**1. Mapping the Necessary Entities, Relationships, and Constraints**

To model Fufu Republic’s data for data-driven decision-making, we’ll need to define the main entities, relationships, and constraints in the system. Here’s a simplified entity-relationship (ER) model:

**Entities:**

- **Customers**: Contains information about customers, such as customer ID, name, contact details, and location.

- **Branches**: Stores information on each restaurant branch, including branch ID, name, location, and menu variations.

- **Menu Items**: Details the available food items, including item ID, name, category, and availability per branch.

- **Orders**: Represents customer orders, including order ID, customer ID, branch ID, order date, and payment method.

- **Payment Methods**: Stores information on payment methods (cash, debit card, online payments).

- **Inventory**: Contains details about stock levels, including branch ID, menu item ID, and stock quantity.

- **Sales**: Records sales transactions, including order ID, item ID, quantity, price, and total sales amount.

**Relationships:**

- Customers place Orders: **One customer** can place **many orders**. (1 to many)

- Orders occur at Branches: **Each order** belongs to **one branch**. (1 to 1)

- Orders include Menu Items: **Each order** can include **multiple menu items**. (1 to many)

- Orders use Payment Methods: **Each order** uses **one payment method**. (1 to many)

- Branches maintain Inventory: **Each branch** manages inventory for **multiple menu items**. (1 to many)

**Constraints:**

- Each branch has its unique menu, meaning the availability of items may vary by branch.

- Payment methods should match those available (cash, card, or online).

- Customer orders must always have at least one associated menu item.

- Inventory levels must be updated with every order.

**2. Creating a Dimensional Model**

**Business Process: Order Processing**

This process captures customer orders, item purchases, and payment details to help analyze sales trends, stock levels, and customer behavior.

**Business Questions:**

1. What are the sales trends across different branches, dining options, and payment methods?

2. How much stock is being consumed per location and per menu item?

3. Which promotions could be tailored based on customer purchase history?

**Grain:**

Each row in the fact table represents an individual menu item sold in a specific order (at the item level).

**Fact Table: Sales Fact Table**

This table stores the transactional data about orders.

|  |  |
| --- | --- |
| **Column** | **Description** |
| Order ID | Unique identifier for each order |
| Order Date | Date and time of the order |
| Customer ID | References the customer who made the order |
| Branch ID | The branch where the order was made |
| Menu Item ID | References the menu item sold |
| Quantity | Number of menu items ordered |
| Payment Method ID | Indicates the payment method used (cash, card) |
| Dining Option | Dine-in, take-out, or online order |
| Sales Amount | Total sales amount for the item |

1. Customer Dimension

Attributes:

Customer ID  
Name  
Location  
Contact Details

2. Branch Dimension

Attributes:

Branch ID  
Branch Name  
Location

3. Menu Item Dimension

Attributes:

Menu Item ID  
Item Name  
Category (e.g., Food, Drink)  
Price

4. Payment Method Dimension

Attributes:

Payment Method ID  
Payment Type (cash, card, online)

5. Order Date Dimension

Attributes:

Order Date  
Day  
Month  
Year  
Weekday/Weekend

6. Dining Option Dimension

Attributes:

Dining Option ID  
Option (dine-in, take-out, online)

**Dimensional Model Diagram (Conceptual):**

- Fact Table: Sales Fact

- Dimensions: Customers, Branches, Menu Items, Payment Methods, Order Dates, Dining Options

Here’s a simplified visual layout of how the fact table connects to the dimension tables:

Customer Dimension

Fact Table (Sales)

Branch Dim

Dining Option Dim

Payment Dim

Menu Item Dim

**Example of Queries to Answer Business Questions:**

1. What are the sales trends across different branches, payment methods, and dining options?

SELECT Branch\_ID, Payment\_Method\_ID, Dining\_Option\_ID, SUM(Sales\_Amount) AS Total\_Sales

FROM Sales\_Fact

WHERE Order\_Date BETWEEN '2024-01-01' AND '2024-12-31'  
GROUP BY Branch\_ID, Payment\_Method\_ID, Dining\_Option\_ID;

2. Which items are selling out quickly at each branch, and how should inventory levels be adjusted?

SELECT Branch\_ID, Menu\_Item\_ID, SUM(Quantity) AS Total\_Quantity\_Sold

FROM Sales\_Fact

GROUP BY Branch\_ID, Menu\_Item\_ID

ORDER BY Total\_Quantity\_Sold DESC;

3. What are the personalized promotion opportunities based on customer purchase habits?

SELECT Customer\_ID, Menu\_Item\_ID, SUM(Quantity) AS Total\_Purchased

FROM Sales\_Fact

GROUP BY Customer\_ID, Menu\_Item\_ID

HAVING Total\_Purchased > 10;

This dimensional model enables Fufu Republic to efficiently analyze sales patterns, manage inventory, and personalize customer promotions.