**Algorithms**

1. Explain and Write KnapSack Algo with Memorization
2. Given a undirected graph, clone it. Now if the undirected graph has the neighbors with the nodes as same data - how do you make sure you create the exact same branches and also how do you make sure you don't run into loops for the exact node. He gave a empty directed graph and asked me write code after that.
3. Given two Btrees. these trees "may" have right and left branches swapped. Now compare it.
4. Given a N different open and close braces in a string "( { [ } ] )". How do you check whether the string has matching braces.
5. Given a unsorted array. Create a balanced BTREE
6. Print a tree like (Parent ( leftchild (leftchild, rightchild), rightchild(leftchild,rightchild) ) )
7. Given a List with duplicate Strings, how do you remove duplicate Strings
8. How do you design a Maze and what kind of data structures you use for Maze. Now print the shorted path from start to end point
9. Merge sorted, non-overlapping list of intervals with another interval [(1,3), (5,10), (12,30)] + (9,31) = [(1,3), (5,31)]
10. The first interview asks about the change combination problem. First it was able to be solved by greedy alg but then the condition changed and turn into a DP problem.
11. The second interview asks to substitute \*s in a string by binary numbers. For example, input aa\*bbb\*c, the output should be four strings: aa0bbb0c, aa0bbb1c, aa1bbb0c, aa1bbb1c
12. Given N people on an MxM grid, find the point which requires the least total distance covered by all people to meet at this point.
13. Assuming that an English dictionary is available, design a spelling corrector.
14. Implement a malloc-like function such that it only returns pointers evenly divisible by N (presumably some power of 2). Use as little overhead as possible. Implement the corresponding free() function
15. Write a function that takes two numbers and adds them together -- one is an unsigned int, and the other is a (possibly very large) number, represented in int array form. So e.g.
16. Find the least common ancestor of 2 nodes in a binary tree...

**Recent Questions**

1. Return the pair of indices that forms the slice where the difference between the maximum and minimum in the slice <= 2.   
     
   Output:   
   (0,0) (1,1) (2,2) (3,3) (4,4) (5,5)   
   (0,1) (1,2) (1,3) (2,3)   
     
   Example slices: 3 5, 5 7, 1 3, 2 3.   
     
     
   The following link   
   https://codility.com/media/train/solution-count-bounded-slices.pdf   
     
   has O ( n ) solution. But couldn't understand the O (n ) solution. Could some one explain with an example?
2. Find next higher number with same digits.   
     
   Example 1 : if num = 25468, o/p = 25486   
   Example 2 : if num = 21765, o/p = 25167   
   Example 3 : If num = 54321, o/p = 54321 (cause it's not possible to gen a higher num than tiz with given digits ).
3. Given a undirected graph with corresponding edges. Find the number of possible triangles?   
   Example:   
   0 1   
   2 1   
   0 2   
   4 1   
     
   Answer: 1
4. Given two strings a and b, find whether any anagram of string a is a sub-string of string b. For eg:   
   if a = xyz and b = afdgzyxksldfm then the program should return true.
5. given a board with black (1) and white (0), black are all connected. find the min rectangle that contains all black.   
     
   example:   
   0 0 0 0 0   
   0 1 1 1 0   
   0 1 1 0 0   
   0 1 0 0 0   
   0 0 0 0 0   
     
   the min rectangle contains all black (1) is the rectangle from (1,1) - (3, 3)
6. Given an array of Integers, and a range (low, high), find all continuous subsequences in the array which have sum in the range. Is there a solution better than O(n^2)?
7. Given an array of Integers, and a range (low, high), find all continuous subsequences in the array which have sum in the range. Is there a solution better than O(n^2)?
8. Given k integers i\_0, i\_1, i\_2, i\_3,...i\_k, find all possible expressions which uses + - \* / and () to generate a result equals to target X. () has the highest priority.
9. Given a dictionary of words, and a set of characters, judge if all the characters can form the words from the dictionary, without any characters left.   
   For example, given the dictionary {hello, world, is, my, first, program},   
   if the characters set is "iiifrssst", you should return 'true' because you can form {is, is, first} from the set;   
   if the character set is "eiifrsst", you should return 'false' because you cannot use all the characters from the set.   
     
   P.S. there may be tens of thousands of words in the dictionary, and the chars set length could be up to hundreds, so I really need some efficient algorithm.
10. Given a dictionary, and a list of letters ( or consider as a string), find the longest word that only uses letters from the string. [I didn't meet this question, what's the best solution?]
11. Write a function return an integer that satisfies the following conditions:   
    1) positive integer   
    2) no repeated digits, eg., 123 (valid), 122 (invalid)   
    3) incremental digit sequence, eg., 1234 (valid) 1243(invalid)   
    4) the returned integer MUST be the smallest one that greater than the input. eg., input=987, return=1023   
      
    function signature could be like this:   
    String nextInteger(String input)

--updated till March 11

Update on Apr 16th:

Amazon To Prepare

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**High Priority**

Write a program to find all telephone numbers from a file   
of this pattern (xxx) xxx-xxxx   
xxx-xxx-xxxx (Come up with a regex)

 string MatchPhoneNumberPattern = "^\(?([0-9]{3})\)?[-. ]?([0-9]{3})[-. ]?([0-9]{4})$";

^ - starting

$ - ending

\( - telling the regex engine to match ( since ( is a special char

? – 0 to many (optional)

(pattern)

[range of chars]

{3} – length ofr the range

How do u know if a number is divisible by 8? (hinted to use a binary operator and NOT % or the subtraction approach)

Compare two release version and tell me which is larger   
eg: 1.0.10 and 1.0.2   
1.0.2 is greater   
  
1.2.0 and 2.1.0   
2.1.0 is greater

Write a function to convert an Integer representing a number of bytes (less than or equal to 1 Gigabyte) into an easy to read format, defined as follows: Maximum of 3 digits (not counting a decimal point), and a single letter to signify the unit of measure. • Round to the nearest valid values. Examples: o 341 = 341B o 34200 = 34.2K o 5910000 = 5.91M o 1000000000 = 1G • No leading zeroes, or trailing zeroes after a decimal point. Examples: o 34K, not 034K o 7.2M, not 7.20M • Be as accurate as possible. Example: o 54123B = 54.1K, not 54K • Note: For this problem, 1000 bytes = 1 KB, and so on

At your disposal you have 100 processing nodes. You have 1 billion rows of data which are located on the storage attached to one processor. All the processors can read from the storage of any other processor over a network. The objective is to sum one of the columns of the data set with minimum cost(time).   
Cost summary   
a. 0.01 unit(of time) to read 1 row of data from a local processor   
b. 0.05 unit (of time) to read 1 row of data from a remote processor   
c. 1000 units(of time) to partition the file into two pieces.   
d. 0.1 unit(of time) to copy 1 row of data from a remote processor to a local processor   
e. 1 unit(of time) to sum 1 row of data   
What is the optimal configuration of the system to sum 1 column of the data file with the minimum cost(time)? Consider location of the data, the partitioning of the data, the number of processors to be used.

given a N x N matrix find the no. of times a word is present in that matrix. constraints you can move in 3 directions from one cell 1. forward , 2. down 3. diagonal . Find all teh occurance of all the word   
  
forward means right (x+1,y)   
down mean (x,y+1)   
diagonal means (x+1,y+1)   
  
it can be done with BFS. {search the no. of occurance of a given word example "sachin" in the whole NxN matrix}   
  
w | s | r | t | g | g|   
a | a | c | h | i | n |   
k | c | h | u | j | j |   
o | h | i | n | y | q |   
  
in this sachin can be found out 3 times.

Given an nxn screen, Each pixel is represented by intensity values. Given a specific pixel as an input, find the no. of pixels of the same colour which can reached from this pixel. Assume any suitable data structure for a screen.

<http://gparlakov.wordpress.com/2013/01/15/breadth-first-search-algorithm-in-c-multidimensional-arrays-problem-7/>

count the consecutive chars in a string.   
  
Example input string: BBSBSS   
output string: B2S1B1S2   
  
\* ignore case . out put is always uppercase   
input : AaV   
output: A1V1

you have an array which has a set of positive and negative numbers, print all the subset sum which is equal to 0.   
  
eg 2, 1, -1, 0, 2, -1, -1   
o/p: 1, -1   
1, -1, 0   
0   
2, -1, -1

<https://www.youtube.com/watch?v=hi-Ec4jYyII>

<http://chinmaylokesh.wordpress.com/2011/01/17/for-a-given-array-of-integers-positive-and-negative-find-a-continous-sequence-with-largest-sum/>

**Medium Priority**

Given a log file which consists of timestamp, customer ID, page id visited by that particular customer. Write a function to return all customers who have visited 5 unique pages in last 30 mins

Sliding window problem where window size is 3 and we need to find the minimum from the window.

Given a list with duplicate values find the first unique elements in it.   
  
for eg: BH BH F AL HJ AL HJ PK   
so answer is F

**Less Priority:**

Asked to break up a string with no spaces into valid words ie. "itwasthebestoftimes" should be processed to read as "it was the best of times

http://www.geeksforgeeks.org/generate-unique-partitions-of-an-integer/