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Personalized Diet Planner

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Introduction

The Nutrition Database is a great resource for quickly determining the nutritional facts about the food you are eating and helping design a meal plan that fits your lifestyle. We wanted to create a database to help the people who wanted to keep track of the food they eat and also create a balanced diet around the food they enjoy. We are contributing a place for anyone to enhance their access and use of nutritional information. Most projects in this category fail to create a place that allows people to not only create a meal plan but also browse different meals to quickly get their nutritional facts and add them to their meal plan, this is the gap our project fills. This project will help people create a healthier lifestyle which will ultimately help people to reach their health goals.

Motivation

The rising awareness of health and nutrition and the challenges of managing personalized diets motivated us to create this project. Many individuals find it difficult to track their nutrition or create meal plans that meet their dietary needs. This project will fill the gap by offering a simple, user-friendly platform that anyone can use to plan meals, track nutrients, and achieve their health goals.

This tool can be used by a wide range of individuals, including fitness enthusiasts, people with dietary restrictions (e.g., vegan, gluten-free), or those managing medical conditions through diet (e.g., diabetes, hypertension).

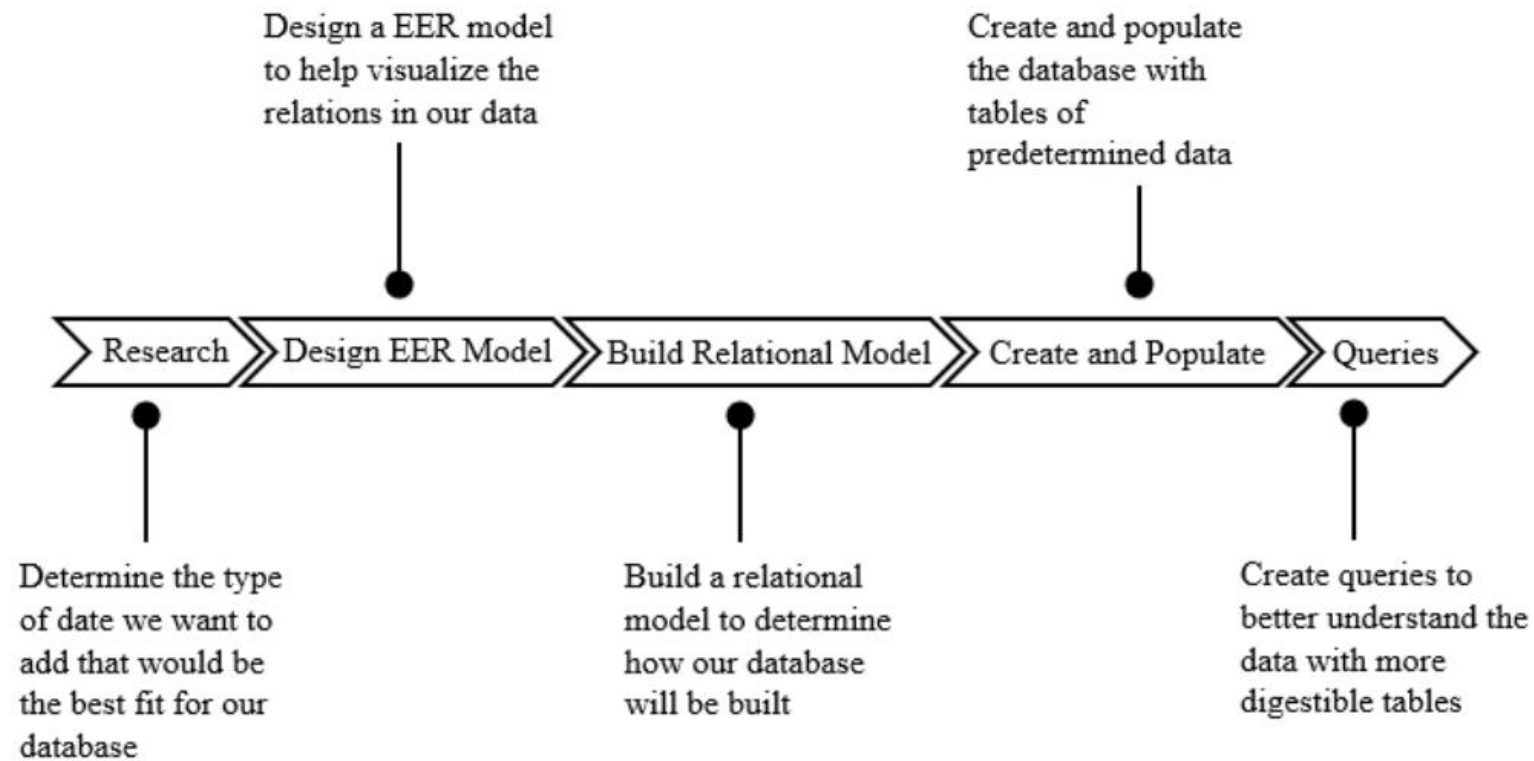


Background

There are several projects and applications similar to our personalized diet planner. For instance, there are MyFitnessPal, which has over 200 million users; Eat This Much, a web-based application; Noom, which has over 50 million users; and many other similar applications.

Although our application shares many similarities to the previously mentioned applications, it aims for simplicity to be used by everyone, health goal-oriented to achieve any personal goal, progress tracking to track and monitor your progress, and lastly, make it freely accessible for anyone to use.

Project Timeline





Design & Implementation

EER Conceptual Data Model Design

Key Entities:

1. User:

- Attributes: UserID (PK), Name, Age, Gender, Weight, Height, ActivityLevel, DietaryPreferences (multivalued).
- Relationships: The user sets goals and uses the planner.

2. DietaryGoal:

- Attributes: GoalID (PK), GoalType (e.g., weight loss, muscle gain), TargetWeight.
- Relationships: Linked to users (1).

3. MealPlan (Weak Entity):

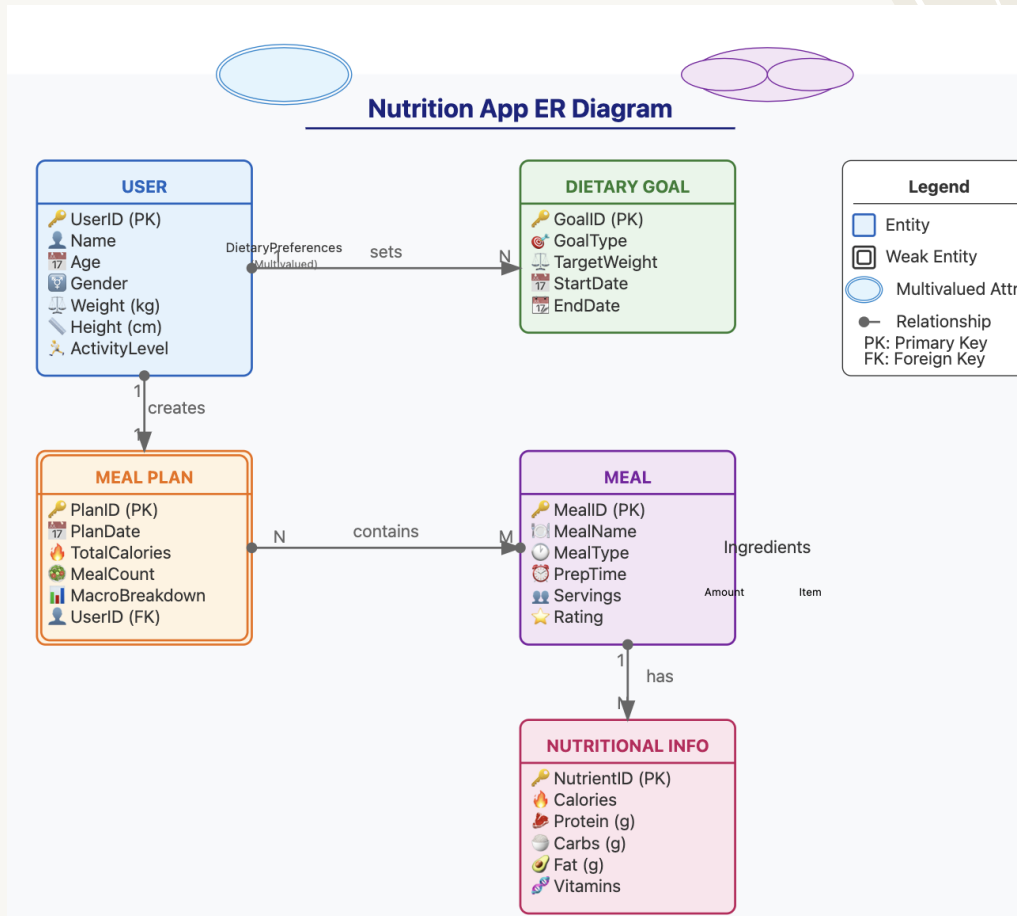
- Attributes: PlanID (PK), PlanDate, Calories, NutritionalBreakdown.
- Relationships: Dependent on UserID (1:1 or 1), weak because it only exists to a user.

4. Meal:

- Attributes: MealID (PK), MealName, Ingredients (composite), MealType (e.g., breakfast, lunch).
- Relationships: M relationship with MealPlan, as multiple meals can belong to one meal plan, and one meal can belong to different plans.

5. NutritionalInfo:

- Attributes: NutrientID (PK), FoodItem, Calories, Protein, Carbs, Fat, Vitamins.
- Relationships: Linked to Meals (1).



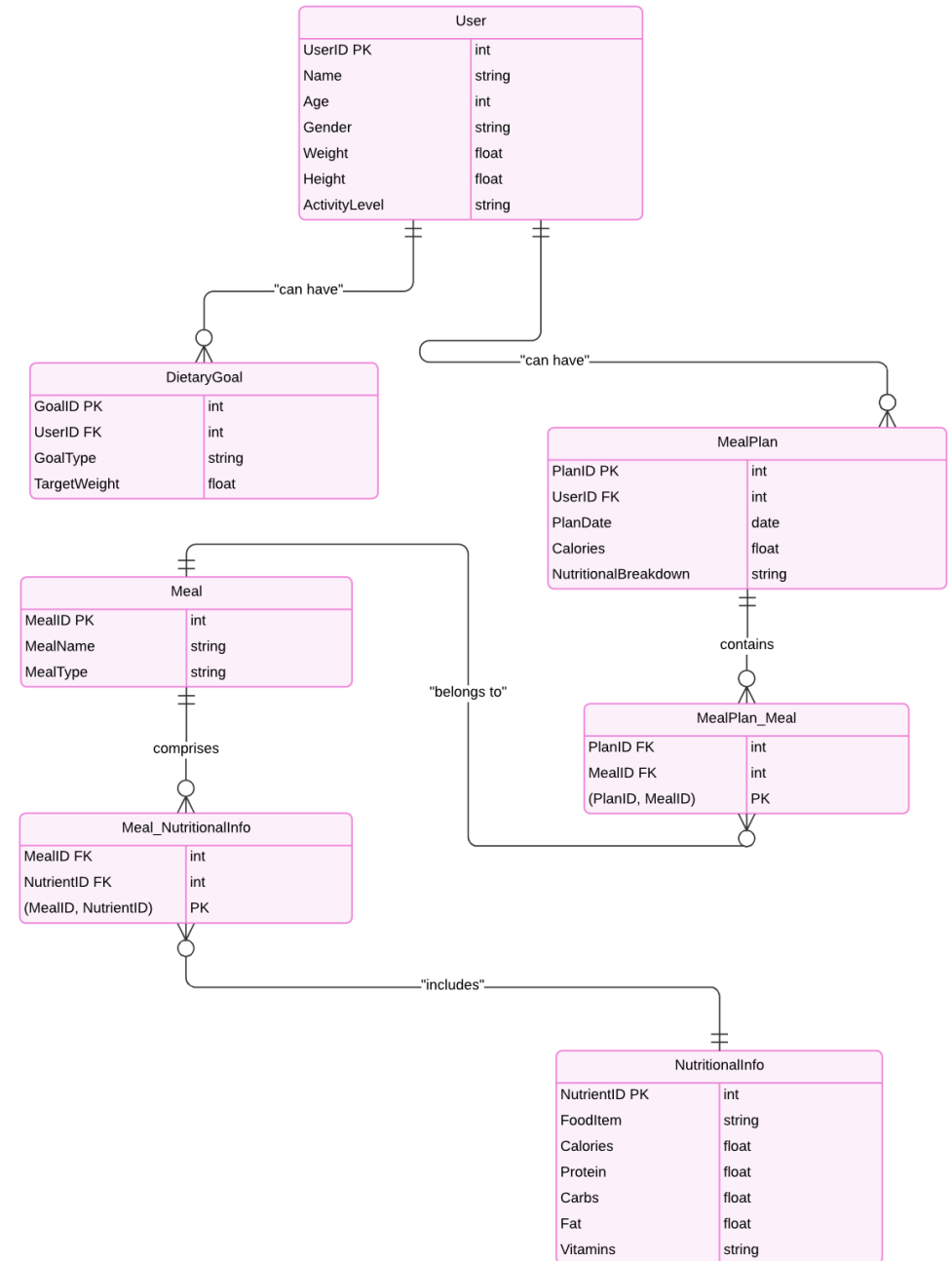
Relationships:

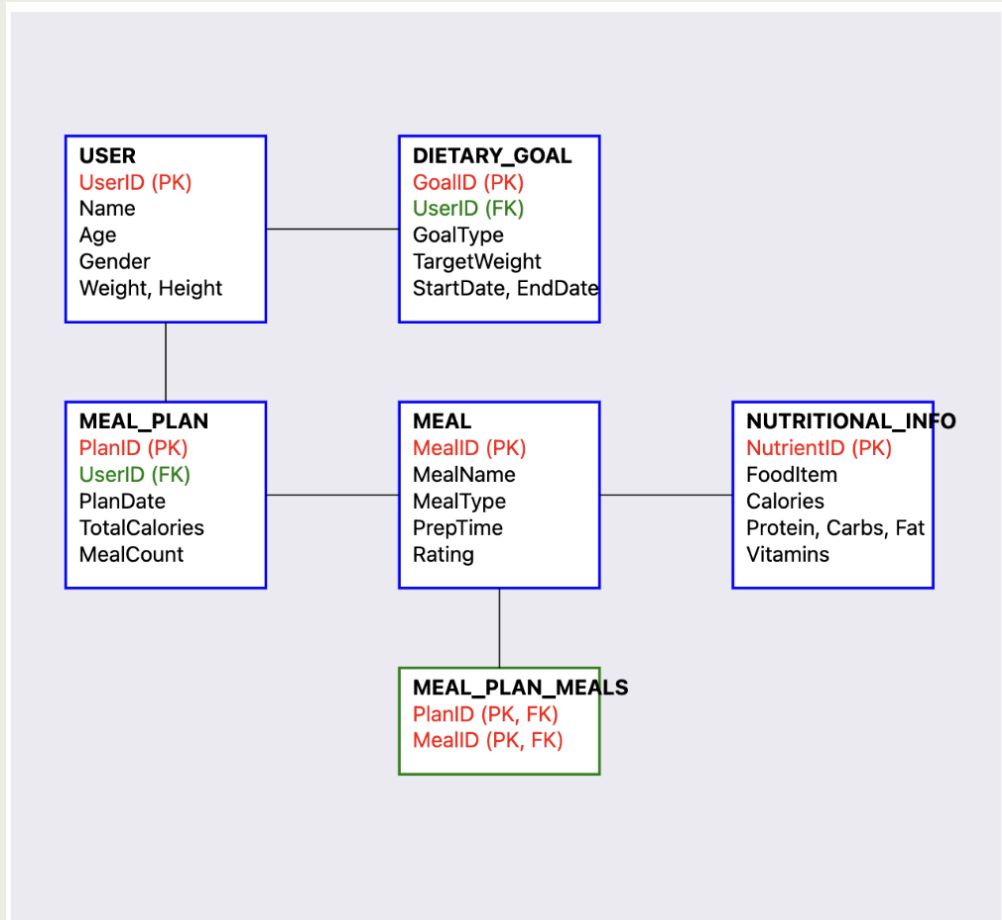
- **User-MealPlan:** A user can have multiple meal plans (1), but a meal plan only belongs to one user.
- **MealPlan-Meal:** A meal plan can contain multiple meals, and a meal can belong to multiple plans (M).
- **Meal-NutritionalInfo:** A meal consists of several food items with nutritional details (1).
- **User-DietaryGoal:** A user can have multiple dietary goals over time (1).

Special EER Features:

- **Weak Entity:** MealPlan is weak as it depends on UserID for identification.
- **Composite Attribute:** The Ingredients in the Meal entity is composite, as it can have multiple components.
- **Multivalued Attribute:** DietaryPreferences in User allows for multiple preferences (e.g., vegan, gluten-free).
- **Cardinalities:** You'll use different cardinalities, such as 1:1 for User-MealPlan, 1 for User-DietaryGoal, M for MealPlan-Meal.

Relational Data Model Design





Normalized Relational Model

Query Execution 1:

```
-- QUERY: List all users who are older than 30
SELECT Name, Age, Gender, ActivityLevel
FROM user
WHERE Age > 30;
```

	Name	Age	Gender	ActivityLevel
1	Sam Wilson	35	Male	Sedentary
2	Michael Brown	40	Male	Active
3	Laura Green	32	Female	Moderate
4	David Carter	45	Male	Active
5	Olivia Johnson	31	Female	Active

Insert Execution 1:

```
INSERT INTO user (Name, Age, Gender, Weight, Height, ActivityLevel, DietaryPreferences)
VALUES ( Name 'Anna Taylor', Age 34, Gender 'Female', Weight 70.0, Height 172.0,
        ActivityLevel 'Moderate', DietaryPreferences '["Gluten-Free", "Vegan"]');
```

	UserID	Name	Age	Gender	Weight	Height	ActivityLevel	DietaryPreferences
1	1	John Doe	30	Male	75	180	Moderate	["Vegan", "Low-Carb"]
2	2	Jane Smith	28	Female	65	165	Active	["Vegetarian"]
3	3	Sam Wilson	35	Male	80	175	Sedentary	["Low-Sugar", "Gluten-Free"]
4	4	Emily Davis	22	Female	55	160	Light	["Paleo"]
5	5	Michael Brown	40	Male	90	182	Active	["Keto"]
6	6	Laura Green	32	Female	68	170	Moderate	["Vegetarian", "Low-Carb"]
7	7	David Carter	45	Male	85	177	Active	["Vegan", "High-Protein"]
8	8	Sophia Martinez	27	Female	60	162	Light	["Gluten-Free"]
9	9	Chris Lee	29	Male	78	175	Sedentary	["Paleo"]
10	10	Olivia Johnson	31	Female	62	168	Active	["Low-Carb", "Vegan"]
11	11	Anna Taylor	34	Female	70	172	Moderate	["Gluten-Free", "Vegan"]

Normalized Query Execution

N.Q.E. Continued

Delete Execution:

```
-- DELETE: Remove a specific food item from NutritionalInfo
DELETE FROM NutritionalInfo
WHERE FoodItem = 'Tofu Stir-Fry';
```

	NutrientID	FoodItem	Calories	Protein	Carbs	Fat	Vitamins
1	1	Apple	52	0.3	14	0.2	Vitamin C
2	2	Banana	89	1.1	23	0.3	Vitamin B6
3	3	Orange	62	1.2	15	0.2	Vitamin C
4	4	Strawberry	33	0.7	8	0.3	Vitamin C
5	5	Almonds	575	21	22	50	Vitamin E
6	6	Spinach	23	2.9	3.6	0.4	Vitamin K
7	7	Avocado	160	2	9	15	Vitamin K
8	8	Carrot	41	1	10	0.2	Vitamin A
9	9	Blueberries	57	0.7	14	0.3	Vitamin C
10	10	Broccoli	55	3.7	11	0.6	Vitamin C

Update Execution:

```
UPDATE User
SET DietaryPreferences = '["Keto", "Gluten-Free"]'
WHERE UserID = 5;
```

	UserID	Name	Age	Gender	Weight	Height	ActivityLevel	DietaryPreferences
3	3	Sam Wilson	35	Male	80	175	Sedentary	["Low-Sugar", "Gluten-Free"]
4	4	Emily Davis	22	Female	55	160	Light	["Paleo"]
5	5	Michael Brown	40	Male	90	182	Active	["Keto", "Gluten-Free"]
6	6	Laura Green	32	Female	68	170	Moderate	["Vegetarian", "Low-Carb"]
7	7	David Carter	45	Male	85	177	Active	["Vegan", "High-Protein"]
8	8	Sophia Martinez	27	Female	60	162	Light	["Gluten-Free"]
9	9	Chris Lee	29	Male	78	175	Sedentary	["Paleo"]
10	10	Olivia Johnson	31	Female	62	168	Active	["Low-Carb", "Vegan"]
11	11	Anna Taylor	34	Female	70	172	Moderate	["Gluten-Free", "Vegan"]

Create View:

- User meal plan summary that combines the data from various tables providing a broad view of the user's meal plans and nutritional breakdown.
- Makes it easier to generate reports and to analyze user dietary data.

	UserID ▾ ↕	Name ▾ ↕	Age ▾ ↕	Gender ▾ ↕	ActivityLevel ▾ ↕
1		1 John Doe	30	Male	Moderate
2		2 Jane Smith	28	Female	Active
3		3 Sam Wilson	35	Male	Sedentary
4		4 Emily Davis	22	Female	Light
5		5 Michael Brown	40	Male	Active
6		6 Laura Green	32	Female	Moderate
7		7 David Carter	45	Male	Active
8		8 Sophia Martinez	27	Female	Light
9		9 Chris Lee	29	Male	Sedentary
10		10 Olivia Johnson	31	Female	Active

DietaryPreferences ▾ ↕	GoalType ▾ ↕	TargetWeight ▾ ↕
["Vegan", "Low-Carb"]	Weight Loss	70
["Vegetarian"]	Muscle Gain	68
["Low-Sugar", "Gluten-Free"]	Weight Loss	75
["Paleo"]	Maintain	55
["Keto", "Gluten-Free"]	Weight Maintenance	90
["Vegetarian", "Low-Carb"]	Maintain Weight	72
["Vegan", "High-Protein"]	Muscle Gain	88
["Gluten-Free"]	Maintain	60
["Paleo"]	Weight Loss	72
["Low-Carb", "Vegan"]	Maintain	62

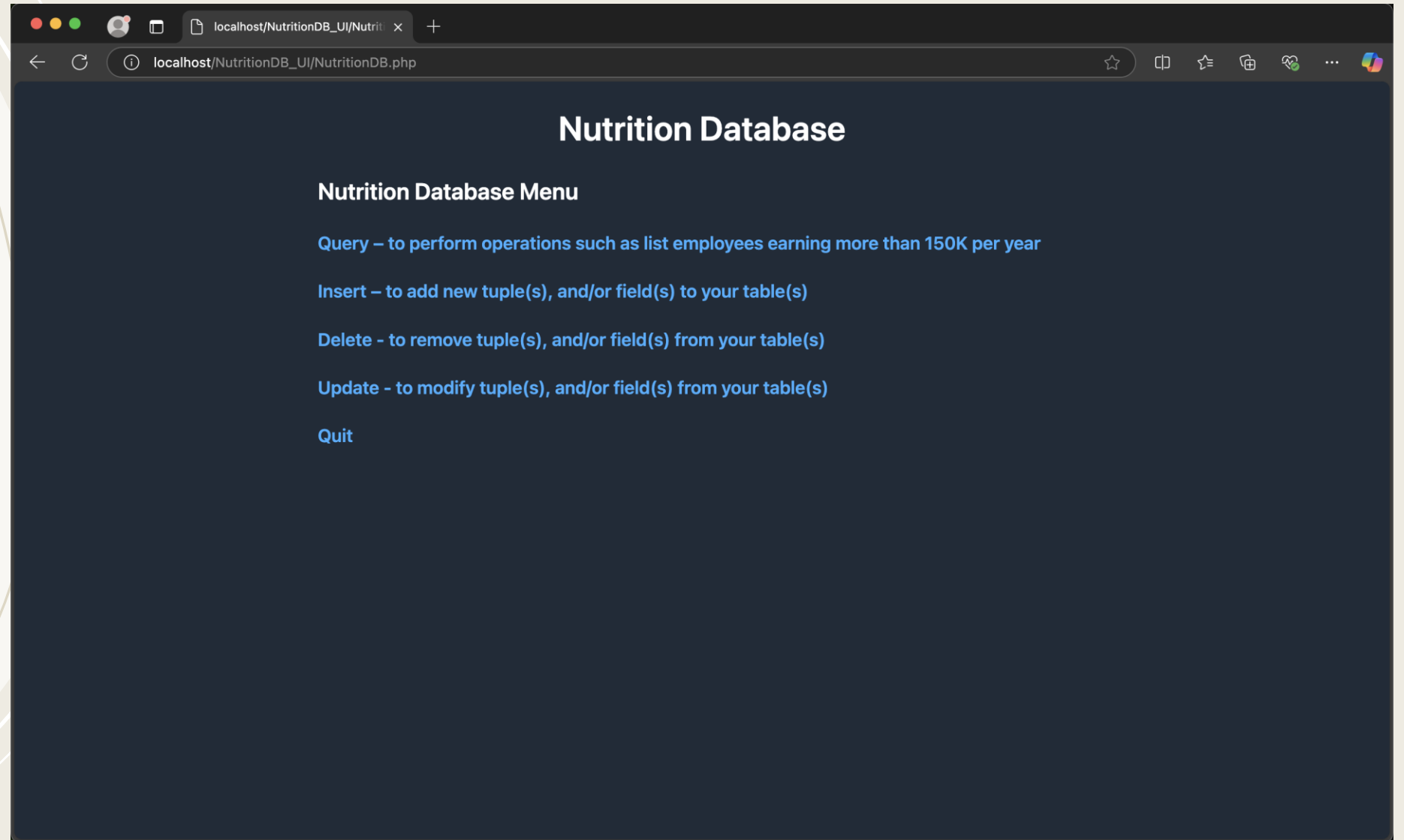
PlanDate ▾ ↕	TotalCalories ▾ ↕	MealName ▾ ↕	MealType ▾ ↕	FoodItem ▾ ↕
2024-10-17	2000	Vegan Salad	Lunch	Apple
2024-10-18	2200	Quinoa Salad	Lunch	Banana
2024-10-19	1800	Chicken Salad	Dinner	Orange
2024-10-20	1600	Egg Scramble	Breakfast	Strawberry
2024-10-21	2500	Keto Omelette	Breakfast	Almonds
2024-10-22	2100	Vegetarian Stir-Fry	Dinner	Spinach
2024-10-23	3000	Vegan Protein Shake	Snack	Avocado
2024-10-24	1800	Gluten-Free Pasta	Dinner	Carrot
2024-10-25	1900	Paleo Steak	Dinner	Blueberries
2024-10-26	1700	Vegan Wrap	Lunch	Broccoli

Calories ▾ ↕	Protein ▾ ↕	Carbs ▾ ↕	Fat ▾ ↕	Vitamins ▾ ↕
52	0.3	14	0.2	Vitamin C
89	1.1	23	0.3	Vitamin B6
62	1.2	15	0.2	Vitamin C
33	0.7	8	0.3	Vitamin C
575	21	22	50	Vitamin E
23	2.9	3.6	0.4	Vitamin K
160	2	9	15	Vitamin K
41	1	10	0.2	Vitamin A
57	0.7	14	0.3	Vitamin C
55	3.7	11	0.6	Vitamin C

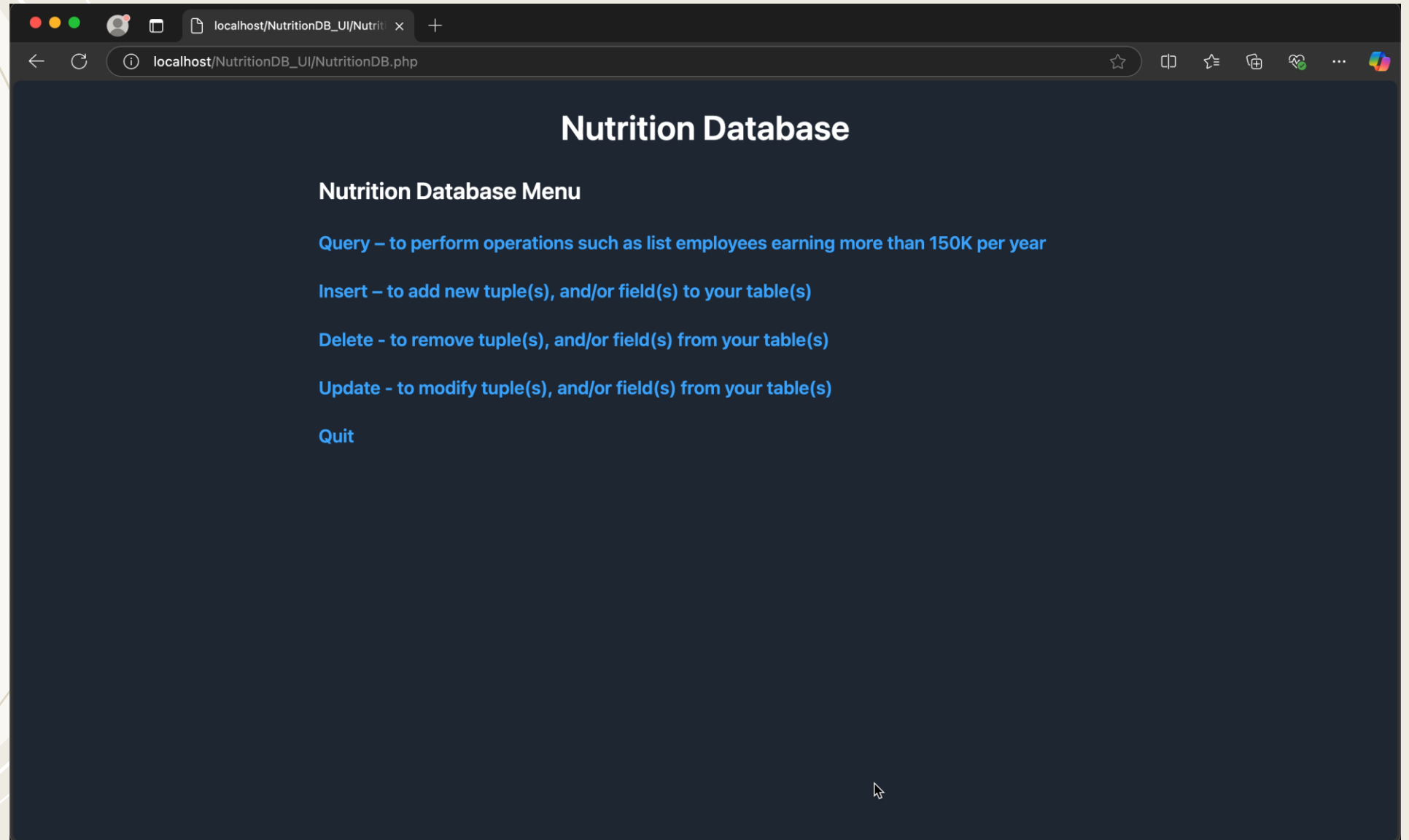
Front End UI



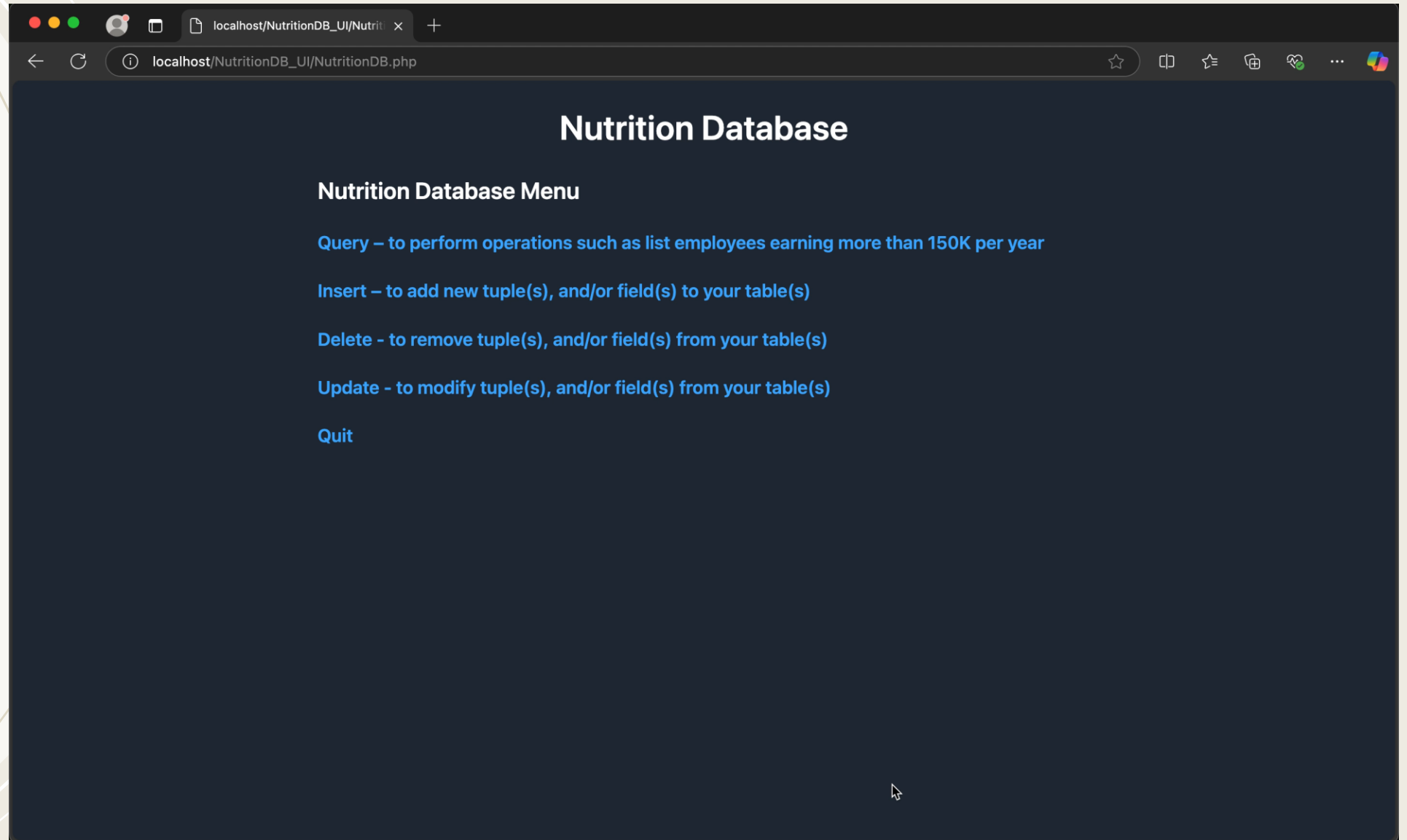
Database Main Menu



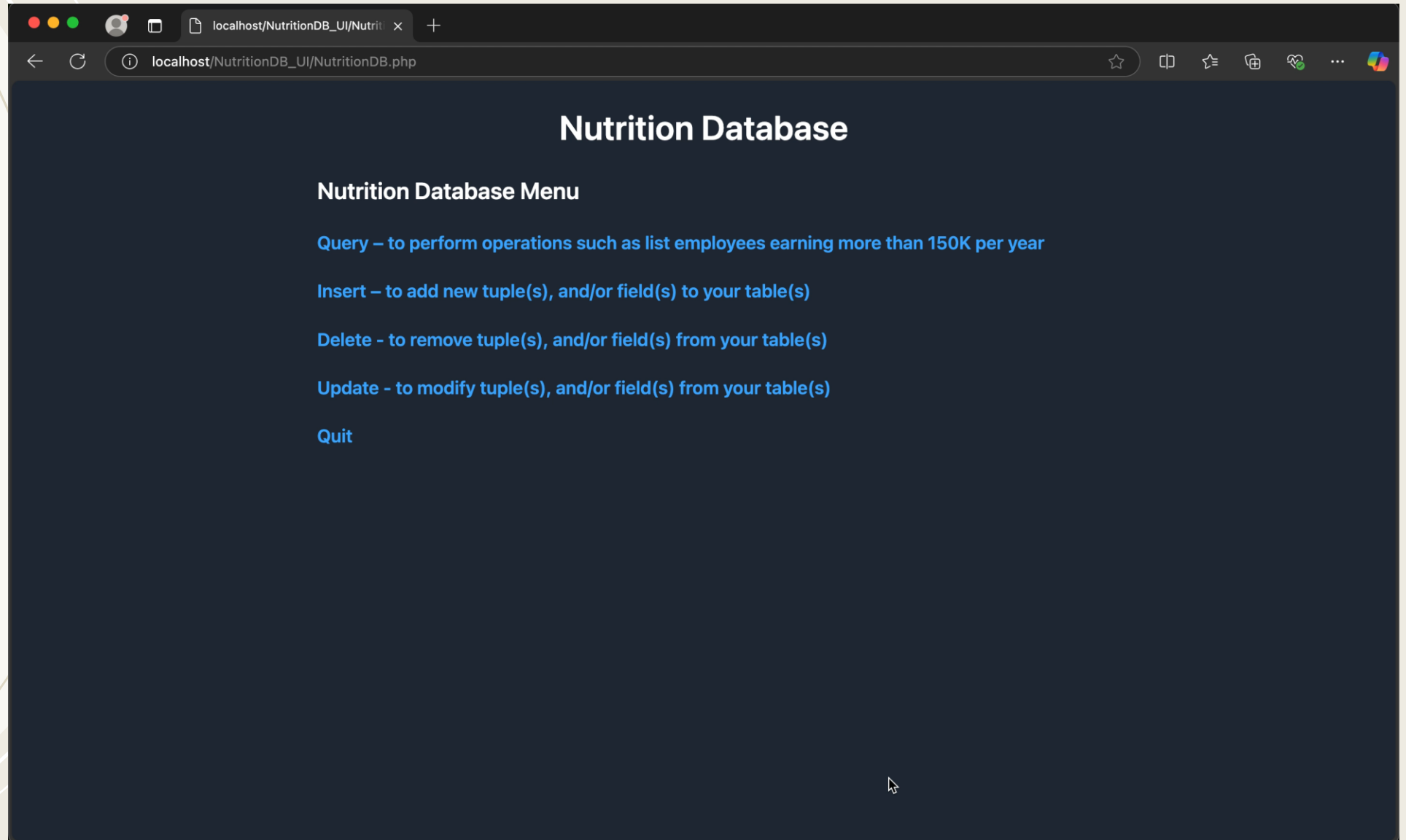
Query Menu



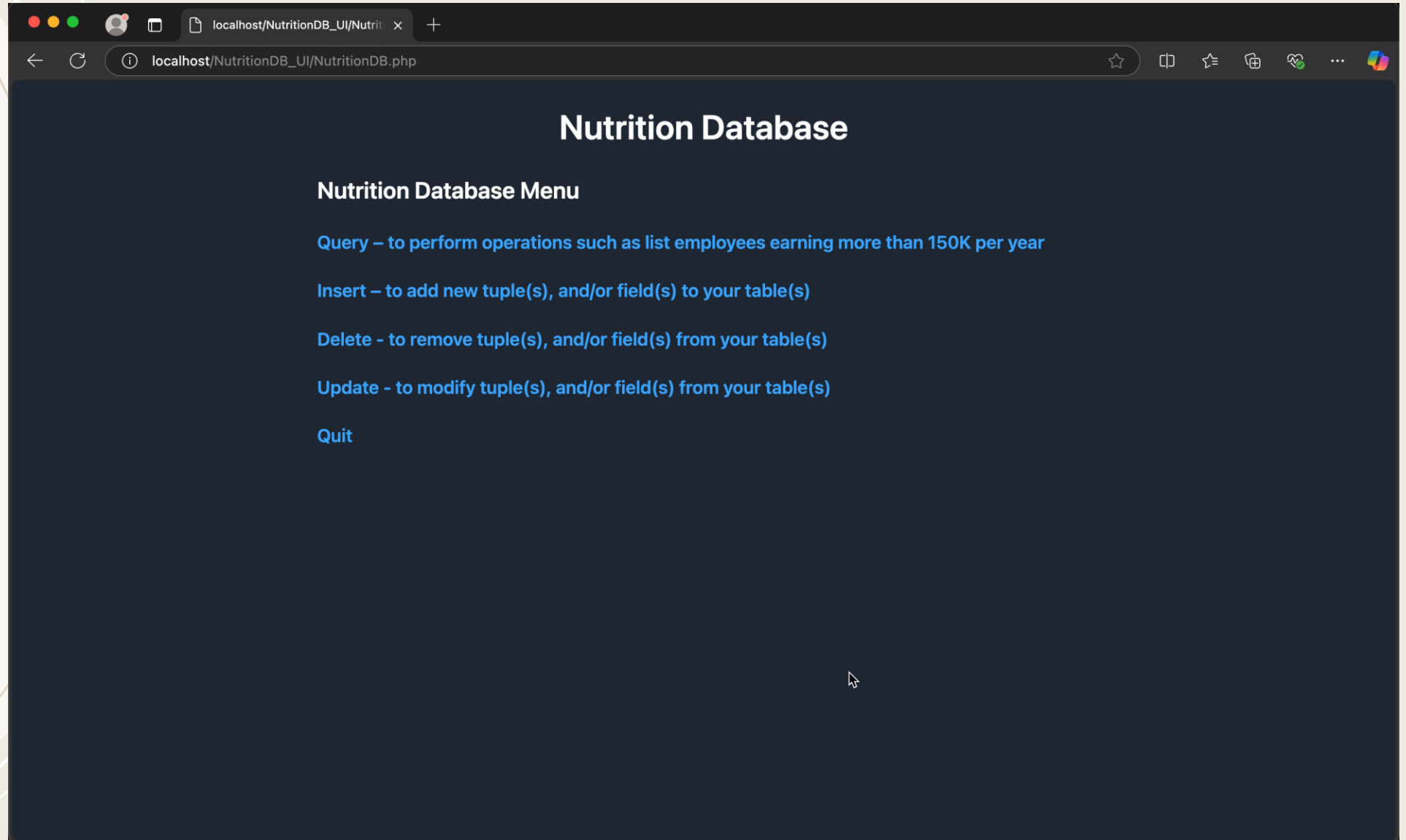
Insert Menu



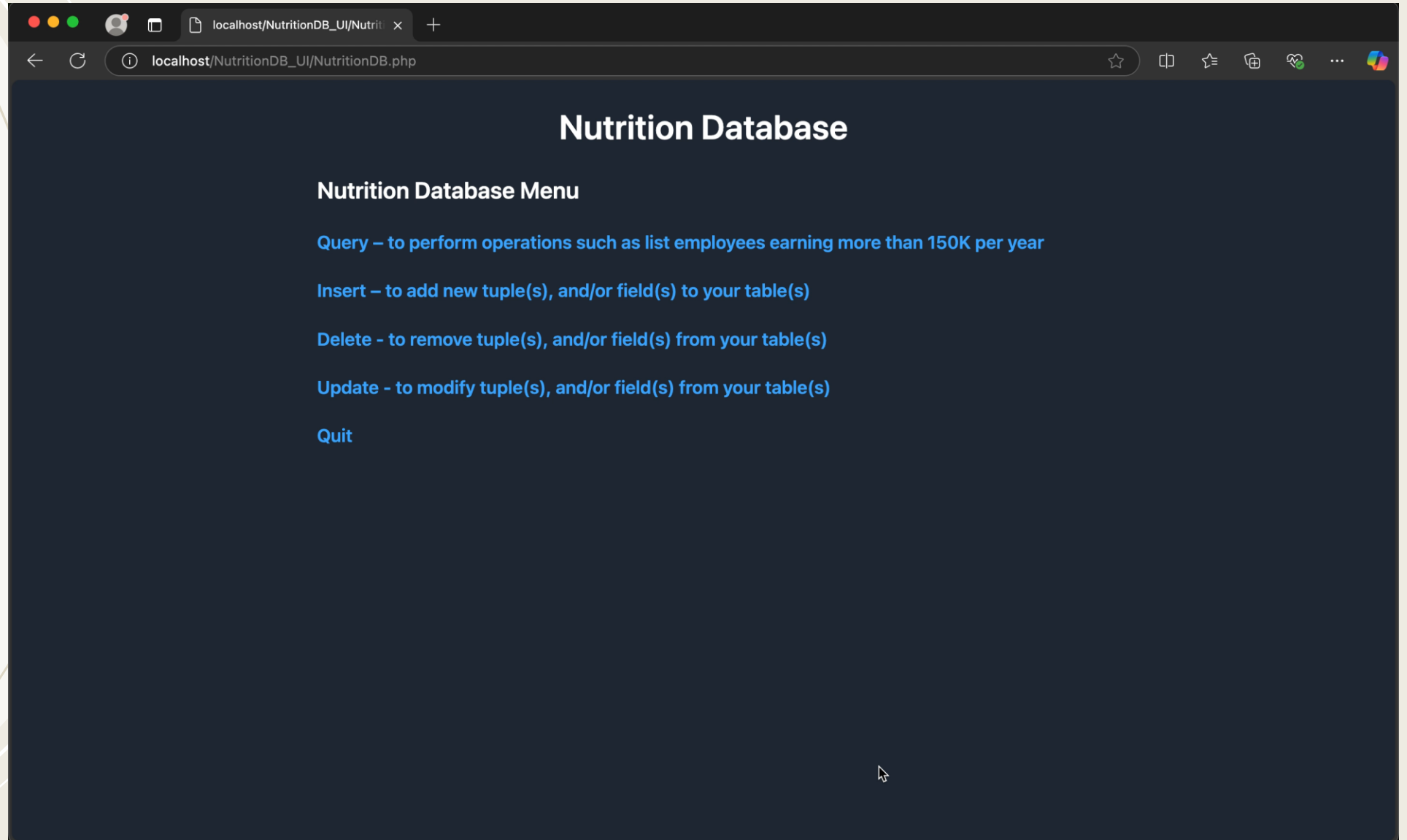
Delete Menu



Update Menu



Quit Menu



Conclusion

The Personalized Diet Planner project demonstrates an effective integration of database systems and user-focused application design to address the growing need for accessible dietary management tools. The project successfully implemented a relational database, normalized schema, and front-end user interface to enable personalized meal planning, nutritional tracking, and dietary goal management. This tool stands out due to its focus on being free and user-friendly while catering to a wide range of health goals and dietary preferences.

Adjustments & Justifications

During the development of the Personalized Diet Planner project, several adjustments were made to align the system with user needs, enhance functionality, and address unforeseen technical challenges. Below are some specific examples of adjustments and their justifications:

Database Normalization:

- *Adjustment:* Initially, the MealPlan entity was designed as a weak entity reliant solely on UserID. During development, the schema was modified to assign MealPlan a primary key (PlanID) while maintaining a foreign key relationship with UserID.
- *Justification:* This change improved database integrity and ensured better scalability. It allowed for easier querying and the potential for integrating meal plans shared across multiple users in future versions.

User-Friendly Interface Adjustments:

- *Adjustment:* The original design planned for a drop-down menu to select dietary preferences. Based on early feedback, this was replaced with a dynamic multi-select feature that allows users to type and add their own dietary preferences.
- *Justification:* This adjustment addressed the limitation of predefined choices and enhanced user experience by offering flexibility for less common dietary needs (e.g., "Low-Histamine" or "Paleo").

Simplified User Registration:

- *Adjustment:* The original user registration process required extensive details such as age, height, weight, and activity level at the outset. This was scaled back to only require name, email, and password during sign-up, with other details collected later.
- *Justification:* This adjustment lowered the barrier to entry, making it easier for users to onboard and increasing the likelihood of retention.

Future work

The Personalized Diet Planner can be enhanced by integrating machine learning to tailor recommendations, developing mobile applications for greater accessibility, and incorporating APIs for real-time nutritional data updates. Advanced analytics and social features will boost user engagement, while specialized meal plans for medical conditions will broaden its functionality. Integration with wearable devices and gamification elements like rewards systems can further enrich user experience, making the planner a comprehensive tool for diverse dietary needs.

A top-down view of a variety of fresh and healthy ingredients arranged on a dark surface. The items include: a bowl of sliced lemons, a bowl of red quinoa, a bowl of yellow lentils, a bowl of blueberries, a bowl of sliced kiwi, a bowl of red grapes, a bowl of almonds, a bowl of yellow cornmeal, a bowl of yellow powder (possibly turmeric), a whole head of garlic, a halved avocado, several orange and red bell peppers, several tomatoes, a bunch of green beans, a bunch of green celery, a bunch of ginger, and some fresh herbs. A large, light-colored, semi-circular graphic element is on the right side of the image, containing the text "Thank you!".

Thank you!