National University of Computer and Emerging Sciences

Laboratory manual # 04
For
Software Design and Architecture

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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-lab04-BSE4D.

Objective:

- ☐ Understanding and designing UML State Diagrams
- ☐ Understanding and designing UML Package Diagrams

Software for this lab:

- ☐ StarUML
- ☐ Visual Paradigm

Create UML state diagrams for the following scenarios:
You can make assumptions and add more details.
Design a UML state diagram representing the states, transitions, and actions of the following scenarios:

1. **Exercise: Online Reservation System for a Restaurant Marks: 10**

The online reservation system allows customers to book tables, modify existing reservations, or cancel reservations

- The reservation process starts in the initial state, awaiting user interaction.
- Users initiate the reservation process by checking the availability of tables for their desired date and time.
- The system displays available tables based on user input.

- After checking table availability, users have three options: Make Reservation, Modify Reservation, or Cancel Reservation.
    - Users can choose one of the available options to proceed.

- If users choose to make a new reservation, the system navigates to the Make Reservation state, which include:
    - Select Date and Time: Users specify the date and time for their reservation.
    - Choose Party Size: Users select the number of guests for the reservation.
    - Confirm Reservation Details: Users review and confirm their reservation details before finalizing.
    - Finalize Reservation: The system confirms the reservation and assigns a booking reference number.

- If users choose to modify an existing reservation, the system navigates to the Modify Reservation state, which include:
    - View Existing Reservations: Users can view their current reservations.
    - Select Reservation to Modify: Users choose the reservation they wish to modify.
    - Go back to the View Existing Reservations step.
    - Update Date and Time: Users can update the date and time of their reservation.
    - Update Party Size: Users can adjust the number of guests for their reservation.
    - Confirm Modification: Users review and confirm the changes made to their reservation.

- If users choose to cancel an existing reservation, the system cancels the reservation and removes it from the system.

2. Exercise: Collaboration Platform **Marks: 10**

The online collaboration platform enables users to collaborate on projects, share documents, and communicate with team members in real-time. During collaboration sessions, multiple activities may occur simultaneously, such as document editing, file sharing, and chat messaging.

Describe the states, transitions, concurrent regions, and nested states of the collaboration platform, considering the following aspects:

- The collaboration platform consists of concurrent regions to manage multiple activities simultaneously, including document editing, file sharing, and chat messaging.
- Within each concurrent region, there are nested states representing different stages or subtasks of collaboration activities. For example, within the "Document Editing" concurrent region, nested states could include "Creating New Document," "Editing Existing Document," and "Saving Changes." In “File Sharing” uploading, downloading and sharing files/documents and in “chat messages” sending messages and receiving messages etc.
- Users will have a choice if they want to create a document or edit a document.
- You can add additional details (states, transitions etc) according to the ongoing scenario.

3. **Exercise: Online Banking System (Package Diagram) Marks: 10**

Draw a UML package diagram for a simplified online banking system. The online banking system aims to provide basic banking functionalities to customers, including account management, fund transfers, transaction history, and balance inquiry.

- Account Management Module: This module is responsible for managing customer accounts. It includes functionalities such as creating new accounts, updating account information, closing accounts, and resetting passwords. Additionally, it tracks account balances, account types (e.g., savings, checking), and account statuses (e.g., active, inactive).
- Transaction Management Module: This module handles the processing of financial transactions. It allows customers to deposit funds into their accounts, withdraw funds, transfer money between accounts, and make payments to external accounts. It also supports transaction reversal and transaction history tracking.
- Authentication and Security Module: This module provides authentication and security features to protect customer accounts and sensitive information. It includes functionalities for user authentication (e.g., login/logout), password management (e.g., password reset).
- Notification Module: This module handles communication between the online banking system and customers. It includes features for sending automated notifications to customers regarding account activities, transaction alerts, payment reminders, and security updates. It supports email notifications and SMS alerts.
- Customer Support Module: This module provides customer support services to address customer inquiries, issues, and requests. It includes features for contacting customer support agents via chat, email, or phone, submitting support tickets, and tracking the resolution of customer issues.

The package diagram should illustrate the modular structure of the online banking system, with each module represented as a package containing related classes and interfaces. Dependencies between modules should be indicated, highlighting the interactions and relationships between different components of the system.