**Exercise 5: Task Management System**

**Linked List**

It is a linear data structure made up of nodes. Each node contains data and a reference (or link) to the next node. Unlike arrays, linked lists do not require a fixed size and can grow or shrink dynamically at runtime.

**Types of Linked Lists:**

* **Singly Linked List**: Each node contains data and a pointer to the next node. It moves in one direction, from head to tail. This is simple and uses less memory but cannot go backward.
* **Doubly Linked List**: Each node contains data, a pointer to the next node, and a pointer to the previous node. It allows movement in both directions forward and backward which makes some operations faster but uses more memory.
* **Circular Linked List**: This can be singly or doubly linked, but the last node points back to the first node instead of having a null reference. It is useful for circular tasks or queues.

**Time Complexity Analysis**

* **Add**: O(n) - traverse to the end and insert
* **Search**: O(n) - check each node
* **Traverse**: O(n) - visit all nodes
* **Delete**: O(n) - search and remove the node

**Advantages of Linked Lists Over Arrays**

* **Dynamic Size**: Can grow or shrink at runtime without needing a fixed size.
* **Efficient Insert/Delete**: Adding or removing elements does not require shifting data as in arrays.
* **Memory Efficiency**: No memory is wasted for unused elements.