Bilkent University
Department of Computer Engineering

Senior Design Project
T2302
Yicem

Analysis and Requirement Report

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1 Introduction

Food waste caused by leftover foods that go unsold in bakeries and cafes is a pressing issue in our modern society. According to the Food and Agriculture Organization of the United Nations (FAO), approximately 13.8% of the food produced is wasted across various stages [1]. Retail stands out as one of these stages, including establishments that directly sell food to end customers, such as cafes and restaurants. According to the FAO, inadequate sales of products nearing the 'best before' date and insufficient stock management are among the reasons for food waste at the retail level [1]. Each day, countless delectable pastries, sandwiches, and other culinary creations remain unsold and eventually end up discarded, contributing to a significant environmental and ethical problem. This wastage squanders valuable resources and money, exacerbates food insecurity, and puts additional strain on our planet's resources.

Yicem aims to solve this issue. Yicem is a mobile application that allows businesses such as cafes, bakeries, restaurants etc. to sell daily fresh and perishable items like cakes, pastries, and baked goods that need to be sold on the same day at a discounted price when they remain unsold at the end of the day.

1.1 Description

This mobile application will be designed for cafes, bakeries, restaurants, and similar establishments to offer daily fresh and perishable items like cakes, pastries, and baked goods that need to be sold on the same day at a discounted price when they remain unsold at the end of the day. With this application, our aim is to increase the profitability of businesses, reduce food waste, and provide people with the opportunity to purchase items at a reduced price.

This application will have two different types of users: first, businesses like cafes and restaurants that will list their unsold daily items at a discounted price at a specific time, and second, individual users who will purchase these discounted items. Businesses will offer their unsold items at a discounted rate in a concept known as the 'mystery box'. The mystery box concept is designed to help businesses sell surplus items in bulk and to prevent misuse of the application. For instance, instead

of selling individual items separately, a business may put items like donuts and cakes into a 'mystery box' named 'dessert box' and sell it as a whole.

With this system, we aim to encourage individual users to purchase the items they want during regular sales hours and avoid waiting for the discounted time since they won't know the exact contents of the mystery box. Individual users can purchase items from these mystery boxes through the application and then collect them from the respective business during the designated pickup times. Additionally, the application will offer features for individual users such as personalized meal recommendations, detailed filtering, and displaying businesses on a map based on their offerings.

2 Current System

While established companies like Getir and Yemeksepeti engage in clearly defined competition within the sector, the Yicem project sets itself apart by specializing in the sale of unsold food items, aiming to efficiently reduce surplus inventory.

Other competitors that focus on the same goal as the Yicem project are also emerging in Europe. There is also a company named Fazla who are trying to accomplish similar goals to ours. However, their operations are solely active in İstanbul and no such competitor product is in service in Ankara. This can position us uniquely in the Ankara market without competition and may facilitate the smooth expansion of our project in Ankara. Additionally, some of these companies in the market do not offer marketing solutions such as the Mystery Box system that we plan to develop which is expected to give the upper hand to us in a hypothetical competitive scenario.

3 Proposed System

3.1 Overview

Yicem addresses the prevalent issue of food waste in the retail sector, particularly in cafes and bakeries. Yicem is a mobile application designed for businesses in the food industry, enabling them to sell unsold items prone to going bad, like cakes and pastries, at a discounted price towards the end of each day. By introducing a 'mystery

box' concept, the app facilitates bulk sales, boosting business profitability, reducing food waste, preventing application misuse, and allowing consumers to purchase quality items at a reduced cost.

The Yicem application caters to two user groups: businesses, including cafes and restaurants, which list discounted unsold items and individual users who can purchase these items. This system encourages timely purchases and can be used to discourage users from waiting for the discounted period, as the exact contents of the 'mystery box' are unknown until purchase. Users can collect their items during designated pickup times. The app also offers additional features such as personalized meal recommendations, detailed filtering, and a map display of businesses based on their offerings. Through Yicem, the goal is to create a win-win situation, benefitting both businesses and consumers while significantly addressing the issue of food waste in the retail sector.

3.2 Functional Requirements

- There should be 2 different applications, one specifically catered for the buyers, and one for the business owners/sellers.
- The business owners must be verified by the admins before they can start to use the application at its full capacity.
- The buyer users will be verified via email authentication.
- The buyer user will be able to see all the businesses that have products to sell.
- The buyer user will see the active discounted offers on the home page.
- The buyer user will be able to see the registered businesses on a map.
- Upon selecting a seller, or via selecting a discounted offer, the buyer user will be able to see all the offers of the selected seller and make reservations for the product they wish to buy.
- On a specific seller’s page, the buyer user will be able to see the opening and closing times of the business.
- On a specific seller’s page, the buyer user will be able to see the user reviews left for the seller.

- The buyer user will be able to see their past purchases and leave reviews for these purchases.
- The buyer user will see the general food types that are being sold by a specific seller. Some examples for the food types are desserts with milk, desserts with sherbet, donuts, biscuits, cookies, etc.
- The buyer users and the seller users will be able to change their account passwords.
- The buyer users will be notified of new offers from the businesses in their proximity.
- The buyer users will be able to favorite a business. The buyer users will be notified of their favorite business' offers regardless of their proximity.
- The buyer users will be able to unlock achievements with different milestones they hit (x amount of purchases made), which will be displayed in their profiles.
- The seller users will be able to put their products up for sale at a desired price.
- The seller users' sale activity will be logged. The logged statistics will be accessible by the seller user to adjust sale prices or times.
- The seller users will be given suggestions by examining their sales statistics.
- The seller users will be able to approve a transaction as complete after a product has been sold to the buyer that had reserved it.

3.3 Non-functional Requirements

3.3.1 Scalability

The initial platform of the application is planned to be the campus of Bilkent university. But the plan is to grow the platform over time and open it up to other campuses in Ankara, and eventually other cities too. Considering this, it is essential to design the system to handle an increasing number of users and businesses.

- Initially, the application should support up to around 12.000 users (number of students in Bilkent). That is, the database of the application should be expected to have large enough space for storing this many users.
- Space cost of business and admin accounts is negligible compared to customers.

- As an estimation, the application should be able to accommodate around %20 monthly increase in scale (number of active users and businesses) without a decrease in performance.
- The system should be designed to allow horizontal scaling in elements such as server and database. For example, if the need arises, the system should be able to allow the addition of more servers without disrupting the existing server.

3.3.2 Performance

As it is the case with mobile apps, providing a seamless user experience should be a key requirement. Having slow response times and frequent crashes could deter potential users away from the application. To address these issues, there will be certain constraints:

- Upon opening, the application should ideally load within 3-5 seconds. Intermediate loading times shouldn't exceed 3 seconds either.
- During peak hours (around the general closing hours of restaurants/cafes in this case, which is roughly 17.30 in Bilkent for example) the application should be expected to support at least 500 users simultaneously. This number can be larger as the platform grows (see scalability).

3.3.3 Reliability

- In the case of a server failure or a shutdown, the system should recover without loss of data.
- In-app payments should be made in an atomic way; that is, outer factors should not result in the loss of a value. In the case of a system failure or shutdown in the middle of a transaction, the system should abort the process and not do any transaction. It is not acceptable to have a scenario where the user loses money because of a system failure.

3.3.4 Security

- Authentication and authorization methods should comply with the industry standards. Only the most up-to-date and verified A&A technologies are accepted to be used.
- Sensitive data should be encrypted and payment info should be invisible to all parties, including the user themselves (for example, the user should only be

able to see the last 4 digits of their credit card after they have entered it). This ensures that payment info is secure even if a malicious source enters the user's account.

    - Secure third-party payment frameworks (such as iyzico) can be used to handle transactions.

3.3.5 Usability

A clean and intuitive UI design is crucial for a mobile application. The application will follow certain constraints for this purpose:

- The most common functionalities should be available right away in the homepage (such as the list of currently open businesses).
- Navigation should not be convoluted. Each core functionality should be reachable from the main page within 3-4 touches.
- The labels and icons for functionalities should be intuitive. For example, the label/icon to indicate a functionality should be selected from the most commonly used options to indicate a similar functionality in other popular applications.
- The application should support Turkish and English at the very least. As the platform grows, different languages should be able to be added easily.

3.4 Pseudo Requirements

- There will be two applications for customers and sellers.
- We will use React Native for developing the cross-platform application.
- We will use Java Spring Boot framework for developing our backend application.
- We will use Google Maps API to provide live location updates and map functionality to users
- MongoDB Atlas NoSQL database will be used as our database management system.
- We will host our server application and database on an AWS EC2 server.
- We will use Github as our version control system.
- We will use Jira as our project management system.
- We will use Java Spring for our backend application.
- Microservice architecture will be used.

3.5 System Models

3.5.1 Scenarios

3.5.1.1 Buyer User

Scenario 1 Register To Yicem:
Actors: Buyer User
Entry Conditions: User opens the app and clicks the “create an account” button
Exit Conditions: User completes the register process successfully OR clicks the back button.
Flow of Events:

1. User enters their username
2. User enters their email address
3. User enters the verification code that is sent to their email address
4. User is navigated to home page

Scenario 2: Login To Yicem
Actors: Buyer User
Entry Conditions: User opens the app
Exit Conditions: User is navigated to home page OR clicks “login” button
Flow of Events:

1. User is directly navigated to home page if they are already registered

Scenario 3 View Business Page:
Actors: Buyer User
Entry Conditions: User logs in the app and navigates to home page OR navigates to the businesses page
Exit Conditions: User clicks back button
Flow of Events:

1. User view list of businesses on the home page
2. User clicks one of the businesses and navigates to a business’ page
3. User sees business’ information including opening-closing hours, list of offerings made by business and review of that business

Scenario 4 Make Reservation:
Actors: Buyer User
Entry Conditions: User logs in the app and in the business page
Exit Conditions: User completes reservation process successfully OR notified for unsuccessful reservation OR clicks cancel button
Flow of Events:

1. User clicks make reservation button for one of the offerings
2. If there is no other user ahead of the queue, user placed first in the reservation queue
3. User selects the time they want to pick up the order from the seller's specified time range

Scenario 5 Make Review:
Actors: Buyer User
Entry Conditions: User logs in the app and in the profile page
Exit Conditions: User makes review OR clicks back button
Flow of Events:

1. User clicks profile button in grid menu
2. User views past purchases in profile section and clicks review button
3. User selects amount of stars (out of 5) to give rating and writes their comments on the opened pop-up page
4. User clicks send button
5. Pop-up page closes and user sees profile page again
6. In the past purchases section of the profile page, the write review button next to the purchase where a review was made changes to the view review button.

Scenario 6 View Nearby Businesses From Map:
Actors: Buyer User
Entry Conditions: User logs in the app and in the map page
Exit Conditions: User clicks back button OR exits the app
Flow of Events:

1. User clicks map button in the grid menu
2. User sees the nearby venues as pinned locations on map

Scenario 7 View Preview of Businesses From Map:
Actors: Buyer User
Entry Conditions: User logs in the app and in the map page
Exit Conditions: User clicks back button OR exits the app
Flow of Events:

1. User clicks map button in the grid menu
2. User sees the nearby venues as pinned locations on map
3. User clicks the pin of the business that want to preview
4. User views the distance, the name of the business, and the button to direct business' page

Scenario 8 View Past Purchases:
Actors: Buyer User
Entry Conditions: User logs in the app and in the profile page
Exit Conditions: User clicks back button OR exits the app
Flow of Events:

1. User clicks profile button in grid menu
2. User views past purchases in profile section

Scenario 9 Favorite a Business:
Actors: Buyer User
Entry Conditions: User logs in the app and in the business page
Exit Conditions: User clicks back button OR exits the app

Flow of Events:

1. User navigates to a business' page
2. User clicks favorite button in business' page to add business to their favorites
3. Favorited business can be seen in the listed businesses page under the favorites section

Scenario 10 Complain About Business:
Actors: Buyer User
Entry Conditions: User logs in the app and in the business page
Exit Conditions: User clicks back button OR exits the app
Flow of Events:

1. User navigates to a business' page
2. User clicks complain button
3. A pop-up page opens and user fills out the form
4. User clicks send button
5. A pop-up page closes, user sees the business' page again
6. User's complaint is sent to administrators.

3.5.1.2 Seller User

Scenario 1 Register To Yicem:
Actors: Seller User
Entry Conditions: User opens the business app and clicks the "Create an account" button
Exit Conditions: User closes the app OR clicks the back button.
Flow of Events:

1. User enters their business' name
2. User enters their email address
3. User enters their phone number
4. User enters their business' address
5. User enters the verification code that is sent to their email address
6. User is navigated to waiting for approval page

Scenario 2 Login To Yicem:
Actors: Seller User
Entry Conditions: User opens the business app and clicks the "Login" button
Exit Conditions: User closes the app OR clicks the back button.
Flow of Events:

1. User enters their email and password
2. User is directed to the home page if their account is activated
3. User is directed to waiting for approval page if their account is not activated

Scenario 3 List an offer:
Actors: Seller User
Entry Conditions: User clicks the “New Offer” button
Exit Conditions: User closes the app OR clicks the back button OR another tab is selected from the grid menu.
Flow of Events:

1. User enters the name, description, price and amount of items in the offer
2. User finalizes the offer and is directed to the home page

Scenario 4 Modify an offer:
Actors: Seller User
Entry Conditions: User clicks any previously created offer
Exit Conditions: User closes the app OR clicks the back button OR another tab is selected from the grid menu.
Flow of Events:

1. User modifies the name, description, price and amount of items in the offer
2. User saves changes in the offer and is directed to the home page

Scenario 5 Delete an offer:
Actors: Seller User
Entry Conditions: User clicks any previously created offer
Exit Conditions: User closes the app OR clicks the back button OR another tab is selected from the grid menu.
Flow of Events:

1. User clicks the delete offer button
2. User is directed to the home page

Scenario 6 Mark an offer sold:
Actors: Seller User
Entry Conditions: User clicks mark offer sold button on any previously created offer
Exit Conditions: User closes the app OR clicks the back button OR another tab is selected from the grid menu.
Flow of Events:

1. User is given a popup notification that the offer has been sold to the reserved buyer user

Scenario 7 Navigate to Sale History tab:
Actors: Seller User
Entry Conditions: User clicks the sale history button from the grid menu
Exit Conditions: User closes the app OR clicks the back button OR another tab is selected from the grid menu.
Flow of Events:

1. User is directed to the sale history tab where they can view previous transactions

Scenario 8 Inspect a previous transaction:
Actors: Seller User
Entry Conditions: User clicks any previous transaction in the sale history tab
Exit Conditions: User closes the app OR clicks the back button OR another tab is selected from the grid menu.
Flow of Events:

1. User is directed to the detailed view of the selected transaction where they can see details of the sold item and the review left by the buyer user

Scenario 9 Navigate to Analytics tab:
Actors: Seller User
Entry Conditions: User clicks the analytics button from the grid menu
Exit Conditions: User closes the app OR clicks the back button OR another tab is selected from the grid menu.
Flow of Events:

1. User is directed to the analytics tab where they can view their most popular item, a graph containing their sale activity breakdown etc.

Scenario 10 Navigate to Profile tab:
Actors: Seller User
Entry Conditions: User clicks the profile button from the grid menu
Exit Conditions: User closes the app OR clicks the back button OR another tab is selected from the grid menu.
Flow of Events:

1. User is directed to the profile tab where they can see the name of their business, address, contact info etc.

Scenario 11 Change text based profile info:
Actors: Seller User
Entry Conditions: User clicks the edit button next to the information they wish to change
Exit Conditions: User closes the app OR clicks the back button OR another tab is selected from the grid menu.
Flow of Events:

1. The selected information box becomes modifiable
2. The user saves or discards their changes

Scenario 12 Change profile picture:
Actors: Seller User
Entry Conditions: User clicks the edit button next to their profile picture
Exit Conditions: User closes the app OR clicks the back button OR another tab is selected from the grid menu.
Flow of Events:

1. User is given the option of taking a picture or choosing one from their gallery
2. User chooses a picture or takes a new one

3. User gets a preview of their new profile picture
4. User discards or saves the changes

3.5.1.3 Admin User

Scenario 1 Login To Yicem:
Actors: Admin User
Entry Conditions: User opens the app and clicks the “Login” button
Exit Conditions: User closes the app OR clicks the back button.
Flow of Events:

1. User enters their email and password
2. User is directed to the Admin home page

Scenario 2 Approve Seller User:
Actors: Admin User
Entry Conditions: User opens Seller User tab
Exit Conditions: User closes the app OR clicks the back button OR another tab is selected from the grid menu.
Flow of Events:

1. User selects one Seller User from the list.
2. User clicks on the Approve button on the detailed info page about the Seller User if the Seller User is not approved yet.

Scenario 3 Reject Seller User:
Actors: Admin User
Entry Conditions: User opens Seller User tab
Exit Conditions: User closes the app OR clicks the back button OR another tab is selected from the grid menu.
Flow of Events:

1. User selects one Seller User from the list.
2. User clicks on the Reject button on the detailed info page about the Seller User if the Seller User is not approved yet
3.

Scenario 4 Remove Seller User:
Actors: Admin User
Entry Conditions: User opens Seller User tab
Exit Conditions: User closes the app OR clicks the back button OR another tab is selected from the grid menu.
Flow of Events:

1. User selects one Seller User from the list.
2. User clicks on the Remove button on the detailed info page of the approved Seller User.

Scenario 5 Remove Buyer User:
Actors: Admin User
Entry Conditions: User opens Users tab inside the Buyer Users tab
Exit Conditions: User closes the app OR clicks the back button OR another tab is selected from the grid menu.
Flow of Events:

1. User selects one Buyer User from the list.
2. User clicks on the Remove button on the detailed info page about the Buyer User.

Scenario 6 See Support Requests:
Actors: Admin User
Entry Conditions: User opens Support Requests tab inside the Buyer Users tab
Exit Conditions: User closes the app OR clicks the back button OR another tab is selected from the grid menu.
Flow of Events:

1. User selects one Feedback from the list.

3.5.2 Use-Case Model

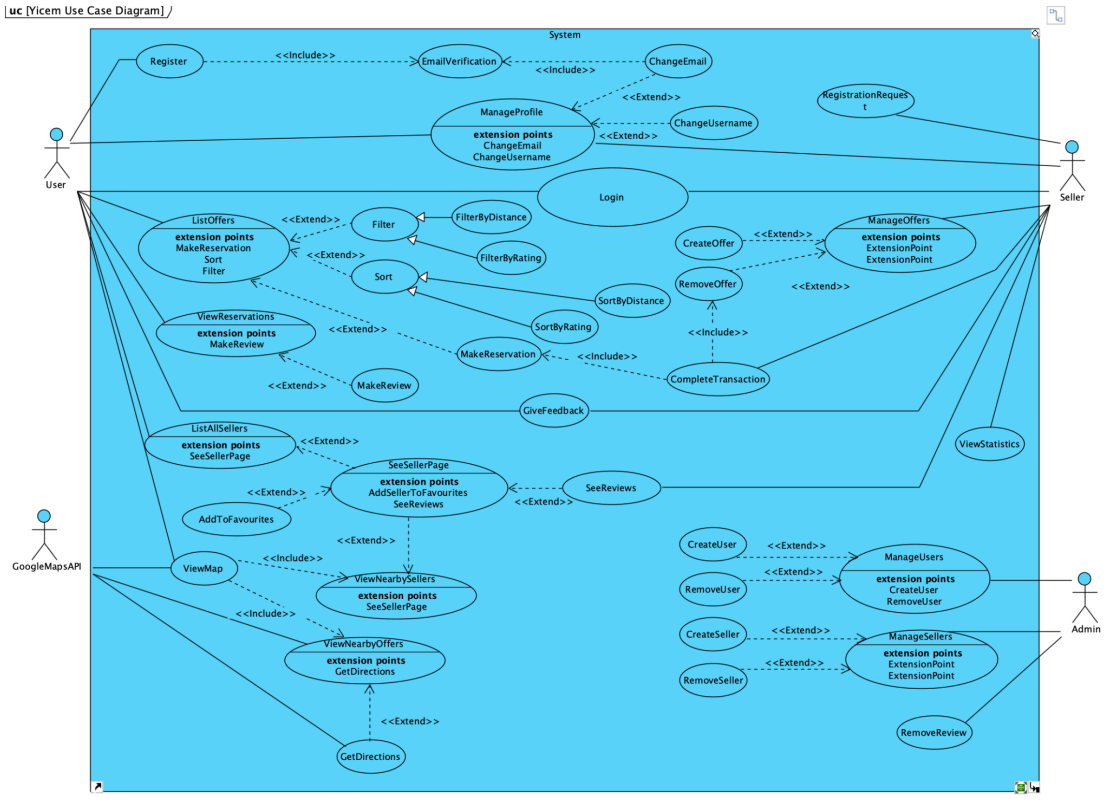

Figure 1: Use Case Model

3.5.3 Object and Class Model

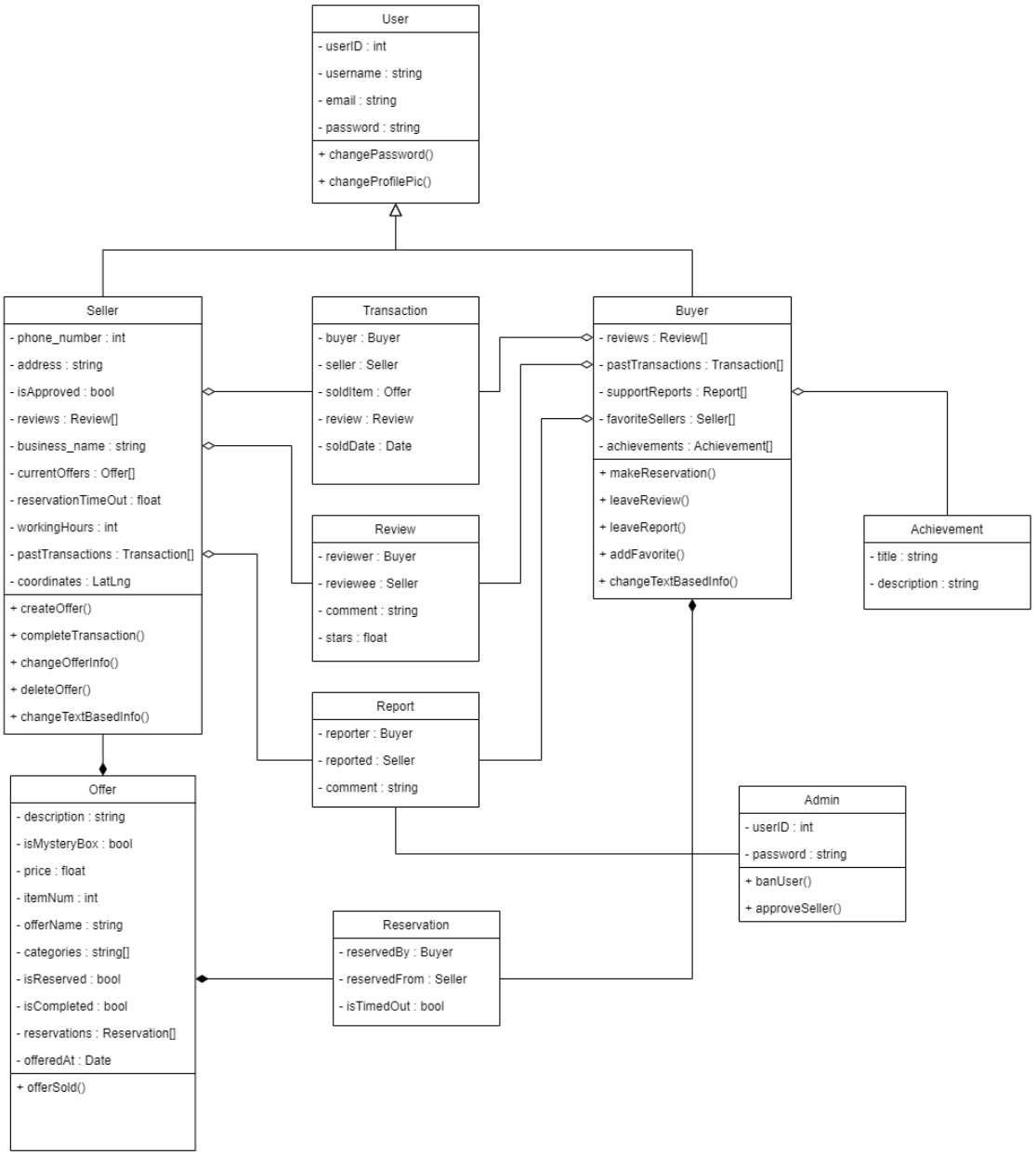

Figure 2: Object and Class Diagram (all attributes of the classes have setter and getter methods, they were not drawn for the sake of simplicity) [high definition]

3.5.4 Dynamic Models

3.5.4.1 Activity and State Diagrams

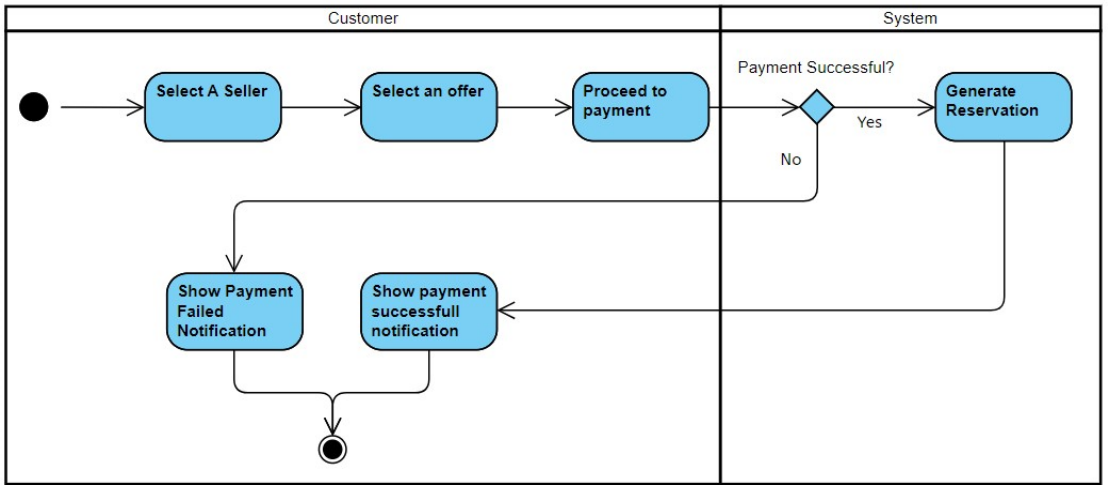

Figure 3: Activity Diagram of Making Reservation via in-app payment process

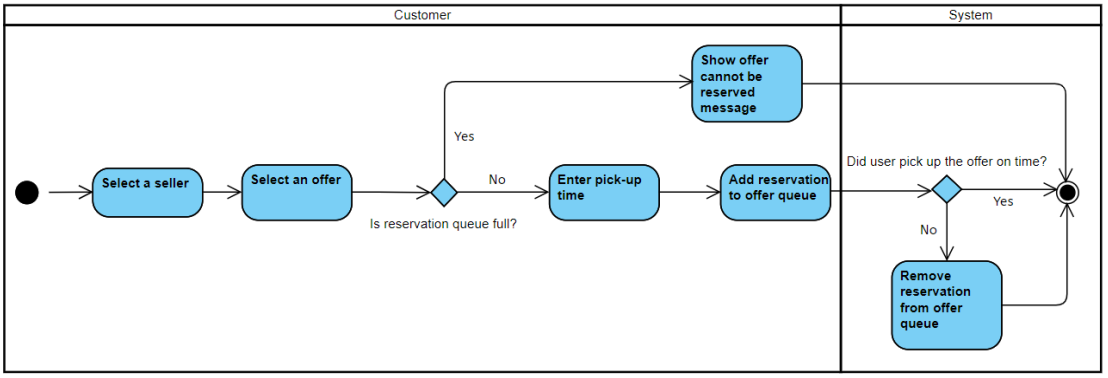

Figure 4: Activity Diagram of Making reservation and pick-up process

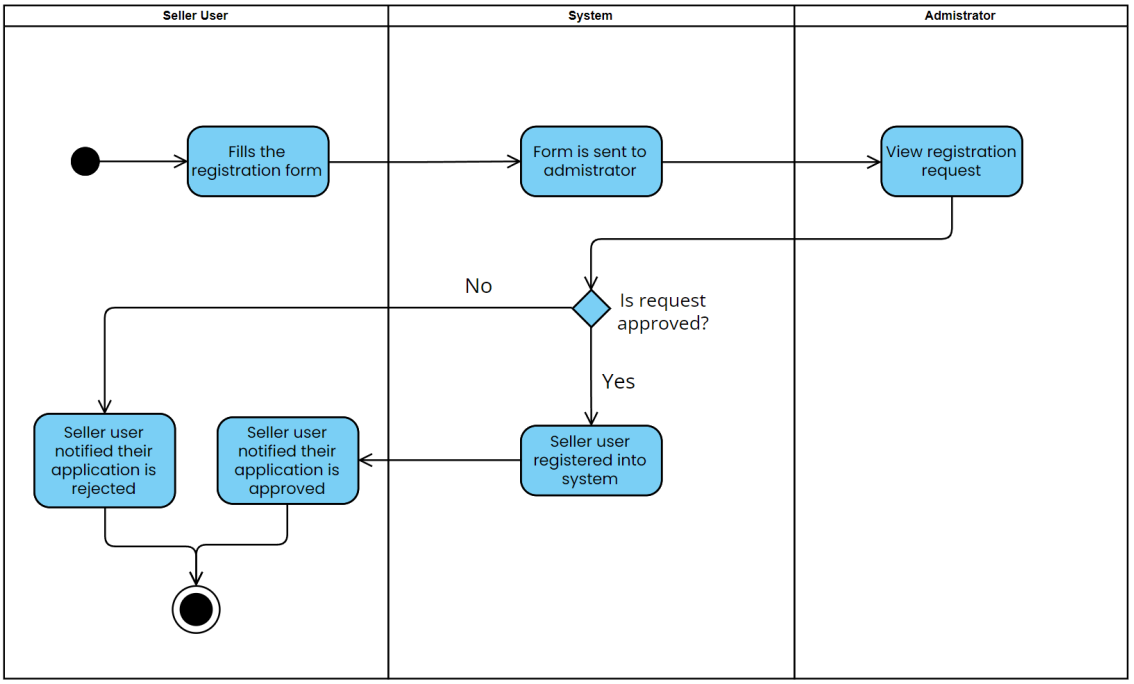

Figure 5: Activity Diagram of Seller User Registration Process

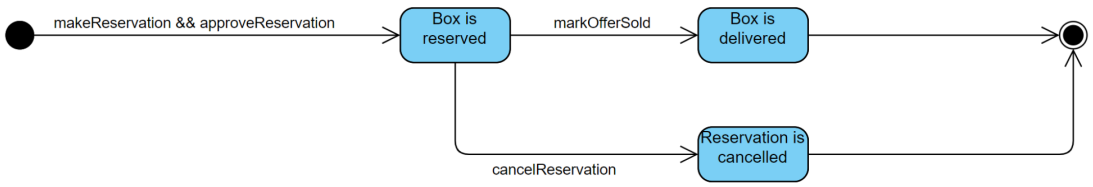

Figure 6: State Diagram of Reservation Process

3.5.4.2 Sequence Diagram

User enters registration details on the UI. Backend Service, driven by Spring, validates, checks for existing accounts, and sends a verification code. After the user verifies, the service creates the account, or notifies the UI on issues.

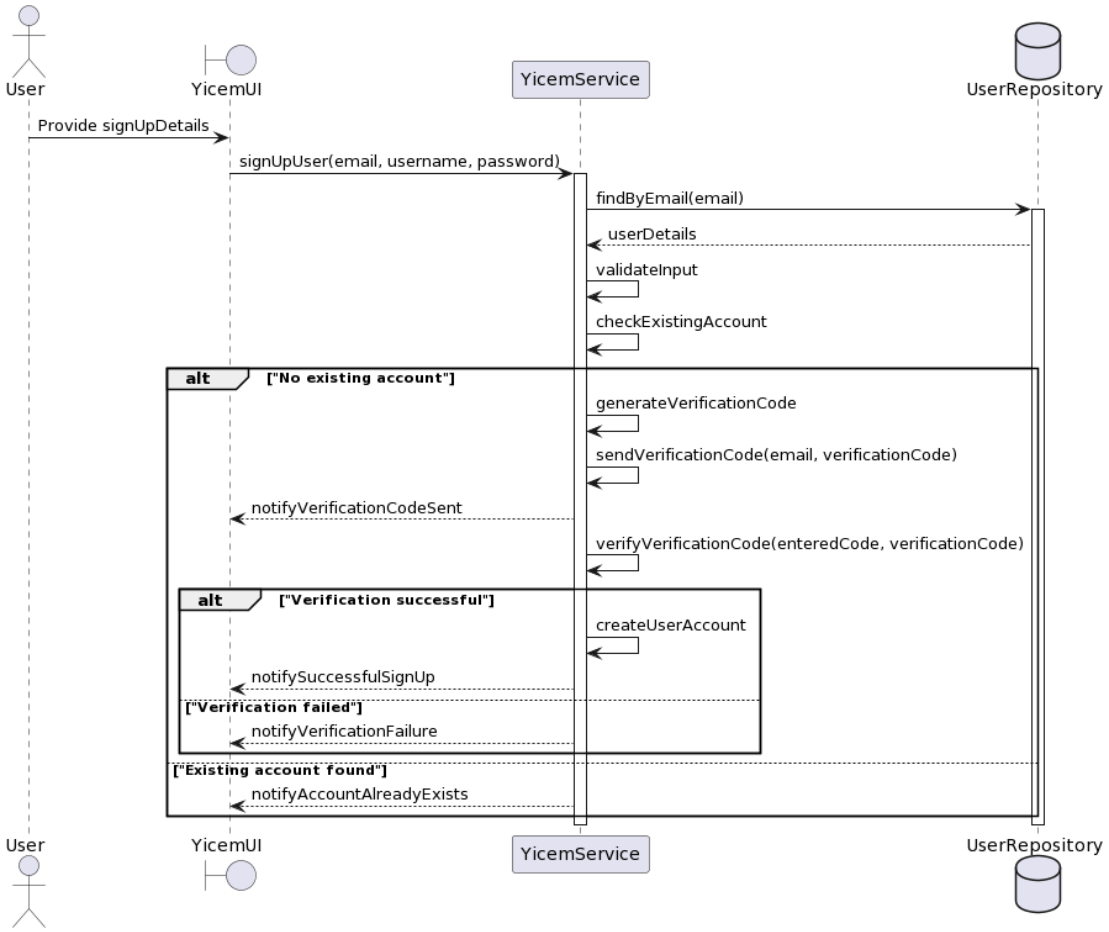

Figure 7: Sequence Diagram of User Sign Up Process

User enters login credentials on the UI. The Yicem Backend Service, powered by Spring, validates and checks the credentials from database. If valid, the service generates an authentication token, sending it to the user. In case of invalid credentials, the UI is notified.

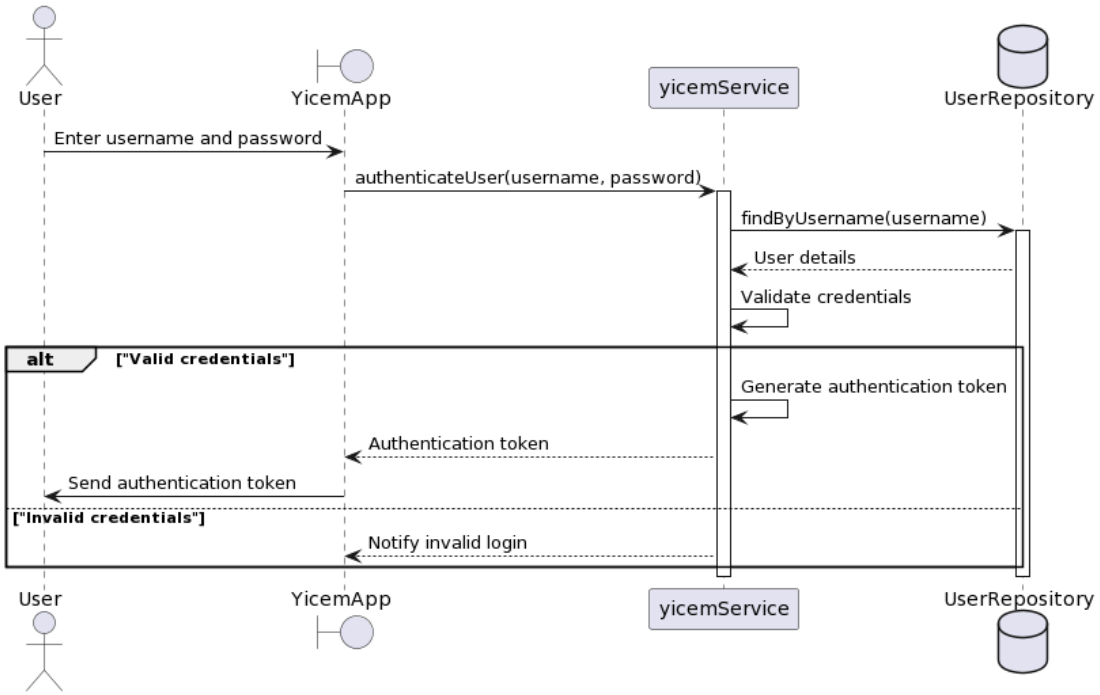

Figure 8: Sequence Diagram of User Login Process

3.5.5 User Interface

Figure 9: Buyer User Login and Sign Up Screens

Figure 10: Buyer User Home Page and Businesses Page Screens

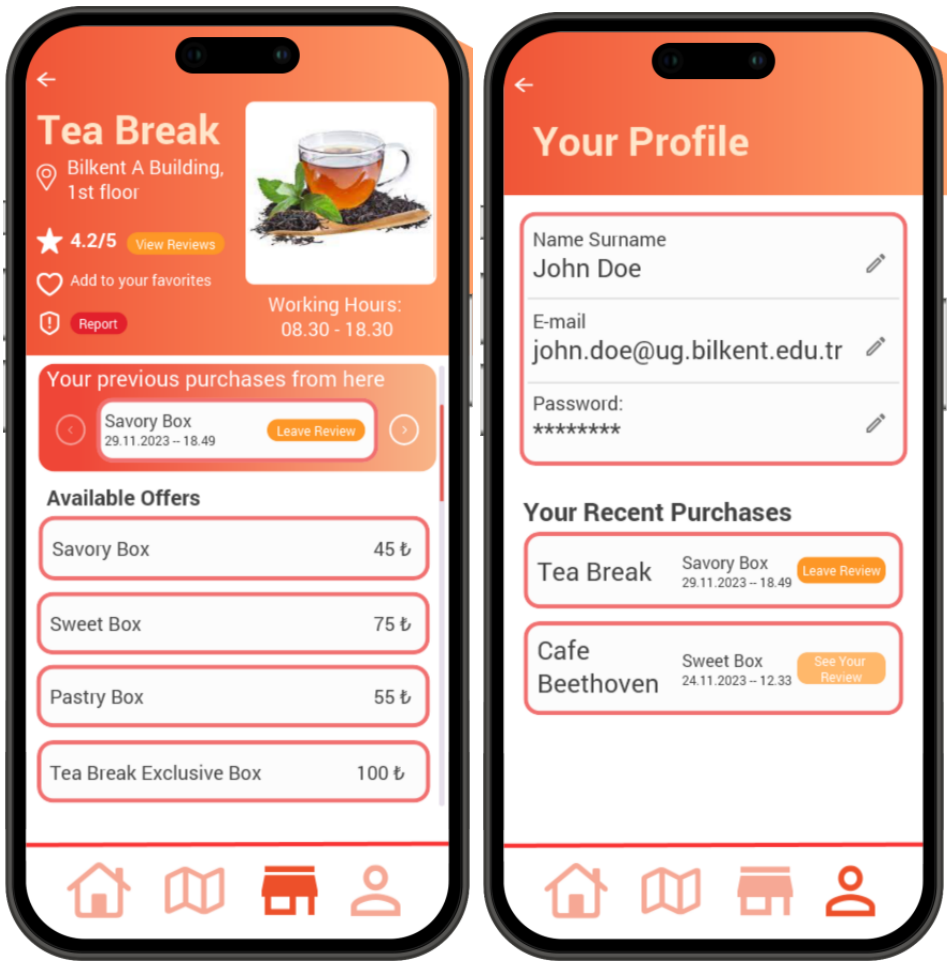

Figure 11: Business' Sale Page and Profile Page Screens

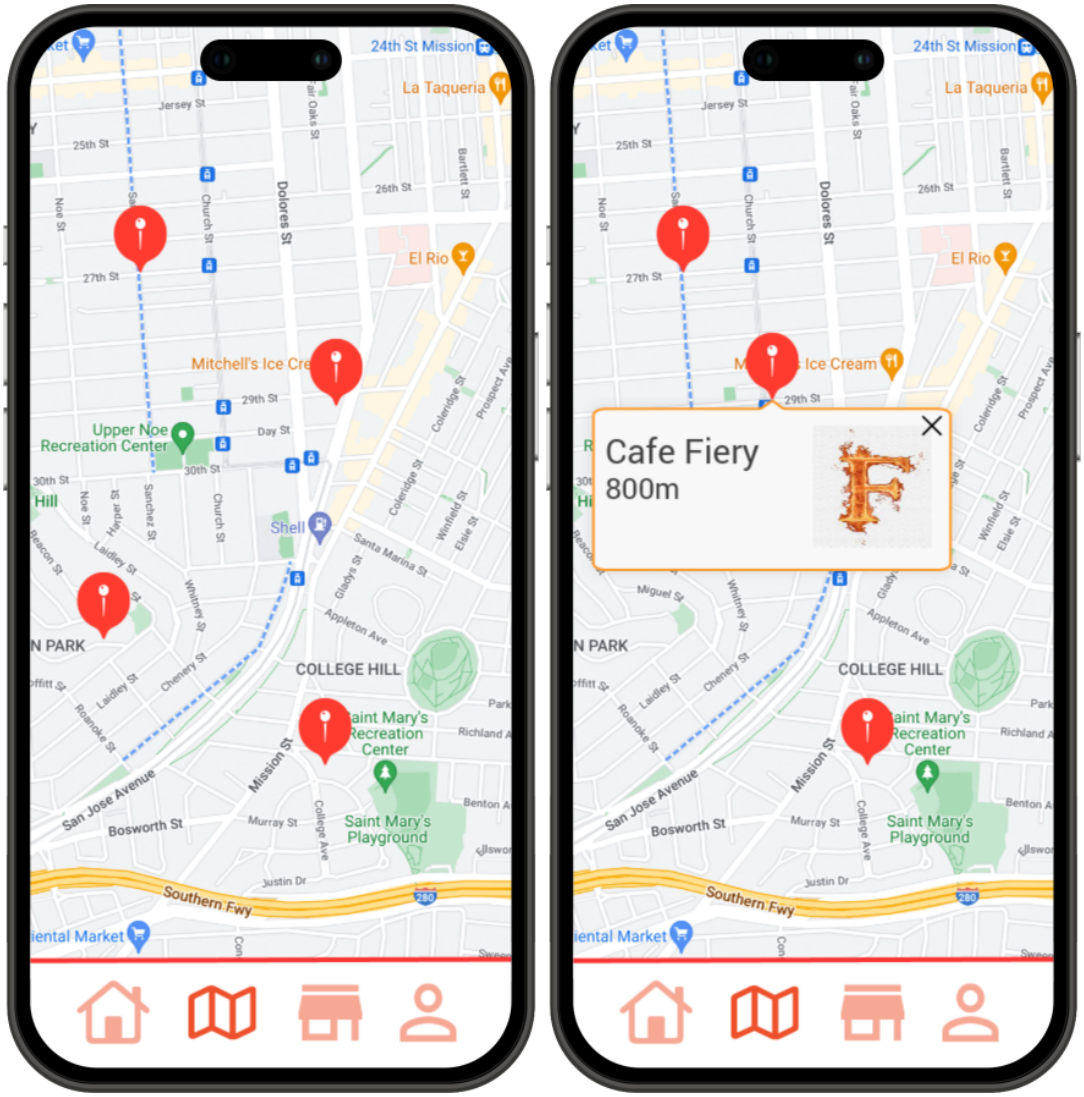

Figure 12: Map Page Screens

Figure 13: Seller User Login and Registration Screens

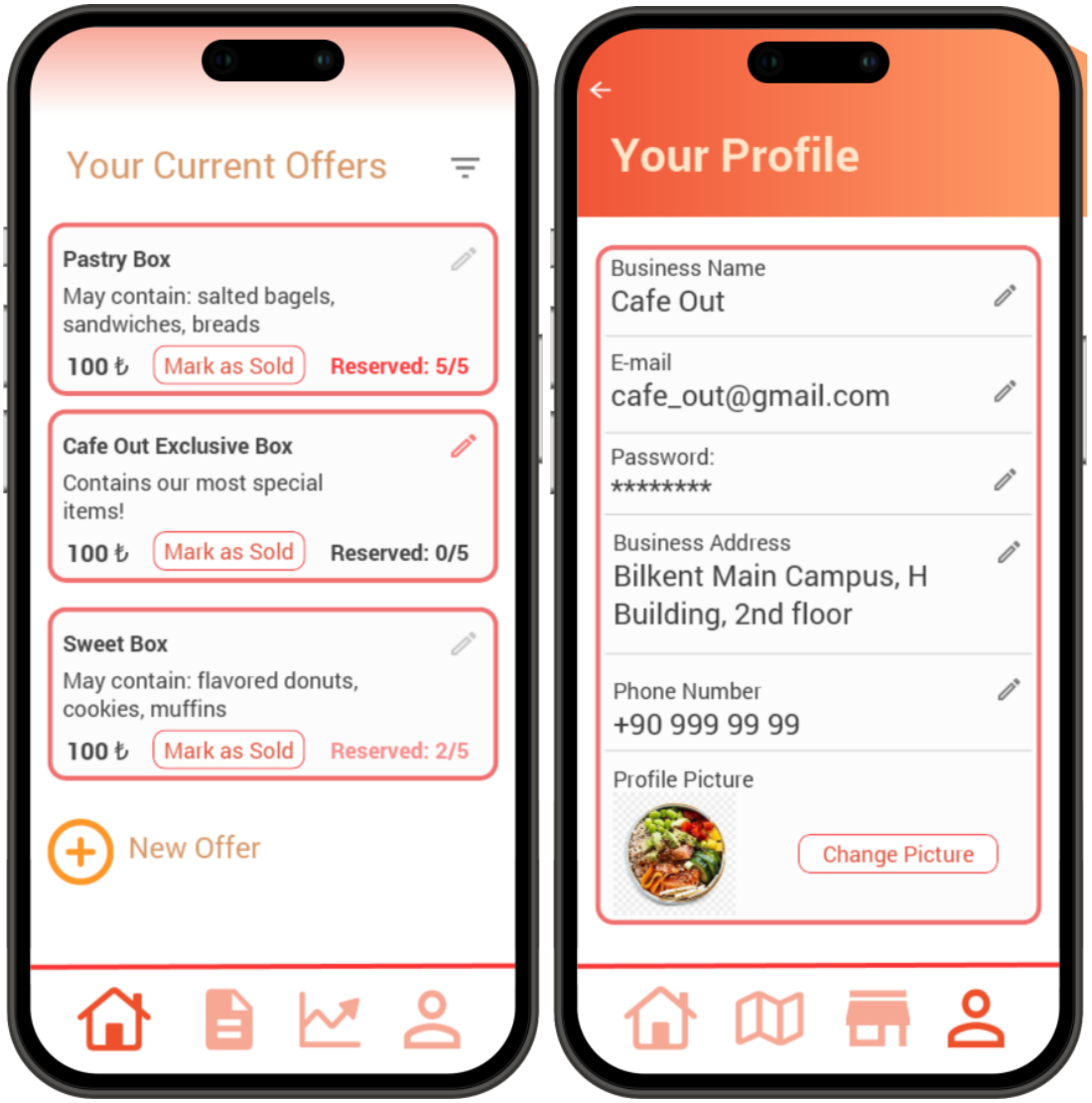

Figure 14: Seller User Create Offer and Profile Page Screens

Figure 15: Seller User History Page and Analytics Screen

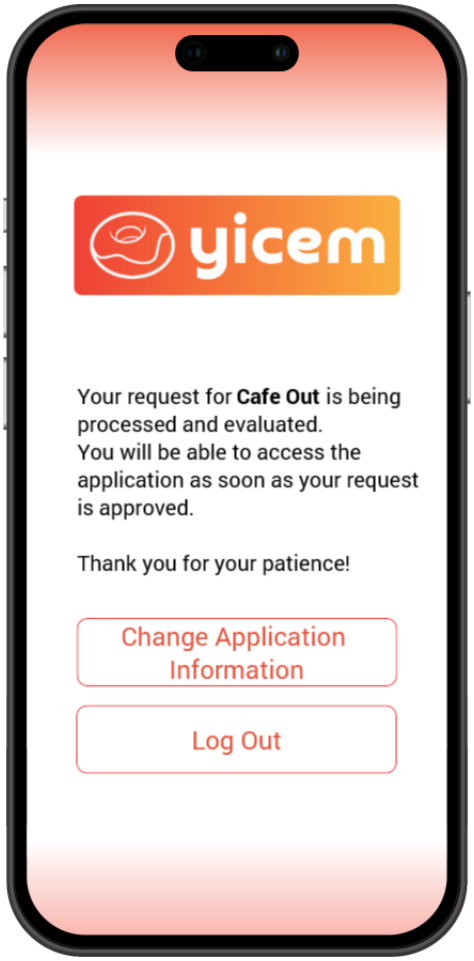

Figure 16: Seller User Registration Evaluating Process Screen

4 Other Analysis Elements

4.1 Consideration of Various Factors in Engineering Design

4.1.1 Public Health Considerations

Yicem aims to provide a platform for selling daily leftover foods at more affordable prices. Therefore, Yicem must ensure that the food sold through the platform is safe for consumption and does not pose any risk to public health. To address this, we are exploring various mechanisms to ensure the edibility of the food sold on Yicem.

The first mechanism involves implementing a complaint form that users can fill out if they encounter a business selling spoiled food. Based on these complaints, we can control the businesses and, if detected that they are

selling food that poses a threat to public health, we may shut down their Yicem accounts.

The second mechanism includes the establishment of a rating and commenting system, allowing users to publicly evaluate the quality of a business' food.

Lastly, the Yicem application will display warning messages to businesses selling daily consumable food if more than one day has passed since the advertisement, prompting them to ensure the freshness of their products.

4.1.2 Public Safety Considerations

Yicem will use the live location of users to show the closest businesses available. However, the live location of the users will not be stored in the application and it will not be shared with third parties. Yicem will only store essential personal data of users such as name and phone number and will refrain from requesting additional personal information. All data stored in the application will be encrypted and protected, ensuring that it remains secure and is not shared with external third parties to provide public safety.

4.1.3 Public Welfare Considerations

Yicem targets businesses and personal users, aiming to provide daily leftover foods at more affordable prices. Therefore, Yicem will not have direct effect on public welfare and there are no issues regarding public welfare.

4.1.4 Global Considerations

Our current target market is Turkey, more specifically Ankara. Therefore, our initial language selection for the app is Turkish. However, there is a huge potential for this app to extend its operation across the globe. For this reason, Yicem may add new regions and languages in the future.

4.1.5 Cultural Considerations

Since Yicem is an application where daily leftover foods are sold for cheaper prices, there is no effect of our application on cultural matters. Therefore, cultural aspects will not be considered in our design.

4.1.6 Social Considerations

One of the social considerations involves the background of personal users. Although Yicem's target audience is anyone seeking affordable food, our initial focus when launching the application will be university students. Purchasing food from restaurants, cafes, etc., is quite costly these days, and since most students have limited budgets, it is essential to provide them with suitable and advantageous deals. The second social consideration is the potential conflict between businesses and personal users due to misuse of the app. Therefore, necessary design choices need to be made to prevent misuse of the app while developing Yicem to prevent these potential conflicts.

4.1.7 Environmental Considerations

Yicem aims to reduce food waste, therefore it is expected to have a positive impact on the environment. To enhance this effect, our plan is to promote Yicem as extensively as possible. The application's positive environmental impact will serve as one of the primary selling points for both business owners and regular users. Furthermore, in our quest to minimize food waste, our goal is to connect food offerings with people to the fullest extent. Therefore, we will have taken this issue into consideration while designing our system.

4.1.8 Economic Considerations

Economic factors will be one of the key factors influencing the design of Yicem. As mentioned in social considerations, Yicem aims to offer suitable and advantageous deals to its users. Yicem will not charge any additional fees from personal users. Additionally, our pricing model should be beneficial for businesses. Therefore, the best pricing model for both personal users and businesses needs to be determined. The optimal pricing model is currently under research. One of the possible pricing methods could be taking a commission from each sale. However, it may change in the future depending on feedback from businesses.

	Effect level	Summary
Public health	9	Yicem must ensure that the food sold through the platform is safe for consumption and does not pose any risk to public health.
Public safety	3	Yicem must keep personal data safe and ensure data privacy.
Public welfare	1	No effect or very little effect
Global factors	2	Yicem needs to be designed in a way to enable globalization in the future.
Cultural factors	1	No effect or very little effect
Social factors	5	Yicem needs to consider the background of its users and prevent the misuse of the app.
Environmental factors	5	Yicem aims to connect food offerings with people as much as possible to minimize food waste.
Economic factors	8	Yicem needs to offer advantageous deals to its users while ensuring economic advantage to businesses.

Table 1: Factors that can affect analysis and design.

4.2 Risks and Alternatives

Including venues in the campus to application: We are planning to add the cafes and restaurants in the campus to our application. However, these venues are dependent on the rules and regulations of the Bilkent University. To add these venues to our

application, we need to get a permit from the university. If we could not get permit from the university, our B plan is to focus on the venues outside of the Bilkent University, primarily venues in Bilkent Center.

Time management: Even though we have a rigid time plan to implement our project, if we have a problem with catching up with the project's schedule in the future, we need to reorganize our schedule to compensate this loss. We may replan our work schedule and since we are working in agile software methodology, we can rearrange the length of our sprints to satisfy the deadline of the project.

	Likelihood	Effect on the project	B Plan Summary
Including venues in the campus	Medium	Low	Focusing on venues outside of Bilkent University
Time management	Medium	High	Replan the work schedule, rearrange sprints if necessary

Table 2: Risks

4.3 Project Plan

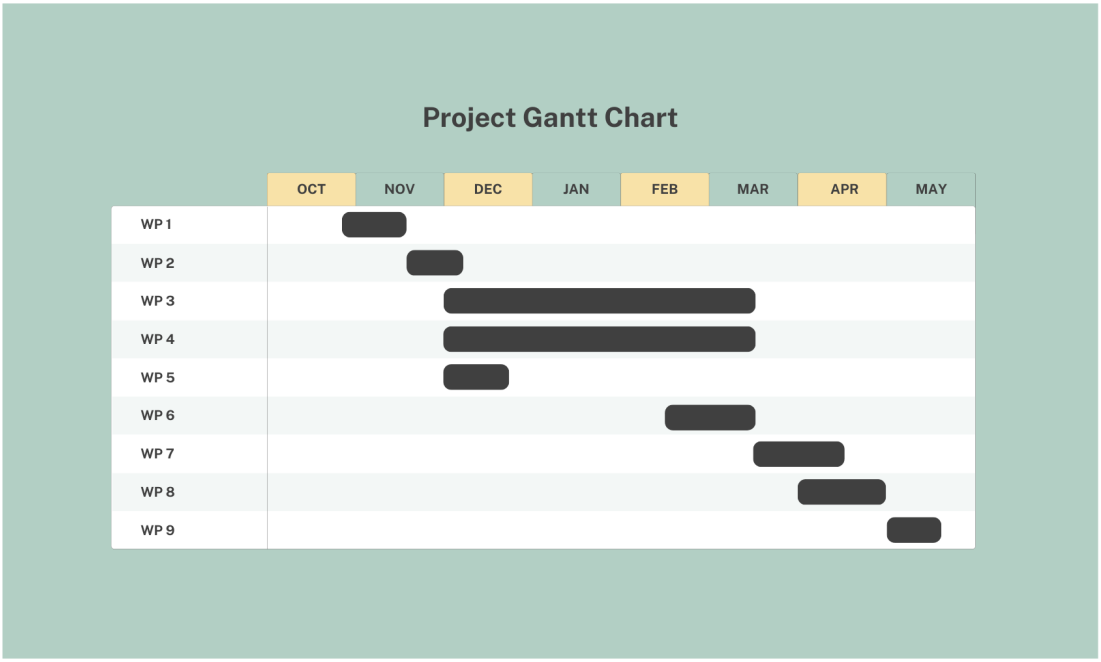

Figure 17: Project Gantt Chart

WP#	Work package title	Leader	Members involved
WP1	Project Specification Report	Ege Çenberci	All Members
WP2	Analysis and Requirements Report	Ahmet Alperen Yılmazyıldız	All Members
WP3	Frontend Development	Yağız Özkarahan	Ege Çenberci, Ahmet Alperen Yılmazyıldız, Bilgehan Sandıkcı
WP4	Backend Development	Ömer Burak Doğan	Ege Çenberci, Ahmet Alperen Yılmazyıldız, Bilgehan Sandıkcı

WP5	Demo and Presentation	Ahmet Alperen Yılmazyıldız	All Members
WP6	Detailed Design Report	Bilgehan Sandıkcı	All Members
WP7	Final Report	Yağız Özkarahan	All Members
WP8	Beta Testing & App Launch	Ömer Burak Doğan	All Members
WP9	Final Demo	Ege Çenberci	All Members

Table 3: List of work packages

WP1: Project Specification Report	
Start Date: 30/10/2023 End Date: 17/11/2023	
Leader: Ege Çenberci	Members: All members
Objectives: Define proposed project's architecture, constraints, professional considerations, and design requirements. Explore project's feasibility through market analysis.	
Tasks: Task 1.1: Introduce the project. Task 1.2: Define design requirements. Task 1.3: Conduct a market research about proposed project's feasibility.	
Deliverables: Deliverable 1.1: Project Specification Report	

WP2: Analysis and Requirements Report	
Start Date: 18/11/2023	End Date: 08/12/2023
Leader: Ahmet Alperen Yılmazyıldız	Members: All members
Objectives: Determine project's comprehensive plan, covering requirements, system models, risks, project planning, teamwork, and ethical considerations.	
Tasks: Task 2.1: Assess strengths, weaknesses of the existing system and describe key features of the proposed system. Task 2.2: Define and document functional and nonfunctional requirements. Task 2.3: Create use case scenarios, use case models, and user interface mock-ups for a comprehensive system representation. Task 2.4: Identify constraints and adhere to relevant engineering standards. Task 2.5: Identify potential risks, propose alternatives, and outline a risk management strategy. Task 2.6: Develop a detailed project plan with timelines, milestones, and resource allocation. Task 2.7: Establish strategies for effective collaboration and communication within the team. Task 2.8: Outline ethical considerations and professional responsibilities relevant to the project. Task 2.9: Identify opportunities for acquiring new knowledge and plan strategies for continuous learning.	
Deliverables: Deliverable 2.1: Analysis and Requirements Report	

WP3: Frontend Development	
Start Date: 1/12/2023	End Date: 20/03/2024
Leader: Yağız Özkarahan	Members: Yağız Özkarahan, Ege

	Çenberci, Ahmet Alperen Yılmazyıldız, Bilgehan Sandıkcı
Objectives: Complete Frontend of the App	
Tasks: Task 3.1: Design the user interface for the mobile app, focusing on user-friendly navigation and intuitive design. Task 3.2: Implement screens for user registration, login, profile management, and home page. Task 3.3: Implement screens for business registration, login, profile management, and home page. Task 3.4: Implement screens for business users to manage items. Task 3.5: Implement screens for displaying shops and items, including an interactive map, details and the ability to purchase. Task 3.6: Implement user rating screen and complaint screen.	
Deliverables: Deliverable 3.1: Frontend Components of the App	

WP4: Backend Development	
Start Date: 01/12/2023	End Date: 20/03/2024
Leader: Ömer Burak Doğan	Members: Ahmet Alperen Yılmazyıldız, Burak Doğan, Bilgehan Sandıkcı, Ege Çenberci
Objectives: Complete Backend of the App	
Tasks: Task 4.1: Implement user registration and login functionality. Task 4.2: Implement business registration and login functionality. Task 4.3: Develop the functionality for businesses to list items. Task 4.4: Set up and integrate the database to store user data, business information, and item listings. Task 4.5: Create API endpoints for user authentication and user-related operations. Task 4.6: Develop API endpoints for business registration and management.	

Task 4.7: Implement API endpoints for listing, updating, and deleting perishable items. Task 4.8: Integrate a secure payment gateway to handle transactions. Task 4.9: Integrate required third-party APIs.
Deliverables: Deliverable 4.1: Backend app running on server Deliverable 4.2: Properly working APIs

WP5: Demo and Presentation	
Start Date: 1/12/2023	End Date: 20/12/2023
Leader: Ahmet Alperen Yılmazyıldız	Members: All members
Objectives: Prepare a presentation that shows functionalities of app	
Tasks: Task 5.1: Prepare UI mockups for use case scenarios Task 5.2: Prepare a demo presentation	
Deliverables: Deliverable 5.1: Frontend UI samples for various use case scenarios Deliverable 5.2: Demo Presentation	

WP6: Detailed Design Report	
Start Date: TBA	End Date: TBA
Leader: Bilgehan Sandıkcı	Members: All members
Objectives: Document the design details of the specified system, including its purpose, architecture, and testing procedures. Serve it as a reference for the team	

and stakeholders.
Tasks: Task 6.1: Define system purpose and design goals. Task 6.2: Research existing solutions and competitors. Task 6.3: Outline high-level architecture. Detail subsystem functions, hardware mapping, data management, and security. Task 6.4: Describe services provided by each subsystem. Task 6.5: Create functional and non-functional test cases. Task 6.6: Identify constraints and adhere to standards. Task 6.7: Write team contributions, collaborative efforts, and leadership roles. Task 6.8: Review, and finalize the document.
Deliverables: Deliverable 6.1: Detailed Design Report

WP7: Final Report	
Start Date: TBA	End Date: TBA
Leader: Yağız Özkarahan	Members: All members
Objectives: Explain project's development, testing, and post-implementation considerations comprehensively. Address ethical aspects, teamwork dynamics, and the application of new knowledge.	
Tasks: Task 7.1: Summarize the project's purpose and goals. Task 7.2: Detail project requirements and final architecture decisions. Task 7.3: Give complete information about development process and testing outcomes. Task 7.4: Develop a plan for post-implementation maintenance. Task 7.5: Address engineering considerations, ethics, teamwork, and new knowledge.	

Task 7.6: Summarize project achievements and suggest areas for future improvement.
Deliverables: Deliverable 7.1: Final Report

WP8: Beta Testing & App Launch	
Start Date: 01/04/2023	End Date: 30/04/2024
Leader: Ömer Burak Doğan	Members: All members
Objectives: Launch the app to application markets.	
Tasks: Task 8.1: Testing all the components Task 8.2: Testing usability of functions by real users Task 8.3: Bug fix Task 8.4: Beta release Task 8.5: Create working iOS app. Submit the app to App Store. Task 8.6: Create working Android app. Submit the app to Google Play Store.	
Deliverables: Deliverable 8.1: iOS version of Yicem app listed on App store. Deliverable 8.2: Android version of Yicem app listed on Google Play Store.	

WP9: Final Demo	
Start Date: 01/05/2024	End Date: 17/05/2024
Leader: Ege Çenberci	Members: All members
Objectives: Present the full functional application and demonstrate features	
Tasks: Task 9.1: Prepare presentation Task 9.2: Prepare answers for possible questions.	
Deliverables: Deliverable 9.1: Full functional app Deliverable 9.2: Final demo presentation	

4.4 Ensuring Proper Teamwork

Effective collaboration within a team is crucial, especially when the group is subdivided throughout project implementation. Maintaining the visibility of contributions and ensuring equal distribution of workload among team members are key priorities. We use two basic tools to make this easier:

GitHub: GitHub is an integral part of our high-level design project, serving as our version control system. Beyond its mandatory use, GitHub is a powerful tool for tracking contributions to the project. It provides a comprehensive overview of our collective efforts, allowing us to track individual and collective progress.

Jira: Jira is our project management system that allows us to streamline our workflow and improve project organization. We plan to adopt an agile working style by dividing our tasks into manageable two-week periods with Jira. This approach helps us keep track of work in progress, identify upcoming tasks, and maintain flexibility in adapting to project changes

By combining GitHub for version control and Jira for project management, we aim to promote efficient teamwork, provide clear visibility, effective task management and an agile development process. Additionally, by using GitHub Projects in their default

and blocked states, we can instantly detect and fix any blocks that may occur during feature development.

4.5 Ethics and Professional Responsibilities

Since Yicem uses sensitive information, including user data and business transactions, it is our ethical and professional responsibility to ensure the highest data protection and security standards. Therefore, we should implement encryption protocols to protect user data and take measures to prevent unauthorized access. Moreover, it is our professional responsibility to provide smooth service to both businesses and personal users. Thus, we must design our system to provide this smooth experience and quickly resolve any issues that may arise.

4.6 Planning for New Knowledge and Learning Strategies

Although our team has prior experience with the Java language, we have chosen to use the Spring Boot framework for the backend of the application, a technology that is new to most team members, except for one person. We plan to learn this framework through documentation, online tutorials, and taking advantage of the expertise of the team members with prior experience in Spring Boot.

On the frontend side of the application, our team has chosen to implement it using the React Native framework. While some team members are familiar with React.js, mobile application development with React Native is new to us. Therefore, we plan to learn this framework through documentation and online tutorials.

Moreover, applying this newfound knowledge by implementing through trial and error and conducting research on online forums such as Stack Overflow, Reddit, etc., is a valuable way to learn and enhance our skills.

5 References

[1] FAO, “Turkey’s National Strategy Document On Prevention, Reduction And Monitoring Of Food Loss And Waste And Its Action Plan.” *Food And Agriculture Organization of the United Nations*, pages 9, 12, 2020.