DAY 12:

Task 5:

Q) Removing Duplicates from a Sorted Linked List

A sorted linked list has been constructed with repeated elements. Describe an algorithm to remove all duplicates from the linked list efficiently.

EXPLANATION:

The Listnode program focuses on a singly linked list where each node contains an integer value. The primary goal is to remove consecutive duplicate values from this linked list and print the list before and after this operation.

Components

1. ListNode Class

Purpose: Represents an individual node in the linked list.

Attributes: Each node has an integer value (val) and a reference to the next node (next).

Constructor: Initializes the node with a given integer value.

2. Listnode Class

Purpose: Provides methods to manipulate and display the linked list.

Key Methods:

- removeDuplicates(ListNode head): Removes consecutive duplicate values from the list.
- printList(ListNode head): Prints the values of the nodes in the list.

Detailed Logic

ListNode Class

- Represents the building block of the linked list.

- Each ListNode instance holds a value and a reference to the next node, forming a chain-like structure.

Listnode Class

1. removeDuplicates(ListNode head)

- Objective: Remove consecutive duplicate nodes from the linked list.

- Logic:

  - Start with the head of the list.

  - Traverse the list using a current pointer.

  - For each node, check if the next node has the same value as the current node.

  - If they are the same, bypass the next node by linking the current node to the node after the next (removing the duplicate).

  - If they are different, move the current pointer to the next node.

  - Continue this process until the end of the list.

- *Outcome*: A modified list with consecutive duplicates removed.

2. printList(ListNode head)

Objective: Print all values in the linked list from head to tail.

- Logic:

  - Start with the head of the list.

  - Traverse the list using a current pointer.

  - For each node, print its value.

  - Move the current pointer to the next node.

  - Continue until the end of the list.

- Outcome: A printed representation of the linked list values.

3. main(String[] args)

Objective: Demonstrate the functionality of the linked list operations.

-Logic:

- Create and initialize a linked list with several nodes, including some consecutive duplicates.

- Print the original list using printList.

- Remove duplicates using removeDuplicates.

- Print the modified list using printList.

Outcome: Visual demonstration of the linked list before and after duplicate remov

Summary

ListNode Class: Defines the structure of each node in the linked list.

-Listnode Class:

-removeDuplicates: Method to remove consecutive duplicate nodes from the list.

-printList: Method to print the linked list.

- Main Method: Demonstrates creating a linked list, printing it, removing duplicates, and printing it again.

By following this logic, the Listnode program effectively manages the linked list, removes consecutive duplicates, and provides a clear before