**Exercise 5: Task Management System**

Q. Explain the different types of linked lists (Singly Linked List, Doubly Linked List).

Understanding Linked Lists

A linked list is a linear data structure where elements are not stored at contiguous memory locations.

Instead, each element (node) contains data and a reference (link) to the next node in the sequence.

Types of Linked Lists:

Singly Linked List: Each node points to the next node.

Doubly Linked List: Each node points to both the next and previous nodes.

Q. Analyze the time complexity of each operation.

Time Complexity Analysis

Add: O(n) in the worst case (adding at the end), O(1) if adding at the beginning

Search: O(n)

Traverse: O(n)

Delete: O(n) in the worst case (deleting the last element)

Q. Discuss the advantages of linked lists over arrays for dynamic data.

Advantages of Linked Lists over Arrays

Dynamic size: Linked lists can grow or shrink as needed, unlike arrays which have a fixed size.

Efficient insertions and deletions: Inserting or deleting elements in a linked list is generally faster than in an array, especially in the middle of the list.

Flexibility: Linked lists can be used to implement various data structures like stacks, queues, and graphs.

-----------------------