

CS 491 - Senior Design Project

Project Specification Document

T2432 - Yes Chef!

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Table of Contents

1. Introduction.....	2
1.1. Description.....	2
1.2. High-Level System Architecture & Components of Proposed Solution.....	3
1.2.1. Client Layer.....	4
1.2.1.1. User Interface.....	4
1.2.2. Backend Layer.....	4
1.2.2.1. Admin Manager.....	4
1.2.2.2. User Manager.....	4
1.2.2.3. Authentication Manager.....	4
1.2.2.4. Recipe Manager.....	4
1.2.2.5. Payment Manager.....	4
1.2.2.6. Ingredient Manager.....	4
1.2.3. Cloud.....	5
1.2.3.1. Text to Speech.....	5
1.2.3.2. Voice Recognition.....	5
1.2.3.3. Database.....	5
1.2.4. Gamification Engine.....	5
1.3. Constraint.....	5
1.3.1. Implementation Constraints.....	5
1.3.2. Economic Constraints.....	6
1.3.3. Health Constraints.....	6
1.3.4. Safety Constraints.....	6
1.3.5. Ethical Constraints.....	6
1.4. Professional and Ethical Issues.....	7
1.5. Standards.....	7
2. Design Requirements.....	7
2.1. Functional Requirements.....	7
2.1.1. User Profile Management.....	7
2.1.2. Recipe Creation and Shared Content.....	8
2.1.3. Social Interaction.....	8
2.1.4. Ingredient Management.....	8
2.1.5. Price Information.....	8
2.1.6. Notifications.....	8
2.1.7. Dietary and Nutritional Information.....	8
2.1.8. Settings and Feedback.....	8
2.1.9. Monetization Features.....	9
2.1.10. Gamification and Organization Features.....	9
2.2. Non-Functional Requirements.....	9
2.2.1. Usability.....	9
2.2.2. Reliability.....	9
2.2.3. Performance.....	9
2.2.4. Supportability.....	9
2.2.5. Security.....	9
3. Feasibility Discussions.....	10
3.1. Market & Competitive Analysis.....	10
3.2. Academic Analysis.....	10
4. Glossary.....	11
5. References.....	12

1. Introduction

Many individuals struggle with organizing their cooking habits due to a lack of time, inspiration, or knowledge about utilizing available ingredients effectively. Challenges such as meal planning, cooking with available kitchen resources, and finding recipes that cater to specific dietary preferences are troubling to many. The absence of accessible tools to simplify the cooking process often leads to reliance on unhealthy takeout options or repetitive meals, which can impact overall well-being and satisfaction of individuals. The need to make cooking a fun and effortless experience has sparked the idea of using technology to provide tools that assist users in organizing their culinary activities. Our project aims to develop a gamified cooking app designed to help users share their favorite recipes, manage ingredients, and receive personalized recipe recommendations based on their available ingredients and preferences. This report intends to provide information on the project description, certain constraints, design requirements, and feasibility discussions.

1.1. Description

Yes Chef! is a mobile application that focuses on turning the cooking process into a fun and easy experience by offering a gamified platform where users can manage their ingredients, share their favorite recipes, and receive personalized recipe recommendations. The gamification aspect, alongside the convenient user interface, aims to attract users from different demographics.[1] Using their mobile device, users can input available items in their kitchen at the moment and dietary preferences to get personal suggestions for meals they can prepare. Inspired by the structure of popular lifestyle and gaming apps, "Yes Chef!" aims to encourage homemade meals and make cooking enjoyable for everyone. One of the main problems that our app wishes to tackle is the struggle of following online recipes. Users can skip to the next part of the recipe with a basic "Yes Chef" command for cases like dirty hands and being away from the screen or the keyboard.

The platform includes categorized recipes, cooking tutorials, challenges, and assessments with various difficulty levels. Features like daily cooking streaks, motivational quotes, and achievement badges are included to enhance motivation and make the habit of cooking sustainable. In addition to personalized cooking paths, Yes Chef! will support recommendations based on user interactions. Users will have the option to receive notifications to reach their daily cooking goals. To sum up, Yes Chef! promotes healthy eating habits and makes cooking accessible and fun.

1.2. High-Level System Architecture & Components of Proposed Solution

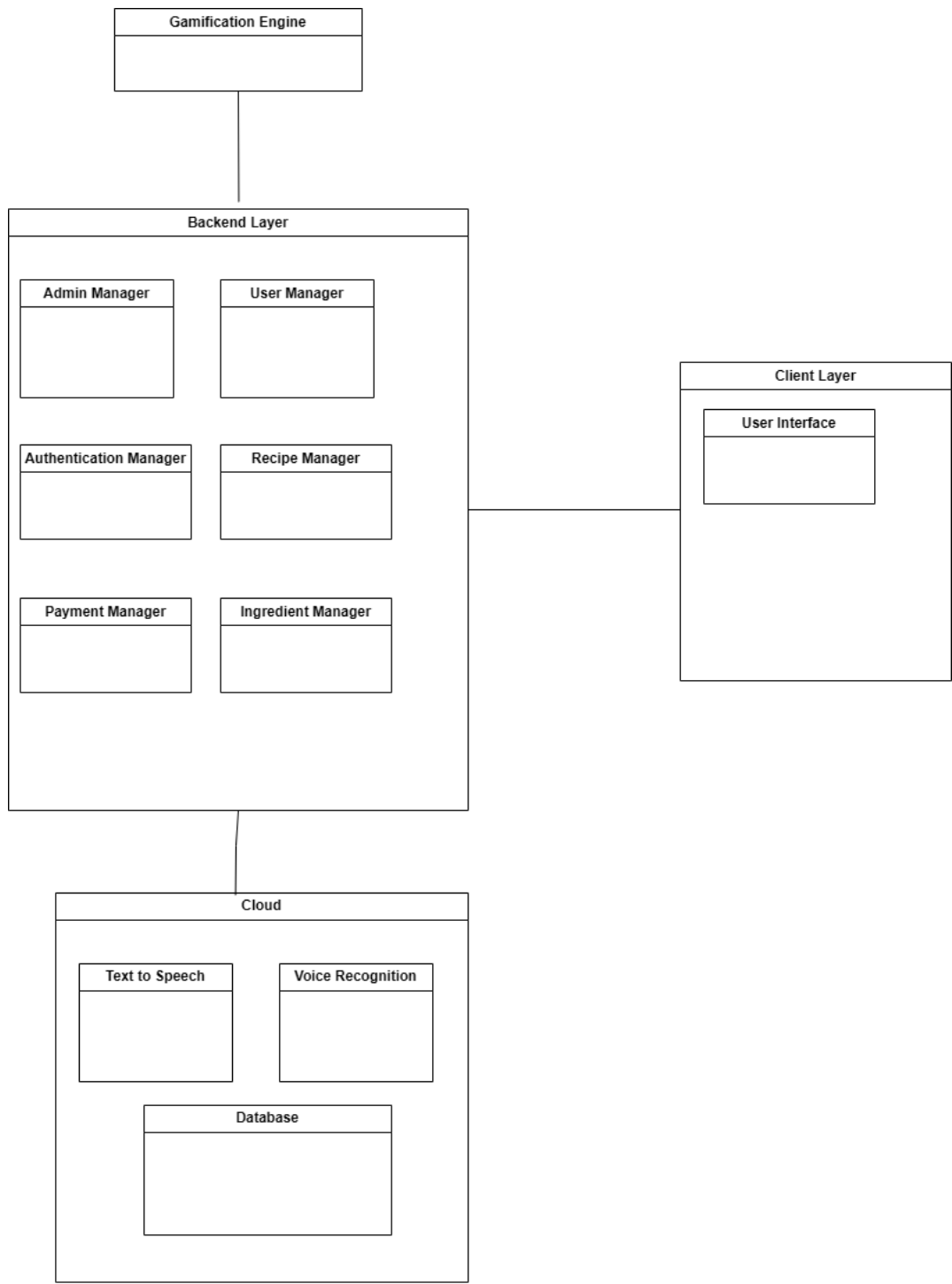


Fig. 1: High-Level System Architecture

1.2.1. Client Layer

This layer is responsible for presenting the information and interactions in a visually appealing way to the user. It serves as the primary way for users to access and interact with the core features of the application. This layer handles rendering interfaces, managing input, and ensuring efficient communication between the user and the backend.

1.2.1.1. User Interface

The user interface is the sublayer of the client layer that is dedicated to handling visual representation and interaction between the user and the backend. This layer ensures that the content of the application is displayed in a visually appealing and accessible way.

1.2.2. Backend Layer

1.2.2.1. Admin Manager

This service provides developers the ability to modify the database and check the errors to improve the project.

1.2.2.2. User Manager

It handles profile settings such as changing name, profile photos, etc. This service handles the user's relationship with other features.

1.2.2.3. Authentication Manager

It handles functionalities such as registering, log in/out, email confirmation, and password changes.

1.2.2.4. Recipe Manager

The recipe manager handles functionalities regarding recipes like adding, removing, and editing recipe details.

1.2.2.5. Payment Manager

The payment manager controls any sort of in-app purchases, making sure safety protocols are followed, and the right amount of transactions are made for both ends.

1.2.2.6. Ingredient Manager

Ingredient Manager handles ingredient variables operations such as quantities, correct units, attributes like freshness, allergens, nutrition values, and costs.

1.2.3. Cloud

1.2.3.1. Text to Speech

This service handles the voice assistant part. It reads what to do in this step of the recipe. We are using Google Cloud's service.

1.2.3.2. Voice Recognition

This service handles the voice input feature. It iterates to the next step when it hears "Yes Chef". This way, users can interact with the application by speaking. We are using Google Cloud's service.

1.2.3.3. Database

This part contains the whole system database. All users, recipes, ingredients, etc. It is uploaded to the cloud.

1.2.4. Gamification Engine

This engine allows administrators and users to create gamified recipes and store them in the backend. It contains the tools necessary to upload multimedia like audio, video snippets, and events such as timers to the recipe presentation. After creation, the multimedia and event hierarchy are stored inside the database inside the backend layer.

1.3. Constraint

1.3.1. Implementation Constraints

- PostgreSQL will be used for effective handling of relations and its feature-rich design.
- A custom engine for recipe input will be developed to make it easier for users to use the core features of the application.
- React will be used as the primary front-end library for the application.
- The Google Cloud services for speech-to-text and text-to-speech will be used for the implementation of voice-recognition and vocalized recipe instructions for better interaction and engagement.
- Cloud hosting via Amazon AWS will be used for a seamless production/development cycle and UX.
- Cross-platform compatibility will be implemented by developing native apps using React Native.
- Git will be used as version control.
- Trello will be used for project management.

1.3.2. Economic Constraints

- We will use the Fatsecret Platform API to retrieve nutritional data of various foods and recipes. The API has a "Premier Free" tier that allows unlimited access to API and is free for startups and nonprofits.
- The Google Cloud service for speech-to-text costs \$0.024 per minute.
- The Google Cloud service for text-to-speech is free for the first 1 million characters per month and an additional 0.0000016\$ per character (16\$ per 1 million characters) after the initial million.
- The databases, libraries, and CI/CD tools that we will use are all free.
- Our preferred cloud hosting service provider, Amazon, has a free tier available for students.

1.3.3. Health Constraints

- Recipes will all have a comprehensive ingredient list with appropriate allergen labels to prevent unforeseeable allergic reactions.
- Possible substitutions for allergenic foods will be provided.
- Accurate nutritional values of recipes will be provided so that users can make informed choices.

1.3.4. Safety Constraints

- Safety tips for dangerous tasks such as cutting, heating up an oven, etc. will be implemented.

1.3.5. Ethical Constraints

- Personal user data such as dietary preference, available ingredients, and more sensitive information such as e-mail addresses, credit card information etc. will be securely stored and encrypted to ensure protection of privacy.
- The aforementioned user data will not be shared with other third-party applications without users' consent.
- Advertising and recommendations within the app will follow standard codes of ethics as to not be manipulative or misleading.
- To ensure the integrity of the project, the "Professional Responsibilities" section under the ACM Code of Ethics and Professional Conduct [2] will be followed by all members.
- The subscription service within the application will be clear and transparent about all information, including pricing and additional benefits received. Users will be notified prior to a possible auto-renewal charge, and canceling a subscription will be made easy.

1.4. Professional and Ethical Issues

- The dietary preferences of a user are personal to them and will be determined via various actions of the user. Since this data may be sensitive, especially for users with possible ED's, this data will be securely stored and will not be shared with any third-party application in any scenario.
- Other sensitive data, such as login credentials, credit card information, etc. will be encrypted and secured using industry-standard methods to prevent unauthorized access and limit gathered information in a possible breach.
- The subscription service will prioritize user consent by ensuring all terms and conditions are stated and accepted. The user will also be notified regularly about their subscription and their upcoming payment dates. Easy subscription and unsubscription will be implemented in the UI.
- Standard ethical design principles will be followed in areas such as advertisements to avoid manipulative practices in our application.

1.5. Standards

- All developers will follow the ACM Code of Ethics and Professional Conduct [2] to ensure a professional and responsible lifecycle for the project.
- Code quality will adhere to the SOLID principles [3] in object-oriented designs. Also, an external code formatter tool Prettier will be used to ensure maintainable and understandable code.
- The protection of user privacy will be ensured by following the ISO/IEC 27001 standard for information security management systems [4].
- The payment process for the subscription system will comply with Payment Card Industry Data Security Standards [5] to ensure secure transactions.
- UML 2.5.1 will be used for modeling.
- IEEE format will be used for citations in the documents.

2. Design Requirements

2.1. Functional Requirements

2.1.1. User Profile Management

- Users must be able to sign up using email, or phone number.
- Users must be able to change their passwords.
- Users must be able to create and edit their profiles (username etc.).
- Users must be able to specify dietary restrictions such as vegan or any allergens.
- Users must be able to view and manage (delete, etc.) their uploaded recipes.
- Users must be able to view and modify their profile visibility.

2.1.2. Recipe Creation and Shared Content

- Users must be able to save their recipes in both text and gamified recipe presentation format.
- Users must be able to add multimedia to their recipes.
- Users must be able to share the recipes within the app.

2.1.3. Social Interaction

- Users must be able to follow other users and see their recipes.
- Users must be able to rate recipes by other users.
- Users must be able to see the ratings of other users on recipes.

2.1.4. Ingredient Management

- Users must be able to input their available ingredients into the application.
- Users must be able to see all ingredients and their missing ingredients for any specific recipe.
- Users must be able to see any substitute ingredient in a recipe if any exists.

2.1.5. Price Information

- Users must be able to see a reasonable average cost of any ingredient from specific stores.

2.1.6. Notifications

- Users must be able to be alerted for expiring ingredients or ingredients that the user is running low on.
- Users must be able to be notified of ratings and reviews on their recipes.
- Users must be able to modify which notifications they want to receive.

2.1.7. Dietary and Nutritional Information

- Users must be able to see the calorie count and nutritional breakdown of gamified recipes.
- Users must be able to see allergen alerts specific to them based on user settings.

2.1.8. Settings and Feedback

- Users must be able to switch between imperial and metric units.
- Users must be able to submit errors or new feature requests.

2.1.9. Monetization Features

- Users must be able to sell their gamified recipes individually or in packs.
- Users must be able to subscribe to premium recipe packs.

2.1.10. Gamification and Organization Features

- Users must be able to create weekly meal plans using the recipes on the application.
- Users must be able to use voice recognition while using the gamified recipes.

2.2. Non-Functional Requirements

2.2.1. Usability

- The user experience will be compact and easy to use. Users should understand at first glance how to achieve their needs in the application. Universal symbols will be used in UI to achieve simplicity in user experience.
- The user should be able to reach the desired pages easily.

2.2.2. Reliability

- The application should handle failures without any data loss.
- The app should perform without failure in 99 percent of use cases during a month.

2.2.3. Performance

- Photos should be uploaded at most 2 seconds in 95 percent of events.
- Speech recognition and answering back to the user should be less than 5 seconds.

2.2.4. Supportability

- The project's design should be made so that it should be easy to add new features to the system later. New features will be added without changing fundamental parts of the code base.
- The system should be able to recognize errors and what caused them.
- The same codebase should work for all systems operating under the same OS.

2.2.5. Security

- ISO/IEC 27001 standards will be followed.
- The sensitive data of users will be encrypted.

- User data will not be shared with third-party applications.

3. Feasibility Discussions

3.1. Market & Competitive Analysis

We have some rivals in the market, and we aim to create a project that has features that are essential for recipe applications. Yes Chef! also has innovative features to bring new standards to the market.

Rivals ----- Features	Nefis Yemek Tarifleri [6]	Yemek.com [7]	Lezzet.com [8]	Diyetkolik [9]	Social Media Pages
Guided Recipes	Written (all) Video (common)	Written (all) Video (rare)	Written (all) Video (rare)	Just written	Written and videos
Calorie Information	Not detailed (just calorie, no nutrition information)	Not detailed	Not detailed	Detailed	Depends son creator
Blog	Only editors can post	Only editors can post	Only editors can post	Only editors can post	Depends on creator
Forum	Yes	No	No	Yes	Comment section

Table 1: Rival Analysis Table

- We have all the features above except the forum because we do not want users to interact with each other.
- We have gamified recipe guides to make cooking more fun and more accessible. We added a voice assistant because hands get dirty and wet while cooking, so users cannot constantly interact with their device using their hands.
- Yes Chef! has a gamification engine for creating premium recipes and sharing them with all users. It also has basic recipes as a blog.
- Users can specify what ingredients they have, and the application suggests recipes they can cook with their own ingredients.
- The application has a detailed calorie tracker for each recipe and ingredient (if possible). Calorie and nutrition information is available.

3.2. Academic Analysis

We did not require any academic analysis for our project.

4. Glossary

ED: Eating Disorder.

Gamification: Application of elements of game playing to other areas of activity.

Multimedia: Using more than one media medium, such as video, movies, or audio for communication.

UX: User experience.

CI/CD: Continuous Integration/Continuous Delivery.

5. References

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