100 DSA Theory Interview Questions

Array & String

- What is an array?
- Difference between array and linked list?
- How is memory allocated for arrays?
- What is a string in programming?
- How are strings stored in memory in C/C++ vs Java?
- What are the advantages and disadvantages of arrays?
- What is a dynamic array?
- What is character array vs string object?
- What is array reallocation?
- What is a 2D array and how is it represented in memory?
- Difference between String, StringBuffer, and StringBuilder in Java?

Linked List

- What is a linked list?
- Types of linked lists?
- Advantages of linked lists over arrays?
- How does insertion/deletion work in a linked list?
- What is a circular linked list?
- What is a doubly linked list?
- Real-life use cases of linked list?
- What are sentinel nodes?
- How to detect a loop in a linked list?
- What is the time complexity of common linked list operations?

Stack & Queue

- What is a stack? Applications of stack?

- What is a queue? Types of queues?

- Difference between stack and queue?

- What is a circular queue?

- What is a priority queue?

- What is a dequeue (double-ended queue)?

- Use cases of stack and queue in real life?

- How to implement stack using queues?

- How to implement queue using stacks?

- What is overflow and underflow in stack/queue?

Trees

- What is a binary tree?

- What is a binary search tree (BST)?

- Difference between BST and Binary Tree?

- What is tree traversal? Types of traversals?

- What is a balanced binary tree?

- What is a heap? Difference between min-heap and max-heap?

- What is an AVL tree?

- What is a complete binary tree?

- What is a red-black tree?

- What is a segment tree and its use case?

Graph

- What is a graph? Types of graphs?

- Difference between tree and graph?

- What are DFS and BFS?

- What is a weighted graph?

- What is a cycle in a graph?

- What is an adjacency matrix and list?

- What is a directed acyclic graph (DAG)?

- What is topological sorting?

- What is Dijkstra's algorithm?

- What is Bellman-Ford algorithm?

Hashing

- What is hashing?

- What is a hash table?

- What are hash collisions? How to handle them?

- Applications of hashing?

- What is a good hash function?

- Difference between HashMap and HashSet?

- What is open addressing?

- What is separate chaining?

- How is hashing used in databases?

- What is load factor in hashing?

Sorting & Searching

- Common sorting algorithms and their complexities?

- Difference between comparison and non-comparison sorts?

- What is bubble sort and how it works?

- What is binary search and its conditions?

- Difference between linear and binary search?

- What is merge sort and quicksort?

- What is selection sort?

- What is insertion sort?

- What is radix sort?

- What is counting sort and when is it useful?

Recursion & Complexity

- What is recursion?
- Difference between recursion and iteration?
- What is tail recursion?
- What is time complexity?
- What is space complexity?
- What is Big O, Big Omega, and Big Theta notation?
- How to calculate time complexity of a code?
- What is logarithmic time complexity?
- What is amortized time complexity?
- What are recursive trees in complexity analysis?

General Concepts

- Difference between linear and non-linear data structures?
- What is dynamic programming?
- What is greedy algorithm?
- When to use greedy vs dynamic programming?
- What is divide and conquer approach?
- What is backtracking?
- What is memoization?
- What are NP-complete problems?
- What is a brute-force algorithm?
- What is the difference between algorithm and data structure?