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19 Essential Algorithm Interview Questions *

Toptal sourced essential questions that the best algorithm developers can answer. Driven from our community, we encourage experts to submit questions and offer feedback.

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INTERVIEW QUESTIONS

What are Divide and Conquer algorithms? Describe how they work. Can you give any common examples of the types of problems where this approach might be used?

View answer

How would you optimally calculate p^k, where k is a non-negative integer? What is the complexity of the solution?

View answer

View answer

What are the key advantages of Insertion Sort, Quicksort, Heapsort and Mergesort? Discuss best, average, and worst case time and memory complexity.

View answer

What is a Hash Table, and what is the average case and worst case time for each of its operations? How can we use this structure to find all anagrams in a dictionary?

View answer

A numeric array of length N is given. We need to design a function that finds all positive numbers in the array that have their opposites in it as well. Describe approaches for solving optimal worst case and optimal average case performance, respectively.

View answer

subsequence of elements in two arrays by using this method?

View answer

Design an algorithm that finds the number of ways in which you can traverse N meters by doing jumps of 1, 2, 3, 4, or 5 meter lengths. Assume that N can be a very large number. What is the resulting complexity?

View answer

What are Red-Black Trees and B-Trees? What is the best use case for each of them?

View answer

You are given a matrix of MxN boolean values representing a board of free (True) or occupied (False) fields. Find the size of the largest square of free fields.

View answer

What are the Dijkstra and Prim algorithms, and how are they implemented? How does the Fibonacci heap relate to them?

View answer

What is the Bellman-Ford algorithm for finding single source shortest paths? What are its main advantages over Dijkstra?

View answer

What is A*, what are its implementation details, and what are its advantages and drawbacks in regard to traversing graphs towards a target?

View answer

We are given an array of numbers. How would we find the sum of a certain subarray? How could we query an arbitrary number of times for the sum of any subarray? If we wanted to be able to update the array in between sum queries, what would be the optimal solution then? What's the preprocessing and query complexity for each solution.

View answer

You need to design a scheduler that to schedule a set of tasks. A number of the tasks need to wait for some other tasks to complete prior to running themselves. What algorithm could we use to design the schedule and how would we implement it?

View answer

A significantly large static set of string keys has been given, together with data for each of those keys. We need to create a data structure that allows us to update and access that data quickly, with constant time even in worst cases. How can we solve this problem?

View answer

Determine if two rectangles intersect.

2. Give another algorithm where rectangles are defined by their width, height, and (x, y) coordinates of their centers.

What are the behaviors of your algorithms for edge cases?

View answer

You have a set of date intervals represented by StartDate and EndDate. How would you efficiently calculate the longest timespan covered by them?

What will be the time complexity?

View answer

You are given the task of choosing the optimal route to connect a master server to a network of N routers. The routers are connected with the minimum required N-1 wires into a tree structure, and for each router we know the data rate at which devices (that are not routers) that are connected to it will require information. That information requirement represents the load on each router if that router is not chosen to host the master. Determine which router we need to connect the master to in order to minimize congestion along individual lines.

View answer

* There is more to interviewing than tricky technical questions, so these are intended merely as a guide. Not every "A" candidate worth hiring will be able to answer them all, nor does answering them all guarantee an "A" candidate. At the end of the day, hiring remains an art, a science — and a lot of work.

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