



GeeksforGeeks

Data Structures & Algorithms in **JAVASCRIPT**

Self Paced

DSA
JAVASCRIPT

Detailed
Course Syllabus

CONTENTS

DATA STRUCTURE - BASICS

- **Analysis of Algorithms (Background)**

- Asymptotic Analysis
- Order of Growth
- Best, Average and Worst Cases
- Asymptotic Notations
- Big O Notation
- Omega Notation
- Theta Notation
- Analysis of Common Loops
- Analysis of multiple loops
- Analysis of Recursion
- Recursion Tree method for solving recurrences
- More example recurrences
- Upper bound using Recursion tree method
- Space Complexity

- **MATHEMATICS**

- Count Digits
- Palindrome Number
- Factorial of a number
- Trailing Zeros in Factorial
- GCD and HCF of two numbers
- LCM of two numbers
- Check for Prime
- Prime Factors
- All Divisors of a Number
- Sieve of Eratosthenes
- Computing Power
- Iterative Power

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

CONTENTS

• Arrays

- Arrays Introduction
- Working of Arrays in JavaScript
- Largest Element in a List
- Second Largest Element in a list
- Check if an Array is Sorted
- Reverse an Array
- Remove duplicates from a sorted array
- Move Zeros to End
- Left Rotate an Array by One

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• Recursion

- Recursion Introduction
- Applications of Recursion
- Writing Base Cases in Recursion
- Tail Recursion
- Practice For Recursion (Part 1)
- Practice For Recursion (Part 2)
- Print N to 1 using Recursion in JavaScript
- Print 1 to N using Recursion in JavaScript
- Sum of Natural Numbers Using Recursion
- Sum Of Digits Using Recursion
- Palindrome Check using Recursion

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• SEARCHING

- Binary Search (Iterative)
- Binary Search (Recursive)
- Analysis of Binary Search

CONTENTS

- Index of first Occurrence in Sorted
- Index of last Occurrence in Sorted
- Count Occurrences in Sorted
- Count 1s in a Sorted Binary Array
- Square root

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• SORTING

- Stability in Sorting Algorithm
- Bubble Sort
- Selection Sort
- Insertion Sort
- Merge Sort Algorithm
- Merge Two Sorted Arrays
- Merge Subarrays
- Count inversions in Array
- Merge Sort Analysis
- Quick Sort Introduction
- Partition a Given Array
- Lomuto Partition
- Hoare's Partition
- Quick Sort using Lomuto Partition
- Quick Sort using Hoare's Partition
- Analysis of Quick Sort
- Space Analysis of Quick Sort
- Heap Sort

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

CONTENTS

• HASHING

- Introduction to Hashing
- Hashing Application
- Direct Address Table
- Hashing Functions
- Collision Handling
- Chaining
- Implementation of Chaining
- Open Addressing
- Double Hashing
- Implementation of Open Addressing
- Chaining vs Open Addressing
- Count Distinct Elements in an Array
- Frequencies of array elements

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• STRING

- Strings in JavaScript
- Escape Sequences and Raw Strings
- Formatted String in JavaScript
- String Comparison in JavaScript
- String Operations Part (1)
- String Operations Part (2)
- Reverse A String in JavaScript
- Check if string is rotated
- Check For Palindrome In JavaScript
- Check if a String is Subsequence of Other
- Check for Anagram in JavaScript
- Leftmost Repeating Character
- Leftmost Non-Repeating Element
- Reverse words in a string

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

CONTENTS

• LINKED LIST

- Linked List Introduction in JavaScript
- Simple Linked List Implementation in JavaScript
- Applications of Linked List
- Traversing a Linked List in JavaScript
- Search in Linked List
- Insert At The Beginning of Linked list in JavaScript
- Insert at The End Of Linked List
- Insert at Given Position in Singly Linked list
- Delete First Node Of Linked List in JavaScript
- Delete Last Node of Linked List
- Delete a node with pointer given to it
- Sorted Insert Linked List in JavaScript
- Middle of Linked List
- Nth Node From end of Linked List
- Remove duplicates from a sorted Singly Linked List
- Reverse a Linked List In JavaScript
- Recursive Reverse A Linked List (Part 1)
- Recursive Reverse A Linked List (Part 2)

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• CIRCULAR LINKED LIST

- Circular Linked List in JavaScript
- Circular Linked List (Advantages & Disadvantages)
- Circular Linked List traversal
- Insert at the Beginning of Circular Linked List
- Insert at The End of A Circular Linked List
- Delete Head of circular Linked List
- Delete Kth Node of Circular Linked List

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

CONTENTS

• DOUBLY LINKED LIST

- Doubly Linked List in JavaScript
- Singly Vs Doubly Linked List (Advantages & Disadvantages)
- Insert at the Beginning of DLL in JavaScript
- Insert at the End of DLL in JavaScript
- Delete Head of A Doubly Linked List
- Delete Last Node of DLL in JavaScript
- Reverse A Doubly Linked List in JavaScript

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• STACK

- Stack Data Structure
- Stack in JavaScript
- Linked List Implementation of Stack in JavaScript
- Stack Applications
- Check for Balanced Parenthesis in JavaScript

Practice Problems

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• QUEUE

- Queue in JavaScript
- Queue Data Structure
- Application of Queue Data structure
- Implementation of Queue using Array
- Linked List Implementation of Queue in JavaScript

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

CONTENTS

• DEQUE

- Deque Introduction
- Deque Applications
- Deque in JavaScript
- List Implementation of Deque in JavaScript
- Linked List Implementation of Deque

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• TREE

- Tree Data Structure
- Application of Tree
- Binary Tree in JavaScript
- Tree Traversal
- Inorder Traversal in JavaScript
- Preorder Traversal in JavaScript
- Postorder Traversal in JavaScript
- Height of Binary Tree
- Print Node at K distance
- Level Order Traversal
- Size of Binary Tree in JavaScript
- Maximum in Binary Tree
- Iterative Inorder Traversal
- Iterative Preorder Traversal
- Iterative Preorder Traversal (Space Optimized)

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• BINARY SEARCH TREE

- Binary Search Tree(Background)
- Binary Search Tree(Introduction)
- Search in BST in JavaScript

CONTENTS

- BST insert in JavaScript
- BST Delete in JavaScript
- Floor in BST (Problem and Solution Idea)
- BST Floor in JavaScript
- Ceiling in BST in JavaScript
- Self Balancing BST
- AVL Tree
- Red Black Tree
- Applications of BST

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• HEAP

- Binary Heap Introduction
- Heap JavaScript Implementation (Introduction)
- Binary Heap Insert
- Binary Heap (Extract min and Heapify)
- Decrease Key and Delete Operations
- Build Heap
- Heap Sort

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

DATA STRUCTURE - ADVANCED

• BIT MAGIC

- Bitwise Operator in JavaScript - Part 1
- Bitwise Operator in JavaScript - Part 2
- Bitwise Operator in JavaScript - Part 3
- Check Kth bit is set or not
- Count Set Bits
- Power of Two
- One Odd Occuring
- Two Odd Occuring
- Power Set Using Bitwise

CONTENTS

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• ARRAY

- Left Rotate by d Places
- Maximum difference
- Stock Buy & Sell Part 2
- Trapping Rainwater
- Maximum Consecutive 1s
- Longest even odd subarray
- Majority element
- Minimum Consecutive flips
- Sliding Window Technique
- Maximum subarray sum
- Maximum circular sum subarray
- Prefix Sum Technique

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• RECURSION

- Subset of a given string
- Printing all Permutations
- Tower of Hanoi in JavaScript
- Josephus Problem in JavaScript
- Subset sum problem
- Rope Cutting Problem

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

CONTENTS

• SEARCHING

- Search in Sorted Rotated Array
- Median of two sorted arrays
- Repeating Elements Part (1)
- Repeating Elements Part (2)
- Allocate Minimum Pages (Naive Method)
- Allocate Minimum Pages (Binary Search)

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• SORTING

- Tail Call Elimination in Quick Sort
- Kth Smallest
- Minimum Difference in an Array
- Chocolate Distribution Problem
- Sort an array with two types of element
- Sort an array with three types of elements
- Merge overlapping intervals
- Meeting the maximum guests
- Counting Sort
- Cycle Sort
- Bucket Sort
- Radix Sort
- Overview of sorting algorithm

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• HASHING

- Intersection of two arrays
- Union of two unsorted arrays
- Pair with given sum in unsorted array
- Subarray with 0 sum in JavaScript
- Check for Palindrome Permutation

CONTENTS

- Subarray with given sum
- Longest Subarray with equal number of 0s and 1s
- Longest common span with same sum in binary array
- Longest Consecutive Subsequence
- Longest Subarray with given sum
- More than n/k Occurrences ($O(nk)$ solution)

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• STRING

- Overview of Pattern Searching
- Pattern Searching in JavaScript
- Naive Pattern Searching
- Improved Naive Pattern Searching for Distinct
- Rabin Karp Algorithm
- KMP Algorithm (Part 1 : Constructing LPS Array)
- KMP Algorithm (Part 2 : Complete Algorithm)
- Anagram Search
- Lexicographic rank of a String
- Longest Substring With Distinct Characters

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• LINKED LIST

- Reverse a linked list in groups of size k
- Detect loop using floyd's cycle detection algorithm
- Detect and remove loop in linked list
- Intersection Point of two linked list
- Segregate even odd nodes of linked list
- Pairwise swap nodes of linked list
- Clone a linked list using a random pointer
- LRU Cache Design
- Merge two sorted linked lists
- Palindrome Linked List

CONTENTS

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• STACK

- Two stacks in an array
- K Stacks in an array
- Previous Greater Element
- Next Greater Element
- Stock span problem
- Largest Rectangular Area in a Histogram (Part 1)
- Largest Rectangular Area in a Histogram (Part 2)
- Largest Rectangle with all 1's
- Stack with getMin() in O(1)
- Design a stack with getMin() in O(1) space
- Infix to Postfix (Simple Solution)
- Infix to Postfix (Efficient Solution)
- Evaluation of Postfix
- Infix to Prefix (Simple Solution)
- Infix to Prefix (Efficient Solution)
- Evaluation of Prefix

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• QUEUE

- Queue and Deque
- Queue Implementation using Circular List
- Implementing stack using queue
- Reversing a Queue
- Generate numbers with given digits
- Design a data structure with min/max operations
- Maximums of all subarrays of size k
- First Circular Tour

CONTENTS

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• TREE

- Level Order Traversal by Line - Part 1
- Level Order Traversal by Line - Part 2
- Check for Balanced Binary Tree
- Maximum Width of Binary Tree
- Convert Binary Tree to Doubly Linked List
- Construct Binary Tree from Inorder and Preorder
- Tree Traversal in Spiral Form
- Diameter of a Binary Tree
- LCA of Binary Tree (Part 1)
- LCA of Binary Tree (Part 2)
- Burn a Binary Tree from a Leaf
- Count nodes in a Complete Binary Tree
- Serialize and Deserialize a Binary Tree

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• BINARY SEARCH TREE

- Ceiling on the left side in an array
- Find Kth Smallest in BST
- Check for BST
- Fix BST with Two Nodes Swapped
- Pair Sum with Given BST
- Vertical Sum in a Binary Tree
- Vertical Traversal of binary tree
- Top View of Binary Tree
- Bottom view of binary tree

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

CONTENTS

• HEAP

- Sort K Sorted Array
- Purchase Maximum Items
- K Largest Elements
- K Closest Elements
- Merge K Sorted Arrays
- Median of a Stream

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• GRAPH

- Introduction to Graph
- Graph Representation (Adjacency Matrix)
- Graph Representation (Adjacency List)
- Graph Adjacency List Representation in JavaScript
- Adjacency Matrix and List Comparison
- Breadth First Search in JavaScript
- BFS for Disconnected Graph
- Connected Components in an Undirected Graph using BFS
- Applications of BFS
- Depth First Search
- DFS For Disconnected Graph
- Connected Components in an Undirected Graph using DFS
- Applications of DFS
- Shortest Path in an Unweighted Graph
- Detect Cycle in Undirected Graph
- Detect Cycle in a Directed Graph (Part 1)
- Topological Sorting (Kahn's BFS Based Algorithm)
- Detect Cycle in a Directed Graph (Part 2)
- Topological Sorting (DFS Based Algorithm)
- Shortest Path in DAG
- Prim's Algorithm/Minimum Spanning Tree
- Implementation of Prim's Algorithm
- Dijkstra's Shortest Path Algorithm
- Implementation of Dijkstra's Algorithm

CONTENTS

- Kosaraju's Algorithm Part 1
- Kosaraju's Algorithm Part 2
- Bellman Ford Shortest Path Algorithm
- Articulation Point
- Bridges in Graph
- Tarjans Algorithm
- Kruskal's Algorithm

Practice Problems

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• GREEDY

- Introduction to Greedy Algorithms
- Activity Selection Problem
- Activity selection
- Fractional Knapsack
- Fractional Knapsack in JavaScript
- Job Sequencing Problem
- Huffman Coding (introduction)
- Huffman Algorithms
- Python Implementation of Huffman coding

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• BACKTRACKING

- Concept of backtracking
- Rat In a Maze
- N Queen Problem
- Sudoku Problem

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

CONTENTS

• DYNAMIC PROGRAMMING

- Introduction to DP
- Dynamic Programming Memoization
- Dynamic Programming Tabulation
- Longest Common Subsequence (Part 1)
- Longest Common Subsequence (Part 2)
- Variation of LCS
- Coin Change Count Combinations
- Edit Distance Problem
- Edit Distance Problem DP solution
- Longest Increasing Sub sequence Problem
- Longest Increasing Subsequence $O(n \log n)$
- Variation of LIS (Part 1)
- Variations of LIS (Part 2)
- Maximum Cuts
- Minimum coins to make a value
- Minimum Jumps to reach the end
- 0-1 knapsack problem
- 0-1 knapsack problem DP Solution
- Optimal Strategy for a Game
- Egg Dropping Puzzle - Part 1
- Egg Dropping Puzzle - Part 2
- Count BSTs with n keys
- Maximum sum with no two consecutive
- Subset sum problem
- Subset Sum Problem (DP Solution)
- Matrix Chain Multiplication
- Matrix Chain Multiplication (DP Solution)
- Palindrome Partitioning
- Allocate Minimum Pages (Naive Method)
- Allocate Minimum Pages (DP Solution)

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

CONTENTS

• TRIE

- Trie Data Structure (Introduction)
- Trie (Representation, Search and Insert)
- Trie Delete
- Count Distinct Rows in a Binary Matrix

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• SEGMENT AND BINARY INDEXED TREES

- Segment Tree (Introduction)
- Constructing Segment Tree
- Range Query on Segment Tree
- Update Query on Segment Tree
- Binary Indexed Tree (Introduction)
- Binary Indexed Tree (An Example Problem)
- Binary Indexed Tree (Prefix Sum)
- Binary Indexed Tree (Prefix Sum Implementation)
- Binary Indexed Tree (Update Operation)

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.

• DISJOINT SET

- Disjoint Set Introduction
- Find and Union Operations on Disjoint Sets
- Union by Rank
- Path Compression
- Kruskal's Algorithm

Practice Problems

This track contains many practice problems for the users which are considered important and must-do as far as Data Structure and Algorithm is concerned.