Task Management Analysis - Linked Lists

1 . Singly Linked List  
- Each node contains a value and a reference to the next node.  
- Can only traverse in one direction (forward).

2 . Doubly Linked List

- Each node contains a value, a reference to the next node, and a reference to the previous node.  
- Allows traversal in both forward and backward directions.

# Time Complexity Analysis

|  |  |  |
| --- | --- | --- |
| Operation | Singly Linked List | Doubly Linked List |
| Add | O(n) | O(n) |
| Search | O(n) | O(n) |
| Delete | O(n) | O(n) |
| Traverse | O(n) | O(n) forward/backward |

# Linked Lists vs Arrays

**Advantages of Linked Lists:**  
- Dynamic size: Memory allocation happens at runtime.  
- Efficient insertions/deletions: No need to shift elements like arrays.  
  
**Limitations:**  
- Slower access time (no indexing).  
- More memory required (extra pointer fields).