National University of Computer and Emerging Sciences

Laboratory manual #2
For
Software Design and Architecture

Course Instructor	**Amir Iqbal**
Lab Instructor	**Muhammad Hashir, Aina Batool**
Section	**BSE-4D**
Date	**07-02-24**
Semester	**Spring 24**

Instructions for lab submission:
You have to submit source files along with a word document. In the word document you have to give the heading of each exercise/question, then paste your UML diagram. Save your word document in the following format: roll number-lab no-section i.e. 21I-0008-lab1-BSE4D.

Objective:

- ☐ Designing and creating UML class diagram

Software for this lab:

- ☐ StarUML

Create UML class diagrams that illustrates the attributes, operations and relationships of the classes for the following:
Note: You can make assumptions if necessary (i.e. add attributes and methods) but don't deviate from the original question.

1. **Exercise: Online Shopping System** **Marks: 10**

The online shopping system allows users to browse through various products, add items to their cart, and purchase them using different payment methods.

User has attributes like id, name, email, password. A User can be an Admin or a Customer. A Customer can register for an account, after registration a customer can login using their credentials. Once logged in, users can view their profile information and update it if necessary.

Customers can browse through different categories of Products such as electronics, clothing, books, etc. They can view details about each product, including its name, description, price, and availability. Customers can add products to their shopping cart for purchase.

The Shopping cart allows customers to add, remove, or update the quantity of items. Customers can view the total price of the items in their cart. They can proceed to checkout once they have finished adding items to their cart.

During the checkout process, customers provide their shipping address and select a payment method. Payment methods may include credit/debit card, PayPal, or other options. Customers confirm their order before making the payment.

Once the payment is made, the system processes the order. Customers receive a confirmation email with the order details and estimated delivery time. Customers can place orders, cancel orders and track orders.

Administrators have access to an admin panel where they can manage products, categories, and user accounts. They can add new products, update existing ones, or remove them from the inventory. Administrators can also view and manage orders, including order status and shipment tracking.

2. **Exercise: Bank System** **Marks: 10**

The bank system contains data on customers identified by their name and address. Each customer may have one or more accounts associated with them.

Each account has a balance and belongs to a specific customer. There are two types of accounts: savings and investment. Savings accounts offer an interest rate, which may vary depending on the bank's policies and the balance in the account. Investment accounts are used to buy stocks.

Investment accounts facilitate the buying of stocks. Stocks are purchased at a certain quantity for a specified price (ticker). The bank applies a commission on stock orders, which is deducted from the account balance.

Customers can deposit or withdraw money from their accounts. Savings accounts accumulate interest over time. Investment accounts allow customers to buy and sell stocks.

The commission for stock orders is calculated based on the quantity of stocks bought or sold and the prevailing commission rate.

The bank system keeps track of the balances in each account and updates them accordingly for deposits, withdrawals, interest accrual, and stock transactions.

The bank provides customer services such as account inquiries, transaction history, and account statements.
The system ensures the security and privacy of customer information and financial transactions.

3. Exercise: Flight Management System **Marks: 10**

The flight management system handles flight scheduling, crew assignment, and aircraft allocation. It ensures that all flights are operated safely and efficiently, adhering to regulatory requirements and airline standards.

An airline, identified by its unique airline ID, operates various flights connecting different airports. Each airline has its own fleet of aircraft of different types.

Each flight is uniquely identified by a flight ID and is scheduled to depart from a departure airport to an arrival airport. Flights have designated pilots and co-pilots assigned by the airline. They are operated using aircraft of a specific type and have scheduled departure and arrival times.

Aircraft are identified by their unique aircraft ID and belong to specific airlines. They can be in a working state or under repair, and their current location is tracked by the system. The airline ensures that all aircraft in operation meet safety standards and undergo necessary maintenance when required.

Pilots are assigned to flights based on their experience level, ranging from 1 (minimum) to 3 (maximum). Different types of aircraft may require a different number of pilots, including captains, co-pilots, and navigators.

Airports serve as departure and arrival points for flights. Each airport is uniquely identified by an airport code.