@thriverashish
Ashish Gupta

THRIVER ASHISH'S

DATA STRUCTURES AND ALGORITHM SHEET

This 90 days Roadmap covers all the topics of DS-Algo which are most important for technical interviews and also important to become a good software engineer

This sheet also covers all the questions that are needed to be solved in order to crack tech giants interviews

90 DAYS

https://www.youtube.com/c/thriverashish

https://www.youtube.com/c/thrivewithashish

https://www.linkedin.com/in/thriverashish

@thriverashish

THRIVE WITH ASHISH

@thriverashish
Ashish Gupta

ARRAYS

10 DAYS

@thriverashish

https://www.linkedin.com/in/thriverashish

https://www.youtube.com/c/thriverashish

DAY 1

Understand Big O notation (Time and Space complexity)

DAY 2

-- Study Basic Concepts of Array and get familiar with List DS in the programming language you chose.

-- Reverse the array in place (space complexity should be constant)
Input —>> 3,5,9,4,2
Output —>> 2,4,9,5,3

-- Insert an element in between of array

DAY 3 AND DAY 4

- Understand Quick Sort, Merge Sort, Insertion Sort and Selection Sort
- Implement them all in your fav programming language

DAY 5

- Understand Binary Search Algorithm
- Search an element in the Sorted Array
- Leetcode Question 33 --> Search in Rotated Sorted Array
- Leetcode Question 50 --> Implement pow(x, n), which calculates x raised to the power n (i.e., xn)

DAY 6

- Understand 2D matrix/ @D Arrays
- Search a 2D Matrix Leetcode 74
- Set Matrix to Zero —> Leetcode 73
- Pascals Triangle —> Leetcode 118
- Rotate Matrix —> Leetcode 48

DAY 7

- Kadane's Algo —> Maximum Subbarray Leetcode 73
- Sort Array of 0's 1's and 2's Leetcode 75
- Two Sum Problem —> Leetcode 1
- Find Duplicate

THRIVE WITH ASHISH

@thriverashish
Ashish Gupta

@thriverashish

https://www.linkedin.com/in/thriverashish

https://www.youtube.com/c/thriverashish

DAY 8

- Stock Buy and Sell --> Leetcode 121
- Next Permutation --> Leetcode 32
- Merge Intervals --> Leetcode 56
- Merge Sorted Arrays --> Leetcode 88

DAY 9

- Reverse pairs --> Leetcode 493
- Grid Unique Paths --> Leetcode 62
- 3 Sum problem --> Leetcode 15
- 4 Sum Problem --> Leetcode 18

DAY 10

- Repeat Missing Number Array --> InterviewBit
  https://www.interviewbit.com/problems/repeat-and-missing-number-array/
- Longest Consecutive Subsequence —>Leetcode 128
- Subarray with given Xor —> Interview Bit
  https://www.interviewbit.com/problems/subarray-with-given-xor/
- Longest Substring without repeat —>

@thriverashish
Ashish Gupta

LINKED LIST

04 DAYS

@thriverashish

https://www.linkedin.com/in/thriverashish

https://www.youtube.com/c/thriverashish

DAY 11

- Understand the concept of Linked List
- Understand its Advantages and disadvantages over Arrays
- Implement the Linked list in the language you chose:
- Create Linked List class
  Create a Node
  Add Node
  Remove Node
  Find Node in Linked List

DAY 12

- Reverse Linked List
- Find Middle of the Linked List
- Remove Nth Node From End of List
- Merge Two Sorted Lists

DAY 13

- Add Two Numbers given in linked list
- Detect and remove Linked List Cycle
- Intersection of Two Linked Lists
- Palindrome Linked List

DAY 14

- Reverse Nodes in k-Group
- Rotate List
- Flattening a Linked List
- Copy List with Random Pointer

THRIVE WITH ASHISH

@thriverashish
Ashish Gupta

STACK

@thriverashish

03 DAYS

https://www.linkedin.com/in/thriverashish

https://www.youtube.com/c/thriverashish

DAY 15

- Understand the basics of Stack Data Structures
- Relate with some real-life examples like
- Stack of Note books and Stack of coins
- Implement the Stack using Arrays (Push Pop etc functionalities)
- Implement the Stack with Linked List

DAY 16

- Sort a Stack
- Valid Parenthesis --> Leetcode 20
- Retrieve Minimum Element from the Stack --> Leetcode 155

DAY 17 (LEVEL UP)

- Next Greater Element using Stack --> Leetcode 496
- Find largest rectangle in Histogram --> Leetcode 84

THRIVE WITH ASHISH

@thriverashish
Ashish Gupta

QUEUES

03 DAYS

@thriverashish

https://www.linkedin.com/in/thriverashish

https://www.youtube.com/c/thriverashish

DAY 18

- Understand the basics of Queue Data Structures
- Relate with some real-life examples
- Implement the Queue using Arrays
- Implement the Queue using the Linked List

DAY 19

- Implement Queue using Stack
- Implement Stack using Queue
- Implement and understand Double Ended Queue

DAY 20

- Understand and Implement Circular Queue
- Fine examples where circular Queues can be used.
- Implement Producer Consumer Problem

DAY 21

- Queue Reversal
- Implement LRU Cache
- Implement LFU Cache

DAY 22

- Learn Sliding window Coding Pattern
- Sliding Window Maximum Leetcode 239
- First negative integer in every window of size

DAY 23

- Trapping Rain Water (Stack-based) Leetcode 42
- Simplify Directory Path (Stack Based) Leetcode 71
  (No Priority Queue for now)

THRIVE WITH ASHISH

@thriverashish
Ashish Gupta

RECURSION

@thriverashish

04 DAYS

https://www.linkedin.com/in/thriverashish

https://www.youtube.com/c/thriverashish

DAY 24

- Understand Recursion and its base conditions etc.
- Understand in depth not only what recursion is but also what kind of Data str it uses internally etc.
- You will get to know how StackOverflow error occurs

DAY 25

- Fibonacci Number
- Reverse the Linked List using the Recursive approach
- Reverse LinkedList in k-groups

DAY 26

- Subset Sums
- Subsets II

DAY 27

- Combination Sum
- Combination Sum II
- Palindrome Partitioning
- Permutation Sequence

THRIVE WITH ASHISH

@thriverashish
Ashish Gupta

REVISION

@thriverashish

03 DAYS

https://www.linkedin.com/in/thriverashish

https://www.youtube.com/c/thriverashish

DAY 28

Revise Arrays and Linked List

DAY 29

Revise Queues and Stacks

DAY 30

Revise Recursion and practice

THRIVE WITH ASHISH

@thriverashish
Ashish Gupta

HASHING AND HASH BASED DS

@thriverashish

04 DAYS

https://www.linkedin.com/in/thriverashish

https://www.youtube.com/c/thriverashish

DAY 31

- Understand what exactly Hash-based Data structures are!
- What is hashing?
- What is a hash code?
- What is Hash Function?
- Understand the concept of ROLLING HASH
- Understand the usage and application of Hash Tables like

  -- Used to implement database indexes.
  -- Used to implement associative arrays.
  -- Used to implement the different data structures like hashMap/HashSet etc

DAY 32

- Understand the internals of HashMap and HashSet
- Read the code of the already implemented hashMap/HashSet library if the code is available like in Java.
- Do a bit of hands-on, iterate the hashMap/set etc

DAY 33

- Design HashSet -- Leetcode 705
- Design HashMap -- Leetcode 706
- Two Sum -- Leetcode 1
- Running Sum of 1D Array Leetcode 1480

DAY 34

- Check If a String Contains All Binary Codes of Size K -- Leetcode 1461
- K Divisible Elements Subarrays -- Leetcode 2261
- Number of Distinct Islands -- Leetcode 711

THRIVE WITH ASHISH

@thriverashish
Ashish Gupta

TREES AND TRIES

10 DAYS

@thriverashish

https://www.linkedin.com/in/thriverashish

https://www.youtube.com/c/thriverashish

DAY 35

- Read the theory of Binary Trees and different types of Binary Trees
- Understand the Node structure of Binary Tree

  Understand and Write Iterative code for following Traversals

- Level Order Traversal
- Inorder Traversal - Leetcode 194
- PreOrder Traversal
- Postorder Traversal
- Zig Zag Level Oder Traversal

DAY 36

- Implement Binary Tree
- Add Node
- Remove Node
- Traverse Node
- Construct Binary Tree from Inorder and PostOrder - Leetcode 105

DAY 37

- Same Tree - Leetcode 100
- Invert Binary Tree - Leetcode 226
- Symmetric Binary Tree - Leetcode 101
- Left/Bottom/Top View of Binary Tree
- Vertical Order Traversal of a Binary Tree - Leetcode 987

DAY 38

- Maximum Width of Binary Tree - Leetcode 622
- Maximum Depth of Binary Tree - Leetcode 104
- Diameter of Binary Tree - Leetcode 543
- Balanced Binary Tree - Leetcode 110
- Lowest Common Ancestor of a Binary Tree - Leetcode 236

DAY 39

- Identify the Path to the given Node
- Binary Tree Maximum Path Sum - Leetcode 124
- Flatten Binary Tree to Linked List - Leetcode 1114
- Mirror Binary Tree
- Serialize and Deserialize Binary Tree - Leetcode 297
- Vertical Sum of Nodes in Binary Tree

@thriverashish
Ashish Gupta

@thriverashish

10 DAYS

https://www.linkedin.com/in/thriverashish

https://www.youtube.com/c/thriverashish

DAY 40

- Understand Binary Search Tree
- Search an Element in BST - Leetcode 700
- Understand the Complexity of searching in BST
- Find Lowest Common Ancestor of a given node in BST - Leetcode 235
- Convert Sorted Array to Binary Search Tree - Leetcode 108
- Validate Binary Search Tree - Leetcode 98

DAY 41

- Construct BST from Preorder Traversal - Leetcode 1008
- Recover BST - Leetcode 99
- Identify Predecessor and Successor of a Node in BST
- Kth Smallest Element in a BST
- Two Sum - Input is BST - Leetcode 653

DAY 42

- Understand Self-Balancing Binary Search Trees
- Read and Understand Red Black Tree
- Read and Understand AVL Tree

DAY 43

- Understand about Quad trees and N-Ary Trees
- Understand Trie Data Structure
- Implement Trie (Prefix Tree)

DAY 44

- Maximum XOR of Two Numbers in an Array - Leetcode 421
- Maximum XOR With an Element From Array - Leetcode 1707
- Hotel Reviews - InterviewBit

THRIVE WITH ASHISH

@thriverashish
Ashish Gupta

HEAP

@thriverashish

03 DAYS

https://www.linkedin.com/in/thriverashish

https://www.youtube.com/c/thriverashish

DAY 45

- Understand what HEAP DS is all about like properties and all
  (heap is a complete Binary Tree)

- Implement its Operations (Min and Max Heap)
  - Heapify
  - Insert Element into Heap
  - Delete Element from Heap
  - Peek
  - Extract Min/Max

- Understand and Read Heap Data Structure Applications
  -Heap is used while implementing a priority queue.
  -Dijkstra's Algorithm
  -Heap Sort

DAY 46

- Distinct Numbers in the window (Interview Bit)
- Merge K Sorted Arrays
- Kth Largest Element in an Array - Leetcode 215

DAY 47

- Top K Frequent Elements - Leetcode 347
- Maximum Sum Combinations - InterviewBit
- Find Median from Data Stream (Hard) - Leetcode 295

@thriverashish
Ashish Gupta

GRAPH

@thriverashish

10 DAYS

https://www.linkedin.com/in/thriverashish

https://www.youtube.com/c/thriverashish

DAY 48

- Understand Graphs
- Understand all three Graph representations and do hands-on
  - Edge list
  - Adjacency Matrix
  - Adjacency List
- Read and Understand Different types of Graphs
  - Directed Graphs
  - Weighted Graphs etc

DAY 49

- Breadth-first search (BFS)
- Depth-first search (DFS)

DAY 50

- Dijkstra - The shorter path from a given node to all vertices
- Floyd Warshall - The shorter path from every vertex to every other vertex

DAY 51

- Prims - Minimum spanning tree
- Kruskal - Minimum spanning tree

DAY 52

- Topological sort
- Articulation points in a graph
- Bridges in a graph
- Johnsons algorithm

DAY 53

- Clone Graph - Leetcode 133
- Number of Islands -- Leetcode 200
- Course Schedule -- Leetcode 207

DAY 54

- Valid path -- Leetcode 1391
- Is Graph Bipartite? -- Leetcode 785
- Smallest multiple with 0 & 1

DAY 55

- Commutable islands
- Detect cycle in Directed and Undirected Graph
- Black shapes

DAY 56

- Knight on chess board
- Word ladder I
- Word ladder II

DAY 57

- Smallest sequence with given primes
- Capture regions on board
- Word search board

@thriverashish
Ashish Gupta

REVISION

@thriverashish

03 DAYS

https://www.linkedin.com/in/thriverashish

https://www.youtube.com/c/thriverashish

DAY 58

Revise Hashing and Practice

DAY 59

Revise Trees and Tries

DAY 60

Revise Graphs and practice

THRIVE WITH ASHISH

@thriverashish
Ashish Gupta

GREEDY

@thriverashish

02 DAYS

https://www.linkedin.com/in/thriverashish

https://www.youtube.com/c/thriverashish

DAY 61

- Fractional Knapsack problem
- N-Meetings in one room
- Job Sequencing Problem

DAY 62

- Minimum Platforms
- Find Minimum Number

THRIVE WITH ASHISH

@thriverashish
Ashish Gupta

DYNAMIC PROGRAMMING

@thriverashish

https://www.linkedin.com/in/thriverashish

https://www.youtube.com/c/thriverashish

10 DAYS

DAY 63

- Understand what overlapping Subproblems mean?
- Understand memoization
- Fibonacci Number
- Catalan Number

DAY 64

- Maximum Product Subarray Leetcode 152
- Longest Increasing Subsequence Leetcode 300
- Longest Common Subsequence Leetcode 1143

DAY 65

- Ones and Zeroes Leetcode 474
- Edit Distance Leetcode 72
- Minimum Path Sum Leetcode 64

DAY 66

- Coin Change Leetcode 322
- Partition Equal Subset Sum Leetcode 416
- Minimum Cost to Cut a Stick Leetcode 1547

DAY 67

- Ways to decode
- Stairs
- Jump game

DAY 68

- Min jumps
- Longest AP
- Evaluate expression to true

DAY 69

- Best time to buy and sell stocks - 1
- Min sum path in matrix

DAY 70

- Max rectangle in binary matrix
- Rod cutting
- Coin sum infinite

DAY 71

- Best time to buy and sell stocks II
- Arrange II
- Best time to buy and sell stocks III

DAY 72

- Equal avg partition
- Regex match
- Regex match II

DAY 73

- Unique BST II
- Max sum path in BT
- Palindromic partitioning

THRIVE WITH ASHISH

@thriverashish
Ashish Gupta

BACKTRACKING

05 DAYS

@thriverashish

https://www.linkedin.com/in/thriverashish

https://www.youtube.com/c/thriverashish

DAY 74

- Understand why Backtracking?
  - when should we apply backtracking
  - how should we apply backtracking

Solve Following Questions

- Subset I
- Subset II

DAY 75

- Combination sum -- Leetcode 39
- Combination sum II -- Leetcode 40

DAY 76

- Palindrome Partitioning -- Leetcode 131
- Generate all parenthesis
- NQueens -- Leetcode 51

DAY 77

- Sudoku Solver -- Leetcode 37
- Permutations -- Leetcode 46
- Kth permutation sequence Leetcode -- 60

DAY 78

- Gray code
- M-Coloring Problem
- Rat in a Maze

THRIVE WITH ASHISH

@thriverashish
Ashish Gupta

STRINGS

04 DAYS

@thriverashish

https://www.linkedin.com/in/thriverashish

https://www.youtube.com/c/thriverashish

DAY 79

- Reverse Words in a String Leetcode 151
- Longest Palindromic Substring Leetcode 5
- Roman to Integer Leetcode 13

DAY 80

- String to Integer (atoi) Leetcode 8
- Longest Common Prefix Leetcode 14
- Rabin Carp

DAY 81

- Implement strStr() {Z Function} Leetcode 28
- KMP algo / LPS(pi) array -- Leetcode 28
- Minimum Characters required to make a String Palindromic -- Inerview bit

DAY 82

- Valid Anagram -- Leetcode 242
- Count and Say -- Leetcode 38
- Compare Version Numbers -- Leetcode 165

THRIVE WITH ASHISH

@thriverashish
Ashish Gupta

RANDOM QUESTIONS

@thriverashish

08 DAYS

https://www.linkedin.com/in/thriverashish

https://www.youtube.com/c/thriverashish

DAY 83-85

Solve Random Array, Linked List, Stacks and Queue Questions

DAY 86-87

Solve Random Recursion Hashing, Tree, and Graph Questions

DAY 88-90

Solve Random DP, Backtracking, Strings, and other Questions

DAY ...

Start Applying, you are Ready

THRIVE WITH ASHISH

@thriverashish
Ashish Gupta

GOOD LUCK

@thriverashish

https://www.linkedin.com/in/thriverashish

https://www.youtube.com/c/thriverashish

All the best!

THRIVE
WITH
ASHISH