1.You have a ladder n-steps in height. You can either take one step

or two steps up the ladder at a time. How can you find out all the

different combinations up the ladder? Then figure out an algorithm that

will actually print out all the different ways up the ladder. ie:

1,1,2,1,2,2... etc...

2. Given the root node to a singly linked list, reverse the last 5

nodes in the list. For a list with 5 or less nodes, reverse the whole list.

3. Given the root node to a singly linked list, write an algorithm to

detect if there is a loop in the list.

4. Write an algorithm to calculate the square root of a number.

5. **Give an array of 100 random integers. Write an algorithm to find the**

**the closest 2 integers (closest by position) in the array that add up to 100**.

6. Given an array of integers, write a method that returns an array of the same size where each

index is the product of all integers except itself, ie given array {1,2,3,4} return {24,12,8,6}

explicitly {2\*3\*4,1\*3\*4,1\*2\*4,1\*2\*3}.

7. Implement a deque. Think about what properties a deque must have.

Implement it as a base class that can be extended and as a template.

In general, start thinking about what's underneath all the other STL

data types and how they work.

8. Given a char pointer to large buffer of memory, write your own

version of my\_malloc and my\_free without using any system calls. Make

it as robust as possible. How would you minimize memory fragmentation?

**9. Giving a char array with only Xs and Ys, do an in-place separation of the Xs and Ys.**

**Example: "XYXXYYYXX" -> "YYYYXXXXX"**

10. Given the function: "bool numExists( int array[], int array\_len,

int num )" where "array" is a sorted array of integers. Determine if

"num" exists in the array.

11. The standard library function of atoi() is not very robust. How

would you design/implement a better version of it?

12. Implement a Singleton. Everyone knows the "textbook" implementation of the

singleton but think of all the different ways you can implement it and

what are their pros/cons? Make a thread-safe version.

1.find the biggest value of sub-string which was a dynamic programming problem

2.Given two arrays of sorted integers, how would you find the minimum difference in O(n) time

3.Copy a block of memory from source to destination. You need to consider the overlapping cases.

4. Return the index of the largest and second largest number of an given array

5. Return the occurrence of each letter of a given string in alphabetical order

6. If there is a people standing in the middle of a railway and there is a train from a unknown distance coming, there are two stations distanced 300m and 500m in two directions of the railway, he has to decide which direction he should run

7. best time to buy and sell stock

8. brain teaser: two robot, same program make them meet each other without knowing their location and no communication between them. Solve it both in 1d and 2d

9. Two linked list joint together, find the node they first meet, what if there is another list point to one of them, how to find the point which the two lists merge

10. there are two linked list that might merge, find the merged node.

11.integer to string

12. string to integer Answer Question

13.if a function returns itself, what will happen if it's called

14.Find the maximum difference in an unsorted array with the index of max greater than min

15.You're given a binary tree--not necessarily complete or proper--and you need to give each node a "friend" pointer that points to the node to its right in the tree. This node is on the same level but is not necessarily a sibling, which makes the problem a little tricky. The friend pointer of the node farthest to the right on each level should be null. View Answer

16.You're given two arrays of the same size filled with positive integers, and an integer 0 <= N <= 255. You need to determine whether N can be written as the sum of some number from the first array and some number from the second array.

17.C++ template metaprogramming (that team was into functional programming and compile time computations). Standard, find nth Fibonacci number using recursive templates

18.1st round : They asked me to select a data structure for storing a dictionary that i have to use for searching words with given letters.It is similar to that of SCRABBLE game.

19.Passing a multi-dimensional array in c89 and other variations.

20.2nd round : Design a class that takes any length integer (memory is the limit) given as string and implement constructors , addition by operator overloading (as i've told them about my choice of C++).

21.3rd round : Write a code to find the common letters in two strings. He was more interested in how his input will break my code and how will i overcome it and what will happen at OS level.

22.Implement a queue using stacks

-implement a stack using two queue

23. Search through an array of integers and find pairs that add to a target View Answer

24.What happens when you assign a string literal to a pointer using strcpy

25.How to remove duplicates from a linked list

-remove duplicate from a sorted array

-remove duplicate from unsorted array

* Excel column number - convert excel column number to letter and vice versa. Example column A is 1 and AA is 27 and so on.
* Is binary tree a BST
* How is virtual functions implemented under the hood
* How is c++ STL class map implemented? What about multi map?
* Print all subsets of a given set
* Max subsequence of array
* Change making problem
* Print all permutations of numbers from 1 to n
* Reverse linked list - with n without recursion.
* Given a binary tree, find the right sibling for every node in the tree,
* Given a system which generates Stock prices to the list of clients. What is the data structure at the client side of keep track of number of changes for each Stock ticker.
* Implement shared pointers with references.
  + Modified version - what if you do not want to de-allocate memory automatically when the object goes out of scope.
* Implement LRU cache
* Given a binary tree, find the right sibling for every node in the tree, (For the rightmost node at any level, the sibling is null, so should not be printed).
* What is the difference between copy constructor and assignment operator in C++
* Define encapsulation, inheritance, polymorphism
* What is the difference between semaphore and mutex
* What is the difference between inner join and outer join

**PROBLEMS FROM CAREER CUP**

* Given points on a plane like (0,0), (1,0), (0,1), (1,1), (0,2), (2,2), (1,2). How many rectangles can be formed ?
* I was asked to design a stock ticker system. Stock ticker is simply the shortened name of company and its current stock size. e.g. for Apple - "AAPL" -->; "115". Design a data structure to store incoming stream of stock tickers. Stream can contain same company more than once but all the values of it had to be stored. I used HashMap<String, List<Integer>>;. Then he was adding more functionalities to system I don't exactly remember the questions now but one of them was related to calculating some ratio in constant time. Some of the questions were challenging.
* Given a set find its power set. (This question is from CTCI) Interviewer then discussed the complexity of my solution. He asked me to explain him how the complexity is 2^n? As per my solution, I was iterating over an arraylist which contained the set elements so the size of list was getting doubled in every iteration. Hence the complexity (2^0 + 2^1 + 2^2 +.....+2^n-1 = 2^n)
* Given a string, add some characters to the from of it so that it becomes a palindrome. E.g.1) If input is "abc" then "bcabc" should be returned. 2) input ---> "ab" output ---> "bab" 3) input ---> "a" output ---> "a"
* You are given a binary tree. Each node in the tree is a house and the value of node is the cash present in the house. A thief can rob houses in alternate levels only. If thief decides to rob house at level 0 then he can rob houses in levels 2,4,6... or he can rob houses in levels 1,3,5,7...Find out the maximum possible amount thief can rob.
* Given an unsorted integer array, place all zeros to the end of the array without changing the sequence of non-zero elements. (i.e. [1,3,0,8,12, 0, 4, 0,7] --> [1,3,8,12,4,7,0,0,0])
* Implement a tick server the has multiple clients interested in different tickers. Clients have Plotters that are updated in real-time with the top 10 tickers that have the most price updates on the top. What data structure would you choose for the server and client plotters?
* Given a string find biggest palindrome substring. For example for given string "AABCDCBA" output should be "ABCDCBA" and for given string "DEFABCBAYT" output should be "ABCBA"
* THERE ARE SEVERAL LOG FILES COMING BY DATE WITH PRODUCT IDS AND I NEED TO REPORT THE TOP 10 (PRODUCT IDS) DURING A MOVING PERIOD OF 1 MONTH. DISCUSSED ABOUT THE DATA STRUCTURES NEEDED TO IMPLEMENT THE SOLUTION.
* ASSUME YOU HAVE A LARGE FILE WITH LINES OF TIMESTAMPS AND IP ADDRESSES . TIMESTAMPS ARE ORDERED, BUT MAY REPEAT AND MAY SKIP. HOW DO YOU DETERMINE WHETHER <br />THERE IS A TIME WINDOW THAT HAS A CERTAIN IP ADDRESS APPEARING MORE THAN K TIMES? HOW WOULD YOU SOLVE THIS IF INSTEAD YOU RECEIVED A STREAM.
* A client wants to build a software phone book that contains everyone in the world (7 billion people). Every person has only the first name and the name is unique. What data structure would you use to store the data?
* You have a function f1() that generates 0 or 1 with the equal probability. Write a function f29() that generates a number between 0 and 29 with equal probability.

**PROBLEMS FROM GLASSDOOR**  
  
**JAN 2017**

* How would you design a trade order matching application?
* What do you know about Bloomberg?
* Find min of array that decrease then increase, like [5,4,3,2,1,2,3,4,5]
* Reverse an int
* Given a list of numbers and a number S, find all pairs of numbers that sum to S.
* If YOU are required to program for an indexed resource like excel, how do you implement it?
* Given array is [0,1,1,0,1,1,1] ; output should be [0,1,1,0,1,2,3] ie., for every non-zero element in array, find its distance to the nearest zero in O(n) time. i would definitely encourage the candidates who read this post to share their solution for this question

**DEC 2016**

* Given a 2D matrix, print all the elements one diagonal at a time.
* Given a root of tree where every node can have arbitrary number of children, write a function which would truncate the tree to a given height and return the root. The leaf nodes of the truncated tree should have the sum of all its children as its value. Define your own data structure to represent the tree.
* How to multiply two integer with out using multiply and division operations
* Deep copy a linked-list with next pointers and random pointers.
* Find the floor of the square root of a number without using special, math functions.
* Design question about web traffic; recording 'hits' and print top-10 most visited websites (both in constant time).
* Difference between public/protected/private variables in C++.
* Given an array of real numbers, find the average of all the numbers except the minimum and maximum.

**NOV 2016**

* Traverse a balanced binary tree and find the greatest sum from one path.
* Figure out how to maximize profits from a single stock in one week given you can only buy once and sell once.
* Any other companies that you have applied for?
* Find whether a tree is balanced and is a BST
* What brings you to Bloomberg. How did you know Bloomberg.
* How to prune and correct error nodes in a binary search tree?
* Describe flaws in your personalities.
* Check if a string is a palindrome. Scale this up to process faster (was looking for multi-threading concepts)
* Trim a tree upto a given height and sum all the nodes below to add to the value of the leaf node
* Write an algorithm to check the correctness of a Sudoku puzzle solution
* Paint fill with follow-up about detecting intersections of circles, detect the node where two linked lists merge into one, implement topological sort.
* Marathon Problem
* Deep Copy a graph
* Joseph Problem
* Given a matrix of integers and a starting point, find all adjacent neighbors with same value, and repeat process with each identified neighbor.
* Data structure for maintaining a leaderboard, allowing updates. Retrieve first k each time
* Round table with m people, remove nth person each time, find the last person left
* Implement a Stack that supports a max function

1. Phone Screen (2 hrs)::  
   **- Given a set of arbitrary float numbers in an SQL table select only the ones that are exactly 4 decimal places  
   - Remove arbitrary spaces from a sentence:  
   eg: "The sky is blue " --> "The sky is blue"  
   - Reverse an integer:  
   eg: 3421 --> 1243**  
   -**design a stack with O(1) lookup for minimum element in the stack**. They first make you optimize your design till they are satisfied and then you have to write code for push, pop.  
     
   -**design an address book which you can use to:  
   a) Get the the info of a person from the name  
   b) Get the info of a person from a number**  
     
     
   Q: Find an element k in a 2D linked list

Q.Design a data structure that keeps track of all the URLs visited and can efficiently return the top K most visited URLs. Implement two functions, 1) visit(String url), 2) topK(int k, String url)

Q. **nterview Questions**

**Q.**Design a parking lot

Q.Level wise binary tree traversal

Q. Merge k sorted linked lists/arrays

q. string encode – aabb->2a2b

q.100005->10,00,05