**EXPERIMENT 3**

List out the entities and identify the relationship between them. Also, identify related attributes supposed to be recorded while considering the normalization rule.

**User Entity:**

**Attributes:**

User ID (Primary Key)

Username

Email

Password (hashed and salted)

First Name

Last Name

Date of Birth

Profile Picture

Registration Date

**Pantry Item Entity:**

**Attributes:**

Item ID (Primary Key)

User ID (Foreign Key to User)

Item Name

Quantity

Category

Expiry Date

**Relationship:**

Many-to-One relationship with User (Each pantry item is associated with one user)

**Recipe Entity:**

**Attributes:**

Recipe ID (Primary Key)

Recipe Name

Description

Preparation Time

Cooking Time

Serving Size

Instructions

Image

Source (e.g., cookbook, website)

User ID (Foreign Key to User)

**Relationship:**

Many-to-One relationship with User (Each recipe is associated with one user)

**Ingredient Entity:**

**Attributes:**

Ingredient ID (Primary Key)

Ingredient Name

**Relationship:**

Many-to-Many relationship with Recipe (A recipe can have multiple ingredients, and an ingredient can be used in multiple recipes)

**Meal Plan Entity:**

**Attributes:**

Meal Plan ID (Primary Key)

User ID (Foreign Key to User)

Plan Name

Start Date

End Date

**Relationship:**

Many-to-One relationship with User (Each meal plan is associated with one user)

**Meal Entity:**

**Attributes:**

Meal ID (Primary Key)

Meal Plan ID (Foreign Key to Meal Plan)

Recipe ID (Foreign Key to Recipe)

Meal Date

Meal Time

**Relationship:**

Many-to-One relationship with Meal Plan (Each meal is part of one meal plan)

Many-to-One relationship with Recipe (Each meal uses one recipe)

**Grocery List Entity:**

**Attributes:**

Grocery List ID (Primary Key)

User ID (Foreign Key to User)

List Name

Creation Date

**Relationship:**

Many-to-One relationship with User (Each grocery list is associated with one user)

**Grocery Item Entity:**

**Attributes:**

Grocery Item ID (Primary Key)

Grocery List ID (Foreign Key to Grocery List)

Item Name

Quantity

Status (e.g., purchased or not purchased)

**Relationship:**

Many-to-One relationship with Grocery List (Each grocery item is part of one grocery list)

Normalization is a process used to organize the data in a relational database to reduce data redundancy and improve data integrity. Based on the entities listed above, here are the related attributes that should be recorded while considering normalization rules:

**User Entity:** Already in at least First Normal Form (1NF) as each attribute contains atomic values.

**Pantry Item Entity:** In 1NF, attributes are atomic. The relationship between User and Pantry Item represents a foreign key relationship (2NF).

**Recipe Entity:** In 1NF, attributes are atomic. The relationship between User and Recipe is a foreign key relationship (2NF).

**Ingredient Entity:** In 1NF, attributes are atomic. This entity may not need further normalization since it primarily serves as reference data for recipes.

**Meal Plan Entity:** In 1NF, attributes are atomic. The relationship between User and Meal Plan is a foreign key relationship (2NF).

**Meal Entity:** In 1NF, attributes are atomic. The relationships with Meal Plan and Recipe are foreign key relationships (2NF).

**Grocery List Entity:** In 1NF, attributes are atomic. The relationship between User and Grocery List is a foreign key relationship (2NF).

**Grocery Item Entity:** In 1NF, attributes are atomic. The relationship with Grocery List is a foreign key relationship (2NF).