Google

1. Given a binary tree and a list of nodes which are to be deleted, construct the forest after deleting the nodes and return all the roots of the final set of trees.
2. Given an array where value represents the height of the wall from the ground. How much water will the array hold. https://www.geeksforgeeks.org/trapping-rain-water/
3. Given an array of size 2N filled with coin values. One can only pick only from beginning or from end. What is the maximum sum one can get by choosing N/2 coins?
4. Given a boolean array of size N. Value 0 indicates water, value 1 indicates stone. Index 0 and index N-1 are always stone. A frog is at index 0 with speed 0 (Speed x means he can jump x indices at once). At every stone the frog can increase its speed by 1, decrease its speed 1 or keep it same. Will the frog be able to cross the array? Yes if he can jump to (N-1)th index or ahead of N-1 index.
5. Given an unsorted array and an element X. You do usual binary search to find X. Instead of middle element, you take random index every time. If arr[randomIndex] > X, move left. Else, move right. Find all the elements in the array which you can always find, no matter what the random indices are.
6. Given a secret code BANANA. Given a string of 6 characters long. Find if the string is encoded by the secret code in bijective way. Ex: COLOLO is encoded by BANANA. C-B O-A L-N. XXXXXX is not encoded by BANANA.
7. Given N points on x-y coordinates. Two points B and C form boomerang at A if they are equidistant from A. Find total number of boomerang.
8. 1 in the matrix below represents a block. Two blocks are attached to each other if they are in left-right, up-down fashion. A block will fall if it is isolated and not touching the ground (last row) through series of attached blocks. Suppose we remove the block 3,3, all blocks except 4,3 and 5,3 will fall.

1	1	1	1	1	0
1	0	1	0	1	1
0	0	1	0	0	1
0	0	1	0	0	0
0	0	1	0	0	0

However in below matrix, if we remove the same block, no block will fall.

1	1	1	1	1	0
1	0	1	0	1	1

0	0	1	0	0	1
0	0	1	0	0	1
0	0	1	0	0	1

Given a matrix and a block X, find all blocks which will fall if we remove X.

9. Find the largest common substring in two text blobs. Example: [“abcdef”,”ghijk”,”lmnop”] and [“klmnxy“,”pqcdefg”] Answer: cdefg. Other substring is klmn but is shorter.

10. Stock price is being generated in stream. A generated data looks like <timestamp,price>. If a new data has some previous timestamp, it can update or delete that previous price. You have to store this streaming data in some data structures so that getMinimumPrice, getMaximumPrice and getLatestPrice work in O(1) time. Note that, the latest, minimum, maximum values can change if the price is updated or deleted.

11. Count number of squares in such M,N grid. Grid consists of points (x) connected by line. Following is a 4X5 grid:

```
x--x--x--x  x
|  |     |  |
x--x--x--x--x
|  |     |
x--x--x--x  x
|        |  |
x--x--x--x--x
```

Answer: size 1 square: 2
Size 2 square: 1
Size 3 square: 1
Total: 4

12. Vector of some data type. Number of total vector is some billions. Number of elements in each vector can range from tens to millions. You have to perform some operation on each vector independently. You are given K machines. How will you process the given vectors so that it is approximately K times faster than processing them on single machine.

Algorythma

1. Given a random number generator from 1 to 5 which generates number with probability 1/5. Using this random generator, make random number generator from 1 to 7 so that the probability of each number is 1/7.
2. Given an array of numbers. Every number occurs twice except one number. The duplicates always occur together. Find the number which occurred once. Ex: 2,2,1,1,6,6,7,9,9,4,4,8,8 Answer: 7

Curefit

1. Given N points in x-y coordinates. A point (x,y) dominates (a,b) if x > a and y > b. Find all undominated points in the given input. Undominated points are those who are not dominated by any other point.

Flipkart

1. Given N process with start time and end time. Find maximum number of processes running at same time.
2. Given N integers, Find the maximum number by concatenating them. EX: 98, 9, 86, 7 Answer 998867.

Glasdoor

1. Given entry and exit time in string format (e.g. entry: "9:42", exit: "11:07"). Find the parking price. Given were constant price, price for first hour and subsequent hours.
2. You are given a DTD for XML in the following format.
   `<!ENTITY a1 10> -> a1` is a leaf tag occupying 1 one line. Integer followed by a1 means it's a leaf.
   `<!ENTITY a2 a1;a1> -> a2` is a tag containing two a1 tags, thus occupying two lines.
   So, when expanded, the whole thing occupies 3 lines. Write a program that will take this definition in a vector<string> and calculates the number of lines in the expanded version (say count). Print "0 <count>" if the number of lines exceeded a given input L, otherwise print "1 <count>".
   Note: Consider the ordering as well. What if a2 contains a1 but a1 hasn't arrived yet?
3. Machine coding (90 min)

   Design Splitwise. Group contains Users. User can be in multiple Groups. Bill is assigned to a Group. Multiple Users are assigned to a bill. User shares can be divided equally, based on fixed values or by percentage. User can see owe amount group-wise and overall.

MakeMyTrip

1. Given N*N matrix. A knight (chess horse which moves 2 and half cells) is present at any cell. Find if the knight can cover all the cells of that matrix. Otherwise return false.
2. Design a stack of size 10 in java with push and pop operation and user defined exception. If stack is empty, pop() should throw StackEmptyException. If stack is full, push() should throw stackFullException. Read this if you are noob:
   https://beginnersbook.com/2013/04/user-defined-exception-in-java/
   https://www.tutorialspoint.com/javaexamples/data_stack.htm
3. Find Kth maximum element in an array.
4. What are disadvantages of singleton design pattern. What is strategy design pattern. What is builder design pattern. What is decorator design pattern. Code decorator design pattern for decorating pizza.
   https://www.geeksforgeeks.org/decorator-pattern-set-3-coding-the-design/
5. Manager round.

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1. Write a program that creates a deadlock.

Zomato

1. Written: Write code on paper for the following
   a. Implement add and find methods for strings. For find method, the string can contain a "." to represent any single character.
      e.g.
      ```
      add("abc");
      add("abd");
      add("polo");
      find("abd") -> true
      find("a.c") -> true (matches "abc")
      find("aa") -> false
      find("p.l.") -> true (matches "polo")
      ```
   b. Given an array a[i], return an output array in which output[i] is equal to the product of all elements of a except a[i]
      a = [1, 2, 3, 4]
      output = [24, 12, 8, 6]
      You are not allowed to divide
   c. A strong password has following properties
      i. Contains 6 to 20 characters
      ii. Contains at least a lower case, upper case and a digit
      iii. Must not contain 3 same characters together ("aaab" is invalid while "aaba" is valid)

      Now given a string, write a program to calculate the **minimum** number of insertion, deletion and updates required to convert it into a strong password.
2. Interviews (apart from projects and work)
   a. Write the decode function for the following
      ```
      int encode(string s)
      ```

```
{
      int h = 9;
      string letters = "abcd1234efgh5678";
      for(int i=0; i<s.length(); i++)
            h = 31 * h + letters.indexOf(s[i]);
      return h;
}
```

b. Snakes and ladder dp stuff. Given all ladders and snakes, find the minimum number of moves to reach 100 from 1.

c.
```
class Animal
{
      public void run()
      { sop ("Animal runs"); }
}
class Horse extends Animal
{
      public void run()
      { sop ("Horse runs"); }
      public void run(int h)
      { sop ("Horse parameter runs"); }
}
Animal a1 = new Animal();
Animal a2 = new Horse();
Horse a3 = new Animal();
Horse a4 = new Horse();
Animal a5 = (Horse)a2;
```
What is the output of?
```
a1.run(); a1.run(5);    // for all a1 to a5
```

d. Making hashmap thread-safe? Use synchronized.
How can we make it faster? Use it at row-level. [ConcurrentHashMap??]
Implement that. On the existing Java hashmap?
Yes!

Design a system to generate a test for the candidates appearing for some test.

- The questions can be MCQs, fill-in-the-blanks, match-the-following and coding types.
- They are tagged in a tree structure.

```
CSE
 - Java
    - Collections
       - List
       - Array
    - Sockets
```

```
    - Threads
- OS
    - Locks
    - Threads
…
```

Similar to e-commerce sites where we can select all the products based on say brand, price-range, relevance, category etc. Note that we can select any criteria and it filters the result based on that.
Read this: http://mikehillyer.com/articles/managing-hierarchical-data-in-mysql/
What if we want to have another criteria like difficulty level?
How to store the questions?

OpenTalk

Google doc round

1. Given an array a[i], return an output array in which output[i] is equal to the product of all elements of a except a[i]
   a = [1, 2, 3, 4]
   output = [24, 12, 8, 6]
   You are allowed to divide. Discussing corner cases.
2. MxN matrix spiral print
3. Find diameter of a tree

Zilingo

Glassdoor

1. You have a database table that stores information about the price change of various product with time. It's append only table. Whenever the price of the product p1 is changed to c1 at time t1, a new row <p1 c1 t1> will be appended.

   ```
   product_id price time
   p1 10 4
   p2 40 4
   p1 20 5
   p1 25 6
   p2 55 7
   …
   ```

   Write an SQL query that will give the price of every product at time t1.
   e.g. at time 6

   ```
   product_id price
   p1 25
   p2 40
   ```

   Note: Consider the case where two updates are made at the same time. Don't assume that the table is sorted by time.

2. Write a BatchIterator using Java Iterator (check here)

UiPath

Glassdoor

1. Abstract classes over interfaces. Why we use interfaces over abstract classes.
2. Given a sentence with each letter as a node of the linkedlist. Reverse the order of the words (not the word itself).
   "My name is Batman" -> "Batman is name my"
3. Zigzag level traversal of a tree.
4. Copy a tree with the copy having every node containing the sum of the subtree under it.

SigFig

Glassdoor

Coding round (screen shared)

You are given a function that, for a particular user, returns a list transactions for the shares they bought or sold in the format "<date>,<BUY|SELL>,<company>". You are given another function that returns a list of friends of a particular user.

Now, for a particular user, you need to print the friend alerts in the following format: "<net_trades>,<BUY|SELL>,<company>" i.e. total number of shares bought or sold by his friends for every company.

e.g. if the transactions of his friends are

```
"2018-01-01,BUY,Company-1"
"2018-01-02,SELL,Company-1"
"2018-01-03,BUY,Company-1"
"2018-01-04,SELL,Company-2"
```

then the output should be

```
"1,BUY,Company-1" -> 2 buy 1 sell = 1 buy
"1,SELL,Company-2"
```

Note that the ordering should be on the basis of net_trades (irrespective of buy/sell info). Also, if the net_trades is same, then the ordering must be on the basis of company name.
Think of the best data structure to be used. Moreover, how can you optimize if you are told to do the same thing for every user (1000 of them).

Kickdrum

Glassdoor

Hackerrank round

1. Given intervals for some events. Find the maximum number of events that can be attended. (sort by end-time)
2. Following are the SQL table to store fruits, their monthly costs and daily transactions.
   - `Fruit (id, name)`
   - `FruitCost (fruitid, cost, year, month)`
   - `FruitTxn (txnid, fruitid, year, month, day, quantity, totalAmountPaid)`

   Write a query that will return the monthly unprofitable transactions in the following format. But do that only if the number of txns is at least 5 for the month.
   - `fruit name`
   - `year`
   - `month`
   - `total quantity of the fruit bought`
   - `number of unprofitable txns for the fruit`
   - `total loss`

Interview round: Refer the glassdoor link above

Paytm

Glassdoor

Interview 1

1. Find the median in a stream of numbers (write code).
2. Given certain intervals, find the maximum number of overlapping (check here).
3. Write code for celebrity in a meeting problem. There are N people in a meeting. There can be at most one celebrity among them. A celebrity doesn't know anyone but everyone knows the celebrity. bool know(A, B) returns true if A knows B. The task is to find the celebrity (if he is present) with minimum calls to 'know' function.

Interview 2

1. Find the number of rectangles in a chessboard (mathematically).
2. Low-level design of a Calendar system. Maintain meetings of various Users. How can we check for meeting conflicts efficiently? Avoid linear search on the meetings of the Users.

Vymo

Glassdoor

Interviews (Algo)

1. Super reduce a string (candy crush style)
2. Zigzag traversal of a tree
3. Data structure to do Insertion, Deletion and GetRandom in O(1) time (use hash map and array)

Design

1. Design the following system. The user clicks on "Download" button and is redirected to another page. On that page, he is waiting for the file to be created. Once it is created, the user will receive a link to download that file. Consider multiple users. There can be a service that fetches from DB and creates an output file.
2. Extension: Let's say the request can be of 3 types. One requests for DB; one processes it locally and one sends the request to third-party. Design this - message flow, write API (function declarations) etc.
3. Another extension: Let's say each request is undergoing processing by many components (services). say s1 -> s2 -> (s3,s4) -> s5. s5 will process only when it has received from s3 and s4. How will the message flow? Can this flow be customized in a file? What if s5 has read from s4 but the corresponding request in s3 is not present? Can they be out of order?

Soroco

Glassdoor

Hackerrank

1. Given an array. Merge consecutive integer range of 3 or more into <first> - <last> format.
   e.g. input: [-3,-2,-1,5,6,7,9,11,12,13,15,16]
   output: -3--1,5-7,9,11-13,15,16
2. Two types of US phone numbers
   Ddd-ddd-dddd
   (ddd) ddd-dddd
   Search these patterns in the given string and return the first one found, else return "NONE"
3. You have to fill two functions that are supposed to decode and encode the input string. The decode function will take an input string and a chunk size. It should then break the string into chunks of given size and generate a compressed version of the string. The encode function will take that (and a chunk size), and should regenerate the original string.
   Note: No global variables please!

Interview 1 (Screen shared)

1. Given an encoding of the form a:1 b:2 c:3 ... . In how many ways a given string of digits can be decoded. e.g. "123" -> 3 -> "abc", "lc", "aw"

Interview 2

1. Extend ArrayList class to behave like a Set. Can we hide extra methods of ArrayList that should not present in Set? e.g. insert in the middle.
2. Design TinyUrl
3. Given N servers processing requests independently. Find a way to determine if the total message rate is within a specified threshold T.

Swiggy

Glassdoor

Machine coding and first interview
Given information about the pending orders and DEs (Delivery Executives).

- Order (id, location, time when the order was placed)
- DE (id, location, time since last delivery)

The following three parameters must be considered while matching
- Distance between order and DE
- How long the order is in queue
- How long the DE has been waiting

Design and code the above system. Consider the scalability challenges.
- How will the distribution among the servers happen?
- What if there are premiere customers who are given higher priority?
- What if we want to give different priority to each of the three parameters above for different regions?
- What if we need have different algorithms for different regions?

Interview - 2 (Algo)

1. Given a tree, what is the maximum time it will take to burn a tree (assuming the fire can start at any node). In one unit of time, the node's left child, right child and parent will burn.
   Basically, diameter of a tree.
2. In the above question, the node of initial fire is given. Basically, diameter of a tree through a given node.

Interview - 3 (Design)

- Design hackerrank type platform for companies to create contests
- Discussion about various use cases, components and ER diagram
- Nothing related to distributed systems

KredX

Telephonic (Google doc)

1. Find nth node from last, in a singly linked list. You get a pointer to the head node on the list.
2. Find if a string is a permutation of a palindrome. Assume only alphabets [a-z]
3. You are given two eggs. Find the minimum height (floor) of a building such that an egg when dropped to ground from this floor or above breaks, but does not break when dropped to ground from any floor below. Egg once broken, cannot be used again.
4. You are asked to design a board of white, black and red squares. A marker on this board can be moved one step at a time, either to the right or down square when the current

square is white; only to down square when the current square is black. Red squares need to be avoided as once the marker is on a red square, further moves are blocked. a) Given a position of the marker, find the next possible position the marker can move to in a single step. b) Given a target position of the marker, define the optimal sequence of steps that the marker can take to reach the target. Assume random distribution of colors across the board.

Pine Labs

Online written: Some online interface. Webcam and desktop recording. No print statements. No google.

1. Largest histogram
2. Tree filter: Keep only nodes within a given range
3. Polynomial represent as a linked list.. Add two of them.. insert at the end of the already implemented
4. Reverse the bits of a 32-bit integer
5. Write a comparator for map<char*, int, cmp_str> with cmp_str being a struct.. complete that struct

Amazon

Glassdoor

Telephonic (Google doc)

1. Design and implement a data structure that can supports insert, update, delete, search and getRandom operations for strings in constant time (not necessary to compile).
2. Given a sorted dictionary (array of words) of an alien language, find order of characters in the language.
   Examples:
   Input: words[] = {"baa", "abcd", "abca", "cab", "cad"}
   Output: Order of characters is 'b', 'd', 'a', 'c'

Interviews

1. Design an airport service that will be used to allocate a free runway when the plane is about to land. Data structure for the same. What if the runway is not available? Message passing between control centre and the plane. Focus on low-level design and code. Can the same runway be alloted to two different planes (locking)? Database storage needed?
2. There is a huge road. Given are the following
   - Array D that stores the distance from a starting point where billboard can be installed.
   - Array C that stores the profit. C[i] -> profit if the billboard is installed at distance D[i].
   - dist -> minimum distance to maintain between the billboards.
   Assume you can install any number of billboards while maintaining a given minimum distance 'dist' between each of them. Find the maximum profit you can achieve
3. Given an array of numbers representing the size of the edges, find the number of triplets that can form a triangle.

4. Given coin denomination of 3, 6 and 17, find the number of ways in which you can form a sum 'n'. How will do it for large numbers?
5. Design an elevator system (low-level and high-level).