CS23302 DATA STRUCTURES LAB

Week 3 Date: 24.07.2025

Lab 3: Single and Circular Linked List

Write Programs to implement the following:

1. **Train Compartment Management System:** Each train compartment is a node in a linked list. Implement functionalities to: (a) Add a compartment at the front or rear, (b) Remove a compartment by number, (c) Display compartments in forward and reverse order.

   Fields in Node: compartmentNumber, capacity, occupiedSeats

2. **Polynomial Operations:** Represent a polynomial using a singly linked list. Each node should contain a coefficient and exponent. Implement: Addition /Subtraction/Multiplication of two polynomials and to display the resultant polynomial.

3. **Music Playlist Management System:** Create a circular linked list to simulate a music playlist. Each song is a node. Provide operations to: (a) Play next song (b) Play previous song (c) Add/remove song and (d) Display playlist

   Song Fields: title, artist, duration

4. **Token Ring Network Simulation: In a token ring network, computers are connected in a ring topology and a token circulates around the ring. Only the computer with the token can send data. Once the data is sent, the token is passed to the next computer.**

   Simulate this using a **circular singly linked list**, where each node represents a computer. Implement the following operations:

   - addComputer(id) – Adds a computer to the ring.
   - removeComputer(id) – Removes a computer from the ring.
   - passToken(steps) – Pass the token steps times from the current computer.
   - sendData(sourceID, destID, message) – Only the computer with the token can initiate sending. Data circulates till it reaches the destination.

Additional Constraints:

- The list must remain circular after any addition or deletion.
- If a computer is removed and it holds the token, the token is passed to the next node.