Data Structures Cheat Sheet

1. Array

Fixed-size sequential memory. Access: O(1), Insert/Delete: O(n), Memory: contiguous.

2. Linked List

Nodes with data and pointers. Access: O(n), Insert/Delete: O(1) at head.

3. Stack

LIFO. Push/Pop/Peek: O(1). Used in backtracking, expression eval.

4. Queue

FIFO. Enqueue/Dequeue: O(1). Used in task scheduling.

5. HashMap

Key-value with hash. Avg O(1), Worst O(n). Collisions handled by chaining/open addressing.

6. Binary Tree

Hierarchical. BST: log n ops if balanced. Used in sorting, range queries.

7. Heap

Binary Heap for priority queues. Insert/Delete: O(log n), Peek: O(1).

8. Trie

Prefix tree for strings. Insert/Search: O(L). High memory usage.

9. Graph

Nodes and edges. Use BFS/DFS. Represented via adjacency list/matrix.

10. Set

Unique items. HashSet: O(1), TreeSet: O(log n). Used for deduplication.

Quick Big-O Table

Operation	Array	LinkedList	Stack/Queue	HashMap	BST	Heap	Trie
Access	O(1)	O(n)	O(n)	O(1)	O(log n)	O(n)	O(L)
Insert	O(n)	O(1)	O(1)	O(1)	O(log n)	O(log n)	O(L)
Delete	O(n)	O(1)	O(1)	O(1)	O(log n)	O(log n)	O(L)
Search	O(n)	O(n)	O(n)	O(1)	O(log n)	O(n)	O(L)