

FALL 2017
CS5551: ADVANCED SOFTWARE ENGINEERING
Department of Computer Science Electrical Engineering
University of Missouri - Kansas City

FOOD-CYCLED



Team Members

Shreya Sridhar, Sulochana Rani Mulpuri, Harika Adivanne , Navya Battu

Project Video Link : <https://youtu.be/Lxj-A1iWmP>

GitHub Link : https://github.com/shreyaabadri/CS5551_team1_project

ZenHub Link : https://app.zenhub.com/workspace/o/shreyaabadri/cs5551_team1_project/boards?repos=102171528

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I. PROJECT DEPLOYMENT & PROJECT MANAGEMENT

INTRODUCTION

Food is one of the basic necessity of life and fuel for the human body and yet, many people still do not have access to a good meal. Many don't realize how much they throw away every day from uneaten leftovers which could otherwise be made available to people in need. In today's world, recycling is a major topic and the idea of reusing would aid in reducing waste. This motivated us to look for a project that combines these two ideas.

'Natural Resources Defense Council estimates that about 40 percent of food in the U.S is never eaten and at the same time one in eight Americans struggle to get proper food.'

The above brief description outlines the core idea of our project, which helps reduce wastage of food and make it available to people in need. This inspired us to take a step forward to initiate this project with the help of an user friendly application and website which will attract more people to be involved in this process and make it a success. Individuals and restaurants can support in this cause and make a difference in their community by providing excess food to those who are in need.

PROJECT GOAL AND OBJECTIVES

Overall Goal (Based on Enactus Requirements):

The main objective of this project is to develop user friendly application and website that could be used by individuals and restaurants to give away excess food to those who don't have access to it. Through this project, food is provided for homeless or less privileged people and also to reduce the wastage of food.

Specific Objectives :

There has not been an easy process outlined to help in repurpose excess food that are otherwise going to be thrown. The project proposes a streamlined simple approach to resolve this with the help of smart technology.

Specific Features :

- User friendly hybrid application to help ease donation and collection of excess food.
- Single login and register for Users and Volunteers.
- Login can also be done using social websites such as Facebook and Google+.
- Identifying nearby Soup Kitchens using Google Maps.
- Check for nutritional value, ingredients and validity of the food.
- Feedback on volunteers by users.

Significance :

We are developing an application to effectively collect and make food available to homeless and less privileged people. People who wish to be part of this program are grouped into two types –

1. User(s) – people who wish to contribute food

2. Volunteer(s) – people who wish to collect food from users and drop off at the nearby soup kitchens.

Initially volunteers are registered with their details. The user also needs to register and then mention the food they wish to donate. After that, a request will be sent to the nearby volunteer to pick up the food. Nearby volunteer who is available accepts the request from the user to pick up food. Also the volunteers details will be sent to the user. After the volunteer picks up the food, he/she drops off in the nearby soup kitchens. After the volunteer picks up the food, he/she drops off in the nearby soup kitchens. After accepting the food from the user, they drop off the food at a nearby Soup Kitchen.

STORIES (ISSUES) :SCENARIO & USE CASE SPECIFICATION

- User logs into the application or signs up if not registered.
- Also Volunteers are registered or can sign up if not registered.
- The User will then provide details such as Name of the food , Cuisine, preparation date, expiry date , spice levels and image of the food.
- A request is then sent to the volunteers nearby.
- After a volunteer accepts request the food history in the User's Dashboard will show a Tick mark indicating that the request was accepted.
- After the volunteer picks up the food , they drop it in the nearby Soup Kitchens.
- Later on , the user can provide a feedback for the volunteer.
- User then logs out of the application.

PROJECT TIMELINES, MEMBERS, TASK RESPONSIBILITY

The screenshot shows a Jira project board titled "CS5551_team1_project". The board is divided into four main columns: Backlog, In Progress, Review/QA, and Done. The Done column contains 11 issues, and the Closed column contains 23+ issues. The issues are listed with their titles, assignees, and descriptions. The interface includes various filters at the top and a search bar.

Backlog	In Progress	Review/QA	Done	Closed
0 Issues - 0 Story Points	0 Issues - 0 Story Points	0 Issues - 0 Story Points	11 Issues - 13 Story Points	23+ Issues - 76 Story Points
Backlog	In Progress	Review/QA	Done	Closed

Issues in the Done column:

- CS5551_team1_project #10 increment(deployment and testing)
- CS5551_team1_project #33 retrieving the name issue
- CS5551_team1_project #34 validation in login issue
- CS5551_team1_project #26 notification issue
- CS5551_team1_project #27 tabs issue

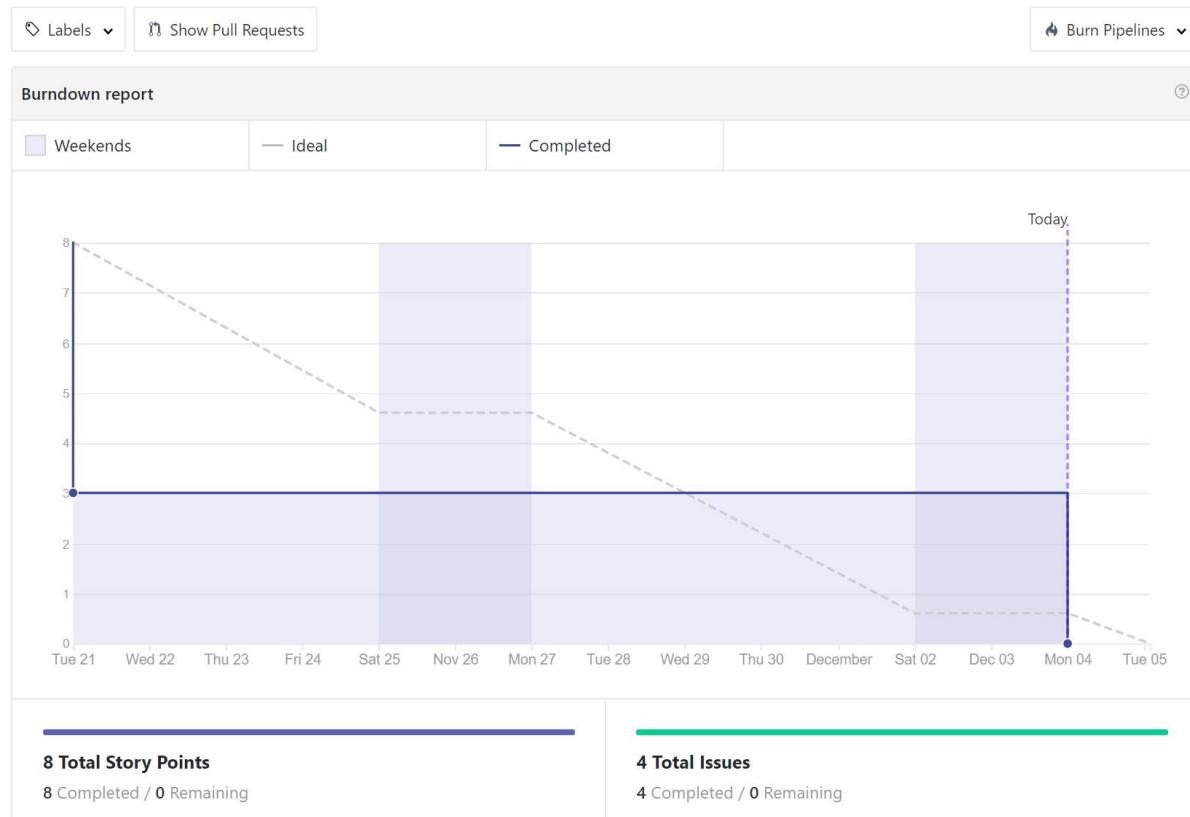
Issues in the Closed column:

- CS5551_team1_project #18 nutrition api 2nd issue
- CS5551_team1_project #15 nutrition api issue
- CS5551_team1_project #9 increment 3(implement food api.enable chat conversation.thank you page and feed back page)
- CS5551_team1_project #25 Harika
- CS5551_team1_project #7 first increment(launch page.login page.register page.facebook oauth for android)

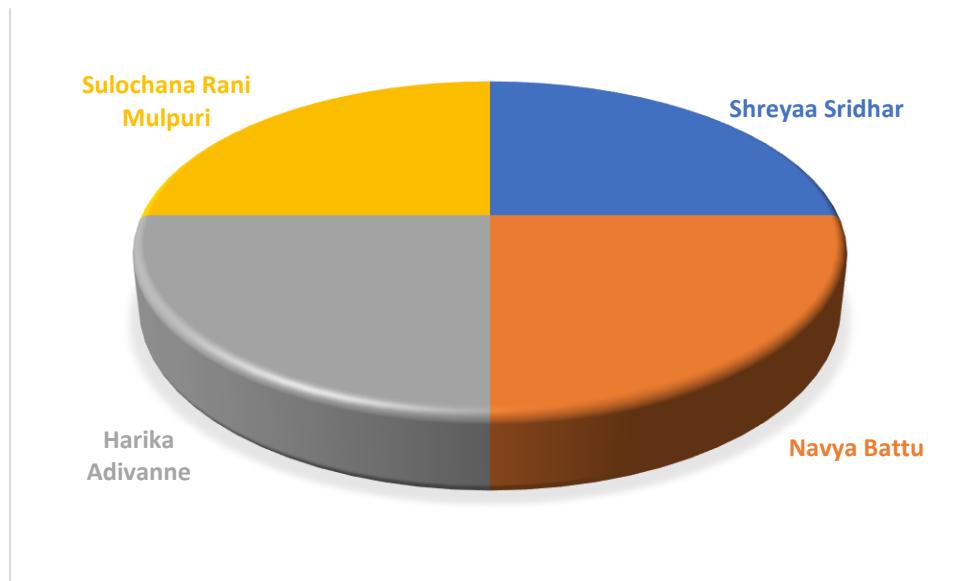
BURNDOWN CHART

increment 4

Start: **Nov 21, 2017** Change Due: **Dec 5, 2017** Change



PROJECT MANAGEMENT



SHREYAA SRIDHAR

Design and implementation of Single Login Page
Design and Implementation of Food API(Edamam API)
Design and implementation of Feedback Form
Design and Implementation of Contact Us Page
Design and Implementation of Camera Plugin
Design and Implementation of User Dashboard Page
Documentation
Class Diagrams for all increments
Wireframes

HARIKA ADIVANNE

Design and implementation of Single Register Page
Design and Implementation of Push Notifications

Design and implementation of Thank You Page

Design and Implementation of Soup Kitchens Locations using Google Maps

Design and Implementation of Volunteer Dashboard Page

Documentation

Activity Diagrams for all increments

Wireframes

SULOCHANA RANI MULPURI

Design and implementation of Single Login Page

Design and Implementation of Food API(Edamam API)

Design and implementation of Feedback Form

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Design and Implementation of Camera Plugin

Design and Implementation of User Dashboard Page

Documentation

Zenhub Charts for all increments

Wireframes

NAVYA BATTU

Design and implementation of Single Register Page

Design and Implementation of Push Notifications

Design and implementation of Thank You Page

Design and Implementation of Soup Kitchens Locations using Google Maps

Design and Implementation of Volunteer Dashboard Page

Documentation

Use Case Diagrams for all increments

Wireframes

II.PROJECT DEMO / PRESENTATION SLIDES

FOOD-CYCLED

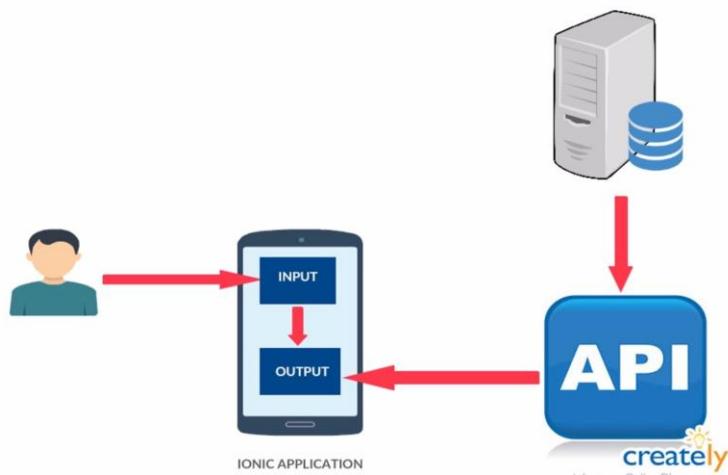
**TEAM MEMBERS :**

Shreyaa Sridhar
Navya Battu
Sulochana Rani Mulpuri
Harika Adivanne

Motivation

- ▶ Application that focuses on food waste management
- ▶ Concept of taking excess food (example - restaurants) and providing it to places that are in need.(example - Soup Kitchens)
- ▶ We selected this project from Enactus

Architecture



Technologies Used

- HTML
- CSS
- Ionic 3
- Firebase
- PostgreSQL
- Heroku

Features

- ▶ Locations of the Soup Kitchens is displayed using Google Maps API
- ▶ Used Edamam API to retrieve the nutrient details of a particular food.
- ▶ Single Login For User and Volunteer

Cont..

- ▶ Used Camera plugin for Uploading the food image
- ▶ OAuth Login
- ▶ Notifications alerts for USER and VOLUNTEER

III. PROJECT PROPOSAL

The main objective of this project is to develop user friendly application and website that could be used by individuals and restaurants to give away excess food to those who don't have access to it. Through this project, food is provided for homeless or less privileged people and also to reduce the wastage of food.

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IV. PROJECT PLAN

Schedule for the four different increments

Increment I

- Launch Page for android and website
- Login and Register Page for android and website
- Facebook and Google Oauth Login for android and website

Increment II

- Launch Page for Ionic Application
- Login and Register Page for Ionic Application
- Facebook and Google Oauth Login for Ionic Application
- Google Maps for Soup Kitchens
- Camera to upload images

Increment III

- Implement Food API to get nutrition information
- Dashboard for User
- Dashboard for volunteer
- Message Notification sent to Volunteer on 'Confirm request'
- Thank You page for contributors

Increment IV

- Feedback for Volunteers
- Deployment
- Testing

V. FIRST INCREMENT REPORT

i. Existing Services/REST API

Facebook API , Food API, Google Maps API

ii. Detailed Design of Features

WIREFRAMES

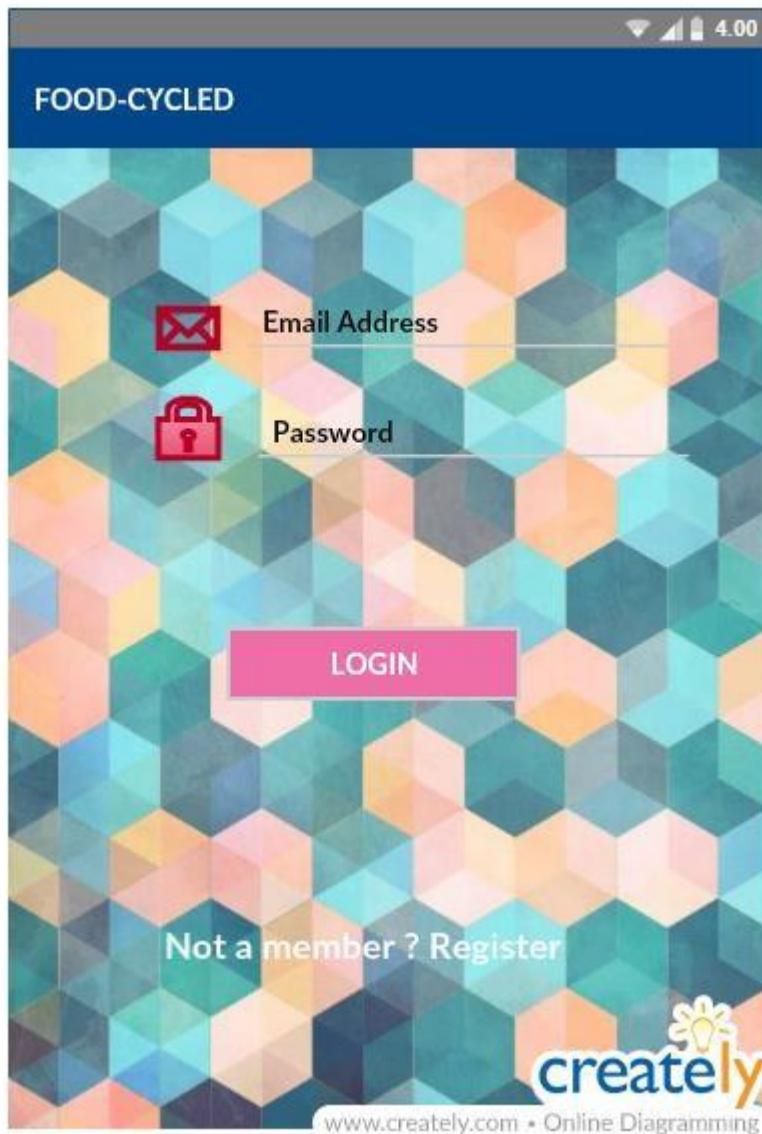
LAUNCH PAGE

The Launch Page is the initial page which loads on opening the Application. It contains 3 buttons - Login, Register and Continue with Facebook.

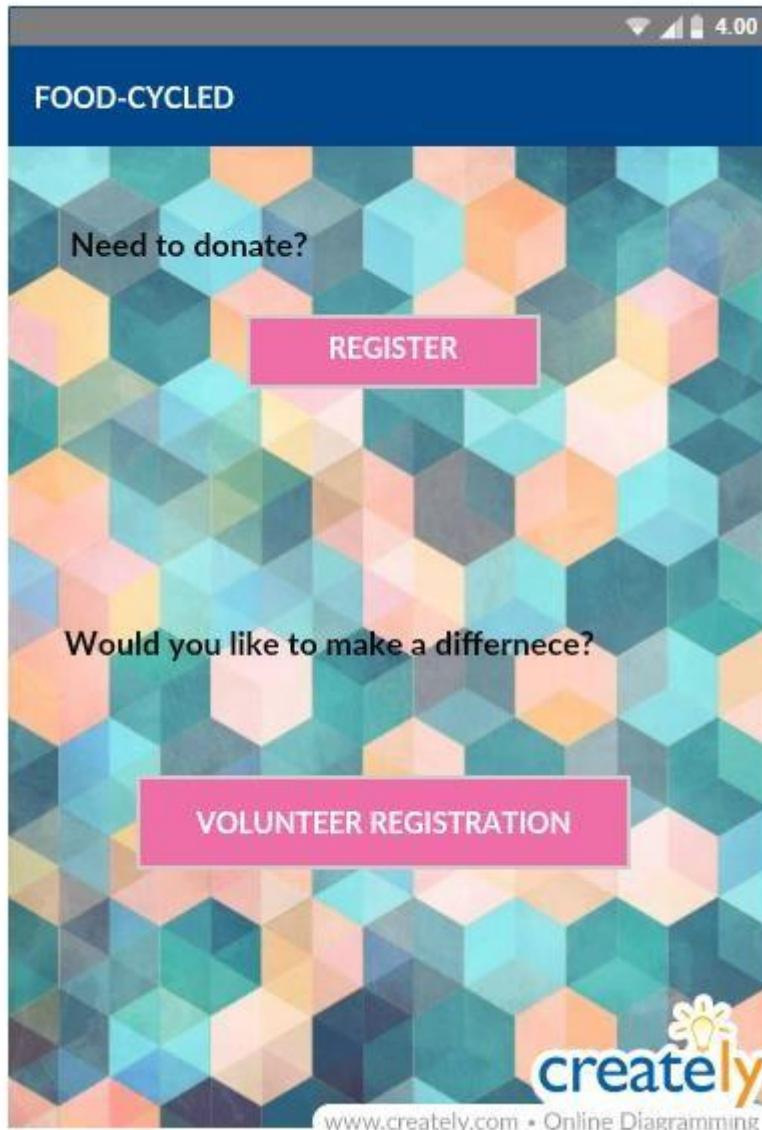


LOGIN PAGE

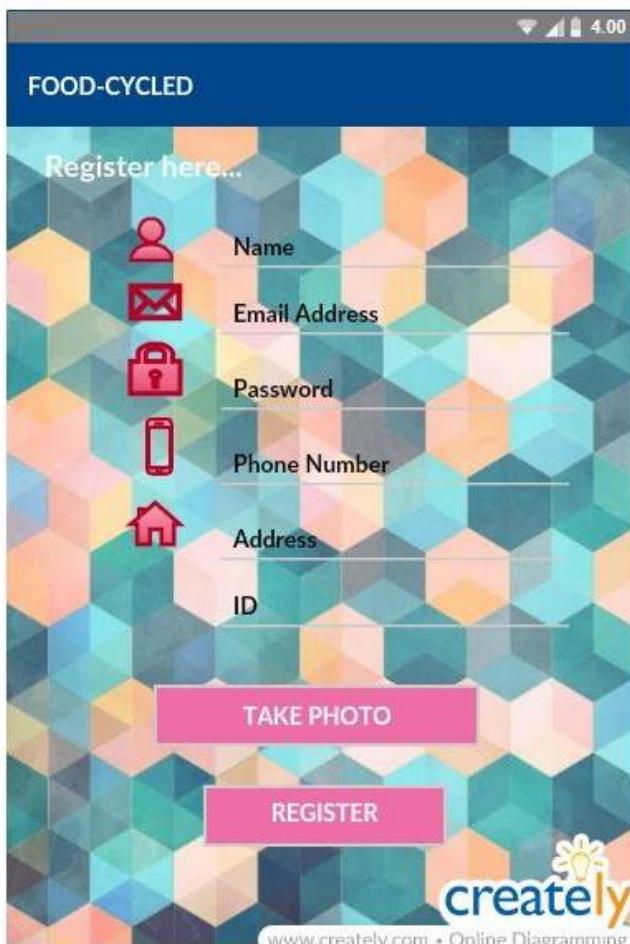
The Login Page does Authentication of previously registered users. Here there are 2 buttons-Login and



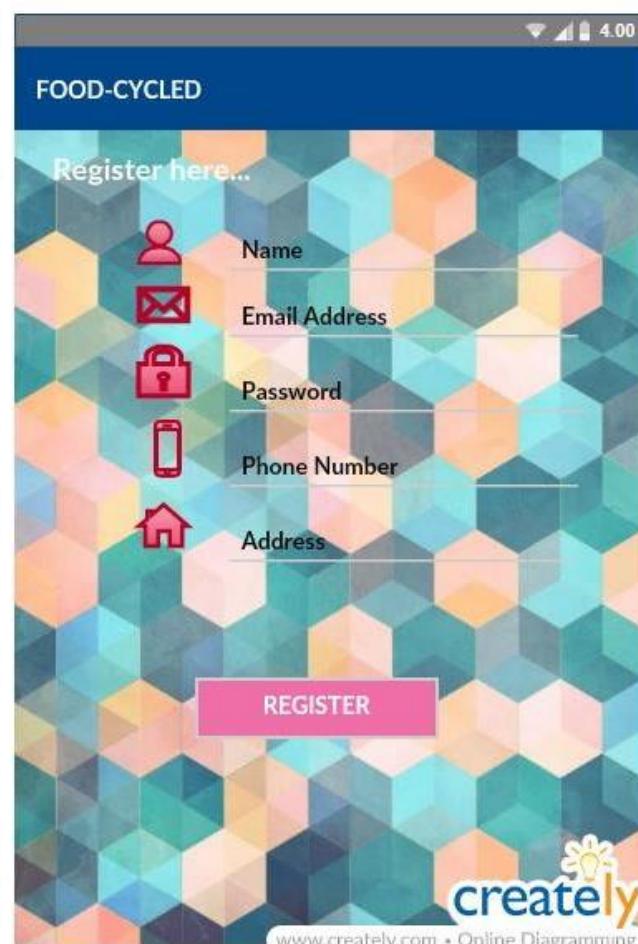
REGISTER PAGE



VOULNTEER REGISTER PAGE



USER REGISTER PAGE



LAUNCH PAGE

Wireframe for Home page where user/Volunteer can redirect to Register or Login Page.



LOGIN PAGE

This wireframe is for login page where user/volunteer can sign in and navigates to home page.

A wireframe of a web browser window titled "LOG IN PAGE". The window has three colored window control buttons (red, yellow, green) at the top left. The title bar contains the text "LOG IN PAGE" in all caps. Below the title bar, there are two input fields, both outlined in blue, stacked vertically. To the left of the top input field is the word "EMAIL". Below the input fields is a checkbox labeled "REMEMBER ME". To the right of the checkbox is a blue rectangular button with white text labeled "SIGN IN". At the bottom left of the page is a link labeled "FORGOT PASSWORD/EMAIL".

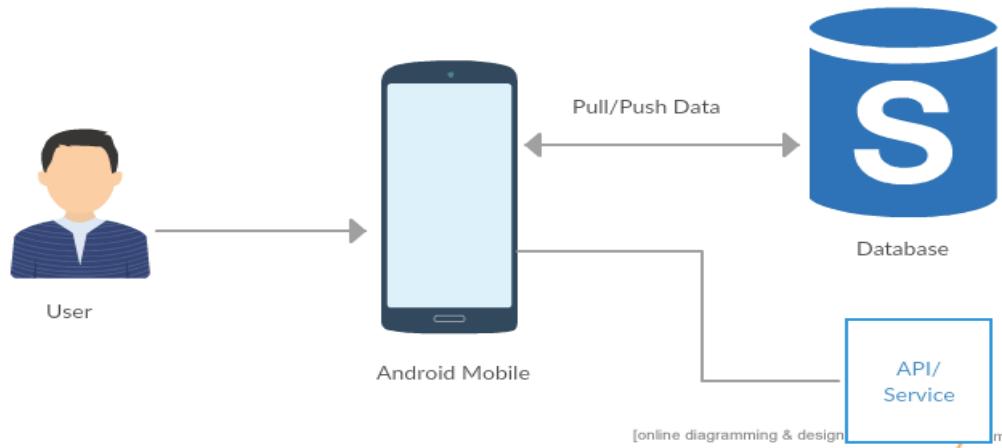
REGISTER PAGE

The register page wireframe consists of Name where user will be given username ,email id where user will be given his mail id, and password and reenter password. If user already have account he can directly log into his account.

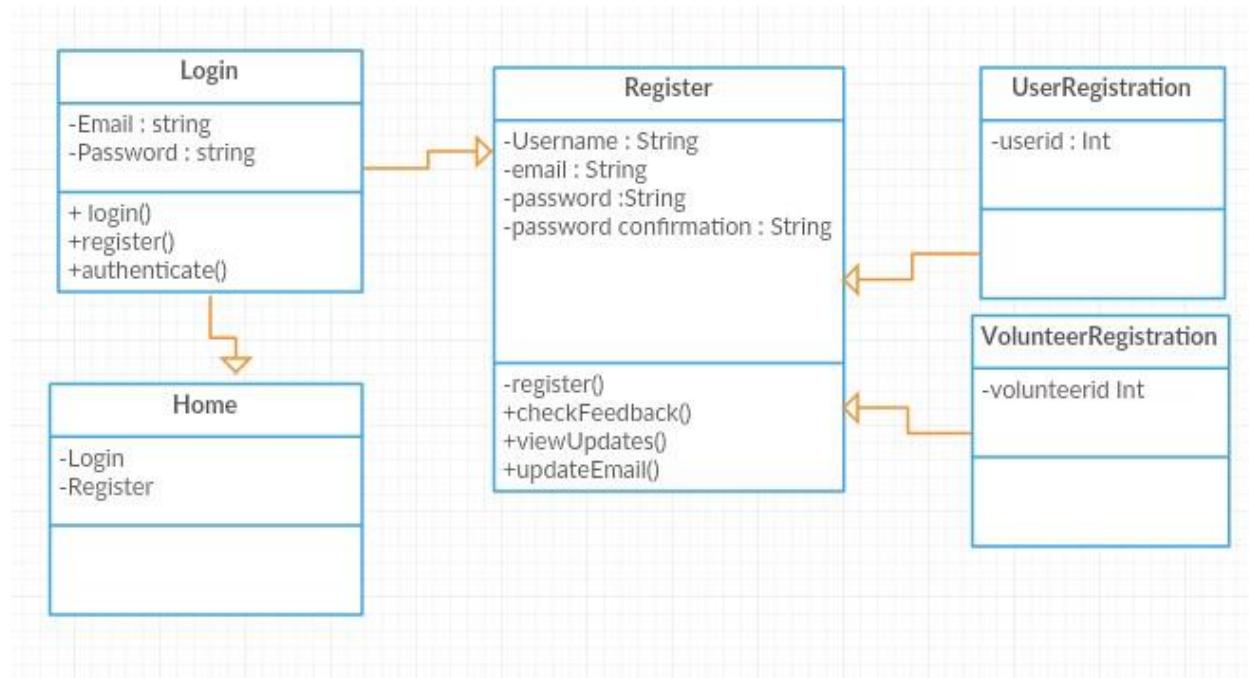
The wireframe shows a registration form titled "Register Page". It includes four text input fields: "Name", "Emailid", "Password", and "Reenterpassword". Below the inputs is a blue "Register" button. At the bottom, there is a link "Already have an account? click here".

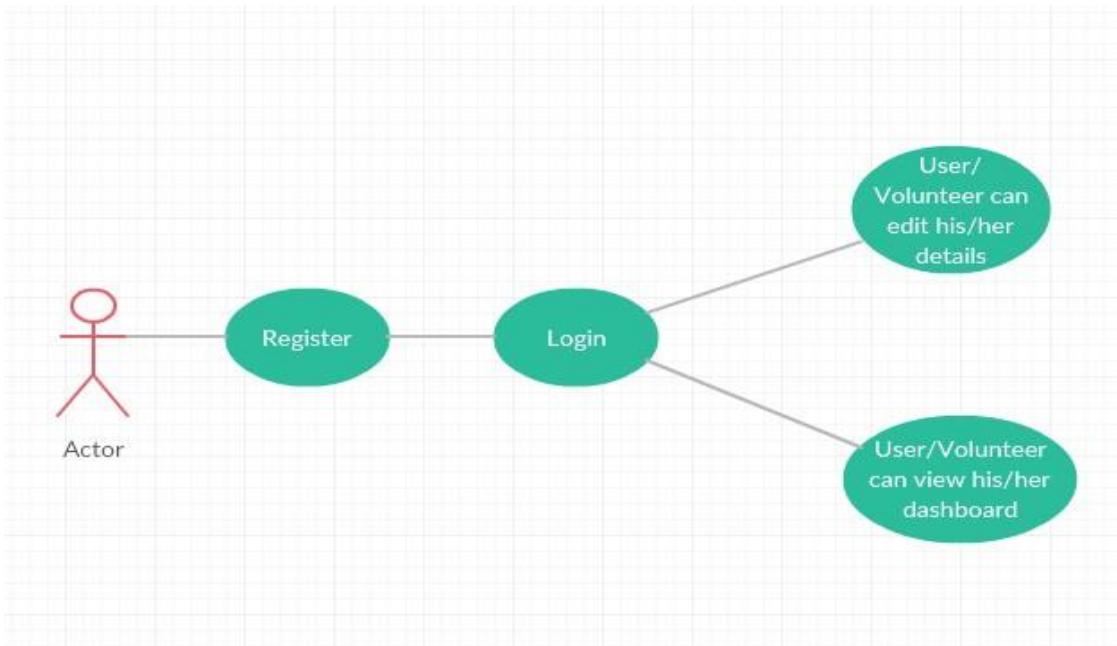
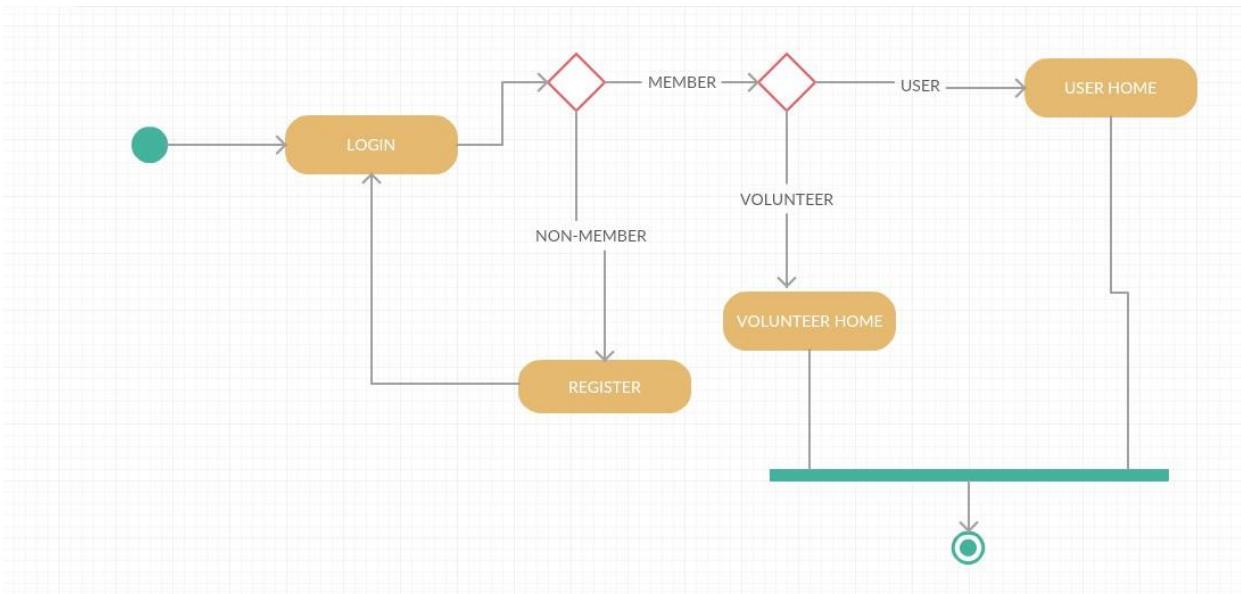
Field	Type
Name	Text Input
Emailid	Text Input
Password	Text Input
Reenterpassword	Text Input
Buttons	
Register	
Already have an account? click here	

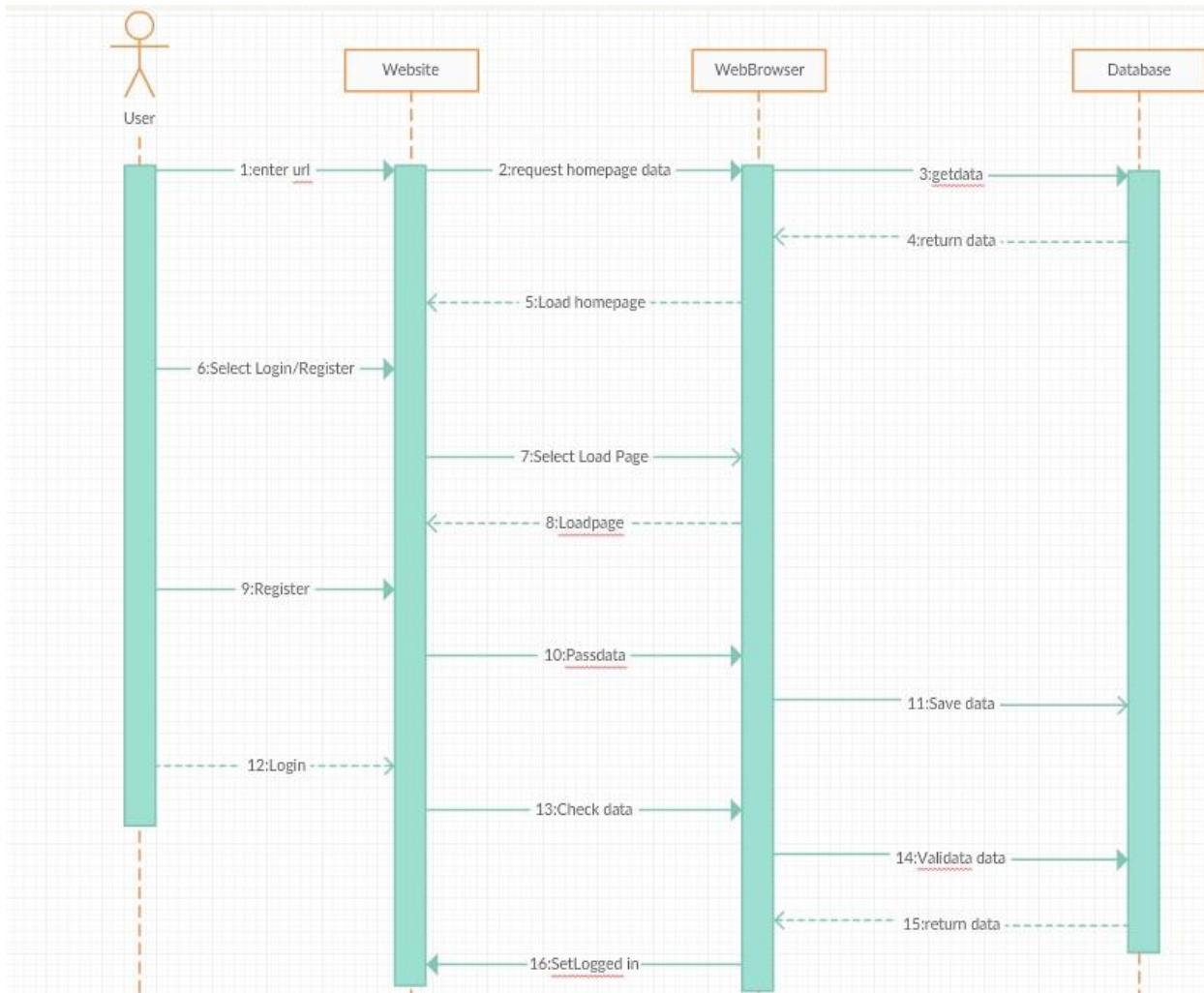
ARCHITECTURE DIAGRAM



CLASS DIAGRAM

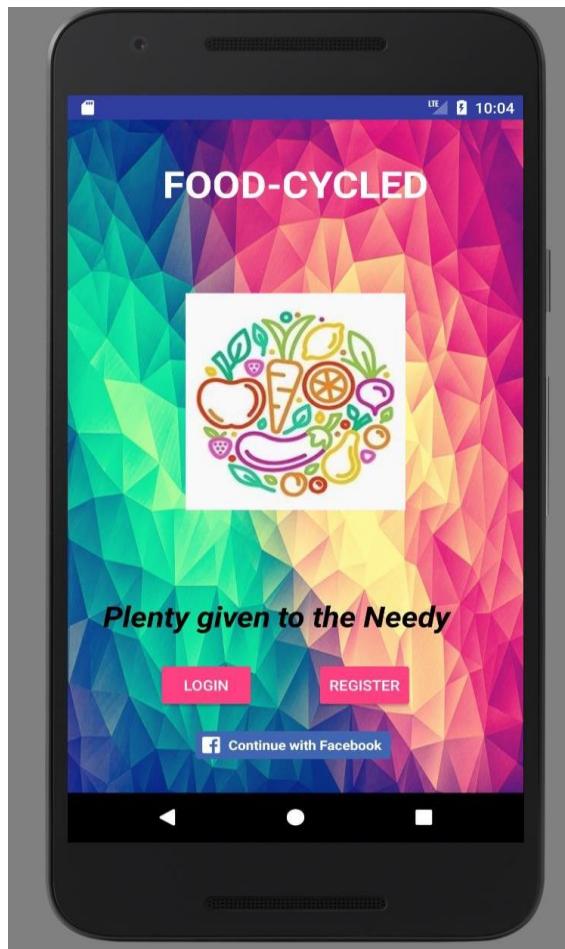


USE CASE DIAGRAM**ACTIVITY DIAGRAM**

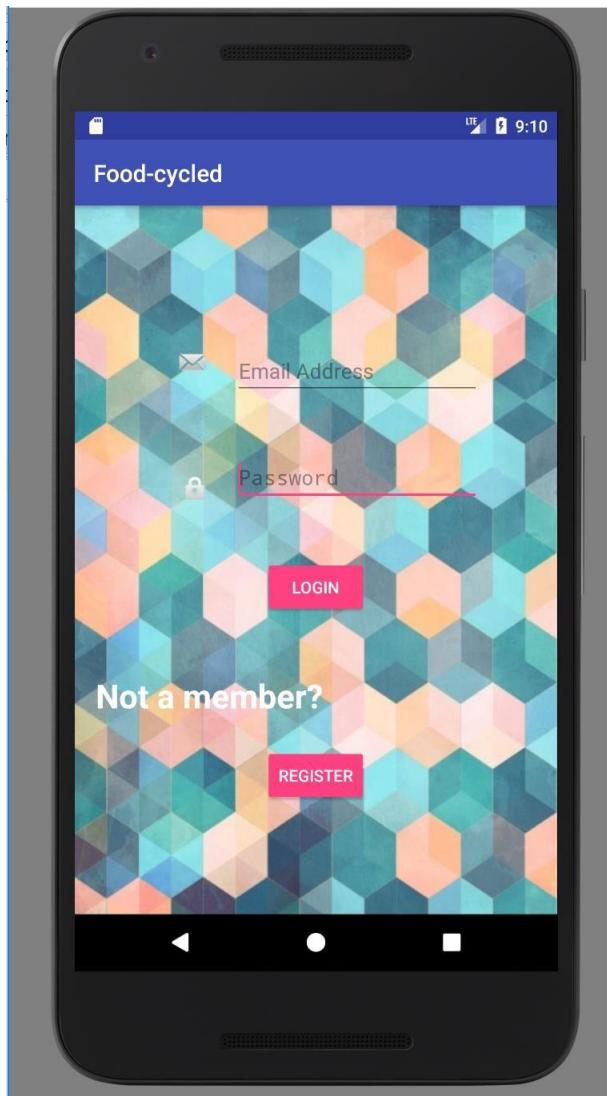
SEQUENCE DIAGRAM

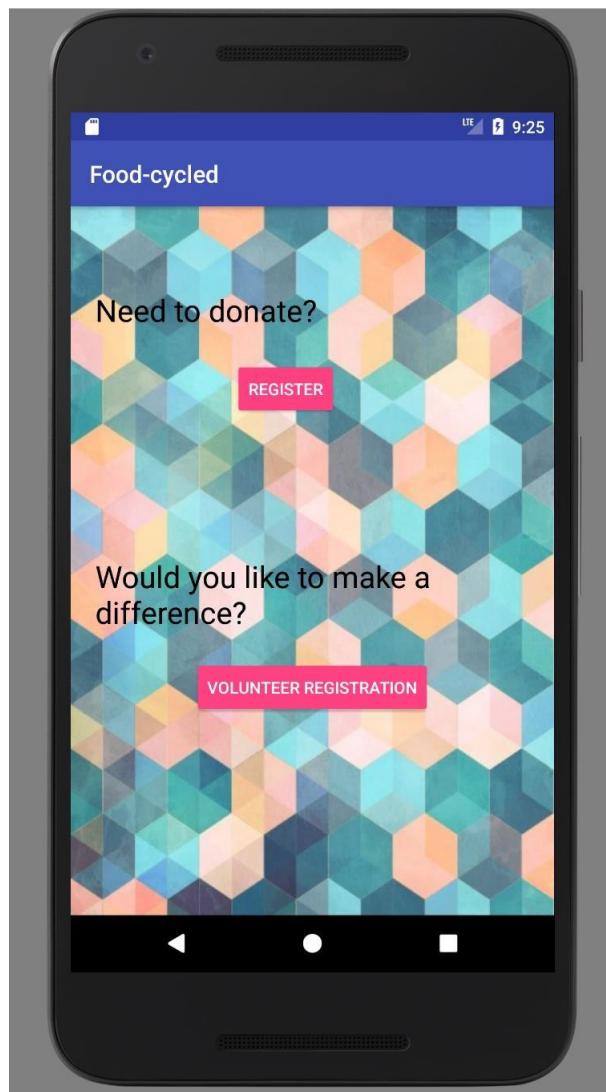
IMPLEMENTATION

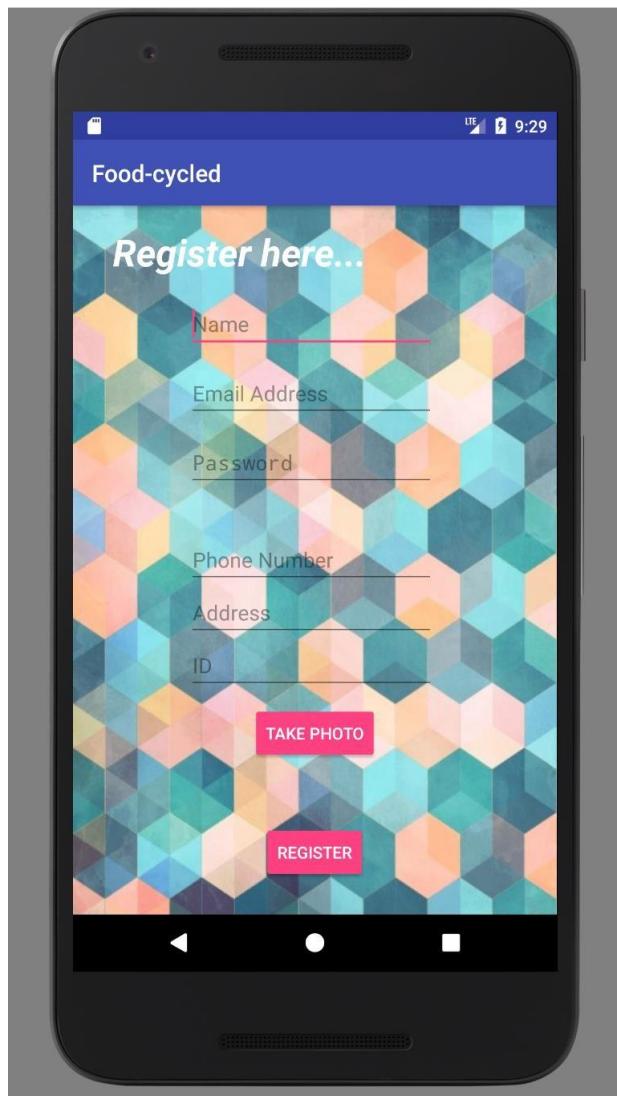
LAUNCH PAGE

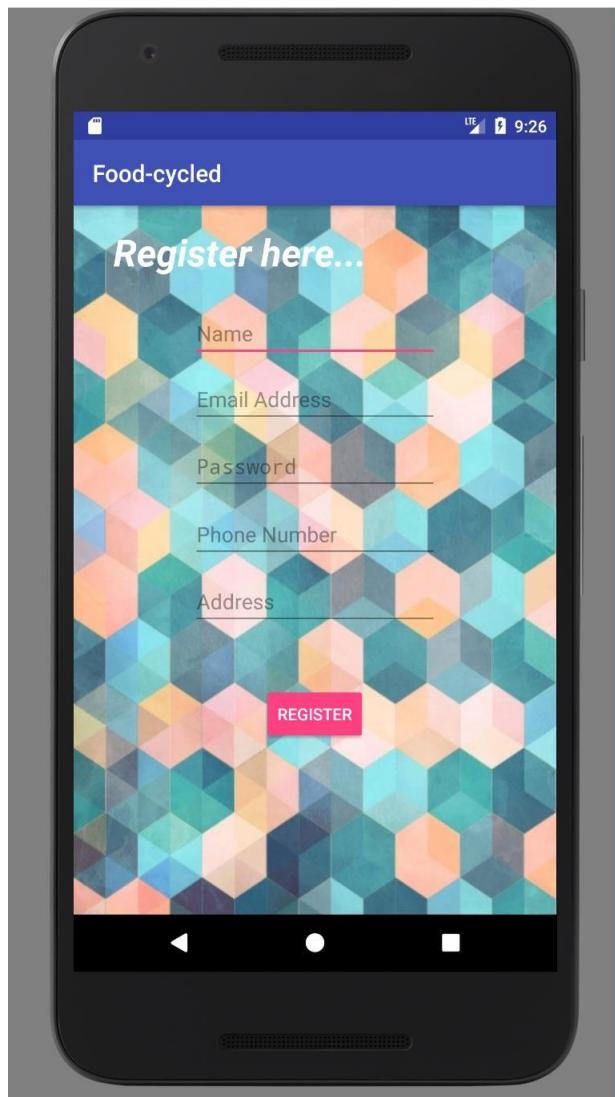


LOGIN PAGE

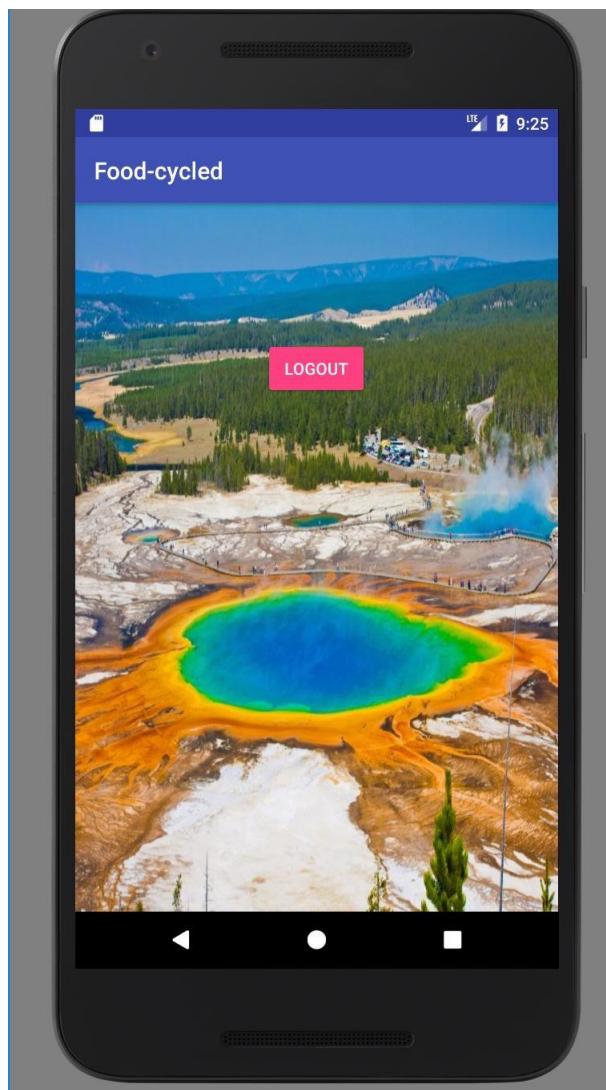


REGISTER PAGE

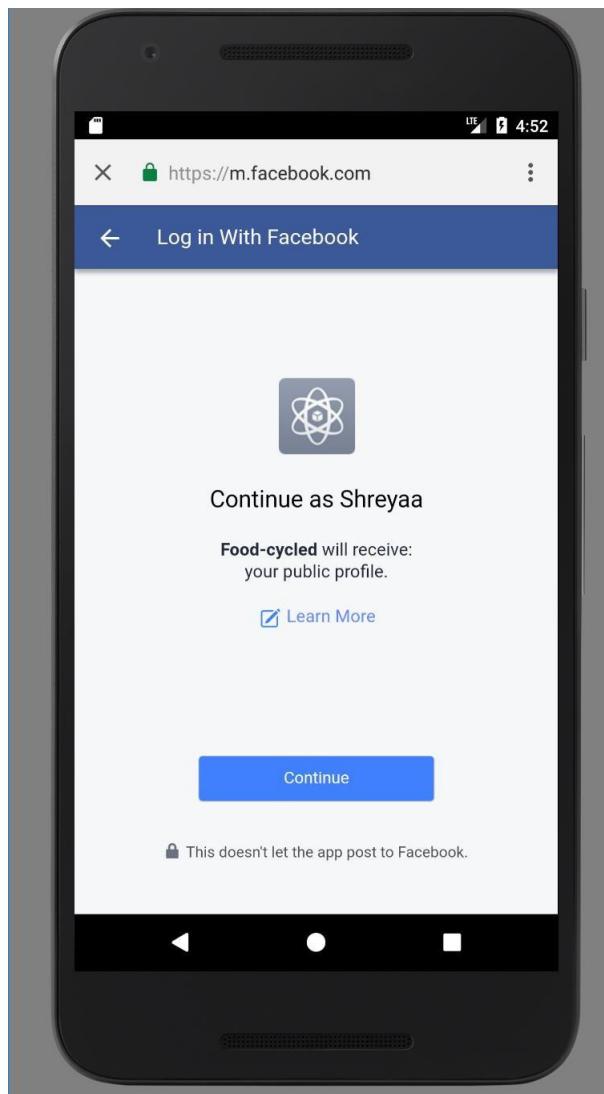
VOLUNTEER REGISTER PAGE

USER REGISTER PAGE

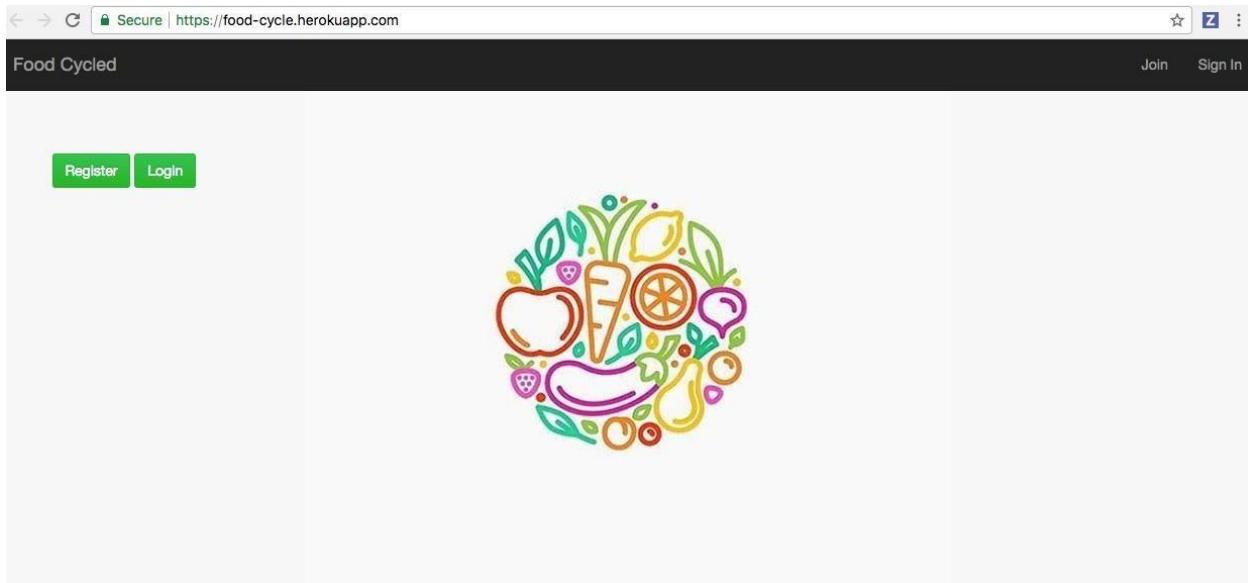
HOME PAGE



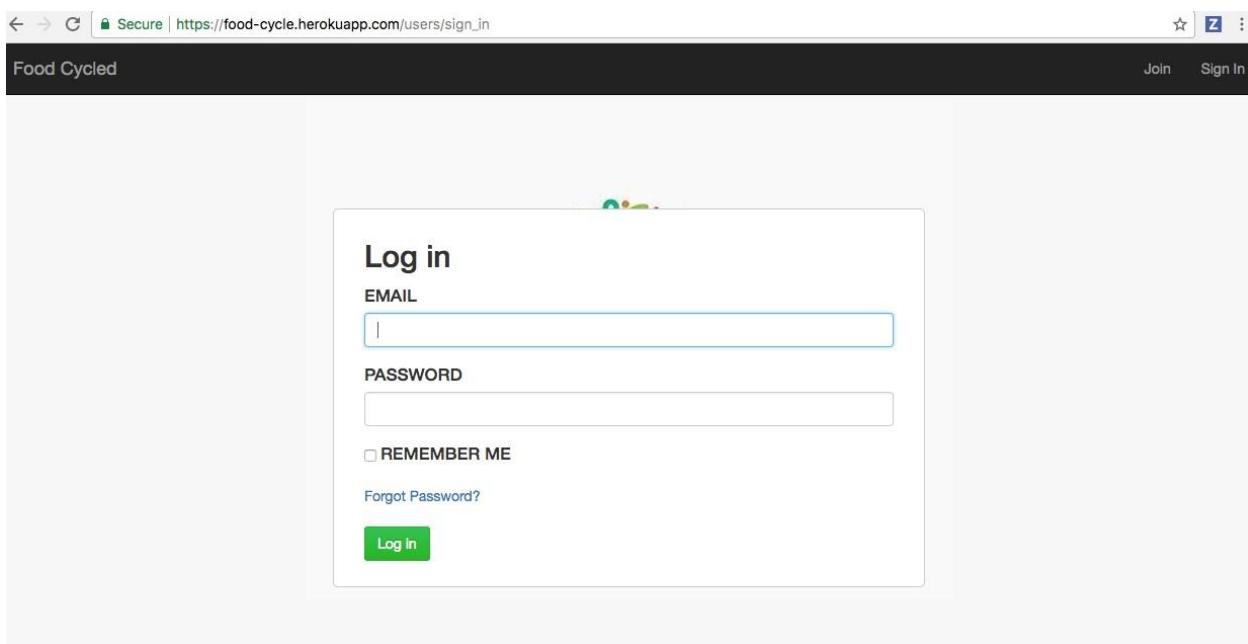
FACEBOOK OAUTH



LAUNCH PAGE



LOGIN PAGE



REGISTER PAGE

The screenshot shows a web browser window with the URL https://food-cycle.herokuapp.com/users/sign_up. The page title is "Food Cycled". On the right side of the header, there are "Join" and "Sign In" buttons. The main content area is titled "Sign up". It contains four input fields: "NAME" (with placeholder " "), "EMAIL" (with placeholder " "), "PASSWORD (6 characters minimum)" (with placeholder " "), and "PASSWORD CONFIRMATION" (with placeholder " "). Below these fields is a green "Sign up" button. At the bottom of the form, there is a link "Already have an account?".

EDIT PROFILE PAGE

The screenshot shows a web browser window with the URL <https://food-cycle.herokuapp.com/users/edit>. The page title is "Edit Profile". The main content area is titled "Edit Profile". It contains five input fields: "NAME" (with value "battu"), "EMAIL" (with value "nbh95@mail.umkc.edu"), "PASSWORD (leave blank if you don't want to change it)" (empty), "6 characters minimum" (text below the password field), "PASSWORD CONFIRMATION" (empty), and "CURRENT PASSWORD (we need your current password to confirm your changes)" (empty). Below these fields is a green "Update" button. At the bottom of the form, there is a link "Back".

VI. SECOND INCREMENT REPORT

i. Existing Services/REST API

Facebook OAuth Login API , Food API, Google Maps API ,Google Auth LoginAPI, Camera API

ii. Detailed Design of Features

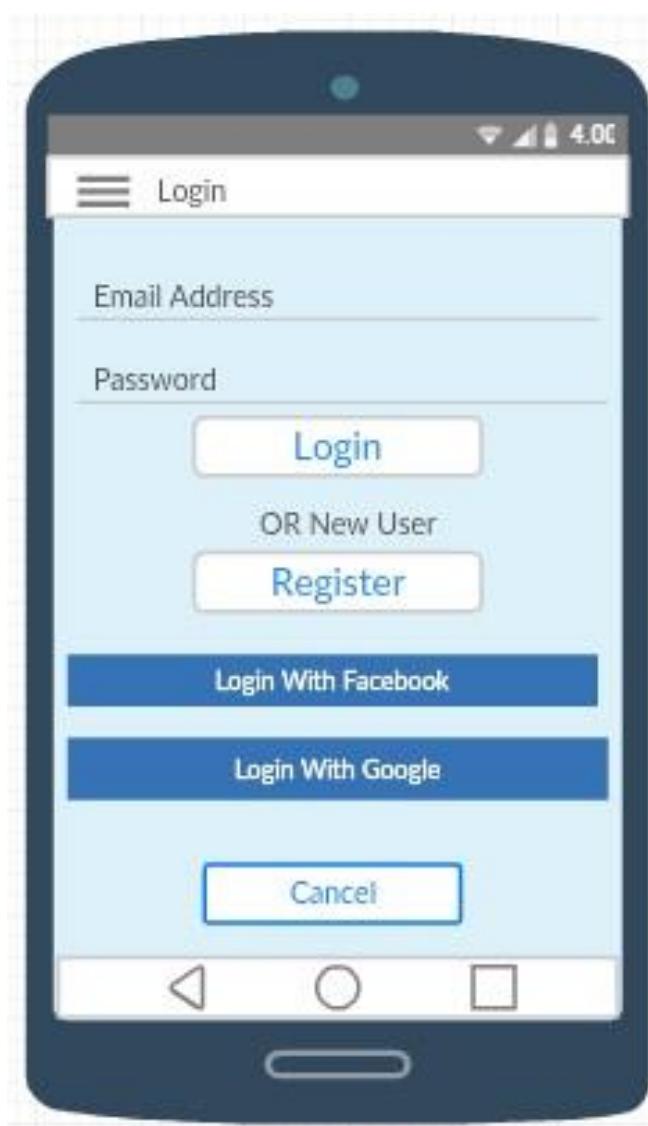
WIREFRAMES

LAUNCH PAGE



LOGIN PAGE

Login Page contains Username and Password. User can register through register button. User can Login through Facebook and Google.



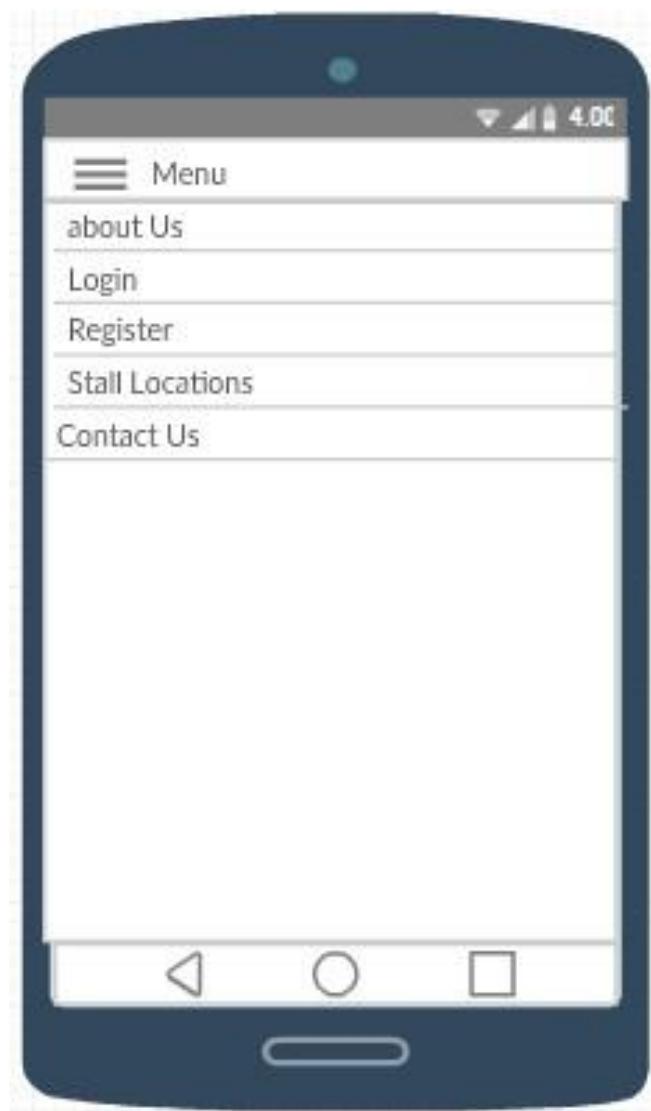
REGISTRATION PAGE

User will be providing the basic details for registration.



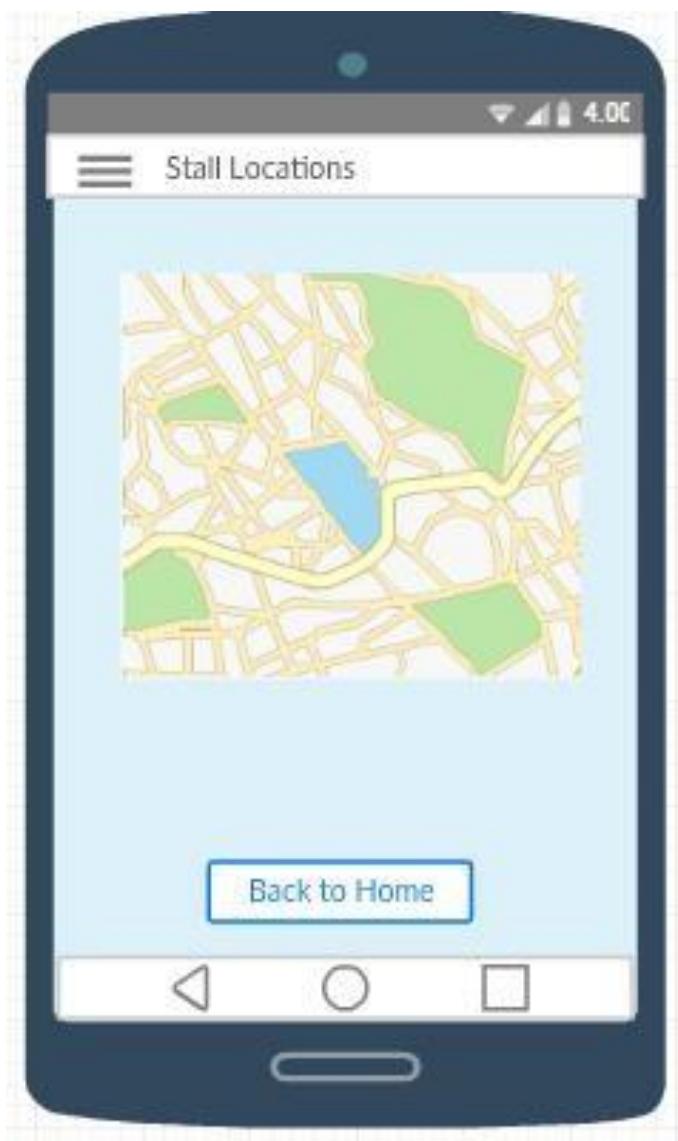
SIDE MENU

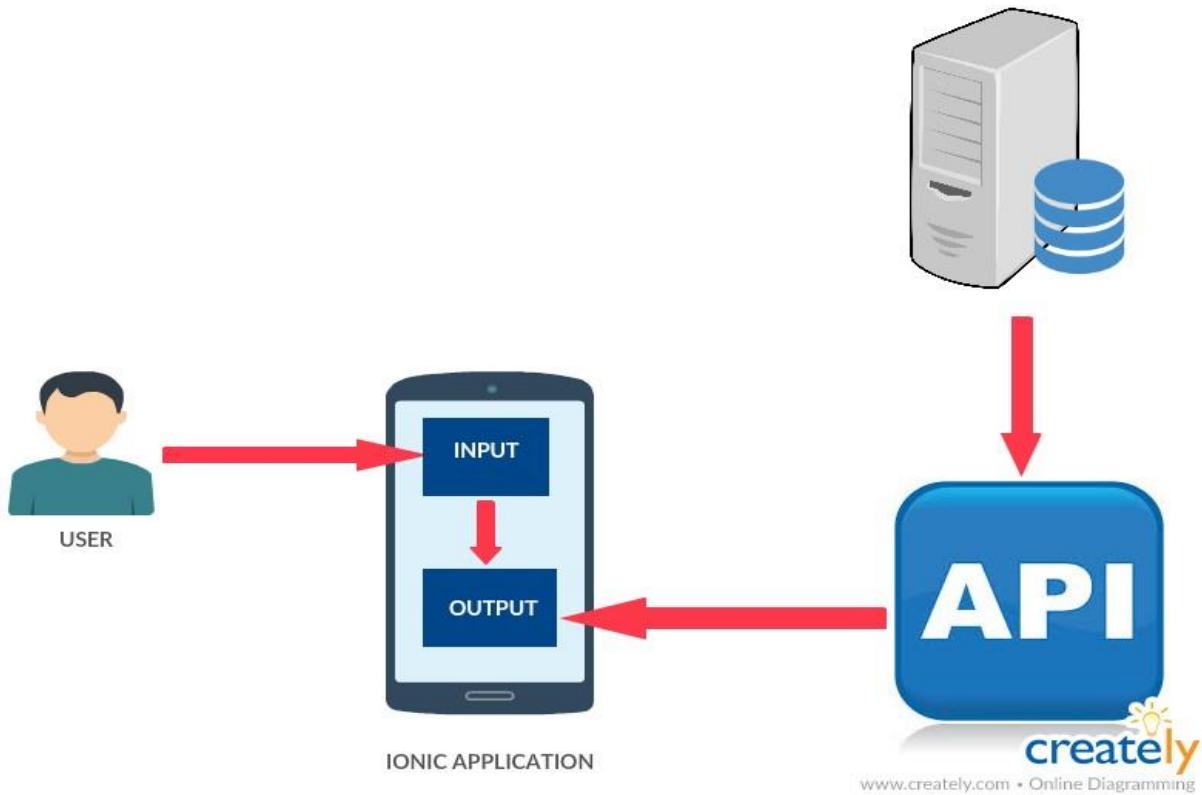
If you press the menu bar to the left ,the following options About us,Login,Register,Stall Locations,Contact US will be displayed.



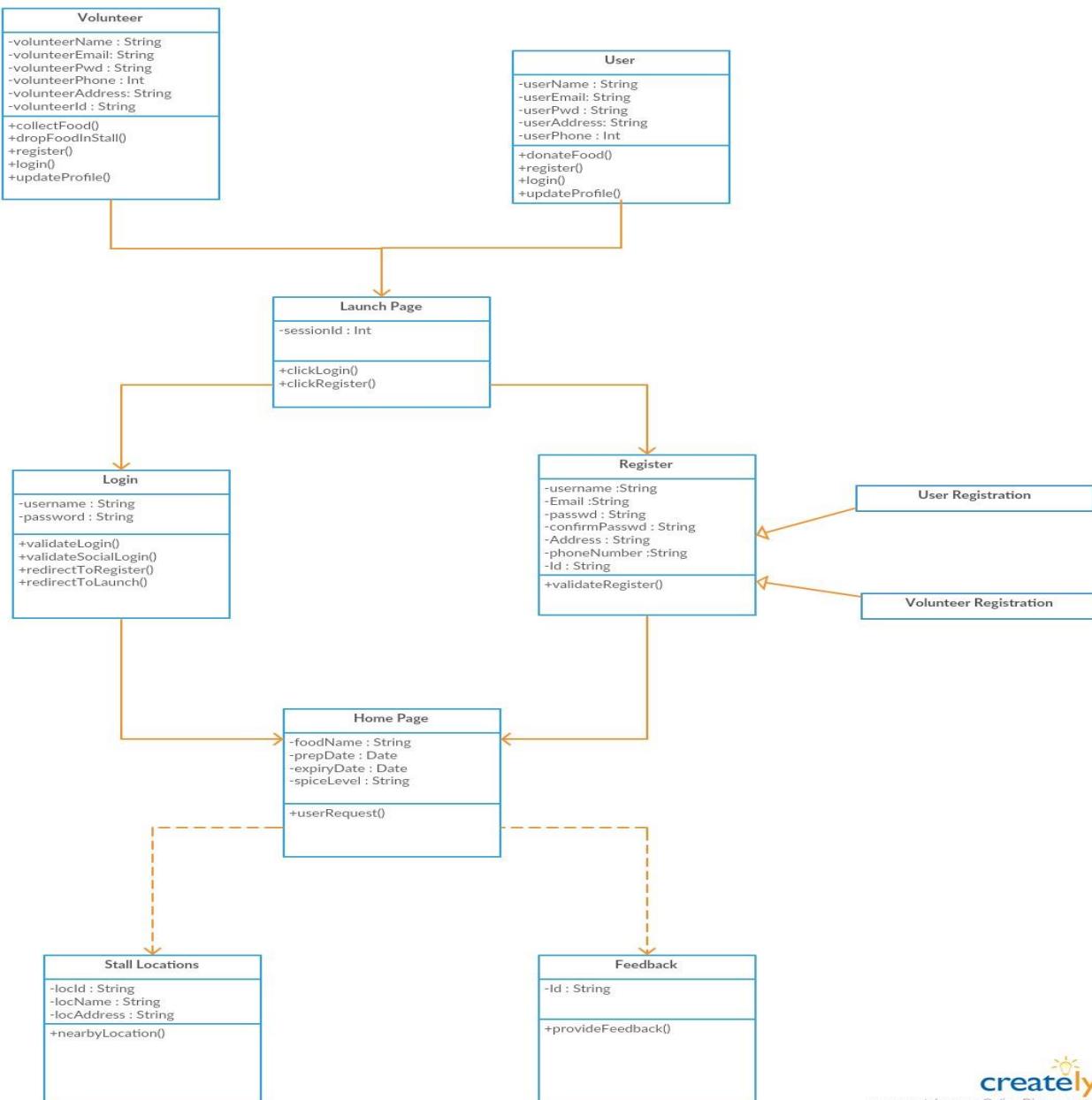
STALL LOCATIONS IN MAPS

Displays nearby Stall locations and has a button to redirect to the Launch Page.



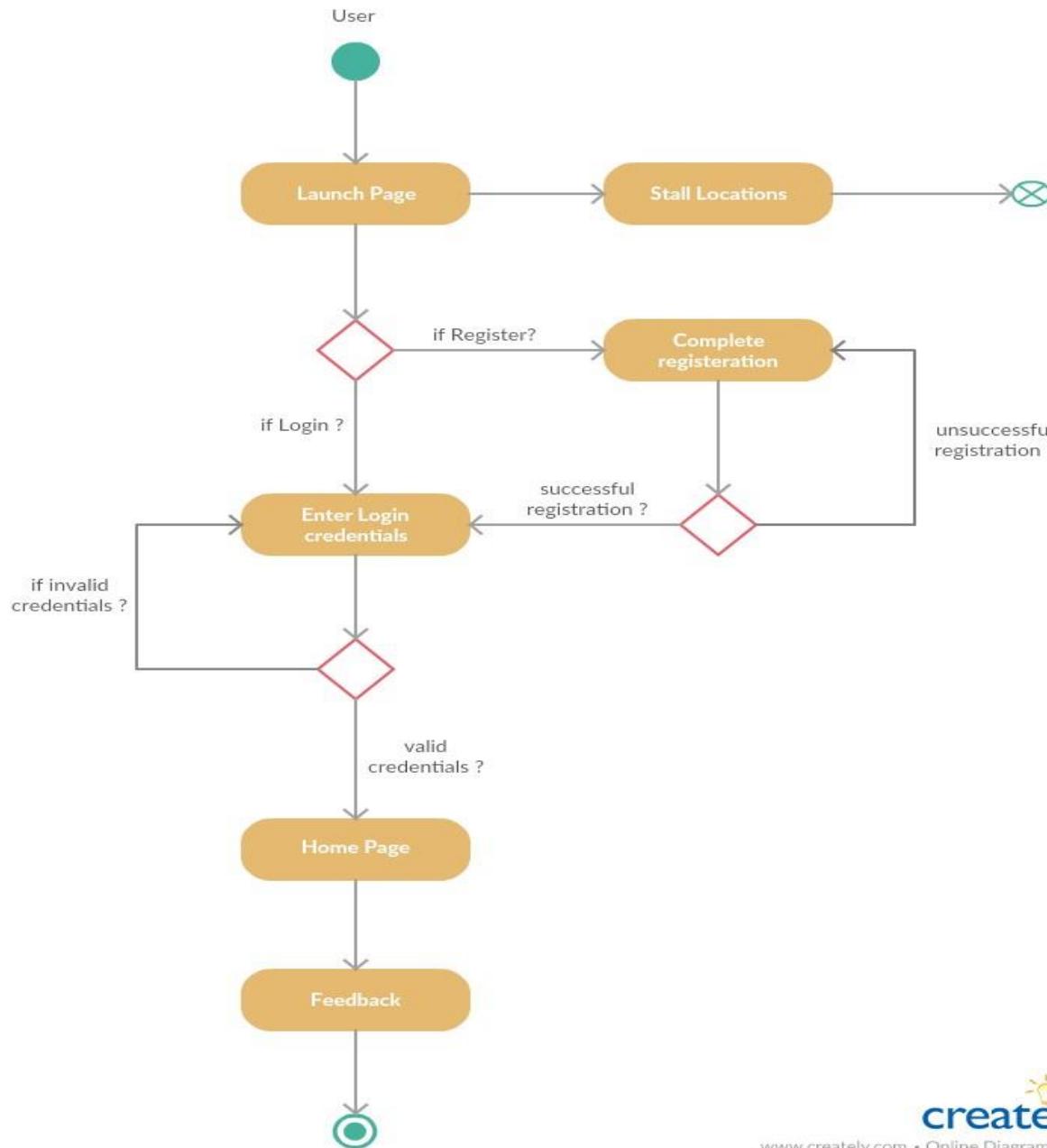
ARCHITECTURE DIAGRAM**CLASS DIAGRAM**

This is the class diagram which represents the Login ,Home and Register page . User and Volunteer are inherited from Register as they have to register with same details. After entering credentials once authentication is successful it will redirect to Home page.

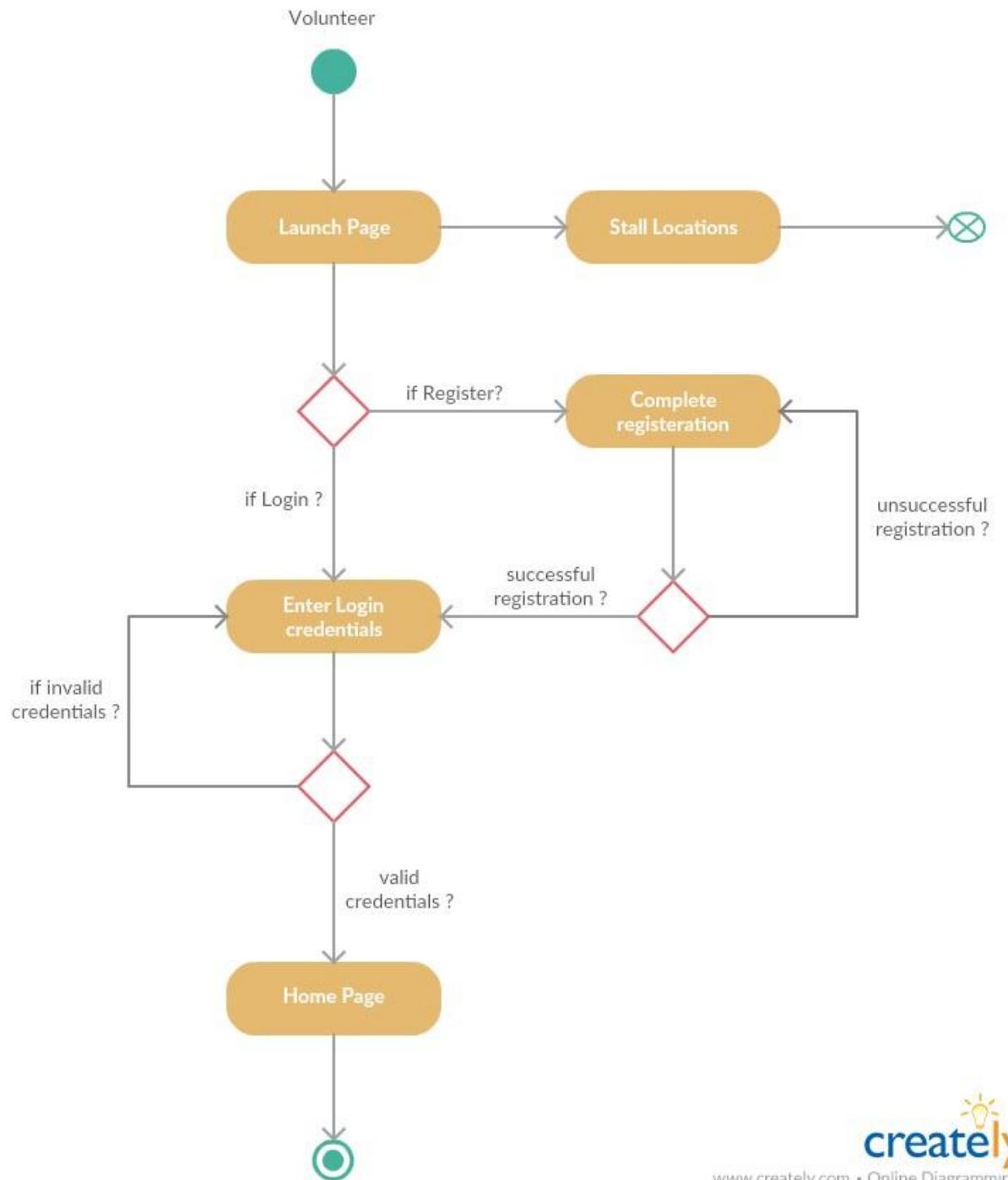


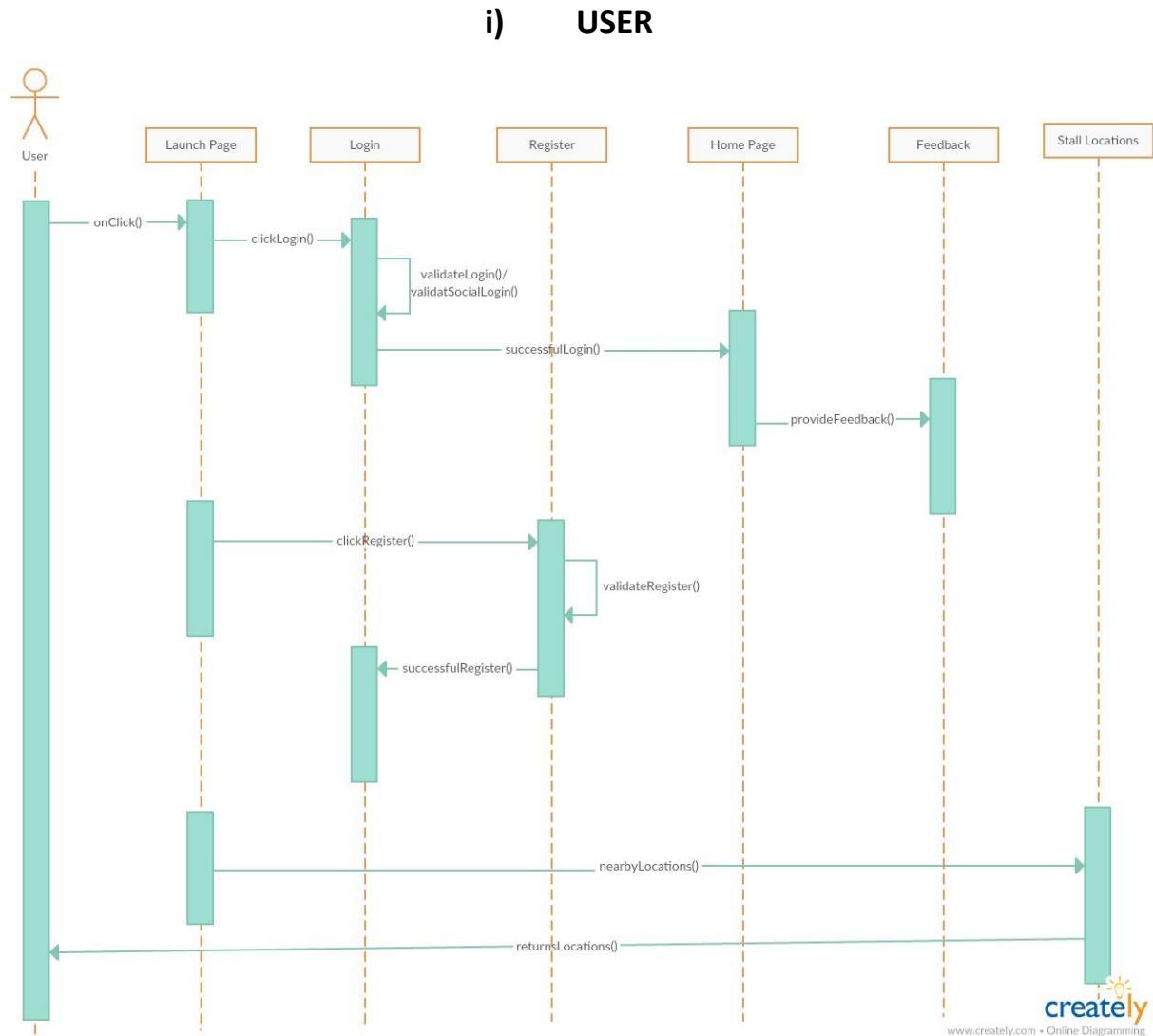
ACTIVITY DIAGRAM

Activity diagram describes the flow of activities involved for user and volunteers to login and to register to enter the home page.

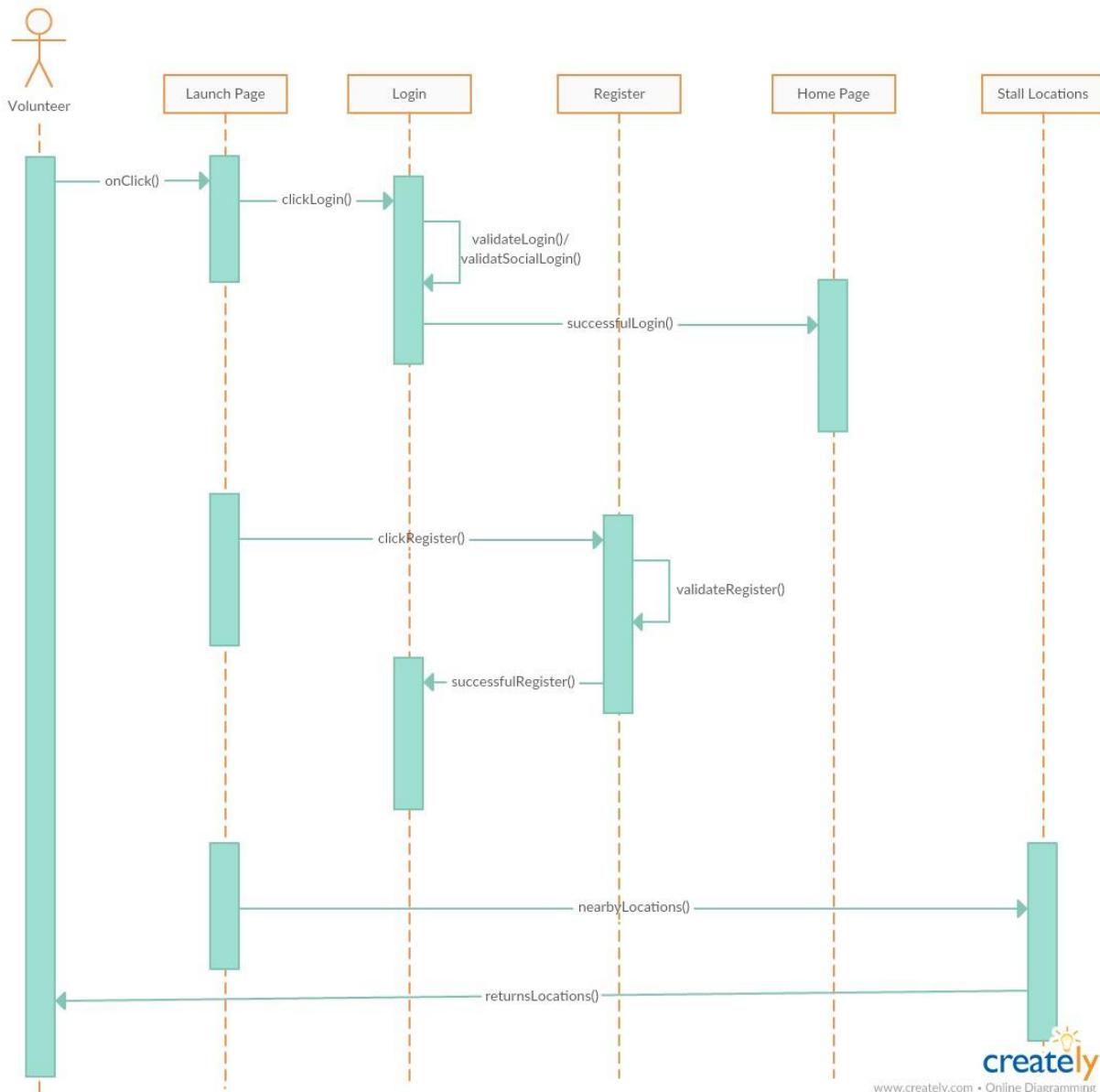
i) **USER**

ii) VOLUNTEER

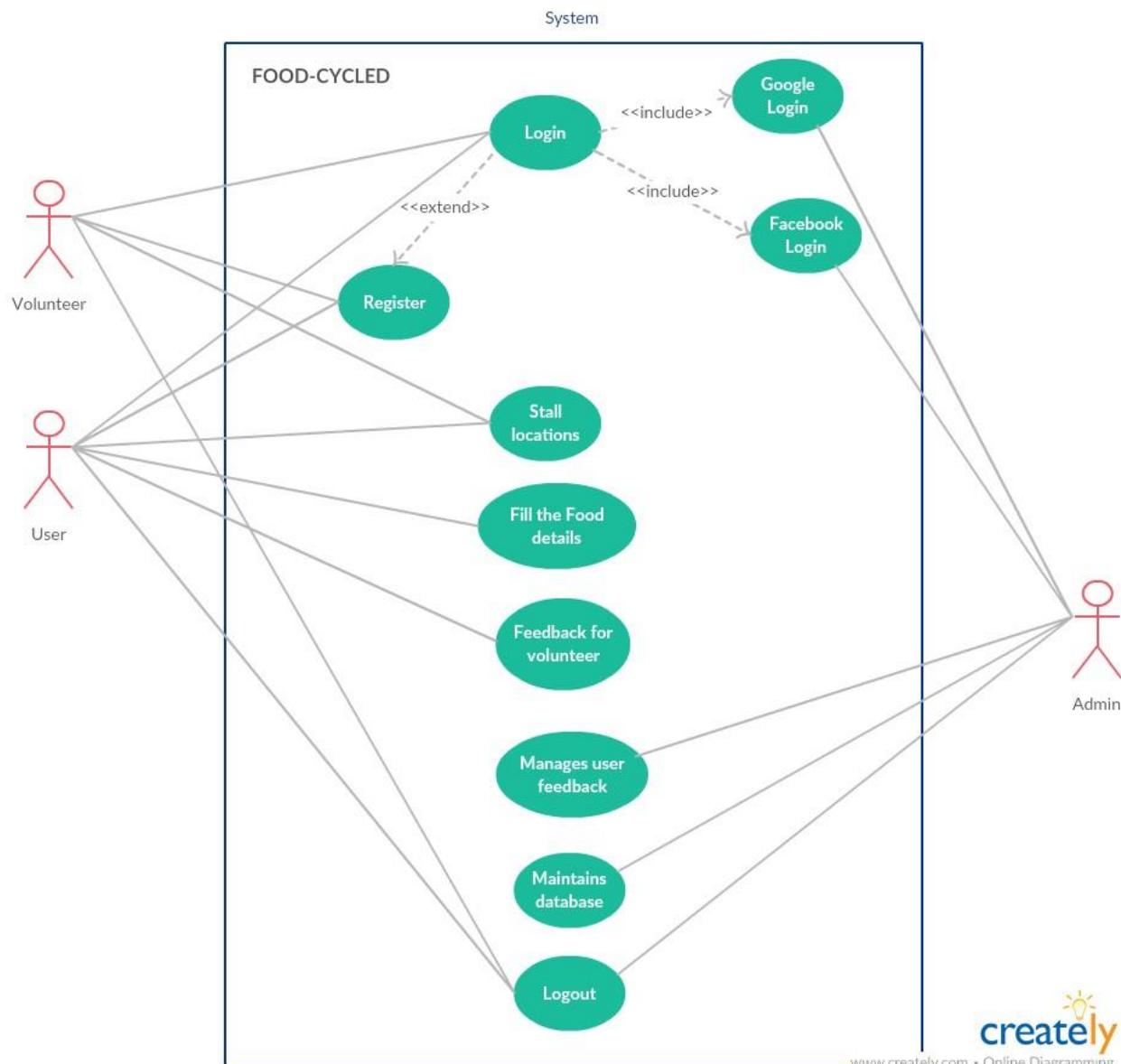


SEQUENCE DIAGRAM

www.creately.com • Online Diagramming

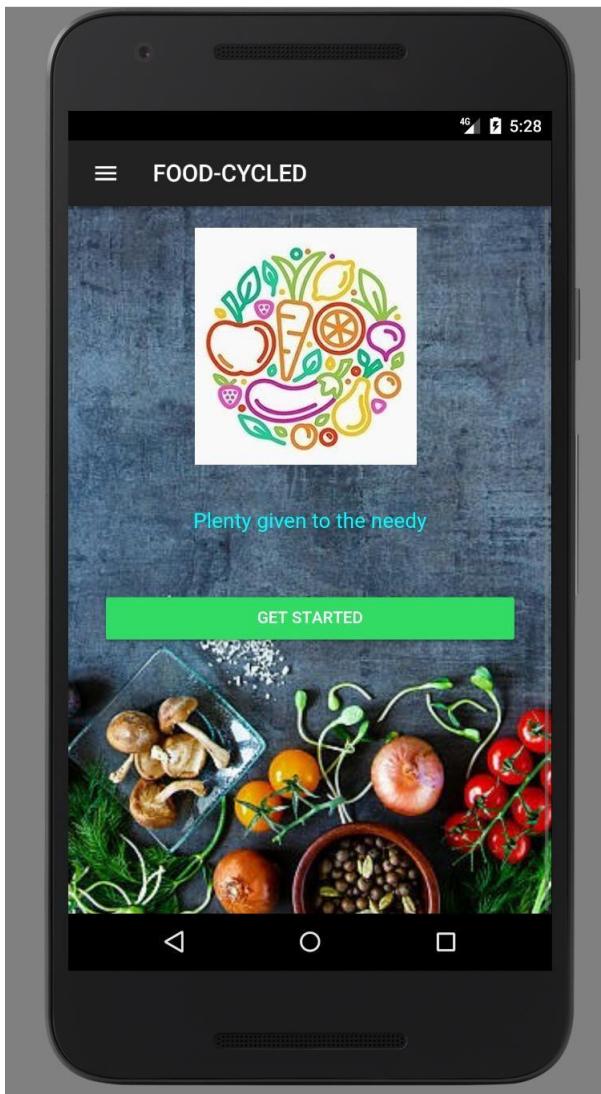
ii)VOLUNTEER**creately**

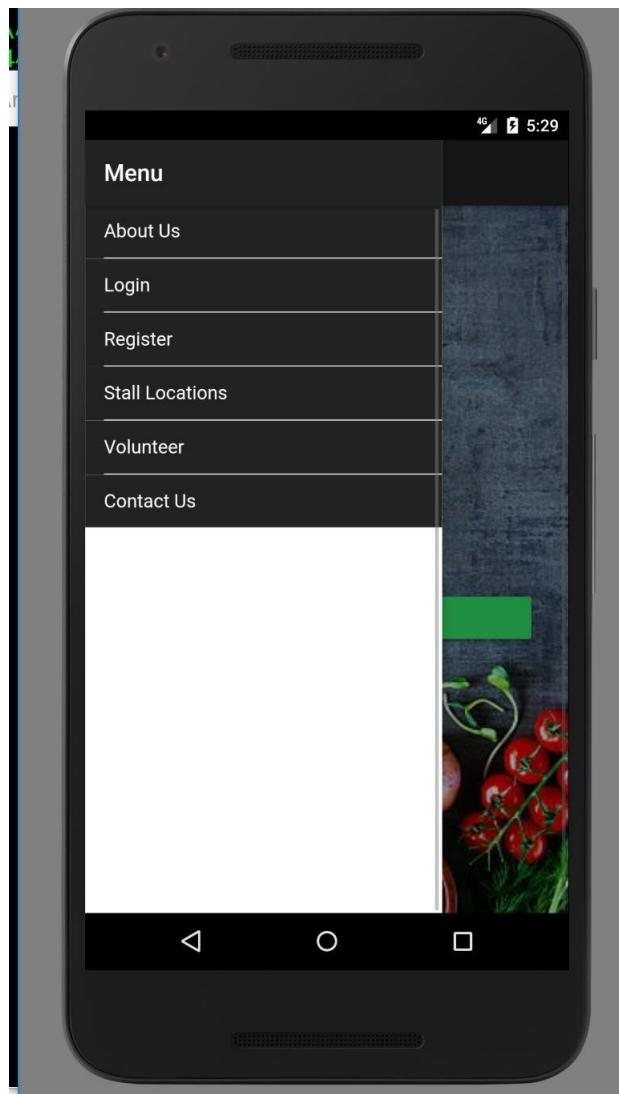
www.creately.com • Online Diagramming

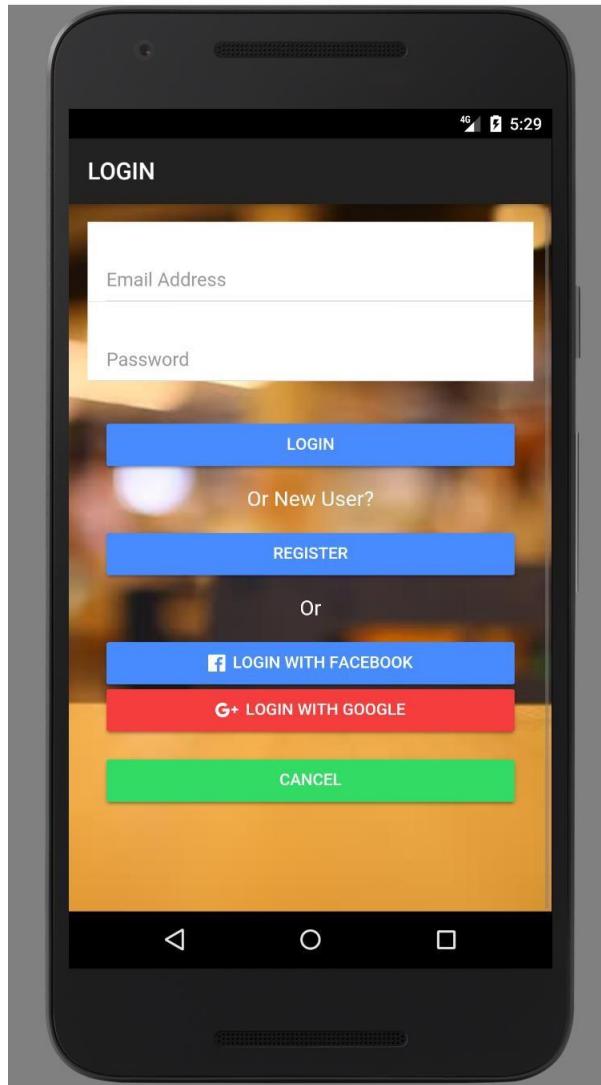
USECASE DIAGRAM

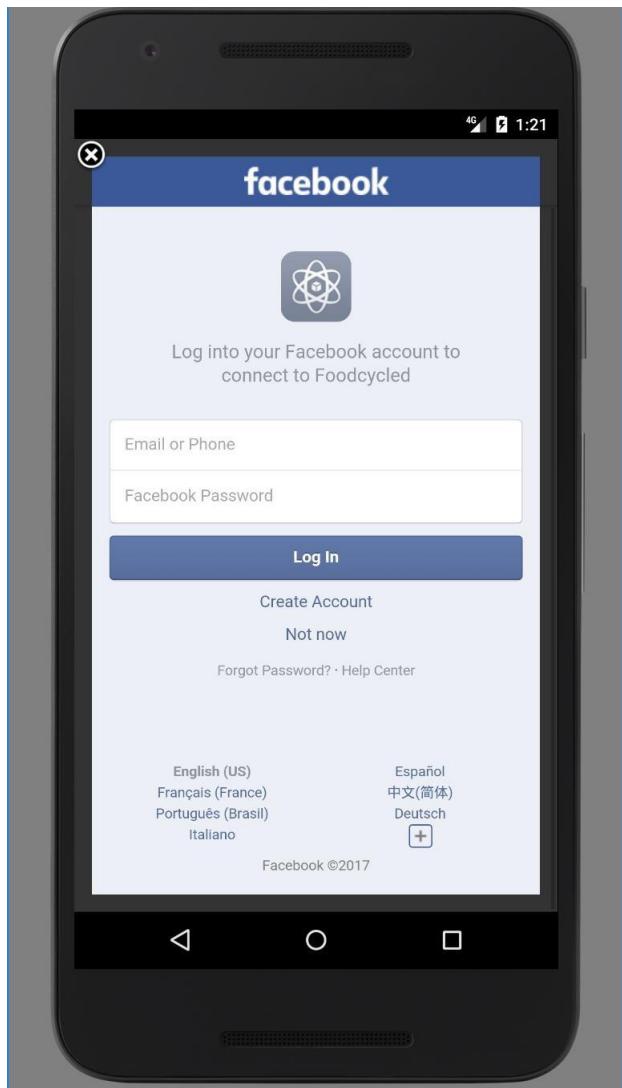
IMPLEMENTATION

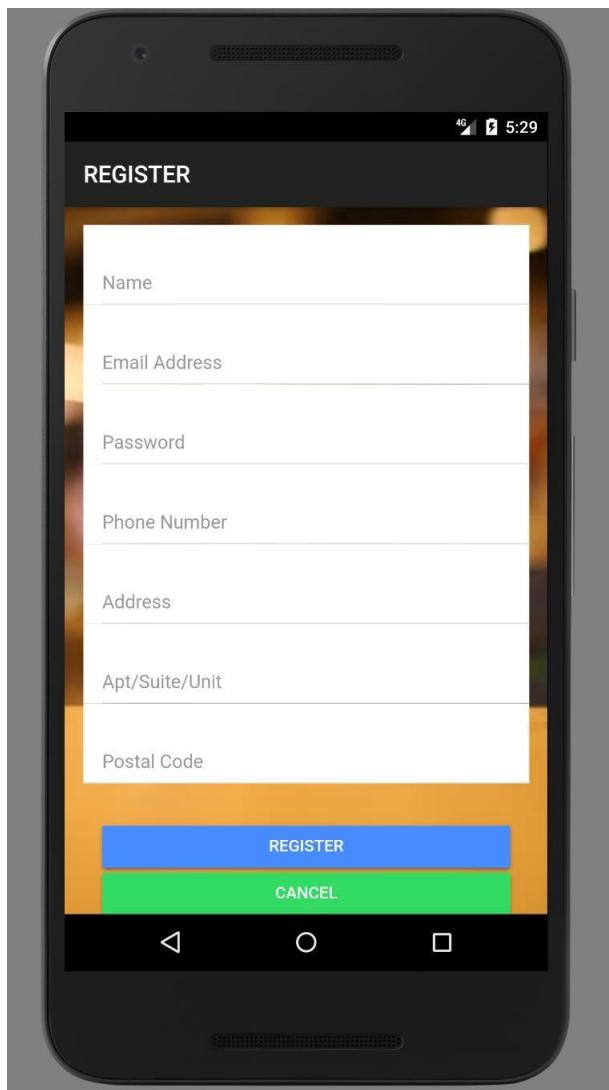
LAUNCH PAGE

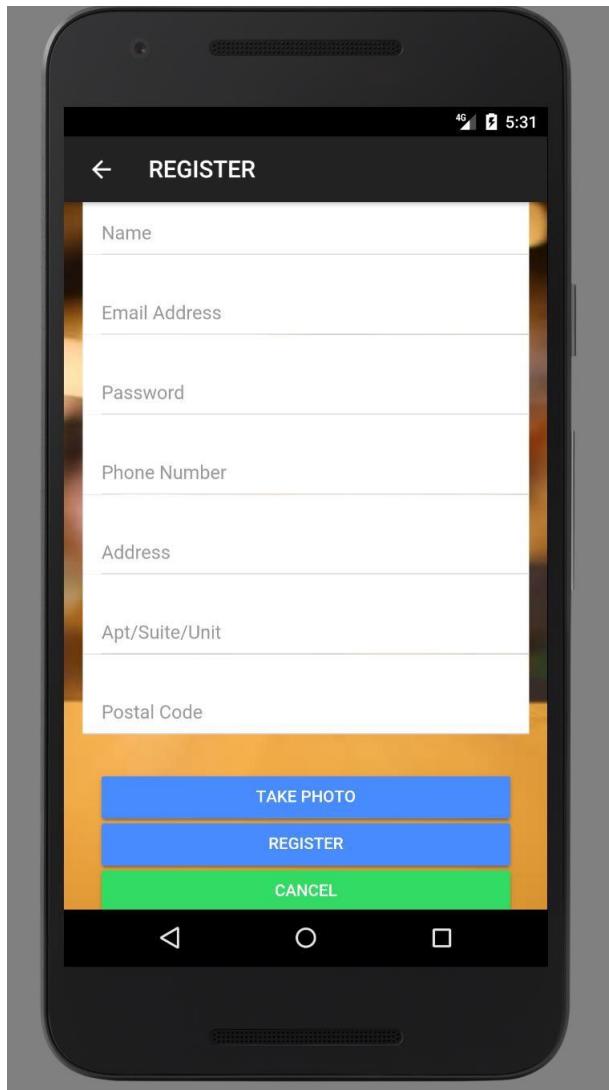


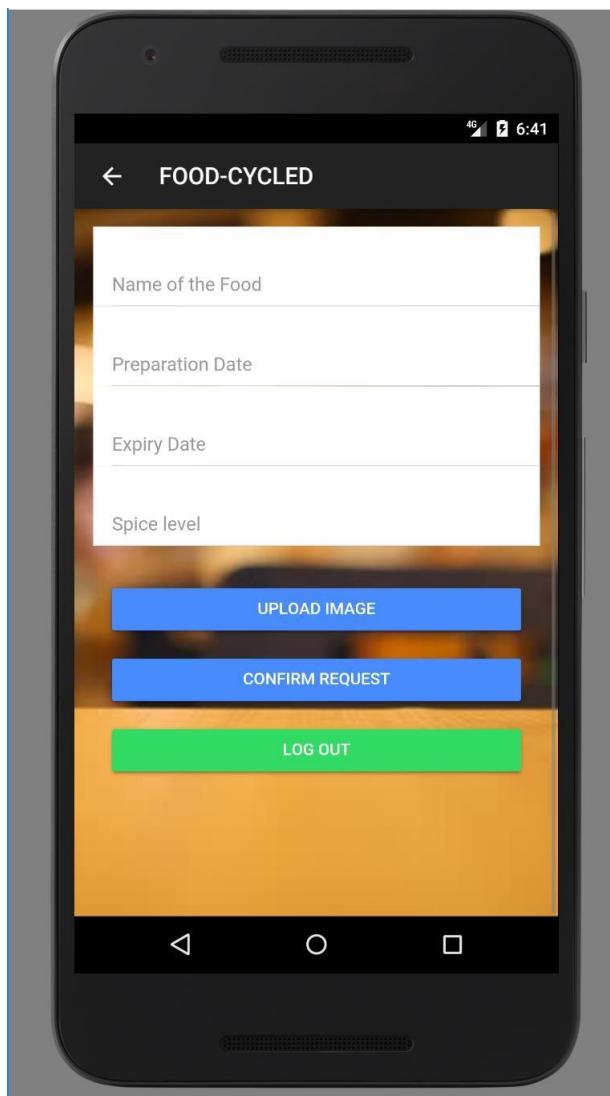
MENU PAGE

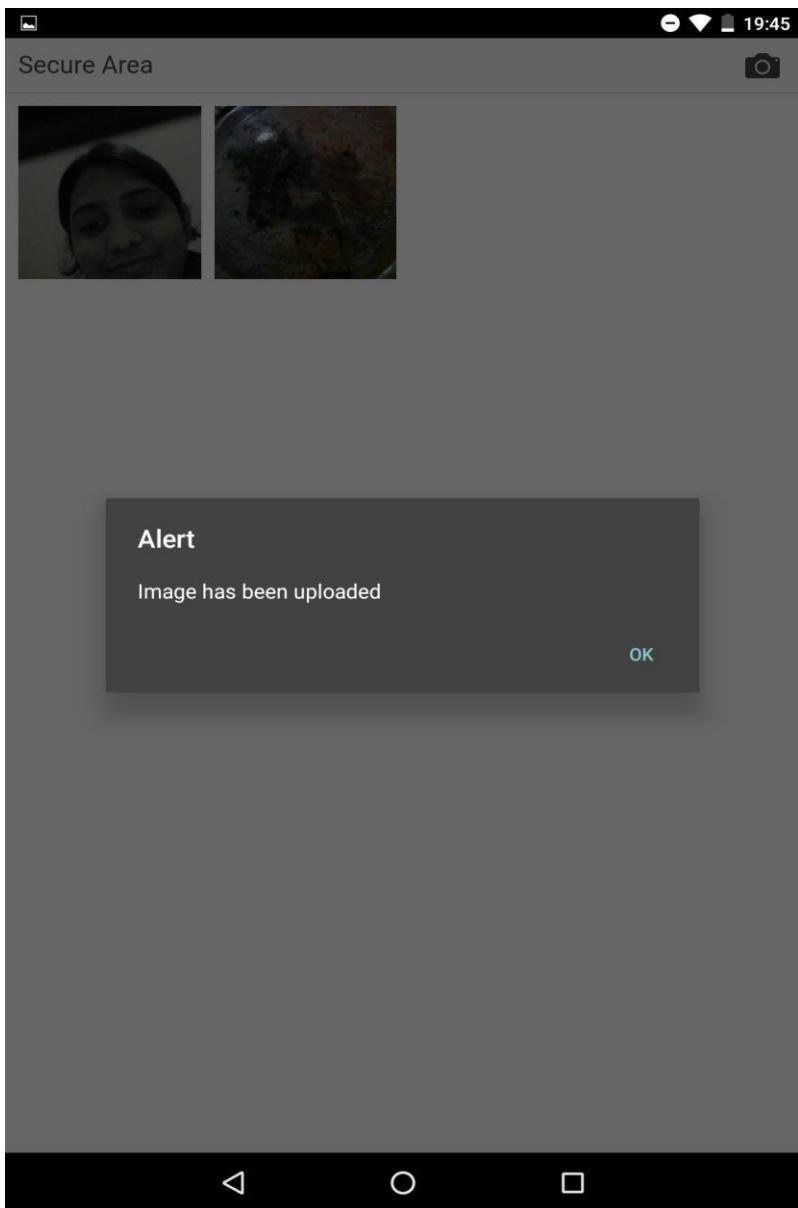
LOGIN PAGE

LOGIN WITH FACEBOOK

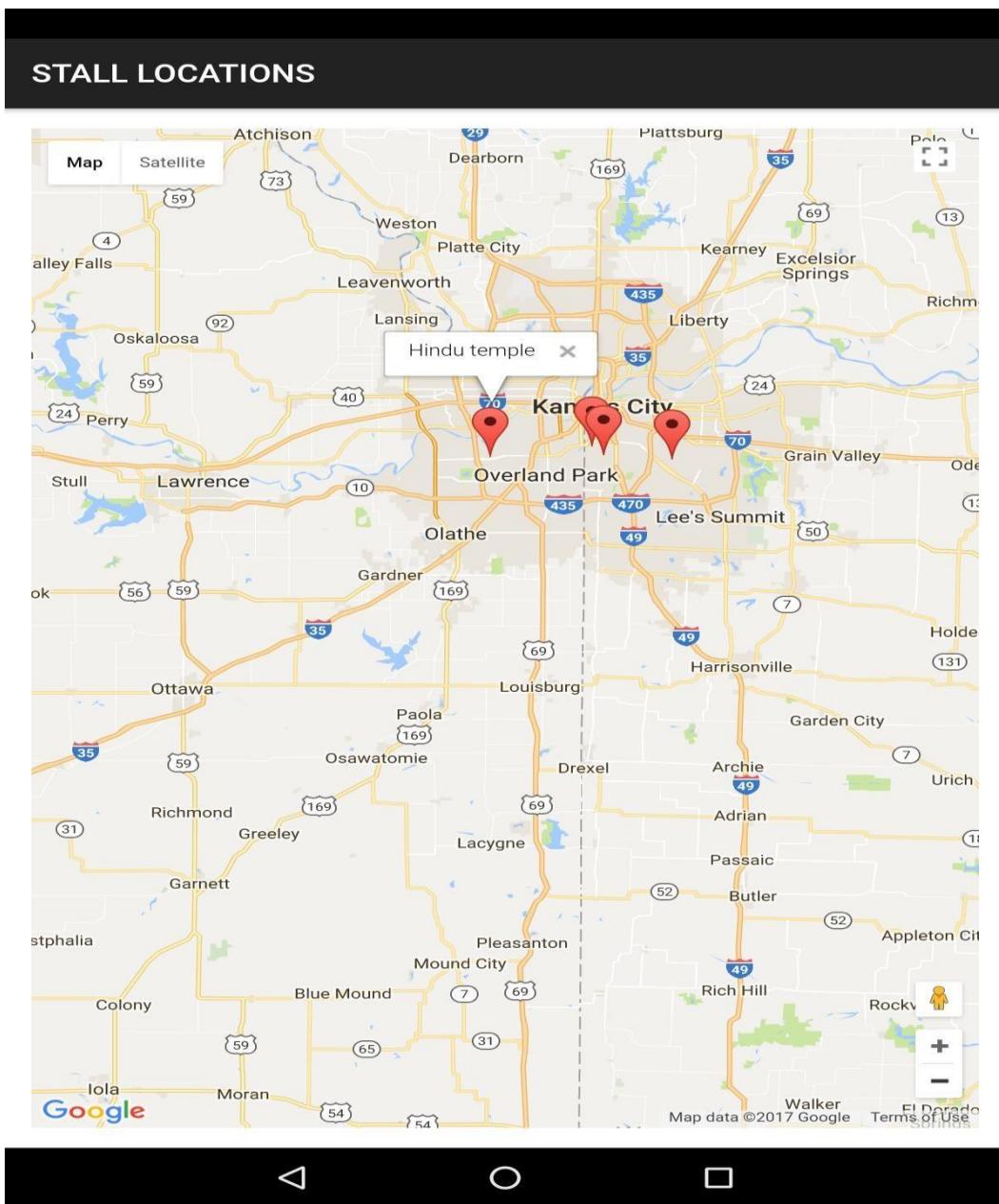
USER REGISTRATION PAGE

VOLUNTEER REGISTRATION PAGE

USER HOME PAGE

UPLOAD IMAGE

STALL LOCATIONS



VII. THIRD INCREMENT REPORT

i. Existing Services/REST API

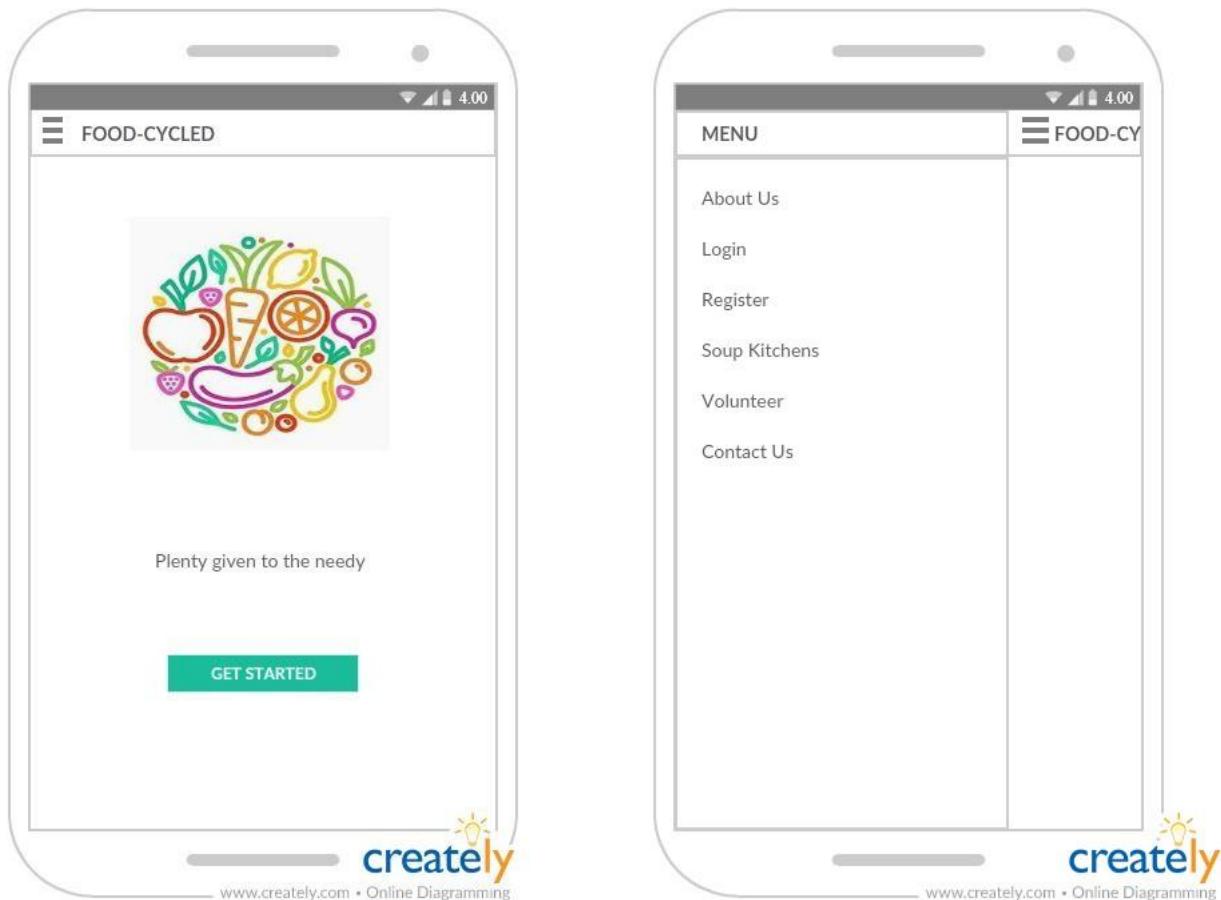
Facebook OAuth API , Food API, Google Maps API ,Google OAuth API, Camera API

ii. Detailed Design of Features

WIREFRAMES

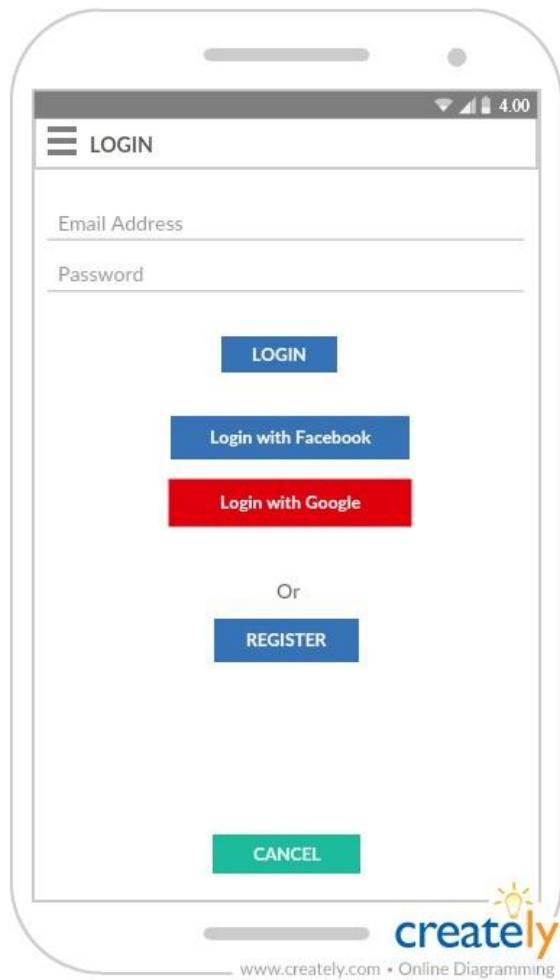
LAUNCH PAGE

The Launch Page of the **Food-cycled** application includes **GET STARTED** button which redirects to Login Page and a side menu bar which contains – **About Us , Login , Register , Soup Kitchens , Volunteer and Contact Us.**



LOGIN PAGE

The Login Page is common for both User and Volunteer. It redirects to their respective Dashboard. There are two Social Logins implemented – Facebook and Google.



REGISTER PAGE

The User and Volunteer registers separately using their basic details. Volunteer has to also upload their Image to register successfully. Upon Successful registration, it redirects to the Login Page.

USER REGISTRATION

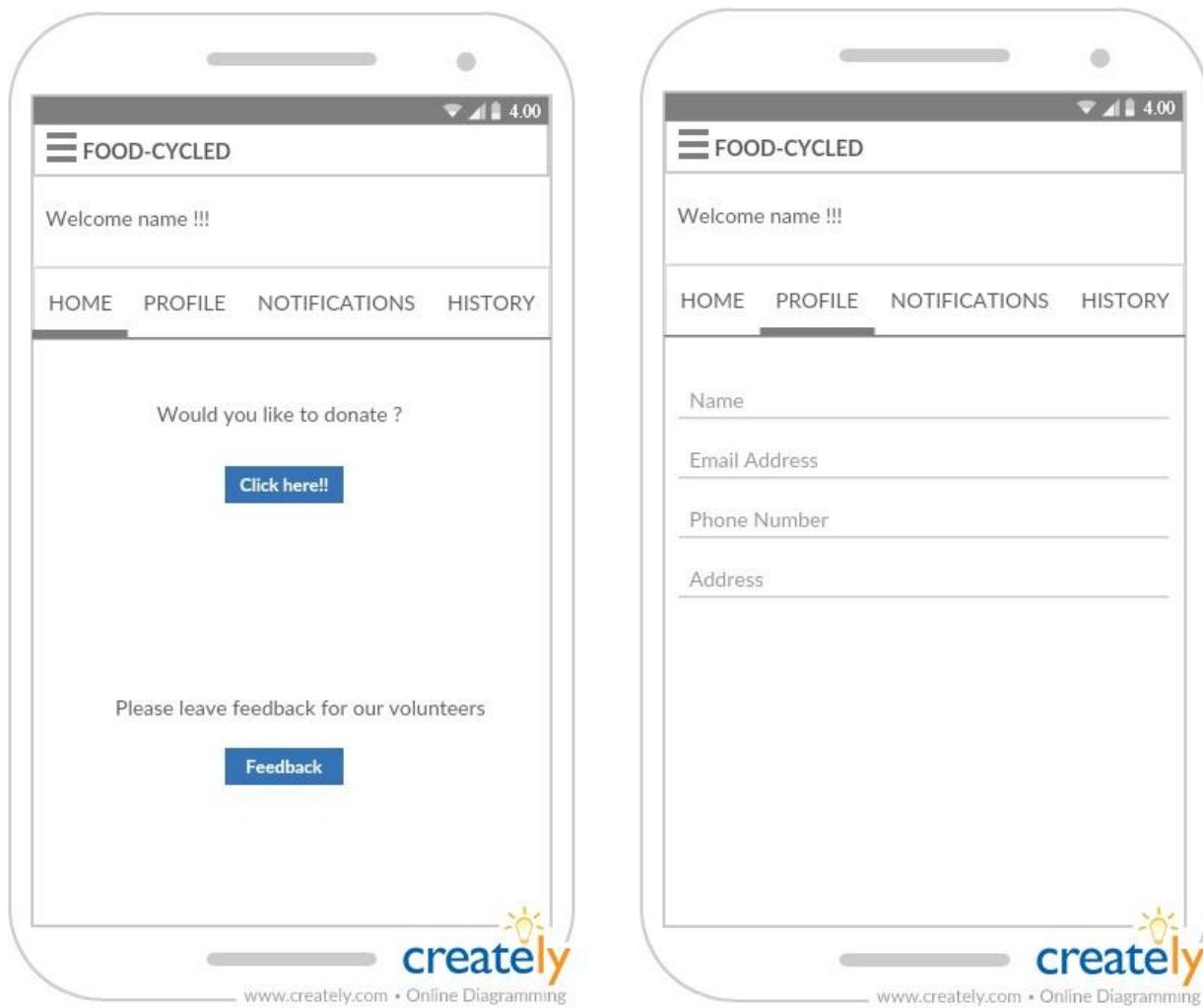
A smartphone screen displaying the User Registration form. The title "REGISTER" is at the top. Below it are six input fields: Name, Email Address, Password, Confirm Password, Phone Number, and Address. A blue "REGISTER" button is at the bottom. At the very bottom is a green "CANCEL" button and the "creately" logo with the tagline "www.creately.com • Online Diagramming".

VOLUNTEER REGISTRATION

A smartphone screen displaying the Volunteer Registration form. It is similar to the User Registration form but includes an additional "ID" field. It also includes an "UPLOAD IMAGE" button above the "REGISTER" button. The layout is identical to the User registration screen, with the "REGISTER" button at the bottom and the "creately" logo at the bottom.

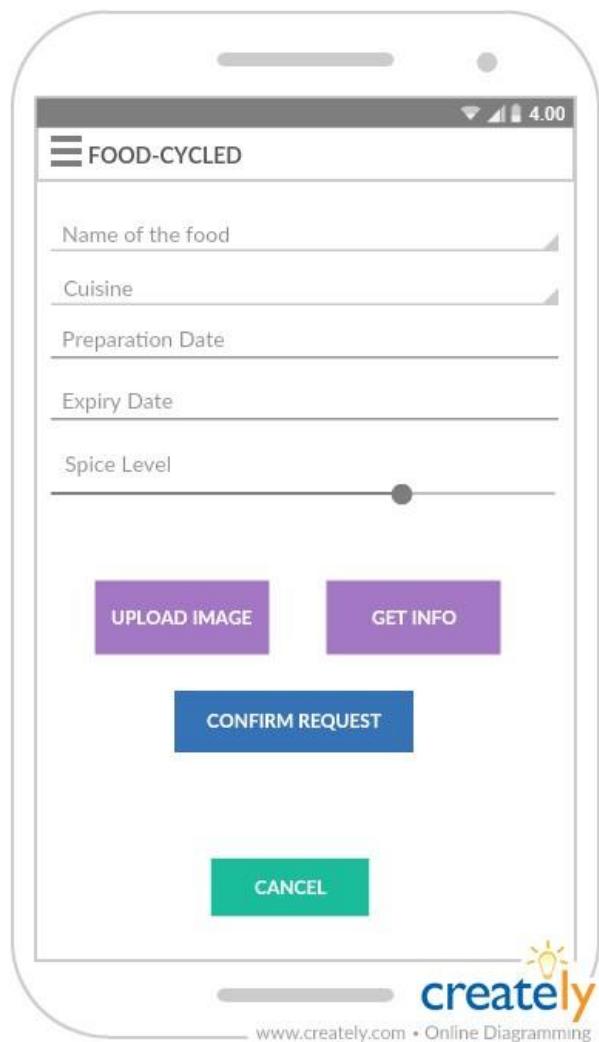
USER DASHBOARD

Upon successful login, User lands in this dashboard page. It displays User name and provides user with tabs – Home, Profile , Notification and History, where Home is the default Tab. In the Home tab , there are two buttons – Click here and Feedback. ‘Click here’ redirects to the Food Request Page and ‘Feedback’ redirects to the Feedback Page.



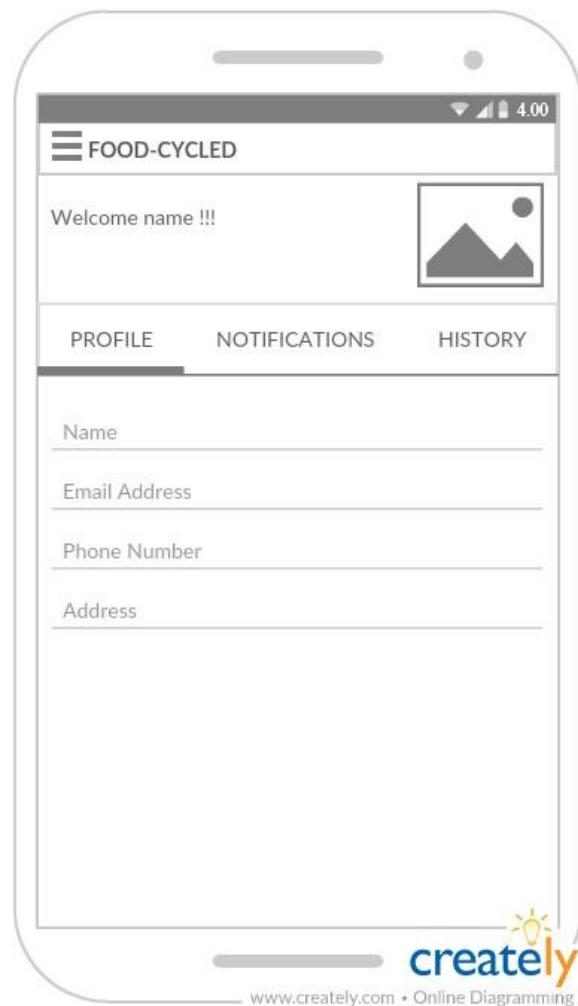
FOOD REQUEST PAGE

For each food the user would like to donate, he/she needs to fill details like – name of food, cuisine, preparation date , expiry date, spice level and also upload image. ‘Get Info’ provides the nutrition details of the food entered and ‘Confirm Request’ sends notification to all volunteers.



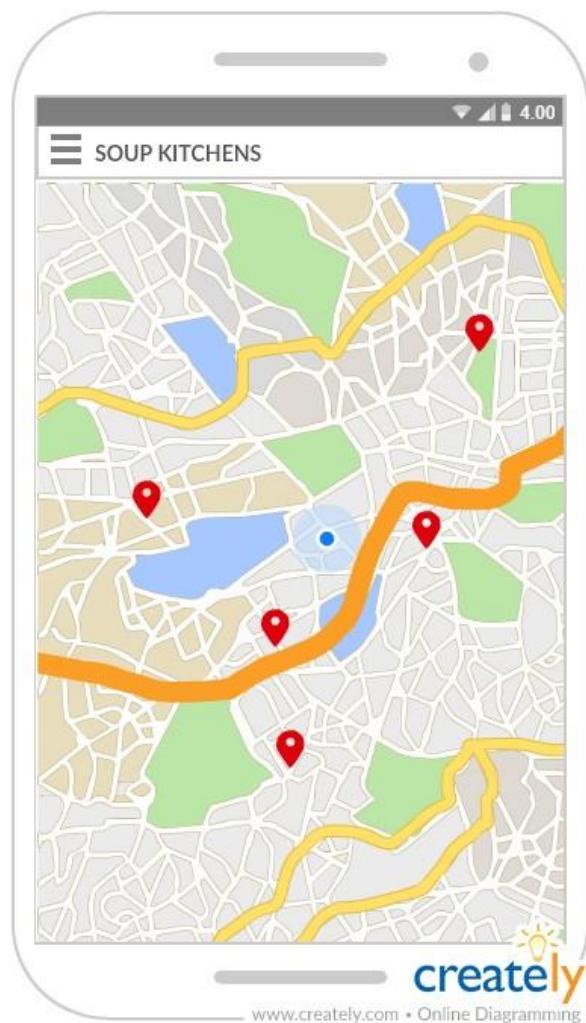
VOLUNTEER DASHBOARD

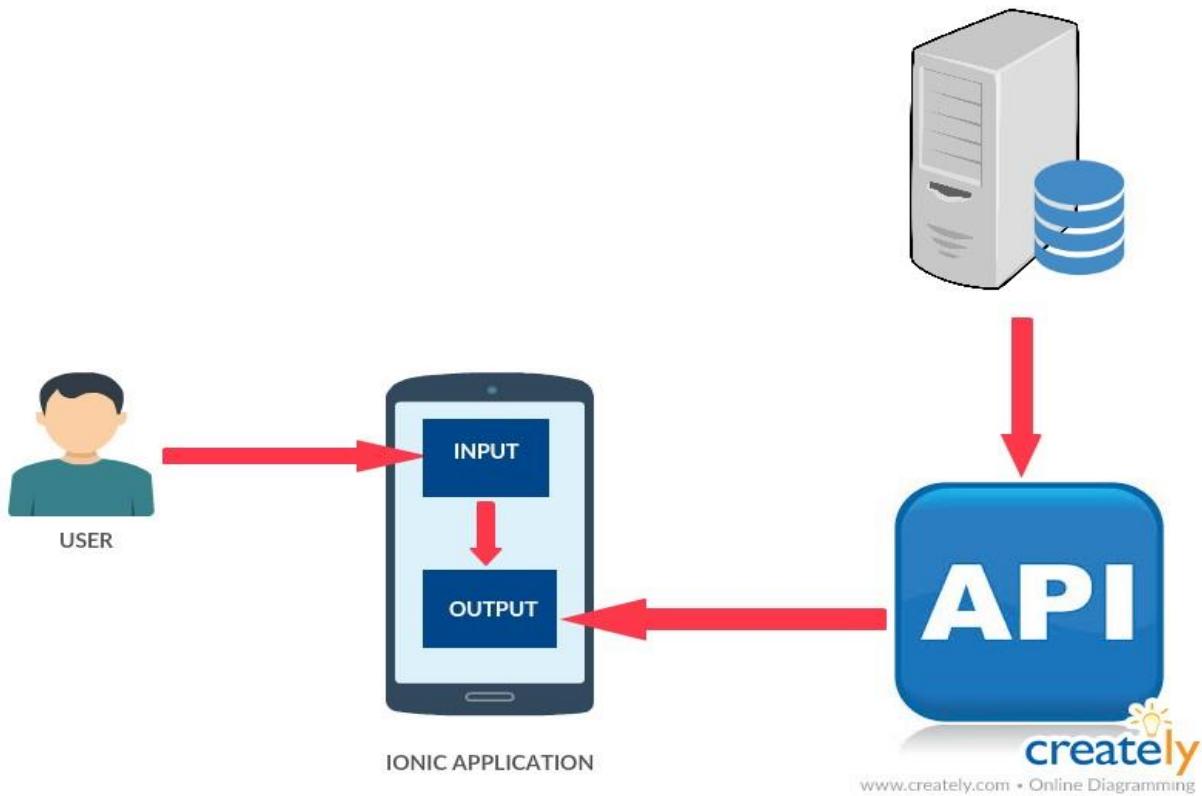
Upon successful Login, Volunteers land on their Dashboard page. Here the Volunteer Name and Image is displayed. There are three tabs – Profile, Notifications and History which displays the respective information. Notifications tab displays the new food requests.



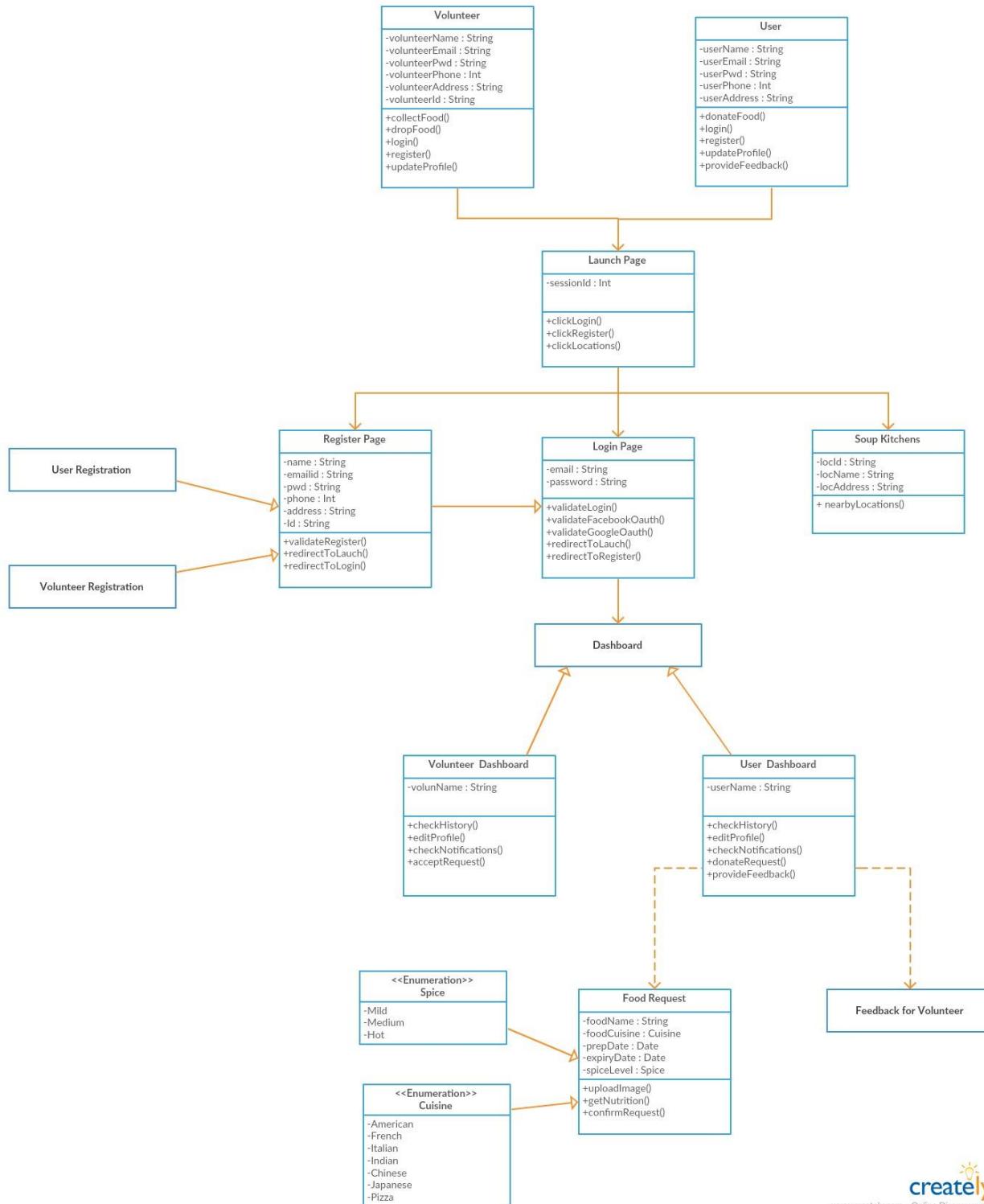
SOUP KITCHENS

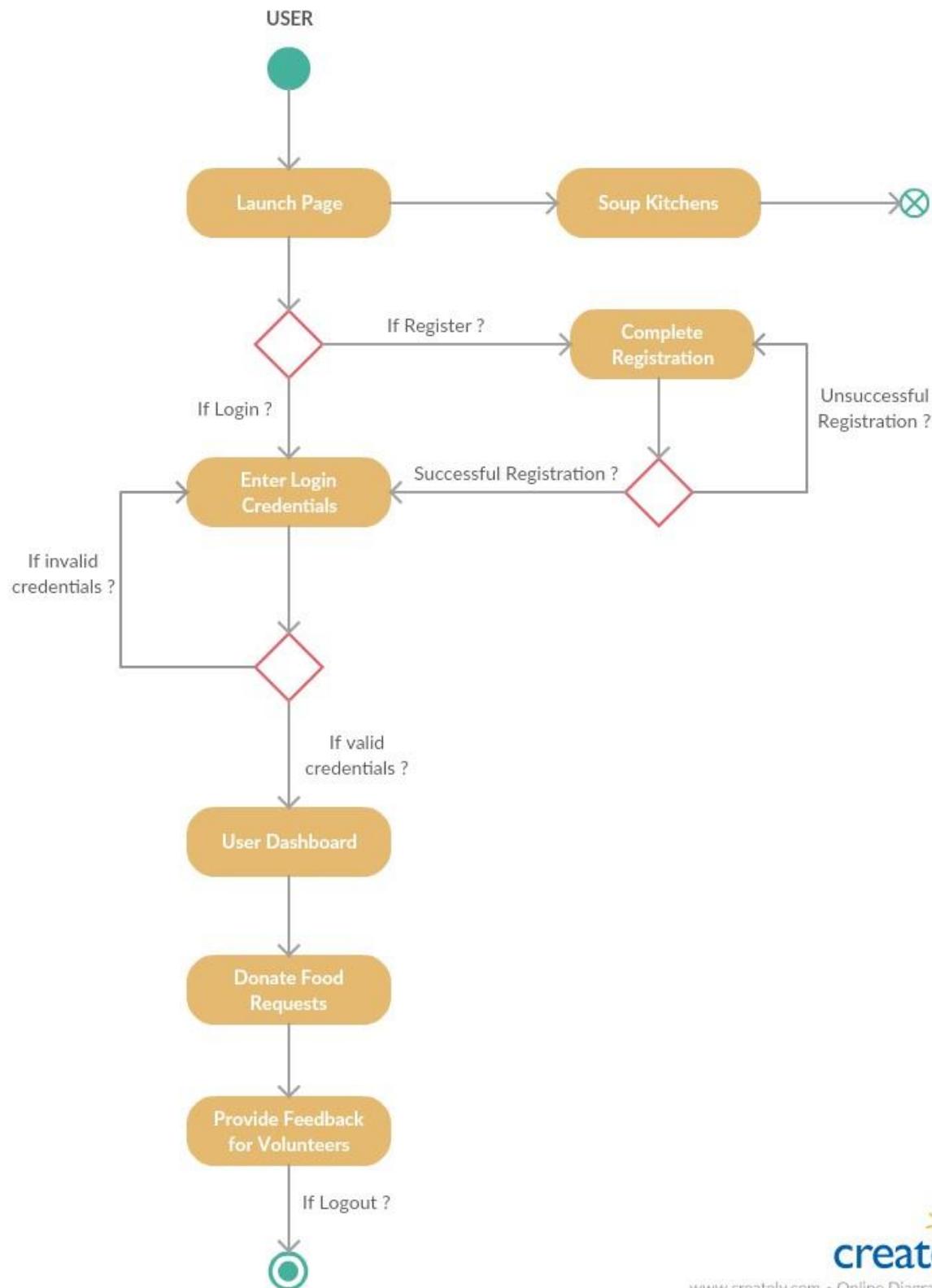
In this Page, the nearby Soup Kitchen Locations are displayed to the person accessing this application.

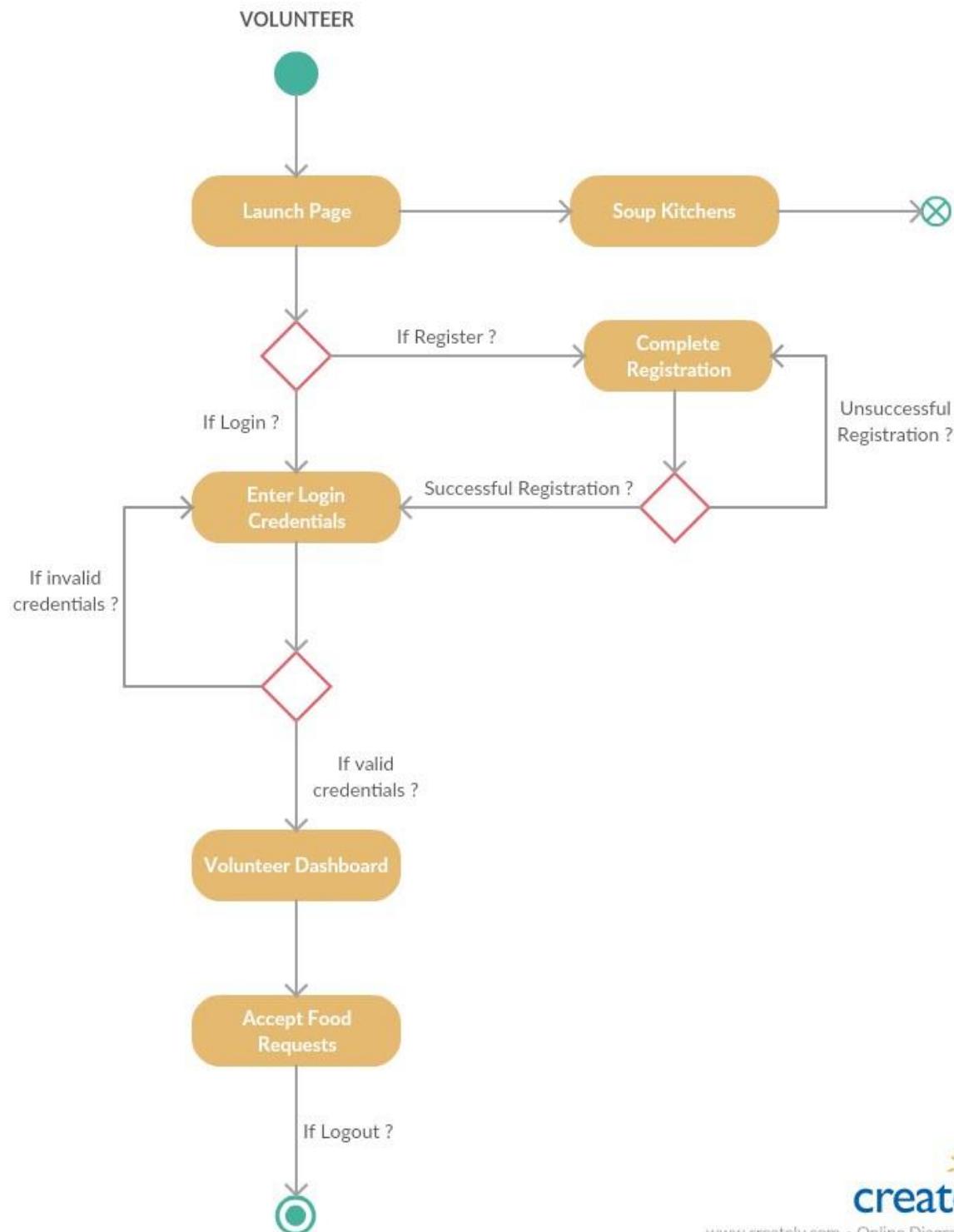


ARCHITECTURE DIAGRAM

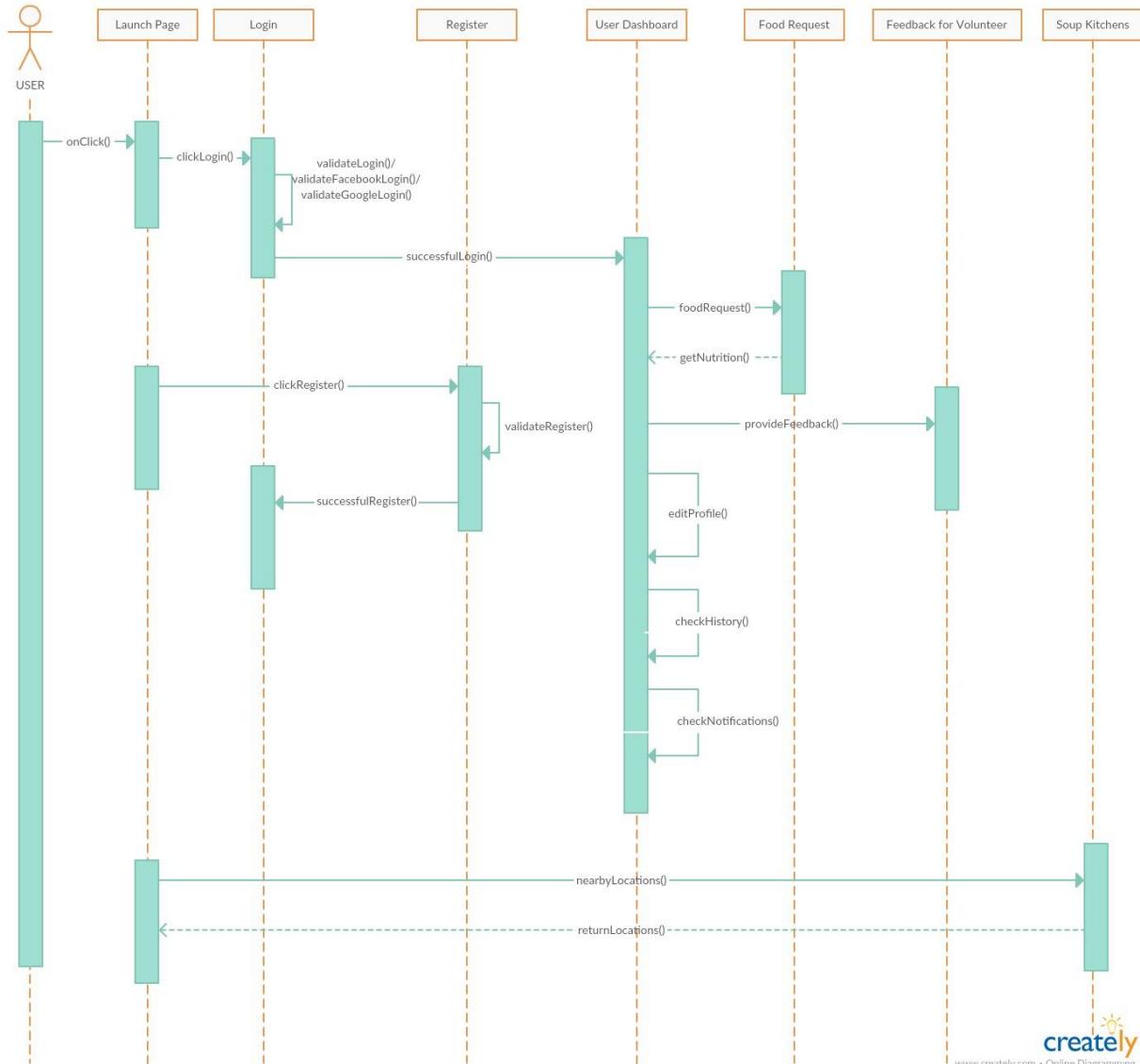
CLASS DIAGRAM

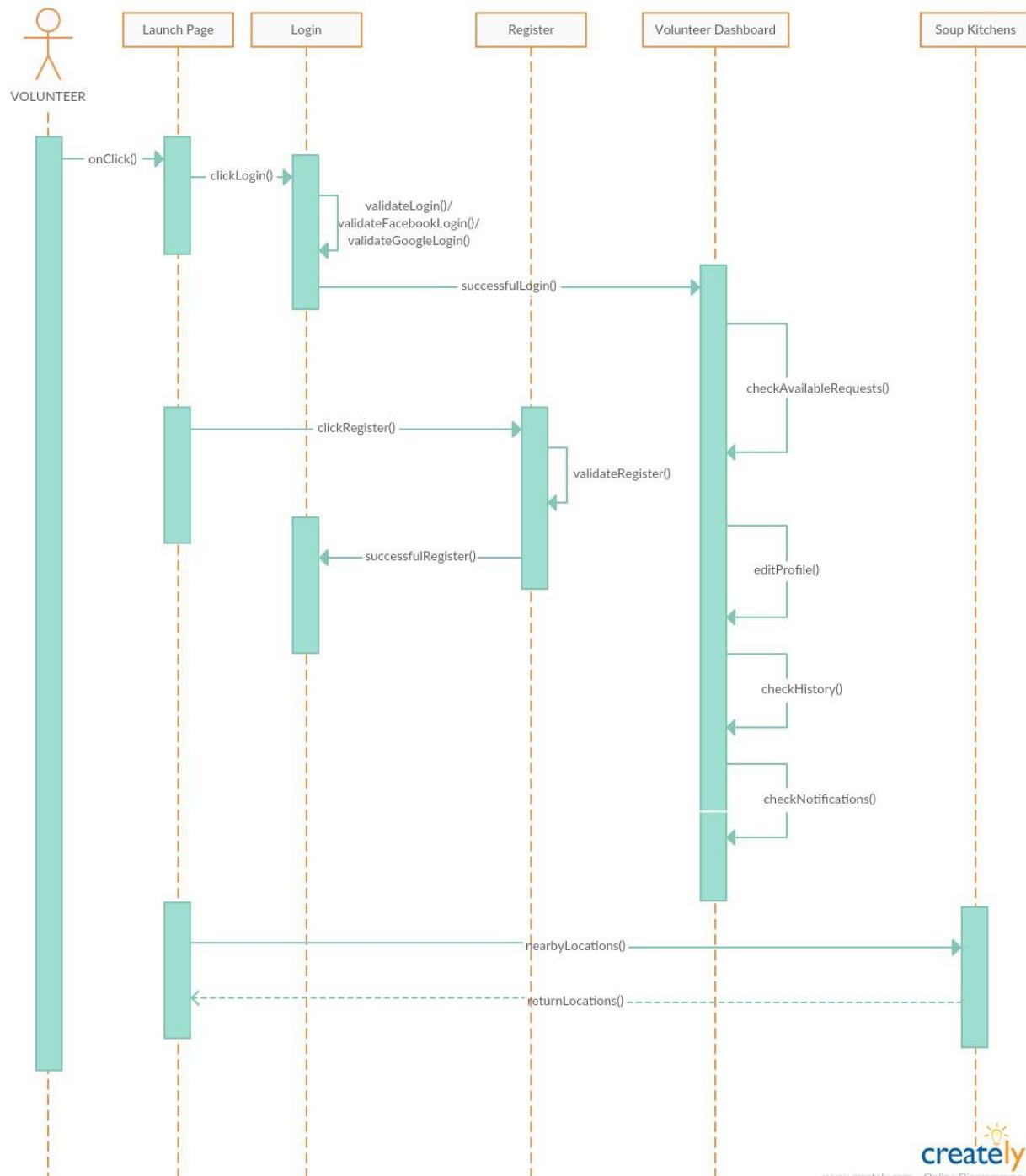


ACTIVITY DIAGRAM

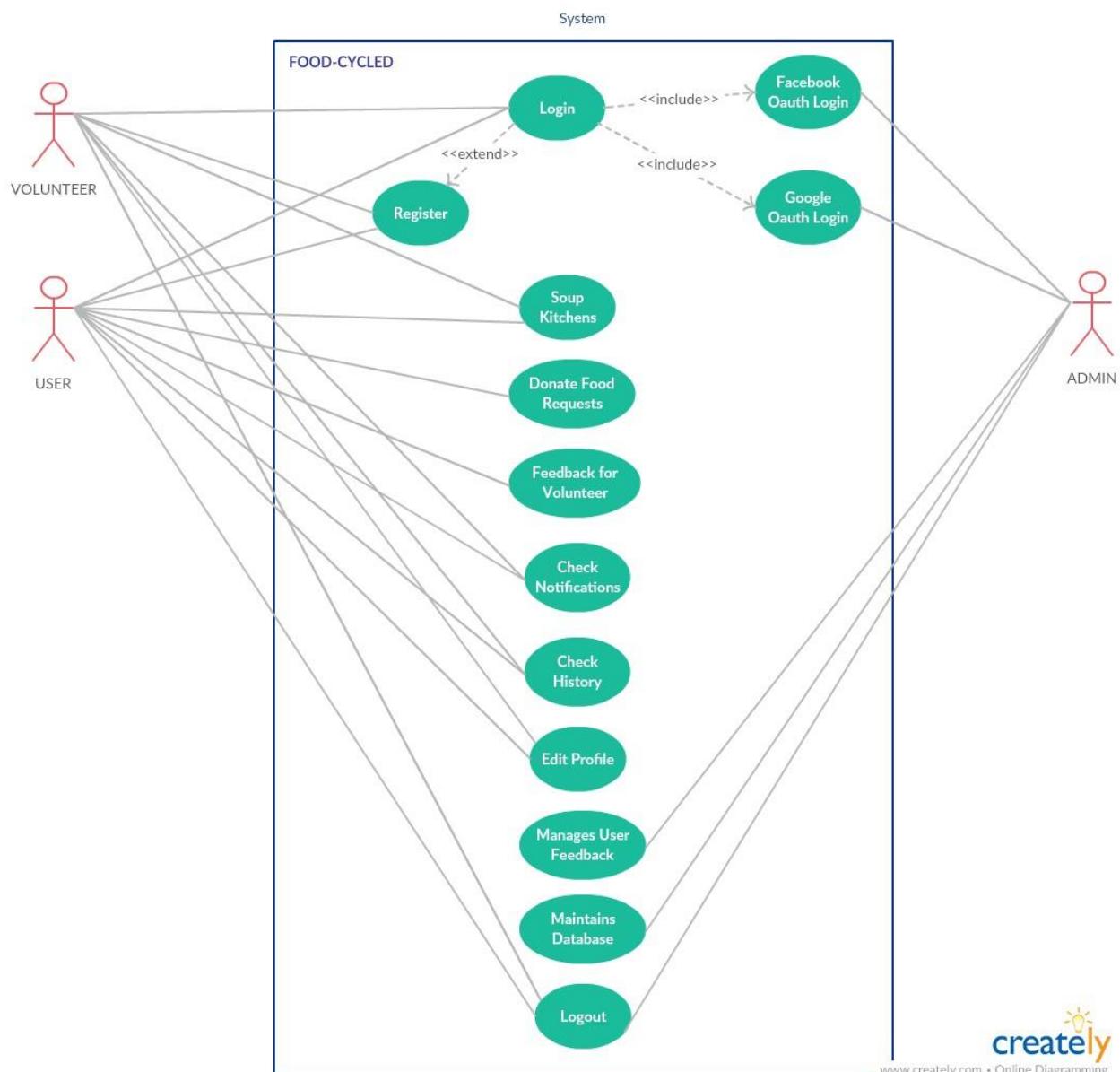


SEQUENCE DIAGRAM



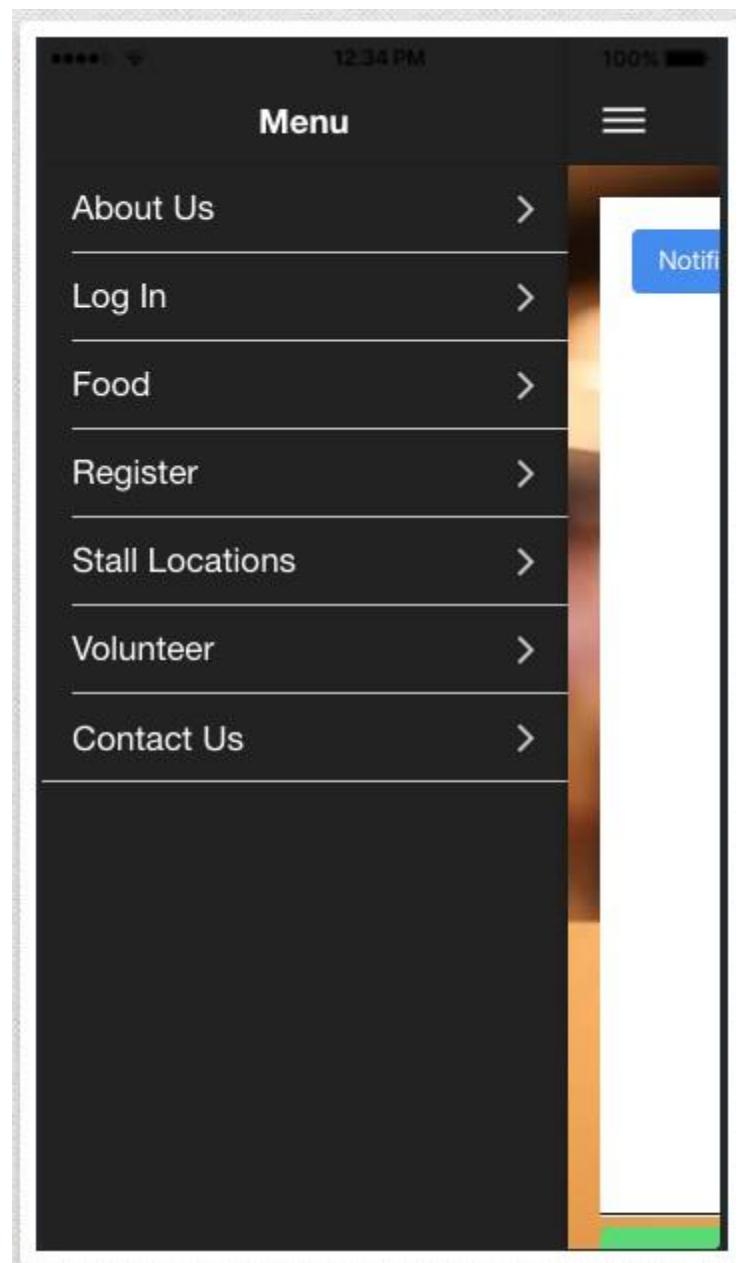


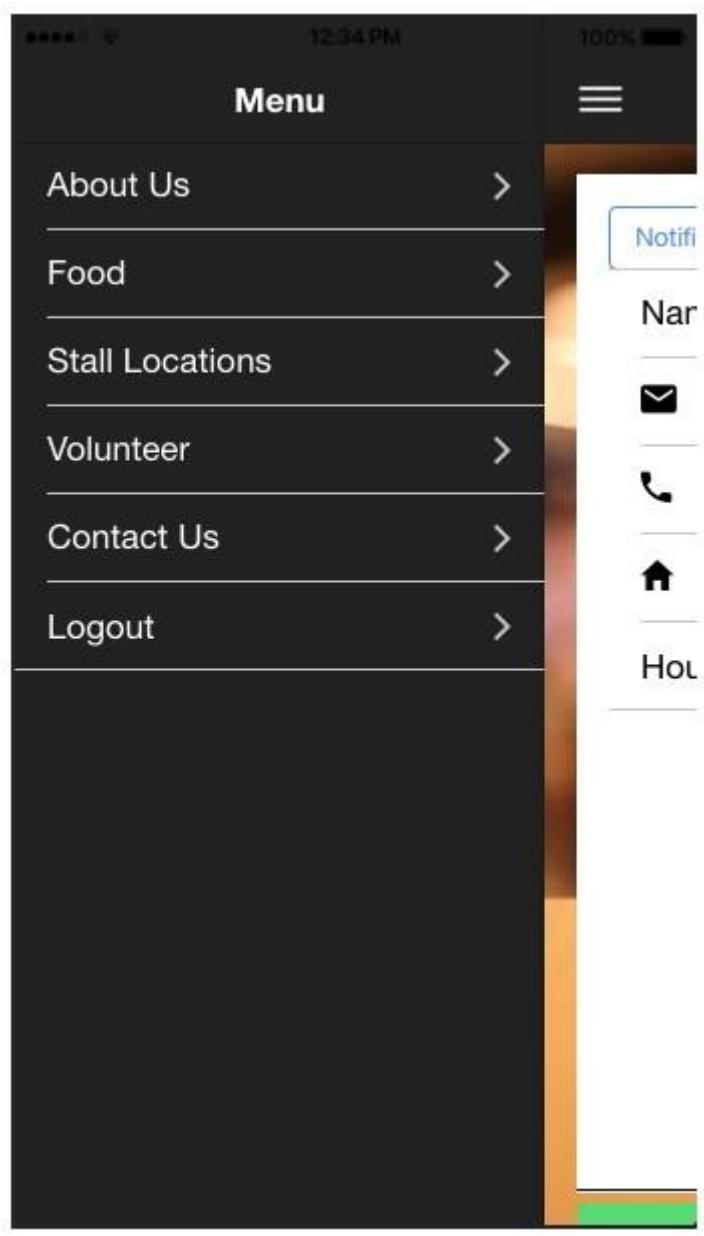
USECASE DIAGRAM

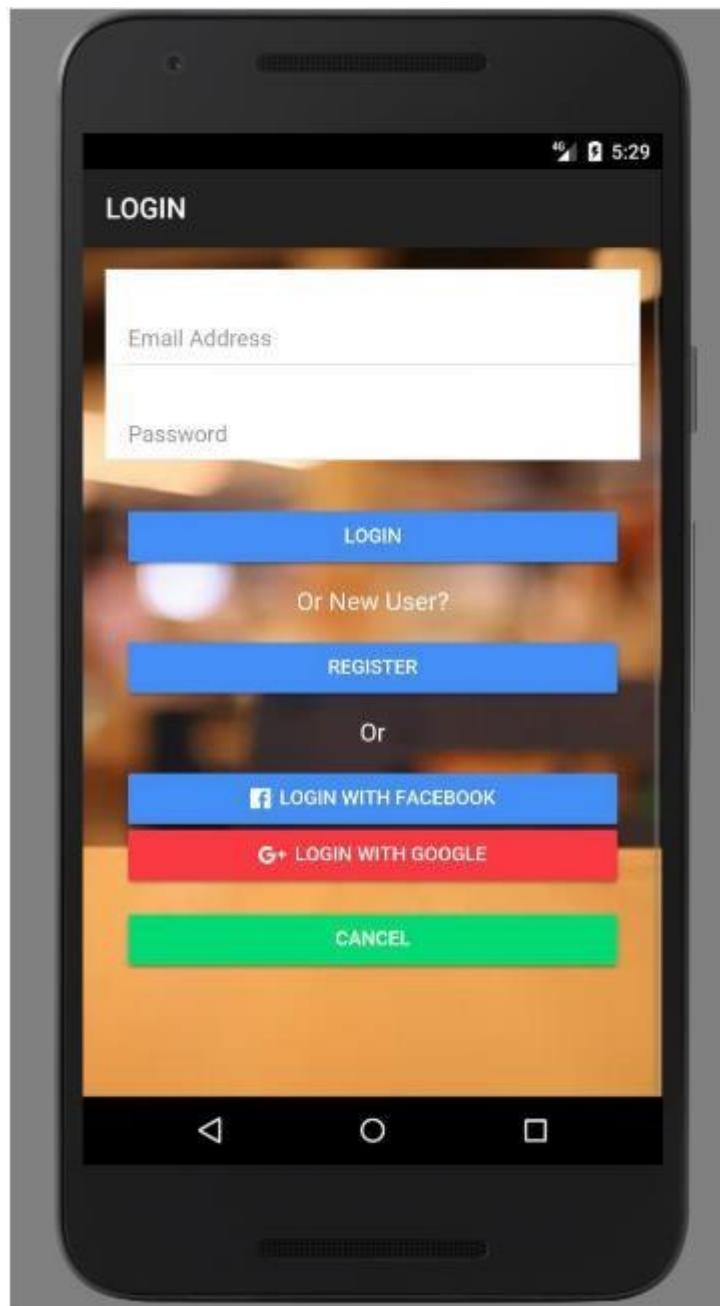


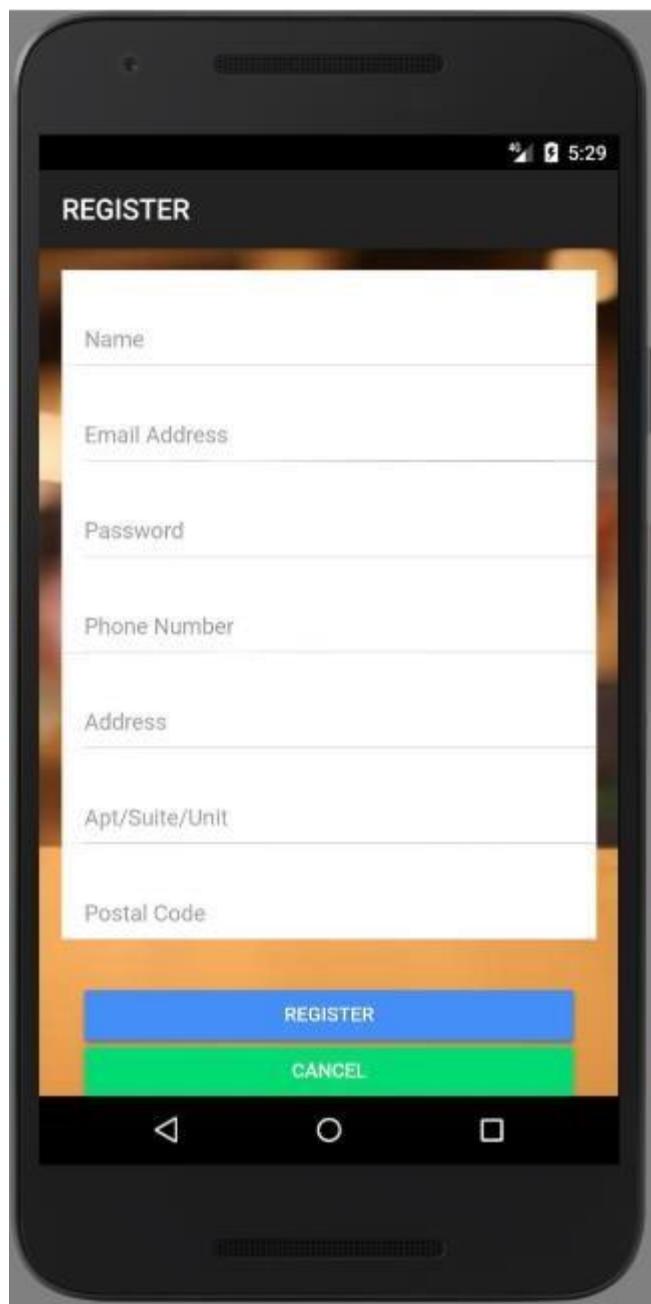
IMPLEMENTATION

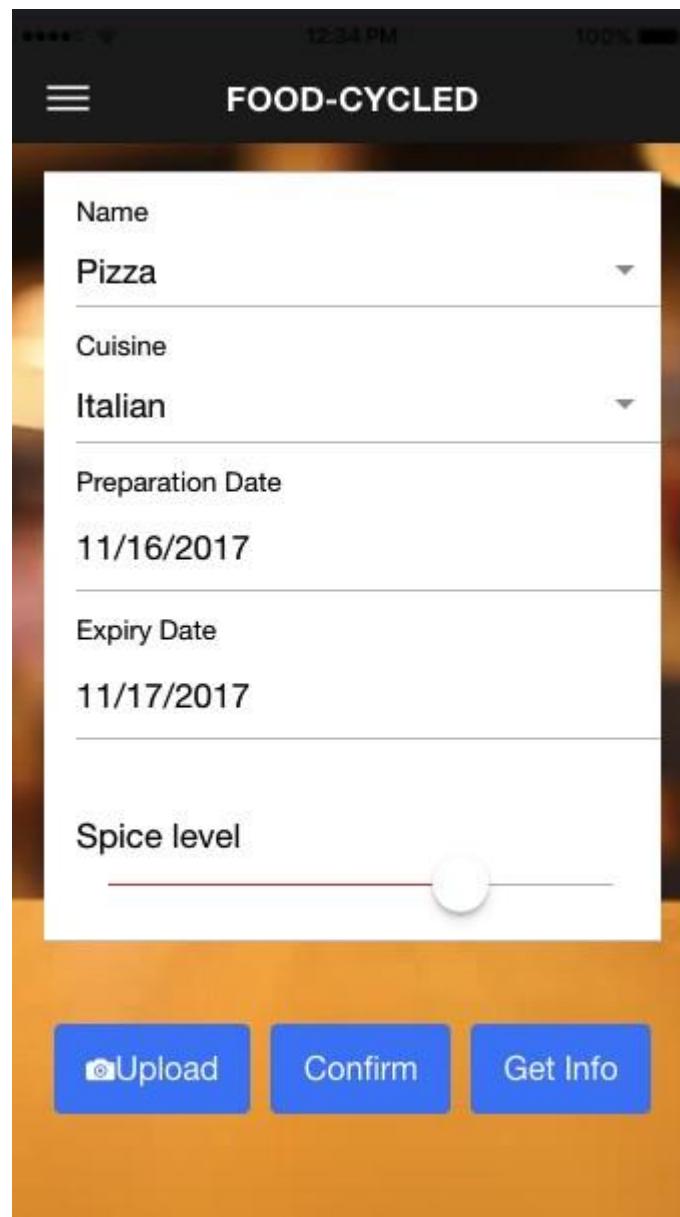
SIDE MENU BEFORE LOGIN AND AFTER LOGIN





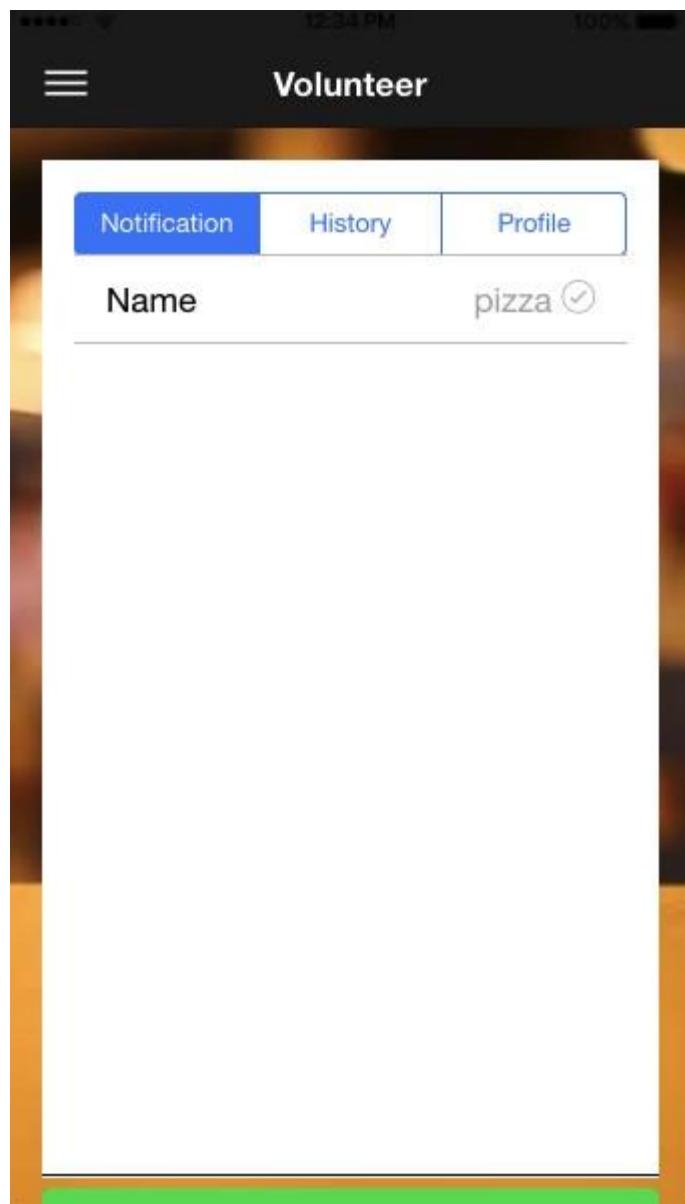
LOGIN PAGE

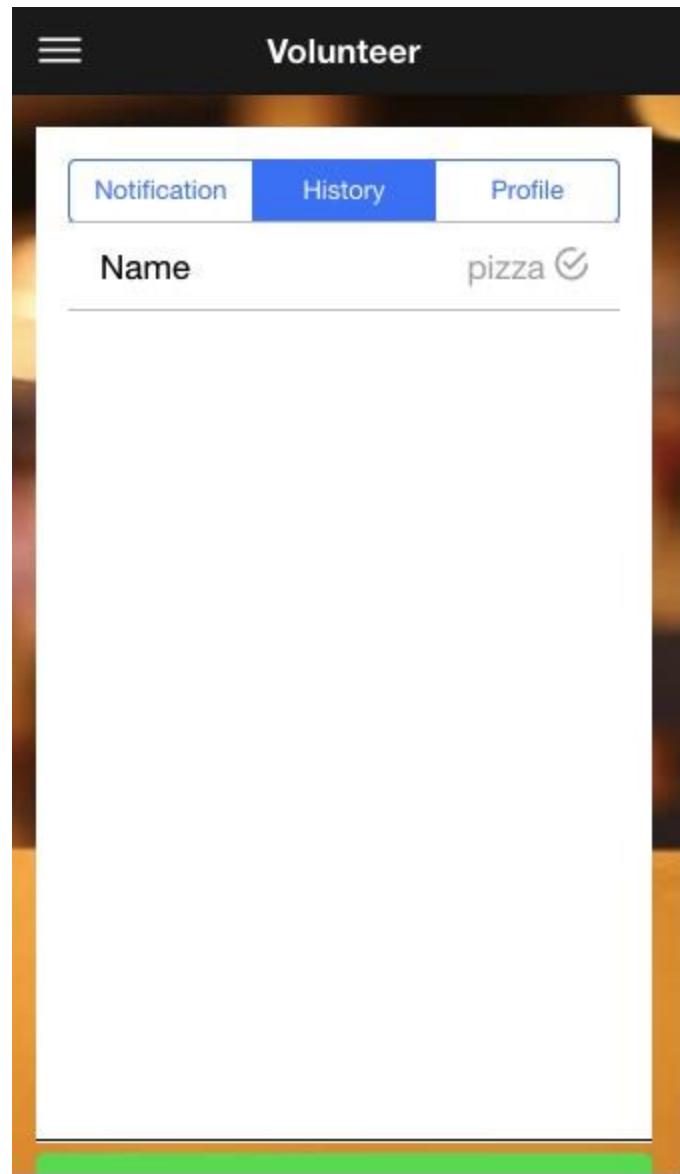
REGISTER PAGE

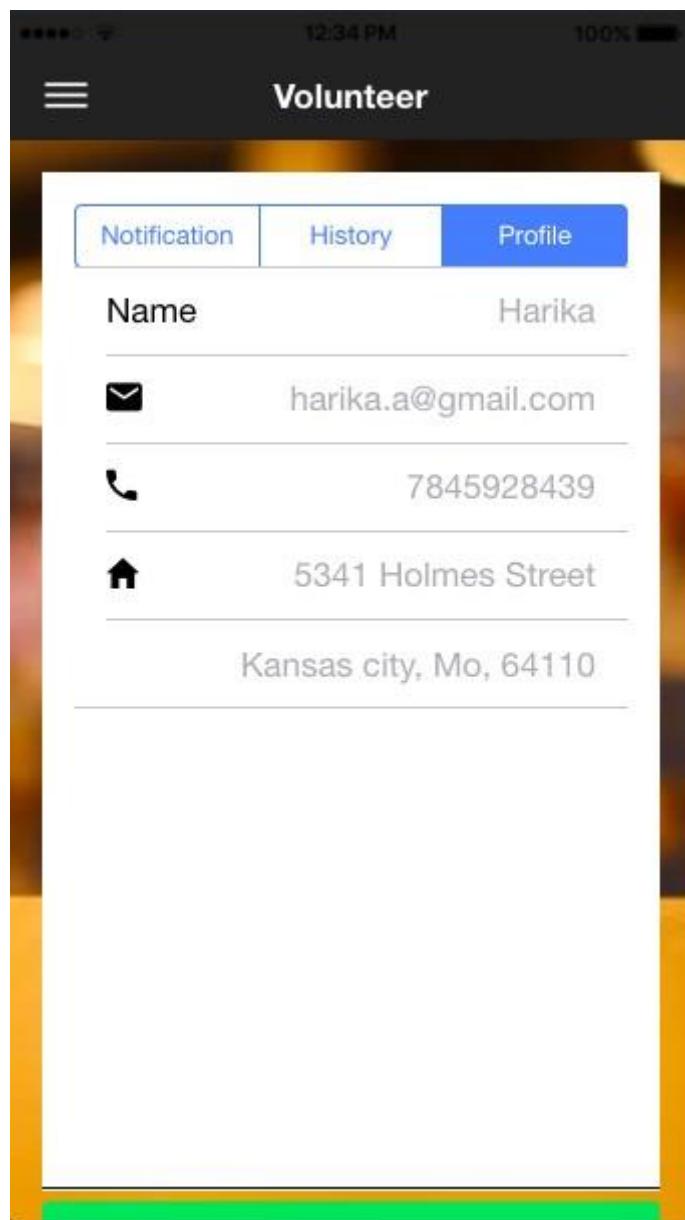
FOOD REQUEST PAGE

		12:34 PM	100%
		Cancel	Details
	Pizza		
	Breakfast Pizza		
Fat		256.82959999999997 g	
Carbs		144.8832 g	
Protein		165.16960000000003 g	
Cholesterol		1967.3600000000001 mg	
Sodium		5839.4 mg	
Calcium		1866.6400000000003 mg	
Magnesium		224.12 mg	
Potassium		2027.6 mg	
Iron		16.0552 mg	
Zinc		17.2936 mg	
Phosphorus		2608.76 mg	

VOLUNTEER DASHBOARD







VIII. FOURTH INCREMENT REPORT

i. Existing Services/REST API

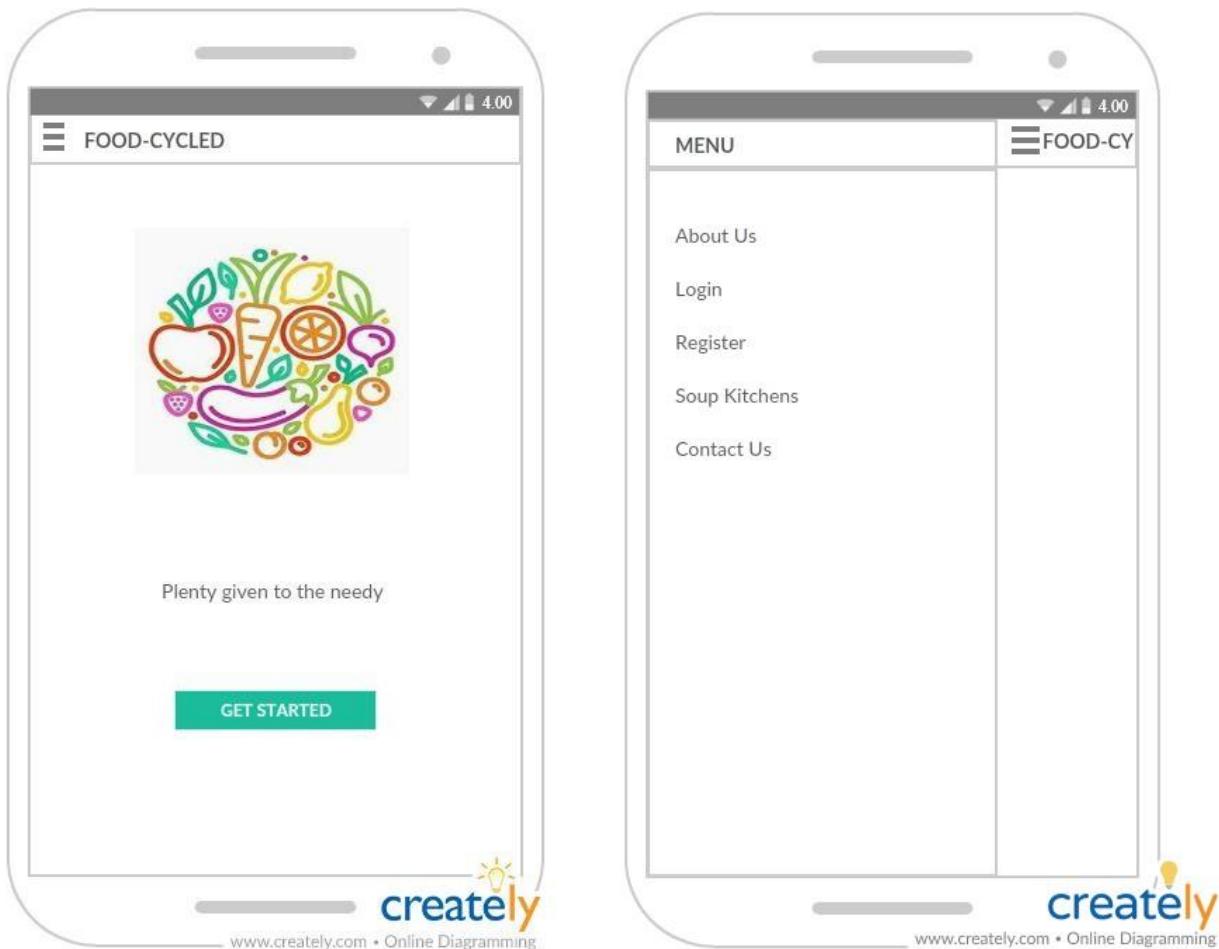
Facebook OAuth API , Google OAuth API, Edamam API, Google Maps API , Camera API

ii. Detailed Design of Features

WIREFRAMES

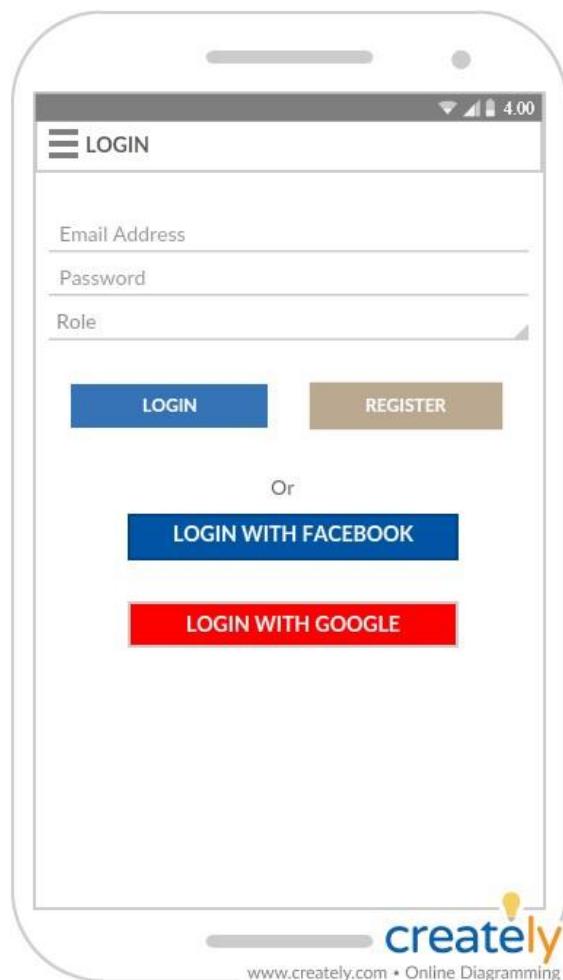
LAUNCH PAGE

The Launch Page of the **Food-cycled** application includes **GET STARTED** button which redirects to Login Page and a side menu bar which contains – **About Us , Login , Register , Soup Kitchens and Contact Us.**



LOGIN PAGE

Single Login Page for both User and Volunteer. It redirects to their respective Dashboard upon successful login. There are two Social Logins implemented – Facebook and Google+, if successful then it is redirected to their respective dashboard based on the role.



REGISTER PAGE

The User and Volunteer registers separately using their basic details. Upon Successful registration, it redirects to the Login Page. Here the User or Volunteer is mentioned using the Role field.

The image displays two wireframe mobile phone screens side-by-side, illustrating a registration process. Both screens have a dark grey header bar with three horizontal lines and the word 'REGISTER'. The top right corner shows signal strength, battery level, and the number '4.00'. The bottom right corner of each screen features the 'creately' logo and the URL 'www.creately.com • Online Diagramming'.

Left Screen (Initial Registration Fields):

- Name
- Email Address
- Password
- Phone Number
- Address
- Zipcode
- Role

A blue rectangular button at the bottom center contains the white text 'REGISTER'.

Right Screen (Adding Role Selection):

- Name
- Email Address
- Password
- Phone
- Address
- Zipcod
- Role

Under the 'Role' label, there is a table with two rows:

<input checked="" type="radio"/> User
<input checked="" type="radio"/> Volunteer

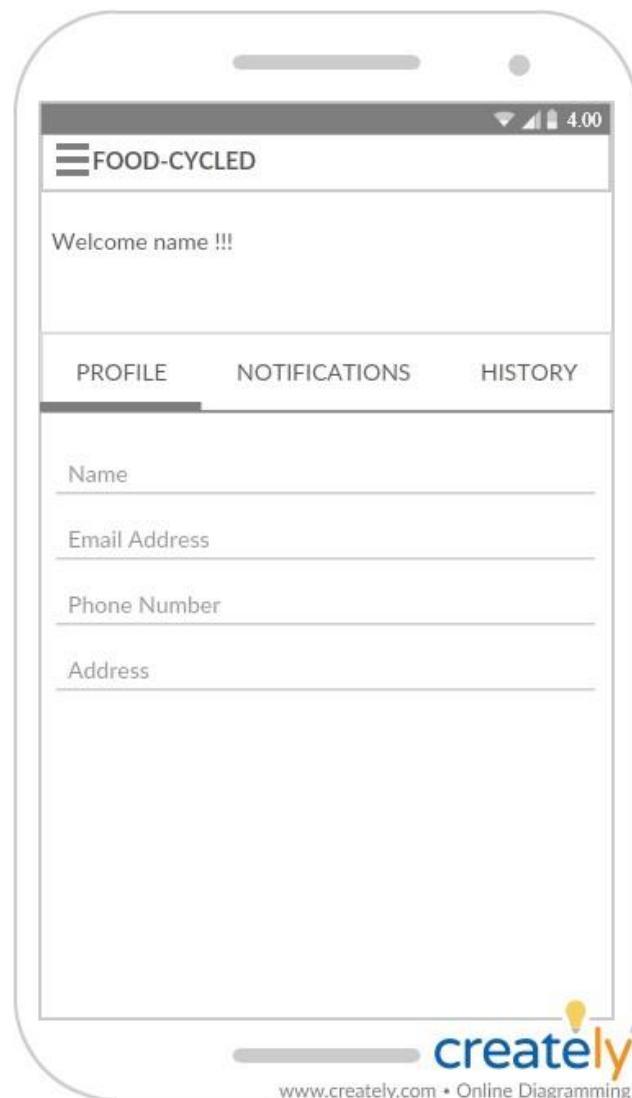
Below the table are two buttons: 'CANCEL' on the left and 'OK' on the right, with the 'OK' button being blue.

DASHBOARD

Upon successful login, User or Volunteer lands in their respective dashboard page. In Volunteer's Dashboard, it displays their name and provides with tabs – Profile, Notifications and History, where History is the default Tab. In User's Dashboard, it displays their name and provides with tabs – Profile and History, where History is the default Tab. User can upload food or leave feedback using the Menu bar.

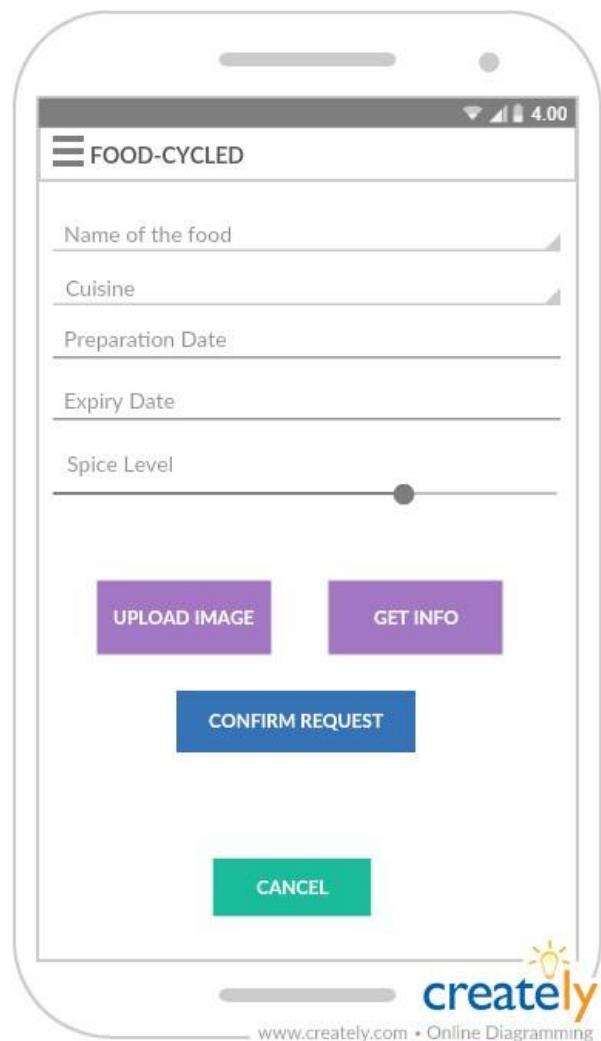
USER DASHBOARD



VOLUNTEER DASHBOARD

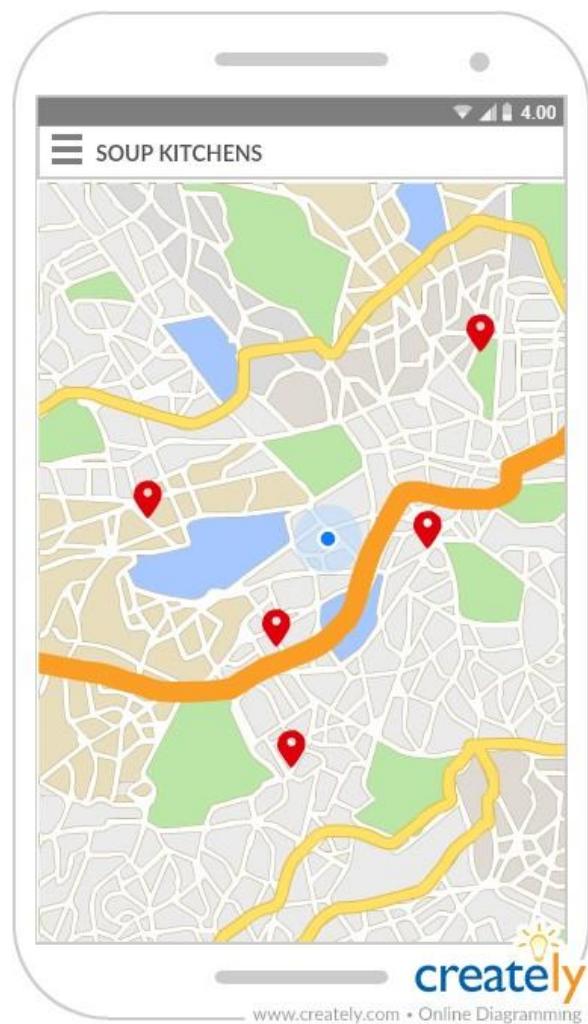
UPLOAD FOOD PAGE

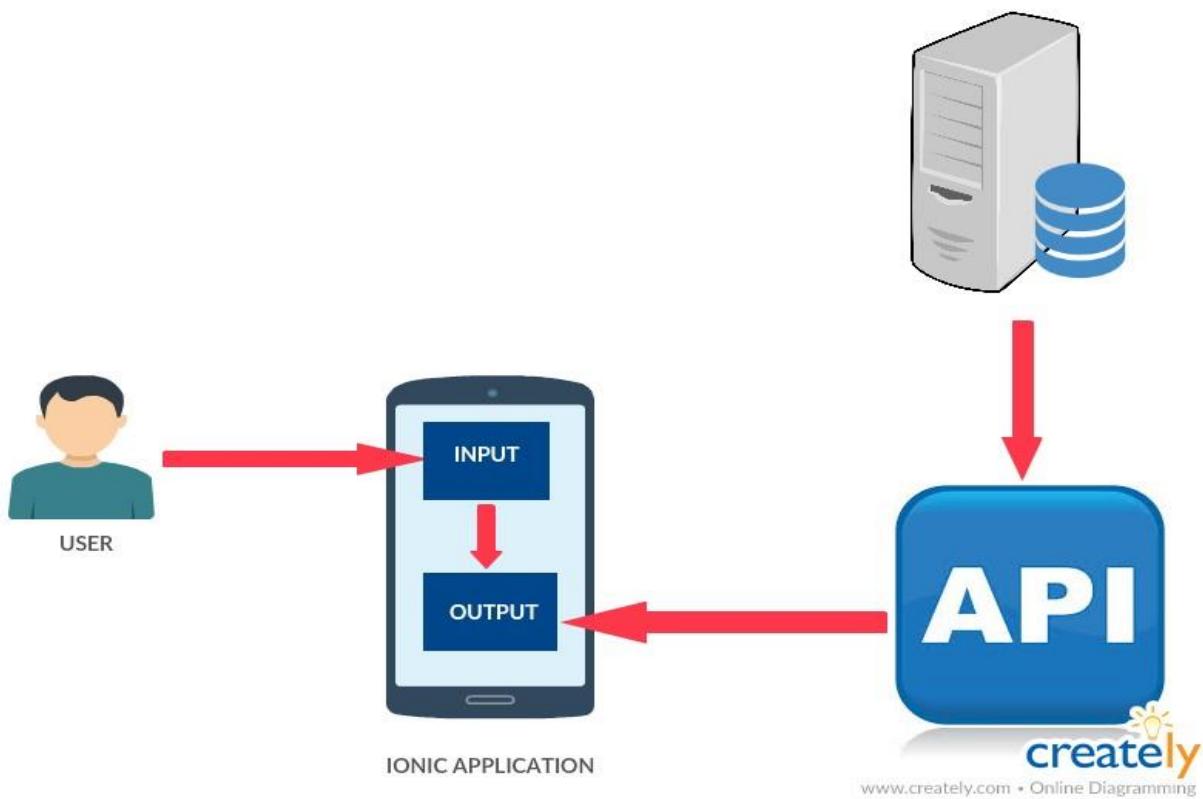
For each food the user would like to donate, he/she needs to fill details like – name of food, cuisine, preparation date , expiry date, spice level and also upload image. ‘Get Info’ provides the nutrition details of the food entered and ‘Confirm Request’ sends notification to all volunteers.



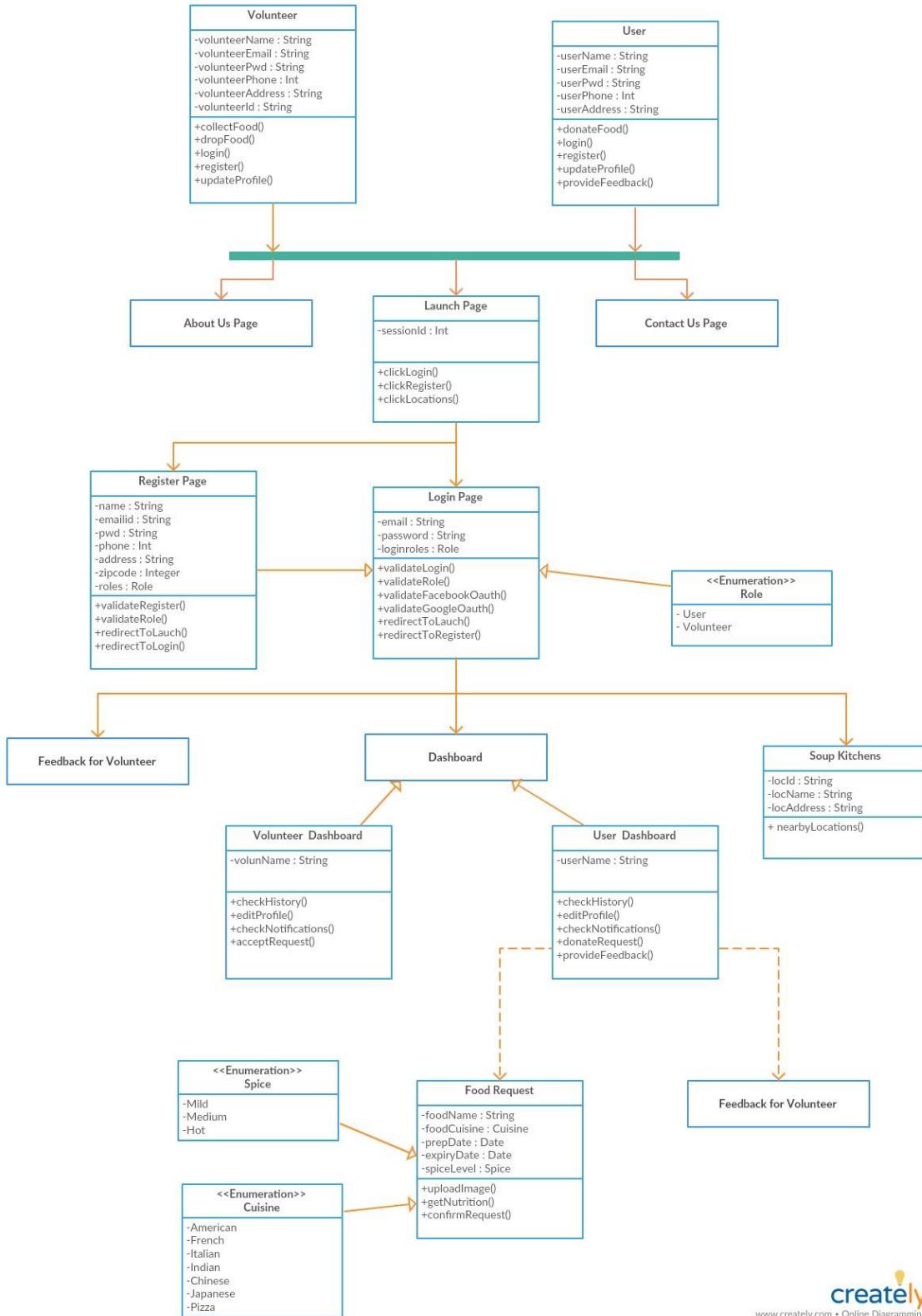
SOUP KITCHENS

In this Page, the nearby Soup Kitchen Locations are displayed to the person accessing this application.

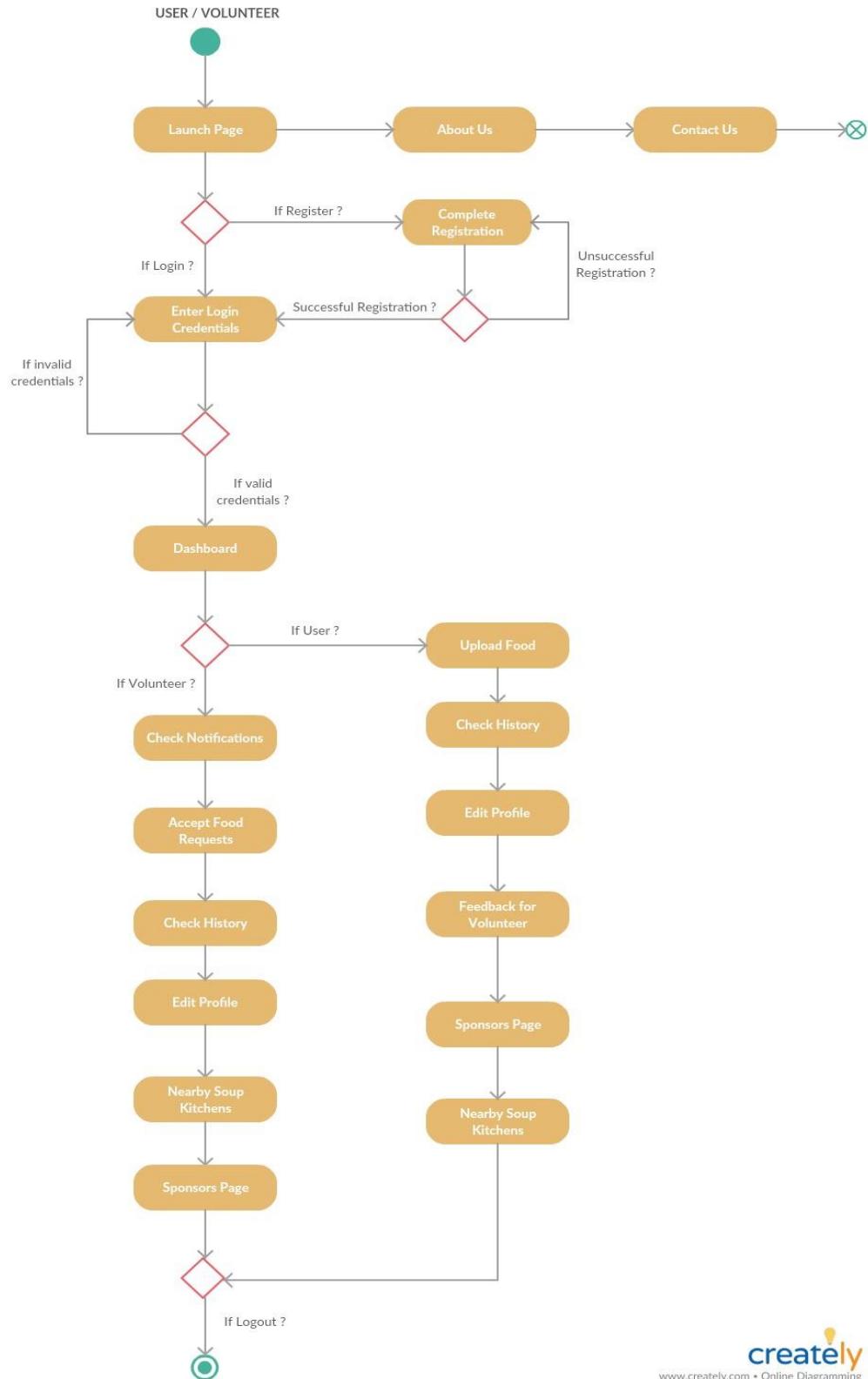


ARCHITECTURE DIAGRAM

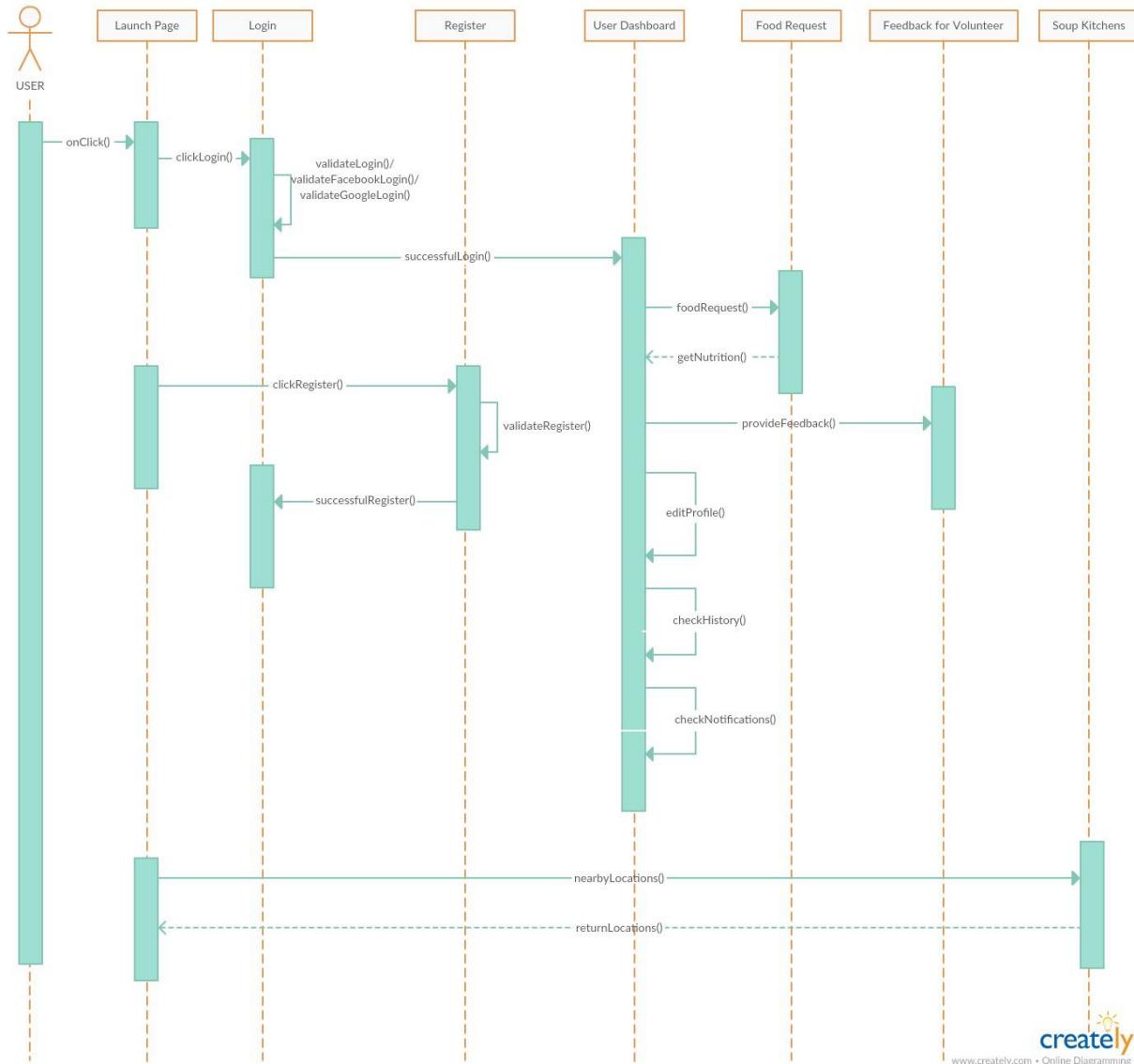
CLASS DIAGRAM

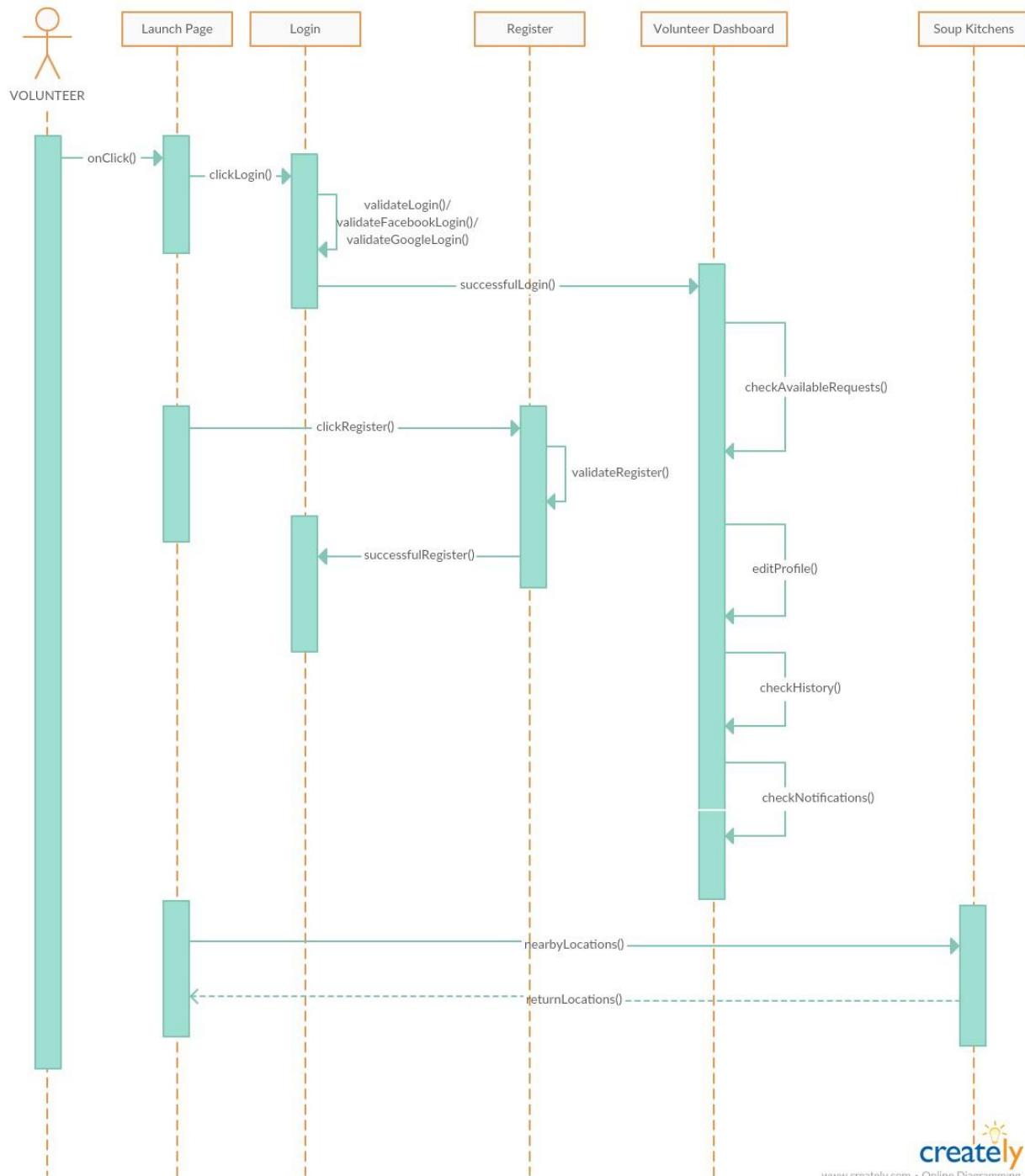


ACTIVITY DIAGRAM

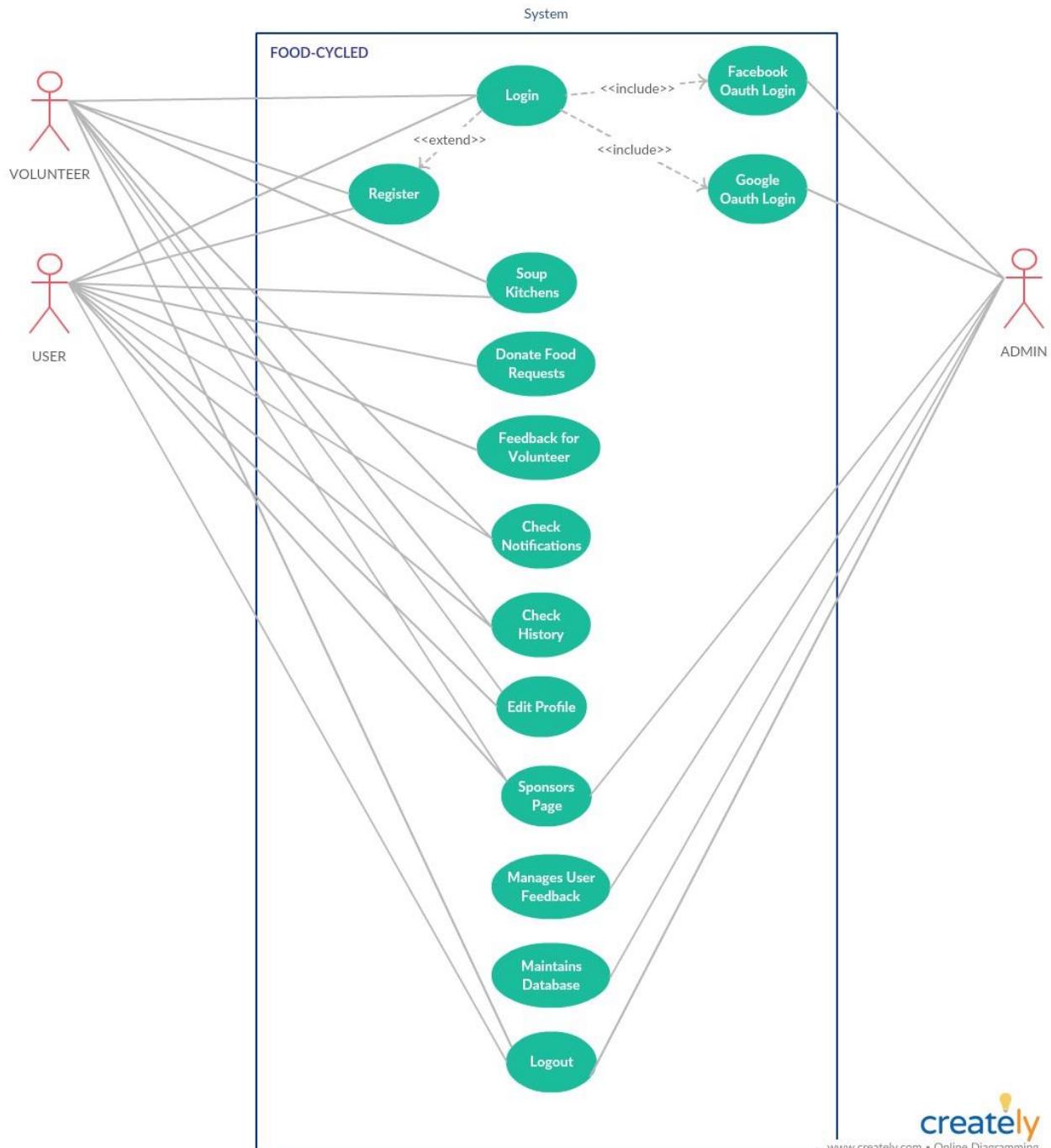


SEQUENCE DIAGRAM



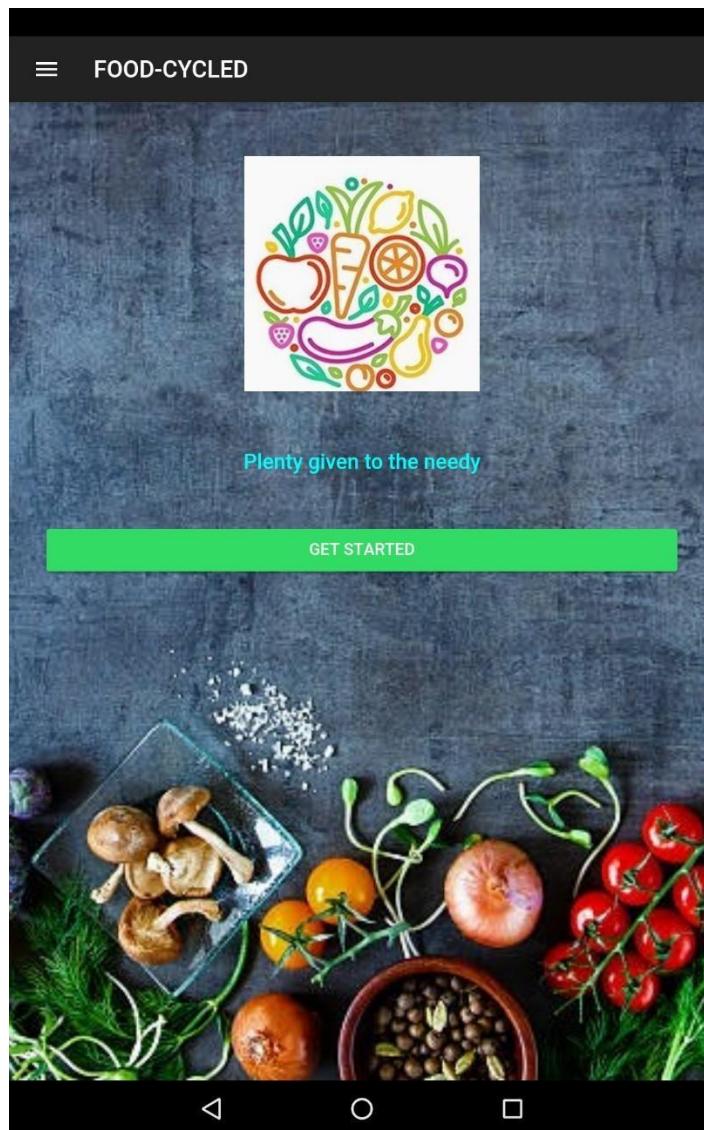


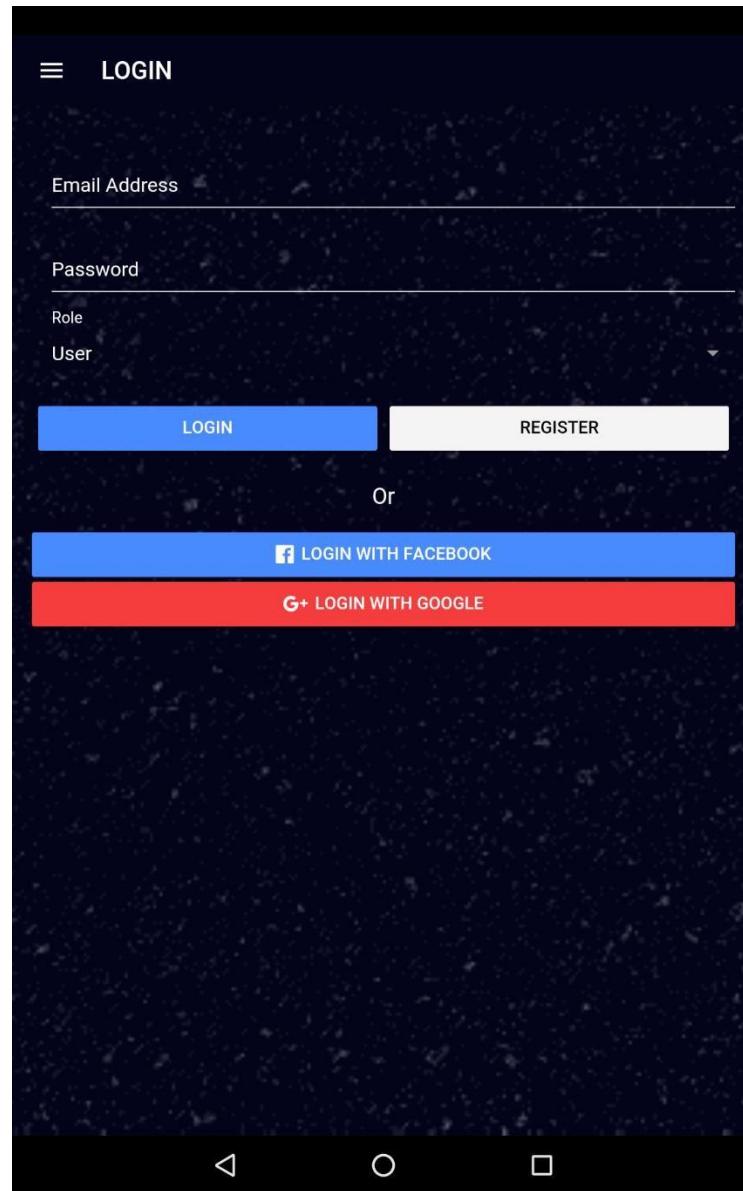
USECASE DIAGRAM

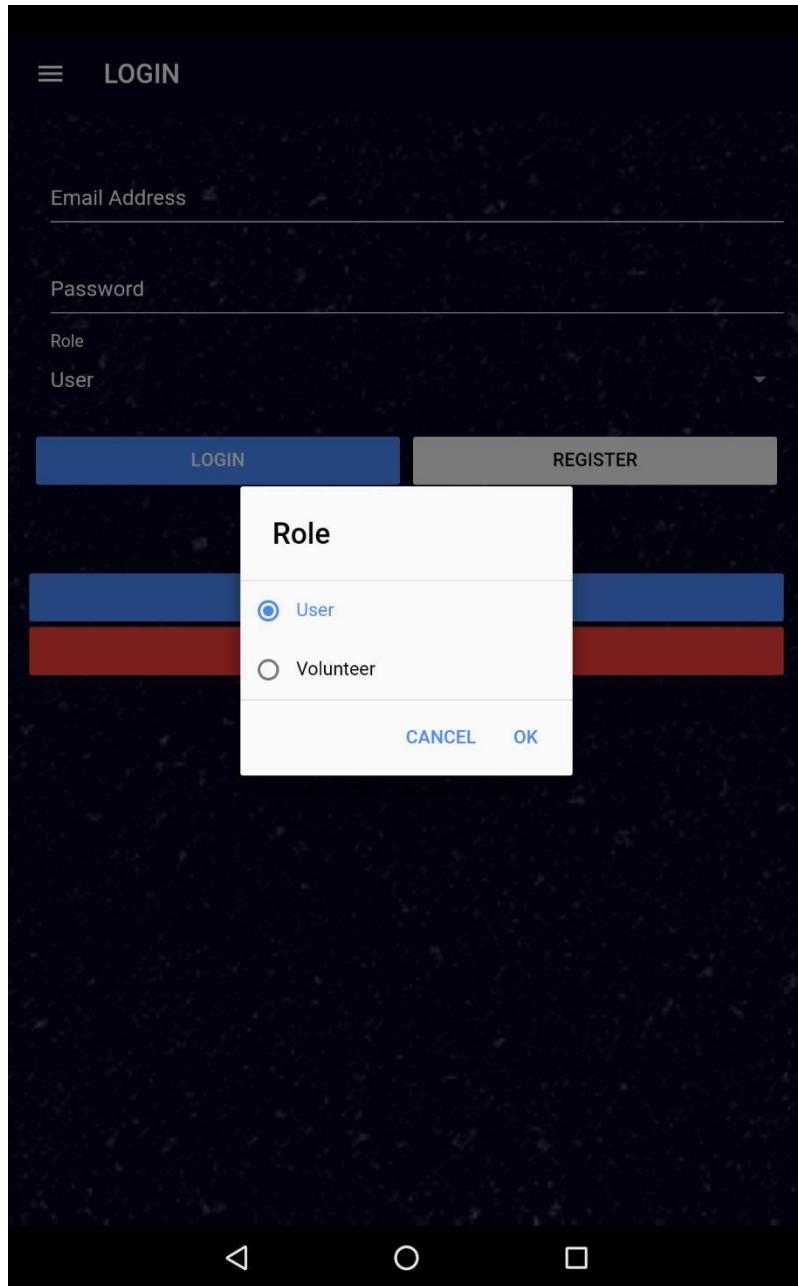


IMPLEMENTATION

LAUNCH PAGE



LOGIN PAGE



REGISTER PAGE

≡ REGISTER

Name

Email

Password

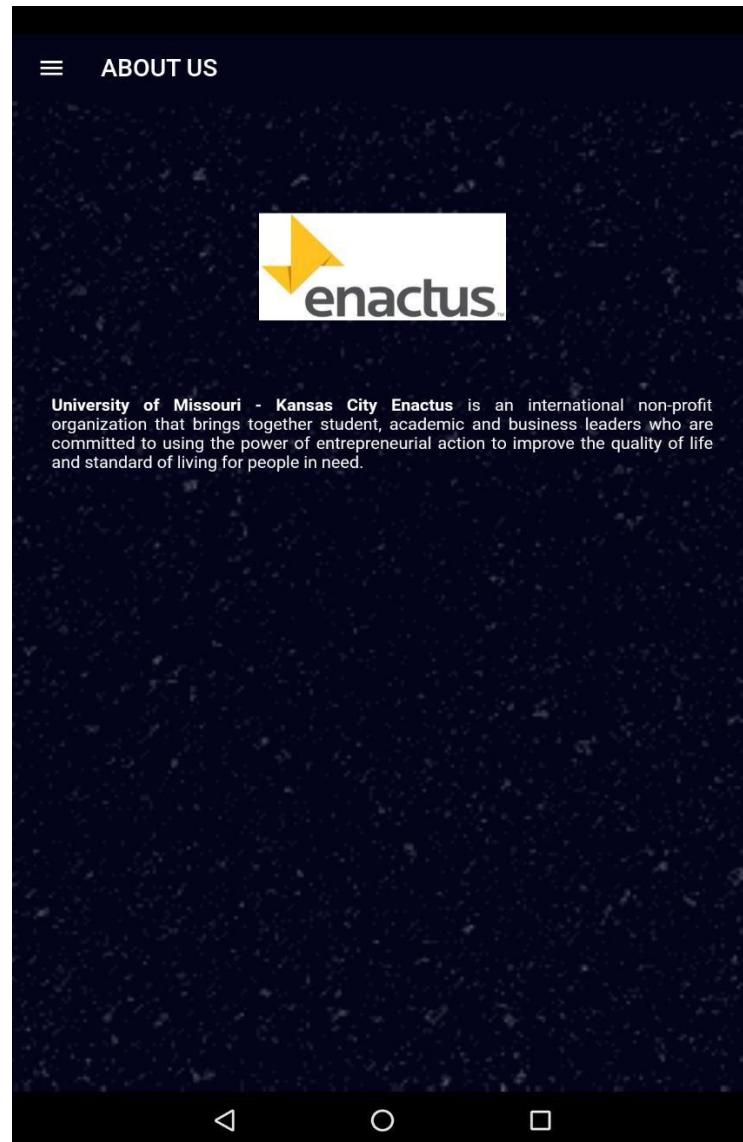
Phone

Address

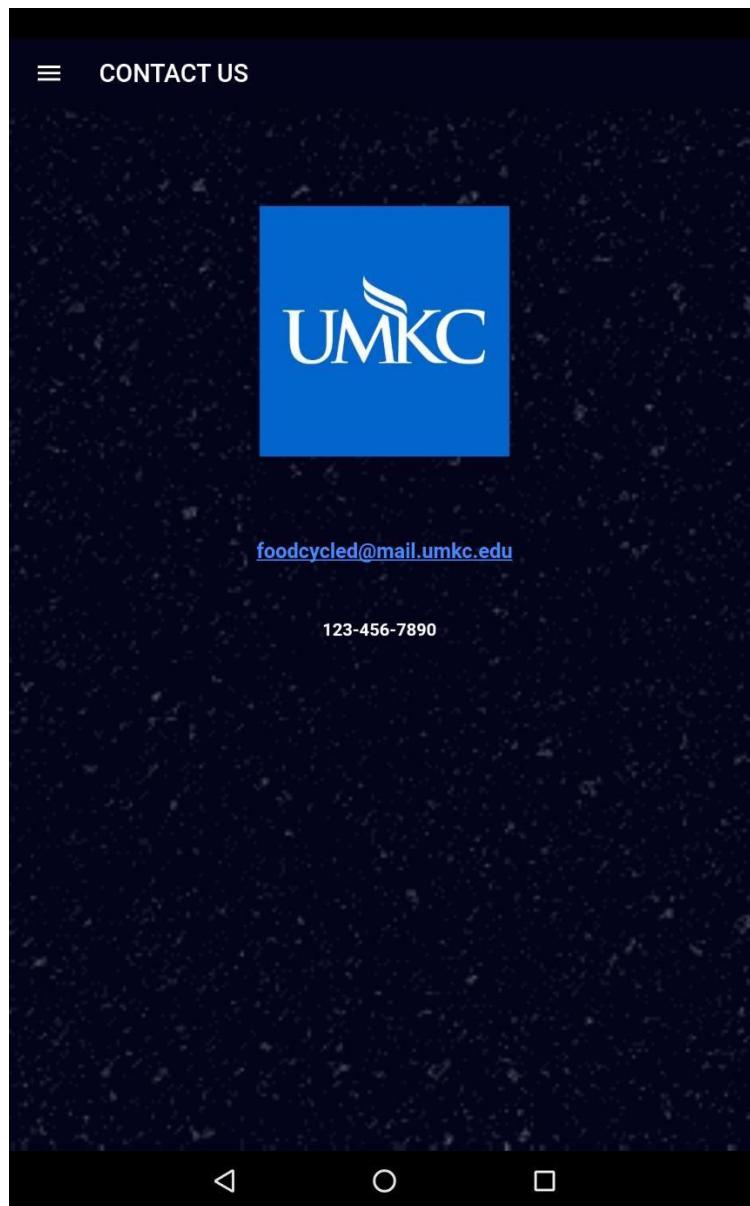
Zipcode

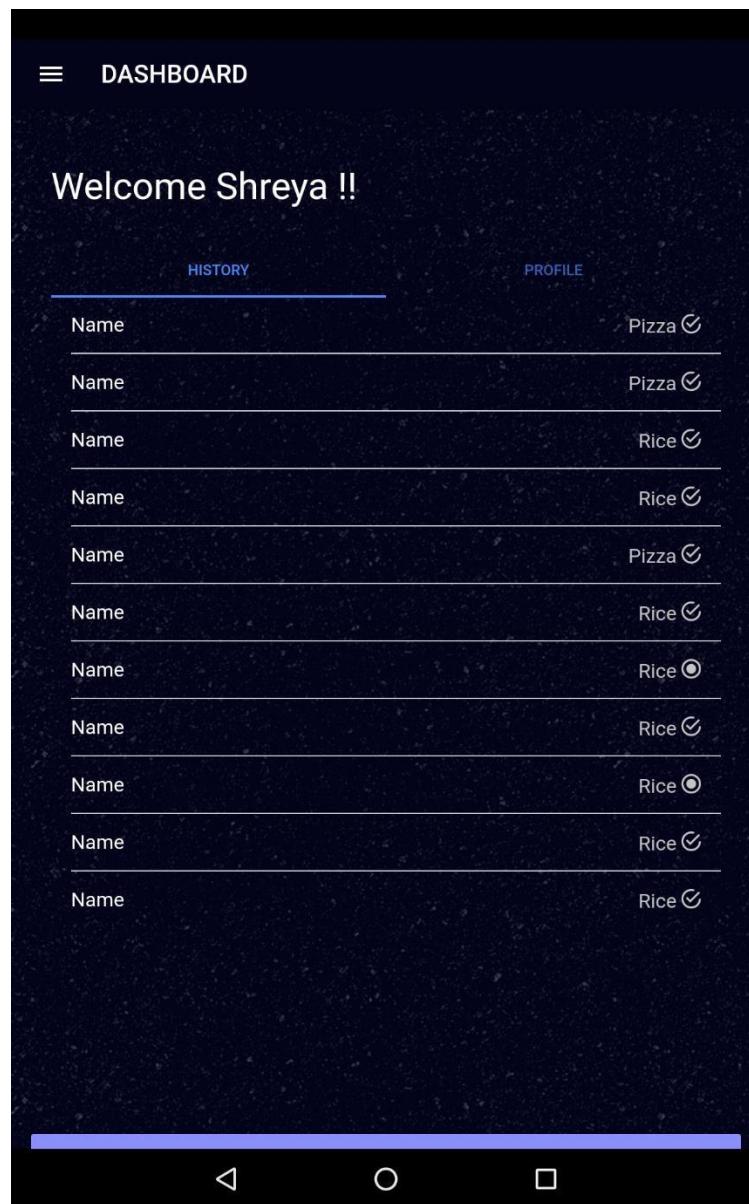
Role

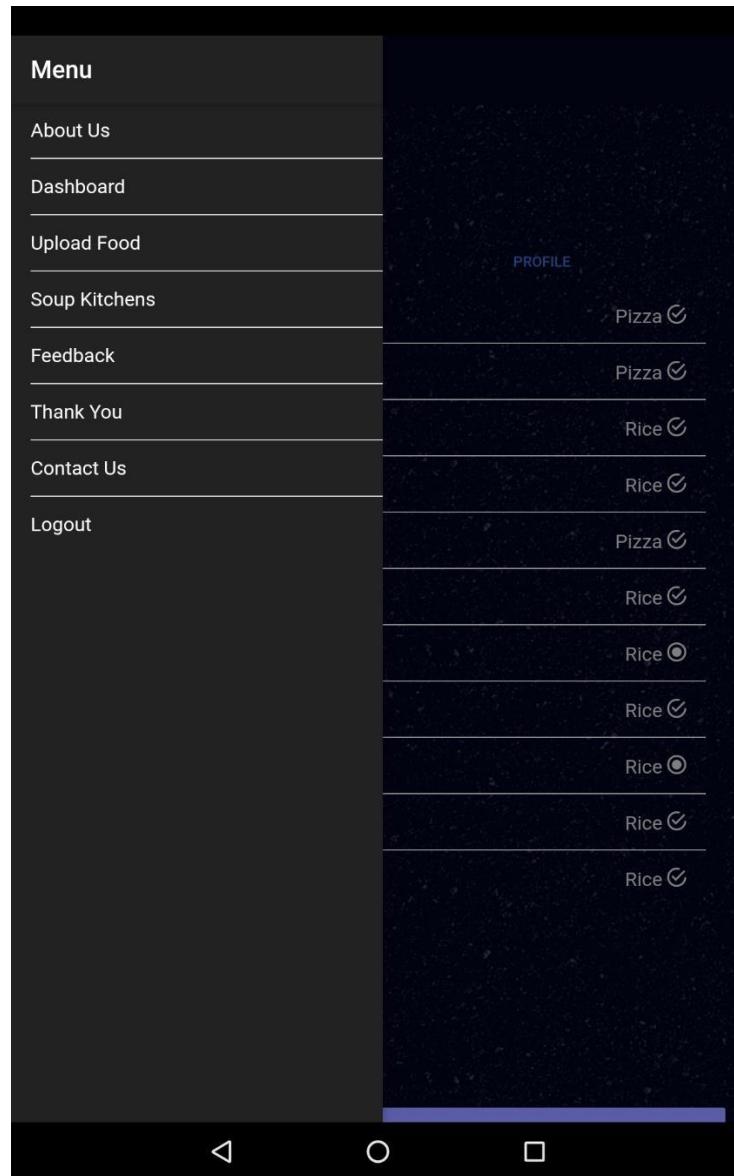
SUBMIT

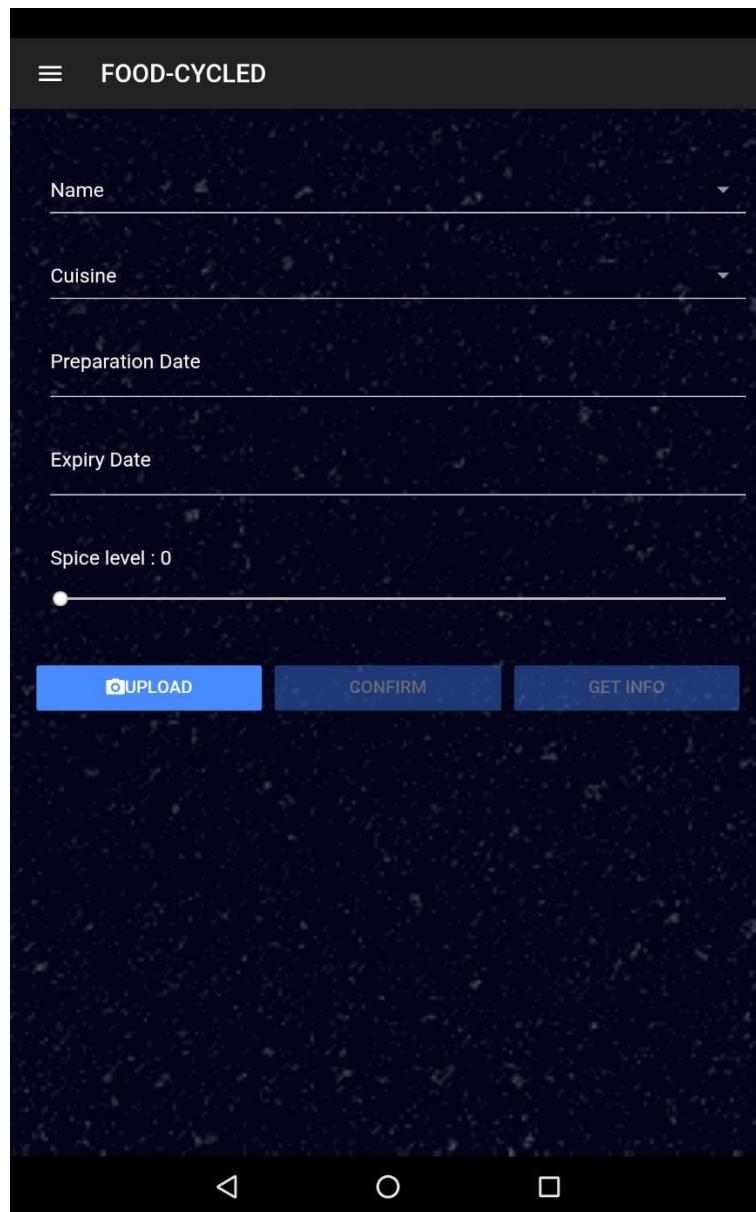
ABOUT US PAGE

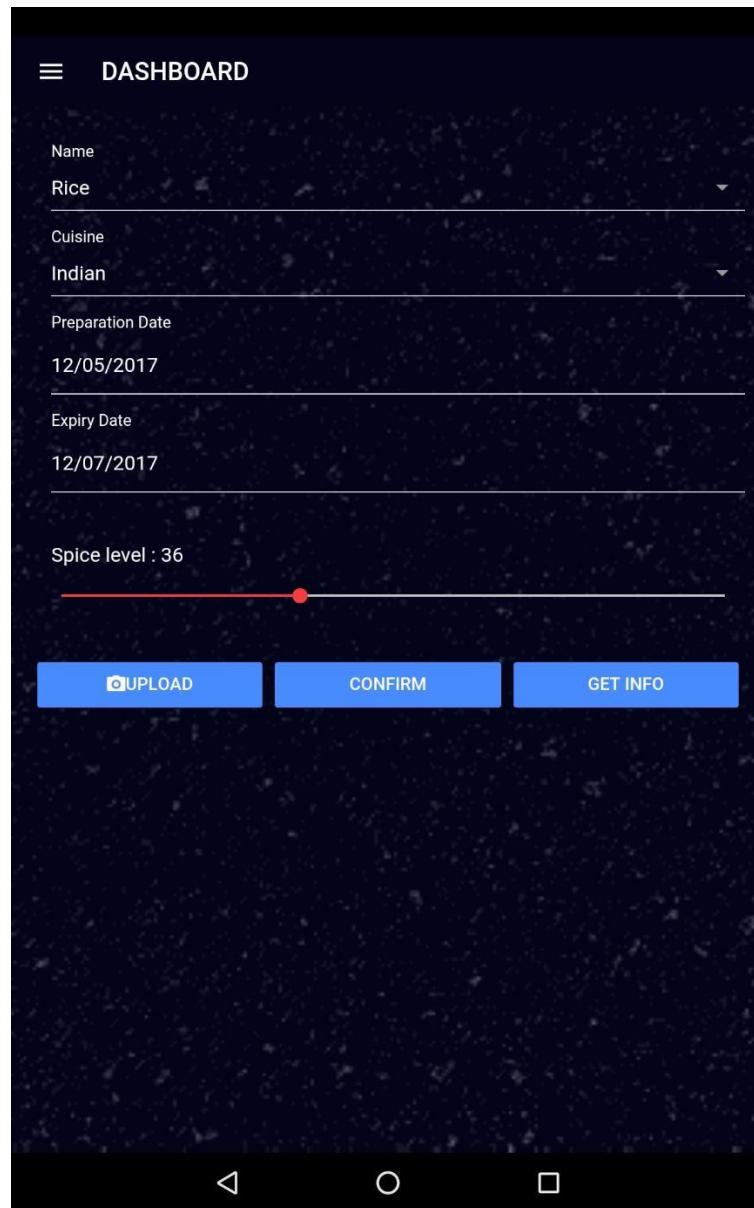
CONTACT US PAGE



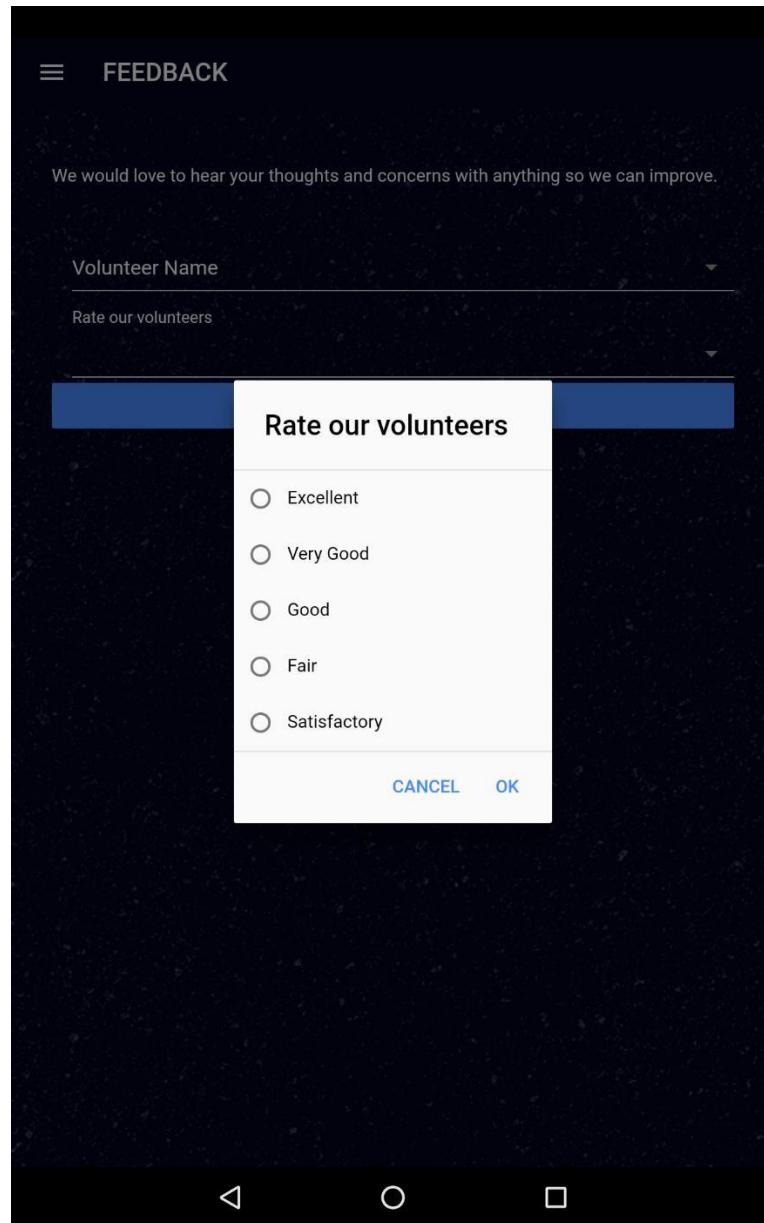
USER DASHBOARD PAGE

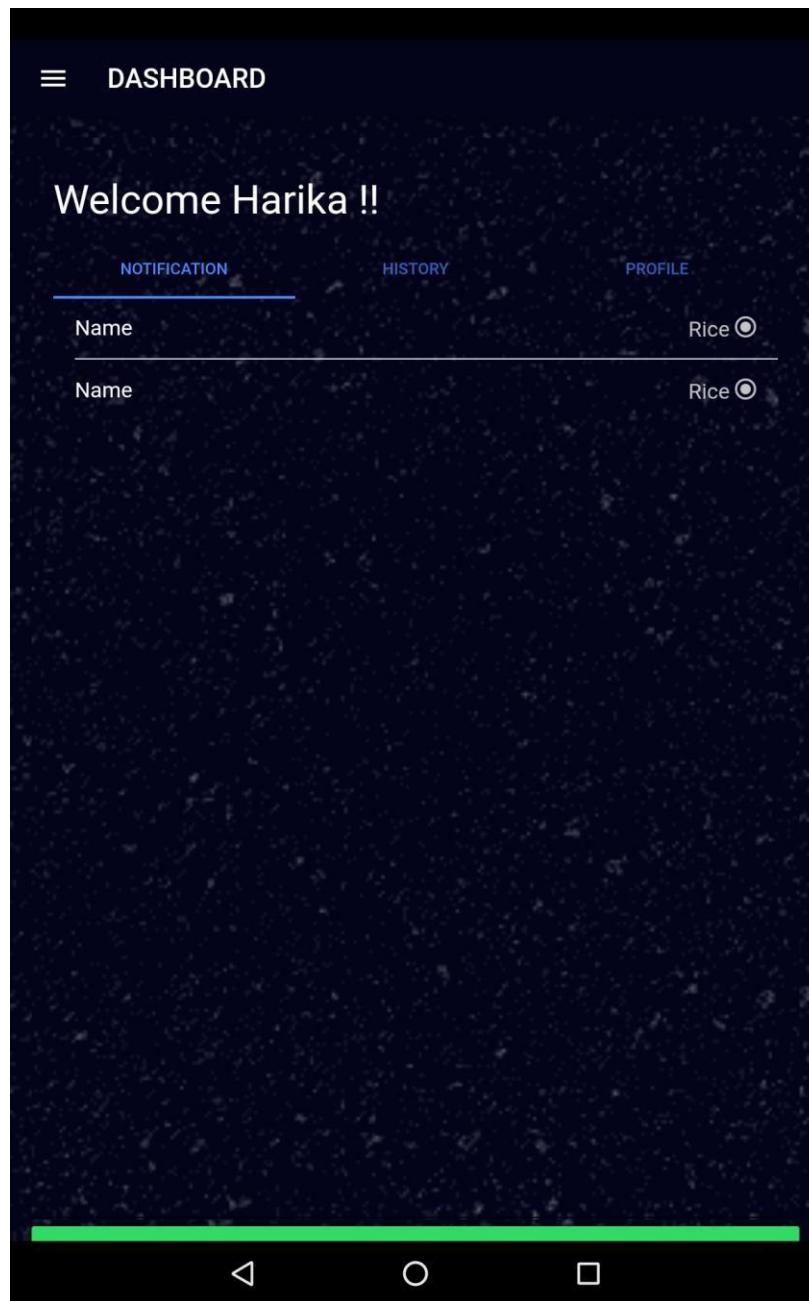


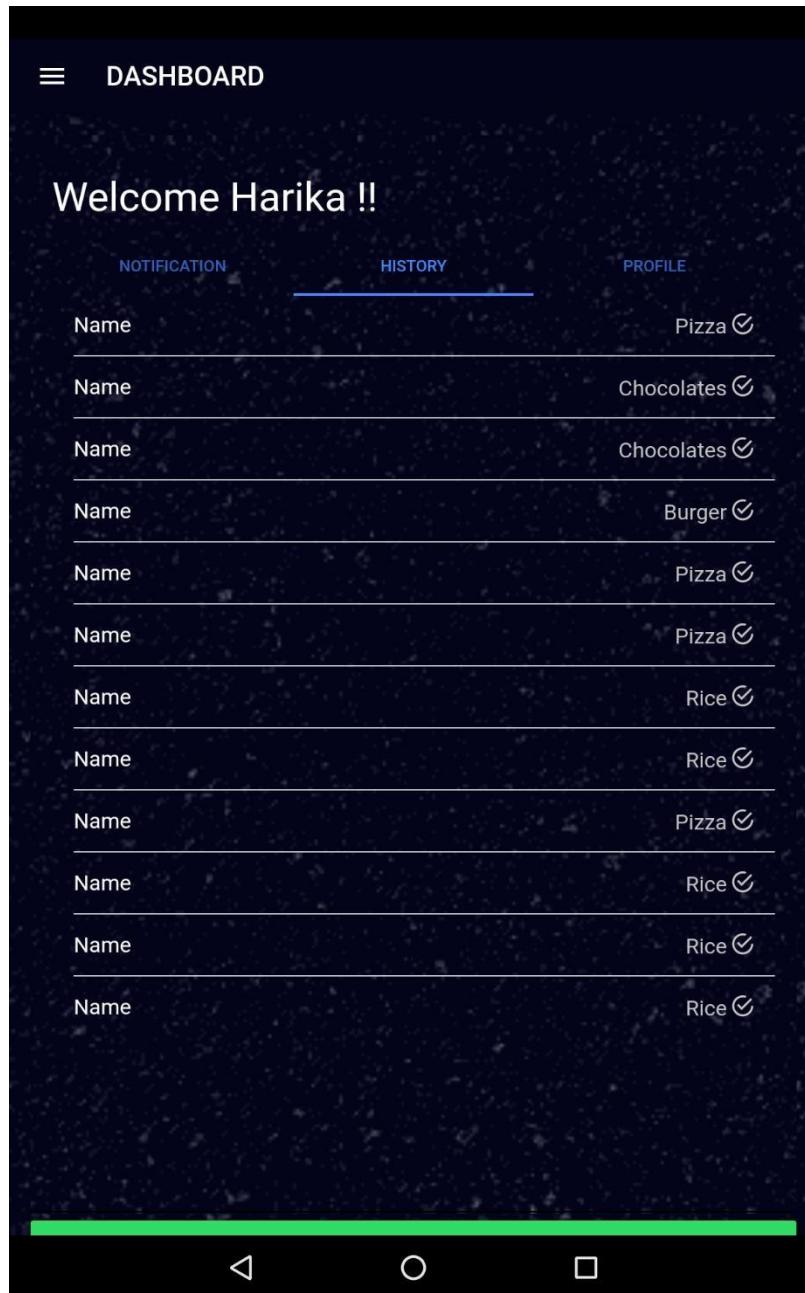
UPLOAD FOOD PAGE



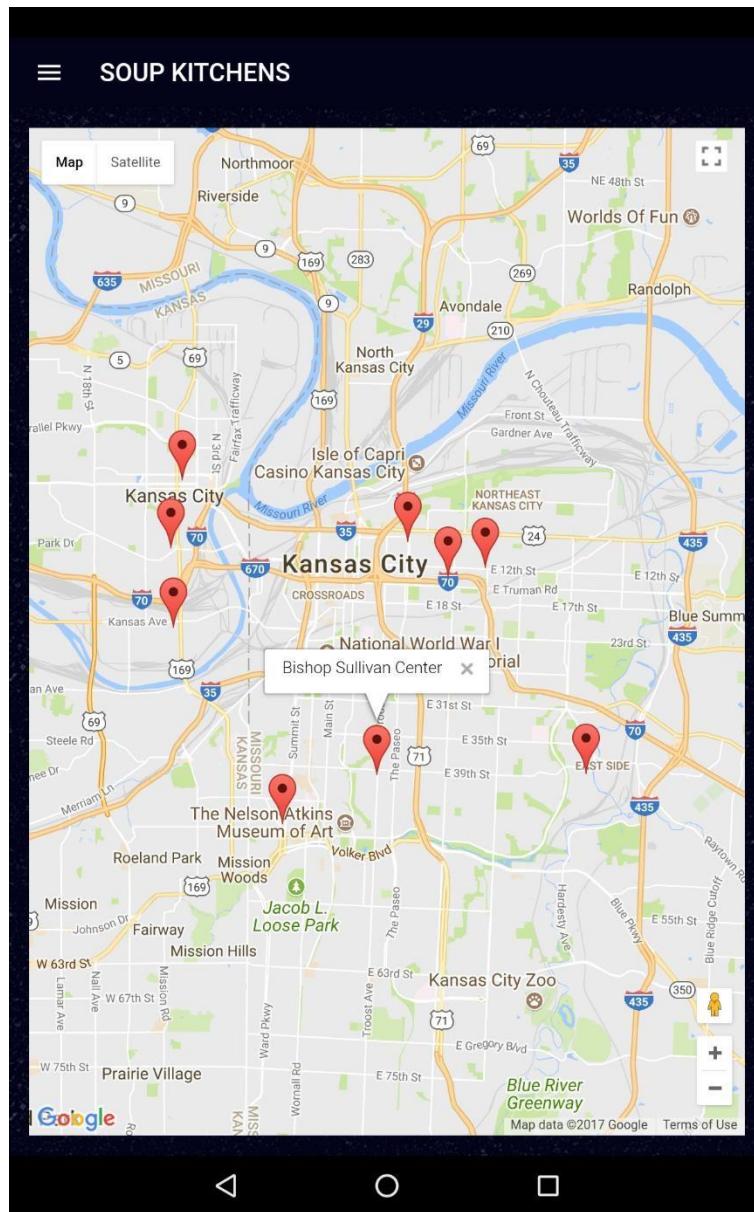
Details	
	Rice Sushi Rice in a Rice Cooker recipes
Fat	4.524 g
Carbs	618.852 g
Protein	51.558 g
Cholesterol	0 mg
Sodium	45.72 mg
Calcium	98.64 mg
Magnesium	282.48 mg
Potassium	670.8 mg
Iron	6.24 mg
Zinc	9.1428 mg
Phosphorus	842.4 mg
Vitamin A	0 µg
Vitamin C	0 mg
Thiamin (B1)	0.546 mg
Riboflavin (B2)	0.3744 mg
Niacin (B3)	12.48 mg
Vitamin B6	1.131 mg

FEEDBACK PAGE

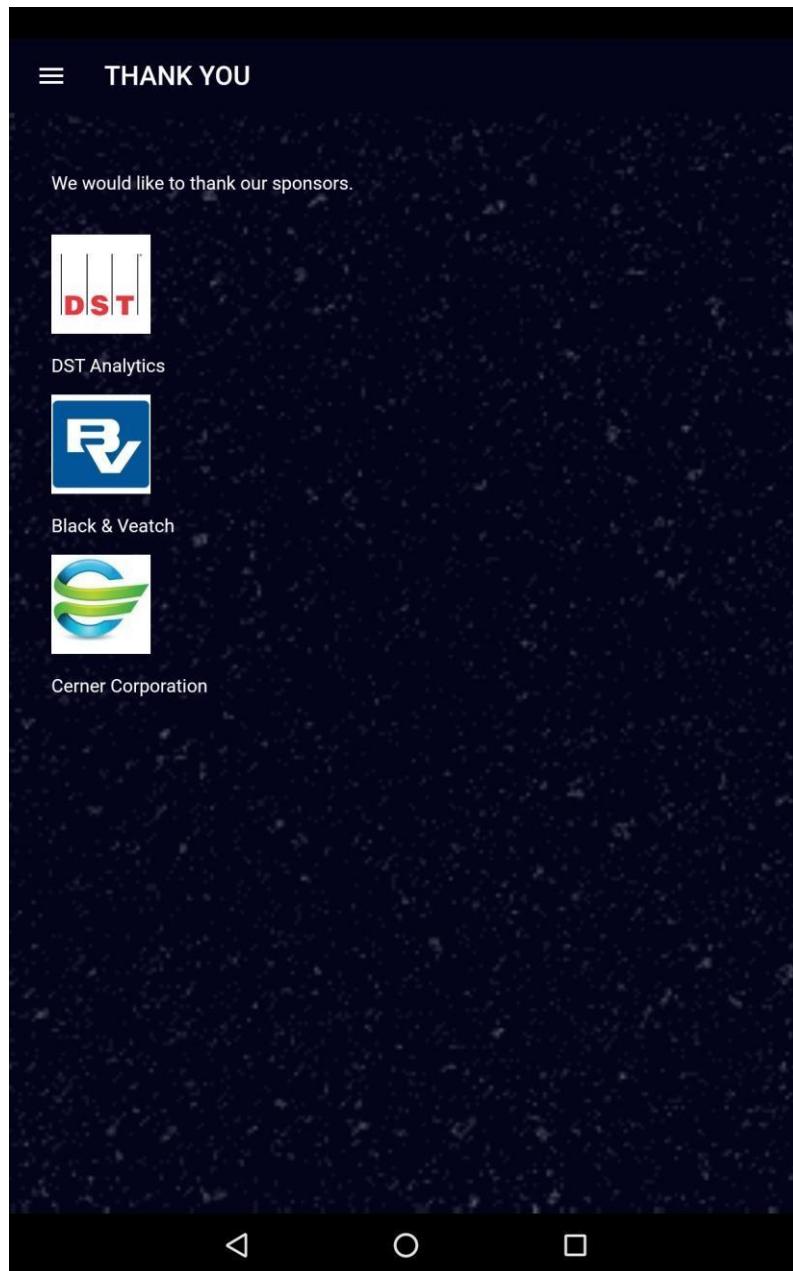
VOLUNTEER DASHBOARD



SOUP KITCHENS



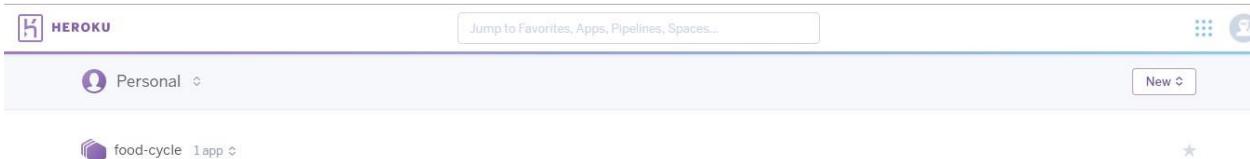
THANK YOU PAGE



DEPLOYMENT

Heroku :

We have deployed the application in Heroku .



Youtube Link to our Application Demo : <https://youtu.be/Lxj-A1iWmPI>

TESTING

i. UNIT TESTING

Sr No	Test Case	Description	Expected Outcomes	Result
1	Successful Authentication (Single Login for User and Volunteer)	User and Volunteer should be able to Login with the Email and password they provided while registering	Successful Login	Pass
2	Unsuccessful Authentication	Provides wrong credentials	Login Unsuccessful with error prompts	Pass
3	Successful OAuth Login (Facebook and Google+ login)	User or Volunteer provides correct credentials	Successful login	Pass
5	Registration Page	User and Volunteer should be able to successfully register by providing their role.	Successful Registration	Pass
6	Upload Food Page	User should be able to get nutrition information of the food	Nutrition details	Pass

ii. PERFORMANCE TESTING

The screenshot shows a browser window with the YSlow extension running. The URL is chrome-extension://ninejjcohidippngpapiinmkglmakh/yslow.html#1. The page displays a grade of A with an overall performance score of 98. It lists 23 items under the 'Grade' section, with 6 being critical (A) and 17 being informational (B). The critical items include 'Make fewer HTTP requests', 'Use a Content Delivery Network (CDN)', 'Avoid empty src or href', 'Add Expires headers', 'Compress components with gzip', 'Put CSS at top', 'Put JavaScript at bottom', and 'Avoid CSS expressions'. Below the grade, there is a detailed explanation of how to reduce the number of components on a page to decrease HTTP requests. There are also 'Read More' links and social sharing options for Twitter and Facebook.

IX. TECHNOLOGY USED

- Android SDK
- HTML
- CSS
- Ionic
- Firebase
- PostgreSQL
- Heroku

X. ACKNOWLEDGEMENT

We would like to express our immense gratitude towards **University Of Missouri-Kansas City**, which created a great platform to attain profound technical skills in the field of **Computer Science**. We are very much thankful to our professor **Dr. Yugyung Lee** for her time and effort in guiding through our project. We extend our heartfelt thanks to our guide, **Ms. Megha Nagabhushan**, for her enthusiastic guidance throughout the course of our project. Last but not the least, our appreciable obligation also goes to all other TA's of Computer Science Department and to our fellow classmates who directly or indirectly helped us.

XI. BIBLIOGRAPHY

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<https://developers.facebook.com/>

<https://developers.google.com/> <https://firebase.google.com/>

<https://www.postgresql.org/docs/>