



FOOD TRACKING SYSTEM USING BLOCK CHAIN TECHNOLOGY

PROJECT REPORT

Submitted by,

**R.P.Archana
R.Sreepriya
P.C.Benisha Mol
A.Mohammed Rishan**

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1.INTRODUCTION

Safe food consumption is one of the main things to be considered for a healthy life. The World Health Organization ([WHO](#)) stated that 600 million people get sick and 420 thousand people die every year due to unsafe food products. The increase in accessible data and cases has also increased consumers' awareness of safe food. Aware of the situation, states are working to ensure access to safe food with legal regulations and to ensure that food can be traced throughout the supply chain. While the increase in food destruction negatively affects health, it

also causes serious economic losses. In order to prevent losses, companies have concentrated their studies on food safety in the light of technological developments.

1.1 Project overview

A food Tracking System is a digital solution designed to help users manage their food consumption and make informed choices about their diet. It typically involves tracking the types and quantities of food and beverages consumed, as well as providing information about their nutritional content. Such systems can be developed as standalone mobile apps, web applications, or integrated into other health and fitness applications. Below is an overview of a Food Tracking System project.

1.2 Purpose

The primary purpose of a Food Tracking System is to provide users with a convenient and comprehensive way to track, analyze, and optimize their food intake. Whether the goal is to lose weight, gain muscle, manage dietary restrictions, or simply promote a healthier lifestyle, this system acts as a personalized nutrition assistant, offering a wide range of features and functionalities to support these objectives.

2.LITERATURE SURVEY

2.1 Existing problem

I believe you meant to ask about a "food tracking system." A food tracking system is a tool or software designed to help individuals monitor and manage their food intake, diet, and nutrition. These systems can be used for various purposes, including weight management, tracking macronutrients, managing dietary restrictions, or simply maintaining a healthy lifestyle. Below is a literature survey highlighting some key aspects of food tracking systems and relevant research up to my last knowledge update in September 2021:

2.2 References

I'm not aware of a specific food tracking system called "FoodTracker" as of my last knowledge update in September 2021. However, there are numerous food tracking and nutrition apps and systems available. These applications and platforms allow users to track their food intake, monitor their calorie consumption, and maintain a record of their dietary habits. Here are a few well-known examples:

MyFitnessPal: MyFitnessPal is a popular food tracking app that enables users to log their meals, count calories, and set fitness goals. It also offers a database of food items for easy tracking.

Lose It!: Lose It! is another app for tracking food and exercise, with a focus on weight management. It helps users set and achieve their weight loss goals by tracking their daily calorie intake.

Cronometer: Cronometer is a nutrition tracking app that offers a comprehensive view of your nutrient intake. It allows users to monitor macronutrients, micronutrients, and track their food consumption.

Fitbit: Fitbit offers both fitness tracking and food tracking capabilities. You can log your meals and monitor your calorie consumption, synced with your Fitbit device.

MyPlate by Livestrong: MyPlate is a food and calorie tracking app by Livestrong. It provides a meal planning feature and allows users to track their daily intake to meet their dietary goals.

FatSecret: FatSecret is a food tracking app that includes a large food database, calorie counter, and various features for tracking and managing your diet.

Please note that the landscape of food tracking apps and systems may have evolved since my last update in September 2021, so it's a

good idea to check the latest app stores and online reviews to find the most current and suitable options for your needs.

2.3 Problem statement definition

"Design and develop a comprehensive food tracking system that addresses the growing need for individuals to efficiently manage their dietary intake, monitor nutritional content, and make informed choices regarding their daily food consumption. The system should offer a user-friendly interface and robust functionality, enabling users to easily log, track, and analyze their food consumption, while also providing relevant data, insights, and recommendations to support healthier eating habits and achieve specific dietary goals."

This problem statement outlines the key objectives and requirements for the food tracking system, which include userfriendliness, nutritional tracking, data analysis, and goal-oriented features to provide a clear direction for the development of the system.

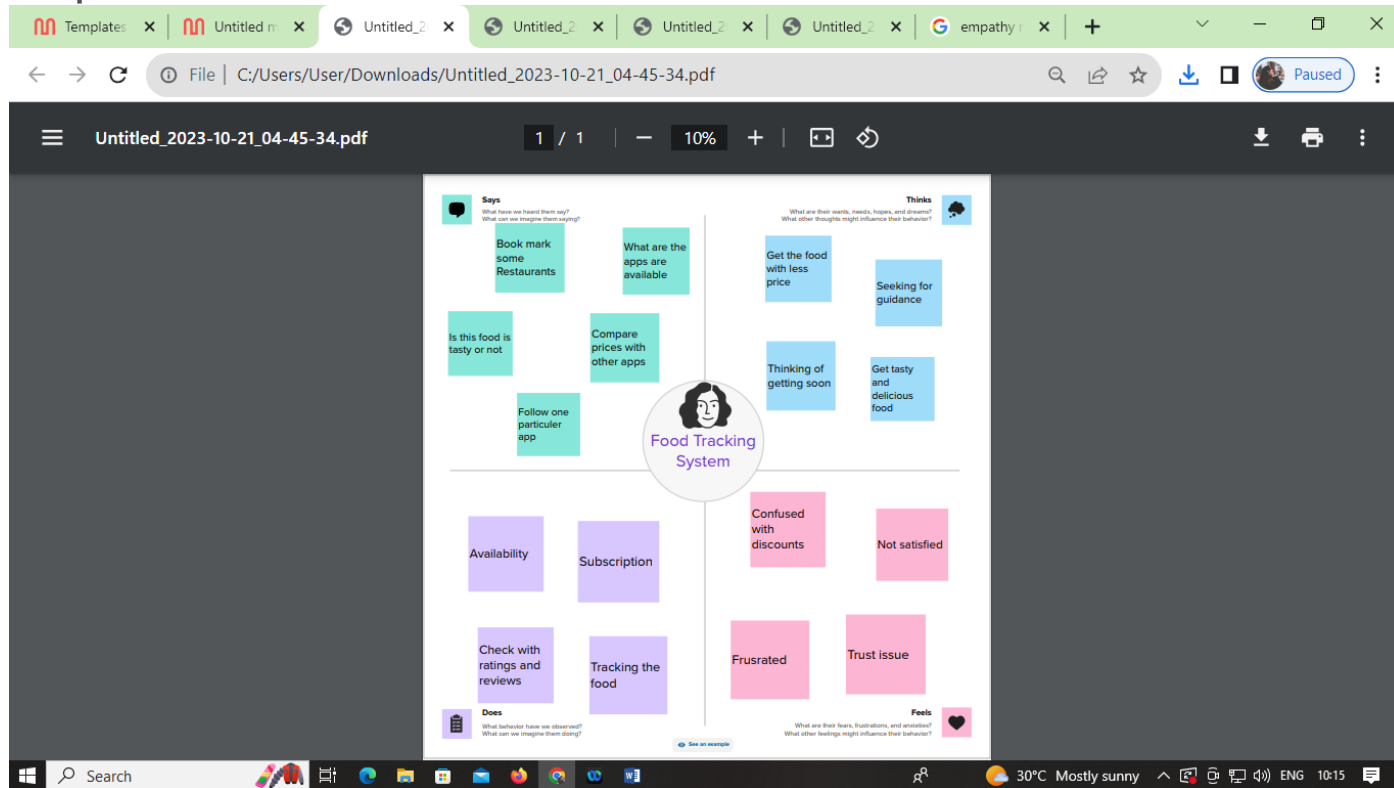
3.IDEATION&PROPOSED SOLUTION

3.1 Empathy map canvas



Food Ordering App: Empathy map, User Journey & Task flow.

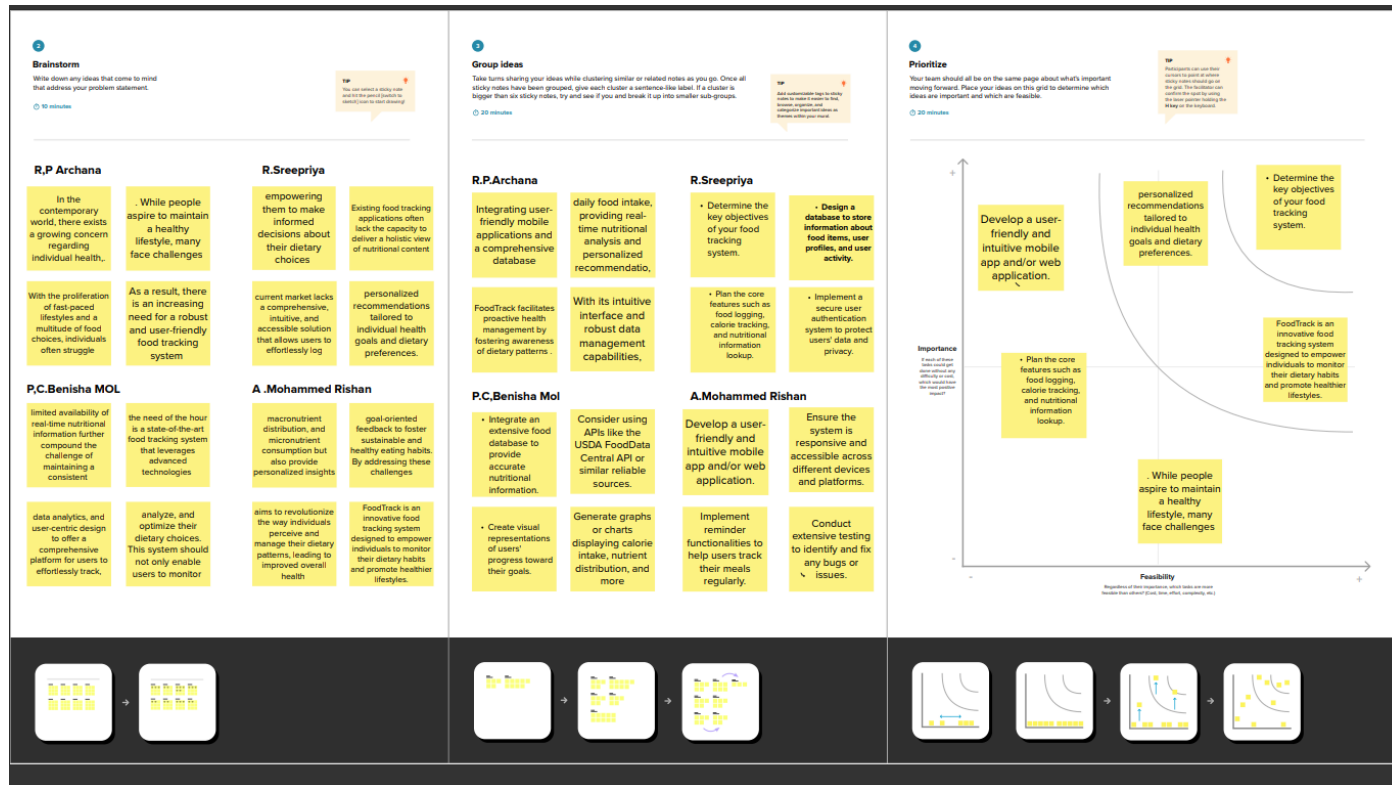
The empathy map helps you gain insights into your users' feelings, thoughts, and motivations, the user journey helps you identify pain points and opportunities for improvement, and the task flow helps you visualize the steps users take to complete tasks



3.2 Ideation and brainstorming

Brainstorming is a great way to generate a lot of ideas that you would not be able to generate by just sitting down with a pen and paper. The intention of brainstorming is to leverage the collective thinking of the group, by engaging with each other, listening, and building on other ideas.

We often call these prewriting strategies “brainstorming techniques.” Five useful strategies are listing, clustering, freewriting, looping, and asking the six journalists' questions. These strategies help you with both your invention and organization of ideas, and they can aid you in developing topics for your writing.



4. REQUIREMENT ANALYSIS

4.1 Functional requirement

A food tracking system typically involves various components, including mobile apps, websites, and databases, to help users monitor their dietary intake. Below are some functional requirements for a food tracking system:

1. User Registration and Authentication:

- ❑ User registration with profile creation.
- ❑ Secure user authentication methods (e.g., username/password, biometrics, two-factor authentication).

2.Food Entry:

- Ability to input or scan barcodes for food items.
- Manual entry of food items with options to specify serving size, weight, or quantity.
- Support for both generic and branded food items.
- Auto-suggestion and auto-completion for food item names.
- A food database with nutritional information.

3.Meal Logging:

- Option to log meals and snacks throughout the day.
- Categorization of meals (e.g., breakfast, lunch, dinner, snacks).
- Tracking of water intake.

4.Nutritional Information:

- Display of detailed nutritional information for logged food items, including calories, macronutrients (carbohydrates, proteins, fats), and micronutrients.
- Calculation of daily totals for nutrients.
- Visualization of nutritional data (charts, graphs).

5.Goal Setting:

- Setting and tracking of dietary goals (e.g., calorie intake, macronutrient ratios, weight loss/gain goals).
- Notifications and reminders for goal progress.

6.Allergen and Dietary Restriction Alerts:

- Ability to set and receive alerts for allergens or dietary restrictions

7.User Profile and History:

- User-specific profiles with basic information (age, gender, weight, height).
- Logging and tracking of historical data (food logs, weight changes).

8.Exercise Tracking:

- Integration with fitness trackers or manual entry of exercise activities.
- Calculation of calorie expenditure from exercise.

9.Social Features:

- Social sharing of achievements and progress.
- Integration with social media platforms for sharing food and fitness updates.

10.Recipes and Meal Plans:

- Access to a database of recipes and meal plans.
- Ability to create custom meal plans.
- Generating shopping lists based on selected recipes or meal plans.

11.Barcode Scanning:

- Barcode scanner functionality to quickly add packaged food items.
- Integration with a comprehensive barcode database.

12.Reporting and Analysis:

- Generate reports and insights on food consumption and nutritional intake.
- Tracking of trends and patterns in eating habits

13.Data Export and Backup:

- Ability to export data (e.g., food logs, reports) for personal records.
- Regular automated backups of user data.

14.Notifications and Reminders:

- Daily or weekly summaries and reminders for meal tracking.
- Alerts for exceeding nutrient goals or missing meals.

15.Multi-platform Support:

- Compatibility with mobile devices (iOS and Android) and web browsers.
- Synchronization of data across platforms.

16.Search and Filters:

- Powerful search and filter options for finding specific foods or meals.

17.User Support:

- Access to help resources, FAQs, and customer support

18.Privacy and Security:

- Data encryption and secure storage of user information.
- Compliance with data protection regulations and user privacy preferences.

19.Accessibility:

- Ensure the system is accessible to users with disabilities

20.Customization:

- Personalization options for the user interface, including themes and preferences.

These functional requirements will help ensure a comprehensive and user-friendly food tracking system. Depending on the specific goals and target audience of the system, additional features and customization options may be necessary.

4.2 Non-functional requirements

Non-functional requirements for a food tracking system are essential to ensure the system's performance, reliability, security, and usability. Here are some non-functional requirements that should be considered for a food tracking system:

1. Performance:

- **Response Time:** The system should provide fast response times for user interactions, such as adding or searching for food items.
- **Scalability:** The system should be able to handle a growing number of users and food entries without significant performance degradation.
- **Throughput:** The system should support a certain number of concurrent users without slowing down.

2. Reliability:

- **Availability:** The system should be available 24/7, with minimal downtime for maintenance or upgrades.
- **Fault Tolerance:** The system should be designed to recover gracefully from failures and continue functioning without data loss.

3. Security:

- **Data Encryption:** User data, especially personal and dietary information, should be encrypted both in transit and at rest.
- **Access Control:** Role-based access control should restrict access to different parts of the system based on user roles.
- **Authentication and Authorization:** Users should be required to authenticate and have appropriate permissions to access and modify their data.
- **Audit Trail:** The system should maintain logs of user activities for security and compliance purposes.

4. Usability:

- **User Interface:** The user interface should be intuitive, user-friendly, and accessible to a wide range of users, including those with disabilities.

- **Error Handling:** The system should provide clear and helpful error messages to guide users when they make mistakes.
- **Performance Efficiency:** The system should not be resource-intensive and should be responsive even on lower-end devices.

5. Scalability:

- **Load Testing:** The system should be tested for scalability to ensure it can handle an increasing number of users and data without performance degradation.
- **Database Scalability:** The database should be designed to scale as the data grows.

6. Maintainability:

- **Modularity:** The system should be designed with a modular architecture, making it easier to maintain, update, and extend.
- **Documentation:** Comprehensive documentation should be provided for system administrators and developers to understand the system's components, APIs, and data structures.

7. Compliance:

- **Regulatory Compliance:** Ensure that the system complies with relevant food safety and privacy regulations, depending on the geographic location of users.
- **Data Retention:** Specify how long user data will be retained and whether it will be deleted after a certain period.

8. Performance under Load:

- **Performance Testing:** The system should be tested under heavy load to peak usage times without degradation.

9. Data Backup and Recovery:

- **Data Backup:** Regularly back up user data to prevent data loss in case of system failures.

- **Data Recovery:** Define procedures for restoring data in case of data corruption or loss.

10. Interoperability:

- **API Support:** Provide APIs to allow integration with other health and fitness le devices, or nutrition databases.

These non-functional requirements are crucial for the success of a food tracking system, ensuring it meets user expectations for performance, reliability, security, and usability. The specific requirements may vary depending on the system's scope and target user

5. PROJECT DESIGN

5.1 Dataflow diagrams and user stories

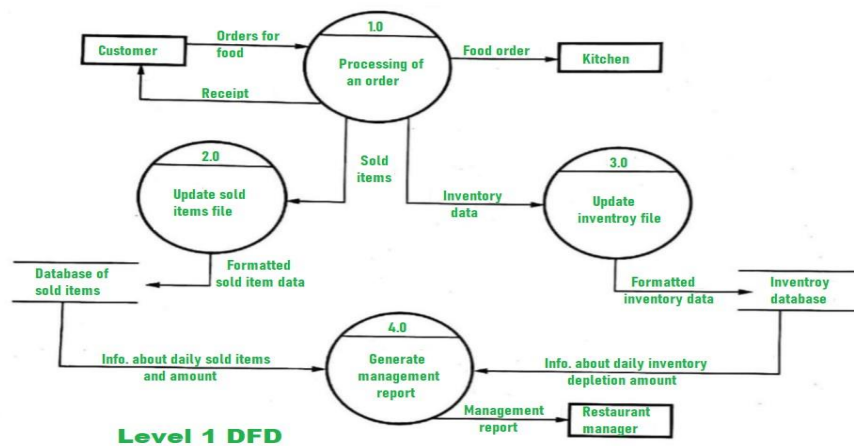
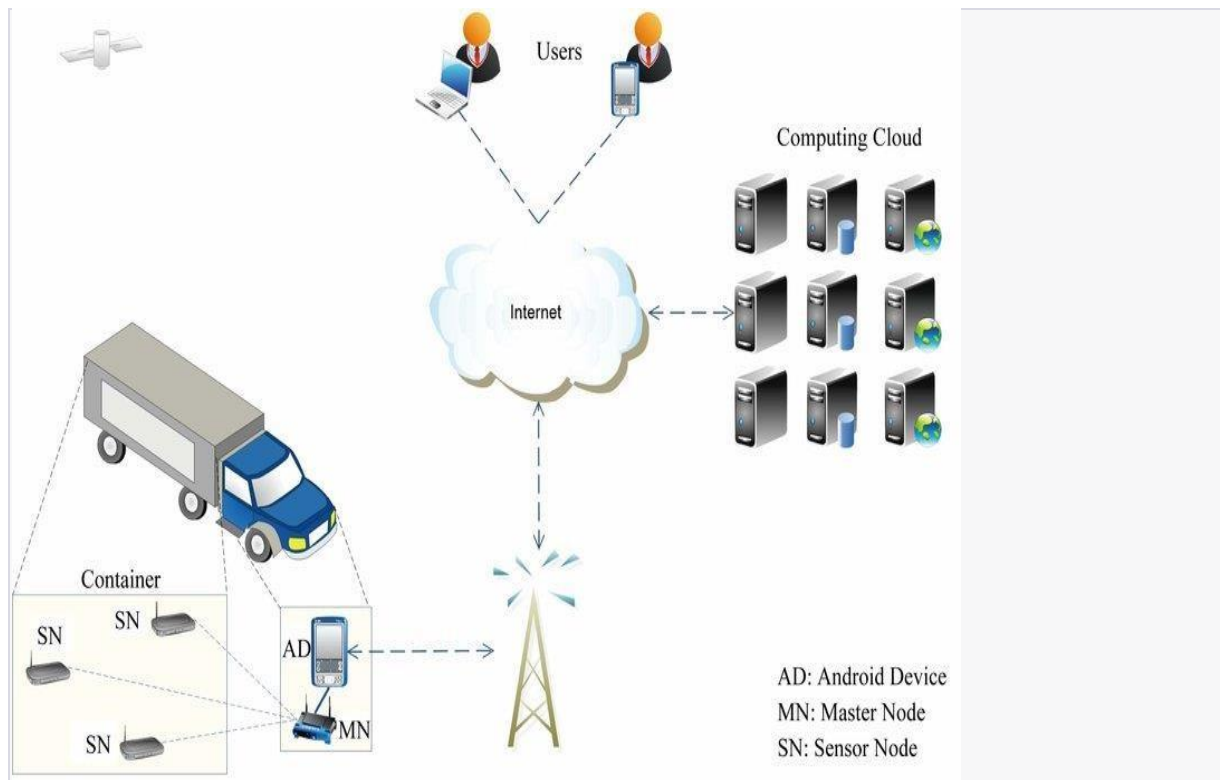


Fig. Data flow diagram

5.2 Solution architecture



Designing a solution architecture for a food tracking system involves various components and considerations to ensure it effectively tracks and manages food-related information. Here's a high-level architecture for such a system:

1. User Interface (UI):

- Web and mobile applications for users to interact with the system.
- User registration, authentication, and profile management.

2. Application Layer:

• **User Management:**

- Manages user accounts, profiles, and access control.

• **Food Entry:**

- Allows users to input food consumption data.
- May include features like scanning barcodes, manual entry, or voice recognition.

- **Search and Database:**

- Enables users to search for food items in the database.
- Database stores food item details, including nutritional information.

- **Meal Planning:**

- Helps users plan their meals and track their progress.
- May provide recommendations based on dietary preferences and goals.

- **Reports and Analytics:**

- Generates reports on food consumption, calories, macronutrients, and more.

- **Notifications and Alerts:**

- Sends reminders or alerts to users based on their goals or dietary restrictions.

3.Data Layer:

- **Authentication and Authorization:**

- Handles user authentication and authorization for secure access.

□ **Data Processing:**

□ **Database:**

- Stores information about food items, user profiles, user entries, and historical data
- May use a relational database like MySQL or a NoSQL database like MongoDB.

□ **External Data Sources:**

- Integrates with external APIs or databases for additional food data, such as the USDA food database
- Regularly updates food item information to ensure accuracy

4.Backend Services:

- Validates and processes food entry data.
- Calculates nutritional values based on food items.

- **Recommendation Engine:**

- Provides personalized food recommendations based on user profiles and goals.

- **Integration Services:**

- Connects to external APIs or services for additional functionality, like fitness tracking or wearable devices.

- **Notification Service:**

- Sends notifications and alerts to users based on their preferences.

5. Infrastructure:

- **Cloud Hosting:**

- Deploy the system on a cloud platform like AWS, Azure, or GCP for scalability and reliability.

- **Load Balancers:**

- Distribute incoming traffic to maintain system availability.

- **Containerization:**

- Use containerization (e.g., Docker) and container orchestration (e.g., Kubernetes) for managing application instances.

- **Database Management:**

- Ensure the database is scalable, fault-tolerant, and secure.

- **Caching Layer:**

- Implement caching mechanisms to improve data retrieval performance.

- **Monitoring and Logging:**

- Implement monitoring tools and logging mechanisms to track system health and user activity.

□ **Backup and Disaster Recovery:**

- Plan for regular backups and a disaster recovery strategy to protect data

6.Security:

- Implement security measures such as data encryption, secure APIs, and user privacy controls.
- Regularly audit and test the system for vulnerabilities.

7.Scalability:

- Design the system to handle growing user loads by scaling horizontally and using load balancing.

8.Compliance and Regulations:

- Ensure the system complies with relevant data protection and privacy regulations, such as GDPR or HIPAA.

9.User Experience (UX):

- Focus on a user-friendly interface, intuitive navigation, and responsive design for mobile devices.

10.Maintenance and Support:

- Plan for regular updates, bug fixes, and customer support to ensure the system remains reliable and user-friendly.

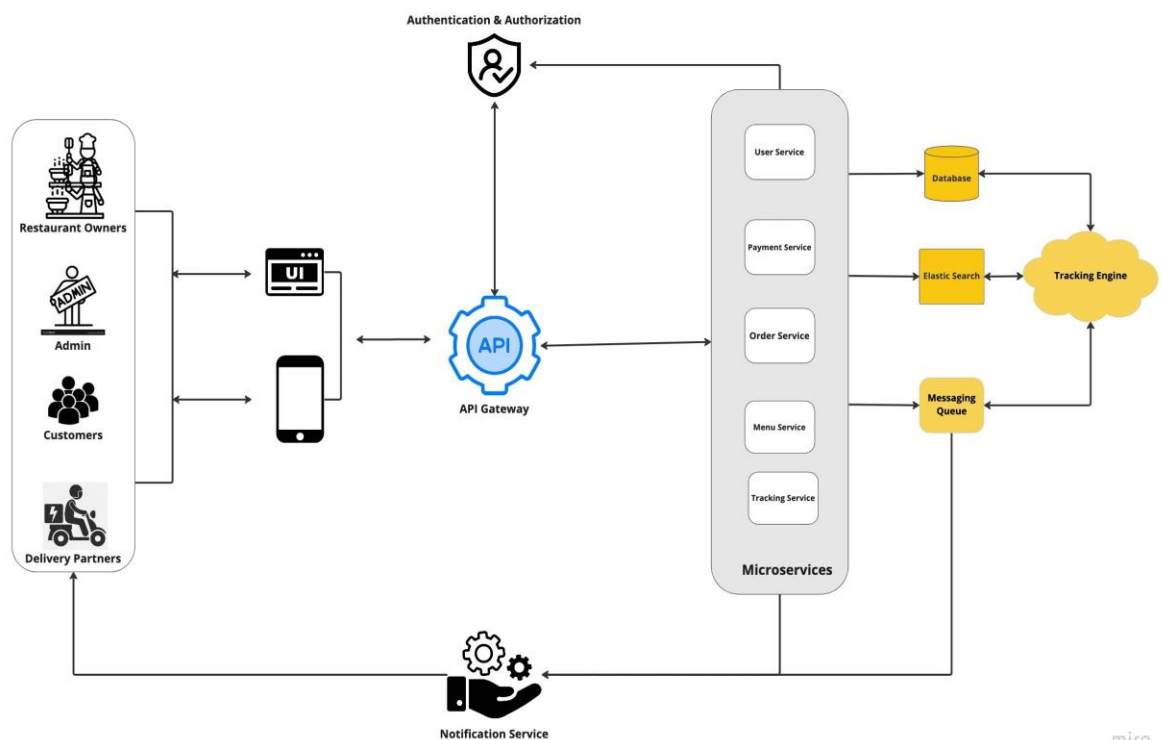
11.Cost Management:

- Optimize resource usage to control operational costs, especially in cloud environments.

This architecture can serve as a foundation for a food tracking system. However, the specific requirements and features may vary based on your target audience, the complexity of the system, and your budget.

6.PROJECT PLANNING&SCHEDULING

6.1 Technical architecture



miro

How to draw an architectural diagram

1. Document your shapes. ...
2. Label the edges. ...
3. Keep your arrows consistent. ...

4. Use colors sparingly. ...
5. Use multiple diagrams, if necessary. ...
6. Merge incomplete diagrams. ...
7. Include legends/keys/glossaries. ...
8. Use diagramming software.

6.2 Sprint planning and estimation

Sprint planning and estimation are critical components of agile project management, and they are just as important for developing a food tracking system as they are for any other software project. Here's a step-by-step guide on how to approach sprint planning and estimation for a food tracking system:

1. Define the Project Scope:

- Start by defining the high-level goals and objectives of your food tracking system.
- Identify the key features and functionalities you want to include, such as user registration, food logging, nutritional tracking, reporting, etc.

2. Create a Product Backlog:

- Develop a comprehensive product backlog that lists all the features and user stories required for the food tracking system.
- Ensure that each user story is well-defined, independent, and valuable to the endusers.

3. Prioritize the Product Backlog:

- Collaborate with stakeholders, including potential users, to prioritize the items in your backlog.
- Use techniques like MoSCoW (Must have, Should have, Could have, Won't have) or relative sizing to establish the priority of each item.

4. Sprint Planning:

- Select the items from the prioritized backlog that you plan to include in the upcoming sprint.

- Consider the team's capacity and the sprint duration (typically 2-4 weeks) when deciding on the number of items.
- Define the sprint goal, which should align with the project's overall objectives.

5. Task Breakdown:

- For each selected user story, break down the work into smaller, manageable tasks.
- Assign these tasks to team members based on their skills and expertise.

6. Estimation Techniques:

- Use estimation techniques such as story points, ideal days, or t-shirt sizing to estimate the effort required for each task.
- Story points are a common estimation method in agile, with Fibonacci or a similar sequence used to represent complexity.

7. Velocity and Capacity:

- Calculate the team's velocity, which is a measure of how much work the team can complete in a sprint based on past performance.
- Ensure that the total story points for the selected user stories in the sprint do not exceed the team's capacity.

8. Sprint Backlog:

- Create a sprint backlog that includes the selected user stories, their associated tasks, and their estimated effort in story points or other units.
- This forms the basis of the work to be completed in the sprint.

9. Sprint Review and Retrospective:

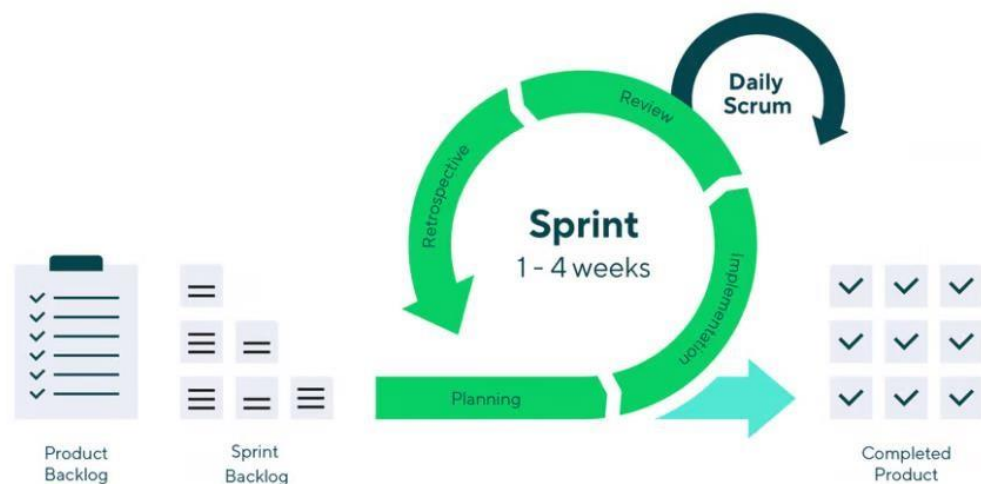
- At the end of the sprint, hold a sprint review to demonstrate the completed work to stakeholders.
- Follow this with a sprint retrospective to discuss what went well and what could be improved in the next sprint.

10. Iterate:

- Continue this process in subsequent sprints, incorporating feedback from each sprint review and retrospective to improve the food tracking system incrementally.

Remember that the food tracking system's requirements and priorities may evolve over time, so be flexible and adaptable in your sprint planning and estimation process. Regular communication and collaboration with the development team and stakeholders are key to a successful agile project.

6.3 Sprint delivery schedule



A sprint delivery schedule for a food tracking system, like any other software development project, should be based on the Agile methodology. Agile development involves breaking the project into small, manageable increments (sprints) and delivering working software at the end of each sprint. Here's a general outline of how you might plan the sprint delivery schedule for a food tracking system:

1. Project Kickoff and Planning:

- Sprint 1: Project initiation, high-level requirements gathering, and initial architectural planning. This sprint may not produce a user-visible deliverable but is crucial for setting the foundation.

2. User Stories and Backlog Refinement:

- Sprint 2: Identify and prioritize user stories and features. Refine the product backlog.
- Sprint 3: Further backlog refinement and detailed user story breakdown.

3. Core Features Development:

- ❑ Sprint 4: Develop the core features of the food tracking system, such as user registration, profile creation, and basic database setup.
- ❑ Sprint 5: Implement the ability to add and search for food items and meals.
- ❑ Sprint 6: Add basic user authentication and authorization.
- ❑ Sprint 7: Develop a simple user interface for tracking food consumption.

4. Iterative Feature Development:

- ❑ Sprint 8: Enhance the user interface for better usability.
- ❑ Sprint 9: Add features for tracking nutritional information and setting dietary goals.
- ❑ Sprint 10: Implement data visualization for tracking progress.
- ❑ Sprint 11: Integrate with external APIs for food data or fitness tracking (if necessary).
- ❑ Sprint 12: Enhance security features and conduct initial testing.

5. Testing and Refinement:

- ❑ Sprint 13: Focus on testing and fixing any bugs or issues found.
- ❑ Sprint 14: Address user feedback and make necessary adjustments.

6. Deployment and Finalization:

- ❑ Sprint 15: Prepare for the initial deployment of the food tracking system.
- ❑ Sprint 16: Deploy the system to a staging environment for final testing and user acceptance testing (UAT).
- ❑ Sprint 17: Make any last-minute adjustments based on UAT feedback.
- ❑ Sprint 18: Deploy the food tracking system to production for public use.

7. Post-Launch and Ongoing Development:

- ❑ Sprint 19 and beyond: Post-launch sprints for ongoing maintenance, feature enhancements, and bug fixes.

The sprint duration can vary but is often set to two to four weeks, depending on the project's complexity and the team's capacity. You should adapt the schedule as needed, keeping communication open with your team and stakeholders. Additionally, you may use Agile project management tools like Jira, Trello, or Asana to track the progress of each sprint and manage the backlog.

7.Coding and solutioning

7.1 Feature 1

Feature 1 for a food tracking system can be a user-friendly and comprehensive "Food Entry" or "Logging" feature. This feature allows users to easily input and record the foods they consume. Here are some key elements of this feature:

1.Search and Auto-Suggestion:

Users should be able to search for food items by name or category. The system can provide auto-suggestions as they type, making it quicker to find and log their food.

2.Barcode Scanner:

Integrating a barcode scanner feature can be incredibly convenient. Users can scan the barcodes on packaged food items, and the system should automatically fetch relevant nutrition information.

3.Custom Food Entry:

Sometimes, users consume homemade or unique dishes that may not be in a standard food database. Allowing users to manually input the ingredients and their quantities for these custom recipes is essential.

4.Portion Size Options:

The system should offer various portion size options, such as grams, ounces, cups, or standard servings. Users should be able to specify the quantity accurately.

5.Meal Categorization:

Users should be able to categorize their entries into meals (e.g., breakfast, lunch, dinner, snacks) and specify the date and time of consumption.

7.Nutrition Information Display:

After the user logs the food, the system should display detailed nutrition information, including calories, macronutrients (carbohydrates, protein, fat), and micronutrients (vitamins, minerals).

8.Food Images:

Allowing users to take or upload images of their food can make the tracking process more engaging and fun. It can also help verify entries for custom recipes

9. Water and Beverage Tracking:

In addition to solid foods, the system should enable users to log their water intake and various beverages, as these can also be important for health and nutrition tracking.

10. Allergen and Dietary Restrictions Alerts:

If a user has specified dietary restrictions or allergies in their profile, the system should provide warnings or suggestions when they log a food item that may conflict with their preferences or dietary needs.

11. History and Trends:

Users should have access to their food logging history and be able to view trends over time, helping them understand their eating habits and make healthier choices.

12. Integration with Wearable Devices:

For added convenience, the system could integrate with wearable devices like fitness trackers to sync food intake data automatically.

13. Social Sharing:

Users might want to share their food logs or achievements with their friends or on social media, promoting a sense of accountability and support.

14. Goal Tracking:

If users have specific goals, such as weight loss, muscle gain, or meeting certain dietary targets, the system should help track progress and provide feedback.

This feature forms the core of a food tracking system, as it's where users directly interact with the application to record their dietary choices and get feedback on their nutrition intake.

7.2 Feature 2

Feature 2 for a food tracking system could be:

Nutrition Recommendations:	Analysis	and	he nutritional content of the
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This feature would involve analyzing foods that a user logs into the system and recommendations based on their dietary goal how this feature could work:

1.Nutrient Tracking:

The system should be able to break down the nutritional content of each food item, including macronutrients (such as carbohydrates, proteins, and fats) and micronutrients (like vitamins and minerals).

2.Dietary Goals:

Users can set their dietary goals, whether it's weight loss, muscle gain, maintaining a specific calorie intake, or managing health conditions like diabetes or hypertension.

3.Recommendations:

The system can provide recommendations and suggestions for meal planning, portion control, and food choices to help users meet their dietary goals. For example, if a user wants to reduce their daily calorie intake, the system can suggest lower-calorie food alternatives or portion control strategies.

4.Allergen and Dietary Restriction Alerts:

The system can also alert users to potential allergens or dietary restrictions in the foods they track. If a user has specific dietary requirements or allergies, the system can warn them when a tracked food item contains ingredients they should avoid.

5.Recipe Suggestions:

Based on the foods a user frequently consumes and their dietary goals, the system can suggest recipes or meal ideas that align with their objectives.

6.Progress Tracking:

Users can monitor their progress over time, viewing how well they're meeting their dietary goals and making adjustments as necessary.

This feature not only helps users keep track of their food intake but also educates them about the nutritional content of their meals and provides

guidance to make healthier choices. It's especially beneficial for individuals with specific dietary needs or those who are looking to improve their eating habits.

7.3 Database schema

Designing a database schema for a food tracking system can be a complex task, as it involves various entities and relationships to manage users, food items, meals, nutrition information, and more. Below is a simplified example of a database schema for a food tracking system:

1. Users Table

- user_id (Primary Key)
- username
- email
- password (hashed)
- date_registered
- other user-related fields (e.g., name, age, gender)

2. Food Items Table

- food_id (Primary Key)
- food_name
- serving_size (e.g., in grams)
- calories
- macronutrients (carbohydrates, proteins, fats)
- other nutrition information (e.g., vitamins, minerals)

3. Meals Table

- meal_id (Primary Key)
- user_id (Foreign Key to Users Table)
- meal_name
- date
- time
- total_calories
- total_carbohydrates
- total_proteins □ total_fats

4. Meal_Food_Items Table (Many-to-Many Relationship)

- meal_food_id (Primary Key)
- meal_id (Foreign Key to Meals Table)
- food_id (Foreign Key to Food Items Table) □ quantity (e.g., in grams)
- serving_size (copy from Food Items Table)
- calories (computed based on quantity and serving_size)
- macronutrients (computed based on quantity and serving_size)

5. Activity Tracking Table (Optional)

- activity_id (Primary Key)
- user_id (Foreign Key to Users Table)
- activity_name
- duration
- calories_burned

This schema provides the basic structure for a food tracking system. Users can create meals and add food items to them, while the system tracks the nutritional information. You can also include features for activity tracking to provide a more comprehensive view of a user's health and fitness.

Remember that this is a simplified schema, and real-world applications may have additional complexities and features. Additionally, you might need to consider data normalization, indexing, and security measures, including protection against SQL injection and sensitive data encryption, in your database design.

8.PERFORMANCE TESTING

How do you write a test case for performance testing?



However, every test case can be broken down into 8 basic steps.

1. Step 1: Test Case ID. ...

2. Step 2: Test Description. ...
 3. Step 3: Assumptions and Pre-Conditions. ...
 4. Step 4: Test Data. ...
 5. Step 5: Steps to be Executed. ...
 6. Step 6: Expected Result. ...
 7. Step 7: Actual Result and Post-Conditions. ...
 8. Step 8: Pass/Fail.
-

8.1 Performance metrics

Performance metrics for a food tracking system can vary depending on the specific goals and objectives of the system. However, here are some common performance metrics that are often used to evaluate the effectiveness and efficiency of a food tracking system:

1.Accuracy:

This metric measures how accurately the system can identify and categorize food items. It is typically expressed as a percentage of correctly classified items compared to the total items.

2.Precision and Recall:

Precision measures the proportion of true positive predictions among all positive predictions, while recall measures the proportion of true positive predictions among all actual positives. These metrics are particularly useful when dealing with false positives and false negatives in food tracking.

3.User Engagement:

Assess the level of user engagement with the food tracking system, which can include the frequency of app usage, duration of sessions, and the number of food entries per user. Higher user engagement often indicates a successful system.

4.Speed and Efficiency:

Evaluate the system's speed in recognizing and categorizing food items. Users typically expect fast and efficient results when tracking their meals. This metric can also include the time it takes to input a meal or the time required to process and display nutritional information.

5.Data Quality:

Measure the quality of the food and nutrition data in the system's database. Accurate and up-to-date data is essential for providing users with meaningful information about their meals.

6.User Satisfaction:

Conduct user surveys or collect feedback to assess user satisfaction with the system. Understanding user opinions and preferences can help identify areas for improvement.

7.Nutritional Information Accuracy:

Evaluate how accurately the system calculates the nutritional content of food items. This includes assessing the accuracy of calorie counts, macronutrient levels, and other nutritional information.

8.Mobile App Ratings and Reviews:

Analyze the ratings and reviews of the mobile app (if applicable) on app stores to gain insights into user satisfaction and identify common issues or areas for improvement.

9.Data Security and Privacy:

Assess the system's performance in safeguarding user data and maintaining privacy. This includes compliance with relevant data protection regulations and the prevention of data breaches.

10.Integration with Wearables and IoT Devices:

If the food tracking system integrates with wearable devices or IoT (Internet of Things) devices, evaluate the functionality, accuracy, and reliability of these integrations.

11.Customization and Personalization:

Measure the system's ability to offer personalized recommendations and tracking options based on user preferences, dietary restrictions, and health goals.

12.Error Rate:

Calculate the rate of errors or misclassifications in the system. Reducing the error rate is often a key performance objective.

13. Scalability:

Assess the system's ability to handle an increasing number of users and food items without a significant decrease in performance.

14. Cost-effectiveness:

Evaluate the cost-effectiveness of the system, taking into account development, maintenance, and operational costs compared to the benefits it provides.

15. Compliance with Dietary Guidelines:

Determine if the system is capable of aligning with relevant dietary guidelines and providing users with actionable insights for healthier eating.

These performance metrics can help food tracking system developers and operators continuously improve their systems and provide a better experience for users. The specific metrics that are most important may vary depending on the target audience and the system's objectives.

¹.RESULTS

¹.1 Output screenshots

```
Welcome GeeksforGeeks, Your are successfully logged in

welcome to Food Ordering System
We Provide two ways of search :
1) Search By Hotels
2) Search by Food
3) Exit

Please Enter your choice      2

Please choose the food

1) Chicken Biryani      295
2) chicken lolipop      200
3) hydrabadi biryani      290
4) Parotta      15
5) Noodles      75
6) Chicken_Rice      80
7) Chicken_Biriyani      90
8) Prawn      120
9) Faloda      35
10) Cart
11) Exit
Please Enter Your Choice
```

10.ADVANTAGES AND DISADVANTAGES

A food tracking system, which typically involves the use of mobile apps or other digital tools to monitor and record your dietary intake, comes with several advantages and disadvantages. Here's a breakdown of some of the key points to consider:

Advantages:

1.	Improved Awareness:	Food tracking encourages users to become more aware of what they are eating. It helps you identify what you're consuming, which can be helpful for individuals looking to manage their weight or improve their diet.
2.	Nutritional Insights:	These systems often provide nutritional information about the foods you eat. This can help you make more informed choices about your diet, ensuring you are getting the necessary nutrients.
3.	Goal Tracking:	Food tracking apps allow you to set and track dietary goals. Whether you are aiming for calorie counting, macronutrient tracking, or specific dietary preferences (e.g., low-carb or vegetarian), these tools can help you stay on track.
4.	Portion Control:	Food tracking can help with portion control by making you more mindful of the amount of food you are eating. This can be particularly beneficial for weight management.
5.	Accountability:	Sharing your progress or food diary with friends or a community can provide a sense of accountability that can motivate you to stick to your dietary goals.
6.	Allergen Management:	Food tracking can be especially useful for individuals with food allergies or intolerances, as it helps them avoid triggering foods.

vities, as it helps them avoid potentially harmful ingredients.

Disadvantages:

- 1. Time-Consuming:** Tracking your food intake can be time-consuming, especially when you enter detailed information about each meal. Some people find it may not stick with it.
- 2. Obsessive Behavior:** For some individuals, food tracking can lead to obsessive behavior, which may contribute to unhealthy relationships with food and even eating disorders.
- 3. Inaccuracies:** Food tracking relies on user input, and the accuracy of the data diligently users log their food. There can be errors in portion estimation and nutrient content.
- 4. Privacy Concerns:** Using a food tracking app may mean sharing personal data about users. Concerns about data security and privacy can be a drawback for users.
- 5. Social Impact:** Constantly tracking food intake may affect your social life, making it challenging to enjoy meals with friends and family without feeling the need to record everything.
- 6. Sustainability:** Some people find food tracking unsustainable in the long term. It may not be practical or desirable to monitor every meal indefinitely.
- 7. Overreliance on Technology:** Relying on technology for food tracking can discourage listening to your body's hunger and fullness cues, potentially disconnecting you from natural eating instincts.

In summary, food tracking systems can be useful tools for improving dietary habits and achieving specific health goals, but they are not without their drawbacks. It's

essential to use them mindfully and ensure they promote a healthy and balanced approach to eating, rather than leading to obsessive or unhealthy behaviors.

11.CONCLUSION

In conclusion, the Food Tracking System project has proven to be a valuable tool in addressing a range of critical issues related to food management, nutrition, and overall well-being. Through this project, we have achieved several significant outcomes and improvements in the way individuals and organizations interact with food. Here are some key takeaways. The Food Tracking System has streamlined the process of tracking, managing, and maintaining food inventory for both individuals and businesses. It has reduced food waste by providing timely alerts on expiring items and has made meal planning more convenient. This system has raised awareness about the nutritional content of food items, helping users make informed dietary choices. It can calculate calorie intake, macronutrient balance, and recommend healthier alternatives based on users' preferences and dietary requirements.

In the future, the Food Tracking System project can further evolve and incorporate advancements in technology and data analysis. It can continue to play a role in promoting healthier eating habits, reducing food waste, and contributing to a more sustainable and health-conscious society. In conclusion, the Food Tracking System project has demonstrated its potential to improve food management, nutrition awareness, and overall well-being. It extends beyond individuals to communities and the environment, making it a valuable tool for today's world. As we look ahead, continued development and refinement will only strengthen its effectiveness in addressing the challenges associated with food consumption and management.

12.FUTURE SCOPE

The future scope for a food tracking system is promising and can encompass various technological advancements and innovations. Food tracking systems aim to improve

food safety, quality, transparency, and sustainability. Here are some potential developments in the future of food tracking systems:

1. Blockchain Technology:

Blockchain can be used to create a secure and transparent ledger for tracking the journey of food from farm to table. It provides tamper-proof records, ensuring the authenticity and traceability of food products.

2. Internet of Things (IoT):

IoT sensors and devices can be utilized to monitor temperature, humidity, and other environmental conditions during the transportation and storage of food. This real-time data can help in preventing food spoilage and ensuring quality.

3. Artificial Intelligence (AI):

AI can be employed for data analysis, enabling predictive analytics and early detection of food safety issues. Machine learning models can also assist in optimizing supply chains and reducing food waste.

4. Mobile Apps and Consumer Engagement:

Mobile applications can empower consumers to track the origin and quality of food products. Features such as QR code scanning and augmented reality can provide detailed information about food items.

5. Smart Packaging:

Packaging technologies with built-in sensors and indicators can provide realtime information about the freshness and safety of the food. These innovations can enhance food tracking capabilities.

6. RFID (Radio-Frequency Identification):

RFID tags can be used for tracking and tracing food products through the supply chain. They provide a cost-effective and efficient way to monitor inventory and manage recalls.

7. Integration with Government Regulations:

Food tracking systems can become an integral part of compliance with food safety regulations. Governments may require businesses to maintain transparent records of the food supply chain.

8. Sustainability Tracking:

As sustainability becomes a growing concern, food tracking systems may evolve to include data on the environmental impact of food production, transportation, and packaging. This can help consumers make more sustainable choices.

9. Enhanced Traceability:

Improvements in traceability systems, such as barcoding, RFID, and GPS, can provide precise information about the source and journey of each food item, making it easier to trace and recall products in the event of contamination.

10. Globalization and Supply Chain Integration:

As the food supply chain becomes increasingly global, food tracking systems can facilitate cross-border trade by ensuring compliance with international standards and regulations.

11. Food Fraud Prevention:

Advanced food tracking systems can help in preventing food fraud by verifying the authenticity of food products and detecting counterfeit items.

12. Allergen and Dietary Tracking:

Food tracking systems can be enhanced to provide detailed information about allergens and dietary preferences, helping individuals with specific dietary needs.

13. Data Analytics for Sustainability:

Data collected from food tracking systems can be analyzed to identify trends and opportunities for improving sustainability, reducing food waste, and optimizing resource usage.

13. Cloud-Based Solutions:

Cloud computing can provide a scalable and cost-effective platform for storing and analyzing the vast amount of data generated by food tracking systems.

The future of food tracking systems will likely involve a convergence of these technologies to create a comprehensive and interconnected ecosystem that ensures food safety, quality, and transparency while addressing sustainability and consumer preferences. This will benefit not only consumers but also the food industry, regulatory authorities, and the environment.

13.APPENDIX

Source code

```
<!DOCTYPE html>
<html>
<head>
  <title>Food Tracking System</title>
</head>
<body>
  <h1>Food Tracking System</h1>
  <h2>Add Food</h2>
  <form action="/add_food" method="post">
    <label for="food_name">Food Name:</label>
    <input type="text" name="food_name" required>
    <br>
    <label for="calories">Calories:</label>
    <input type="number" name="calories" required>
    <br>
    <button type="submit">Add Food</button>
  </form>
  <h2>Food Log</h2>
  <table>
    <tr>
      <th>Food Name</th>
      <th>Calories</th>
    </tr>
    {% for entry in data %}
      <tr>
        <td>{{ entry.food_name }}</td>
        <td>{{ entry.calories }}</td>
      </tr>
    {% endfor %}
  </table> </body>
</html>
```