



**The Department of Computer Science & Engineering
(CSE) and Computer Application (CA)**
(Odd Sem 2021-25)

Project Report On
**“Recipe Recommendation System-
The Kitchen Oracle”**

(Minor Project, CSE-701-P2)

Submitted to

The Department of “CSE & CA”

In partial fulfillment of the requirements for the award of the
Bachelor Of Technology in Computer Science Engineering

By

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November, 2024

Certificate

Certified that *Prerna Kumari(SBU210249)* and *Harshita Kumari(SBU211070)* of **B.TECH (CSE), VII ,Batch-2021-2025**, have carried out the research work presented in this project entitled “**Recipe Recommendation System (The Kitchen Oracle)**” for the award of (**B.TECH-CSE** degree) from **Sarala Birla University, Ranchi** under my supervision during **Odd Sem 2024-25 session**. The project embodies result of original work and studies carried out by Student himself and the contents of the project do not form the basis for the award of any other degree to the candidate or to anybody else.

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Declaration

We, **Prerna Kumari (SBU210249)** and **Harshita Kumari (SBU211070)**, student of **B.TECH CSE-VII, Batch(2021-25)**, hereby declare that the report titled “ **Recipe Recommendation System (The Kitchen Oracle)**” which is submitted by us to the department of CSE & CA , Sarala Birla University Jharkhand, in partial fulfillment of the requirement for the award of degree in “**B.TECH CSE**” , has not been previously formed the basis for the award of any degree, diploma or other similar title or recognition. We further declare that the report is written by us and no part of the report is copied from any source(s) without being duly acknowledged.

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Date:

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Acknowledgement

I express my sincere gratitude to my project guide **Akanksha Mrinali** for her able guidance, continuous support and cooperation throughout my project, without which the present work would not have been possible. My endeavor stands incomplete without dedicating my gratitude to him/ she; he / she has contributed a lot towards successful completion of my project work.

I would like to acknowledge my indebtedness and deep sense of gratitude to **Dr. Pankaj Kr Goswami** sir, Dean-FoECS, SBU, **Dr. Biswarup Samanta** sir, Asso. Dean-FoECS & HoD – CSE&CA, SBU and my Program Coordinator, **Dr. Dipti Kumari madam**, to encourage me to the highest peak and to provide me the opportunity to prepare the project.

I would also like to express my sincere thanks towards my teachers at SBU and my family and friends for their unending support, and tireless effort that kept me motivated throughout the completion of this project.

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Table of Contents

Topic	Page Number
• Title Page	i
• Certificate	ii
• Declaration	iii
• Acknowledgement	iv
• Table of Contents	v
• Project Synopsis	vi
• List of Figures.....	vii
• List of Tables	viii
1. INTRDOUCTION.....	01 - 02
- Theoretical Background	
- Objective of the Project	
- Literature Review (if any)	
- Scope of the study	
- Limitations of the Study	
2. PROBLEM ANALYSIS	03
• PROBLEM DEFINATION	
• REQUIREMENT ANALYSIS AND DEVELOPMENT	
a. Functional Requirement	
b. Nonfunctional Requirement	
c. Goals of Implementation	
3. SYSTEM IMPLIMENTATION DETAILS	04
• Methodology Adopted	
• Hardware and Software Used	
4. DESIGN	05-07
• Flowchart	
• Entity Relationship Diagram	
• Database tables	
5. IMPLEMENTATION	08-09
6. RESULT.....	10-14
7. CONCLUSION	15
8. FUTURE SCOPE	16
9. LIMITATIONS	17-18
10. ANNEXURE – I:	19
References	
11. ANNEXURE – II:	20-29
Weekly Progress Reports (All original copies of WPRs)	
12. ANNEXURE – III:	30-31
Internship Certificate	

THE DEPARTMENT OF “CSE & CA”

PROJECT SYNOPSIS

Student Name: Prerna Kumari & Harshita Kumari

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Program & Branch: B.TECH CSE **Batch:** 2021-25 **Semester:** VII **Section:** B

Academic Session: Odd Semester 2024-25

Project Guide Details:

Guide Name: Ms. Akanksha Mrinali

Designation: Assistant Professor, CSE, SBU

Project Information

1. Course Title: Minor Project

2. Courses Code: CSE-701-P2

3. Credit Unit: 5

4. Project Duration:

a) **Date of Project Commencement:** 21st August, 2024

a) **Date of Project Completion:** 15th November, 2024

5. Approved Project Title (to be duly approved by the Project Guide):

Recipe Recommendation System – “The Kitchen Oracle”

6. Objectives: The objective of The Kitchen Oracle is to create a recipe recommendation system that simplifies meal planning for users. It allows users to search for recipes by name or ingredients.. The platform ensures a secure user experience with robust login and sign-up features. The project aims to combine functionality, simplicity, and aesthetics in an intuitive interface.

7. Methodology to be adopted: The project was developed using Flask, SQLite, and Flask-WTF for backend functionality, including secure user authentication and data handling. The front end was styled with HTML, CSS, and Bootstrap for a responsive design. User data and recipes were managed with SQLAlchemy. Additional tools like Flask-Login ensured session management, while Flask-Bcrypt handled password encryption for security. The development process included implementing search functionality, validating user inputs, and designing intuitive navigation for an efficient user experience.

8. Brief Summary of the project: *The Kitchen Oracle* is a recipe recommendation system designed to make meal planning easy and enjoyable. It enables users to search for recipes by name or ingredients. The platform features a secure login and sign-up system and incorporates a user-friendly design. By blending technology and culinary exploration, the project aims to provide a seamless experience for cooking enthusiasts and beginners alike.

Signature with date
(Student)

Signature of Industry Guide, if any

Signature with date
(Project Guide)

List of Figures

1.	FLOWCHART.....	05
2.	ER Diagram	06

List of Tables

1.	DATABASE	07
	i. User table	
	ii. Recipe table	

1. INTRODUCTION

The Recipe Recommendation System, titled **The Kitchen Oracle**, is a web-based application designed to simplify the process of finding and managing recipes. It leverages user-input ingredients to recommend suitable recipes, providing a personalized and efficient cooking experience. This project integrates key web development technologies, offering a seamless and user-friendly interface for recipe discovery and management. The system aims to address the common challenge of deciding what to cook with available ingredients. By utilizing a structured recipe database, the application enables users to explore a variety of recipes tailored to their preferences, saving time and reducing food waste. Key features include a search functionality based on ingredients, categorized recipe views (e.g., vegetarian and non-vegetarian), user authentication for added personalization, and the ability to add and manage custom recipes. Developed using the Flask framework with SQLite for database management, the project incorporates front-end technologies such as HTML, CSS, and JavaScript for responsive and interactive designs. Additional styling enhancements ensure a modern and visually appealing user interface. The integration of a dynamic grid layout and interactive recipe cards enhances the overall user experience, making recipe exploration enjoyable and intuitive. The project not only showcases practical web development skills but also emphasizes user-centric design, problem-solving, and efficient data management techniques, making it a valuable addition to the field of personalized recommendation systems.

1.1 Theoretical Background

The Recipe Recommendation System, *The Kitchen Oracle*, is built on the foundation of personalized recommendation systems. These systems leverage user preferences and input data to suggest tailored options. In this case, the platform utilizes ingredient-based matching algorithms to filter and recommend recipes from a curated database. The theoretical framework combines elements of database management, web development, and user experience design to create a seamless recipe discovery platform.

1.2 Objective of the Project

The primary objective of this project is to develop an intuitive and efficient web-based application that:

1. Recommends recipes based on user-input ingredients.
2. Provides a platform for users to manage and explore different categories of food.
3. Simplifies meal preparation while promoting resourcefulness and reducing food waste.

1.3 Literature Review

While recipe recommendation systems have been explored in various forms, this project builds upon existing concepts of:

- Ingredient-based recommendation models.

- Interactive user interfaces for recipe discovery.
- Database-driven web applications.

The system enhances traditional methods by offering a user-friendly interface with features like dynamic recipe cards, personalized login systems.

1.4 Scope of the Study

The Recipe Recommendation System encompasses the following:

- A searchable recipe database categorized into different options.
- A user-friendly interface built with responsive design principles.
- Integration of authentication systems to enable user-specific functionalities like saving and adding recipes.
- Deployment of a robust back-end system using Flask and SQLite for efficient data storage and retrieval.
- Use of modern front-end technologies to ensure a visually appealing and functional interface.

1.5 Limitations of the Study

1. The recommendation logic is limited to exact ingredient matches and does not currently use advanced algorithms like machine learning or natural language processing for recipe discovery.
2. The system relies on a pre-defined database and does not include real-time scraping of recipes from external sources.
3. Ingredient input requires manual entry, which could be streamlined with additional tools like voice recognition or barcode scanning.
4. The project does not address dietary restrictions, allergens, or advanced filtering capabilities in its current scope.
5. Scalability and performance optimization for large-scale usage may require future enhancements.

2.PROBLEM ANALYSIS

2.1 Problem Definition

In today's fast-paced world, meal planning can be a challenge, especially when limited ingredients are available or inspiration is lacking. Additionally, existing recipe platforms often require extensive searches, leading to inefficiency. There is a need for a system that simplifies the process of finding suitable recipes based on available ingredients while providing a user-friendly interface for recipe management. The Recipe Recommendation System, *The Kitchen Oracle*, addresses this gap by offering an easy-to-use platform where users can input ingredients and receive tailored recipe suggestions, enhancing their culinary experience.

2.2 Requirement Analysis and Development

a. Functional Requirements

1. *User Authentication*: - Login and signup systems to enable personalized user sessions.
2. *Recipe Search and Recommendation*: - Ingredient-based search functionality to match user inputs with available recipes.
3. *Recipe Management*: - Add new recipes with associated metadata (name, cuisine, ingredients, instructions, preparation time, and images).
4. *Dynamic Recipe Cards*: - Interactive recipe cards displaying details like ingredients and preparation time.
5. *Responsive Design*: - Ensure the platform works seamlessly across various devices.

b. Nonfunctional Requirements

1. *Usability*: - Intuitive interface for users of all technical proficiency levels.
2. *Performance*: - Quick response times for search and page load operations.
3. *Scalability*: - Ability to handle an expanding database of recipes.
4. *Security*: - Secure user data handling with encrypted passwords and session management.
5. *Reliability*: - Ensure the application operates smoothly without frequent crashes or errors.

c. Goals of Implementation

1. *Efficiency*: - Provide users with quick and accurate recipe suggestions based on available ingredients.
2. *User Engagement*: - Create a visually appealing and interactive platform to encourage user interaction and retention.
3. *Accessibility*: - Ensure that the platform is accessible to users across various devices and screen sizes.
4. *Customization*: - Allow users to add and manage their favorite recipes.

3. SYSTEM IMPLEMENTATION DETAILS

3.1 Methodology Adopted

The development of *The Kitchen Oracle* follows an agile methodology to ensure iterative progress and incorporation of user feedback. The key phases include:

1. Planning:

- Brainstorming project objectives, user needs, and potential challenges.
- Setting up milestones and deliverables for incremental progress.

2. Design:

- Creating wireframes and mockups for the website layout, user interface, and recipe cards.
- Structuring database schema for efficient storage and retrieval of recipe details.

3. Development:

- Building the back-end functionalities using Flask for user authentication, recipe searches, and dynamic content management.
- Developing front-end components with HTML, CSS, and JavaScript, ensuring

Hardware and Software Used

1. Hardware:

- Processor: Intel Core i5 or equivalent (minimum).
- RAM: 8 GB or higher for smooth development and testing.
- Storage: 20 GB of available space for project files and database storage.

2. Software:

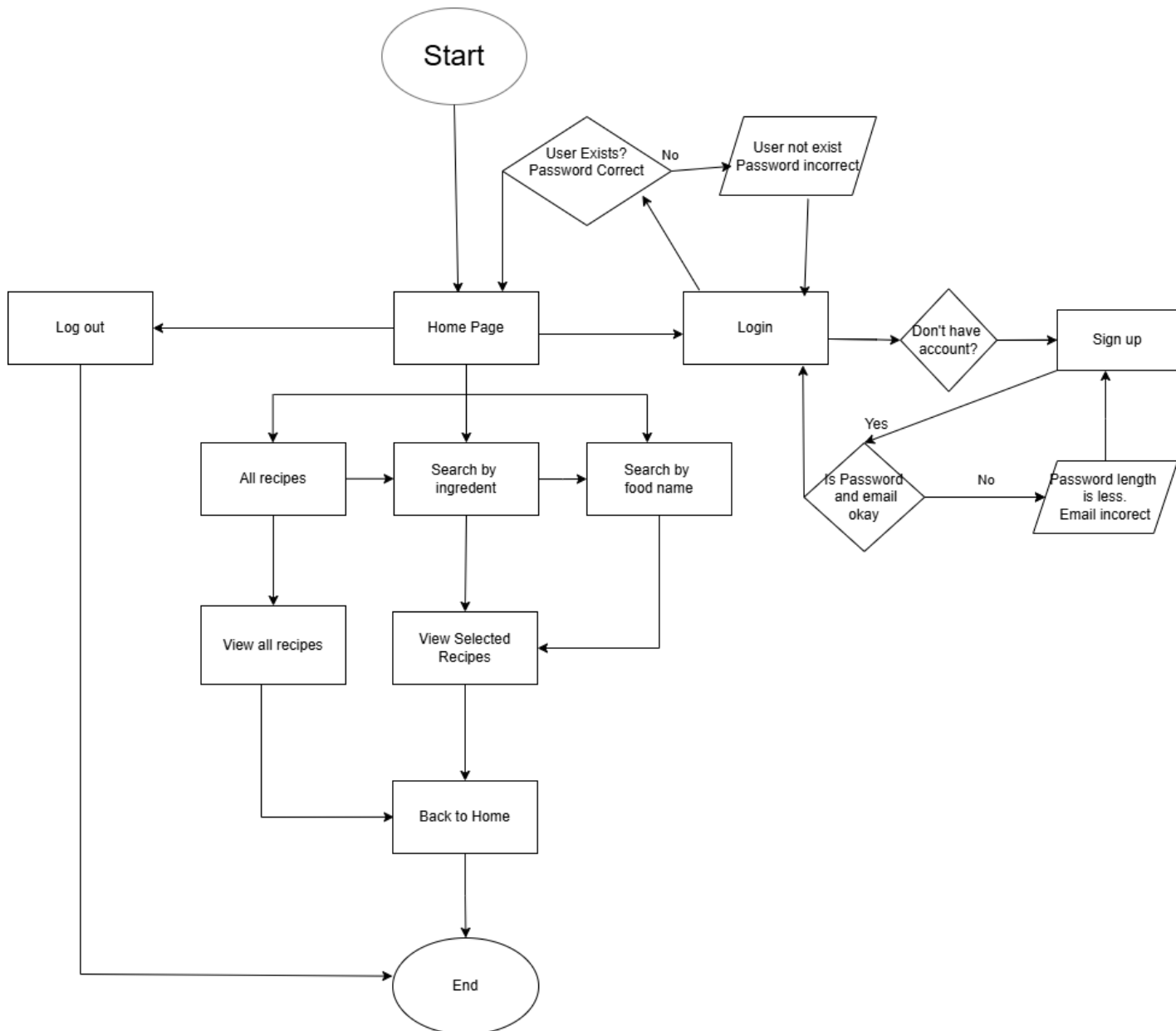
- Development Environment: Python (version 3.9 or higher), Flask (framework for back-end development), SQLAlchemy (database ORM), Jinja2 (templating engine).
- Front-End Tools: HTML5, CSS3, JavaScript, Bootstrap for responsive design.
- Database: SQLite for lightweight and easy-to-configure database management.
- Other Tools: Visual Studio Code (IDE), Google Chrome for browser testing, Image editing tools like Canva or GIMP for recipe card images.

4. DESIGN

4.1 Flowchart

Below is the high-level flowchart representing the functionality of *The Kitchen Oracle*:

1. User Login/Signup: - The system validates credentials and directs users to the homepage upon successful login.
2. Homepage: - Users can search for recipes or explore available categories.
3. Recipe Search: - Input ingredients are processed to fetch matching recipes.
4. Recipe Details: - Selected recipe details are displayed, including cuisine type, ingredients, preparation time, and instructions.
5. Add Recipe: - Registered users can contribute new recipes by filling out a form and uploading an image.
6. Logout: - Users can securely log out and return to the login page.



Entity-Relationship Diagram (ERD)

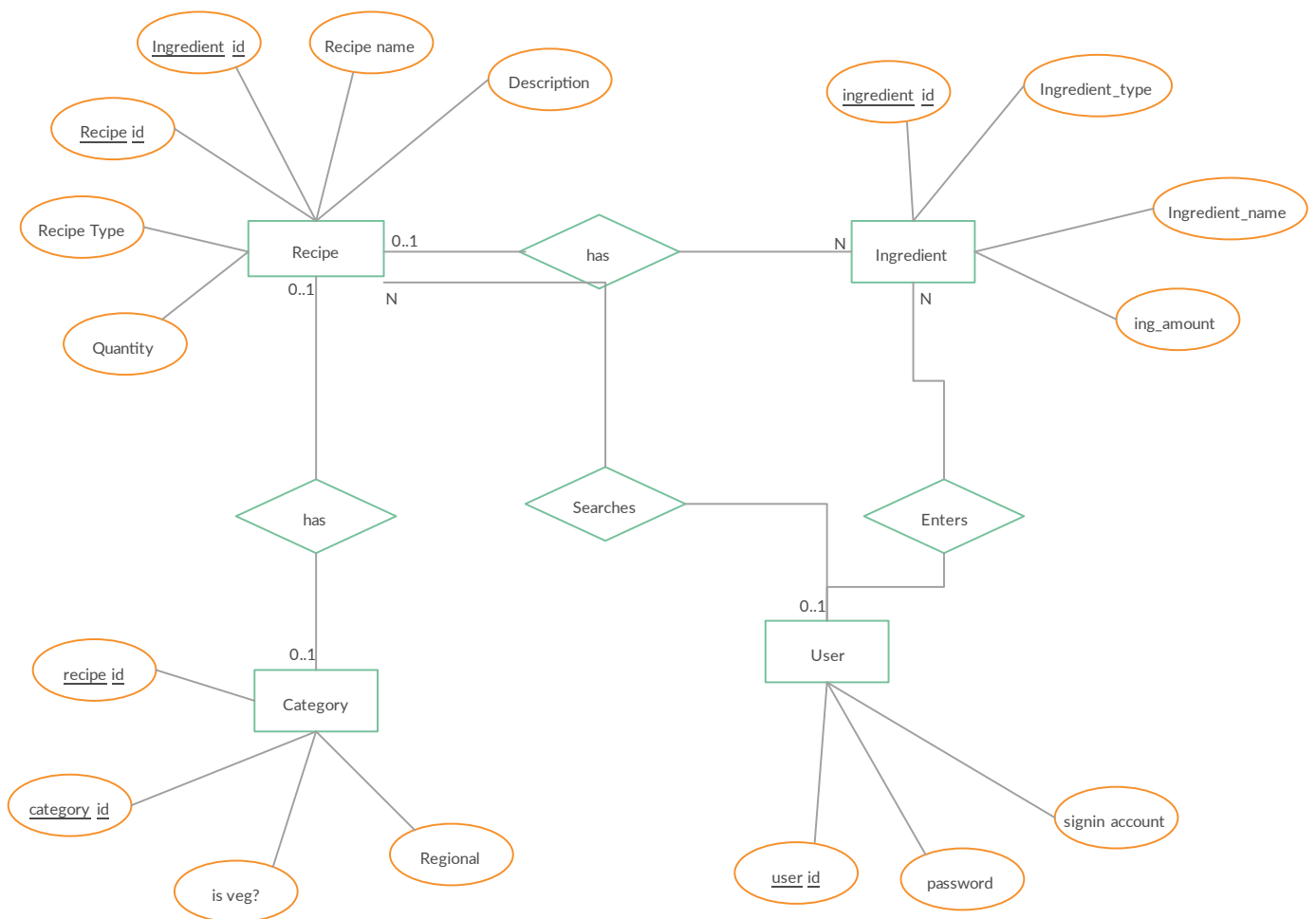
The ERD captures the relationships between various entities in the database:

1. User:

- Attributes: UserID (PK), Username, Email, Password.
- Relationships: One-to-many with Recipe (a user can add multiple recipes).

2. Recipe:

- Attributes: RecipeID (PK), Name, Cuisine, Ingredients, Instructions, PrepTime, ImageURL, UserID (FK).
- Relationships: Belongs to a single User and has many Ingredient entries.



DB Browser for SQLite - D:\Projects\Recipe Rcnds Sys\instance\database.db

File Edit View Tools Help

New Database Open Database Write Changes Revert Changes Undo Open Project Save Project Attach Database Close Database

Database Structure Browse Data Edit Pragma Execute SQL

Create Table Create Index Modify Table Delete Table Print Refresh

Name	Type	Schema
Tables (2)		
recipe		CREATE TABLE recipe (id INTEGER NOT NULL, name VARCHAR(100) NOT NULL, cuisine VARCHAR(50), ingredients VARCHAR(500), instructions TEXT, prep_time VARCHAR(10), image_url VARCHAR(120))
id	INTEGER	"id" INTEGER NOT NULL
name	VARCHAR(100)	"name" VARCHAR(100) NOT NULL
cuisine	VARCHAR(50)	"cuisine" VARCHAR(50)
ingredients	VARCHAR(500)	"ingredients" VARCHAR(500)
instructions	TEXT	"instructions" TEXT
prep_time	VARCHAR(10)	"prep_time" VARCHAR(10)
image_url	VARCHAR(120)	"image_url" VARCHAR(120)
user		CREATE TABLE user (id INTEGER NOT NULL, username VARCHAR(150) NOT NULL, email VARCHAR(150) NOT NULL, password VARCHAR(150) NOT NULL, PRIMARY KEY (id), UNIQUE (username))
id	INTEGER	"id" INTEGER NOT NULL
username	VARCHAR(150)	"username" VARCHAR(150) NOT NULL
email	VARCHAR(150)	"email" VARCHAR(150) NOT NULL
password	VARCHAR(150)	"password" VARCHAR(150) NOT NULL
Indices (0)		
Views (0)		
Triggers (0)		

Database

5.IMPLEMENTATION

The implementation of “*The Kitchen Oracle*” focuses on translating design into a functional, user-friendly recipe recommendation system. Below are the critical aspects of implementation:

Frontend Implementation:

1. HTML and CSS:

- Used for creating responsive layouts and styling.
- Implemented a grid-based design for displaying recipe cards with images and details.

2. JavaScript:

- Enhances interactivity by enabling actions like clicking on a card to reveal recipe details.
- Implements a feature to center the active card while dimming the background for better user focus.

3. Templates:

- Utilized Jinja2 templates in Flask for rendering dynamic content, such as search results and recipe details.

Backend Implementation:

1. Flask Framework:

- Manages the web server and routes, such as user login, signup, search, and recipe addition.

2. Database Interaction:

- SQLAlchemy ORM is used for seamless communication with the SQLite database.
- CRUD operations are implemented for user and recipe management.

3. User Authentication:

- Integrated Flask-Login for secure session handling.
- Passwords are encrypted using bcrypt.

Database Structure:

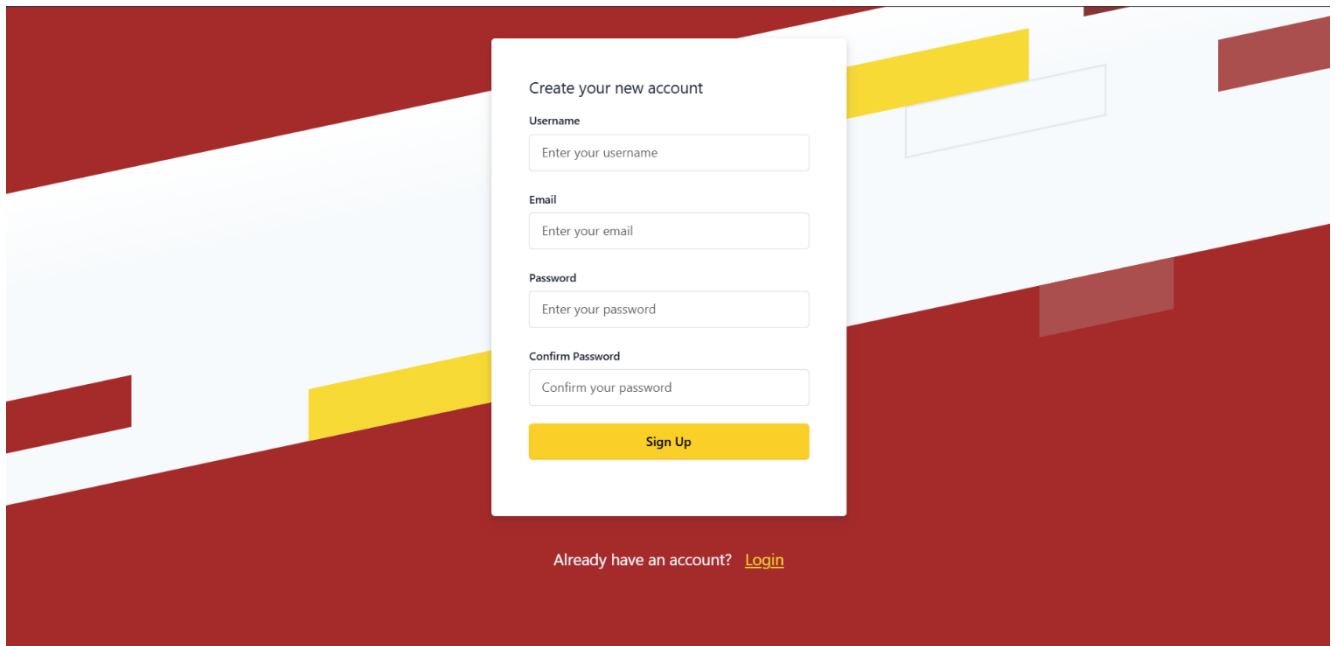
- Tables Implemented:

1. User Table: Stores user credentials and metadata.
2. Recipe Table: Stores recipe details, linked to the user who added the recipe.

Deployment Details:

1. Environment: Developed locally using Flask's debug mode for testing.
2. Static Assets: Recipe images and the background image are stored in the /static/images directory.

6. RESULT



The sign up page features a white modal form centered on a background of red and yellow geometric shapes. The form is titled 'Create your new account' and contains four input fields: 'Username' (placeholder: 'Enter your username'), 'Email' (placeholder: 'Enter your email'), 'Password' (placeholder: 'Enter your password'), and 'Confirm Password' (placeholder: 'Confirm your password'). A yellow 'Sign Up' button is at the bottom of the form. Below the form, the text 'Already have an account? [Login](#)' is displayed.

Create your new account

Username

Enter your username

Email

Enter your email

Password

Enter your password

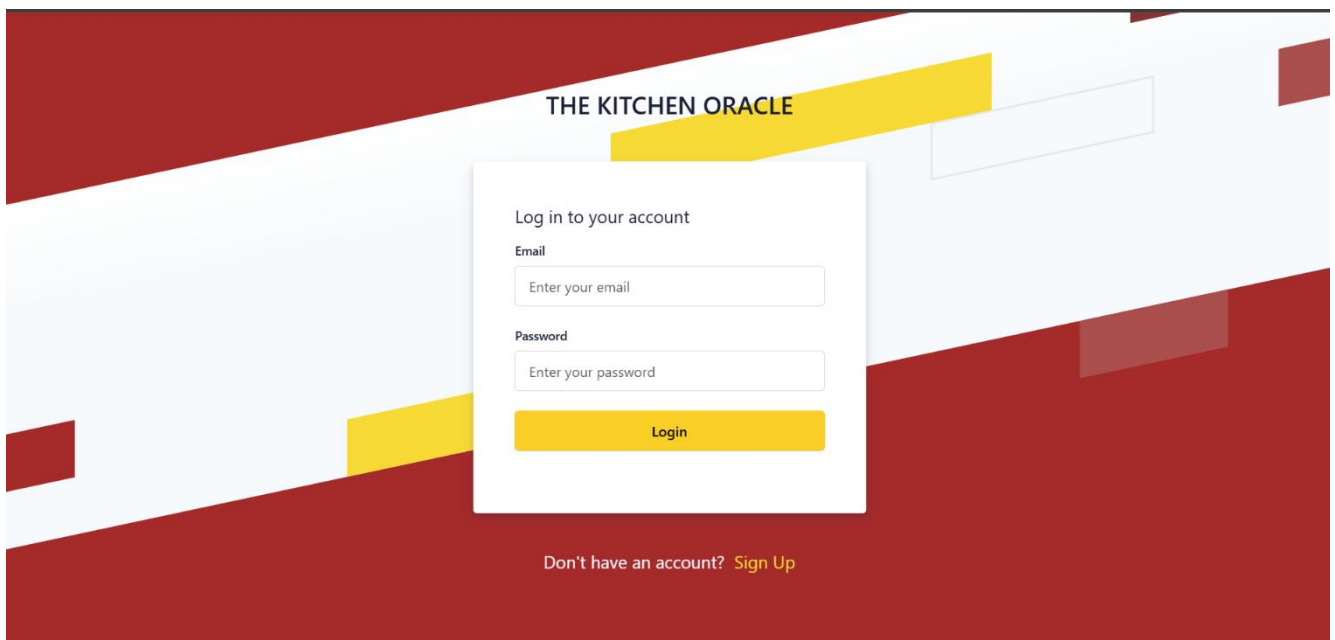
Confirm Password

Confirm your password

Sign Up

Already have an account? [Login](#)

Sign up page



The login page features a white modal form centered on the same red and yellow geometric background. The form is titled 'Log in to your account' and contains two input fields: 'Email' (placeholder: 'Enter your email') and 'Password' (placeholder: 'Enter your password'). A yellow 'Login' button is at the bottom of the form. Above the form, the text 'THE KITCHEN ORACLE' is displayed. Below the form, the text 'Don't have an account? [Sign Up](#)' is displayed.

THE KITCHEN ORACLE

Log in to your account

Email

Enter your email

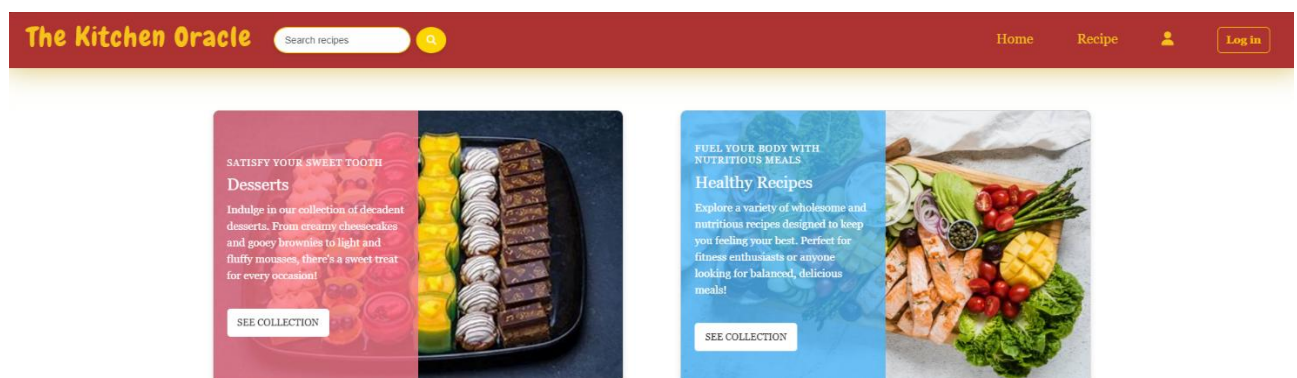
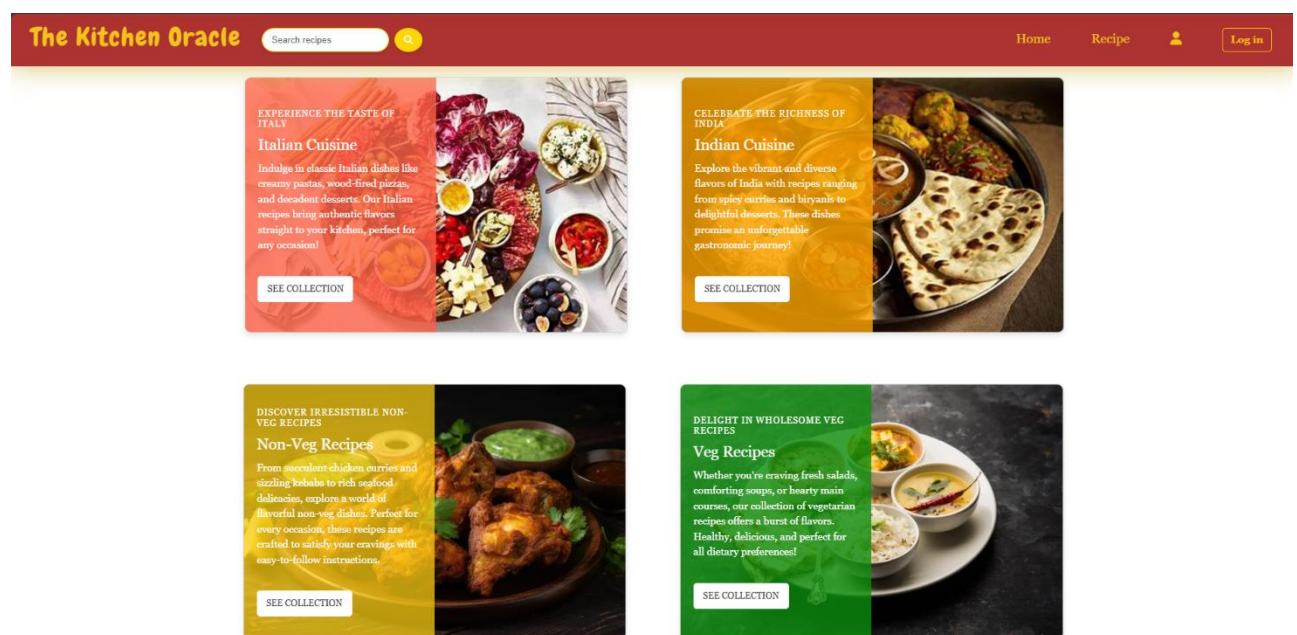
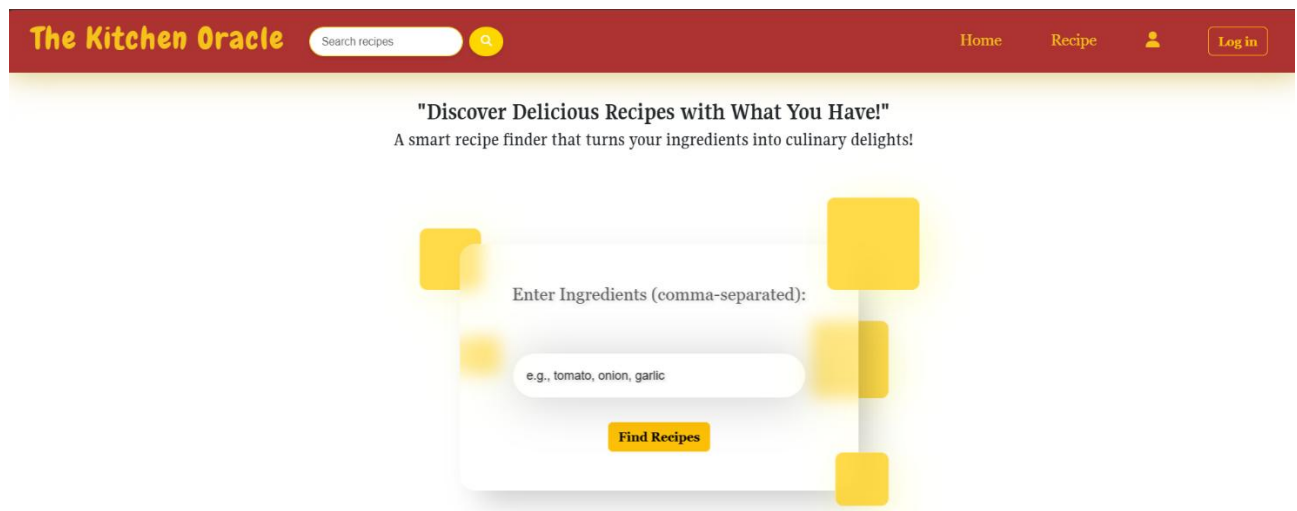
Password

Enter your password

Login

Don't have an account? [Sign Up](#)

Login Page



← **Recipe Results**




Halwa
Cuisine: Indian
Ingredients: Sooji,Ghee,Milk,Cardamom powder,Nuts
Preparation Time: 30 min minutes




Chocolate Shake
Cuisine: American
Ingredients: milk,black currants,vanilla extract,Ice cubes
Preparation Time: 5 min minutes

← **Recipe Results**

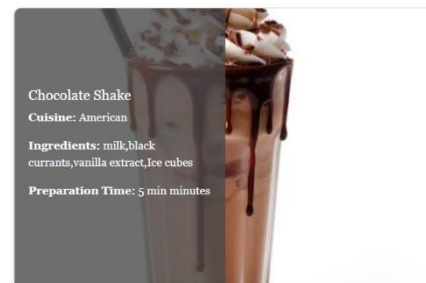
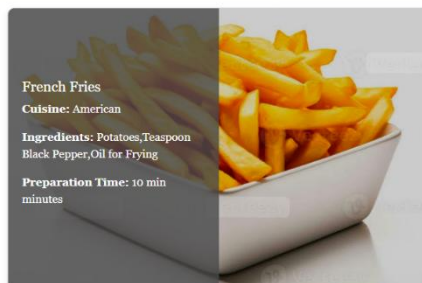
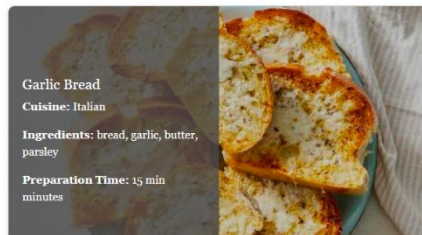
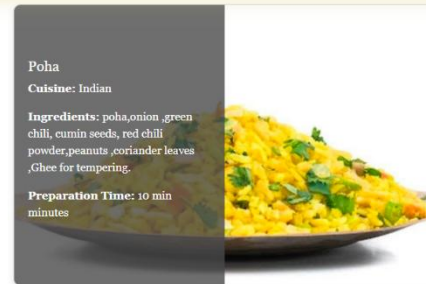


Chocolate Shake



Halwa
Cuisine: Indian
Ingredients: Sooji,Ghee,Milk,Cardamom powder,Nuts
Preparation Time: 30 min minutes
Steps:
1. Heat ghee in a pan.2. Add semolina and roast until golden brown.3. Add milk gradually, stirring continuously.4. Add sugar and cardamom powder, cook until the mixture thickens.5. Add nuts and cook for a few more minutes.6. Serve hot or cold.

Recipe Result



About Us

Welcome to **The Kitchen Oracle**! We aim to make cooking easy and fun by providing you with the best recipes tailored to your preferences. Whether you're a beginner or a seasoned chef, you'll find something delicious to cook!

Contact

Email: support@kitchenoracle.com

Phone: +1 (234) 567-890

Follow us on:





Privacy Policy

At The Kitchen Oracle, we value your privacy and are committed to protecting your personal information. We ensure that your data is used responsibly and only to enhance your experience with us."

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All Recipe Page

The Kitchen Oracle

[Home](#)[Recipe](#)[Log out](#)



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About Us

Welcome to **The Kitchen Oracle**! We aim to make cooking easy and fun by providing you with the best recipes tailored to your preferences. Whether you're a beginner or a seasoned chef, you'll find something delicious to cook!

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Profile Page

7. CONCLUSION

The “*The Kitchen Oracle*” project successfully developed a recipe recommendation system that allows users to discover new recipes based on the ingredients they have on hand. By integrating a simple yet powerful database structure with an intuitive user interface, the system provides a seamless experience for searching, adding, and viewing recipes. The implementation leveraged Flask for the backend, SQLAlchemy for database management, and HTML, CSS, JavaScript for the frontend. Key features include user authentication, dynamic recipe searches based on ingredients, and an engaging UI that adapts to different screen sizes. The system was built with scalability and user experience in mind, ensuring that it is easy to expand with additional features, such as adding recipe categories, integrating user reviews, or including more advanced search filters.

Future Enhancements:

While the project has been successfully implemented, future improvements could include:

1. Integration of machine learning algorithms for personalized recipe recommendations.
2. Addition of a recipe rating system to help users select the best recipes based on feedback from others.
3. Extension of the platform to support multi-language functionality, making it accessible to a global audience.

In conclusion, *The Kitchen Oracle* provides a comprehensive solution for recipe discovery and recommendation, offering both simplicity and scalability. The project has successfully met its objectives, providing an engaging and efficient tool for users looking to make the most of their ingredients.

8. FUTURE SCOPE

The *The Kitchen Oracle* project has laid a strong foundation for further enhancement and expansion. Several improvements and new features can be implemented to increase the system's capabilities, performance, and user engagement. The future scope of this project includes:

- 1. Personalized Recipe Recommendations:** - Incorporating machine learning algorithms such as collaborative filtering or content-based filtering to provide personalized recipe recommendations based on users' past behavior, preferences, or similar user profiles. This could make the system smarter and more adaptive to individual tastes.
- 2. User Reviews and Ratings:** - Implementing a review and rating system where users can rate recipes they try and leave feedback. This will help in generating user-driven content and improve the decision-making process for other users searching for new recipes.
- 3. Multi-Language Support:** - To expand the user base globally, adding multi-language support would make the application more accessible and user-friendly to non-English speakers. This could include language settings based on the user's region.
- 4. Advanced Search Filters:** - Enhancing the search functionality by adding advanced filters such as recipe difficulty, cooking time, calories, dietary restrictions (e.g., vegan, gluten-free, low-carb), and more. This will allow users to narrow down their search results more precisely based on their needs.
- 5. Meal Planning and Subscription Services:** - Adding a meal planning feature where users can plan their meals for the week and receive daily recipe suggestions. Additionally, offering a subscription-based service for premium content like exclusive recipes, detailed cooking tutorials, and weekly meal plans could provide a revenue stream and more personalized services.
- 6. User Accounts and Social Features:** - Enabling user profiles where users can save their favorite recipes, create custom recipe collections, or share their recipes with other users could enhance the community aspect of the platform. Users could also follow other cooking enthusiasts, share recipes, and interact within the platform.
- 7. Augmented Reality (AR) for Recipe Visualization:** - Implementing AR (Augmented Reality) features to help users visualize the final dish and get real-time cooking instructions in their kitchen. This feature could guide users step-by-step with interactive visuals, improving the cooking experience.
- 8. Mobile App Development:** - Developing a mobile app version of the platform would enhance accessibility and usability for users, allowing them to easily access recipes and ingredients while cooking in the kitchen. Mobile apps could provide features like voice search and notifications for new recipes.

9. LIMITATIONS

Despite the successful development and implementation of *The Kitchen Oracle*, there are several limitations that should be considered for future improvements. These limitations are based on both technical and functional aspects of the system:

- 1. Limited Recipe Database:** - The current version of the application relies on a predefined set of recipes. The size and diversity of the recipe database can be expanded, but currently, it may not cover all regional, international, or niche cuisines. This limits the scope of recipes available to users, especially those with specific dietary requirements or cultural preferences.
- 2. Static Ingredient List:** - The ingredient list for each recipe is fixed, meaning that the application does not dynamically adjust based on availability or user preferences. The system lacks an intelligent ingredient suggestion mechanism, which could automatically adapt the recipe based on user-specified preferences (e.g., vegan, gluten-free, etc.).
- 3. Limited User Interaction:** - The application does not fully support user-generated content such as sharing custom recipes, reviews, or social interactions between users. This can limit the sense of community and engagement that a more interactive platform could offer.
- 4. Lack of Advanced Personalization:** - The recommendation system in place is fairly basic, offering recipes based on user-selected ingredients. It does not yet include more advanced personalization features, such as learning from past behavior, preferences, or suggesting new recipes based on historical interactions with the platform.
- 5. Absence of Real-time Ingredient Availability:** - The system does not check the real-time availability of ingredients in users' local grocery stores or provide users with dynamic ingredient substitution options based on what is available near them. This could enhance the user experience by making recipe selection more convenient.
- 6. No Integration with External APIs:** - Although the system provides static recipe data, it currently lacks integration with third-party services such as grocery delivery APIs, nutritional information databases, or restaurant APIs that could make the experience more robust.
- 7. Limited Mobile and Offline Functionality:** - The web-based version of the application does not support offline access, meaning users must have an internet connection to view recipes. Additionally, the application is not yet available in a mobile app format, which would be beneficial for users who want to access recipes while cooking in the kitchen without being tied to a computer.
- 8. No Voice Command Integration:** - With the growing popularity of voice assistants, integrating a voice command feature for hands-free navigation of recipes could be highly beneficial. Currently, the app does not support voice interaction, which could improve the cooking experience, especially for users working in the kitchen.
- 9. Performance and Scalability Issues:** - As the number of users increases, the system may face performance issues, especially in terms of speed and response time when searching through large recipe databases. The backend architecture may require optimizations for scalability to ensure smooth performance with an increasing number of users and recipes.

10. Limited Diet Customization: - While users can browse recipes, the system does not yet offer full diet customization options, such as low-calorie, keto, or diabetic-friendly diets. Incorporating more dietary preferences and restrictions would increase the system's utility for health-conscious users.

11. Dependency on Static Content: - The application relies on static content (e.g., recipe details, images) which means it lacks dynamic interaction with the users, such as live cooking sessions or personalized tutorial videos. The introduction of dynamic content could improve the user experience. --- These limitations are not necessarily drawbacks but areas for future experience

10. ANNEXURE – I: References

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- [8] <https://www.youtube.com/>