SDLC Case Study Worksheet

Project Title: Online Shopping Cart

Team Name: Web Scalers
Team Members and Roles:

1. Muhammad Ibrahim - Project Manager
2. Afan Qaisar - Backend Developer
3. M Bilal Atif Usmani - Frontend Developer
4. Amir Aslam - QA Engineer
5. Abdullah Mufeez - UX Designer
6. Abdullah Khan - QA Engineer

1. Requirements Phase

Functional Requirements:

1. Users can register, log in, and manage their profile.
2. Users can browse products by categories and search for specific items.
3. Users can add products to the shopping cart and update quantities.
4. System calculates total price including tax and discount before checkout.
5. Users can proceed to checkout and place an order with payment options.

Non-Functional Requirements:

1. The website must load within 3 seconds on standard broadband connections.
2. The system must handle at least 1000 concurrent users without crashing.

2. Design Phase

Work Breakdown Structure (WBS):

Level 1: Online Shopping Cart
├── Level 2: Requirements Gathering
├── Level 2: Design
│ ├── Level 3: Frontend (UI/UX)
│ ├── Level 3: Backend (Database, APIs)
├── Level 2: Development
│ ├── Level 3: Frontend Development

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│   ├── Level 3: Backend Development
├── Level 2: Testing
│   ├── Level 3: Unit Testing
│   ├── Level 3: Integration Testing
├── Level 2: Deployment & Maintenance
```

UML Use Case Diagram:

Actors: User, System, Admin
Use Cases: Register/Login, Browse Products, Add to Cart, Calculate Total, Checkout, Manage Orders

3. Backend Design

Tool Used: MySQL for Database, Node.js/Express for API development.
Design: ER diagram with entities - Users, Products, Cart, Orders, Payments.

4. Development Phase

```
FUNCTION calculateCartTotal
  INPUT: List of cart items (price, quantity), taxRate, discountPercentage
  PROCESS:
    total ← 0
    FOR each item in cart:
      total ← total + (item.price × item.quantity)
    taxAmount ← total × taxRate
    discountAmount ← total × discountPercentage
    finalTotal ← total + taxAmount - discountAmount
  OUTPUT: finalTotal
END FUNCTION
```

5. Testing Phase

Test Case 1:
Input: Cart = [Product1: 100×2], Tax=10%, Discount=5%
Expected Output: 209 (200 + 20 - 10)
Result: Pass

Test Case 2:
Input: Cart = [Product1: 500×1, Product2: 300×1], Tax=8%, Discount=0%
Expected Output: 864 (800 + 64)
Result: Pass

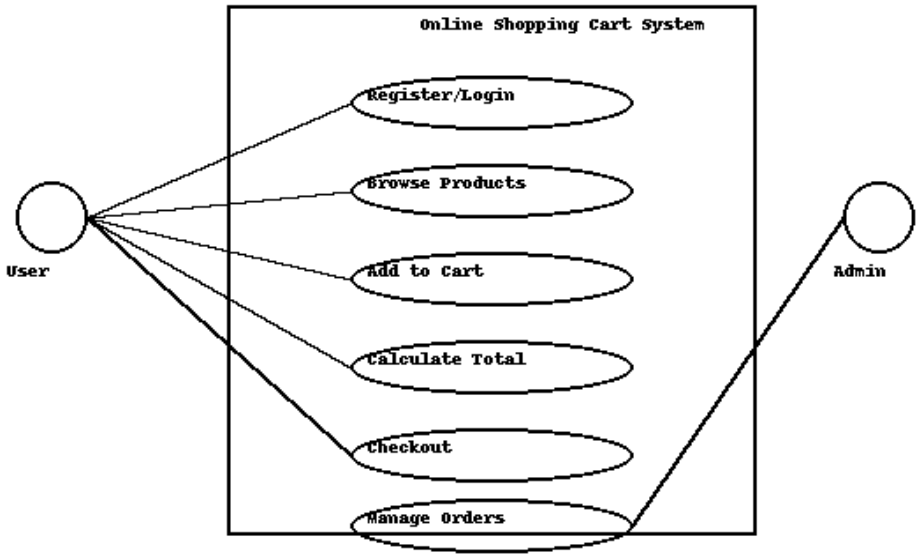
Test Case 3:
Input: Cart = [Product1: 250×4], Tax=5%, Discount=10%

Expected Output: 950 (1000 + 50 - 100)
Result: Pass

6. Reflection

1. Most challenging phase: Design Phase – because creating a scalable and user-friendly architecture required careful planning.
2. Best SDLC model: Agile – it allows iterative development and frequent feedback from stakeholders.
3. Functional & Non-Functional Requirements: Determined through stakeholder meetings, brainstorming sessions, and user research.

UML Use Case Diagram (Visual):



UML Class Diagram (Visual):