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

Singly Linked List:

A singly linked list consists of nodes where each node has two components: data and a pointer (or reference) to the next node in the sequence.

The last node in the list points to null, indicating the end of the list.

Operations like insertion and deletion are efficient when done at the head of the list, but searching can be slow since it requires traversing the list from the head to the desired node.

Doubly Linked List:

A doubly linked list is similar to a singly linked list but with an additional pointer in each node that points to the previous node.

This allows traversal in both directions (forward and backward).

It offers more flexibility than a singly linked list but requires extra memory for the additional pointers and slightly more complex node operations.

**2) Analyze the time complexity of each operation.**

Add Task: O(n) - Since we add tasks to the end of the list, in the worst case, we traverse all n nodes to find the end.

Search Task: O(n) - We may need to check each node in the list to find the task.

Delete Task: O(n) - Similar to search, we may need to traverse the entire list to find the task to delete.

Traverse Tasks: O(n) - To display all tasks, we need to traverse the entire list.

**3) Discuss the advantages of linked lists over arrays for dynamic data.**

Advantages of Linked Lists over Arrays for Dynamic Data:

Dynamic Size: Linked lists do not need to be resized as elements are added or removed. In contrast, arrays have a fixed size, requiring resizing or reallocation when the capacity is exceeded.

Ease of Insertion/Deletion: Insertion and deletion of elements in a linked list do not require shifting elements, as they do in an array. This makes linked lists more efficient for scenarios with frequent insertions and deletions, particularly in the middle of the list.

This setup provides a flexible and dynamic way to manage tasks in a task management system, leveraging the benefits of a singly linked list.