Product Based Problem Check-List

12 October 2020 19:19

Pre-Placements checklist

Data Structures:

1. **Array:**
    1. Kaden's Algorithm
    2. N/2, N/3 greatest Number
    3. Merge overlapping intervals
    4. Rotate matrix
    5. Buy / Sell stocks - I, II, III: https://leetcode.com/problems/best-time-to-buy-and-sell-stock/

2. **Strings:**
    1. Pattern matching algorithms (KMP + Rabin Karp)
    2. Using StringBuilder class -> Add, Multiply Strings
    3. String compression algorithm

3. **LinkedLists:**
    1. Implementation of Linkedlist
    2. Detect cycle in a linkedlist - Floyd Algo
    3. Reverse a linkedlist + reverse in groups

4. **Stacks:**
    1. Implementation of Stack
    2. Balance parenthesis
    3. Trapping rain water
    4. Implement min stack

5. **Queues:**
    1. Implementation of Queue + Deque
    2. Sliding window maximum
    3. Implement BFS
    4. Implement Level order in Binary tree

6. **PriorityQueues or Heaps:**
    1. Implementation of Heap Data structure
    2. Connect n ropes with min cost: https://www.geeksforgeeks.org/connect-n-ropes-minimum-cost/
    3. Median of running stream: https://www.geeksforgeeks.org/median-of-stream-of-running-integers-using-stl/
    4. LRU and LFU cache

7. **Sets & Maps:**
    1. Internal working of HashMap
    2. 4-sum
    3. Longest substring without repeat: https://www.interviewbit.com/problems/longest-substring-without-repeat/

8. **Binary Trees:**
    1. Implementation: insert, delete, traverse: https://youtu.be/QhIM-G7FAow
    2. Print top level, left level, right level, level order, zig-zag traversal of Binary tree
    3. Invert a binary tree: https://leetcode.com/problems/invert-binary-tree/
    4. Lowest common ancestor

9. **Binary Search Trees:**
    1. Implementation
    2. Check if a tree is BST or not
    3. AVL tree and rotation

10. **Graphs:**
    1. Implementation, BFS and DFS traversals
    2. Topological sorting
    3. Bellman ford Algorithm
    4. Dijkstra's Algorithm
    5. Prim's Algorithm
    6. Kruskal's Algorithm
    7. Unique Islands Problem: https://www.geeksforgeeks.org/find-the-number-of-distinct-islands-in-a-2d-matrix/

11. **Tries:**
    1. Implementation

12. **Segment Trees : More important in CP**
    1. Implementation

Algorithms:

1. **Two pointers Algorithm**
    1. 3-Sum
    2. Container with most water

2. **Math**
    1. Fast Power: https://www.youtube.com/watch?v=dyrRM8dTEus
    2. Euclid GCD
    3. Sieve of Eratosthenes

3. **Recursion + Backtracking**
    1. Sudoku solver
    2. N-Queens Problem
    3. Permutation and Combinations (Bruteforce)
    4. Sort the array containing only 0, 1 and 2

4. **Bits Manipulation + Mathematics**
    1. Find one non-repeating number, find two
    2. Count 1 bits in a number

5. **Divide & Conquer**
    1. Merge Sort
    2. Median of two sorted arrays

6. **Binary Searching**
    1. Find upper and lower bound using Binary search
    2. Allocate books: https://www.interviewbit.com/problems/allocate-books/

7. **Greedy Programming**
    1. Candy distribution: https://www.interviewbit.com/problems/distribute-candy/
    2. Gas station: https://www.interviewbit.com/problems/gas-station/
    3. Fractional Knapsack

8. **Dynamic Programming**
    1. 0/1 Knapsack: https://www.youtube.com/watch?v=y6kpGJBI7t0
    2. Longest increasing subsequence
    3. Matrix chain multiplication
    4. Coin change problem

Operating System:

1. Basics of Threads
2. Process scheduling algorithms
3. Critical section Problem
4. Deadlock
5. Memory management
    1. Paging
    2. Segmentation
6. Page replacement algorithms
7. Disk scheduling algorithms

DBMS:

1. Types of Keys: Candidate, Super, Foreign keys

2. Normal Forms
3. Joins
4. SQL queries
5. ACID properties
6. Indexing: B trees, B+ trees concepts

Systems Design:

1. **Low level design:**
    1. Class, ER diagrams
    2. OOPS concepts
    3. Design Elevator system, Parking Lot, MakeMyTrip System

2. **High level design**
    1. Scaling
    2. Distributed systems
    3. Microservice and Monolithic architecture
    4. Load balancing
    5. Message queue
    6. Design Whatsapp, Tinder, Uber system