1. **Understand Linked Lists:**

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

**Types of Linked Lists**

**Singly Linked List**:

* + **Structure**: Each node contains data and a reference (or link) to the next node in the sequence.
  + **Advantages**: Simple to implement and efficient for sequential access and insertions/deletions at the beginning.
  + **Disadvantages**: Inefficient for reverse traversal and insertions/deletions in the middle or end (requires traversing from the head).

**Doubly Linked List**:

* + **Structure**: Each node contains data, a reference to the next node, and a reference to the previous node.
  + **Advantages**: Allows efficient forward and backward traversal, and easier insertions/deletions from both ends.
  + **Disadvantages**: More complex to implement and requires more memory per node due to the additional reference.

1. **Analysis:**

* Analyze the time complexity of each operation.

**Time Complexity of Each Operation**

* **Add Operation**:
  + **Time Complexity**: O(n) in the worst case (when adding to the end of the list).
* **Search Operation**:
  + **Time Complexity**: O(n) in the worst case (when searching for an element at the end or not in the list).
* **Traverse Operation**:
  + **Time Complexity**: O(n) (since all elements need to be visited).
* **Delete Operation**:
  + **Time Complexity**: O(n) in the worst case (when deleting an element at the end or not in the list).

1. Discuss the advantages of linked lists over arrays for dynamic data.

**Dynamic size, Efficient insertions and deletions.**