

Foodie keepers

*Group name: FC Foodie keepers

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***Abstract*—As our society is getting more concerned about inequalities, we are suggesting a way to end bad alimentation. Because of bad financial situation, a lot of people have to skip meals or use cheap junk food. To answer this issue, our project aims on giving cheap but better food to these people. Furthermore, our solution is ecological and avoid the food to go to waste. Our project is an app that links the restaurant's owners with customers with financial issues. Our app will inform its users when a restaurant nearby has food leftovers.**

***Index Terms*—Food, Online service, Application**

I. INTRODUCTION

A. Motivation

The unfinished meals after a grand party or activity, the food that cannot be sold in restaurants and snack stalls every day, or the goods to be eliminated after the supermarket's daily inventory are mainly still edible and intact food, but have to be discarded as garbage.

Accorded to the United Nations, one third of the world's food is discarded, and the main cause of waste is expired or poorly sold goods from large supermarkets all over the world. Discarded food is certainly a loss, but for businesses, it is the choice to maximize benefits to quickly empty inventory and quickly replace foods.

In this world of hyper-consumption, we wanted to give a slight inflection, a small deviation just above the minimum to perhaps participate in a change of our ways of thinking. Let's use this opportunity of premature waste in our nearest shops to introduce a new system of social sharing.

B. Problem statement (client's needs)

We believe that customers need to develop humanized services. Therefore, we decided to develop a software that can reduce food waste and is used in daily life.

Food waste is a major problem worldwide. In the US alone, up to 40 percent of food goes uneaten—meanwhile one in six households didn't have enough money for food last year.

Therefore, to meet the client's requirement and solve the social issue, we figured out our software.

C. Research on any related software

- Olio

Olio is a mobile app for food-sharing, aiming to reduce food waste. It does this by connecting those with surplus food to those who need or wish to consume such food. The food must be edible; it can be raw or cooked, sealed or open.

- Too good to go

Too Good To Go is a mobile application that connects customers to restaurants and stores that have unsold food surplus. The application covers major European cities, and in October 2020, started operations in North America.

- Phenix

One third of what we produce is produced... for nothing. But this isn't an inevitability:at Phenix,we are convinced that all waste can find a second life,as long as we use a bit of imagination

- No food waste

No Food Waste is a movement turned NGO started by Padmanaban Gopalan and his friends Dinesh manickam and Sudhakar Mohan to get rid of the problem of hunger. The team of No Food Waste scouts for marriage halls, institutions and homes that might have excess food.

TABLE I
ROLE ASSIGNMENTS

Role	Name	Task description and etc.
User	Yeol Yang	Assumes which specific services would be popular and needed in the user's point of view. Also searches for the background of the actual services.
Customer	Edouard Maurice	Predicts which requirements could be needed to raise purchasing desire in the customer's point of view. Also when the software development is done, checks if the requirements are sufficient or not.
Software Developer	Daphnée Correia	Draws out a list of software features to satisfy the customer's requirements and works on the actual software development. Tries best to reflect the customer's and user's needs.
Development Manager	Pacôme Manceaux	Totally manages the project schedule and checks the deadline of each role. Helps other roles to communicate with each other smoothly and evaluates the software features.

II. REQUIREMENTS

1) Creating an account

When first opening the application, the user has to fill some information. First, he will have to enter some basic information such as his name, age and email address. Then he will have to choose whether he is in the buyer side or the seller side. Basically, seller side includes restaurant's owners, supermarket/hypermarket 's owners...and buyer side includes people interested in buying the offered products.

On the buyer side, the user will have to fill more information. He will have to give his address and also choose his favorite dishes among given categories. On the buyer side, the app will require the restaurant's address and the type of food served

2) Type of purchase

When opening the app, the buyer will have two choices: meals prepared in restaurant or groceries shopping.

In the first category, the buyer can buy leftover meals prepared in restaurant, coffee shops...at a cheaper price. And in the second one, the buyer will be allowed to buy basic aliments like eggs, milk, yoghurt...with close expiration dates always at a cheaper price.

3) Customer choice

If the buyer chooses the « meals prepared in restaurants » category, different options will be offered to him to help him make his choice. He can choose the restaurant in which he wants to buy food leftovers

regarding the restaurant's location, the type of food he wants to eat or just let the app make suggestions based on the preferences he has filled earlier. To have more accurate suggestions, the buyer can also set price range. Lastly, a kind of surprise choice will also be available for those who want to try something new. With that option, the app will choose a restaurant for the buyer. On the « groceries shopping » category, the user will be allowed to choose by type of product and location of the shop.

4) Payment and pick up

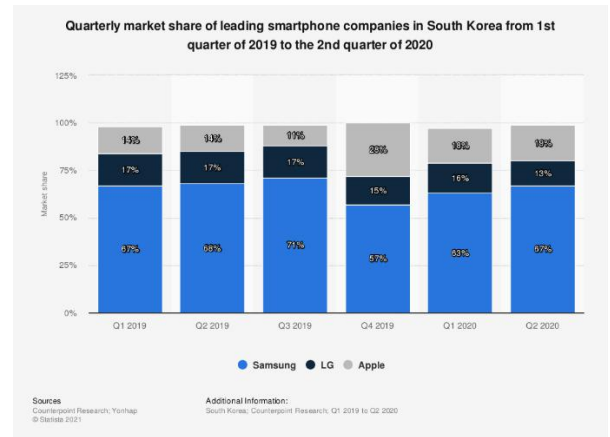
To be as convenient as possible, the app will let the buyer choose whether he wants to do online payment or pay directly by cash at the restaurant, so our app will need to be linked with an online payment device. The app will also include a schedule device to set pick up time. Lastly, two options will be available for the buyer: asking the restaurant to pack the meal, that will be a paying option, or letting the customer bring his own container, which is more sustainable.

III. DEVELOPEMENT ENVIRONMENT

A Choice of software development platform

1) Platform used

The platform we will choose to work on will be a mobile app. Indeed, our project is based on fast services for daily use, so it needs to be usable at any time to be very convenient for the user. As we all carry our smartphone with us at any time of the day, a mobile app is the most appropriate platform for our service to provide fast and easy-to-use services. Plus, this app needs to be cross-platform. Since our service is based on a collaboration between professionals (restaurant owners, supermarket managers...) and individuals, the more users there are, the more diversity there will be and therefore the more attractive our service will be. We will focus on Android and iOS operating systems because the leading smartphones' companies in South Korea are Samsung (Android), LG (Android) and iPhone (iOS), according to this Statista's analysis. But for now, as our programming skills and experience in software engineering are at a development stage, we will only focus on one of the OS previously mentioned, which is Android.



2) Programming language

- C sharp

Concerning the programming language, we will use C#, and more particularly the open-source platform Xamarin. We want to work with C# because all the team members have knowledge and experience on coding with this language. In addition, C# is a very convenient language when it comes to develop mobile applications because it is object oriented, so error detection is simpler, and it has a large community (it is ranked on top 10 most used programming languages among developers), which means that finding support or answers for questions is not as hard as it might be with a lesser language. Finally, this large community also ensure the continued existence and use of the language.

3) Cost estimation

Hardware	Computer x4 (Programming purpose)	4,300,000 (Microsoft Surface Pro 7)
	Mobile Phone (Testing purpose)	895,400 (Samsung Galaxy S21 5G)
		1,106,899 (iPhone 12 Pro)
Software	Back-end server (AWS)	0
	GitHub	0
	Overleaf	0
	Visual Studio	0
	MySQL Workbench	0
Human resources	Designer	4,060,000
	TOTAL	10,362,299

- Why the Microsoft Surface Pro 7:

This laptop is powered by the Intel Core i5-1035G4, which is a 10th Gen processor, and an integrated GPU. There are more powerful GPUs in the market but as we are not developing a video game it doesn't really matter and it should be more than enough. This machine offers 8GB RAM and 128GB SSD-based storage, so compiling android development files and programs will take less time compared to a laptop with HDD-based storage. 8GB RAM is good enough to read data fast. Like most of the laptops made by Microsoft, this one does not support storage or memory expansion, but the development of our mobile application will not need us to have extra storage. It is also provided with Windows 10 OS, which makes things easier when it comes to using Visual Studio. This is a lightweight laptop that comes with a detachable keyboard and trackpad, it is just 1.1 pounds of weight. Though it is a full-fledged laptop, it is as light as a tablet. It means that we can easily develop new apps from coffee shops or other establishments and the laptop can be carried in a pouch.

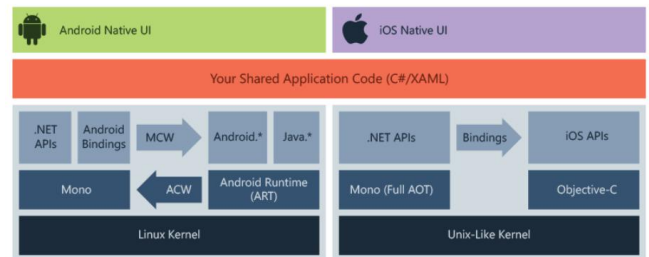
Lastly, the laptop offers a battery life of up to 10.5 hours on a single charge with support for fast charging, which is very convenient as we are used to meet in cafes for team meetings.

- Why the Samsung Galaxy S21 & iPhone 12 Pro:

To make our choice, we just searched for the most frequently bought smartphones in Korea using Android and iOS operating systems. As we plan to make our app available under this two OS, it is important that we can test how our app runs under two different operating systems to make sure that the app can be successfully downloaded, executed, and that it can interact with the supporting back-end content infrastructure.

4) Information of your development environment

Regarding Xamarin platform, it will allow us to reach a lot of our prerequisites. Xamarin will make us able to develop a cross-platform app because it contains reusable code, 90% of which can be recycled for the development of apps on various platforms. Xamarin applications can be written on PC or Mac and compile into native application packages, such as an .apk file on Android, or an .ipa file on iOS. The platform IDE enables such C# coding that the result is a native look and feel of the mobile app. As Xamarin is built on top of .NET, it also automatically handles tasks such as memory allocation, garbage collection and interoperability with underlying platforms.



Explanation on how cross platform development works with Xamarin

- Microsoft Visual Studio



All of this will allow us to save time, be more efficient and offer a comfortable user experience. Since we plan to use Xamarin, we will also need to use Visual Studio as a code editor.

Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft. It is used to develop computer programs, as well as websites, web apps, web services and mobile apps. Visual Studio uses Microsoft software development platforms such as Windows API, Windows Forms, Windows Presentation Foundation, Windows Store and Microsoft Silverlight. The most

basic edition of Visual Studio, the Community edition, is available free of charge. This is the edition we will use for the development of our project.

- AWS (Amazon Web Service)



As our application will require login, registration features, and a place to save data, we will need a back-end server. AWS (Amazon Web Services) can be used for both android and iOS operating systems, so we will use this one as our back-end server.

Amazon web service is an online platform that provides scalable and cost-effective cloud computing solutions. AWS is a broadly adopted cloud platform that offers several on-demand operations like compute power, database storage, content delivery, etc. A feature that separates AWS from other cloud services is its capability to launch and scale mobile, e-commerce, and SaaS applications. API-driven code on AWS can enable developers to build uncompromisingly scalable applications without requiring any OS and other systems.

- Amazon RDS



However, as we will have to manage customers data, transactions, and product catalog, we will also need a database to organize and store the data. Since AWS provides another service called Amazon Relational Database Service (RDS), which allow access to a database engine, we will use this service and choose MySQL as a database. Indeed, AWS supports MySQL as a fully managed database service with RDS, which is available for trial at no cost with the AWS Free Tier for one year.

Amazon Relational Database Service (or Amazon RDS) is a distributed relational database service by Amazon Web Services (AWS). It is a web service running "in the cloud" designed to simplify the setup, operation, and scaling of a relational database for use in applications. Administration processes like patching the database software, backing up databases and enabling point-in-time recovery are managed automatically.

Scaling storage and compute resources can be performed by a single API call to the AWS control plane on-demand.

- MySQL



Concerning MySQL, it is one of the most widely adopted free and open source relational database and serves as the primary relational data store for many popular websites, applications, and commercial products. With more than 20 years of community-backed development and support, MySQL is a reliable, stable, and secure SQL-based database management system. To work with it, we will use SQL (Structured Query Language).

- Github



GitHub is a website for developers and programmers to collaboratively work on code. The primary benefit of GitHub is its version control system, which allows for seamless collaboration without compromising the integrity of the original project.

B Software in use

- Google Maps API

The restaurants proposing meals on our platform will be presented on a map. A user will be able to access the offers in a specific area. Thus, it appears convenient using the Google Map API service to implement this functionality. The Xamarin framework facilitates this task by offering a NuGet package for map management, in addition for being cross-platform (Android and Apple).

- Chayxana

Chayxana is an open project for a mobile restaurant application on GitHub offering similar services to ours based on the Xamarin framework and coded in C#. We are thinking of taking some parts of the code and adapting it to our project.

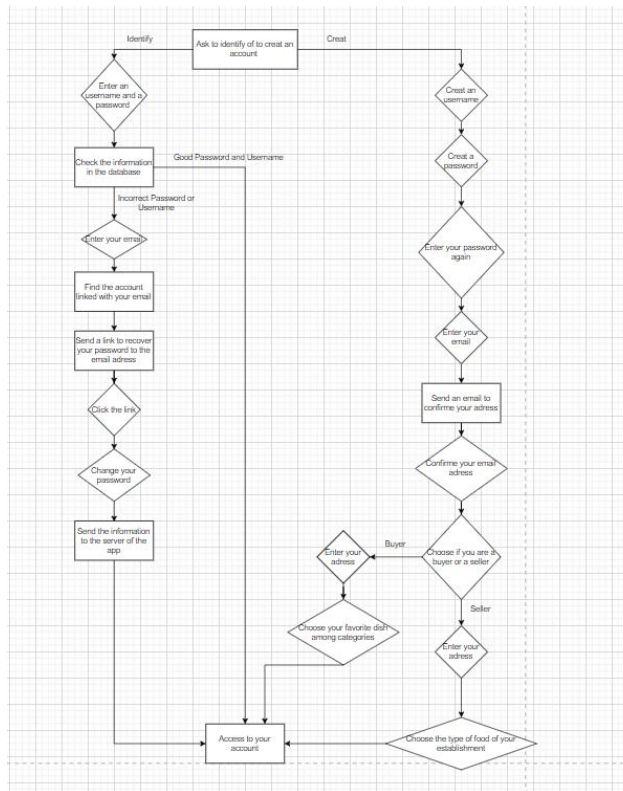
D Task distribution

IV. Specifications

A. Creating and logging to an account

When the user open the app, the first thing he will see will be a choice to either login to an account or sign up. If he choose to sign up, he will have to enter his username and password. The information will be sent to our database to check if this username is link to this password. If not, then it will ask again and if he want to recover his password. If he don't remember the password, then he will have to input his email address. The information will be send to our database, who will send a link to his mail to recover his password.

If the user press the button sign up. Then, he will have to input a username, a password and a mail address. Then two buttons will appear, asking if he is a buyer or a seller of food. If he select buyer, he will have to input his location and select a category of food he prefer. If he chose seller, he will input also a his location, and he will select the categories of food he is selling. All this information will be filled in a class then sent to the database.



B. Selecting the type of purchase

After logging to his account, the app will show to the buyer two buttons. The first one ask if he wants to buy leftovers from restaurants. The second one, suggest to buy basic food like eggs, milk and yogurt with a close expiration date from a supermarket.

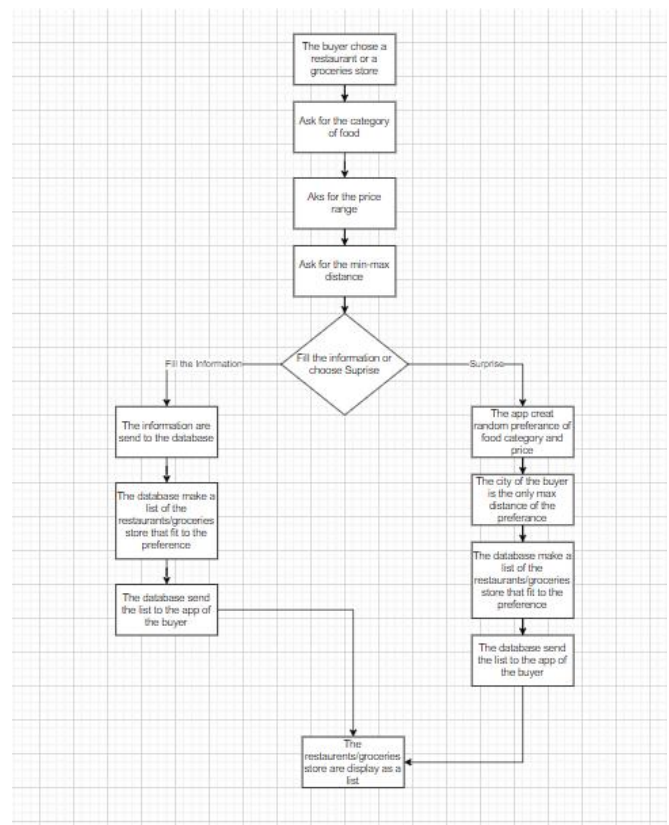
C. Customer Choice

Once the buyer has selected the first button, the one to receive leftovers from restaurants, a page with multiples categories of food, a price range and the max-min distance of the restaurant. At the bottom of the page, there will be two button, one that says "Save", where the buyer save his selection. The

information will be send to a the database. Firstly, to look for restaurants that fits in the buyer preference, but also to save his preference. Once the restaurants have been found, the database will send all there information, and they will appear in a list in the app.

The other will say "No Selection". This means that the app will find randomly a restaurant. For that, the preference like the categories and the price will be chosen randomly by the app, only the address has to be the same city. The random information will be sent to the database, to find multiples restaurants fitting the categories. Then they will appear as a list to the buyer.

If the buyer has selected the other button, the one to receive food from supermarket. Then the process is almost the same as the first button. The buyer can set up a price range, choose a category and a min-max distance from him. The information is also sent to the database to find a list of groceries stores that fits the preference, and save the preference of this buyer. Then, the groceries stores that fits this category are shown as a list in the app.



D. Payment and pickup

Once the buyer has chosen his restaurant or groceries store, the different food available will appear, with their price, as a list. The buyer will just have to click on the name of one food from the list. After, a calendar will appear, where the buyer can set the hour and the day of the delivery within the limits of the restaurant or groceries store. Then a button will appear asking if the buyer want to bring his own container for the food. If he don't, he can just press on a cross on the top-right of

the screen. Finally, two buttons will appear, one asking to pay online, the other to pay directly at the counter.

If the buyer choose to pay at the counter, then the app will send the class that took all the information of his order to the server. Then, the server will send it to the account of the seller. A mail will also be sent to the email address of the seller account.

If he choose otherwise, then he will have to fill his financial information for a payment online. The buyer can choose to either pay by Paypal or by credit card, by pressing some buttons. He will have to fill his financial information. Then the information will be sent to our Payment Gateway. Once the payment is complete, the order is sent to the restaurant or grocery store like in the payment at the counter option. The application will wire transfer the money to the seller.

