55 Data Structures Interview Questions to Ask Candidates

Questions

1. Can you explain the difference between an array and a linked list?

2. How would you implement a queue using two stacks?

3. What is a hash table and when would you use one?

4. Explain the concept of a binary search tree and its advantages.

5. How would you design a data structure for a least recently used (LRU) cache?

6. What is the difference between a stack and a queue, and can you give an example of when you'd use each?

7. Can you explain what a trie is and when it might be useful?

8. What are the key differences between a singly linked list and a doubly linked list?

9. Can you describe how you would reverse a linked list?

10. Explain what a balanced binary tree is and why it is important.

11. How would you find the middle element of a linked list?

12. What is the difference between depth-first search (DFS) and breadth-first search (BFS)?

13. Can you explain what a priority queue is and how it works?

14. How would you detect a cycle in a linked list?

15. What are red-black trees and where are they used?

16. Describe the advantages and disadvantages of using a hash table.

17. How would you implement a stack using an array?

18. What is a graph and how can it be represented in a computer program?

19. Can you explain the difference between directed and undirected graphs?

20. What is a heap and how is it different from a binary search tree?

21. How would you merge two sorted linked lists?

22. Explain what dynamic arrays are and how they differ from regular arrays.

23. What is a segment tree and in what scenarios would you use one?

24. How would you implement a queue using a circular array?

25. What is the significance of AVL trees in data structure?

26. Describe a scenario where you would use a skip list.

27. How do you implement an adjacency matrix and an adjacency list for graph data structures?

28. How would you design a data structure to store a large amount of data that you need to search frequently?

29. Can you explain what a Bloom filter is and when it might be useful?

30. Can you describe how a Fibonacci heap works and its applications?

31. What is a Deque and where would you use it?

32. Explain the concept of a Van Emde Boas tree and its advantages.

33. What is a Splay tree and how does it differ from other self-balancing trees?

34. Can you discuss the advantages and disadvantages of using a Skip list?

35. Explain what a K-d tree is and its applications.

36. How would you implement a data structure that supports both insert and delete operations efficiently?

37. Can you explain what a Fenwick tree is and how it can be used for cumulative frequency tables?

38. Describe a scenario where a graph data structure would be preferred over a tree. Why?

39. How can you use a stack to evaluate a postfix expression?

40. What approach would you take to remove duplicates from a sorted array?

41. How would you implement a data structure that supports finding the median in constant time?

42. Can you explain the concept of a disjoint-set data structure and its applications?

43. What is a bloom filter, and how can it be used to optimize searching in large datasets?

44. How would you design a data structure for an autocomplete feature?

45. Explain how you can use a heap to find the k largest elements in an array.

46. How would you design a data structure to manage real-time ticket bookings for an event?

47. Describe a scenario where using a double-ended queue (Deque) would be the most efficient solution.

48. How would you approach designing a data structure to store and retrieve user session data efficiently?

49. Can you explain how you would optimize the search function in a large dataset using data structures?

50. Imagine you need to manage a large list of tasks with different priority levels. Which data structure would you choose and why?

51. How would you design a data structure to handle autocomplete suggestions for a search engine?

52. Describe how you would implement a newsroom feed that always shows the most recent articles at the top.

53. How would you design a data structure to support real-time analytics on streaming data?