



Database Design

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Overview

I have been considering the Recip-Ease concept for a long time, going back to my undergraduate program. One thing that would eventually slow my development dreams to a halt was the daunting task of normalizing a relational database for use with recipe data. After all, recipes vary greatly as far as the number of ingredients, the number of instruction steps, and this just gets more complicated as I would attempt to classify different recipes into different categories and types. However, once I took Advanced Data or some such class, I was introduced to MongoDB, and after working with it a few hours light bulbs were going on in my head.

Simply due to the nature of recipes, it was obvious that using a database with fewer relationships and more flexibility was just the thing. Recipes are really “documents” not “records” or “tuples”. The database has a total of five collections; users, recipes, appetizer_ingredients, dessert_ingredients, and main_course_ingredients. For the purpose of my MVP, there is only one relationship that being case where the recipes documents will store the user_Id for the user who created the recipe. Here are the schema for the collections and how any relations are established, if any:

Users (users)

```
{
  "_id": Number, (Unique User ID)
  "username": String,
  "email": String,
  "password_hash": String,
  "created_at": Date,
  "updated_at": Date }
```

Users Sample Document:

```
{
  _id: 1,
  username: 'mikeyrat',
  email: 'mikeyrat@yahoo.com',
  password_hash: 'hashed_password_here',
  created_at: 2025-03-18T12:00:00.000Z,
  updated_at: 2025-03-18T12:30:00.000Z
}
```

The users collection is a simple database of users with their login credentials and email addresses. For my MVP, not much else is required. The only relation with this database is in the recipes collection, where the user ID of the user creating a recipe will be stored. In this case, the user can, for instance, click a “Show My Recipes” and the website will display just their recipes.

Recipes (recipes)

```
{
  "_id": Number,
  "user_id": Number, (References the users._Id)
  "name": String,
  "category": String,
  "type": String,
  "ingredients": {
    "ingredient": { "quantity": Number, "unit": String }
  },
  "instructions": [String],
  "created_at": Date,
  "updated_at": Date
}
```

Recipes Sample Record

```
{
  _id: 8,
  user_id: 1,
  name: 'Classic Chicken Noodle Soup',
  category: 'Main Courses',
  type: 'Soups',
  ingredients: {
    'Chicken breast': {
      quantity: 1,
      unit: 'Lbs.'
    },
    'Olive oil': {
      quantity: 1,
```

```

        unit: 'TBSP'
    },
    'Onions': {
        quantity: 1,
        unit: 'Cup'
    },
    'Garlic': {
        quantity: 2,
        unit: 'Qty'
    },
    'Carrots': {
        quantity: 2,
        unit: 'Qty'
    },
    'Celery': {
        quantity: 2,
        unit: 'Qty'
    },
    'Chicken broth': {
        quantity: 6,
        unit: 'Cup'
    },
    'Egg noodles': {
        quantity: 8,
        unit: 'Oz.'
    },
    'Salt': {
        quantity: 1,
        unit: 'TSP'
    },
    'Black pepper': {
        quantity: 0.5,
        unit: 'TSP'
    },
    'Thyme': {
        quantity: 1,
        unit: 'TSP'
    },
    'Parsley': {
        quantity: 1,
        unit: 'TSP'
    }
},

```

instructions: [

```

    'Heat olive oil in a large pot and sauté onions, garlic, carrots, and celery until softened.',
    'Add chicken breast and pour in chicken broth.',
    'Season with salt, black pepper, and thyme.',
    'Bring to a boil, then reduce heat and simmer for 20 minutes.',
    'Remove chicken, shred it, and return it to the pot.',
    'Add egg noodles and cook until tender.',
    'Stir in parsley before serving.'
  ],
  created_at: 2025-03-18T13:50:00.000Z,
  updated_at: 2025-03-18T13:55:00.000Z
}

```

The recipes collection actually stores the recipes. They are categorized using established categories; Appetizers, Desserts, and Main Courses. There is also a field for recipe Type, such as (for Desserts) Cakes, Pies, Ice Cream, etc. Being that one of the main features of the web site is to display to the user the most common ingredients for the category and type of recipe they are entering, these fields allow the lists for the user to be pared down to the most relevant ingredients. This will also help in the recipe search function to narrow down the recipes a user is searching for. An example query to call up all of a user's recipes would be “db.recipes.find({ user_id: 1 }).pretty();”. Since MongoDB doesn't enforce foreign keys, the project will utilize soft linking by storing the user_id inside the recipe documents, instead of using embedded documents.

Ingredient Collections (appetizer_ingredients, dessert_ingredients, main_course_ingredients)

```

{
  "_id": Number,
  "ingredient": String,
  "types": [String],
  "rank": Number,
  "usage_count": Number
}

```

Ingredient Sample Document

```

{
  _id: 20,
  ingredient: 'Chocolate chips',
  types: [
    'Cookies',
    'Cake',
    'Pudding',
    'Ice Cream'
  ],
  rank: 20,
}

```

```
usage_count: 131  
}
```

The ingredient collections contain data for the three main categories as listed above. Research using the AI provided by Maryville has provided me with between 75 and 125 of the most common ingredients for each of the collections. “rank” is the original ranking when imported, and “usage_count” is the number that will be incremented when an ingredient is utilized in a recipe. As an ingredient is used more frequently, it will gain relevance in the ingredient list and will be listed more predominantly in subsequent ingredient displays.

Again, how this is envisioned to work, when a user begins entering a recipe, they will provide a name, and select a Category for their recipe. The “Type” menu drop down will populate with the appropriate types for that recipe category. Next using those two pieces of information, the web page will search for the recipe type in the appropriate collection, and return the 20-30 most popular ingredients. To enter the ingredients for their recipe, they click on an appropriate ingredient and the appropriate quantity button(s) in the UI. Clicking OK for that ingredient and quantity, the ingredient is added to the recipe record, and the usage_count for that ingredient is incremented and its record updated. Once all the ingredients are entered, the user will have the ability to type instructions for each step of the recipe. When completed, the user clicks “Save” and the recipe is saved to the recipes collection.