% felt that buffets waste considerable amounts of food, and 100% felt that a solution should be implemented to solve the problem of food waste. 78.3% of respondents expressed their preference for an application over a website, and 94.3% felt that our project will be useful, with the rest remaining neutral. Survey results and graphs can be found in **Appendix (B)**.

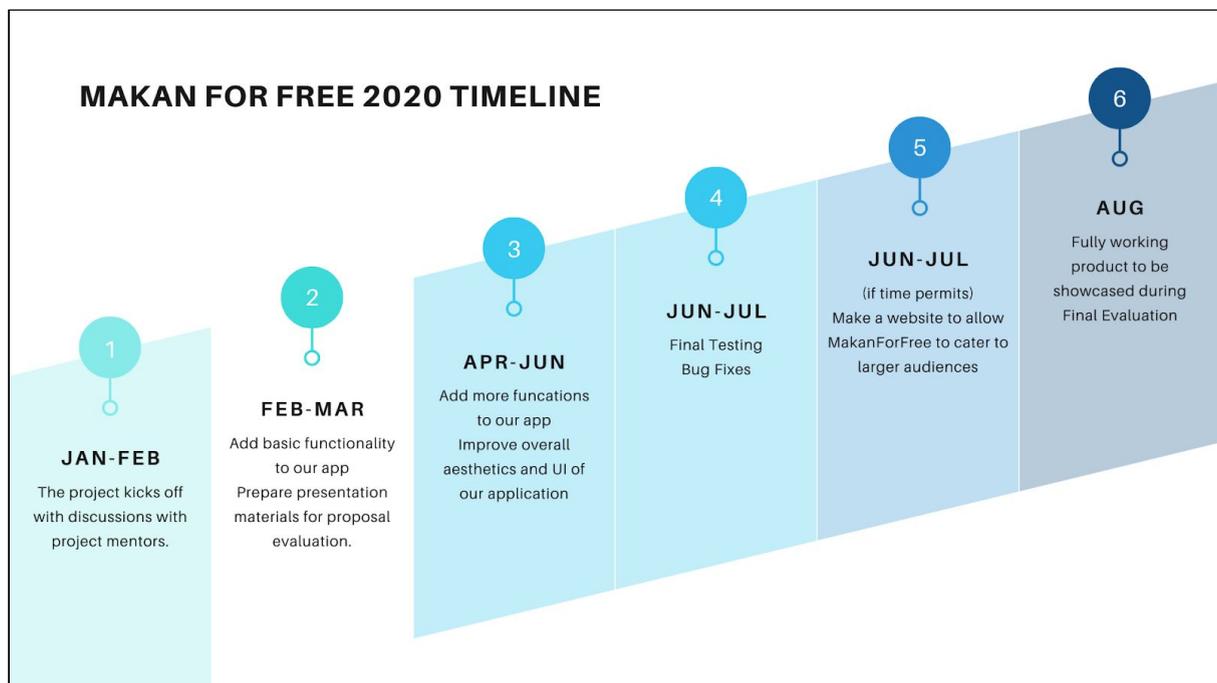
#### 3.3 Development Tools

| <i>Tool</i>                 | <i>Description</i> | <i>Rationale</i>   |
|-----------------------------|--------------------|--|
| Flutter                     | UI Toolkit         | <ul style="list-style-type: none"><li>- Ease of cross-platform development with a unified language (Dart)</li></ul>  |
| Cloud Firestore             | Database           | <ul style="list-style-type: none"><li>- Realtime (the app will be refreshed and users will be notified immediately when the database is updated)</li></ul>   |
| Firebase Authentication SDK | Authentication     | <ul style="list-style-type: none"><li>- Easy implementation of sign in, sign up, and authentication</li><li>- Sign In Methods are aplenty (phone number, email, Google account, Apple ID, etc.)*</li><li>- Works hand in hand with Cloud Firestore to ensure that users who are not signed in cannot read or write content in the database</li></ul> |

### 3.4 Job Distribution

| <i>Member</i>        | <i>Job Description</i>   |
|----------------------|--|
| Neo Hao Jun          | Prototyping, design, and coding<br>Research, slides, and written report                    |
| Justin Tan Cheng Yu  | Research, slides, and written report<br>Needs Analysis                                     |
| Khua Eu Chek Jeric   | Research and slides<br>Prototyping, design suggestions, and bug fixes<br>Code optimisation |
| Poon Wei Yew Gabriel | Case Studies<br>Prototyping, design suggestions and bug fixes<br>Code optimisation         |

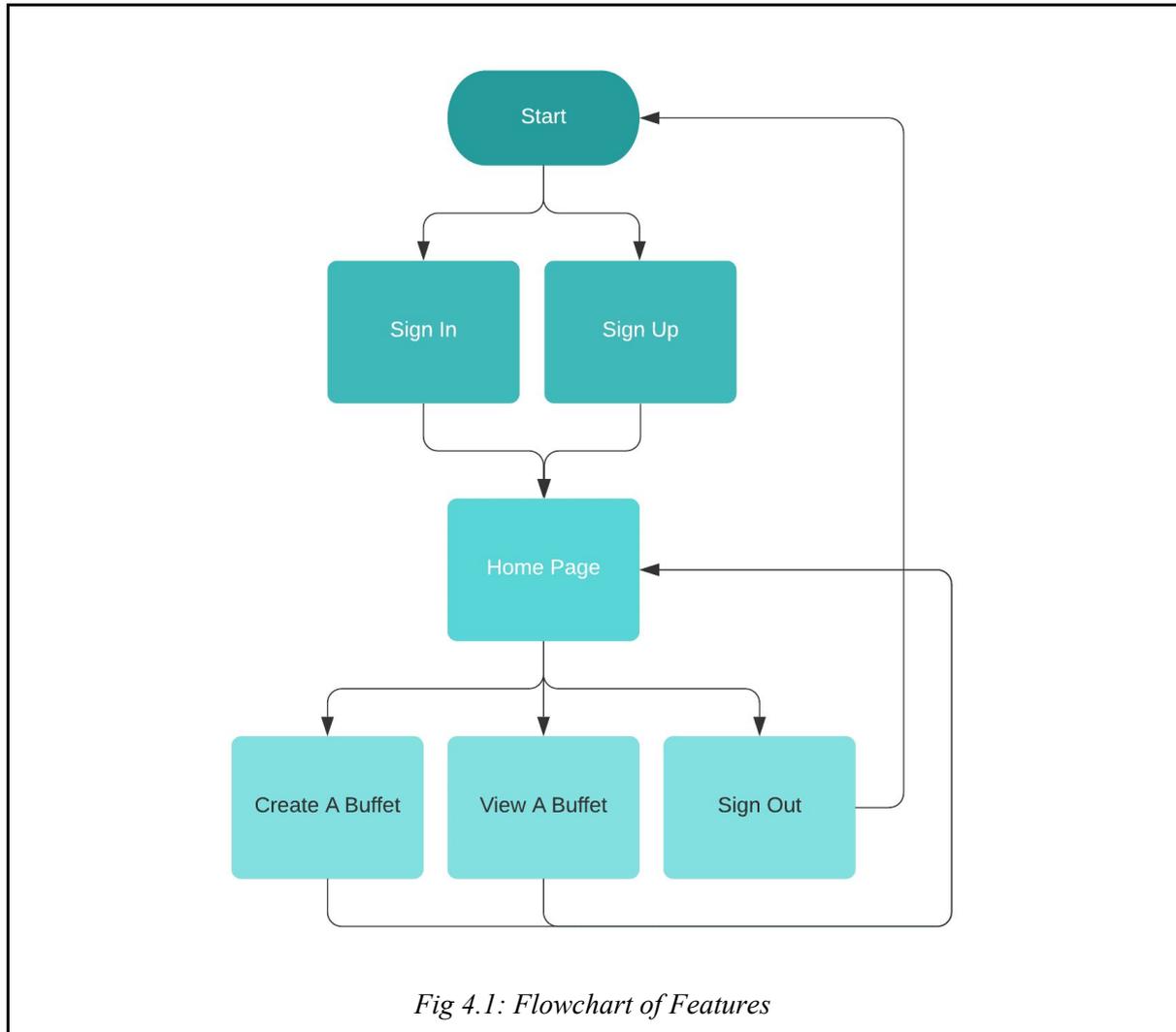
### 3.5 Project Timeline



*Fig 3.1: Project Timeline*

## 4. Outcomes, Analysis, and Discussions

### 4.1 Flowchart of Features



### 4.2 Summary of Features

Currently, the app is able to do the following:

1. Handle Sign In, Sign Up, and Sign Out
2. Allow students or organising team members to post buffets on the app
3. Allow students and teachers to view available buffets sorted in chronological order (with red for archived, green for ongoing, and blue for upcoming)
4. Allow students to delete buffets

*Screenshots of all the aforementioned features can be found in **Appendix (A)**.*

## **5. Implications and Recommendations**

### **5.1 Areas for Improvement and Possible Further Extensions**

We think it is possible to include an option for caterers to add a photo of the buffet. This will make the amount of food left more apparent to users. Additionally, the Buffet Details page is currently quite plain and we believe that a picture of the buffet will help to add some vibrancy to the page.

We also feel that notifications can be implemented, but did not do so due to a lack of funding, the complexity of the implementation, and the risk of the feature introducing unnecessary bugs.

## 6. Conclusion

### 6.1 Reflections & Learning Points

1. **A seemingly simple project might not be that easy to execute.** Our project might seem simple at first sight, but much planning was needed to ensure that we only focused on the main features of the app instead of adding too many features; it may cause confusion and result in a bad user experience.
2. **Planning, time management, and adaptability are extremely important.** The bringing forward of the June Holidays caused us to, instead of spreading the work out into the last few weeks of Term 2 and the June Holidays, finish everything in a month so that our project would not significantly impact our studies in Term 3.
3. **Good communication among team members and with our mentor is crucial too.** During the “Circuit Breaker” period, we were unable to meet up physically to complete our project together, and hence good communication amongst ourselves was extremely important.
4. **Good job distribution helps to speed up efficiency when completing our project.**
5. **Procrastination is detrimental to the progress of our project,** and we should not put off the completion of our project just because of a bug that we are unable to solve.
6. **Small issues may seem fine at first but may snowball into larger ones.** It is better to solve such problems in the early stages instead of only working on them when they cause larger problems.

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# Appendix A

## Sign In, Sign Up Screens

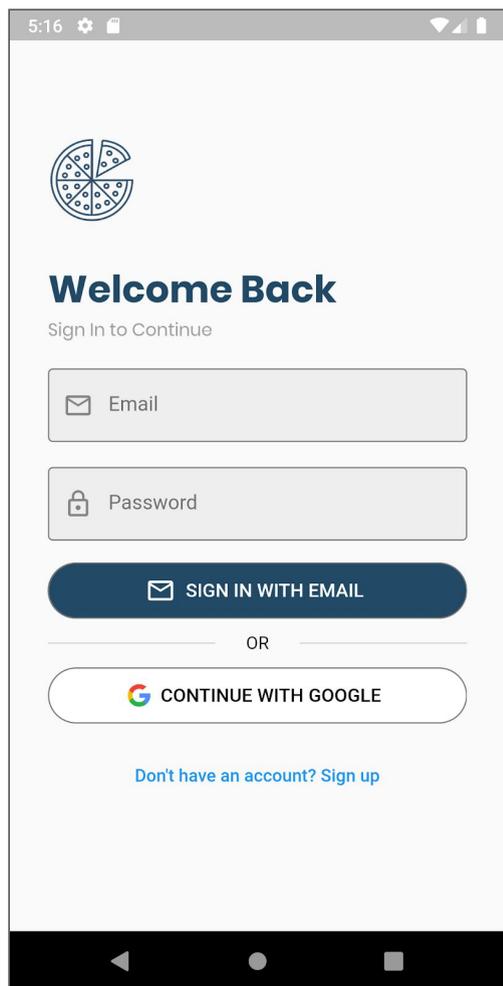


Fig 8.1: Sign In Screen

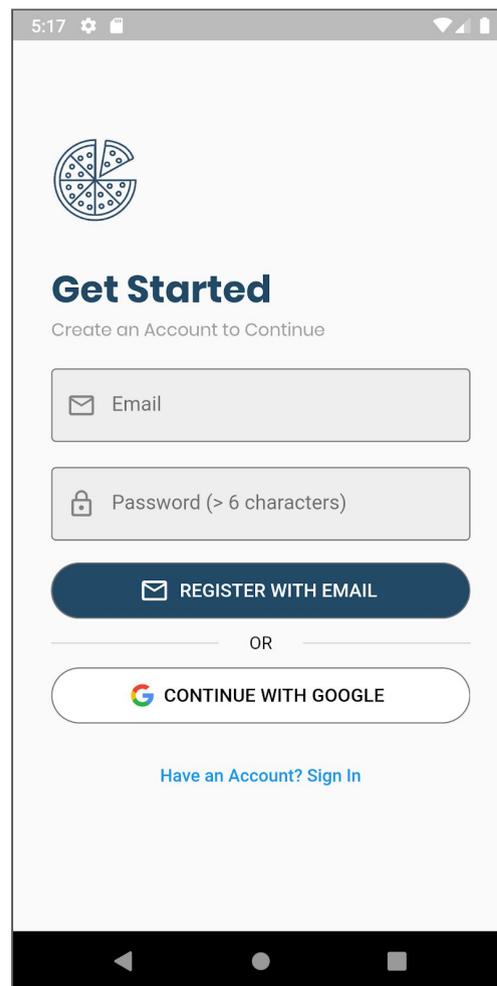
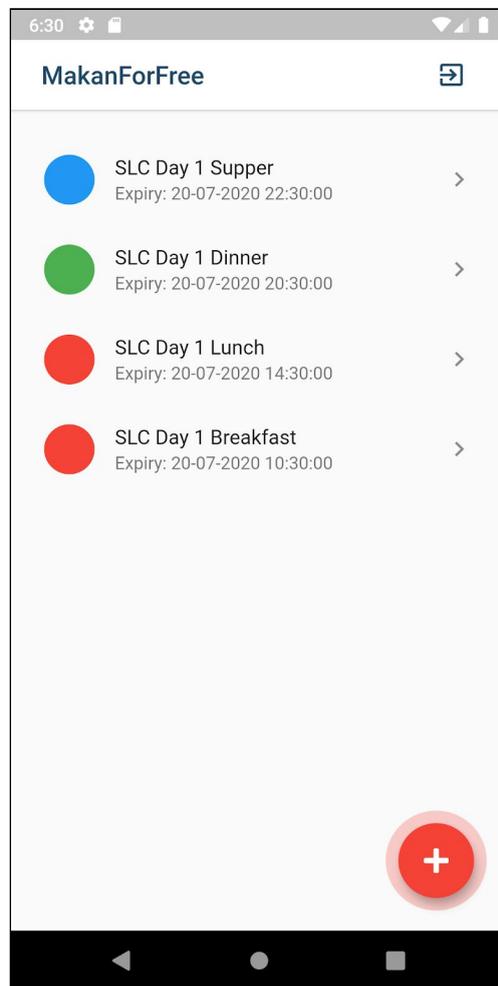


Fig 8.2: Sign Up Screen

## Home Screen



*Fig 8.3: Home Screen*

*\*\*Sorting (Archived, Current, Upcoming) correct as of 20 July 2020, 18:30 GMT +8*

## Create Buffet Screen

5:46

← Add a Buffet

T Buffet Name (e.g. SLC Day 1 Lunch)

Location (e.g. OTH, KKH)

Amount of Food Left ▾

☰ Food Choices Available

📅 Buffet Expiry Date Change

🕒 Buffet Expiry Time Change

Halal

Vegetarian

I have obtained the event organiser's permission

✓ SUBMIT

Fig 8.4: Create Buffet Screen

5:46

← Add a Buffet

T Buffet Name (e.g. SLC Day 1 Lunch)

Location (e.g. OTH, KKH)

Abundant

Reasonable

Not much left

Amount of Food Left ▾

☰ Food Choices Available

📅 Buffet Expiry Date Change

🕒 Buffet Expiry Time Change

Halal

Vegetarian

I have obtained the event organiser's permission

✓ SUBMIT

Fig 8.5: Amount of Food Picker

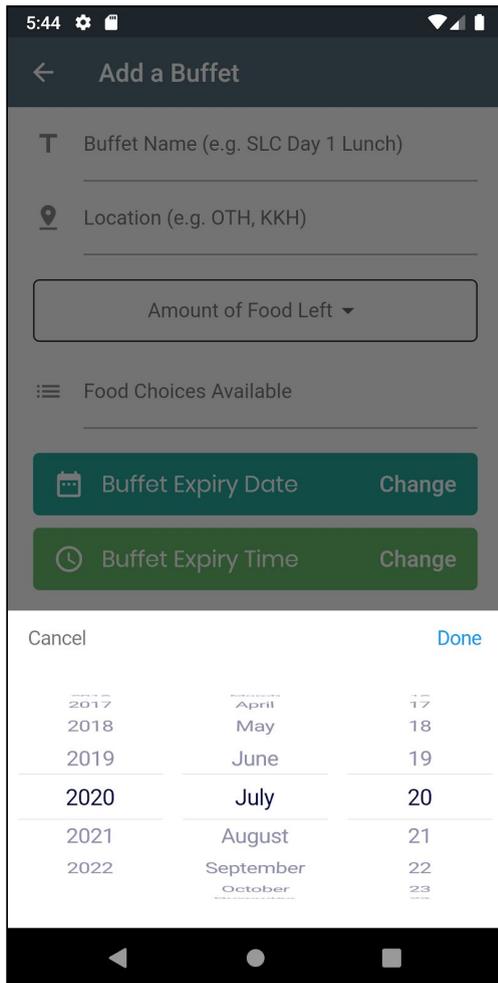


Fig 8.6: Expiry Date/Time Picker

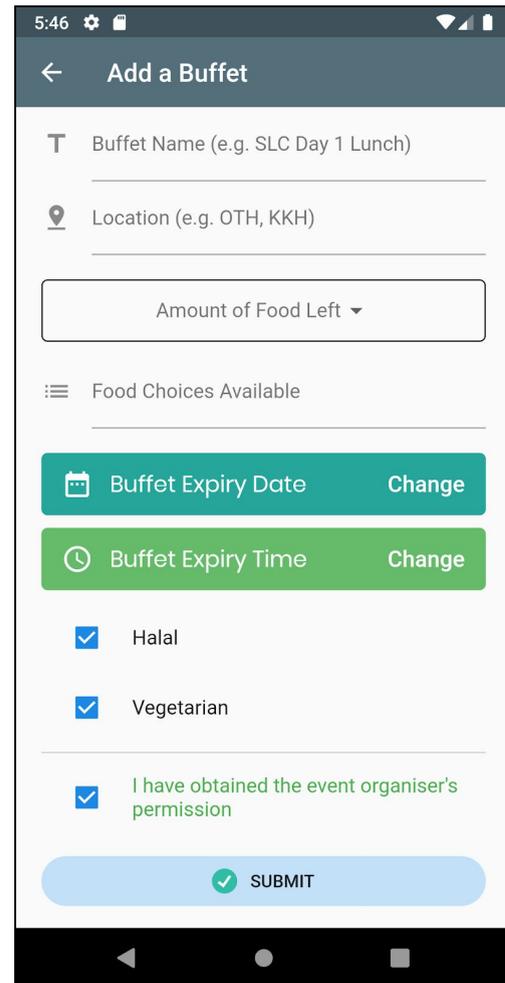
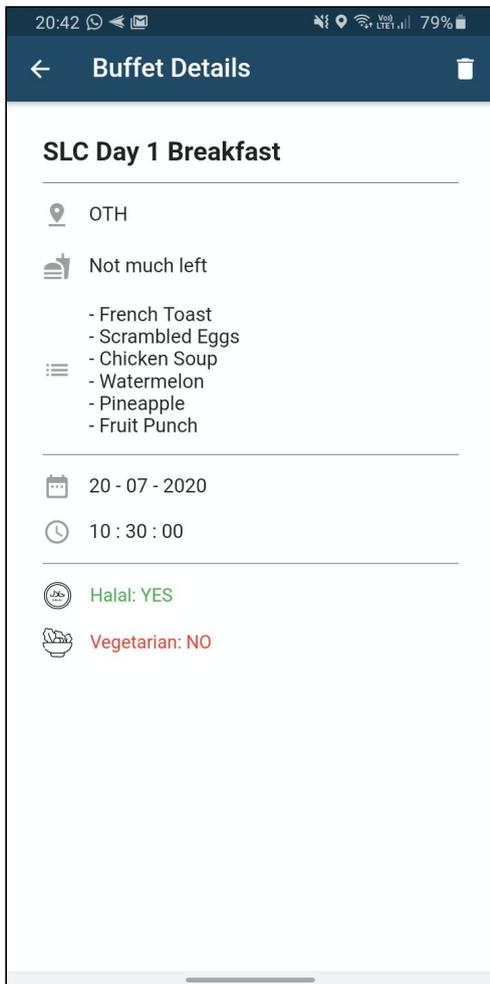
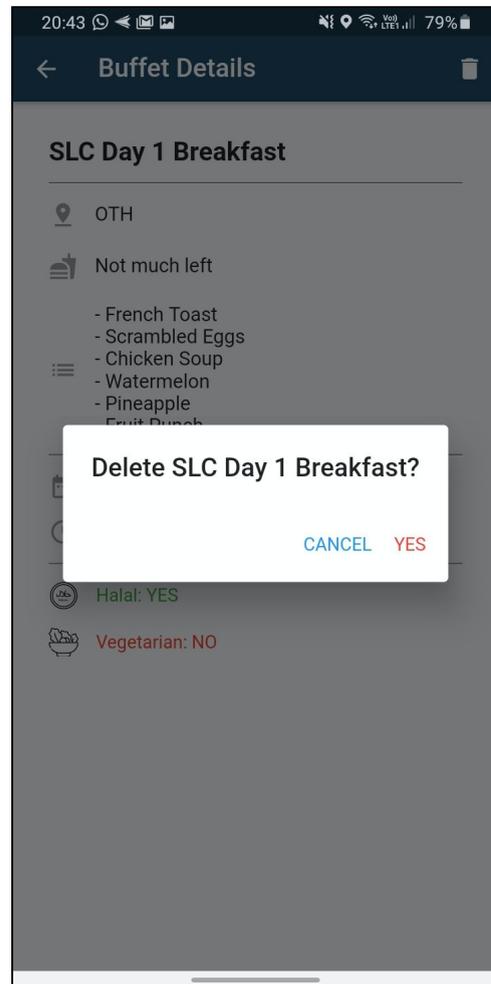


Fig 8.7: Checkboxes (Permission Text turns Green)

## Buffet Details Screen, Delete Buffet Function

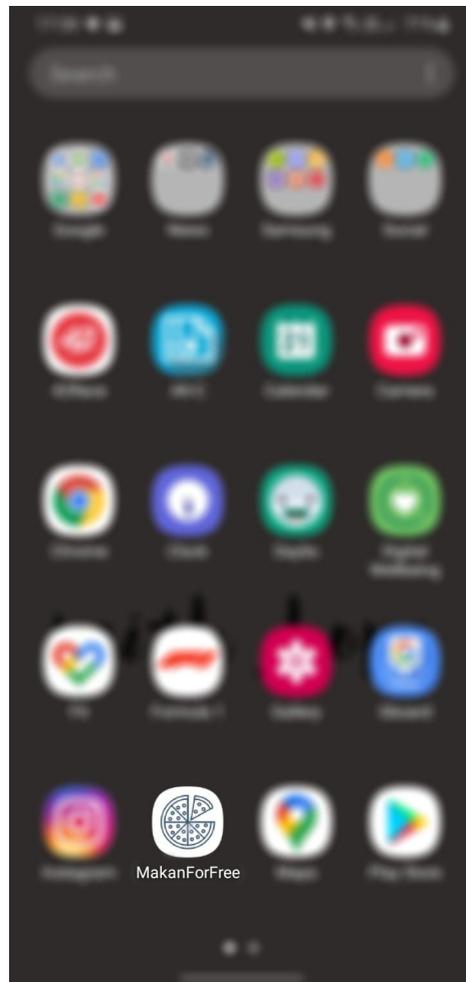


*Fig 8.8: Buffet Details Screen (SLC Day 1 Breakfast) - Halal and Vegetarian Options are coloured accordingly*



*Fig 8.9: Delete Buffet Function*

## App Icon



*Fig 8.11: App Icon as seen on Team Leader's Phone during Debugging*

## Database

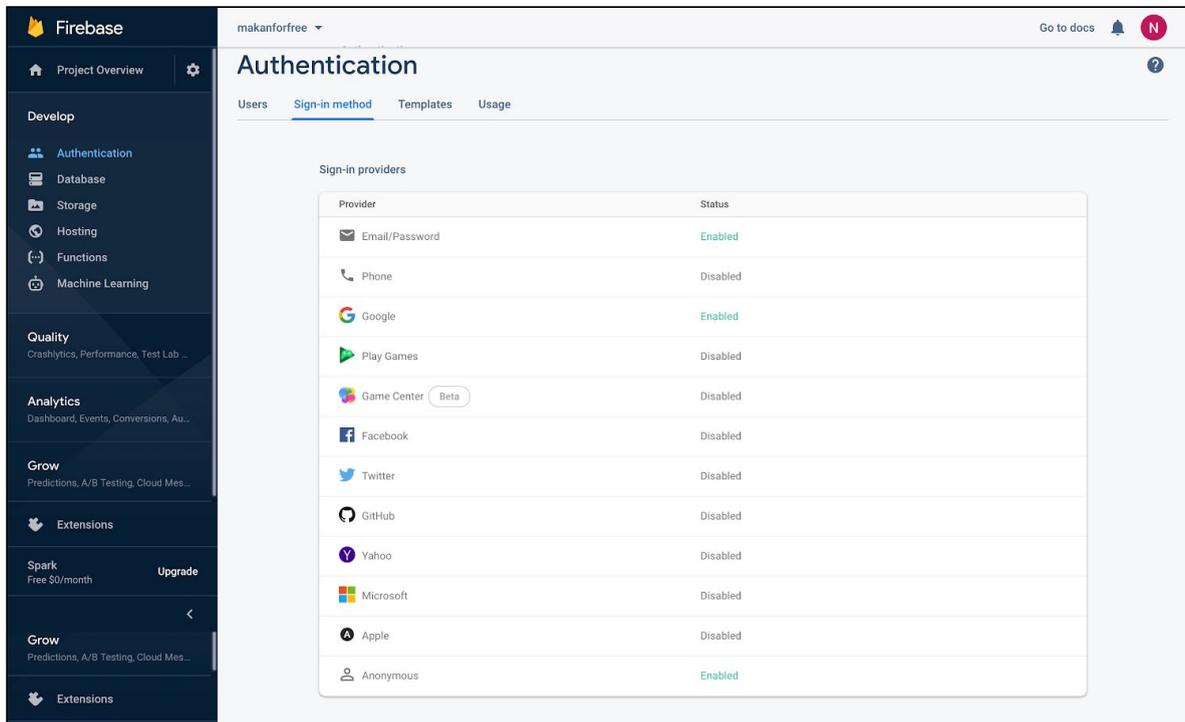


Fig 8.12: Enabled Authentication Methods (Email/Password and Google Account)

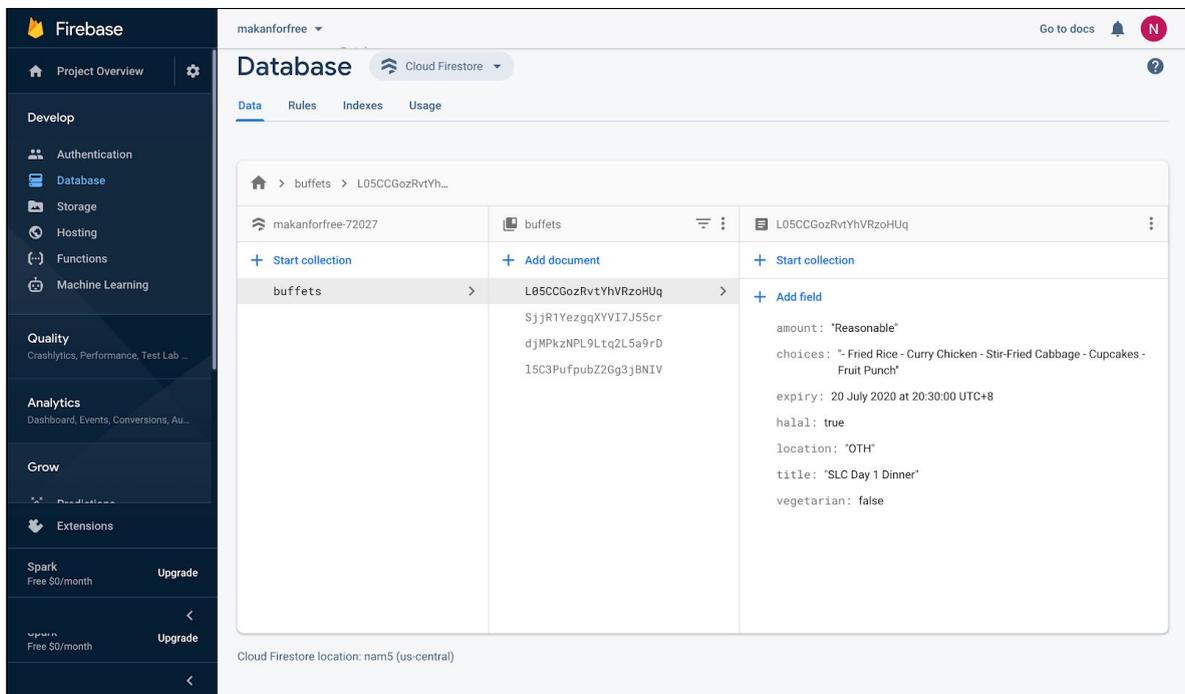
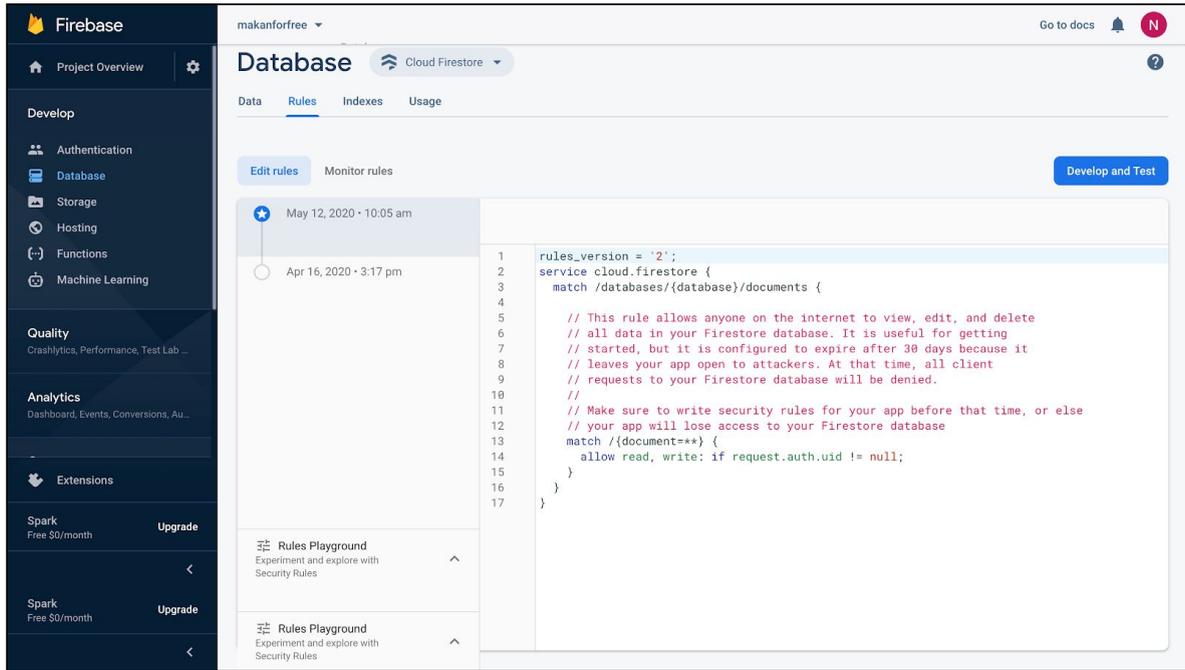


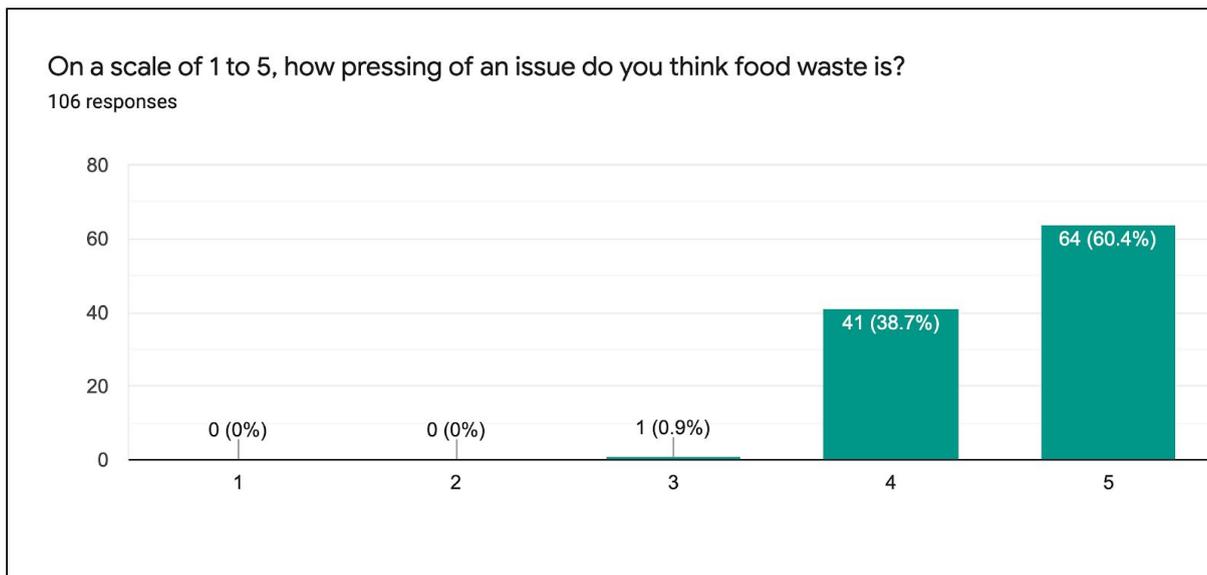
Fig 8.13: Database Documents are Auto-ID(ed) for security purposes, but our code is able to sort the documents based on the DateTime values in chronological order (see Fig 8.3)



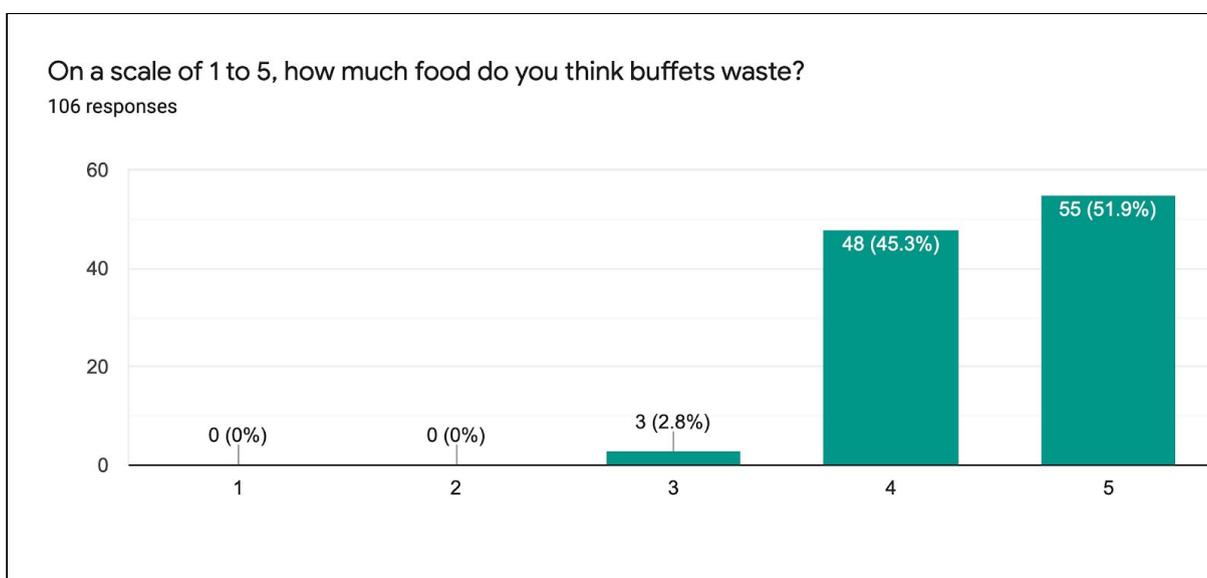
*Fig 8.14: Database Rules are set to “read” and “write” only for users who are logged in for security purposes, to ensure that unauthorised users are not able to “read” or “write” the database*

## Appendix B

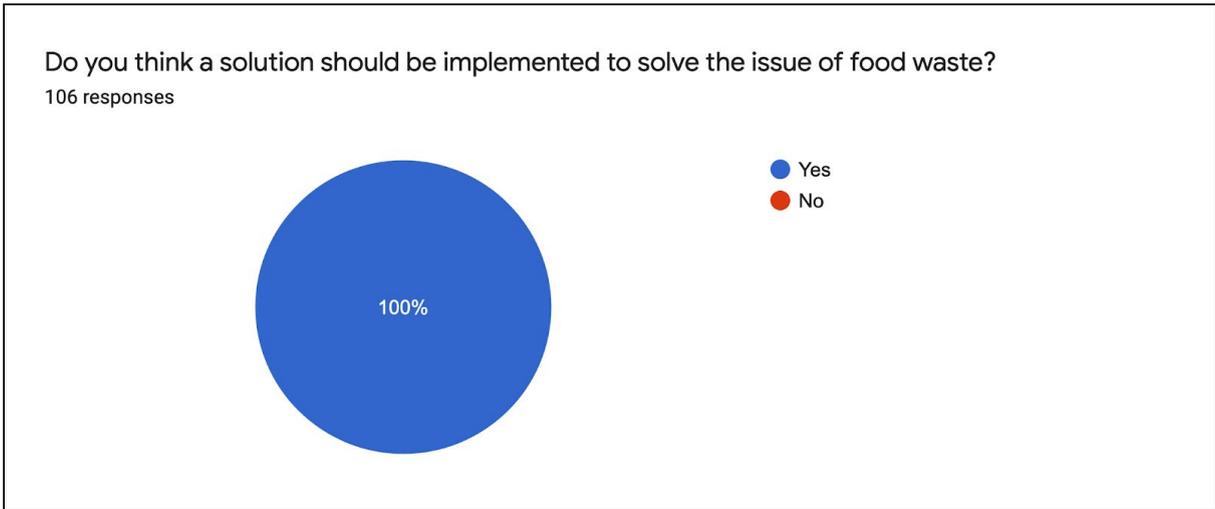
### Survey Results



*Fig 9.1: 99.1% of respondents feel that food waste is a pressing issue*



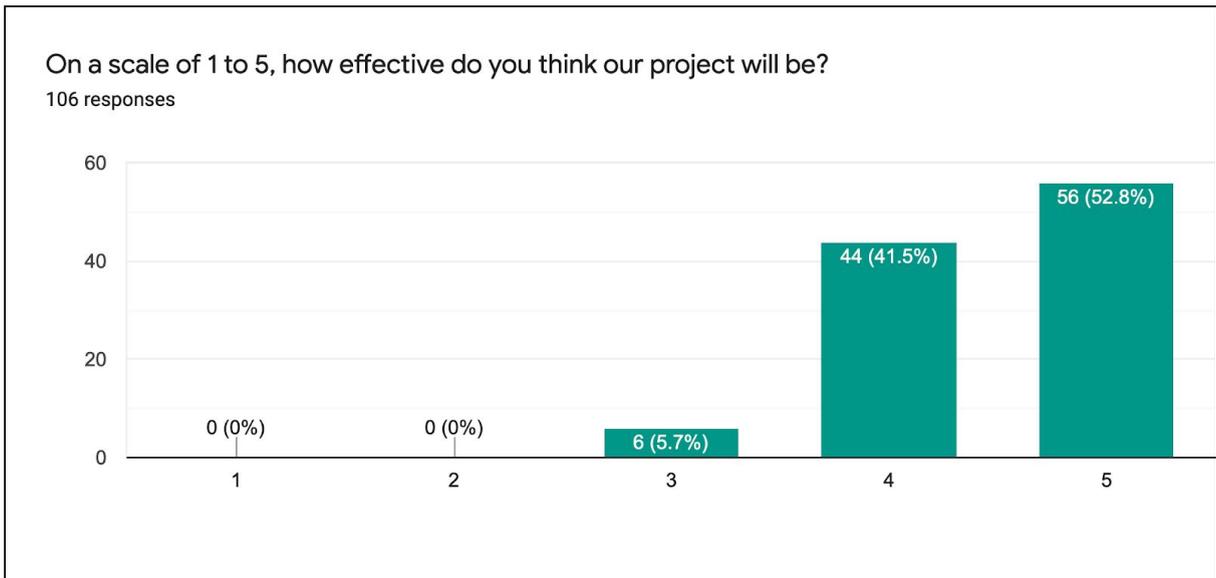
*Fig 9.2: 97.2% of respondents feel that buffets waste considerable amounts of food, with the rest remaining neutral*



*Fig 9.3: 100% of respondents feel that a solution should be implemented to solve the issue of food waste*



*Fig 9.4: 78.3% of respondents expressed their preference for an application over a website*



*Fig 9.5: 94.3% of respondents felt that our project will be useful, with the rest remaining neutral*

Word Count: 1493 words<sup>1</sup>

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<sup>1</sup> Word Count excludes Cover Page, Table of Contents, Labelling of Diagrams/Charts, Section (7) Bibliography, Appendix (A), and Appendix (B)