**Exercise 5: Task Management System**

**Singly Linked List:**

* A singly linked list is a linear data structure where each element is a separate object called a node. Each node contains two parts: data and a reference (or link) to the next node in the sequence.
* **Advantages**:
  + Efficient insertion and deletion operations (O(1) at the beginning or end if head pointer is used).
  + Dynamic size, as memory allocation is flexible.
* **Disadvantages**:
  + Sequential access only; random access is not feasible (O(n) to access nth element).
  + Extra memory for storing links.

**Time Complexity Analysis**

* **Add Task**: O(n) - Adding at the end requires traversing the list.
* **Search Task**: O(n) - Searching requires traversing the list.
* **Traverse**: O(n) - Requires traversing all elements of the list.
* **Delete Task**: O(n) - Deleting requires finding the node and potentially adjusting pointers.

**Advantages of Linked Lists over Arrays for Dynamic Data**

* **Dynamic Size**: Linked lists can grow (or shrink) dynamically without the need for resizing or reallocation.
* **Efficient Insertions and Deletions**: Inserting or deleting elements can be more efficient compared to arrays, especially for large lists.
* **Flexible Memory Allocation**: Linked lists use memory efficiently by allocating memory only when required.