

Database Design for Restaurant Visits

Your Name

Spring 2025

1. Functional Dependencies

The following functional dependencies exist in our dataset:

$$\text{RestaurantName} \rightarrow \text{RestaurantID}$$
$$\text{CustomerEmail} \rightarrow \text{CustomerID}, \text{CustomerName}, \text{CustomerPhone}, \text{LoyaltyMember}$$
$$\text{ServerEmpID} \rightarrow \text{ServerName}, \text{ServerBirthDate}, \text{ServerTIN}$$
$$\text{VisitID} \rightarrow \text{RestaurantID}, \text{CustomerID}, \text{ServerEmpID}, \text{VisitDate}, \text{VisitTime}, \text{PartySize}, \text{MealTypeID}, \text{WaitTime}$$
$$\text{VisitID} \rightarrow \text{BillID}, \text{PaymentMethodID}, \text{FoodBill}, \text{AlcoholBill}, \text{TipAmount}, \text{DiscountApplied}, \text{OrderedAlcohol}, \text{TotalAmount}$$
$$\text{PaymentMethodID} \rightarrow \text{PaymentMethod}$$
$$\text{MealTypeID} \rightarrow \text{MealTypeName}$$
$$\text{GenderCountID} \rightarrow \text{MaleCount}, \text{FemaleCount}, \text{UnspecifiedCount}$$

2. Normalization to 3NF

To remove redundancy and ensure efficiency, the schema is decomposed into the following tables:

- **RESTAURANT** (**RestaurantID**, RestaurantName)
- **CUSTOMER** (**CustomerID**, CustomerName, CustomerPhone, CustomerEmail, LoyaltyMember)
- **SERVER** (**ServerEmpID**, ServerName, ServerBirthDate, ServerTIN)

- **VISIT** (VisitID, RestaurantID, ServerEmpID, CustomerID, MealTypeID, VisitDate, VisitTime, PartySize, WaitTime)
 - **PAYMENTMETHOD_LOOKUP** (PaymentMethodID, PaymentMethod)
 - **BILL** (BillID, VisitID, PaymentMethodID, FoodBill, AlcoholBill, TipAmount, DiscountApplied, OrderedAlcohol, TotalAmount)
 - **SERVER_RESTAURANT** (ServerEmpID, RestaurantID, StartDateHired, EndDateHired, HourlyRate)
 - **MEALTYPE** (MealTypeID, MealTypeName)
 - **GENDERCOUNT** (GenderCountID, VisitID, MaleCount, FemaleCount, UnspecifiedCount)
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3. Normalization Process

1st Normal Form (1NF)

- Ensures all values are **atomic** (no multi-valued attributes).
- Removed repeating groups from the data.

2nd Normal Form (2NF)

- Removed **partial dependencies** by ensuring each **non-key attribute depends on the entire primary key**.
- Separated **restaurant details, customers, servers, and payments** into their own tables.

3rd Normal Form (3NF)

- Removed **transitive dependencies** (attributes that don't depend directly on the primary key).
 - Ensured that:
 - ServerEmpID in SERVER_RESTAURANT links to both SERVER and RESTAURANT.
 - VisitID in BILL links to a unique VISIT.
 - CustomerEmail acts as a unique identifier for **customers**.
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4. Entity Relationship Diagram (ERD)

The following diagram represents the relationships between entities in the schema:

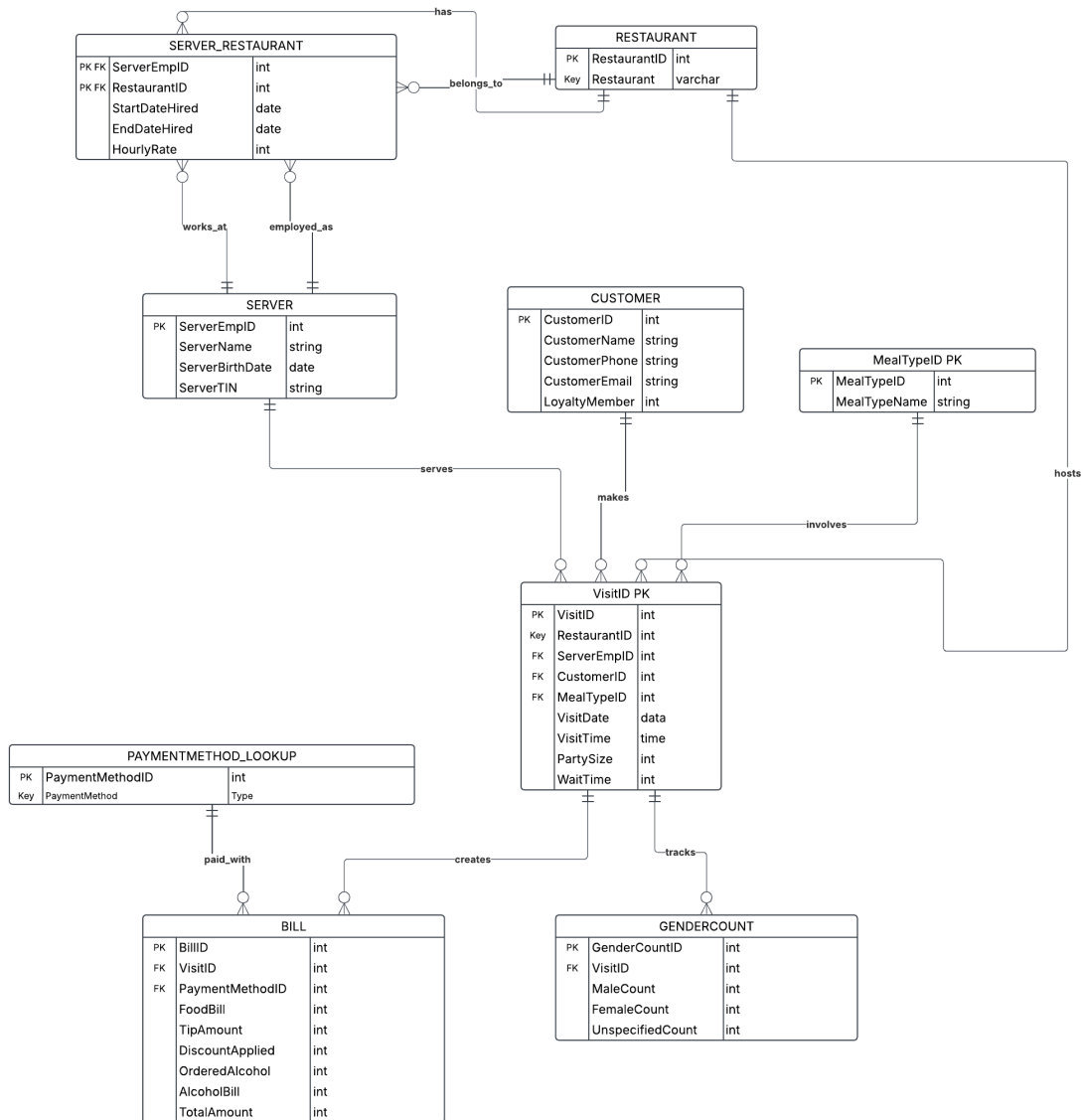


Figure 1: Entity-Relationship Diagram