

DSA

TOPICS TO COVER IN DSA WITH C++: (the same topics need to be covered in other languages like python)

1. Introduction to C++
2. Variables and Data Types
3. Operators in C++
4. Control Flow (If-Else, Switch-Case)
5. Loops (For, While, Do-While)
6. Functions in C++
7. Recursion
8. Arrays
9. Strings
10. Pointers
11. Dynamic Memory Allocation
12. Introduction to OOPs
13. Classes and Objects
14. Constructors and Destructors
15. Inheritance
16. Polymorphism
17. Abstraction
18. Encapsulation
19. Exception Handling
20. File I/O
21. STL - Standard Template Library
22. Introduction to Data Structures
23. Time and Space Complexity Analysis
24. Asymptotic Notations (Big O, Omega, Theta)
25. Arrays as a Data Structure
26. Linked List (Singly, Doubly, Circular)
27. Stack (Array and Linked List Implementation)
28. Queue (Array and Linked List Implementation)

29. Trees - Binary Trees, Binary Search Trees
30. Tree Traversals (Inorder, Preorder, Postorder)
31. Heap and Priority Queue
32. Hashing
33. Graphs - Representation and Traversals (BFS, DFS)
34. Introduction to Algorithms
35. Searching Algorithms (Linear Search, Binary Search)
36. Sorting Algorithms (Bubble, Selection, Insertion, Merge, Quick, Heap)
37. Divide and Conquer Algorithms
38. Greedy Algorithms
39. Dynamic Programming
40. Backtracking
41. Graph Algorithms - Dijkstra, Bellman-Ford, Floyd Warshall
42. Graph Algorithms - Kruskal, Prim
43. Graph Algorithms - Topological Sort, Strongly Connected Components
44. String Algorithms - KMP, Rabin-Karp
45. String Algorithms - Z Algorithm, Manacher's Algorithm
46. Bit Manipulation
47. Advanced Data Structures (Trie, Segment Tree, Fenwick Tree)
48. Advanced Topics - Disjoint Set Union, LRU Cache
49. Advanced Topics - Bloom Filters, LZW Compression
50. Problem Solving and Competitive Programming

Websites like LeetCode, HackerRank, and Codeforces have a lot of problems for you to solve.

Learning is just a small part in DSA. **20% is learning. 80% is practice.**

Learning Resources:

- 1) DSA in c++ by code with harry. Truly one of the best channels to learn DSA.
- 2) DSA in c++ by babbar. The GOAT.
- 3) Fireship- a great channel in general for any coder. Doesn't teach much but has a website with his courses which are concise but very much to the point.
- 4) NeetCode- every leetcoder's friend
- 5) Chatgpt and Bard- well coding isn't just fun to do by tutorials. AI can help find bugs in code and personally assist in doubt clearing when something isn't clear.