

# Restaurant Ordering & Billing System

## Course Information

- **University:** Cairo University - Faculty of Computers and Artificial Intelligence
- **Course:** Advanced Software Engineering 2025
- **Team:** [Anton] & [Hatem]
- **TA:** [Ta Marwa] or Mostafa

## Design Patterns Implemented

1. **Facade Pattern** - RestaurantFacade.java provides unified interface for ordering workflow
2. **Abstract Factory Pattern** - Creates menu families (Vegetarian, Non-Vegetarian, Kids)
3. **Factory Method Pattern** - Creates specific items (Italian Pizza, Eastern Pizza, Burgers)
4. **Decorator Pattern** - Adds customizable add-ons to menu items
5. **Observer Pattern** - Notifies kitchen and waiter when orders are placed
6. **Strategy Pattern (Payment)** - Supports Cash, Card, and Mobile Wallet payments
7. **Strategy Pattern (Discount)** - Applies category-based discounts

For detailed design rationale, see `src/DOCUMENTATION.txt`

## Project Structure

```
src/
├─ Main.java
├─ DOCUMENTATION.txt
├─ model/                (MenuItem interface + base classes)
├─ factory/
│   ├─ abstractfactory/  (3 menu factories)
│   └─ factorymethod/    (Pizza & Burger factories)
├─ decorator/            (5 add-on decorators)
├─ observer/             (Kitchen & Waiter notification)
├─ facade/               (RestaurantFacade)
├─ billing/              (BillingService, Bill, TaxCalculator)
└─ Strategy/
    ├─ payment/           (3 payment strategies)
    └─ discount/          (4 discount strategies + factory)
```

# How to Run the Project

## *Prerequisites*

- Java JDK 8 or higher

## *Compilation*

```
cd src
javac Main.java
```

## *Execution*

```
java Main
```

## Example Test Cases

### *Test Case 1: Pizza Order with Customization & Discount*

**Scenario:** Order 2 Italian Margherita pizzas with add-ons

**Input:**

```
1 (Dine-in)
2 (Order Pizza)
1 (Italian Pizza)
Margherita
1 (Extra Cheese)
2 (Mushrooms)
6 (Done customizing)
2 (Quantity: 2)
4 (Finish Order)
1 (Cash Payment)
```

**Expected Output:**

```
Items: Italian Margherita Pizza, Extra Cheese, Mushrooms × 2
Subtotal: $260.00 (Base: $95, +$15 cheese, +$20 mushrooms = $130 × 2)
Discount: -$26.00 (10% Pizza Discount applied)
Tax (14%): $32.76
Total: $266.76
Kitchen & Waiter notified
```

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## *Test Case 2: Meat Order with Fixed Discount*

**Scenario:** Order 2 Beef Burgers

**Input:**

```
1 (Dine-in)
3 (Order Burger)
Beef
6 (No add-ons)
2 (Quantity: 2)
4 (Finish Order)
2 (Card Payment)
4111111111111111 (Card number)
```

**Expected Output:**

```
Items: Classic Beef Burger x 2
Subtotal: $220.00 ($110 x 2)
Discount: -$14.00 ($7 per Meat item x 2)
Tax (14%): $28.84
Total: $234.84
Payment via Credit Card
```

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## *Test Case 3: No Discount Scenario*

**Scenario:** Order desserts and beverages (no eligible discount category)

**Input:**

```
1 (Dine-in)
1 (Browse Menu Families)
3 (Kids Menu)
3 (Dessert)
6 (No add-ons)
2 (Quantity: 2)
1 (Browse Menu Families)
3 (Kids Menu)
4 (Beverage)
6 (No add-ons)
1 (Quantity: 1)
4 (Finish Order)
1 (Cash Payment)
```

**Expected Output:**

Items: Ice Cream Sundae × 2, Chocolate Milk × 1  
Subtotal: \$88.00 (\$35×2 + \$18×1)  
Discount: \$0.00 (No Discount applied)  
Tax (14%): \$12.32  
Total: \$100.32

## Discount Scenarios

### Available Discount Strategies

The system automatically selects the best discount based on order contents (Priority-based):

Priority	Category	Discount Type	Discount Amount
1 (Highest)	Pizza	Percentage	10% off pizza items
2	Chicken	Percentage	8% off chicken items
3	Meat	Fixed	\$7.00 off per meat item
4 (Default)	Other	None	No discount

### Discount Examples

1. Pizza Discount (10%)

- Order contains: Pizza items
- Calculation: 10% of total pizza price
- Example: \$200 pizza → \$20 discount

2. Chicken Discount (8%)

- Order contains: Chicken items (no pizza)
- Calculation: 8% of total chicken price
- Example: \$150 chicken → \$12 discount

3. Meat Discount (\$7/item)

- Order contains: Meat items (no pizza/chicken)
- Calculation: \$7 fixed per meat item
- Example: 3 beef burgers → \$21 discount (\$7 × 3)

4. No Discount

- Order contains: Only desserts/beverages/veggie items
- No discount applied

## *Priority Rule*

If an order contains multiple categories, only the **highest priority** discount applies:

- Pizza + Chicken → Pizza discount (10%)
- Chicken + Meat → Chicken discount (8%)
- Meat only → Meat discount (\$7/item)