

Project Proposal

Meal Recommendation System

COMP9900-9900-M18R-BSoDwarning

Taste Studio



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1, Background

1.1 Problem Overview

Current Meal Recommendation Systems on the market have basic recipe filtering functions and cooking instructions.(Kitchen Stories, 2022) However, for various users, there are more personalized functional requirements. In terms of recipes, there is a trend that people are paying more and more attention to healthy diets. Current websites lack some in-depth diet and fitness functions. And for various preferences, there is a lack related to allergies or contraindicated ingredients. The reason for developing our system is to provide optimization on this basis, and personalized recipes are recommended, so that they can also use our system for their fitness plan.

Most of the current interfaces are complicated, and the main page will display a lot of information according to the current trending, such as new recipes and seasonal dishes.(Allrecipes, 2022) For older or less comprehensible users, it will take extra time to learn to use and search the required recipe.

To improve the Meal Recommendation System, there are several functions added in the updated product. Firstly, the calorie calculation of the dishes is implemented for motivating users to keep healthy. Besides, in order to improve the efficiency of searching recipes, the user needs to add some basic information during the process of registering, including some allergic ingredients or the fitness plan.

1.2 Existing systems and issue

In this part, there are three websites (links in reference) that will be compared and analyzed:

Feature	Kitchenstories	Allrecipes	Xiachufang
Home page	1.Currently recommended or up-to-date recipes, such as some seasonal recommended meals. 2. Search bar 3. The latest uploaded recipes 4. Some highly rated recipes	1.Randomly recommend some popular or recently updated recipes. 2. Current trend about cooking 3. Food news and trends 4. Recommendations for breakfast, dinner and baking recipes	1. Recently updated recipes 2. Current popular recipes & Frequently searched recipes 3. Active recipes creators 4. Some keywords which can be used as tags for recipes
User Page	1. The user can create a cookbook to manage his favorite recipes in folders. 2. The user can upload and share his own recipes. 3. If the user likes some	1.The user can create collections to organize his saved items. 2. The user can upload and share his own recipes. 3. The reviews that the user	1. The user can manage his personal information such as username and email address. 2. The user can upload and share his own recipes. 3. The recipes from other

	<p>articles, he can save and check them in the LIKE area.</p> <p>4. Some basic information including user name, websites, bio and personal data.</p>	<p>has added to the content can be checked.</p> <p>4. The personal information can be managed, such as username and email.</p> <p>5. Some functions related to social media.</p> <p>6. The user can choose to subscribe to various preferences as newsletters.</p>	<p>users can be saved and checked.</p> <p>4. The user can find other users based on social media.</p> <p>5. The user can follow others and view their pages.</p>
Searching function	<p>1. The user can search for the required recipe by typing keywords in the search bar.</p> <p>2. The user can add tags to filter dishes.</p> <p>3. The page displays recipes with images, number of likes, time and provider.</p> <p>4. The recipes can be sorted to display.</p>	<p>1. The user can search for the required recipe by typing keywords in the search bar.</p> <p>2. There are classifiers on the top bar which can be used to search recipes.</p> <p>3. The recipes are displayed with images and ratings.</p>	<p>1. The user can search for the required recipe by typing keywords in the search bar.</p> <p>2. There are classifiers on the side bar and top bar which can be used to search recipes.</p> <p>3. The recipes are displayed with images, ratings, provider and ingredients.</p> <p>4. The recipes can be sorted by rating, number of likes and popularity.</p>
Recipe page	<p>1. In the recipe page, there are images, videos and text as instructions.</p> <p>2. The user can rate and comment on the recipes.</p> <p>3. The user can set servings to check the amount of ingredients.</p> <p>4. There are instructions about utensils and ingredients for users.</p> <p>5. On the bottom of pages, there are tags for the recipes.</p> <p>6. More recommended recipes are provided on the page.</p> <p>7. The user can check the page of the provider.</p>	<p>1. There are images, videos and text as instructions.</p> <p>2. The user can add and check images, ratings and comment on the recipes.</p> <p>3. The tips from the community related to the dish are displayed on the page.</p> <p>4. There are instructions about ingredients for users.</p> <p>5. The user can check the page of the provider.</p> <p>6. There is a basic instruction about nutrients facts.</p>	<p>1. There are images and texts as instructions.</p> <p>2. The user can add comments on the recipes.</p> <p>3. There are instructions about utensils and ingredients for users.</p> <p>4. Other user's notes related to the recipe can be checked.</p> <p>5. On the bottom of the page, there are recommendation related to this recipe.</p> <p>6. The user can check other recipes from this provider.</p>

Some issues and problems can be found by analyzing and comparing the above three websites.

1. The recommended recipes are based on seasonal or recent updates and ratings instead of preference of users. Lack of personalized recommendations.
2. In the process of searching recipes, there are a lot of filters that can be added which makes the pages complicated. To reduce the operational burden on users, processes and designs need to be simplified.
3. There is a lack of design related to healthy diet. For people with fitness plans, calorie calculations should be added to the system.
4. In terms of users with allergies or ingredients contraindications, the system should provide search categories and personalized recommendations.

2, User Stories and Sprints

2.1 Project objectives

- Users are able to deliver their opinion for all the recipes in terms of liking and making the comment.
- The system authorizes users to navigate the recipes that they would like to view based on recipes name and tags.
- Users are able to click the thumbnail to view details of the recipe.
- Users are able to subscribe and unsubscribe the contributor and they can get the new post from the subscribed contributor.
- Users can sort the order of posts by the contributor they subscribe to in order of likes and times.
- The system needs to recommend the user's other recipes similar to the recipe that the user navigated.
- Users are able to have their own profile to view their personal information and recipes published by themselves.
- The system authorizes users to conduct and modify their own recipes with each detailed information.
- Admin users have elevated privileges and they are able to modify the database in terms of recipes and comments.
- Users are asked to register and they can own persistent data to retain their collection, preference, watched history and personalized recipe recommendation.

2.2 User stories

2.2.1 User type

- Explorer (EX) - Users who want to find the recipe and are recommended some potential interesting recipes.
- Contributor (CO) - Users who want to contribute and share their recipe to others.
- Admin (AD) - Users have elevated privileges and are able to modify the database.
- Registered User (RU) - Users who own persistent data and can be authenticated, and users are compulsory to register.

2.2.2 User Stories Table

This table below demonstrates the user stories table which is proposed in this project. The code is a prefix of user type shown above.

Code	User Stories	Acceptance Criteria
EX1	As a recipe explorer, I want to search the recipe through the name and tag so that I can find the recipe in a relevant topic quickly and easily.	<ul style="list-style-type: none">● Users can type the name or tag into the search bar.<ul style="list-style-type: none">○ At most enter 50 characters.● Keyword can match the tag:<ul style="list-style-type: none">○ Ingredient○ Cooking Method○ Meal type○ Description
EX2	As a recipe explorer, I want to see all the relevant details of the recipe so that I can decide if it is worth adopting.	<ul style="list-style-type: none">● Users can view the recipe's detail:<ul style="list-style-type: none">○ Title○ Description/Tips○ Ingredient○ Cooking Method○ Meal type○ Detailed cooking step○ review/comment○ The number of liking○ Cooking time
EX3	As a recipe explorer, I want to filter the recipe based on its category so that I can find the recipe matching my interest quickly.	<ul style="list-style-type: none">● User can choose these tag to filter:<ul style="list-style-type: none">○ Cooking Method○ Ingredient○ Meal type
EX4	As a recipe explorer, I want to be	<ul style="list-style-type: none">● Users will be recommended by their visited

	recommended recipes relevant to those I have navigated so that I can cook new dishes similar to my hobby.	<p>recipes through these features:</p> <ul style="list-style-type: none"> ○ Cooking Method ○ Ingredient ○ Meal type
EX5	As a recipe explorer, I want to bring my opinion to the recipe so that good recipes can be found by other users and bad recipes can be noticed.	<ul style="list-style-type: none"> ● Users can like the recipe. ● Users can withdraw their liking to the recipe. ● Users can comment on the recipe freely and other users can see it. ● Users can delete the comment they posted.
EX6	As a recipe explorer, I want to view the details of the recipe through its thumbnail so that I can find some recipe that looks attractive.	<ul style="list-style-type: none"> ● Users can see the thumbnail of recommended recipes on the mainpage. ● Users can click the thumbnail to view the details of them.
EX7	As a recipe explorer, I want to subscribe to some other users who have posted attractive recipes so that I can follow their new recipe.	<ul style="list-style-type: none"> ● Users can subscribe and unsubscribe the contributor. ● Users can see the new post from their subscribed contributor on the subscription page.
EX8	As a recipe explorer, I want to see the recent or best post on the subscription so that I can see and choose the hot dishes and the new dishes easily.	<ul style="list-style-type: none"> ● Users can choose the different sorted ways on the page of subscription: <ul style="list-style-type: none"> ○ newest ○ most liked
EX9 (novel)	As a recipe explorer, I want to see the calories and whether I can accept the calories in this recipe so that I can have a healthy diet.	<ul style="list-style-type: none"> ● Users can see the approximate calories on the recipe page: <ul style="list-style-type: none"> ○ Each ingredient ○ Total dish ● Users can add the intaken recipe into today's calories (cont.) ● Users can see the warning if they will exceed the threshold of calories when they adopt this recipe.
EX9 (novel)	As a recipe explorer, I want to collect and save the recipe into a place so that I can find some usable recipes easily.	<ul style="list-style-type: none"> ● Users can save their favorite recipes into their profile ● Users can remove unwanted recipes in their favorite list
EX10 (novel)	As a recipe explorer, I want to see a wanted recipe that I am not allergic to and disliked so that it reduces the workload to exclude	<ul style="list-style-type: none"> ● Users can choose allergic and disliked food on the sign up page. <ul style="list-style-type: none"> ○ At most 100 allergic foods

	the unwanted recipe.	<ul style="list-style-type: none"> ○ At most 100 dislike foods ● Users can adjust allergic and disliked food on their settings page. ● Users won't be recommended the recipes labeled with these unwanted tags.
EX11 (novel)	As a recipe explorer, I want to know the recipe of dishes in restaurants so that I can know its ingredients and cooking step and store this recipe to cook at home.	<ul style="list-style-type: none"> ● Users can upload the photo of dishes to the system and search the recipe. ● The size of photo cannot exceed 3MB ● Users cannot upload other things: <ul style="list-style-type: none"> ○ Ingredient ○ Not cookable things ● Users cannot search for some recipe not in the repository.
CO1	As a recipe contributor, I want to upload the recipe to the system so that others can see and learn the recipe to cook more dishes they might not know.	<ul style="list-style-type: none"> ● Users can contribute their recipe to the system including the details: <ul style="list-style-type: none"> ○ Title <ul style="list-style-type: none"> ■ At most 50 characters ○ Photo of recipe cover <ul style="list-style-type: none"> ■ At most 3MB ○ Description and tips of recipe <ul style="list-style-type: none"> ■ At most 800 characters ○ Tag <ul style="list-style-type: none"> ■ At most 20 tags ○ Ingredients <ul style="list-style-type: none"> ■ At most 20 ingredients ○ Recipe steps <ul style="list-style-type: none"> ■ At most 20 steps ■ Each photo at most 3MB ■ Each description of step at most 800 characters ○ Calories (elective) <ul style="list-style-type: none"> ■ 4 digits only ● Users cannot upload more than 500 recipes.
CO2	As a recipe contributor, I want to modify the recipe to the system so that I can modify some accident mistakes easily.	<ul style="list-style-type: none"> ● Users can conduct the recipe through: <ul style="list-style-type: none"> ○ Edit each visible detail ○ Delete ● Users cannot modify the like and comment on their contributed recipe.
CO3	As a recipe contributor, I want to view the published recipes in the same area so that I can conduct and check them easily.	<ul style="list-style-type: none"> ● Users can view their published recipes on the profile.

AD1	As an admin, I want to regulate recipe comments so that users won't be affected by inappropriate comments.	<ul style="list-style-type: none"> • Admin users can edit comments posted by users. • Admin users can delete user reviews because <ul style="list-style-type: none"> ○ Invasive words ○ Inflammatory words ○ Advertisement
AD2	As an admin, I want to modify the details of recipes so that any mistake pointed out by other users' comments can be fixed.	<ul style="list-style-type: none"> • Admin users can edit all the content in the recipe details that will be displayed on the homepage.
AD3	As an admin, I want to delete the unreasonable recipe so that users won't be misled by incorrect recipes.	<ul style="list-style-type: none"> • Admin users can delete the recipe from these reason: <ul style="list-style-type: none"> ○ Unmatched Name, ingredient and step ○ Advertisement ○ Impossible to achieve ○ Illegal and invasive words
RU1	As a registered user, I want to be able to have a customized account so that I can get recommended and contribute recipes.	<ul style="list-style-type: none"> • Users can create an account through the valid: <ul style="list-style-type: none"> ○ Email ○ Password • Users are asked to retry if: <ul style="list-style-type: none"> ○ The email has already taken ○ The email is invalid ○ Password is less than 6 characters • Users can log in automatically once the account has already been created.
RU2	As a registered user, I want to access my account from various devices so that I can sync my customization and personal information easily.	<ul style="list-style-type: none"> • Users can log in using: <ul style="list-style-type: none"> ○ Username ○ Email address has been registered • Users can log in to various devices simultaneously. • If a user fails to enter the valid password after 6 attempts, they will be prompted to reset the password.
RU3	As a registered user, I want to log out my account in the system so that my account won't be modified and stolen maliciously.	<ul style="list-style-type: none"> • Users can log out from the current platform • The other platform's account remains constant if the current platform's one has logged out.
RU4	As a registered user, I want to be able to reset the password so that I won't lose this	<ul style="list-style-type: none"> • Users can reset the password by entering the valid email address.

	account if I forget the password or be blocked by the system.	<ul style="list-style-type: none"> ○ If it is valid, the system will send verification code to this email address. ● Users cannot be able to know if the email they entered is valid.
RU5	As a registered user, I want to remain logged in the same device so that it reduces the meaningless workload to login every time.	<ul style="list-style-type: none"> ● Once users have logged in, they will remain this unless they sign out manually.
RU6	As a registered user, I want to modify the profile so that I can change my information and preference freely.	<ul style="list-style-type: none"> ● Users can view their profile and click the setting page to modify their own information.

2.3 Sprints

Sprints are held approximately 2 weeks long. These sprints help us to demonstrate the progress in week 5, 8 and the final presentation in week10. The end date of each sprint is determined by the specific lab time that we need to present.

Sprint	Start Date	End Date	Sprint Scope
1	30/Sep/2022	10/Oct/2022	Basic features are supposed to be implemented in the aspect of backend and frontend. This will include homepage, part of recipe detail, click thumbnail of recipe, user registration, user login, user profile.
2	11/Oct/2022	31/Oct/2022	This sprint is to implement many advanced features. This includes searching recipes with tags, commenting on the recipe, contributing the recipe, contributor modification, user subscription and the core feature of recommendation system and some novel features of calories, allergic food, collection of recipe.
3	1/Nov/2022	14/Nov/2022	The rest of functionalities should be implemented in this final sprint. This includes novel features of recognition of food, sort of post of subscription and more detail of basic features.

In Sprint 1, we want to show the core function of browsing the recipe and the rest basic but must-do functionalities like registration and user data storage which is a kick-off term because all the recommendations are based on users' settings making account storage vital.

2.4 Jira Screenshots

2.4.1 Sprints 1

▼ Backlog (24 issues)		000	Create sprint
LN9900-21	As a recipe explorer, I want to view the details of the recipe through its thumbnail so that I can find some recipe that looks attractive.	IN PROGRESS	
LN9900-17	As a recipe explorer, I want to see all the relevant details of the recipe so that I can decide if it is worth adopting.	IN PROGRESS	
LN9900-34	As a registered user, I want to be able to have a customized account so that I can get recommended and contribute recipes.	IN PROGRESS	
LN9900-35	As a registered user, I want to access my account from various devices so that I can sync my customization and personal information easily.	IN PROGRESS	
LN9900-36	As a registered user, I want to log out my account in the system so that my account won't be modified and stolen maliciously.	IN PROGRESS	
LN9900-41	As a registered user, I want to modify the profile so that I can change my information and preference freely.	IN PROGRESS	
LN9900-38	As a registered user, I want to remain logged in the same device so that it reduces the meaningless workload to login every time.	IN PROGRESS	

2.4.2 Remaining sprints

LN9900-19	As a recipe explorer, I want to be recommended recipes relevant to those I have navigated so that I can cook new dishes similar to my hobby.	TO DO	
LN9900-24	As a recipe explorer, I want to see the calories and whether I can accept the calories in this recipe so that I can have a healthy diet.	TO DO	
LN9900-16	As a recipe explorer, I want to search the recipe through the name and tag so that I can find the recipe in a relevant topic quickly and easily.	TO DO	
LN9900-18	As a recipe explorer, I want to filter the recipe based on its category so that I can find the recipe matching my interest quickly.	TO DO	
LN9900-22	As a recipe explorer, I want to subscribe to some other users who have posted attractive recipes so that I can follow their new recipe.	TO DO	
LN9900-26	As a recipe explorer, I want to see a wanted recipe that I am not allergic to and disliked so that it reduces the workload to exclude the unwanted recipe.	TO DO	
LN9900-27	As a recipe explorer, I want to know the recipe of dishes in restaurants so that I can know its ingredients and cooking step and store this recipe to cook at home.	TO DO	
LN9900-28	As a recipe contributor, I want to upload the recipe to the system so that others can see and learn the recipe to cook more dishes they might not know.	TO DO	
LN9900-29	As a recipe contributor, I want to modify the recipe to the system so that I can modify some accident mistakes easily.	TO DO	
LN9900-30	As a recipe contributor, I want to view the published recipes in the same area so that I can conduct and check them easily.	TO DO	
LN9900-23	As a recipe explorer, I want to see the recent or best post on the subscription so that I can see and choose the hot dishes and the new dishes easily.	TO DO	
LN9900-20	As a recipe explorer, I want to bring my opinion to the recipe so that good recipes can be found by other users and bad recipes can be noticed.	TO DO	
LN9900-25	As a recipe explorer, I want to collect and save the recipe into a place so that I can find some usable recipes easily.	TO DO	
LN9900-31	As an admin, I want to regulate recipe comments so that users won't be affected by inappropriate comments.	TO DO	
LN9900-32	As an admin, I want to modify the details of recipes so that any mistake pointed out by other users' comments can be fixed.	TO DO	
LN9900-33	As an admin, I want to delete the unreasonable recipe so that users won't be misled by incorrect recipes.	TO DO	
LN9900-37	As a registered user, I want to be able to reset the password so that I won't lose this account if I forget the password or be blocked by the system.	TO DO	

2.5 Novel Functionalities

1. Calories

Users will see the calories of the various ingredients that make up the dish when they browse a recipe, and they can check whether the calories of the dish exceed the threshold that user's set in advance. This offers users health management in which we want to focus on the health diet of users rather than a simple recipe recommendation system in the market.

2. Personalized customization

Users are not supposed to be recommended by their unwanted recipe, here we deliver the personalized customization to avoid the potential unwanted recipe. The system will collect user information including users' allergies, contraindication (e.g. vegetarianism, diabetes) and disliked food and make an intelligent recommendation compared to existing software.

3. Recipe recognition

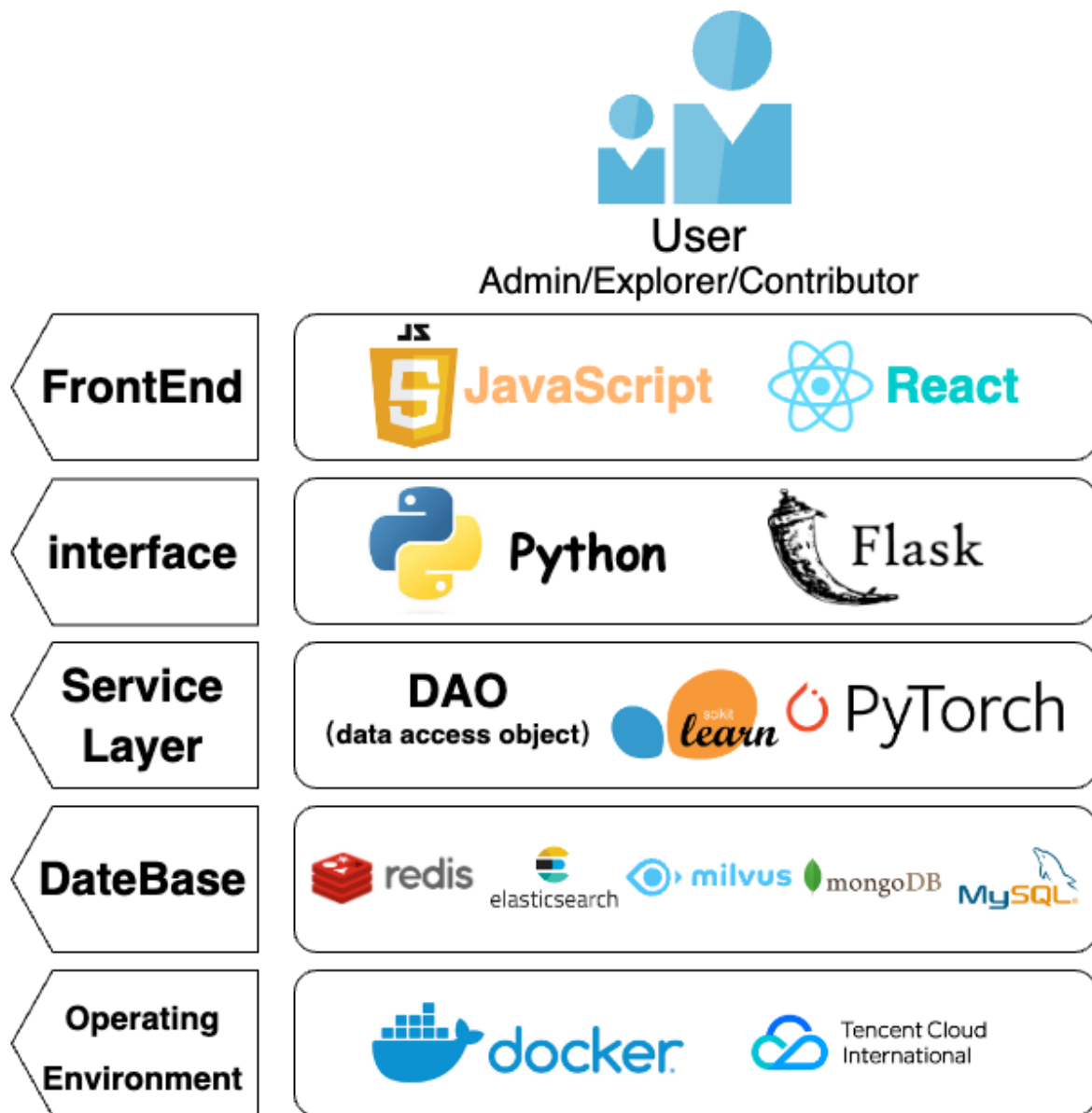
Users are allowed to upload the photo of the dish to search its recipe in which the system will recognize the photo and provide some similar recipes. With the succession of the technology, modern software tends to deliver more and more convenient ways to explore things. Hence, this image search makes the software more intelligent than the existing software because there is merely no meal software performing this feature.

4. Collection

Users are allowed to save the recipe in their profile and there will be a collection list displaying the whole recipe. This helps users reduce the workload to search the same recipe in a duplicate way and they can find the past worthy recipe to view again.

3, Technical depth and scale

3.1 Software architecture diagram



For the frontend, Axure is used to design our user interface with the prototype in which React is addressed to implement this. To be specified, React is a free and open-source front-end JavaScript library for building user interfaces based on UI components.

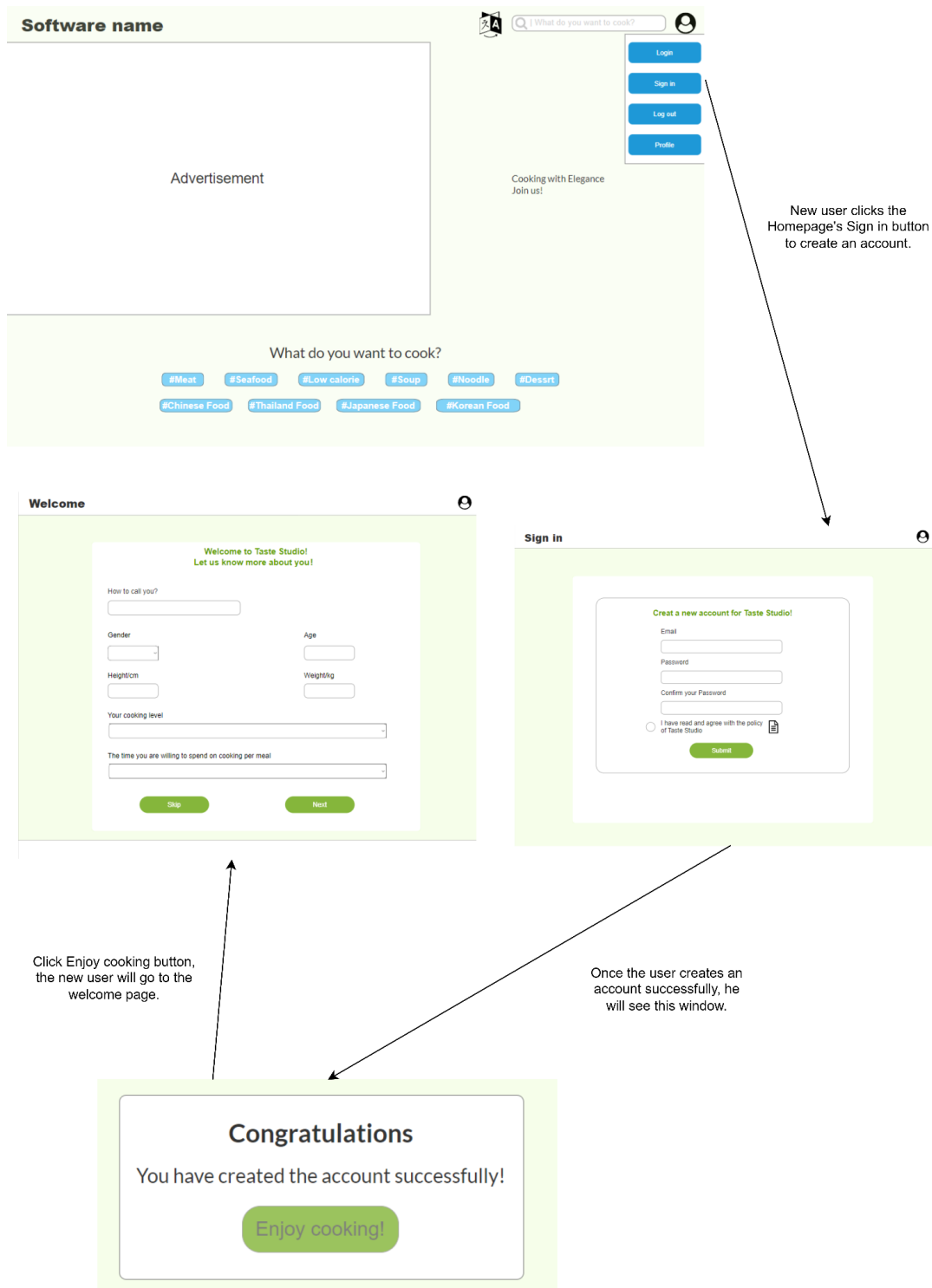
In the backend, Python plays a crucial role in the implementation and development. Flask is chosen as the web application framework to interact with the front end.

In the service layer, we will use some DAO frameworks (Pymysql, Pymongo etc.) to interact with the database. Recommendation algorithms are addressed to personalize recipe suggestions to users. In addition, Neural search algorithms (Embedding) are used for searching engines (elasticsearch) to facilitate users to retrieve the content they want. This algorithm is mainly implemented by scikit-learn or pytorch but the concrete way is still debatable.

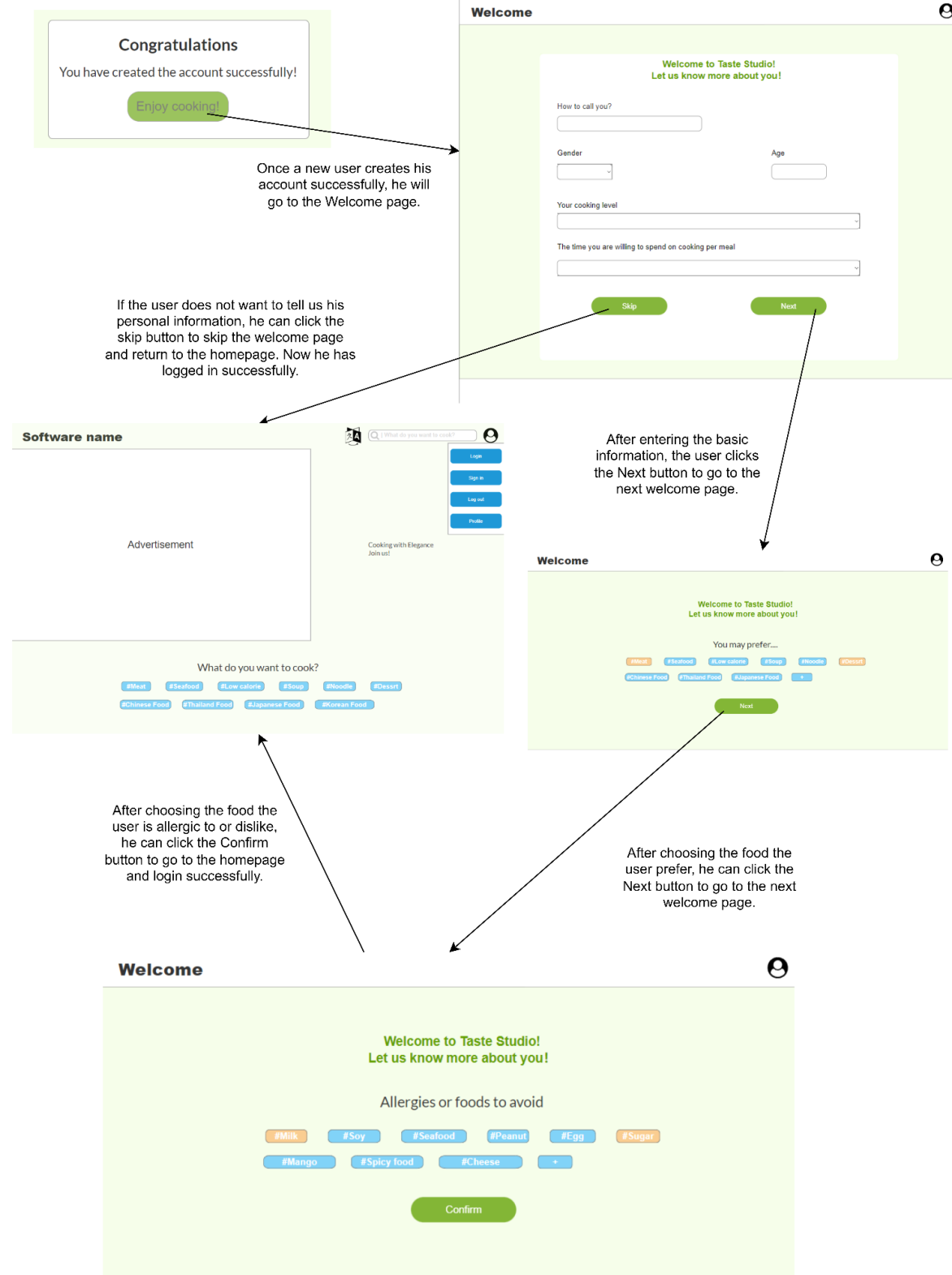
For the database, all the historical data will be saved in mysql. Hotspot information which evokes widespread discussion will be temporarily stored in redis. New information and user behavior data will be temporarily stored in MongoDB in which this storage ensures real-time user requests. Milvus stores the data in elasticsearch and embedding. In this case, search recall is performed by both elasticsearch and milvus.

3.2 Interface and flow diagram

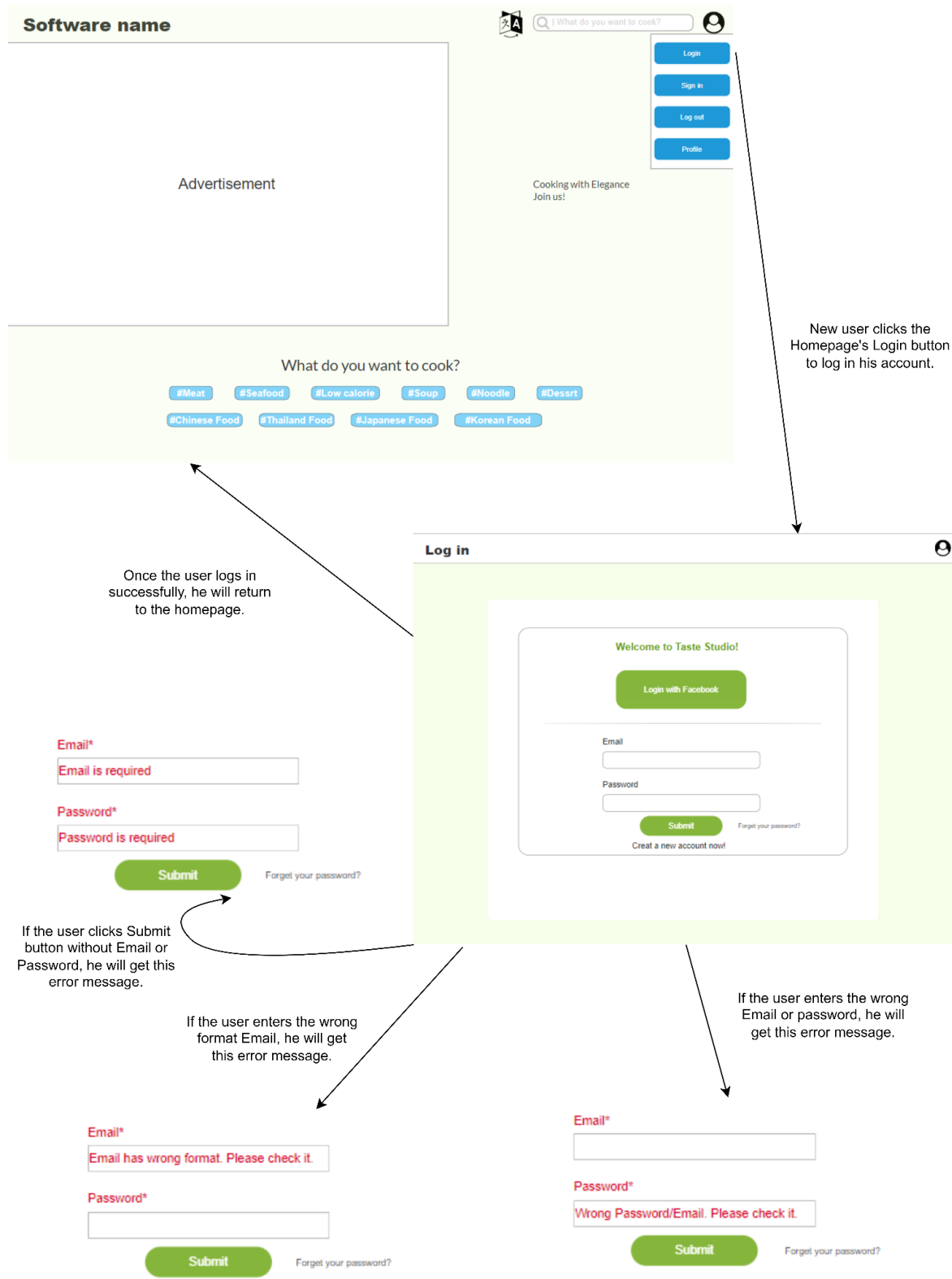
Sign in



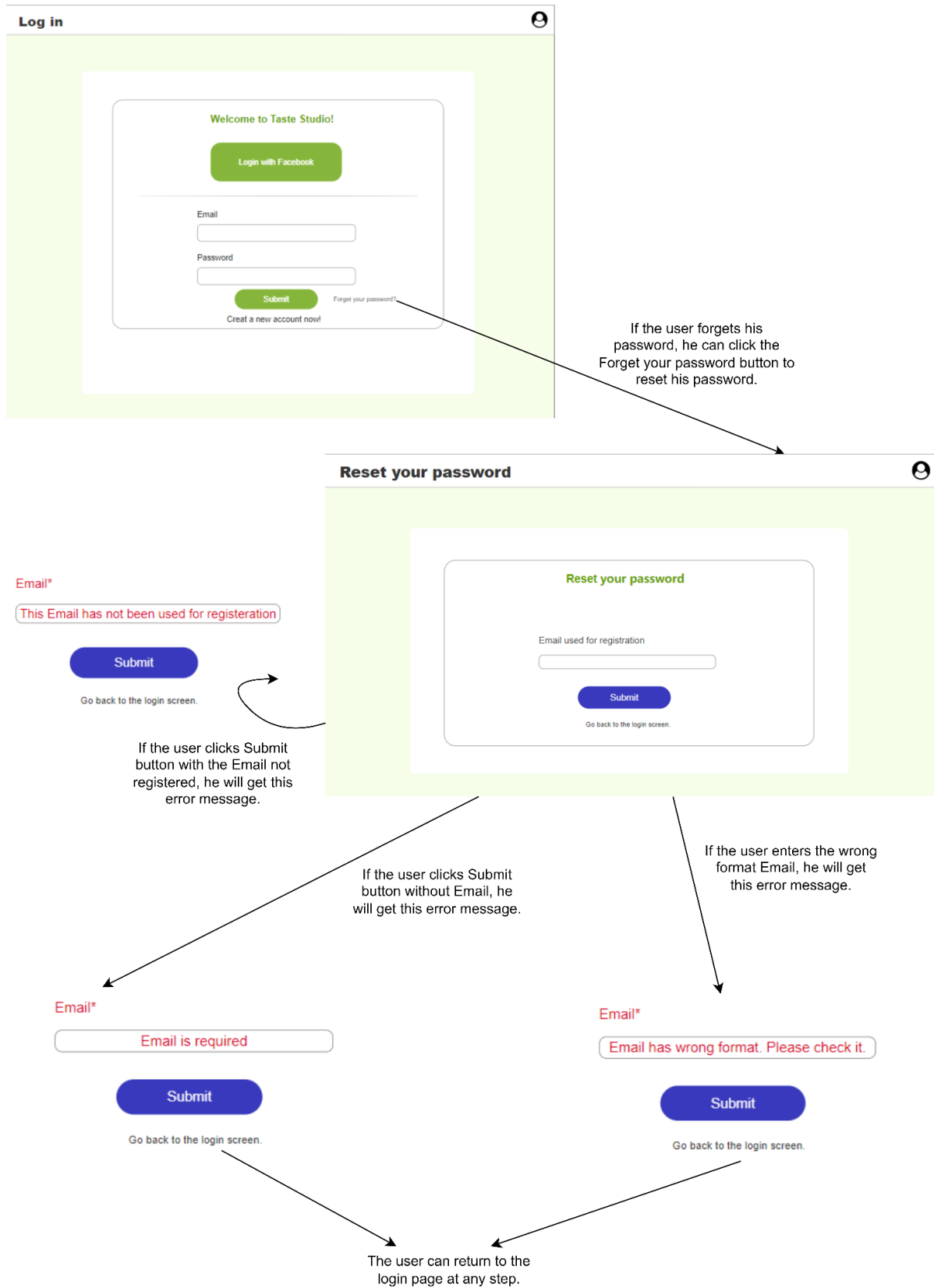
Welcome page and kick off



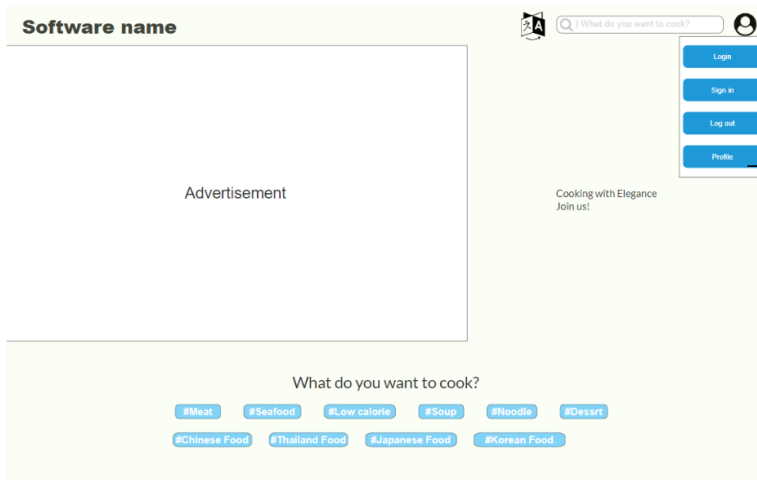
Login the account



Reset the Password



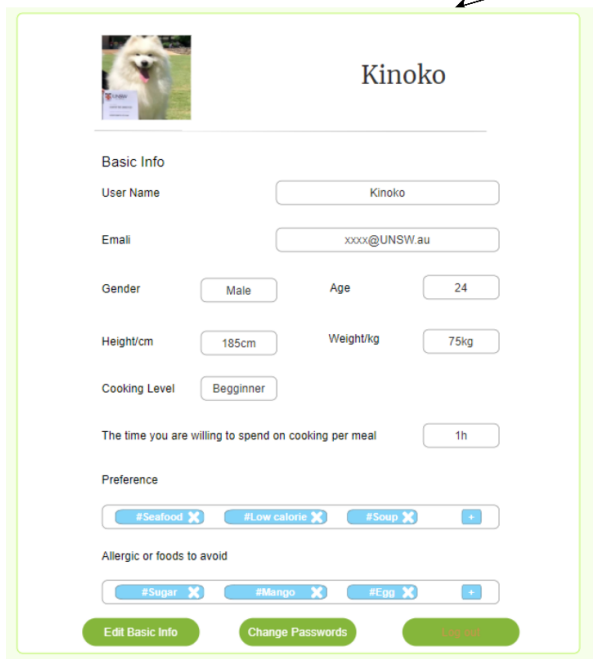
Profile and setting



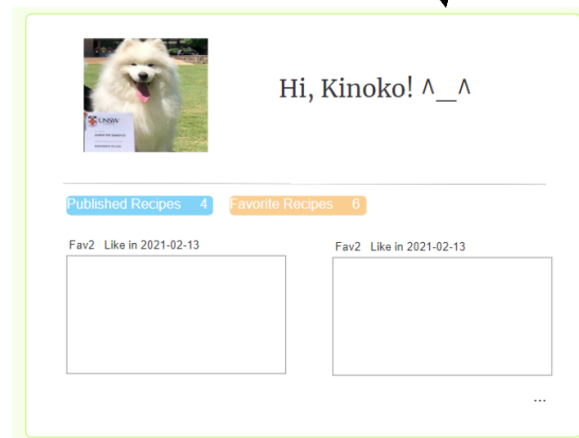
The user can click the Profile button to go to his profile page. This page will show the user's published recipes by default.



The user can click the Basic information button to check his information and set it.



The user can choose the Favorite Recipes button to show the favorite recipes.



Create Recipe

Software name

What do you want to cook?

Login

Sign in

Log out

Profile

Cooking with Elegance
Join us!

Share your Recipes now!

The user can click this button to share his own recipes.

Basics

NAME YOUR RECIPE

E.g. Kung Pao Chicken

ADD PHOTO

+ Recipe Cover
Best Pixel: 1300 x 1024

Image must be original personal photos,
in jpg format

ADD DESCRIPTION

Tell us the story behind your dish or share some tips...

ADD TAG

E.g. Breakfast, Main, Beverage, Chinese, European

Ingredients

AMOUNT	INGREDIENT	
E.g. 400 grams	E.g. Chicken fillet	↕ ×
		↕ ×
		↕ ×

ADD ONE MORE INGREDIENT

Recipe Steps

STEP 1

+ photo for this step

click here to write step description

↕ ×

STEP 2

+ photo for this step

click here to write step description

↕ ×

ADD ONE MORE STEP

DELETE RECIPE

SUBMIT THE RECIPE

RECIPE NAME

Description

TAGS

#Meal#Seafood#Low calorie

Ingredients

xxxx spoon

INGREDIENT1

100 calories

xxxx gram

INGREDIENT2

120 calories

Total Calories

220 calories

🚫 Exceeded your target calorie

Recipe Steps

STEP 1/N

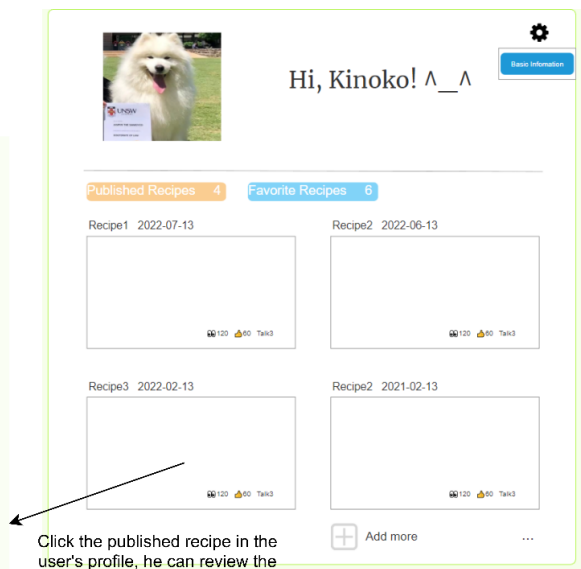
Description

STEP 2/N

Description

🔪

🗑️

[Edit this recipe.](#)


Click the published recipe in the user's profile, he can review the details of this recipe.

Software name

Basics

NAME YOUR RECIPE

ADD PHOTO






Image must be original personal photos, in jpg format

ADD DESCRIPTION

ADD TAG


Ingredients


AMOUNT	INGREDIENT	
<input type="text"/>	<input type="text"/>	✕
<input type="text"/>	<input type="text"/>	✕
<input type="text"/>	<input type="text"/>	✕

ADD ONE MORE INGREDIENT


Recipe Steps


STEP 1





STEP 2



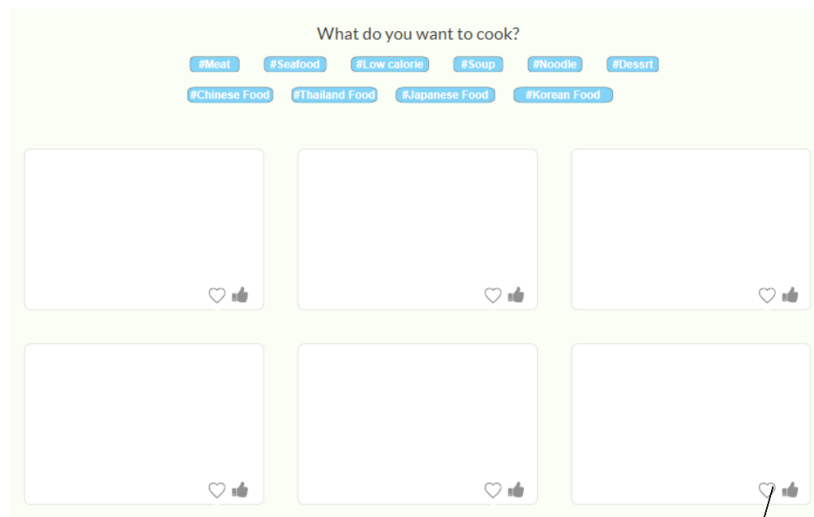


ADD ONE MORE STEP

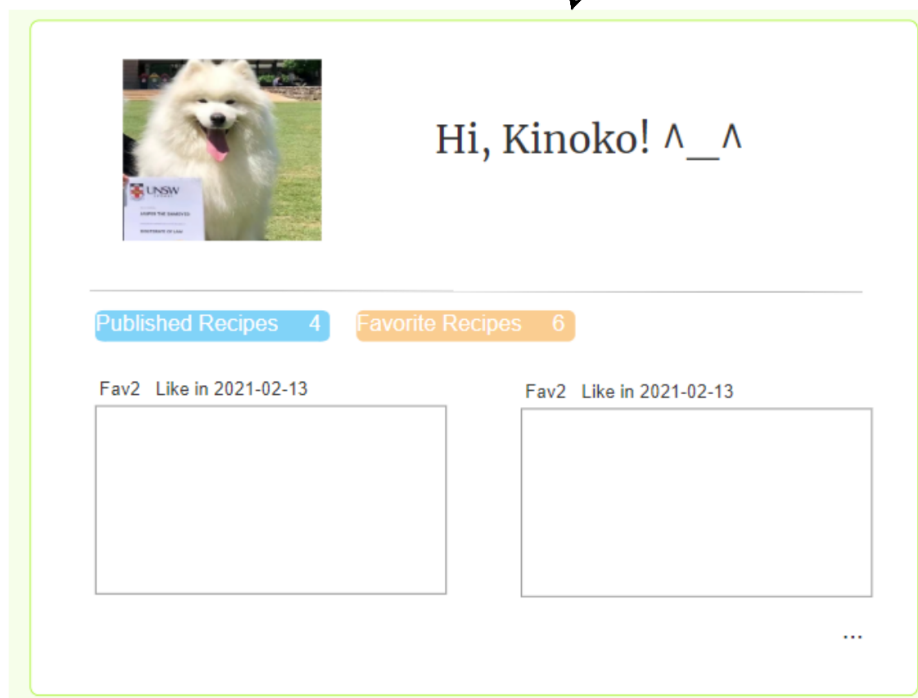
DELETE RECIPE

SUBMIT THE RECIPE

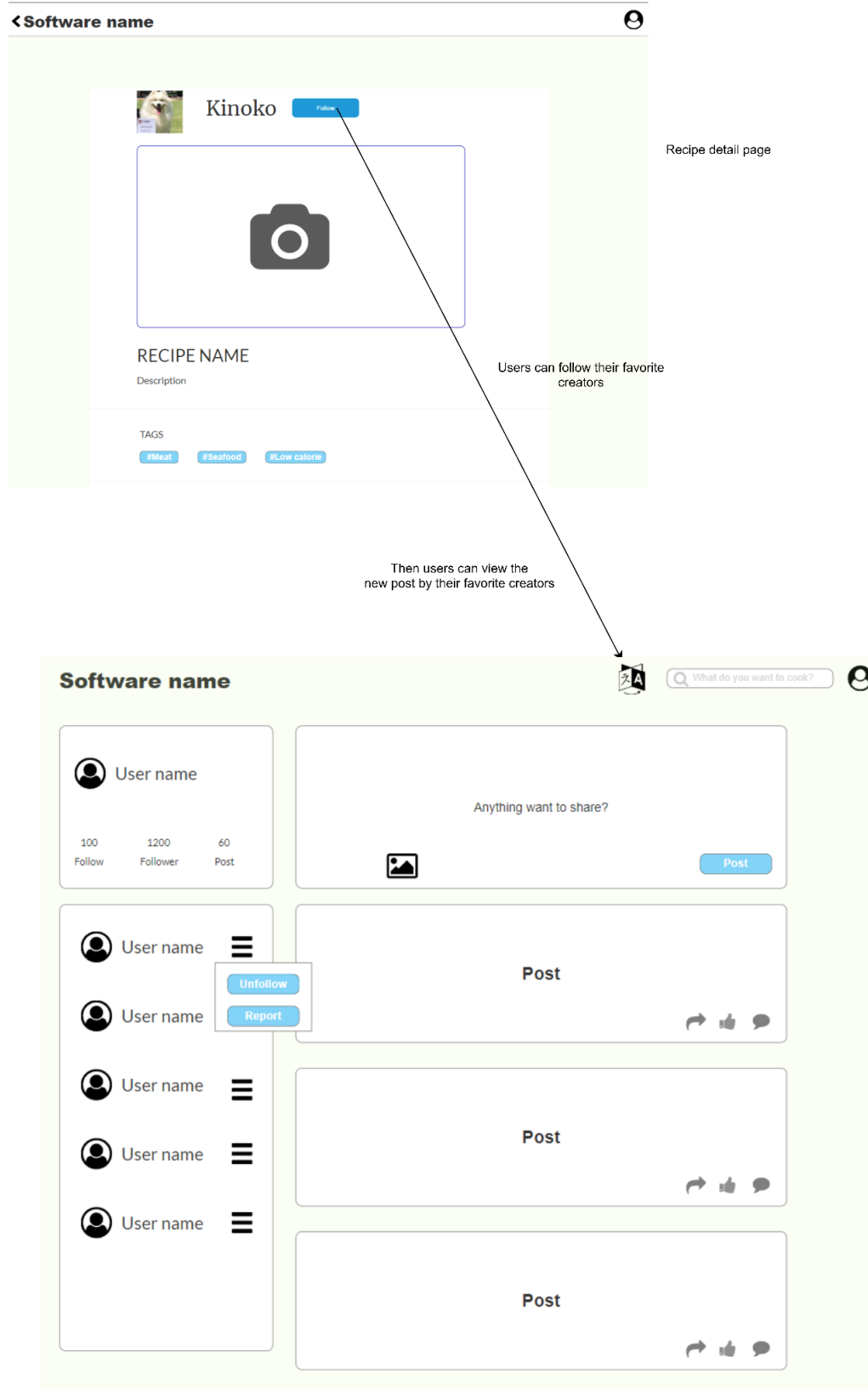
Favorite and collection



Click the heart button on the homepage, the user can collect this recipe and add it to his favorites.



Subscription



4. Reference

- [1] Stories, K., 2022. *Kitchen Stories*. [online] Kitchen Stories. Available at: <https://www.kitchenstories.com/en/> [Accessed 25 September 2022].
- [2] Allrecipes. 2022. *Allrecipes | Recipes, How-Tos, Videos and More*. [online] Available at: <https://www.allrecipes.com/> [Accessed 25 September 2022].
- [3] Xiachufang.com. 2022. *XIACHUFANG*. [online] Available at: <https://www.xiachufang.com/> [Accessed 25 September 2022].