**Exercise 5: Task Management System**

1) The different types of linked lists (Singly Linked List, Doubly Linked List).

A linked list is a linear data structure where elements are not stored in 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 has a reference to the next node.

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

2)Analysis

Time complexity:

addTask: O(1) as it adds a new node at the beginning.

searchTaskById: O(n) as we need to traverse the list in the worst case.

displayTasks: O(n) as we iterate through all nodes.

deleteTask: O(n) in the worst case when the task to be deleted is at the end.

3)Advantages of linked lists over arrays for dynamic data:

Dynamic size: Linked lists can grow and shrink as needed.

Efficient insertions and deletions: Elements can be inserted and deleted in O(1) time by modifying pointers.

No wasted space: Linked lists only allocate memory for nodes that are actually used.

However, linked lists have the disadvantage of not providing random access to elements, unlike arrays.