

## 2. Linked List – Data Structure

### ♦ Definition:

A **Linked List** is a linear data structure where each element (**node**) contains:

- **Data**
- **Pointer** to the next node

It does **not** store elements in contiguous memory.

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### ♦ Types of Linked Lists:

1. **Singly Linked List** – Each node points to the next node only
  2. **Doubly Linked List** – Nodes point to both previous and next
  3. **Circular Linked List** – Last node points to the first node
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### ♦ Key Operations:

- **Insertion:**  $O(1)$  at head,  $O(n)$  at tail
  - **Deletion:**  $O(1)$  at head,  $O(n)$  at tail
  - **Search:**  $O(n)$
  - **No direct access via index**
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### ♦ Example (Singly LL in C++):

cpp

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```
struct Node {
```

```
int data;  
Node* next;  
};
```

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◆ **Real-life Example:**

- Playlist navigation (Next/Previous)
- Browser history
- Undo/Redo in editors