**Exercise 5: Task Management System**

**1.Types of Linked Lists**

**1. Singly Linked List:**

* A singly linked list consists of nodes where each node has a data part and a reference (or link) to the next node in the sequence.
* It allows traversal in one direction (forward).
* Basic operations (insertion, deletion) are simpler but traversing backwards is not possible directly.

**2. Doubly Linked List:**

* A doubly linked list consists of nodes where each node contains a data part, a reference to the next node, and a reference to the previous node.
* It allows traversal in both directions (forward and backward).
* Operations are more complex due to the additional previous pointer but provide more flexibility in traversal and manipulation.

**4.Analysis**

**Time Complexity:**

* **Add Task**: O(n) in the worst case (traverse to the end of the list).
* **Search Task**: O(n) in the worst case (traverse the list).
* **Traverse Tasks**: O(n) (traverse the entire list).
* **Delete Task**: O(n) in the worst case (find the node and adjust pointers).

**Advantages of Linked Lists over Arrays:**

* **Dynamic Size**: Linked lists can grow or shrink in size dynamically, unlike arrays which have a fixed size.
* **Efficient Insertions/Deletions**: Inserting or deleting elements does not require shifting other elements, making these operations more efficient compared to arrays, especially for large datasets.