

Phase III: Logical Data Model Documentation

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Smart Restaurant Order & Kitchen Management System

1. Normalization Justification (3NF)

The database schema is normalized to **Third Normal Form (3NF)**:

- **1NF:** All columns are atomic. No repeating groups (Ingredients are separated into the RECIPES table).
- **2NF:** All non-key attributes depend on the full Primary Key. In ORDER_DETAILS, price depends on the specific item in the order.
- **3NF:** Transitive dependencies are removed. Customer details are in the CUSTOMERS table, not repeated in ORDERS.

2. BI & Analytics Strategy

- **Fact Tables:** ORDERS, ORDER_DETAILS, KITCHEN_QUEUE, TRANSACTIONS.
- **Dimensions:** CUSTOMERS, MENU_ITEMS, TABLES, INGREDIENTS.
- **Auditing:** AUDIT_LOGS tracks all INSERT/UPDATE actions for security.

3. Data Dictionary

Assumptions: Currency is RWF. stock_quantity decrements via triggers.

Table: CUSTOMERS

Column	Data Type	Constraints	Description
customer_id	NUMBER(5)	PK, NOT NULL	Unique identifier
first_name	VARCHAR2(50)	NOT NULL	Customer first name
phone_number	VARCHAR2(15)	UNIQUE	Contact number
loyalty_points	NUMBER(5)	DEFAULT 0	Reward points

Table: TABLES

Column	Data Type	Constraints	Description
table_id	NUMBER(3)	PK, NOT NULL	Unique table ID
table_number	NUMBER(3)	UNIQUE	Physical table number
capacity	NUMBER(2)	CHECK > 0	Number of seats
status	VARCHAR2(20)		'AVAILABLE', 'OCCUPIED'

Table: MENU_ITEMS

Column	Data Type	Constraints	Description
menu_id	NUMBER(5)	PK, NOT NULL	Unique Item ID
item_name	VARCHAR2(100)	NOT NULL	Dish Name
price	NUMBER(10,2)	CHECK > 0	Price in RWF
prep_time_min	NUMBER(3)	NOT NULL	Cooking time (mins)

Table: INGREDIENTS

Column	Data Type	Constraints	Description
ingredient_id	NUMBER(5)	PK, NOT NULL	Unique Ingredient ID
stock_quantity	NUMBER(10,2)	CHECK >= 0	Current stock level
reorder_level	NUMBER(10,2)	NOT NULL	Low stock alert limit

Table: RECIPES

Column	Data Type	Constraints	Description
recipe_id	NUMBER(5)	PK, NOT NULL	Recipe ID
menu_id	NUMBER(5)	FK	Link to Menu
ingredient_id	NUMBER(5)	FK	Link to Ingredient
qty_needed	NUMBER(10,2)		Amount used per dish

Table: ORDERS

Column	Data Type	Constraints	Description
order_id	NUMBER(10)	PK, NOT NULL	Unique Order ID
table_id	NUMBER(3)	FK	Reference to Tables
customer_id	NUMBER(5)	FK	Reference to Customers
order_date	TIMESTAMP	DEFAULT SYS-DATE	Time of order

Table: ORDER_DETAILS

Column	Data Type	Constraints	Description
detail_id	NUMBER(10)	PK, NOT NULL	Detail Line ID
order_id	NUMBER(10)	FK	Parent Order
menu_id	NUMBER(5)	FK	Item Ordered
quantity	NUMBER(3)	CHECK > 0	Quantity

Table: KITCHEN_QUEUE

Column	Data Type	Constraints	Description
queue_id	NUMBER(10)	PK, NOT NULL	Ticket ID
detail_id	NUMBER(10)	FK	Link to Order Detail
priority_score	NUMBER(5)		Urgency calculation
status	VARCHAR2(20)		'WAITING', 'COOKING'

Table: NOTIFICATIONS

Column	Data Type	Constraints	Description
notif_id	NUMBER(10)	PK, NOT NULL	Notification ID
order_id	NUMBER(10)	FK	Link to Order
message	VARCHAR2(255)		SMS Text Content

Table: TRANSACTIONS

Column	Data Type	Constraints	Description
txn_id	NUMBER(10)	PK, NOT NULL	Payment ID
order_id	NUMBER(10)	FK	Link to Order
amount_paid	NUMBER(10,2)		Final amount
payment_method	VARCHAR2(20)		'CASH' or 'CARD'

Table: AUDIT_LOGS

Column	Data Type	Constraints	Description
log_id	NUMBER(10)	PK, NOT NULL	Audit ID
table_name	VARCHAR2(30)		Target Table
action	VARCHAR2(10)		'INSERT', 'UPDATE'
change_date	TIMESTAMP	DEFAULT SYS-DATE	Log Timestamp