SW Engineering CSC648-848-05
Summer 2024

FitNutri Hub
Team 03

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MILESTONE 2
Date: 06/11/2024

History Table

Milestone	**Version**	**Date Submitted**
Milestone 3	V1	7/24/2024

Table of Contents

1.

2. Data Definitions

1. User: Describes the group of individuals that will utilize the application. Users are categorized into two ways: registered and unregistered.

1.1 Registered User: A user who created an account and has all of the application's capabilities accessible to them.
1.1.1. Name: The full name of the user creating a user account.
1.1.2. User ID: A unique identifier for each user.
1.1.3. Username: The chosen display name of the user.
1.1.4. Email: The user's email address for communication and account recovery.
1.1.5. Password: A hashed string used for user authentication.
1.1.6. Date of Birth: The user's date of birth.
1.1.7. Gender: The user's gender for health metrics and recommendations.
1.1.8. Height: The user's height to calculate BMI.
1.1.9. Weight: The user's weight to calculate BMI.
1.2.**Unregistered User:** A user with restricted access to the application's functionality who still needs to make an account.

2. Activity Data: A user who created an account and has all of the application's capabilities accessible to them.
2.1. Activity ID: A unique identifier for each recorded activity.
2.2. Activity date: The Time and date when the activity took place
2.3. Activity type: The type of physical activity.
2.4. Activity duration: How long the user was doing the activity for.
2.5. Activity distance: The distance covered during the activity.
2.6. Calories burned: Estimated number of calories burned during the activity.
2.7. Heart rate: The user's average heart rate during the activity.

3. Nutrition Data: The distribution of nutrient intake in each meal(like high protein and low carb to meet the user's dietary goals.
3.1. Meal ID: A unique identifier for each meal entry.
3.2. Meal type: The type of meal (breakfast, lunch, dinner, snack).
3.3. Food item: The name of the food item consumed.
3.4. Calories consumed: The number of calories in the food item.
3.5. Macronutrients: The amount of carbohydrates, proteins, and fats in the food item.
3.6. Micronutrients: List of Vitamins (A, B, C, D, E, and K) and Minerals (Ca, Mg, Zn, Fe) plus fiber content.

4. Recipe Data: Guidelines and dietary data for the user's meal preparation to prepare the meal for the week.
4.1. Recipe ID: A unique identifier for each recipe.
4.2. Recipe name: The name of the recipe.
4.3. Description: A description of the recipe.
4.4. Category: The recipe category (dessert, appetizer, main course).

4.5. Preparation time: The time required to prepare the ingredients.
4.6. Cooking time: The time required to cook the dish.
4.7. Total time: The total time required to prepare and cook the recipe.
4.8. Servings: The number of servings the recipe yields.
4.9. Ingredients: the name of the ingredients.
4.10. Nutrition information: nutritional information (calories, carbohydrates, proteins, fats, fiber, sodium).

5. Health Metrics: The health condition of the user to indicate their health and vitality to organize healthy meal plans and exercise.
5.1. Health Goal: Defined health goal for the user (Health, Fitness, Performance, etc. goal).
5.2. Healthline: User health condition or treatments, if any restrictions.
5.3. BMI: Simplistic measurement of a healthy range of weight related to height.
5.4. RHR: The resting heart rate of the user.
5.5. A1C Reading: Measure of the average level of blood sugar over a given time.
5.6. Dietary Restrictions: List of foods that must be left out of a person's diet.
5.7. Diet Plans: Categories and quantities of food that a person eats for a health outcome.
5.7.1. Diabetes Management: Specific diet to manage diabetes.
5.7.2. Ketogenic: A diet high in fats influences metabolism.
5.7.3. Vegan: Diet consisting of no animal products.
5.7.4. Vegetarian: Diet consisting mainly of plant sources.
5.7.5. Paleo: Diet focussing on whole foods with high protein, low carbohydrates.

6. Health Recommendations: Personalized recommendations for the user according to their health condition.
6.1. Nutrition recommendation: A list of nutrients that will help the user achieve their set goal.
6.2. Meal recommendation: A list of meals or recipes that contain recommended nutrition.
6.2.1. Daily Recommendation: Recommendation for that day.
6.2.2. Weekly Recommendation: Recommendation for that week.
6.2.3. Monthly: Recommendation for that Month.
6.3. Workout recommendation: A prepared workout that will help the user achieve their goal.

7. Tracking/Logging/Analytics: A log of the user's physical activities to track the user's calorie intake and workout regimens.
7.1. Weight: The weight that the user registered on that day.
7.2. Daily Calories: The number of calories the user consumed that day.
7.2.1. Daily Protein: The amount of protein consumed that day.
7.2.2. Daily Carbohydrate: The amount of carbohydrates consumed that day.
7.2.3. Daily Fat: The amount of fat consumed that day.
7.3. Exercise time: The amount of time the user exercised that day.
7.4. Stress level: A 1-10 rating of the level of stress the user experienced that day.

3. Functional Requirements

Priority 1 (Critical)

1. **User Account Management**
   1.1 A user shall securely sign up.
   1.2 A user shall securely sign in.
   1.3 A user should be able to create their profile (age, weight, height, fitness goals).
   1.4 A user should be able to do password recovery/reset.
   1.5 A user should be able to update their account.
   1.6 A user should be able to delete their account.
   1.7 Each user shall have exactly one account.
   1.8 A user shall log into their account using secure authentication.
   1.9 A user shall fill out one health information form.
   1.10 A user shall be able to choose many types of nutrition
   1.11 A user shall be able to choose many types of workouts
   1.12 Users shall write many dietary restrictions
   1.13 A user shall generate one personal nutrition plan
   1.14 A user shall generate one personal workout plan
   1.15 A user shall view many recipes
   1.16 A user shall view many exercises
   1.17 Users shall search for recipes and workouts using keywords.
   1.18 Users shall be able to share, edit and print fitness and nutrition progress many times.
2. **Account**
   2.1An account shall belong to one user at most.
   2.1An account shall be associated with one email at most.
3. **Tracking**
   3.1. A user shall be able to track their calories burned throughout their day.
   3.2. A user shall be able to track their total steps throughout their day.
4. **Health information**
   4.1A health information shall be filled by one user
   4.2 A health information shall contain many Types of Nutrition
   4.3 A health information shall contain many Types of workout
   4.3A health information shall contain one article based on a personal nutrition plan.
   4.3 health information shall contain one article based on a personal fitness
   4.4 Health information shall include user goals related to weight, fitness level, and dietary preferences
5. **Types of Nutrition**
   5.1 A type of Nutrition shall be chosen by many users
   5.2 A type of Nutrition shall contain one article
6. **Types of Workout**
   6.1 A type of workout shall be chosen by many users
   6.2 A type of workout shall contain one article

7. **Exercises**
   7.1 An exercise shall include instructional videos and images
   7.2 An exercise shall provide estimated calories burned
   7.3 An exercise shall be viewed by many users
8. **Recipe**
   8.1 A recipe shall consist of many dishes
   8.2 A recipe shall be categorized by diet type (ex., keto, vegan)
   8.3 A recipe shall be viewed by many users
   8.4 A recipe shall include instructional videos and images
9. **Personal nutrition plan**
   9.1 A personal nutrition plan shall be generated by many users
   9.2 A personal nutrition plan shall be shared by many users
10. **Personal fitness plan**
    10.1 A personal workout plan shall be generated by many users
    10.2 A personal workout plan shall be shared by many users
11. **Dietary Restrictions**
    11.1 A Dietary Restrictions shall be written by many users
12. **Assess**
    12.1 An assess shall be generated by many users
13. **Form**
    13.1 A form shall be submitted by one users
    13.2 A form shall be categorized by topic (ex., nutrition, workouts, achievements)
    13.3 A form shall allow users to request support or submit feedback directly to the service team
14. **Post**
    14.1 shall be liked by many users
    14.2 Posts can be categorized by topic (Ex, nutrition, workouts, achievements)
15. **Article**
    15.1 An article shall contain one type of nutrition
    15.2 An article shall contain one type of workout
16. **Nutrition progress**
    16.1 Nutrition progress shall be editable by one user
    16.2 Nutrition progress shall display food intake(ex., breakfast, lunch ,dinner), micros and vitamins to one user
17. **Fitness progress**
    Fitness progress shall be editable by one user
    Fitness progress shall display activity(ex. number of workout, minutes and days of strike), weight, lb and achievements to one user

<u>Priority 2 (Important)</u>

1. **User Account Management**
   1.1 A user shall be able to upload and manage profile pictures.
   1.2 Users should be able to establish and monitor fitness goals with the app.
   1.3 A user shall be able to go back and edit posts.
   1.4 A user shall be able to go back and delete posts.

1.5 A app shall provide moderation tools to manage community interactions and ensure a positive and supportive environment.

1.6 Users shall submit many forms and attach files to these forms.

2. **Health information**
   2.1 Health information shall include a history of user health data over time.
3. **Recipe**
   3.1 A recipe shall allow users to comment and rate its effectiveness and taste
4. **Form**
   4.1 A form shall contain many files sent by the users
5. **Posts**
   5.1 A post shall allow users to engage through comments and replies

6. **Social Features**
   6.1 Users shall be able to like, comment and share other user's posts.
   6.2 A user shall be able to create posts.
   6.3 Users should receive notifications when other users like their posts.
   6.4 Users should receive notifications when other users comment on their posts.
   6.5 A user shall be able to share many personal workout plans/nutrition plans on social media
7. **Tracking**
   7.1 A user should be able to log their meals and snacks throughout their day.
8. **Analytics**
   8.1 The app shall provide information about the user's health.
   8.2 The app shall provide messages in intervals to check up on the user.
   8.3 A user shall be able to view statistics about their health & workout.
9. **Meal Planning**
   9.1 The application should produce meal plans.
   9.2 Users should be able to personalize their meal plans using the app.
   9.3 All meal nutritional information should be provided by the app.
10. **Workout Planning**
    10.1 A user shall be able to create personalized workout plans based on their fitness goals.
    10.2 The app shall suggest pre-designed workout routines categorized by fitness level (beginner, intermediate, advanced) and specific goals (weight loss, muscle gain, endurance).
    10.3 Customers shall be able to schedule workouts.
    10.4 Customers shall be able to set reminders in the app.
    10.5 Customers shall be able to track completed exercises.
11. **Monitoring Fitness and Health**
    11.1 The app must work with other fitness tracker apps and devices.
    11.2 The customers' physical activity must be tracked by the app.
    11.3 The customers' physical activity must be linked to their dietary intake.
    11.4 Customers should be able to establish and monitor fitness goals with the app.
    11.5 customers should be able to check their overall health and nutritional status on a dashboard provided by the app.
    11.6 Physical activity manual entry should be supported by the app.

11.7 Customers ought to be able to record their physical dimensions and weight on the app.

12. Notification

12.1 Users shall like and receive notifications for many posts.

12.2 Users shall customize their notification settings.

12.3 Notifications shall be received by many users for likes and comments on their posts

Priority 3 (Opportunistic)

1. Tracking

1.1 The app shall provide feedback on the user's nutritional intake (calories, macronutrients carbohydrates, proteins, fats, vitamins, and minerals).

1.2 Users shall track forms from other users.

1.3 Users shall view forms from other users.

2. Analytics

2.1. The app will provide an option for feedback so that the developers would be able to update the program.

3. Meal Planning

3.1. The app shall offer customized meal recommendations based on the users' tastes and dietary constraints.

3.2. Cooking directions and recipe recommendations should be included in the app.

3.3. The app shall allow customers to track their meals and read barcodes on packaged goods.

3.4. The app should provide users with recipes.

3.5. All recipes shall list the nutritional values per serving.

4. Workout Planning

4.1. A user shall have the option to follow live-streaming workout sessions led by fitness instructors.

5. Monitoring Fitness and Health

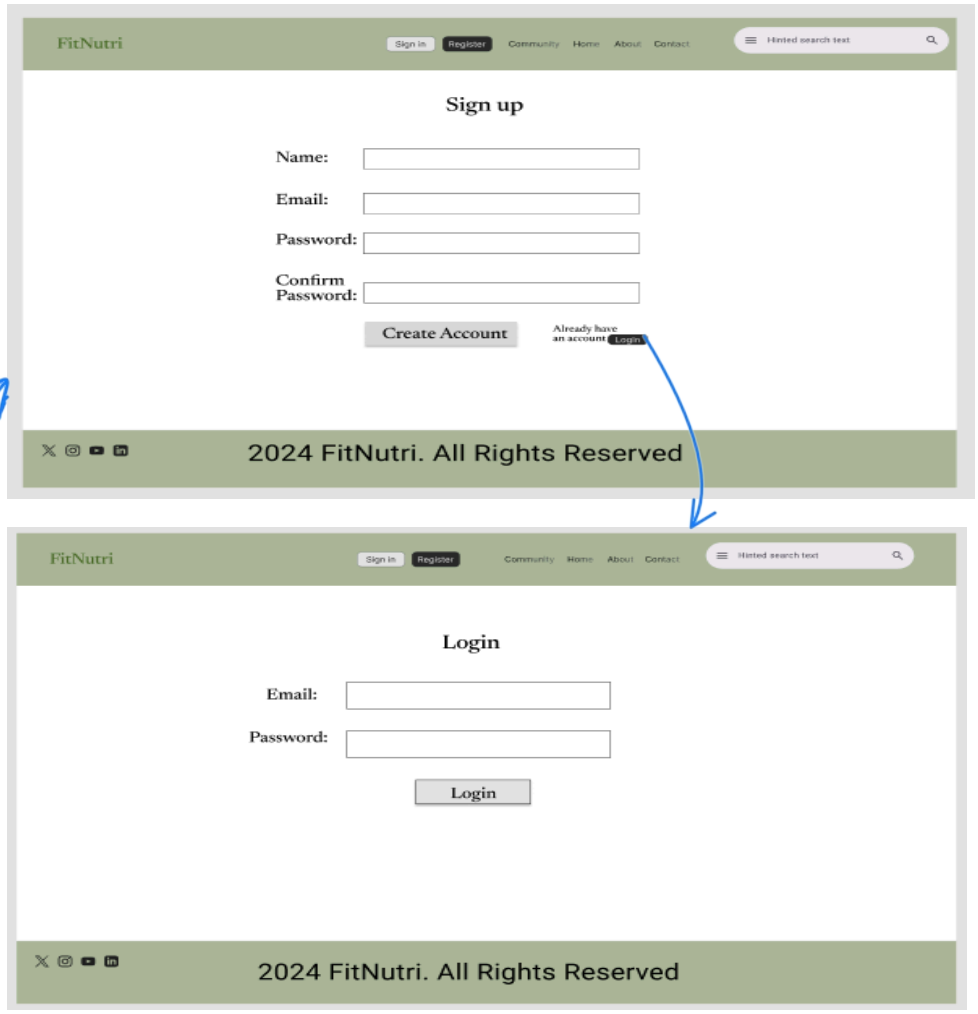
5.1. Taking into account the customers' activity levels, the app ought to offer insights and suggestions.

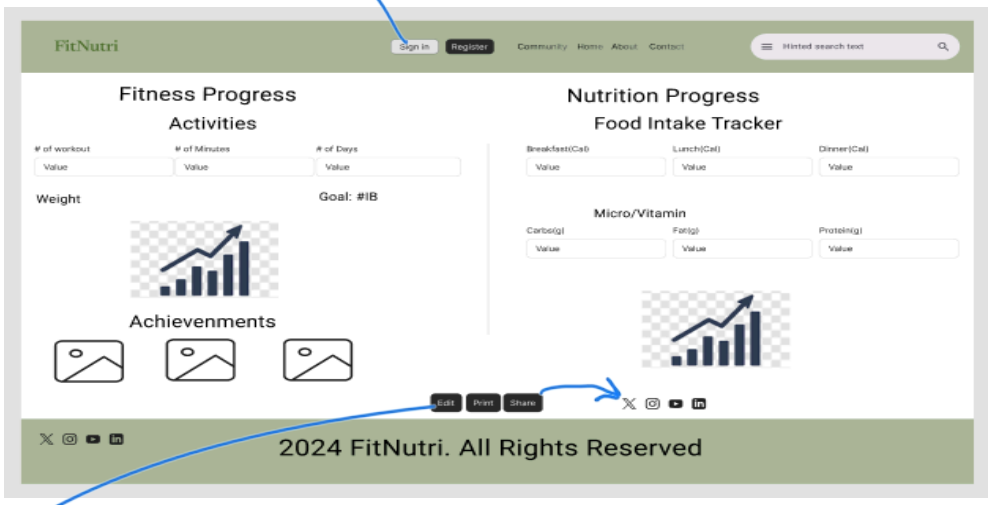
5.2. The software ought to alert customers to their accomplishments and activity benchmarks.

5.3. The app needs to provide pointers and guidance on keeping an active lifestyle and a balanced diet.

4. Wireframes Based on Mockups/Storyboards

You can find our **FULL** mockups here: [FitNutri's Figma]

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Food Intake Tracker
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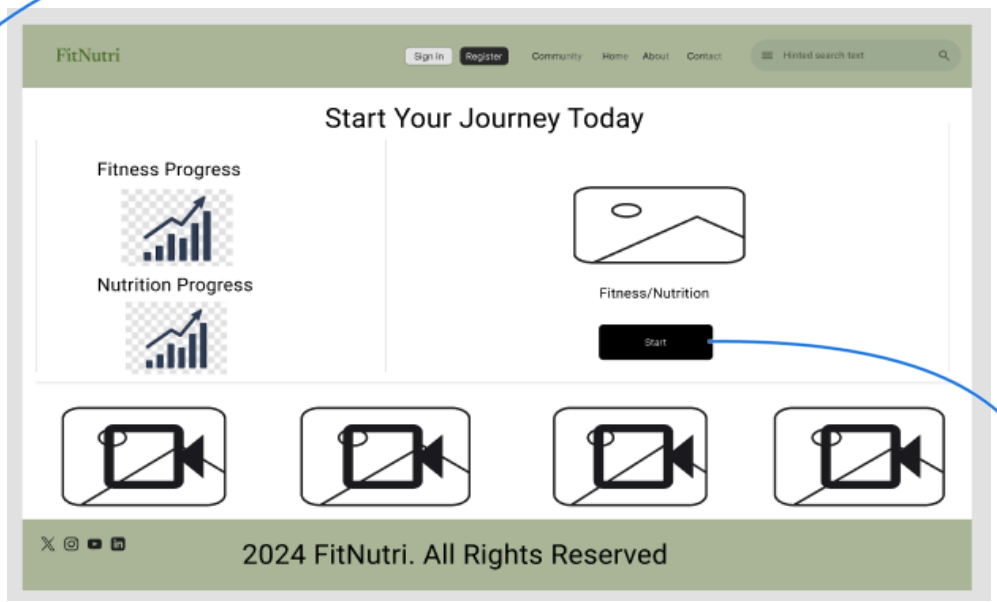
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Start Your Journey Today
Fitness Progress
Nutrition Progress
Fitness/Nutrition
Start
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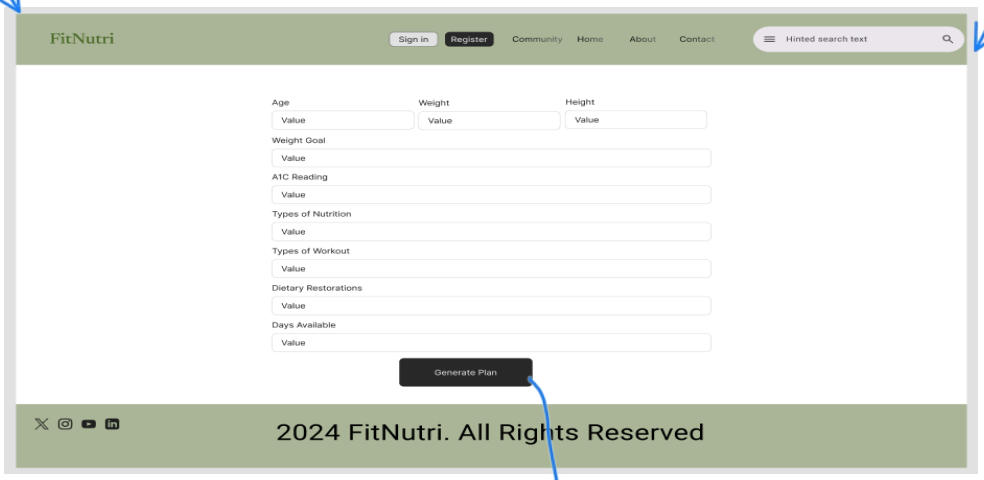
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Weight Goal
A1C Reading
Types of Nutrition
Types of Workout
Dietary Restorations
Days Available
Generate Plan
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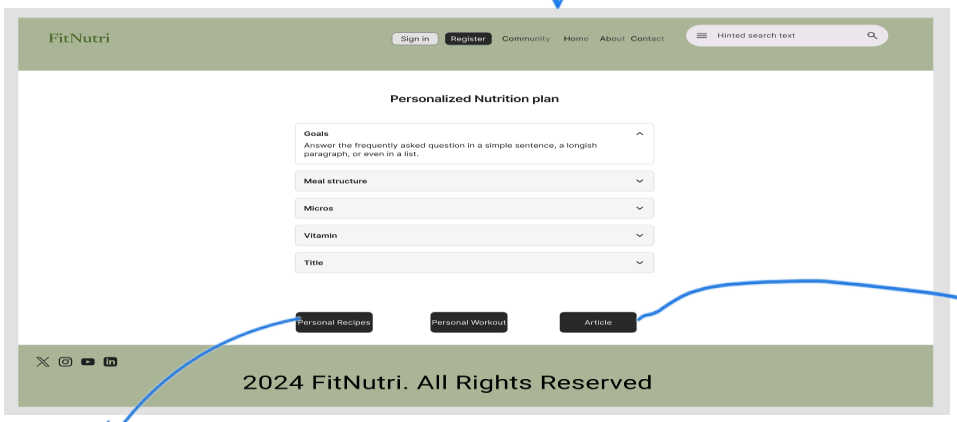
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Personalized Nutrition plan
Goals
Answer the frequently asked question in a simple sentence, a longish paragraph, or even in a list.
Meal structure
Micros
Vitamin
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Personal Recipes
Personal Workout
Article
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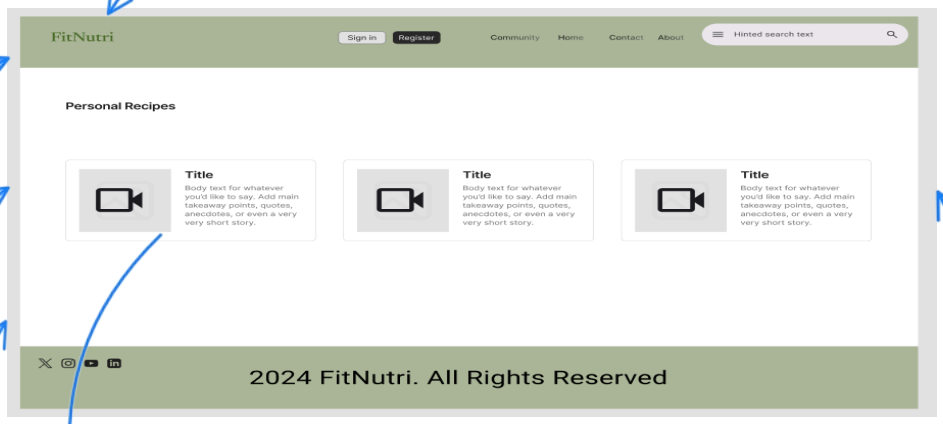
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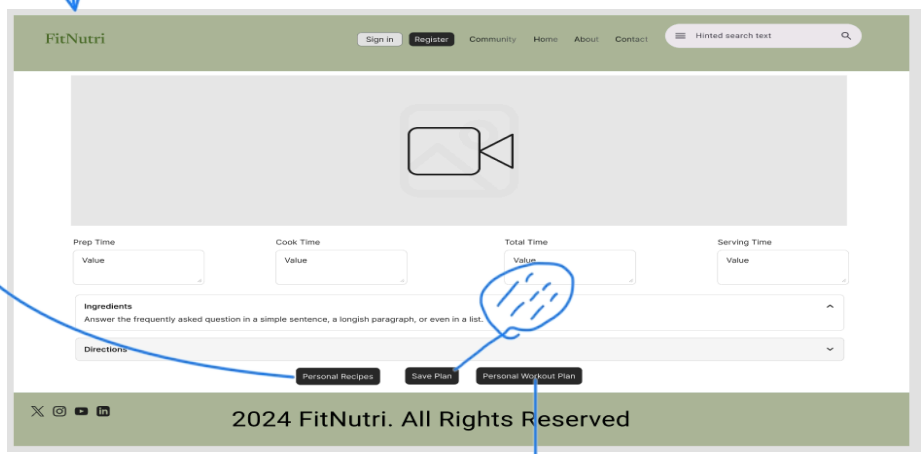
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Personal Workout Plan
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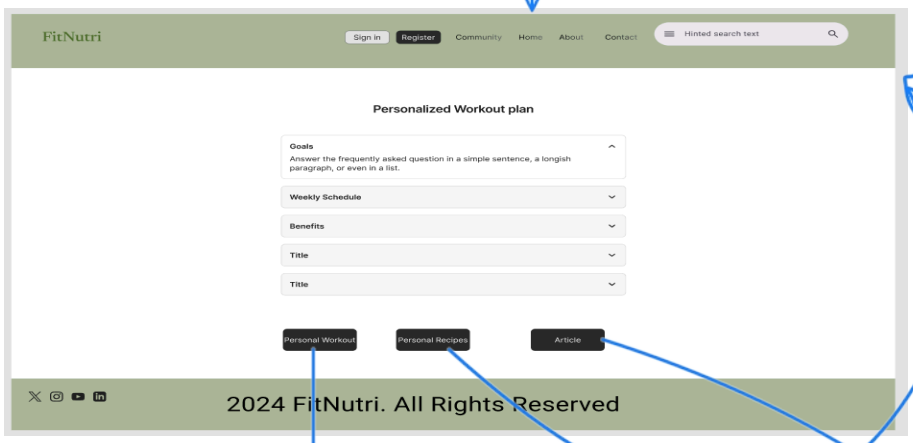
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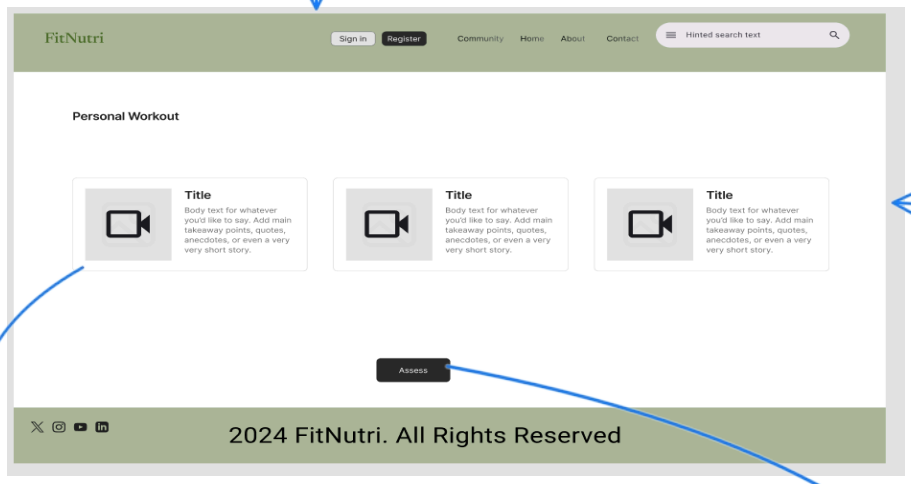
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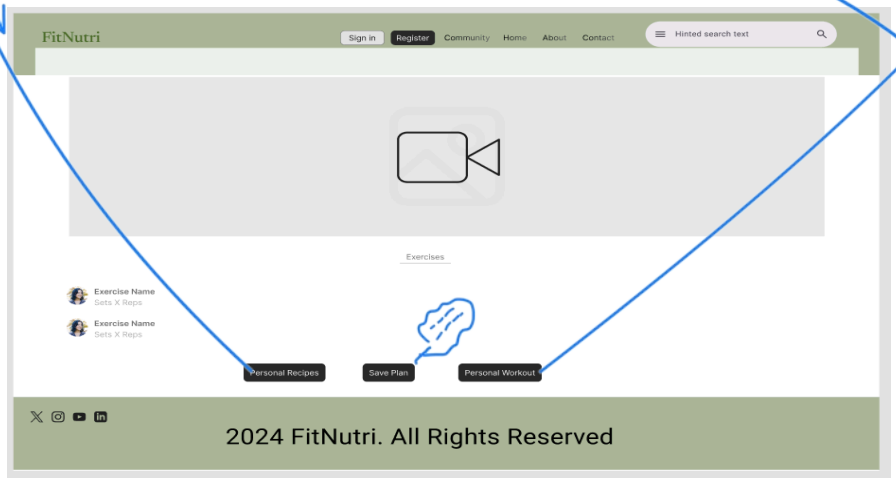
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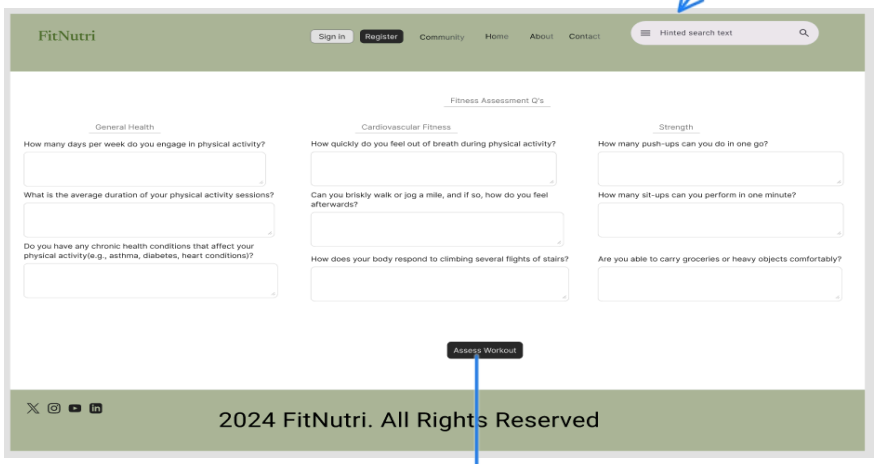
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Fitness Assessment Q's
General Health
How many days per week do you engage in physical activity?
What is the average duration of your physical activity sessions?
Do you have any chronic health conditions that affect your physical activity(e.g., asthma, diabetes, heart conditions)?
Cardiovascular Fitness
How quickly do you feel out of breath during physical activity?
Can you briskly walk or jog a mile, and if so, how do you feel afterwards?
How does your body respond to climbing several flights of stairs?
Strength
How many push-ups can you do in one go?
How many sit-ups can you perform in one minute?
Are you able to carry groceries or heavy objects comfortably?
Assess Workout
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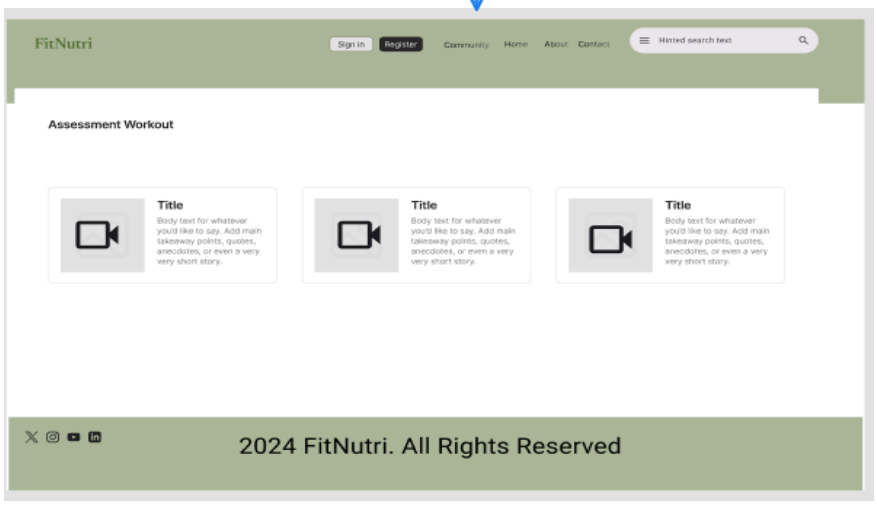
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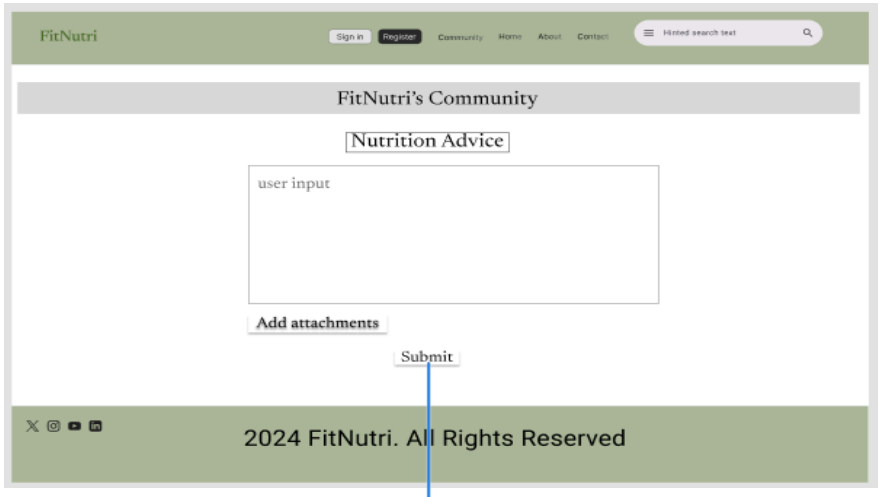
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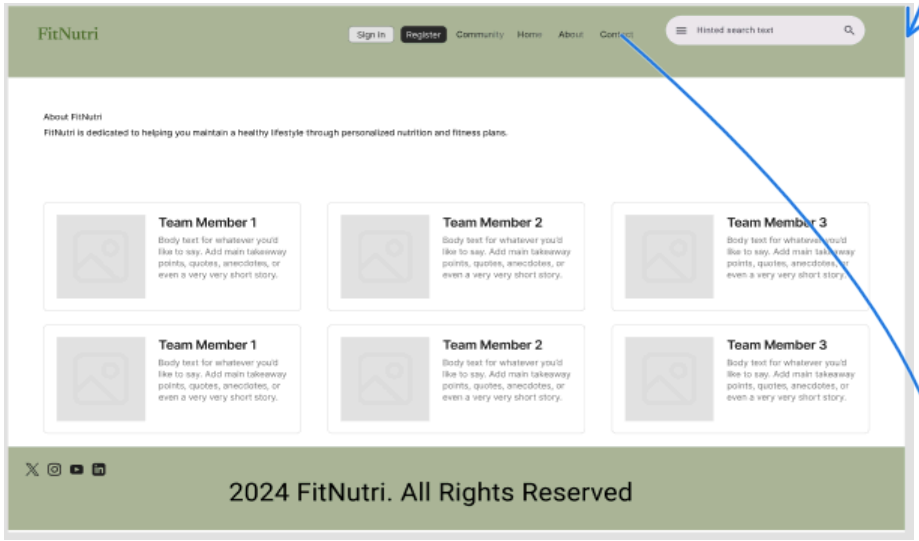
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About FitNutri
FitNutri is dedicated to helping you maintain a healthy lifestyle through personalized nutrition and fitness plans.
Team Member 1
Team Member 2
Team Member 3
Team Member 1
Team Member 2
Team Member 3
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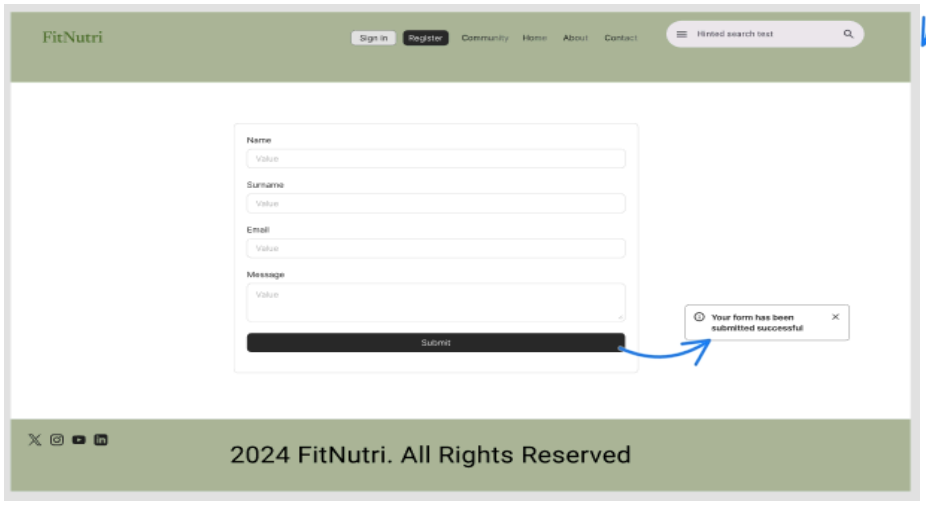
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5. High-Level DB Architecture & Organization

1. **User (Strong)**
   Attributes/types
   UserID (PK): numerical
   Username: alphanumerical
   Email: textual (format: email)
   Password: textual
   DateOfBirth: date
   Gender: categorical (e.g., male, female)
   AccountID (FK): numerical

   Relationships
   1.1 Each user shall have exactly one account
   1.2 A user shall log into their account using secure authentication.
   1.3 A user shall fill out one health information form.
   1.4 A user shall be able to choose many types of nutrition
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2. **Account (Strong)**
   Attributes/types
   AccountID (PK): numerical
   UserID (FK): numerical
   Email: textual (format: email)
   Password: textual
   RecoveryEmail: textual (format: email)
   RecoveryPhone: numerical

ProfileUpdateTime: datetime

Relationships

2.1 An account shall belong to one user at most

2.2 An account shall be associated with one email at most

3. **Health Information(weak)**

Attributes/types

HealthInfoID (PK): numerical

UserID (FK): numerical

CurrentWeight: numerical (unit: kg or lbs)

GoalWeight:numerical(unit:kgorlbs)

FitnessLevel:categorical(e.g.,beginner,intermediate,advanced)

DietaryPreferences: textual

NutritionTypeID (FK): numerical

WorkoutTypeID (FK): numerical

Relationships

3.1 A health information shall be filled by one user

3.2 A health information shall contain many Types of Nutrition

3.3 A health information shall contain many Types of workout

3.4 A health information shall contain one article based on a personal nutrition plan.

3.5 Health information shall contain one article based on a personal fitness plan.

3.6 Health information shall include a history of user health data over time.

3.7 Health information shall include user goals related to weight, fitness level, and dietary preferences.

4. **Types of Nutrition(weak)**

Attributes/types

NutritionTypeID(PK):numerical

Description:textual

RecommendedCalories: numerical (unit: calories)

Relationships

4.1 A type of Nutrition shall be chosen by many users

4.2 A type of Nutrition shall contain one article

5. **Types of Workout(weak)**

Attributes/types

WorkoutTypeID(PK):numerical

Description:textual
ExpectedCalorieBurn: numerical (unit: calories)

Relationships
5.1 A type of workout shall be chosen by many users
5.2 A type of workout shall contain one article

6. **Exercises(Weak)**
   Attributes/types
   WorkoutID (PK): numerical
   WorkoutName: textual
   Duration: numerical (unit: minutes)
   IntensityLevel: categorical (e.g., low, medium, high)
   CaloriesBurnedEstimate: numerical (unit: calories)
   WorkoutTypeID (FK): numerical

   Relationships
   6.1 An exercise shall include instructional videos and images
   6.2 An exercise shall provide estimated calories burned
   6.3 An exercise shall be viewed by many users

7. **Recipe(Weak)**
   Attributes/types
   RecipeID(PK):numerical
   DietType: categorical (e.g., vegan, keto)
   PreparationTime: numerical (unit: minutes)
   CookingTime: numerical (unit: minutes)
   IngredientList: textual
   UserRatingAverage: numerical (scale 1-5)
   NutritionTypeID (FK): numerical

   Relationships
   7.1 A recipe shall consist of many dishes
   7.2 A recipe shall be categorized by diet type (ex., keto, vegan)
   7.3 A recipe shall allow users to comment and rate its effectiveness and taste
   7.4 A recipe shall be viewed by many users
   7.5 A recipe shall include instructional videos and images

8. **Personal nutrition plan(weak)**
   Attributes/types

NutritionPlanID (PK): numerical
UserID (FK): numerical
PlanDetails: textual

Relationships
8.1 A personal nutrition plan shall be generated by many users
8.1 A personal nutrition plan shall be shared by many users

9. **Personal fitness plan(weak)**
   Attributes/types
   FitnessPlanID (PK): numerical
   UserID (FK): numerical
   WorkoutDetails: textual

   Relationships
   9.1 A personal workout plan shall be generated by many users
   9.1 A personal workout plan shall be shared by many users and social media

10. **Dietary Restrictions(weak)**
    Attributes/types
    RestrictionID (PK): numerical
    UserID (FK): numerical
    RestrictionType: categorical (e.g., dietary, physical)
    Description: textual

    Relationships
    10.l A Dietary Restrictions shall be written by many users

11. **Assess(weak)**
    Attributes/types
    AssessID (PK): numerical
    UserID (FK): numerical
    DateAssessed: date
    AssessDetails: textual

    Relationships
    11.1 An assess shall be generated by many users

12. **Form(weak)**
    Attributes/types

FormID (PK): numerical
UserID (FK): numerical
SubmissionDate: date
FormType: categorical (e.g., feedback, survey)
Attached: textual (format: file type)

Relationships

12.1 A form shall be submitted by one users
12.2A form shall contain many files sent by the users
12.3 A form shall be categorized by topic (ex., nutrition, workouts, achievements)
12.4 A form shall allow users to request support or submit feedback directly to the service team

13. Posts(strong)

Attributes/types

PostID (PK): numerical
UserID (FK): numerical
PostDate: date Content: textual
Category: categorical (e.g., nutrition, workouts, achievements)
LikeCount: numerical

Relationships

13.1 A post shall be liked by many users
13.2 A post shall allow users to engage through comments and replies
13.3 Posts can be categorized by topic (Ex, nutrition, workouts, achievements)

14. Notifications(strong)

Attributes/types

NotificationID (PK): numerical
UserID (FK): numerical
NotificationType: categorical (e.g., reminder, alert)
NotificationDate: datetime NotificationContent: textual

Relationships

14.1 Notifications shall be received by many users for likes and comments on their posts

15. Article(weak)

Attributes/types

ArticleID (PK): numerical

RelatedToNutritionTypeID: numerical
RelatedToWorkoutTypeID (FK): numerical
Content: textual

Relationships

15.1 An article shall contain one type of nutrition
15.2 An article shall contain one type of workout

16. Nutrition progress

Attributes/types

ProgressID (PK): numerical
UserID (FK): numerical
Date: date
FoodIntakeDetails: textual
MicronutrientsDetails: textual

Relationships

16.1 Nutrition progress shall be editable by one user

16.2 Nutrition progress shall display food intake(ex., breakfast)microsand vitamins to one user

17. Fitness progress

Attributes/types

ProgressID (PK): numerical
UserID (FK): numerical Date: date
ActivitiesDetails: textual
Weight: numerical (unit: kg or lbs)
Achievements: textual

Relationships

17.1 Fitness progress shall be editable by one user

18.2 Fitness progress shall display activity weight, lb and achievements to one user

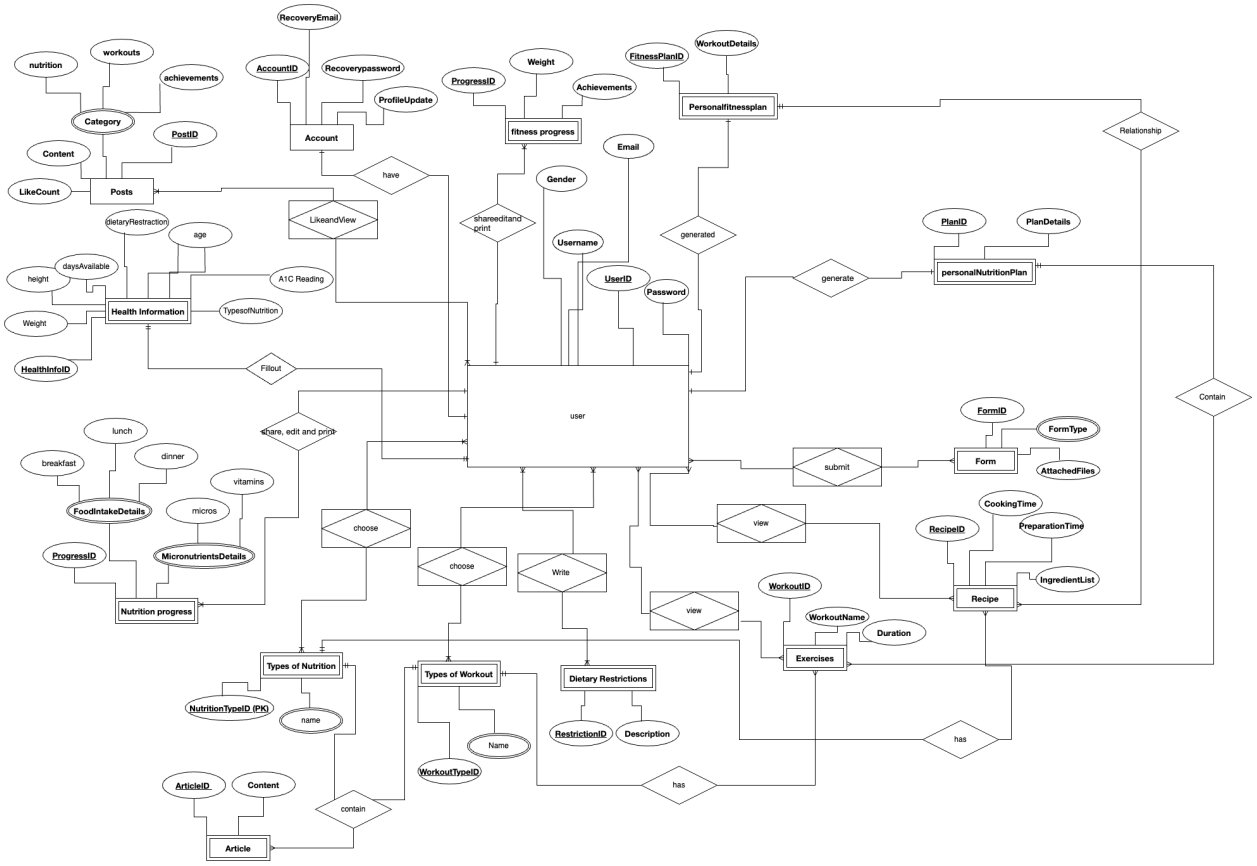
Define the DBMS

We decided to use MYSQL as the database management system for the project due to its simplicity and ease of use. Integration of anything needed is a breeze and very smooth. Frameworks and programming languages are essentially global with MYSQL which makes using it very easy

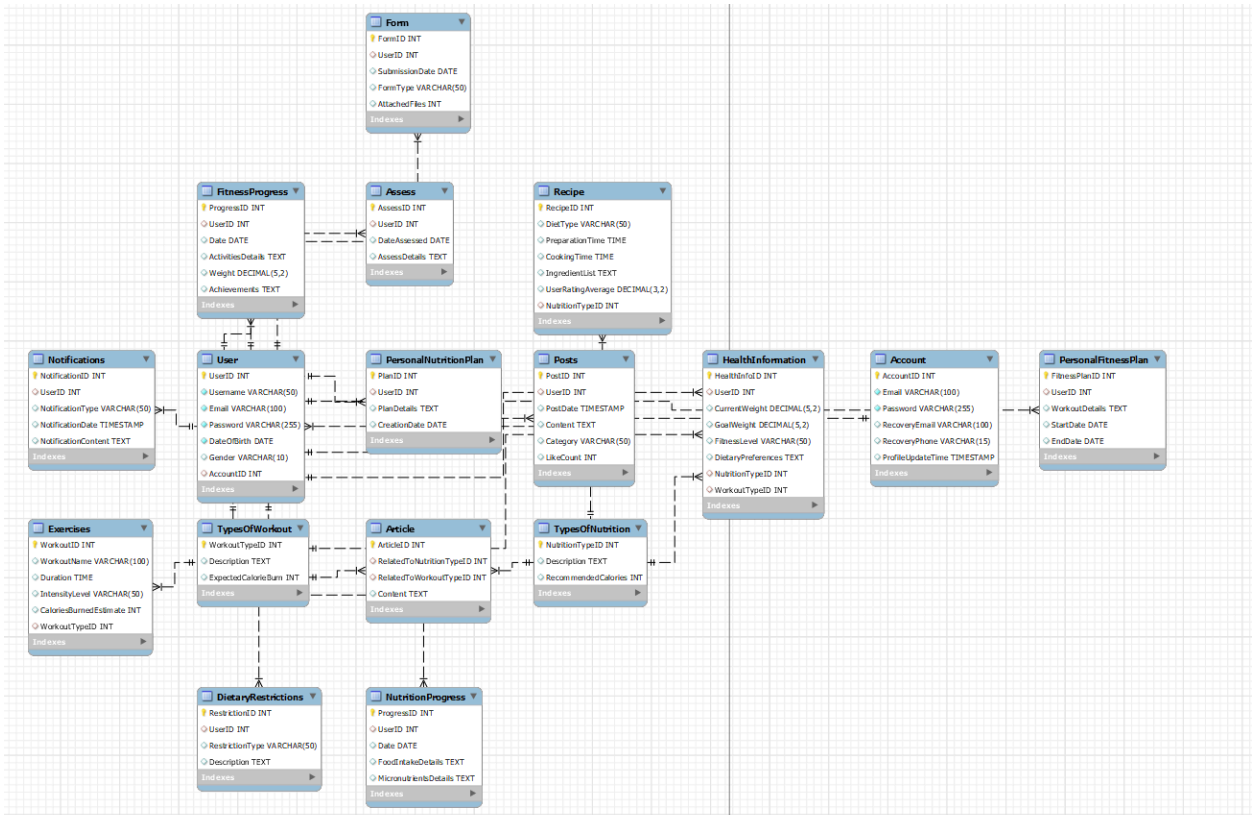
Media Storage

To store media files such as images, videos, recipes, etc, we plan on using MySQL database. And to store the files, we plan on using BLOBS, MediumBLOBS, or LargeBLOBS depending on the file size of the media. We will have to choose carefully what type of media we will allow because media files can be quite big and can really slow down the database if we're not careful with the size.

An Entity Relationship Diagram (ERD)

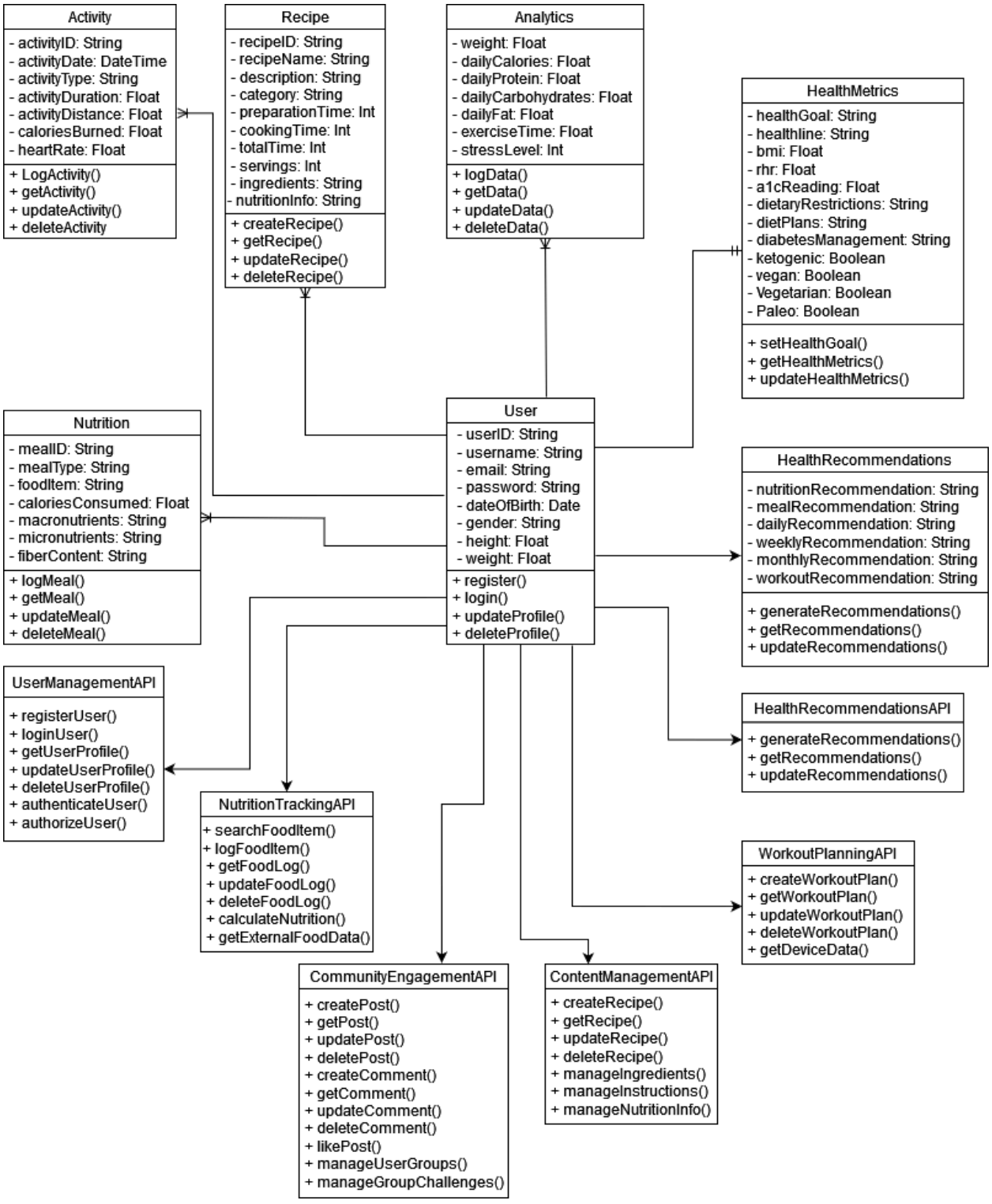


An Entity Establishment Relationship Diagram (EER)

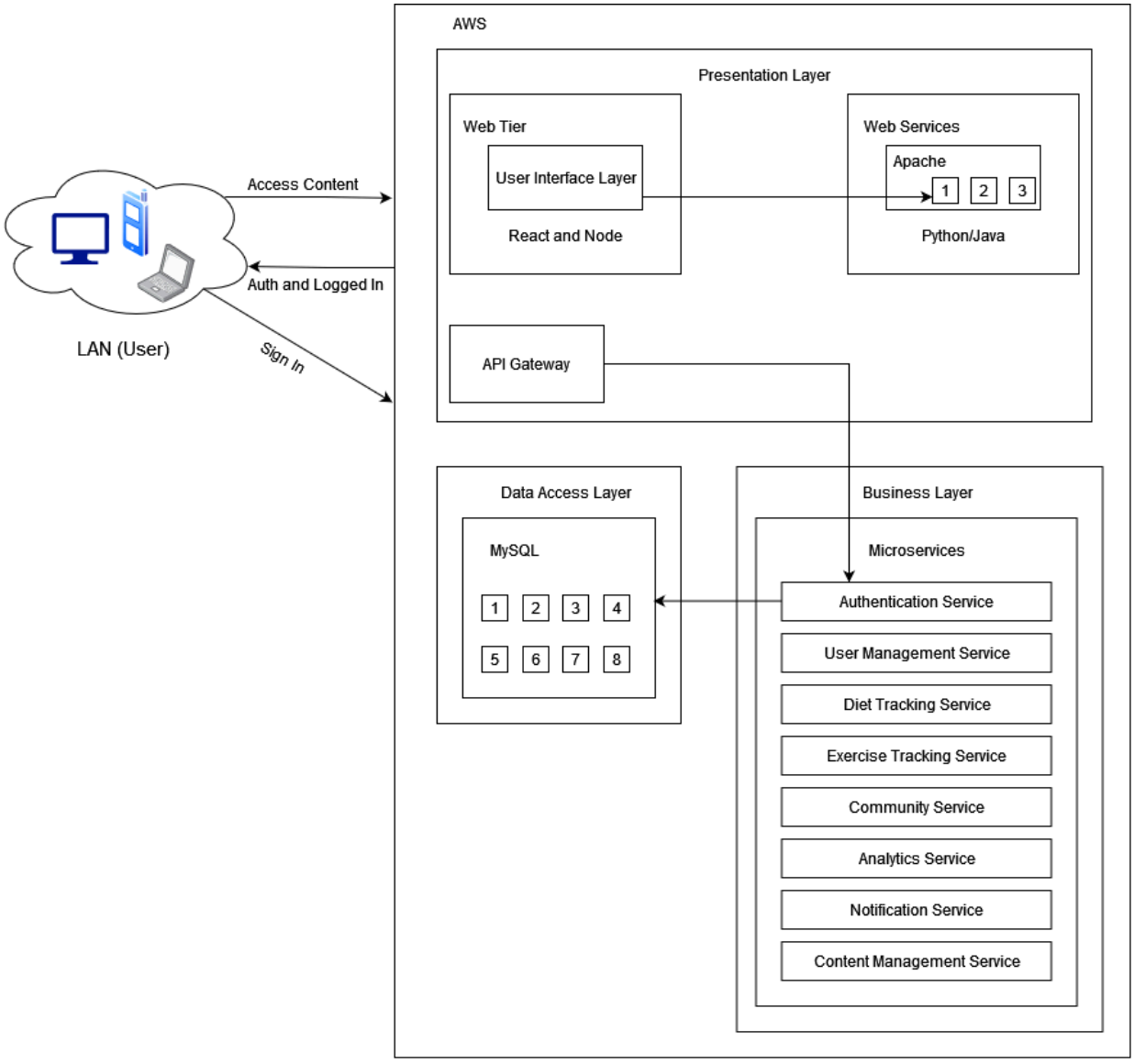


4. High-Level Diagrams

UML Class Diagram



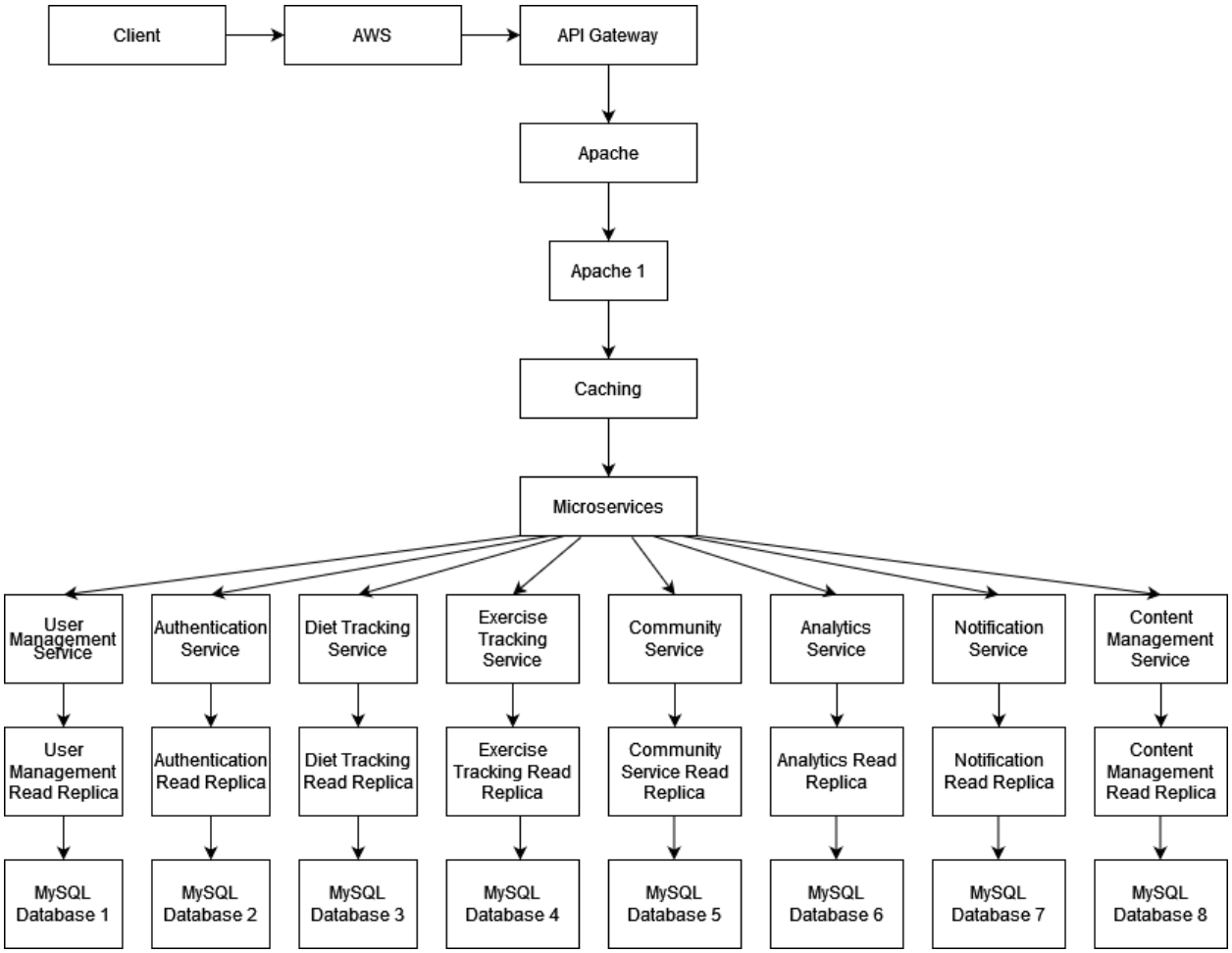
App Network and Deployment Design



Summary of Components:

The FitNutri site will make use of several microservices which include user management, authentication, diet, and exercise. Breaking down the services in this way will allow for easier maintenance and scaling. Load balancing will be handled using multiple servers and microservices so that servers will be able to distribute traffic as needed. Caching will be used to prevent prevalent requests from always needing server response. By caching user information and other important features, the load on servers will be reduced further. Database replication

will be used to increase reliability by allowing data to still be available even if the original server disconnects. Authentication will be handled using an API Gateway making it so that data is encrypted while it is transmitted



Summary of Design Patterns:

Of the various UML design patterns, three were specifically utilized because of their importance in reliability and consistency. First is the usage of the singleton pattern. This was important for making sure that there would not be multiple instances needed to perform their actions which reduces the overall resources required. Second is the factory pattern which allows for subclasses to create objects on their own. This is important for allowing the subclasses to make new objects as needed without having to rely on changing code. Third is the observer pattern which makes it

so that all states of an object stay updated. This allows the objects to always be in sync so there is more consistency when relaying data

10. Detailed List of Contributions

NO.	Member	Contribution	Rating
1	Michelle Nguyen (Team Lead)	● Set up documents, organized Notion for task management for M3V1. ● Grammar checked and cleaned document ● Reviewed all tasks of everyone every week ● Plan the meeting and next tasks in general to Discord. ● Set up Figma and worked on the wireframes for all pages by using Figma. ● Completed the detailed list of contributions section on the document. ● Pushed finish touches to application prototype.	
2	Mitchell Caine	● Worked together as a team for the functional requirements. ● Worked on the frontend prototype. ● Lead discussions on a final meeting about finishing touches to frontend organization.	10
3	Shreejana Bartaula	● Worked together with Nilo and John on the data definition. ● Lead and scribe the team discussion on the data definitions. ● Worked together as a team for the functional requirements. ● Joined every single meeting and gave excellent insights and collaboration. ● Worked on the front end of the prototype. ● Organized and gave insight into the priority functional requirements. ● Strong communication with others.	10
4	Eduardo Enrique Muñoz Alvarez	● Fixed the database architecture. ● Worked on instance issues from the M2 prototype. ● Took main responsibility for the instance and deployment app. ● Strong communication with others. ● Organized the database content and M3 documentation.	10
5	Nilofar Ali	● Worked together as a team for the functional requirements. ● Worked together with Shreejana and John on the data definition. ● Strong communication with others.	10

		• Helped on Figma wireframes. • Implemented frontend for Milestone 3 prototype with Ali, Mitchell and Shreejana.	
6	Uzair Hamed Mohammed	• Collaborated and helped work on instance issues from the M2 prototype. • Strong communication with others. • Implemented and improved the backend for the prototype.	10
7	John Collins	• Worked on the data definitions with Shreejana and Nilofar • Implemented models for the backend based on the data definitions and entities	10
8	Ali Hadwan	• Worked together as a team for the functional requirements. • Added finish touches to priority function; requirements. • Worked on the Figma design in collaboration with Nilo. • Implemented frontend for Milestone 3 prototype. • Strong communication with others.	10
9	Ali A	N/A	0