Question Bank

Accolite

Full time Interview
- Build a hospital management system , library system
- Question related to inner join outer joins dbms queries
- Os-producer consumer problem
- Data structure -reversing linked list , searching in rotated linked list,blocked queue implementation 'TRIE' data structure
- Virtual function ,dynamic polymorphism full working code
- Basic OOPs concept, DBMS basics(Transaction, SQL etc), Programming (Backtracking, Recursion, Sort, Real-time top 10 data, Maze problem, Queue etc)
- Be very good at pointers and use of static keywords.
- I was asked to implement a stack from scratch and what data structure would I use to implement it and why ?I replied by saying a linked list. I wrote the whole implementation using a doubly linked list, to do both push and pop in O(1) time.
- Given a number, print whether it is prime or not? I gave an O(sqrt(n)) solution, and she was satisfied with it. Then she gave me a situation and asked me to give the data model for it. I had to design a system where there were X tables in a restaurant and 9-11 was the timing of the place. I had to make reservations keeping in mind all possible constraints I can think of
- After waiting for 15 minutes, I was called for the second round. This was completely based on my resume, he asked me to explain my projects and since I had some ML projects listed, I was asked some basic ML questions. Some DBMS questions like, why do we need transactions. Some Linux commands and about the tools I had listed on my resume.
- best day to buy and sell stocks with a)1 transaction b)any number of transactions
- Sort the array using a function which reverse the array[0 to i]
- Puzzle- There are N doors in a row, all doors are initially closed. A person walks through all doors multiple times and toggles (if open then close, if close then open). Which doors are open in the end?
- Duplicate a Linked List with a random pointer.
- Find no. of set bits of a number.
- Given a 2D array of size nx2. First element in each row is 0 or 1. 0 represents left shoe and 1 represents right shoe. Second element in each row represents shoe size. Check if in a given array all shoe sizes form a pair or not.

Adobe

Internship Interview questions

- Return the modified even number list. Then add on it to modify for generic list(means if they want prime number list,odd number list or anything else).
- Ask about selection, bubble and insertion sort and which is better. 4. Some Java related small questions like what is arraylist and how it works. 5. Puzzle given two candles which burns in 1 hr. Measure 45 min from them. 6. Given a stack of different size cards. Give the count of the number of cards you can from above. 7. Puzzle :- Given 5 heads 22 tails. Make two piles of equal number of heads. 8. Rotate matrix inplace. 9. How garbage collector works in java(backend)
- Given 2 jars, each with a capacity of 100 balls. There are 50 red balls and 50 blue balls, find no. of balls you will put in each jar such that probability of red ball is greater than that of blue ball each time a ball is drawn from any of the jars.
- Given a binary tree and a light source fitted above the tree. Print those nodes values whose shadow will be formed.
- Given an array of negative and positive integers, find the first missing positive integer in the array.
- There is a single lane road such that no car overtakes any other car. Cars are moving at different speeds on the road. Now given the speeds of the car, find out how many clusters of cars would be formed and in each cluster how many cars would be there.
- rope cutting problem. nodes swapped in bst, find them, zig zag tree traversal
- Abstract Class in Java
- Use any data structure to represent a sheet of paper.
- How is hashmap implemented internally?
- What is paging, virtual memory, thrashing, how to prevent it?
- Least Recently Used Algorithm
- Draw an explain working of page table
- Pseudocode to find h-index from array of citations
- Matrix Traversal from (0,0) to (n-1, n-1) and then back while collecting diamonds + Question on Greedy.
- Given an array of number of citations of N papers, find H-index of researcher where H-index is h if H papers have at least H number of citations.
- MCQs related to linear algebra and probability
- Given an NxM matrix where the columns and rows are sorted in ascending order and a target element, the objective is to find the target element in that matrix and return its position in the format {i, j} where i is the row index and j is the column index. Return {-1, -1} if the element is not found.
- Given an NxN square matrix, each element of the square matrix is either -1,0, or 1. A path is indicated by any number >= 0. 1 is a token. Whenever a token is encountered, the score is increased by 1 and the element at that position becomes 0 (path without a token). The objective is to go from (0,0) to (n-1, n-1) and back while maximizing the score and then return the score. Points acquired via a path that does not lead to the destination can not be added to the total score. While going from (0,0) to (n-1, n-1), the player can only move down once or right once on each move. While going back the other way the player can only move up once or left once on each move.

Online test

- oops concept- polymorphism, abstraction, inheritance, encapsulation. Write examples of the following.
- arraylist vs array
- Given a sorted array rotated from a particular position(position not specified). Find the element from the array.
- complexities of heap sort etc.
- Implement a binary tree and write some of its functions
- from a file of data count the occurrences of a word and tell the word with maximum occurrences (using file reading)
- https://drive.google.com/file/d/18WZ3R-gd8g1ZC1kSjh6TDXCRtom6L_hu/view?usp=sharing
- Buy and sell stock with max profit
- Recursively delete all consecutive duplicates in a string.
- Tell whether a number is a power of 2
- From resume (Android app development) - if the main screen is taking a lot of time to load, how will you check and take care of it.
- Given two strings, s1 comprises of alphabets, s2 has alphabets as well as the wildcard '*'. write a function that returns true if the strings match else false. The wildcard could mean any alphabet. Example: abcdeabs, a* match, a*a* also matches, *s matches, but *eb* doesn't match
- How would a system like amazon shopping give a notification to users when a product comes back in stock? (should consider the scale)
- Traversals of Binary Trees and Binary Search Trees, Convert Binary Tree to Circular Linked List and Doubly Linked List, Paging and Segmentation, Threads, Heap and Stack in C, Concurrency Control, Discretization of attributes in Decision Tree Classifiers
- 21 occurrence
- Vertical traversal of nodes in a binary tree. Then print in forward or reverse alternating order the elements in the vertical columns so formed starting from the first column.
- Matrices given with O and X's convert all Os to Xs if the group of Os are padded with Xs in all directions. (Up down left right)
- Given a Database of million entries, return a sample of size 100 which nicely captures the distribution. It was a stats and sampling based problem.
- Split linked list from the middle
- Design FB feed, vertical and horizontal traversal, map (how to avoid inconsistent state), palindromic substring
- Next largest number in the array.
- Ways to reach n stairs if 1,2 and 3 steps are allowed at a time.
- Given two bishops on the nxn chessboard count the minimum no. of moves taken by one Bishop to reach the other.
- Given a string and a no. K, reverse string at consecutive subsequences of length K.
- 2 bishops x,y coordinates are given b1(x,y) and b2(x2,y2) (b1 is fixed, min no. of moves required to kill b1 by moving only b2. ii) some tiles are blocked now (rest same question)
- print matrix of size n*n in spiral form

Full time Interview
- Given a rotated array find a target in log(n) time and tell the number of threads used for the same
- Given an m*n matrix given the number of ways to reach from start to end .
- Reverse the Linked list recursively, Find the loop in the linked list recursively
- Max sum subarray, invert binary tree, find smallest element in rotated sorted array, find element in array which has frequency one if all others have frequency two

- Find the node at kth position from the end in a linked list in 1 iteration.
- Print matrix in a spiral fashion.
- Write Preorder traversal iteratively
- BFS, DFS, Mutex, Scheduling algorithms.
- A bee flies in between two trains and finds the distance travelled.
- 2 jars having a capacity of 100 balls each. There are 50 green balls and 50 black balls. Divide the 100 balls in the two jars such that probability of finding black ball is the highest
- Write a pseudocode for this question in the link. https://leetcode.com/problems/h-index/description/(It was a subjective question).
- Recursively remove adjacent elements from an array
- Maximise profit when buying and selling stock, 1 transaction is a must. In case there is no profit, minimise loss.

HR Questions
- Which type of team would you like to work in, Cutting Edge Technology or Standard Products, why not the other, give reasons?
- What will you do in case of conflict with the manager on ideas?
- What will you do in case you do not like the project assigned to you?
- How did you get into coding? The journey from 11th and 12th to IIITD
- Why do you want to join Adobe?
- Which was your most challenging project?
- How did you manage teamwork?
- What innovation did you do?
- Given a scenario in which the manager is not agreeing to you how will you proceed

Airtel

Full time Interview
- Check if x is in the matrix, which is row sorted and column sorted. Time - O(N)
- Check the number of occurrences of a x in a sorted array of n elements.
- Given an array stream, we need to print the stream on the basis of following conditions. If a[i] is divisible by 2 print AA instead of that number, If a[i] is divisible by 3 print BB instead of that number, If a[i] is divisible by 5 print CC instead of that number, If a[i] is divisible by 6 print AABB (since 2n3) instead of that number and so on m conditions. Which data structure will be used to store these conditions and print.
- What is a hashmap and how to implement it, which DS will be used to implement it.
- Design a library database (tables, E-R diagram) then optimize it further.
- Sort based on frequency
- Egg dropping puzzle
- given a binary tree, check whether it is a BST or not.
- SQL query to find second max salary from an employees table which has a "salary" column.
- Write code (one a laptop) for Dijkstra's algorithm.
- Write code for iterative merge sort.
- Explain deadlocks.
- Even elements Insertion and deletion in linked list, projects in detail, paging, merge k sorted lists, merge sort using iteration, prim's algorithm from scratch and it's proof
- Given two numbers represented by linked lists, create another linked list representing their sum.
- Given a sorted array, find the number of occurrences of an element. (Modified binary search)

- Given a rod of length n inches and an array of prices that contains prices of pieces of size smaller than n that you can sell (need not be all sizes). Determine the maximum value obtainable by cutting up the rod and selling the pieces.
- Given a bag of words (of large size) and an input word, print all the words in the bag that are anagrams of the input word. Do so in no more than O(n) time complexity.
- How will you define your own custom HashMap? Later the question was modified to more restrictions like if you had just an array that you could use to store data then how would you do it, etc.
- Explain your favourite algorithm and code it out.
- Explain in your own words the concept of OOP.
- Explain the concept of interfaces. Explain default methods that can be defined in interfaces (A new concept introduced in Java 8)
- If you were given a project, how would you choose what programming language you are going to work in? (I had to explain Python v/s Java)
- Explain in brief your favourite project in Android (I was asked this because I had a lot of android projects in my resume)
- Level order traversal, Spiral order traversal, Right / Left view, Inward converging spiral order traversal of a binary tree, Best data structure to be used for infinite number of incoming elements to be stored in a sorted manner, OOPS

Online test
- Given a list of integers, you have to tell how many of them are perfect squares
- Given a list of n integers and an integer k, sort first k items of the list in increasing order and remaining in decreasing order and print the list.

HR questions
- "How many footballs can fit inside a commercial airplane"
- Define the work that you did in your internship?
- Are you a research-oriented person?
- What else do you like to do apart from academics?
- How do you like to work on a project? In a team, as an individual? And how do you go about working on it?
- Would you be comfortable working on new technologies?
- Why did you want to join Airtel X Labs?

Amazon

Internship Online test
- Matrix Traversal (moves allowed in all 4 directions) + Reasoning Questions + Question on Greedy
- Implement an algorithm for Round-Robin Scheduling with different arrival times.
- Given a row-wise sorted binary matrix, find the row with maximum 1s
- Find max sum path in n-ary tree
- Given a BST, connect nodes in a level (left to right)
- Design a hotel review system given customer reviews and 'magic' words. Return the best k hotels (ie the ones with max number of magic words across reviews).

Internship Interview

- If there is a linked list in which each node points to the next node and to a Random node(part of linked list only). How do you clone that linked list?
- Given a BST with two of its node values swapped. Correct the BST.
- Given an unsorted array filled with multiple occurrences of 0, 1, 2. Sort the array in one traversal and O(n).
- Difference between Processes and Threads.
- Binary KnapSack and SQL queries
- Find maximum path sum in n-ary tree.
- When to use an array and when to use a linked list.
- We start with a value n in cash and we can choose to invest in a scheme. Here the return we get is floor(n/2) + floor(n/3) + floor(n/4). Each of these 3 numbers is a component that we can choose to reinvest to get a better return (no other amount can be invested after the first investment). Given an n, you have to write a function which calculates the maximum possible return you can get by investing n. Eg- n=24 gives return 12+8+6=26. Now you can reinvest 12 to get a return 6+4+3=13. Hence the max possible return from investing 24 is 13(not 12)+8+6=27. So 27 has to be returned.
- Given n countries and q bidirectional roads connecting some of them, find the number of distinct continents.
- Given an array of size>=4, print the number d such that a+b+c = d where a,b,c,d are integers in the array.
- Given n chairs some of which are filled, find the index at which one person can sit such that he is at maximum distance from his next nearest person. Extend it to k people. (O(n) time)
- In a tree find the two nodes which are a maximum distance apart and also write the code for it.
- What if we have an acyclic graph in the above question. How can we find the 2 nodes that are a maximum distance apart? With the least complexity.
- Implement a list in a language of your choice (append, remove, get operations)
- Given a list of subjects and their prerequisites. Determine whether it is a valid offering or not.
- Replicate a linked list which has nodes pointing to the next node and random nodes as well, Find square root of a rational number such that the difference between actual value and calculated value is less than 10e-6.
- Given a binary matrix which is sorted row wise and column wise, return the index of the row having maximum number of 1s
- Find the maximum value in a stack at any point of time.
- Given a binary matrix of 0s and 1s only, sorted according to both column and row, find the index of the row having maximum no of 1s in O(1).
- Given a string which contains only 'a' or 'b'. There is an operation by which you can remove any palindrome subsequence from the string. Find the minimum number of operations required to make the string empty.
- https://www.hackerrank.com/challenges/candies/problem
- The problem is too long to explain but an analogy could be drawn to huffman coding problem if you are able to pick up on that during interview. Basically, store all elements in a min heap. Extract 2 elements, add them up and add the result back in the min heap.
- Given a set of 'n' strings, find whether they form a complete cycle. For example, set S = {abcde, efgh, hjia } forms a complete cycle because last character of 'abcde' matches first character of 'efgh' and similarly for 'efgh' and 'hjia' and from 'hjia' back to 'abcde'.
- Find the max area rectangle in a histogram?

Full Time Online test

- Number of days a stock remains maximum, (done by stack) , edit distance of a string , (dp)
- Minimum path for a 2d matrix starting from the index (0,0) to (m,n).
- Given two strings s1 and s2. Check whether the permutation of s2 is a substring of the string s1.
- Reverse every k elements of a linked list.
- Different methods of data augmentation
- Naive Bayes Algorithm
- Straighten an acyclic directed graph into a linked list in bfs manner with minimum time and space. (O(n)time and O(1) space)

Full time Interview
- Given a string, rearrange it as no two adjacent characters are the same.
- Convert the given string (say, 4123456) to it's english number equivalent (four million, one hundred and twenty three thousands four hundred and fifty six)
- Find Subsequence with Maximum Sum in an array including negative values. (Subsequence may not be continuous)
- Four sections: 1. Code Debug (7 questions-20 mins) 2. Coding (2 questions, 70 mins): i). Count No of distinct pairs in an array that sum upto a given number. ii) Cloning of a doubly linked list with next and arbitrary pointer. 3. Workstyle Assessment questions (20 mins) 4. Logical Reasoning (24 questions, 20 mins).
- Find the bridge in a graph.
- second section had 2 coding questions,
  1st- Compress a given string in lexicographical order. ex: I/p-> bbbaaacc, O/p->a3b3c2.
  2nd- On the warship strategy, an optimal strategy to set the number of ships in each layer. Each ship has a value 'V' and next layer after that ship can have 0 to ((V*V+1)%M-1) valued ships. find (total number of ships)%M. constraints: 1st layer has only 1 ship with value 'V'=2; ex: I/p-> number of layers(N)=2, M=3; O/p -> 0 explanation: first layer has only 1 ship with value 2, therefore next layer can have ((2*2+1)%3)=2 ships. total number of ships=3, value returned 3%3=0;
- Substring matching z algo, level order, heap sort
- N x N matrix with rotten, fresh tomatoes and empty cells. At every second one cell in all directions is infected and thus fresh ones rot. Given the 2D matrix returns the number of seconds it takes for all thr fresh tomatoes to rot.
- Given n number of courses with given prerequisites, check if a course order is valid.
- Questions on polymorphism, inheritance, java.

Axtria

Full time Interview
- how to cut cake in 8 pieces using three cuts
- How to fill a bucket for 7 litles using 3 and 4 litres buckets.
- Find the average salary and department name of all employees according to department.
- a runner is running 2 laps around a circle. H eran the first lap with a speed of 4m/sec . He ran the 2nd lap with some speed (say x). His average speed over the 2 laps was 8 m/sec. What is his speed during the 2nd lap? Answer is infinity.
- Given 2 jugs of 5L and 3L each, you have to store 4L of water. How will you do it?
- There are 6 rounds in a gun. Your enemy put 2 bullets in those rounds with the condition that he put both those rounds consecutively. He fired the first shot at you but the round was blank. What

is the probability that when he shoots the second time, the round will not be blank, i.e., you will be shot?Answer 1/4

Full time Online test
- There were 2 sections: Subjective Section 6 questions had to be attempted in 20 minutes. 5 questions were about Axtria and 1 question was to tell about a problem you have faced in a project group and how did you resolve it. 2) Objective Section: 80 questions in 80 minutes. 20 each for English, Quant, Logical and Technical.
- There was one section dedicated to c output type questions. Level of questions was moderate.

HR Questions
- If another company offers higher compensation, would you leave us and take that job?
- What problems did you face while doing your project? What did you learn in your 1st year of MTech? Why Axtria?

BuyHatke

Internship Online test
- Solve a sudoku board using backtracking
- Given an unweighted directed graph, check at all nodes if a cycle exists from that node
- First non repeating character (eg. abacddbec output - aabbbbcce if all characters are repeating then put #)
- Find the first non-repeating character in a stream of characters.
- Find three numbers in an array that sum to 0. Returned pairs should be unique.
- Report all the nodes in a graph that are part of some cycle in the graph. (Connected Components)
- Given an array of integers, return all unique triplets that sum to zero.
- https://leetcode.com/problems/zigzag-conversion/
- For incoming streams of characters, report the oldest unique character. If none exist report '#'. For example 'abaccbd' --> 'aabbb#d' 100 minutes for 4 questions.

Internship Interview
- Perfect Squares leetcode, linked list basic questions
- Find the minimum path sum in a triangle.
- Find the missing numbers in an array in which numbers from 1 to n are present. (using bit manipulation).
- Find prime numbers till given number n. (In O(nlogn) time , sieve of eratosthenes).
- Print the boundary(left view, right view and bottom view) of a tree.
- Define paging, page replacement, belady's anomaly, page fault, TLB.
- You are given a glass jar with 80% water(data) filled inside it, you have to go out for 7 days, how will you detect if someone opened the jar(looked into your data). The water(data) should not get corrupt in the process.
- Given n queries, find the number of primes in a subtree rooted at given number a.
- Given natural number N, find R such that N-R*(R+1)/2 is positive and minimum.

- Given an undirected graph, instead of weight between 2 nodes, we are given the probability of travel between 2 nodes. Given the start and end node, report the maximum probability we can achieve and the exact path which needs to be taken for it.
- Difference between private and public IPs. How does a packet reach a client if only the public IP is known to it?
- Why does the need for task scheduling arise in an OS?
- A discussion on how Linux treats processes and threads as simple tasks.
- given an undirected weighted graph with probabilities attached, and start and end, find the max path from start to end (Multiple probabilities and not add them).
- There's an array given of size n, where n+2 elements are given except 2, find those two in o(1) space.
- Dbms: ACID properties, and explain to me how indexing works internally, phantom threads
- given an array with an ap sequence, find missing element in o(logn)
- A stacks given, return the minimum element in o(1) time, o(1) space
- Detection of loop in link list - Floyds hare and tortoise
- An array and an integer k is given, subsequence of the array will be formed if and if only pairs of the elements do not sum to be integral multiples of k. Find the largest subsequence that can be formed. Solve it in o(n)
- Given a reference to a node in link list, delete it.Reference to the Head is not given

Full time Interview
- 1d Array given, find the number of unique ap subsets
- del a specific node in a LL, only ref to that node given
- directed weighted graph, find st -> en -> st cost, both paths should have one crossing point at least.. give minimum weight of such path
- Binary tree max path sum between two leaves
- 2d array +/- integers, find max sum of any rectangle inside
- Ap given for 1st to nth term, one term missing , find it.
- Array and int K given, find MAX length of a subset in which no two pair sum is divisible by K.
- OS RAG
- Directed graph cycle find

Curefit

Internship Interview
- Spiral matrix printing
- Given an array of integers, find the first occurence of a number such that all elements to the less are less it and all elements to right are greater than it.
- First missing positive number
- Word Break into a minimum number of spaces.
- https://www.geeksforgeeks.org/sum-of-maximum-elements-of-all-possible-sub-arrays-of-an-array/
- Check for increasing subsequence of length three in O(n) time.
- Given k sorted arrays. Give a single sorted array after combining them.

HR

- Tell me something about Arduino.
- Tell me, how can you use the learnings from this project, in the future.

- Your preferred programming language and why?

Dailyhunt

Full time Interview
- Round 1: write a code to print the shortest path to overcome all the obstacles in a given grid.
  Round 2: Edit Distance, puzzle question: given three people with loaded gun A,B,C each have probability of making a correct shot as 1/2,1/3,1/4. Given the starting chance, what should C do to be safe? Ans: C should waste his shot, as both A and B will choose each other to shoot and C will have a good chance to be safe.
  Round 3: write a code in any comfortable language to find the duplicate lines in a file, without using any collection (i.e. no maps, arraylist, dictionaries, etc.)
- LRU algorithm.
- Whatsapp System design.

Dell

Full time Interview
- Difference between c++ and java
- A program to find largest product of two numbers in an array
- Difference between abstraction and encapsulation
- What is function overloading
- What happens when the computer is turned on?
- What are the two factors for judging efficiency of a program? Write an efficient algorithm to sort n numbers.
- How to allocate 2D arrays dynamically?
- What are data structures? What are ADTs?
- Generate a random number from a given range with repetition and without repetition.
- Boot up process of computer
- Virtual memory
- 2d array access using pointers
- 2d array memory allocation
- what is JDBC and resultset
- Virtual functions, friend functions.
- Difference between RIP and OSPF.
- Difference between malloc and calloc.
- What is void in c/c++?
- Coding question two finds the difference between two lists of strings.
- Difference between tuple, list and dictionary in python.
- What is pointer to pointer?
- WAP to count the number of inversions in an array
- WAP to find the 1st element in an array, for which elements on the left are smaller and on right are greater.
- what will happen/what happens when infinite recursion occurs.
- How the stack frame grows, i.e. how heap and stack grows.
- what happens when you are out of space.
- Components of stack frames

- Runtime and compile-time binding.
- Represent real world entities using Object Oriented Programming and Design.
- How would you implement a system to check the status of a seat in a train? (Available/ Not available)
- Searching algorithms.
- Difference between windows and linux
- Binary search in a shifted sorted array.
- All the approaches to find the middle node in a doubly linked list.
- All the Linux commands that I knew of.
- How are IP addresses assigned in our mobile phones?
- What is a gateway vs a router? Where is the gateway for our home wifi network.
- How is routing done? Complete process.
- About RAID.
- Explain the recursion process in memory.

Internship Interview
- Explain Docker, why docker. Why java swing and comparison with spring. Explain the scenario for safe cars(IOT related). How a smart hotel system uses Alexa(project based). Anagram Code.1 Puzzle. Concepts of OS(Virtual memory, paging) , OOPS concepts, Selection sort (comparison with other sorting algorithms)

HR
- Tell two things which you find wrong in yourself and try to improve it.
- Why did you not pick placement in B.Tech only?
- Tell me about your recent project and the problems faced during it and how you tackled them.
- Asked reasons why I changed my stream and reasons for selecting IIITD vs other colleges.
- What do you know about Dell that makes you want to be a part of our organization?
- Dell is an established company where generally your teammates are experienced professionals. What would you do to make yourself noticeable in such a case?
- How many balls can you fill in an aeroplane?
- If given an opportunity to work in either a startup-like framework or an institute like Dell, which one would you pick?
- Were you selected in other companies before this? If not, what were your shortcomings and how did you overcome those?
- Given a chance will you prefer being a leader or will you prefer working under a leader?

Elucidata

Full time Interview
- Technical Round -
  There were 2 technical rounds (the first was for technical knowledge and the second one was a coding round). Both were based on a case study. The questions in the coding round were data algorithms which could be answered using either Python or R. Some interviewers were ok with pseudo-code or otherwise theoretical explanations of your solution as well.
  Round 1 - Given that a researcher wishes to know if the whole genome expression patten of a particular cell type changes when it is subjected to different treatments and the fact that you are given the whole genome expression data for the 4 treatments, which statistical technique would you use to conclude that there are significant changes for different treatments?

Given a dataframe (of the earlier question) with named row and column names, can you tell which wet lab technique was used? (Row names suggested Affy probe IDs and the columns were named as 'S1, S2, S3' and the like).

Given the dimensions of the dataset, can you tell how many probes were used in the microarray experiment and how many samples were subjected?

The four treatments had four replicates each. What are replicates and why are they used?

- A quality histogram is shown with size of the reads on the y-axis and the number of reads with that size on the x-axis. (The plot was somewhat a traditional negative binomial distribution). Can you guess what percentage of reads will be classified as small reads?

- Looking at the histogram shown earlier, can you comment on the quality of the reads and the data generated?

- Given the differential expression heatmap of all the samples on one gene (4 or 5 probes corresponded to that 1 gene), what conclusions can you draw from the figure? (Red denoted high-expression, blue denoted low-expression with the faint colours of the gradient denoting in-between values). (The interviewer was looking to see if the candidate can draw conclusions well. You might see a total red bar in front of one treatment - you can say that that treatment over-expressed that particular gene or the opposite if you see a complete blue bar).

- Given that the researcher wants to remove technical outliers and not lose genes of interest, out of mean, median and mode, which statistic would you suggest for this purpose? (The mean/median can be used but you don't want to remove highly expressed genes which are of biological importance).

- Given a probability distribution, can you name which distribution it is? (In my case, it was a Gaussian mixture model).

- Round 2 - Coding round -
  Some questions regarding the projects undertaken
  Detailed technical know-how questions related to any one project - in my case they wanted a deep answer on how genome assembly works. They were looking for my explanations on de Bruijn graphs and Burrows-Wheeler transforms.
  Asking how PCA works. What does it mean to project something? Technical know-how on PCA. What does it actually plot? Given a drawn scatter-plot (on paper), what would its first and second principal components look like? How many principal components would it actually have
  Given a dataset with 3 samples each belonging to 3 classes, there are three kinds of missing value patterns that can be seen. One where all the values for a given feature is missing, second where 2 values are missing, the third where only one value is missing. For the first pattern, remove that feature itself. For the second pattern, replace the missing values with the non-missing value of that feature of that cell class only. For the third pattern, replace the missing value with the average of the 2 non-missing values of that feature of that cell class. How would you go about dealing with those NA values?

- Quantify how many computations would that solution take if you have 20,000 features for 3 samples each of 3 classes. How would the solution scale if we increased the number of samples and the number of classes?

- Now given the same dataset (with 9 samples total from 3 classes and 20,000 features), you are given a new sample which does belong to any 1 of the classes but you don't know which one. Suggest a technique by which you'll try to find out which class does it belong to. (I made some assumptions about the data that there is very low intra-class variation and very high inter-class variation, then a random forest model with proper feature selection can predict it).
  In case the new sample is not similar to any one of the 3 classes, what would you do to find which class it belongs to? (I suggested an unsupervised clustering algorithm)

- The interviewer asks can correlation be used? On what basis would this correlation-based approach fail? (If there is no linear relationship in the data)
- Given mass spectrometry data, how would you calculate the ratio of parent amino acid reading for the 6 samples to the readings of the same amino acids with the highest carbon labelling? Some amino acids have as low as 2 different carbon labelings and some amino acids have as many as 12 carbon labellings. (Jumping criteria in the dataframe). Quantify how large the jump size should be for the least number of computations.
- Now given those ratios that you have, we wish to divide those ratios with all the readings of that amino acid.

Endurance

Full time Interview
- How will you make a database for an office (like the employees, departments and other things) and how will you apply SQL queries on that database.
- If you were to handle the memory optimisations, how would you do it?
- Different states of a thread.
- Suppose there is a function which returns the dependencies for a program, and there may be dependencies for the dependencies (just like a bfs tree), print their order.
- Based on dbms(constraints, trigger)
- Android project based, reverse a linked list , Reverse Linked list in groups of k, checked unchecked exceptions in java, y string is immutable
- Search for a element in rotated sorted array
- For each index in the element , find the maximum element from the remaining sub array greater than the current element else store -1.
- Normalisation
- Scenario where we require indexing and where we don't want to use it
- Difference between list and tuple in python,slicing
- what happen in backend after we hit some url
- Osi model,protocol in each layer.
- Which file system we use in windows.
- On which port number does http and https work. What is the difference between them? How does it work?
- In all the storage devices there is less storage space than expected. Why?
- What is the difference between TCP and UDP? Real life application of UDP? 3-way Handshaking?
- What happens when we type a URL in the browser and press enter?
- In DNS where we use TCP connection?
- Technical details about the project.
- Suppose we are given two tables in a database. Table1 has employee name, employee id and salary. Table2 has employee id and list of projects. Add one column in Table 1 such that if the employee has done any project mark 'yes' otherwise 'no'.
- Difference between http and https .What is the problem with just http ?
- How does SSL work ?
- How will you analyze 10 terabytes of data with limited RAM, say 12 Gb?
- Subnet masks
- What is context switching and why is it required ? What will happen if there is no context switching?

- Explain about memory management in detail (I explained about paging and paging with virtual memory)
- Difference between join and union
- Difference between mysql and mongodb and Explain the significance of Nosql databases
- Again regarding Virtualization and difference between containers and virtualization
- If you are CEO of an e-commerce website you wish to start. What are the features you will take care of ? He asked about technologies to be used .... (open ended question)

Internship Interview
- find the number in the array which doesn't have a copy in the array
- design student portal. (Explain all the database, system, network concepts used)
- belady's anomaly

HR

- How did you maintain a relationship with a team player who is always negative?
- Have you ever tried to maintain rapport with someone where it is difficult to initiate the conversation?
- Tell me a situation where you tried more than your efforts and yet failed ? How did you overcome it?
- Tell me a situation where you are incorrect / wrong and how did you handle it?

Expedia

Full time Interview
- You have 25 horses. Find the fastest 3 horses in the minimum number of races given you can only race 5 horses at a time.
- Given an array, rotate it k times, inplace, clockwise or anticlockwise.
- Given a deck of cards, find the missing card among the deck.
- Given an API which tells whether person A knows person B or not. There is a gathering of N people out of which one is the mayor and the rest are civilians. The mayor doesn't know anybody, but everyone knows the mayor. The civilians may know each other, and if civilian A knows civilian B, civilian B knows civilian A. Give an algorithm to find the mayor.
- Questions based on graphs and transitive relationship, linked list cycle detection and starting point of the cycle , make the bst from binary tree, convert the binary tree to balanced bst, 25 horses puzzle , rat in a maze, length of the longest sequence with only two digits can occur. Eg: [1,2,2,3,1,1,1,3,4] so the length is :4 in O(n)
- Sort the array with 3 values are given 1,2,3. in O(n)

Internship Interview

- Given arrival and departure time of trains tell minimum number of platforms required
- Given a big number in the form of a linked list and 1 to it.
- Rat in the maze problem
- Sort an array containing only 0s 1s and 2s , in linear time and no extra space.
- Diameter sum in a binary tree

- Given a sorted and rotated array, find the minimum element in it in O(logn) time.
- Add 1 to a number represented in a linked list
- Print the first non-repeating character of a string
- Find the length of a linked list with a loop
- Print the nth node from last of a linked list
- Find the maximum subsequence with two distinct numbers.
- Find diameter of a tree
- given an array from 1 to 100 consecutively find the missing no.
- find the character which when removed from the string , makes it a palindrome
- Write the code for the data structure Linked List in Java and for its add function.
- Find the minimum and maximum of an incoming stream of values.
- How to instantiate an object in javascript?
- Give the different types of indexes in DBMS.
- What is normalisation in DBMS?
- Only 1 question asked
  https://www.google.com/amp/s/www.geeksforgeeks.org/find-the-next-lexicographically-greater-word-than-a-given-word/amp/
- Missing element from 1st n natural nos.
- Balanced parentheses, zig zag level traversal of Binary tree, find the smallest missing number in array of non negative numbers, Dutch flag problem
- Given a m,n matrix and int[] X, int[] Y are centers of circles of radius r. Find a path from 0,0 to m-1, n-1 such that the path doesn't intersect any circles. If such path is not possible print False, else print the path.
- Given a linked list, find the middle node in one pass.
- Determine if the given string have balanced parenthesis, but the string contain characters '(' , ')' and '*' where "*" can be '(' or ')' depending on which gives a balanced string. eg. "((*)" is balanced, "*(" is not balanced.
- DP - StairCase Problem.
- String manipulation - given aaabbbccc you need to reduce the string to abc.
- How to design a URL shortener.
- Program to simulate cache
- Find if one string is rotation of other
- https://leetcode.com/problems/reverse-words-in-a-string/ This question with in-space constraint was given.
- Implementation of hashmap using any hashing technique.
- given a binary tree, restructure the binary tree such that each level in the binary represents a linked list independently. And do it in place by having a next pointer of the node in addition to left and right
- Internal working of HashMap(of your preferred language, mine was Java)
- Left Join,Right Join,Inner Join.
- Rain Water Trapping Question of array (available on gfg & leetcode)
- Finding the missing card
- Rotating an array n times.
- Grouping anagrams
- Cousin nodes in a binary tree
- Count distinct (i,i+1) pairs in an array where i the the element in the array
- Rotating an Array, maximum overlaps in n ranges, kth largest in a stream, reading/writing b-tree in a file, the next number is the pronunciation of the previous number
- Remove consecutive duplicates from a string . eg input > aaaabbccaaa output > abca

- Given cost matrix find minimum cost to reach A[N][N] from A[1][1] where A is the cost matrix

Internship Online test

- There is a country on a 2D plane. The country can be represented as a nxm matrix with each cell as a city. A festival is to be held in the country in one of the cities. We are given some cities and the number of people in them. We need to find the city where the distance traveled by all the people is minimum.
- Write code to convert dates into given format(2nd Jan 2020 into 2020-01-02)
- Given a list of numbers (with duplicates) of size n, delete m numbers from the list such that after deletion the count of unique numbers in the list after deletion is minimum
- https://www.geeksforgeeks.org/count-the-number-of-ways-to-divide-n-in-k-groups-incrementally/
- https://www.google.com/amp/s/www.geeksforgeeks.org/printing-frequency-of-each-character-just-after-its-consecutive-occurrences/amp/
- There are n cities in a 2D plane, we have (x,y) coordinates of each city and number of people living in the city. Find a point (a,b) such that the total cost to bring all the people to (a,b) is minimum. Cost to bring a person from (x,y) to (a,b) = |x-a| + |y-b|. Note : it's not necessary that (a,b) is the coordinate of one of the cities, it can be anywhere in the 2D plane. Constraint : n = 10^5. Nums of people in a city <= 50. 0 <= x <=10^4, 0 <= y <= 10^4"
- Merging 2 strings such that the characters of 2 strings appear alternately in the output string.
- Given an array of strings , and queries. Each query has d L and R denoting the starting and ending index of the array. Find the number of strings from L to R which start and end with a vowel.
- String Compression (Hackerrank) - character followed by number(if >1) equal to its continuous number of occurrences

HR

- You have to design an app and you have to make 4 teams among a group of 40 members for this app. How would you go about it? If Team A comes up with a feature that disrupts the features of Team B and this creates a dispute, how would you solve this?
- Given a group of 10 people, 4 of them are first-time travellers, 2 of them have restrictions about the food they eat, 2 of them are physically-disabled. List the questions you would ask them to plan a trip for them.
- Describe your experience working for a team. How do you handle a team member who does not do a lot of work? Describe what you did in a situation where you came up with an idea that was better than the idea of one of your group members.
- Designing an app for conducting hackathons.
- What was the best thing you liked about the presentation (given by the company)? What is the current project on which you are working?
- How will you make a person contribute to a group project if he/she fails to do so?
- What do you think is better, leading a team or working as a team member?
- What the government should have done to prevent covid and all, and discussion on swine flu, covid, when should we open the expedia office and why?...
- Tell me something about yourself which is not in your CV, like about you, your family....
- I told him that I do content writing as a hobby and own a blog. He asked me what all topics I've written and finally asked me for the link to the blog.
- How ratings are calculated for a restaurant? Average is not a great parameter. Why? How can we make the ratings better? If the restaurant was great earlier but now the chef is different, how will people get to know this?

- What do you know about Expedia.Any question that you would like to ask?

Flock

Full time Interview
- Let's assume you have given N(integer). Permutation of N is all the permutations of integers from 1 to N. Let's define the rank of any permutation of N as its position in its lexicographic order. for ex: for N =3, 123 has 1st rank and 321 has 6th rank.
- Let's define the difference between two permutations as the sum of the differences between absolute values of the corresponding values of the permutations.
- Given a value K(Integer), two permutations A and B where rank(B) > rank(A). We need to find out the number of permutations possible between A and B whose difference is <=K.
- So for any permutation x between A and B. We need to take the difference of x with the permutation from which it is most close. If it is in between, then consider the minimum difference from both A and B. for ex: if x = 312 then it is closer to 321. if x = 132 then it is closer to 123.
- Find the number of unordered pairs (x,y) where 0 <= x,y < n and x != y such that f(x) + f(y) is prime. The function f returns the sum of digits of the number like f(19)=1+9=10.
- Q1:Longest Increasing Subsequence such that differences of elements inside it are also in longest increasing subsequence.
- Q2 bitmask dp

Futures First

Full time Interview
- 87^2 and 132^2 in 10 seconds without pen and paper.
- You have 5 eggs and are on a 100 floor building. Determine the floor from which the egg will not break after being dropped. Ascertain the minimum number of tries.
- Memorizing 8 words and repeating them later in the interview.
- Estimate the dimensions of a window in the room, height of the room.
  Puzzle Ques:
  Give me a 5 digit number such that

  _ _ _ _ _
  0 1 2 3 4
  The upper number is the number of times that number comes in the 5 digit number.
  Like 0 over 4 means that 4 comes 0 times in the number. (0 forms the 5th digit of the 5 digit number)
  Ans :
  2 1 2 0 0
  Asked 24 * 25 while I was solving the question.
- Mathematical Puzzles: Multi Hall probability problem, Russian roulette, Bayesian probability problems.
- Memory tests: A pattern is shown and we are asked to memorize it, we are asked to write the same pattern after a while.
- Knowledge of international and National markets: Difference between Sensex and Nifty, Why is the Japanese currency devalued in comparison to the rest of the developed nations.
- Third round: We were divided into groups of 4. 16 questions were thrown at us with the marking for the first 4 being +1/-1, next 4 as +2/-2, next 4 as +3/-3 and the final 4 as +4/-4. They analyze

the mathematical aptitude of the students making them compete with each other simultaneously, also analyse the risk taking abilities. We were made to place bets on who we thought the winner would be, and even that carried some weightage.

Goldman Sachs

Full time Interview
- 3 arrays were given and we have to find elements from each array s.t. The difference is minimal. Eg: arr1={5,10,15,20}, arr2={2,3,6,15,20 }, arr3={ 8,16, 24}. Minimum difference is {15,15,16}. I was asked to give the optimum solution.
- To find a bst with minimum height. Theoretical questions and logic was asked.
- To find whether a substring is present in a given string. Was asked to write the code.
- Memory size 64KiB was given. Had to design a memory structure having 2 functions:
- balloc and bfree
- Min(a-b) in two sorted arrays.
- Block to be arranged in increasing order such that a block below has to be placed on too only when moving out. Like a tower of Woden which we play.
- Find the number of negative elements in a row wise sorted matrix.
- Kth smallest element in a row wise and column wise sorted matrix.
- Given ranks of various students. Find the minimum number of candies that can be distributed so that each student gets at least 1 candy and people who are adjacent, the one with higher rank should have atleast one more candy than the one with lower rank seated adjacent to him.
- Find a triplet in the given unsorted array with sum equal to a given number
- Given two linked lists how will you check if they merge at some point?
- Given a BST that supports all the usual operations of insert, delete, etc, you add two functions snapshot which when called saves the current state of the BST and function getVersion(int version_num) which retrieves the BST as saved at snapshot given by version_num. Propose how you would efficiently implement this. [This is called a persistent BST]
- The following languages are compiled or interpreted - python , java , c++.
- How would you optimize the speed of a python program?
- What is Global interpreter lock in python
- Why do you need both CPU and GPU
- How is a dictionary implemented in python?
- Why is open hashing preferred over a hashing scheme using linked lists to compensate for collisions [think in terms of cache hit rates]
- Questions on deep learning - why has it gained traction in last decade, security in deep networks, interpretability of DNNs

Full time Online test
- Infix expression to postfix expression
- Given N Coordinates in a 2D Plane, find the smallest side of a square that can be formed by the coordinates such that the sides are parallel to the axes.
- Given a stack, you can pick an element and place it on top, calculate the minimum steps required to rearrange the stack in ascending order, such that you can only select an element to move if all the elements above it are in ascending order.

Internship Interview
- 2 strings, to check if one is the anagram of the other.

- Diameter in a graph.
- A puzzle: n rooms, n people with ids from 1 to n. All the rooms have lights which are initially off. A person with id i goes and toggle all the rooms i, 2i, 3i... after each person has visited the rooms, which all rooms will have light on?
- Alien dictionary
- Singleton paradigm
- What is SQL how would your explain it to your nephew
- Make a Youtube data base
- 3. Knight on chess board problem
- given a url you are to return a 7 length string encoding (a-z). if the encoded string is given you should be able to return the url.
- one very long question on designing complex data structures from simple data structures
- Convert Java code to equivalent functional programming code.
- Delete n elements from circular linked list.
- Thread vs Process
- Shared memory between processes
- Difference between thread, risk and vulnerability?
- DDoS & DoS
- TCP header
- Man in middle attack
- Encryption first or compression
- Ransomware uses symmetric key or asymmetric
- Blockchain
- Difference between hashing and encoding.
- CIA model of security
- Trojan: Mechanism + Recent attacks
- OSI Model with emphasis on the structure of packets at different layers.
- Discuss security algorithms/systems used in online banking.
- Packet Sniffing, Ensuring security at Transport Layer.
- How to verify the authenticity of the received file if it has been tampered with but still has the same hash? Elaborate on Digital Signatures.
- Coding Question: Given a string which represents 'cd' command like "\a\.\b\..\c\.\d", Report the final PWD after traversing the string.
  (..): go back one level
  (.): stay in the same directory
- What do companies do to prevent brute force approaches to cracking passwords?
- Even if I have a password, I cannot get into a person's account, how?
- What is SQL injection?
- How will you improve the crown jewel system?
- Define spam filtering, phishing.
- Syntax and meaning of join and inner join in MySQL
- What is DNS? What are the 2 methods that DNS uses?
- How to perform a dictionary attack in python?
- n rooms, n people with ids from 1 to n. All the rooms have lights which are initially off. A person with id i goes and toggle all the rooms i, 2i, 3i... after each person has visited the rooms, which all rooms will have light on?
- counting all groups of 3 in the list which form Pythagoras relation.
- Find a missing integer from a given array of unordered numbers from 1 to n with one number missing.

- Ugly numbers
- number of paths in a binary tree from root to leaf having sum of node values equal to k
- Write a code to get nth Fibonacci number.
- SQL vs NoSQL
- Indexing methods in Databases
- B trees and B+ trees
- Find Kth largest element in a BST.
- How would you implement a trie?
- Explain the concept of virtual and physical memory.
- What is cache? What are the types of cache?
- Count trailing zeros in n!
- Count trailing zeros in product of [i ^ (i!)] for 1 <= i <= n.
- Implement persistent BST.
- Given categories st every category may or may not have multiple subcategories and products such that every product may or may not have multiple categories, design moveProductFromOneCategoryToAnother and deleteCategory (note that this also deletes subcategories).
- Implementing a Version Control System of BST. User can modify the BST by insert / delete and can search for an element in not only the current version but also in any of the previous ones.l
- nth smallest number whose prime factorisation only includes 2,3 or 5. Example 1,2,3,4,5,6,8,9,10,12. Do this in O(n) time.
- Reduce a nxm matrix to (n-f-1)x(m-f-1) matrix where each cell is the sum of fxf square corresponding to the original matrix. This question was similar to https://leetcode.com/problems/matrix-block-sum/
- Two integer input streams are given. Integers are being retrieved from them indefinitely. Find the maximum of all integers retrieved at any point of time.
- Write a Java class to a file.
- Merge two min heaps.
- There is an MxN array. Each row in the array is sorted in ascending order. You have to count the number of negative elements
- Given the price of a stock on different days you need to maximize the profit. You can only buy and sell the stock once. Buying should be done before selling. (Algorithms)
- Given any integer between (0-9999) represent it in words. For instance 1011 is represented as One Thousand Eleven. (Basic Programming, Algorithms)
- If someone types the shortened URL on the Client side how will the System work to deliver the actual Address to the System (Networking)
- There are two infinite incoming streams of numbers at any instance that return the maximum value among both the streams till that instance. (Multi-threading)
- Pen and Paper: Write the code for an Insertion and Deletion in a Binary Heap.
- Given two arrays of size M and N find the Union of these two arrays. (Basic Programming, Algorithms) What will be the solution if one of the arrays is very large in size. (Basic Programming, Algorithms)
- Given N integers find the Longest increasing subsequence. (LIS, Algorithms, Dynamic Programming)
- Given two strings of length N and M find the Longest Common subsequence (LCS, Algorithms, Dynamic Programming)
- What is your approach while debugging your program? How can you debug if there is a 503 Error code with Internal Server Error. (Coupled With 2nd Question of HR). (Log Files)
- Find of a Binary tree is BST or not. Write code and give space and time complexity for the code.

- 1. https://www.google.com/amp/s/www.geeksforgeeks.org/find-the-missing-number/amp/
- https://www.google.com/amp/s/www.geeksforgeeks.org/find-a-repeating-and-a-missing-number/amp/
- You are given a string. You can rearrange its characters. You cannot remove any character. What is the minimum number of characters you should add so as to make a palindrome? Example "abcab" requires 0 characters to make a palindrome as we can rearrange to get "abcba"
- You are given two strings s1 and s2. String s2 can be formed by rotating the characters of s1. For example s1 = "abcde", s2 = "cdeab". s2 can be formed by removing a from front and adding to the end of s1, followed by the same rotation for b. Thus to get s2, we need to rotate two characters of s1. Write a function that returns the minimum rotations required to form s2 from s1.
- How is garbage collection done in java?
- Given a palindromic String you have to change exactly one character such that the resultant string is not a palindrome, and it is lexicographically smaller than all possible answers and it should be also smaller than the given string. If there is no possible answer print "Impossible" otherwise print the resultant string.
- Given 5L and 3L jars, how would you make 4L from them?
- What does (n & (n - 1)) == 0 checks for?
- 100 door toggle problem. Famous GFG puzzle.
- Explain 3 way handshake
- How do you protect your data on your system?
- Types of protocol and their port number?
- How to protect Database from attack?
- What are vulnerabilities?
- Rabbit Puzzle
- Bitwise AND operator: What does (n & (n-1)) == 0 mean?

Internship Online Test
- Given a collection of coordinates, find the side of the smallest square that can be formed where one side is parallel to the X axis and other parallel to Y axis.
- How many 3-digit numbers of the form 'abc' where a < b and b > c
- Calculate Row Major ,Column Major and Addresses of a 2D array
- Networking based questions such different protocols (TCP,UDP,SCTP,SMTP)
- Find the min possible side of a square that can be formed from given coordinates, given sides should be parallel to x or y axis
- Given a string of length n (1 <= n <= 1e5) consisting of lower case latin letters. Find the lexicographically smallest subsequence of length k (1 <= k <= n).
- Advanced Programming - Two lines x = 0 and x = n and centres and radii of circles are given. The circles may overlap. Thinking of the two lines as a road and the circles inside them as obstacles find the maximum width of the vehicle that can run on the road.
- A stable stack is one in which the blocks below each block are equal to or greater than it in size. If a stack is unstable, one can pull out any block and place it on the top provided the substack above it is stable. You are required to find the minimum number of steps to make the given stack stable. (One step means pulling a block from the stack below a stable substack and placing it on the top).

HR

- There is a problem on the client side. You and your team are out for lunch and you receive a call from the Management team to fix the problem. How are you going to help the management team to fix the problem? They don't know how to code and you also don't know the source code.
- What was your thought process while designing a database system for your project?
- Plans after graduation?
- Your profile is heavily oriented towards ML/DL why would the role of analyst at GS be of any interest you since this job entails more of algorithms and development work
- What would you do if you had to complete a project with a stipulated deadline, and your group-mate has a personal emergency to attend too.
- If in a difficult team project assigned, your team member is not able to work due to a legitimate reason and stops working in the middle-way, what would you do in that situation ?
- What were your other backup colleges in case you didn't get into IIIT Delhi and how happy are you with your choice of choosing IIIT Delhi over them?
- Given 6 months, what can you do to improve this COVID situation and how much money would you require (you can hire people)?
- What technology interests you the most?
- You're in a team of 3, only you're working. How would you go about it? Will you consider the manager intervening in this scenario?
- You need to count the number of trees in India. How will you do it?
- Project related to Cybersecurity
- What fascinates you about security?
- Do you prefer SIRT over SDE? Why?
- CTF over research or vice versa?

Grofers

Full time Online test
- Given an integer array which represents the heights of N buildings, the task is to delete N-2 buildings such that the water that can be trapped between the remaining two buildings is maximum.
- Find the maximum area of water that can be stored in between a grid of buildings. The grid is (n*m) . buildings are denoted by " % "and water by " @". Also if the water is on the edges of the grid then that amount of water has not to be counted. All the buildings are of width 1
- Trapping rain water in 3d (Modification to trapping rain in 2d)
- Print nos according to frequencies
- Right view of a tree
- Channing strA to strB using the words in the given set, at most one change at a time
- Discussion on paper coding
- Design book my show

Harman

Full time Interview
- Delete a node without its head pointer given
- Given a sorted linked list, arrange it in the following order i.e. 1st min - 1st max -2nd min- 2nd max and so on For reference,Given linked list 1 2 3 4 5, final output should be 1 5 2 4 3.

- Reverse a Linked list between 2 specific nodes 'm' and 'n'. Handle all the edge cases.
- You have been given the center of the circle as (0,0), radius as 'r' and total number of points as 'n', generate 'n' equidistant points that lie on the circumference of the given circle.
- Build a system to represent the stock market and display the ticker.
- What version of Java do you use and what is the latest technology used in recent versions?
- You're given two arrays A and B with some elements, and find the elements that are common in both the arrays.
- Difference between '==' and 'equals()' in java.

HR
- If you have to get help in your work from somebody, how will you convince him/her.
- What do you know about Harman?
- Why would you join Harman?

HCL

Full time Interview
- What is BigData, Blockchain Technology, Difference between C and Java, Insertion and Selection Sort,Run-time polymorphism,Interfaces and Abstract classes
- What is a firewall, you have good core ece projects, why don't you look for some product based firms, questions on hardware security, patches, hobbies and next 5 year plan.
- What is the "yield" keyword in python, and what is a friend function in C++. Also asked what function overloading is in java. What is the final keyword in java?
- Asked to write code on paper related to a question mixing prime numbers and divisors..was very easy
- Asked what sorting algorithms I know? And then specifically asked about merge sort
- Asked about to write an example code explaining function overriding
- Asked about SOAP vs REST web services
- Asked what I know about Cloud computing
- How are AWS and VMWare different as a company
- Question on Java such as no of files created, jvm
- What is a cloud ? What is VMware? Difference b/w them.

HR
- How do you feel being the eldest one among your siblings?
- What would you do if you had a fight with any of your colleagues?
- Being a fresher, how would you imagine the corporate world to be like?

Info Edge

Full time Interview
- What is the JVM? Why is Java considered machine independent?
- How does the java garbage collector work? What are the disadvantages? What is a generational garbage collector?
- Write code for the singleton design pattern.
- Write code to add a node to a binary search tree.

- BST: write code for insert, search and delete
- Java internals: what is JRE, JVM, how is garbage collection done
- Java concepts, what is HashMap, how is it implemented, reverse an ArrayList, find the number of elements of a linked list.
- Suppose you have an array of 1 to n and a number is missing how would you find the missing number.
- Given an array, print the repeating element. (Number within integer range, basically use a hashmap, and implement your own hashmap).
- Merge two sorted arrays.
- Write down bst code.
- Difference between pointer and functional pointer.
- Design and code abstract level design of BookMyShow
- Locking and types of locking
- Reverse every string inside a string containing only characters otherwise print them in their absolute string positions.

LinkedIn

Internship Interview

- Given a string, find whether an anagram of the string exists which is palindromic.
- Given a sorted linked list with a loop, insert a node at the correct position.
- Given the root of an n-ary tree, find the nodes which are at a distance of k from the root.
- Given a string, check if any anagram of that string is a palindrome.
- Print all nodes at distance k from the root.
- Given a circular sorted linked list, make an insertion function for it.

Internship Online test
- the question was about file handling, to read from a text-file, process data, create a new file for output and output required data to the output file.

Make My Trip

Full time Interview
- Given N Array Tree, and Pointers to root node (A) and some other node (B) in the tree. Make Node B root without swapping. (Ans- Told a recursive approach to change direction of links in the path).
- Simple SQL Query to find rows with max value in one column.
- Given a circular list, find the next greater element, with complexity.
- Find pairs of anagrams in an ArrayList of String.
- Diameter of a N-ary tree, Bottom View of a Binary Tree, Multithreading based question

Full time Online test
- There were around 20 MCQ questions, ranging from OS, basic DSA, Object Oriented Programming concepts and output based questions. All output based question were from C/C++
- Given a string, you want to know the rank of the original string if all unique substrings of the string are sorted in lexicographic order.

- Given an input n, you need to tell the number of ways you can form an array A of size n from the first n natural numbers such that for any index i, A[i] != A[i+1] + 1.

Mathworks

Internship Interview Explain Tree/Bst/Binary Tree/AVL Tree/RB Tree

Internship Online test
- Divide array into 2 subsets such the subsets satisfy the following : a.no common element, b:all elements of first less than second c. Union forms the original array find the partition which has minimum sum for the sub array with larger elements
- Find a key which takes max time to be pressed on a keypad. Input is a list of list with each inner list having 2 elements [key, cumulative time].
- Have to send blocks of data in chunks of 2^n. Tell the minimum no of chunks required to send all the blocks
- Consider a situation where swap operation is very costly. Which of the following sorting algorithms should be preferred so that the number of swap operations are minimized in general?
- return type of malloc
- Given N piles containing White(W) and Black(B) boxes only, two players A and B play a game. Player A may remove any number of boxes from the top of the pile having the topmost box White and Player B may remove any number of boxes from the top of the pile having the topmost box Black. If there is a pile with top as W, then player A has removed one or more boxes. Similarly if there is a pile with top as B, then player B has to remove one or more boxes. They play alternating, with the player A first to move. Both players play optimally.
- No. Of pairs possible from a given set of integers such that the sum of both elements in the pair is divisible by 60.
- Number of distinct pairs in an array sum up to a target K.
- https://www.geeksforgeeks.org/roll-characters-string/
- Array manipulation questions - > 1. you have an array of numbers given no. of moves to make all the numbers equal , here 'move' is defined as incrementing consecutive n-1 numbers by 1 2. you have an array of numbers , and value
  value = x[0]*x[1]*x[3]..........., here x[i] is equal to a[i] if i%2==0 or i==0 and x[i] is equal to 1/a[i] if i%2!=0
- arrange numbers in such a way that value is maximised
- Given a stack of size n with numbers from 1 to n, find the minimum number of steps required to sort the stack.
- How do you define a collision in a hash table?
- Which among the following is non-static polymorphism. (method overloading, method overriding etc.)
- There is a list of strings of words that are repeating and we have to number them by adding a number at the end of the string and return the list. Eg: {"test", "hello","test",test"} Return {"test","hello","test1","test2"}
  .

Full time Online test
- 4 out of 15 apples are rotten. They are taken out one by one at random and examined. The ones which are examined are not replaced. What is the probability that the 9th one examined is the last rotten one?

- Six bells commence tolling together and toll at intervals of 2, 4, 6, 8 10 and 12 seconds respectively. In 30 minutes, how many times do they toll together ?
- Question related to transconductance
- ripple counter ckt
- mosfet related questions
- VDF Questions
- VHDL code basic errors
- c basic prog ques --- pointers mainly
- oops classes questions
- 12 In a bipolar transistor at room temperature, if the emitter current is doubled the voltage across its base-emitter junction. (A) doubles (B) halves. (C) increases by about 20 mV (D) decreases by about 20 mV.
- Technical interview mostly was asked on FPGA domain and RTL code.
- Complete RTL to GDS flow was asked as studied in vdf.
- The major focus was only on the subject and projects we have studied during first year.

Full time Interview
- How to implement XML parser efficiently, expecting a high level diagram not code.
- lots of discussion about threads, design questions such as singleton pattern, factory pattern.
- virtual functions, dynamic and static binding, output based questions for c,c++and java, Scheduling, Semaphores vs Mutex code in java, Pointer based questions.
- Rotate a mxn matrix, Polymorphism, Encapsulation, Mutex vs Semaphore, Paging, OOPS questions, code for operator overloading
- https://www.geeksforgeeks.org/puzzle-1-how-to-measure-45-minutes-using-two-identical-wires/ and https://www.geeksforgeeks.org/puzzle-heaven-hell/. One tree question - https://www.geeksforgeeks.org/print-right-view-binary-tree-2/. And one question on the Venn Diagram.
- FIR IIR filter
- Time and frequency domain sampling
- What information can be derived from impulse response
- Advantages and drawbacks of 5g
- Basically questions from the subjects written in resume and matching the profile
- Explain functionality of C and MATLAB code
- Flow of a C or MATLAB program
- Write the verilog code for interpolation (since it was related to one of my projects)
- Draw FSM for a given sequence detector. Write the verilog code for above FSM.
- basic questions related to blocking , non blocking assignment, and other verilog and FPGA basics
- Given a list of random numbers, describe what algorithm you would apply to sort these numbers.
- What is the four color theorem?
- Given two structure definitions A and B, what will be the sizes of each object? (refer to https://www.geeksforgeeks.org/structure-member-alignment-padding-and-data-packing/)
- Storage classes in C
- Given a system which maintains a log file and adds an entry every hour, an error occurred at a particular time. How would you find where and what the error was?
- Given a tool which analyzes a number of xml files for semantic correctness and is slow in evaluating the files individually. How would you trace the bottleneck in the tool?
- They kept a group discussion round and I was rejected in that round. The thing they expect is not how confidently you put your point but how you can stay silent even in exciting situations as the

company's requirements seemed to be more kind of a business processing outlet requirement. My friends (in csp) who faced interviews were asked questions from filter design, programming basics, their resume and gate level signals. Communication part was not their focus at all.

HR
- GD on Open Source vs Licensed Products
- How do you manage your projects along with the course going on?
- Tell me about something you have learnt valuable in recent times.
- Describe EDG, strengths and weaknesses, Name of your technical interviewer, situation where you risked and failed, Something daring that you have done, Why Mathworks
- How the internship would be helpful to you.
- How did you deal with conflicts of interest with your own teammates while working on projects
- How do you manage your time?
- Have you ever encountered a situation where you had to work with someone you didn't want to? How did you tackle it?
- What are your technical skills as regards to the different programming languages?
- What do you know about the EDG role at Mathworks?

Media.net

Full Time Interview:
- Difference between TCP and UDP working.
- You are given a weighted undirected graph having N cities, weights representing the distance between cities. There are hotels in H cities (mentioned in input). Every day, you can travel at most k units. You stay in a hotel that night and resume your journey the next day. Compute the minimum days to reach from source city S to destination city T - Expected complexity is O(N^3)
- You are given 2 strings A and B. You can perform the following operation -delete a character from string A and insert it in the beginning of string A. Find the minimum number of operations to convert string A to string B. Expected complexity is O(N) where N is the length of the string.
- Find the number of ways to put N candies in K boxes such that each box gets at least one candy; the boxes are indistinguishable.
- There are N balloons in a row, each has a number (A_i) on it. Popping the ith balloon (2 <= i < N) gives you A_{i - 1} * A_i * A_{i + 1} coins and rearranges the balloons, maximize the total number of coins by popping all balloons except two.
- Given a graph with n cities and bidirectional roads (weighted graph). Some cities have hotels. You are allowed to travel only k distance in a day and then rest overnight at a hotel. Determine the number of days to go from a source to a destination.
- Given pairs of players who cannot play against each other. Determine if they can be split into two teams.
- Explain the entire process of how www.google.com is resolved ?(SRE Role)
- Questions on Data structures (dictionary implementation).(SRE Role)
- TCP/IP model (SRE Role)
- How a DNS request is made
- Difference between sql and NoSql and their advantages and disadvantages
- Questions on HTTP Headers and SSH Handshake
- Process vs Threads
- How to make Android apps better
- How load balancer works

- RAID in operating system

Online Test:
- In a binary tree, the diameter sum between two leaf nodes is defined as the sum of all the nodes in the unique path when traveling from one leaf to the other. Assume that the tree is a complete binary tree and every leaf node is at the same depth from the root of the tree. Find the value of maximum diameter sum in a binary tree.
- Note that the maximum diameter may be a single leaf node as well (since a single leaf node is also a valid diameter - the trivial path of length 0 from the leaf node to itself).
- You are given a binary tree in the input defined by the following grammar rules.
  NODE_VALUE := lowercase english alphabet .
  NODE_DEFINITION := NODE_VALUE (LEFTCHILD_DEFINITION RIGHTCHILD_DEFINITION)
  Thus a definition such as "a(b(..)c(d(..)e(f(..).)))" refers to a tree with 'a' as the root, whose children are 'b' and 'c'. 'b' has no children. 'c' has two children 'd' and 'e'. 'd' has no children. 'e' has one left child 'f' and no right child. Note that after every 'english character' there is always an opening round bracket '(' that starts the definition of the subtree that is defined under the node. For any position that is empty, there is a '.' character.
  You draw the tree as follows.
  Write the root on column 0
  Write the left child of the root on one column to the left of root and right child of the root on one column to the right of the root.
  Continue writing the subtree, such that if the value at a node is written in column 'x', then the left child is written in column 'x-1' and the right child is written in column 'x+1'.
  You are given a column number 'x'. Print all the values in column 'x' in sorted order ('a' < 'b' < 'c' and so on)
- You are given a square matrix of integers. The cost of travelling from cell A to cell B is the sum of numbers in all the cells which lie on the path between A and B, inclusive.
  You need to travel from the top left cell to the bottom right cell, and back, minimizing the total cost of travel, subject to the following conditions:
  1) You cannot use squares on the leading diagonal of the matrix (Apart from the top left and the bottom right cells.)
  2) When travelling to the bottom right corner, you may only move rightwards or downwards. Similarly, while travelling back to the top left corner, you may move only leftwards or upwards.
  3) Your first move while going from top left to bottom right should be rightwards. Similarly, your first move while going from bottom right to top left should be leftwards.
- Application Layer Protocols like HTTP, LDAP
- Subnetting (Ex: Valid subnet masks)
- TLB in operating system

Internship Interview:
- Given an array, form another array in which elements are pairwise coprime. The minimum element can be 2 and it should be lexicographically just greater than the given array.
- Given an array, give the longest increasing subsequence such that the difference between the consecutive elements in the subsequence is also increasing.
- Why is disk read/write slower?

- Given a tree and a value K. Each node has some value V. You need to find a connected component of the tree which contains K nodes, and the average of the values of those node is maximum over all possible k-connected components of that tree.
- Given an array of integers, find the longest increasing subsequence in it. Also, the difference between adjacent numbers of that subsequence formed should also be in strictly increasing order. For example - 1 3 4 The answer should be 2. [1, 3] or [1, 4] or [3, 4]. [1, 3, 4] cannot be the answer, since the difference between the adjacent terms is [2, 1] which is not in increasing order.
- Given a number M and a number N. You can perform only 2 operations on M any number of times. Add `1` to the number. Multiply `2` to the number. You need to form N from M. Count the minimum number of steps required to do it.
- What is the difference between interface and inheritance?
- Why to use interfaces over abstract classes?
- What is Thrashing?
- What is Starvation? Define it in terms of programming (not OS)? He wanted to hear the term probability.
- What is TCP protocol? (Tell about the 3 way handshake)
- What happens when you enter a url on your browser? (Tell everything from searching ip address on your pc, then going to the dns server, how it is resolved etc.)
- Which data structure will you use to implement Priority Scheduling?
- Flask, Ajax, random stuff about web development.
- What are promises in JavaScript?
- Explain the concept of Virtual Memory.
- Why is the critical section needed?
- How to synchronize threads?
- What are the conditions for deadlock to occur?
- Find the minimum number of moves to form a particular string from an empty string of the same length. In each move one can add a character from some index till some another index, replacing the previous characters at all those positions.
- Advanced Binary Search, Two pointer approach
- Given an array A of size n - where 1 <= Ai <= m denotes color of that index and 0 denotes the index is uncolored. The beauty of an array is denoted as the (1 + count of indices 'i' such that a[i] != a[i+1]). Given a 2D cost array such that cost[i][j] denotes the cost of coloring i'th node to color j. Find the minimum cost to color the entire array such that the beauty is exactly k, return -1 if not possible.
  INPUT - array A[], cost[][], integer k, m, n.
- Given an array A of size n, compute the maximum value of (A[x] + A[y] - x + y) for 0 <= x,y< n. Intended Space complexity O(1) and time complexity O(n).
  Round 2 -

Online Test: 1. Direct Knapsack Problem, 2. A DP problem, 3. Calculating distances in an unweighted graph.

Mercedes Benz:

Full Time Interview:
- Different ways to test a hardware related module.

- Interview questions mainly were in control systems, signals, aptitude and english. Technical round mainly was oriented towards projects I did, especially embedded ones. Then they asked about the demerits of ultrasonic distance sensors and asked them to explain in detail.
- What is precision, recall?
- What is under fitting, overfitting and how to handle it?
- Overlapping interval problem on pen paper.
- Most part of the interview was discussion on projects related to ML/Data Science as my intro and resume had projects related to those..Analog and Digital Signal
- Principal component Analysis (PCA)
- Sampling and Quantization

Online Test:

- It was a proctored exam with webcam and audio access required in a laptop but can be given from any location...was conducted on hirepro platform...had 45 MCQ questions to be completed in 60 minutes...there was no negative marking
Section 1: 10 general aptitude consisting of quant, logical reasoning - Level: Medium
Section 2: 5 Verbal Ability Questions - Level: Easy
Section 3: 15 technical questions related to database, networks, file systems etc..they were questions mostly on internal details of various products..port numbers etc..was not able to attempt more than 5 questions confidently in this section..not sure why it was there in the first place..
Section 4: 15 Gate like technical questions on Algo, DS, OS - Level: Easy

HR:
- Would you still work if we don't have any profiles of your interest ?
- They didn't want your reason to join but wanted to hear how great they are. Next they asked about future plans to ensure i won't be leaving the firm soon.

Microsoft

Full Time Interviews:
- https://www.techiedelight.com/change-elements-row-column-j-matrix-0-cell-j-value-0
Converting indian currency from English string to integer. Eg -> one lakh twenty thousand --> 120000
Finding similar rows in a matrix storing binary values(1,0).
Note No use of any inbuilt libraries like Hasmap or dictionary.
- Print an array in a clockwise manner. The function should also have a flag variable. If flag is false, then start printing in anti-clockwise manner
- Connect nodes at the same level, Create another pointer for every node in a linked list which points to the next greater element, how to create a graph in python? How to detect duplicates in a contact list if two contacts are considered duplicate if any one of the three attributes match.
- Find loop in linked list, Reverse linked list in o(1) time complexity, Trie data structure, Concept of paging, Locks in os
- Rotation of image, closest common parent node in a tree
- Given a mobile keypad, wap to print all the strings that can be generated from a given number sequence. For eg: input : 234 output : ADG,AEG,AFG,ADH,AEH,AFH,BDG,BEG,BFG... Follow up- reduce memory

- Given 2 processes having multiple threads, if one of the threads of process 1 writes hello world in a location and saves the address of that location in a file what will the thread of process 2 read at that location.
- Design and implement LRU cache.
- How to prevent deadlock when using multiple threads in hashmaps?
- Given a number in string format. Find the next closest palindromic number.
- What's multithreading? What's the issue in Multithreading? How is it handled?
- Given a circular linked list, break it into two circular linked lists. (Single traversal)
- Given a list of intervals for events, club the overlapping events and return the new list.
- Given a list of numbers, find the minimum pairwise XOR.
- Given 3 numbers - n,m and o. Insert m into n at the oth index of its binary format.

Online Test:
- find unique passwords given in the form of a string. Two passwords are the same if characters at positions I,j are swapped such that (I+j)%2 is zero.
- You have to distribute n chocolates to k students , such that first student gets 1, second gets 2 and so on, if after giving chocolates to kth student still you have chocolates left you have you give k+1 chocolate to 1st , k+2 chocolate to second and so on. Find number of chocolates given to some jth student
- Find whether 2 passwords are the same or not. 2 passwords are considered to be same when one can be transformed to other by swapping characters at position i, j where (i+j) %2==0
- Distribute k chocolates among n children

Internship Interview:
- Minimum length of subarray sorting which will make the complete array sorted.
- Array of length n consists of numbers between 1 to n-1. Find the first repeating element.
- Given a string. Is it possible to rearrange it so that no 2 adjacent characters are the same.
- Question on c/c++ pointers
- Given: Two strings , check if one contains the anagrams of the other. O/p : boolean
- Given two strings, check if any substring of string1 is anagram of string2
- Minimum number of platforms required to accommodate the trains, who's arrival and departure times are given.
- Working of hashmap in trie.
- Given 2 sorted linked lists may contain repeated elements. Create a new linked list of the elements that are present in both linked lists. Repeating elements are to be appended only once
- Given a list of words tell if it's possible to make a chain of all characters. Two words can be connected if the suffix(last 3 characters) of the 1st word is a prefix(first 3 characters) of the next word.
- Check if the linked list is a palindrome.
- Difference between static and dynamic allocation.
- Given an sorted array with positive and negative integers, sort the absolute value of the elements in O(n) time
- Given sorted array find element which occurs more than N//4 times (O(N) AND LOG(N)) approach
- Given an array and an element, determine if that element exists more than n/4 times and n/2 times in the given array respectively. Now if the element is not given, find if there exists an element which occurs more than n/2 and n/4 times respectively.

- Given a number n, find the next greater number using the digits of n.
- Given a binary tree, find the longest consecutive integers sequence going from top to down.
- Given an array a and an integer k, find the maximum p such that every subarray of a has the sum less than k.
- Given edges with weights in a tree , find longest distance between two nodes
- Longest contiguous subarray and subsequence with sum k
- Deadlocks, multiple thread >2 deadlocks
- Rearrange elements in a string such that identical elements have minimum separation of k elements
- Given a binary tree with positive weights, find maximum distance b/w 2 nodes
- Given a array of integers, find first missing positive integer
- Given an array of sorted integers, find an element with frequency > len(arr)/4, or report it's impossible.
- Design and code a REPL for a language interpreter, with autocorrect and autocompletion.
- Given a stream of characters, report if the string formed up till now is a palindrome.
- given the minimum separation value, say d. rearrange the given string such that the identical elements should be atleast d distance away from each other
- design a snake and ladder game (like data structure used and how you play)
- Insertion in min heap, convert currency given in string to integer, print duplicate rows in a 2D matrix having only 0s and 1s.
- Max sum subsequence
- Print the matrix in spiral form.
- Print the concentric circles from the matrix.

Online Test:
- 3 question on Mettl 90 mins
  1. LCS
  2. LIS
  3. Given a string return url in the form <protocol>://[url].ru</directory>
  protocol can be http or ftp.
  eg. httpsunrux - http://sun.ru/x
  ftphttprururur - ftp://http.ru/ruru
- Given 2nd and 3rd term of GP and 'n', find the nth term of the GP rounded off to the third decimal place
- Length of the longest common subsequence between two strings
- Dice throw - GFG
- Given the second and third third of a GP, find the n-th term, upto 3 digits of decimal precision and return the answer as string.
- String manipulation to insert punctuation marks to a website link
- Longest subsequence problem, basic number theory

HR:
- When did you write your first code?
- Which was your first programming language?
- How did it feel to overcome a problem that you'd been stuck on but finally figured out?
- What projects did you work upon

● What do you want to do in future?

Morgan Stanley

Internship Interview:
● How to count no of words in each page of book..Make class book then paragraph the line and describe full working code

Online Test:
● Amcat test with logical ability, debugging and coding sections. The test was lengthy, especially the logical ability section. Data representation problems; Debugging simple codes; Bit manipulation; string rotation
● Given a 32 bit integer, and a range L to R, flip all bits in the range and then print the resulting number.
● Given a string and a pattern, print the length of the longest prefix that can be possible if the string can be rotated, i.e. abbccd becomes bbccda after 1 rotation.
● Given a list of request ids, generate acknowledgement for each element of the report by adding up the next R numbers. If R is negative then previous R numbers are added. Example: List: 3 5 2 5 6 and R = 3, then output is 12 13 14 14 10. If R=-3 then 13 14 14 10 12
● Sum of k previous or next elements in a rotated array
● Given two strings, find minimum rotations to get the Longest common prefix
● Find new number if you flip bits in a given range

MyKaarma

Internship Interview:
● Implement Queue using stack.
● check if the two strings are anagram of each other
● https://leetcode.com/problems/trapping-rain-water/
● https://www.geeksforgeeks.org/find-next-greater-number-set-digits/#:~:text=Following%20is%20the%20algorithm%20for,smaller%20than%20next%20digit%209.
● https://www.interviewbit.com/problems/sum-of-pairwise-hamming-distance/
● kth minimum element given the bst without using recursion
● make 4 equilateral triangles of unit side using 6 matchsticks of unit size
● left join and right join

Myntra

Full Time Interview:
● Backtracking,dp,DLL to BST,Dikstra,Proof of fast slow approach for loop detection
● Given a string, find if it is nth periodic. What is a static and a functional language?

Internship Interview:
● Total number of pairwise overlaps in n ranges
● Write a program to find the first node of loop in a linked list.
https://www.geeksforgeeks.org/find-first-node-of-loop-in-a-linked-list/

- Given a set of intervals, count the total number of overlaps.
- What are templates in c++ . Difference between templates in c++ and Generics in Java.
- Find the maximum sum contiguous array.
- 1.Implement LRU

HR:
- Temperament judgement in situations
- talk about your favourite books
- What is a team according to you?
- What are your thoughts on Digital India?
- Rank your preferences: work quality, work life balance, compensation

Nagarro:

Full Time Interviews:
- push zeros to front of array and ones to end of array.
- print Keypad codes
- print unique elements in a given string
- Shift all 0's at the beginning & 1's at the end in an array containing 0-9 nos- TC: O(n), Space: O(1)
- a=1,b=2, and so on.. Decode all possible combinations of given string say,(1134)

HR
- Tell me something about your internship
- What was your JEE rank
- Any achievements on sites like hackerRank, hackerEarth

NetApp

Internship Interviews:
- Then asked for implementing Queue using a Linked List
- Asked to write a C program for counting the number of bits in an integer.
- Given an integer, find whether it is a power of 2 or not.
- Given 2 strings, find whether one is a substring of another or not.
- Basics of OS : Deadlock, semaphore, etc.
- Write a code to implement insertion and deletion to/from a doubly linked list.
- WAP to print frequency of all the characters in a string.
- Difference between class and structure.

Online Test:
- Section 1 Programming Question of Easy Difficulty 1 was from Heap, 1 from bitwise manipulation and 1 was of basic permutation.
- Section 2 There were around 30 questions. The topics covered were from System Programming, Operating System, Logical Reasoning and Quantitative Aptitude.
- The Online Test consisted of 2 parts:

1) Coding test :
In this round, 3 questions had to be solved in 50 minutes. The three questions were :
a) Given an integer in binary form, we have to find whether it is divisible by 6 or not
b) I don't remember the exact question but it was similar to this.Given an array, we have to just remove and add two minimum elements and insert the addition back into the array. Do this till the array contains only 1 element and that element is the answer.
c) You have 3 pockets and an infinite number of coins. You have to put coins in these pockets such that each pocket contains at least 1 coin and the total number of coins across the pockets lie in the range [X,Y]. We have to find the total number of ways this can be done.
2) MCQ Test
This test consisted of 30 questions to be solved in 30 minutes. The questions were from basic OS, Computer Architecture, Linux Commands and Puzzles as well. Some questions were Fill in the Blanks type as well (especially Puzzles)

HR:
- She told me about the Intern role and whether I'd be comfortable with Systems based work since my resume was majorly Data Science based.
- She told me about the culture at NetApp.

Nvidia:

Internship Interviews:
- Digital electronics: counter Design. Synchronous and asynchronous reset. Difference between Asynchronous and synchronous counters.
- Some questions on verilog: Blocking and non-blocking, how asynchronous reset is implemented on hardware.
- One technical Puzzle.
- One question based on data transfer protocol, like how to synchronize 2 modules that are working on 100Mhz asynchronously. How to make them synchronize. (Answer: Can be done through FIFO).
- One hypothetical question on data transfer between 2 modules and its implementation on hardware.
- Most of the questions were from basic digital electronics.
- What is Multilevel Queue Scheduling? How it is different from Priority Scheduling.
- Given Arrival Time, Burst time of Processes. Draw its Gantt chart by Preemptive SJF.
- What is multithreading? Is multithreading useful for a uniprocessor?
- Compare Thread Switching and Process Switching. Which one is fast?
- What are Semaphores? Give an example by using semaphore such that it ensures mutual exclusion property of critical sections?
- What are Wait and Signal? Write their implementation.
- What is a memory leak? Give an example. How can it be avoided?
- Find the maximum depth of the tree
- What is the complexity of the binary search? Prove it. Is it suitable for Linked List?

NXP:

Full time Interviews:
- Describe briefly all the steps in VLSI Design Flow.
- What is logic synthesis
- Which tool did you use for the logic synthesis step?
- How does the DC tool work and does Logic synthesis ?
- What is CTS?
- Inputs in the logic synthesis step.
- How is the reduction of circuit elements done in the logic synthesis step?
- Explain some of the constraints given at the logic synthesis stage.
- What is cache memory, use of it, levels in cache, which circuit is used in which level.
- What is the difference between SRAM and DRAM and Flash, which has less and more speed and power.
- What is write back and write through, which one is better in case of Cache.
- What are the addressing modes in the Cache, explain the advantages and disadvantages of each
- Given three scenarios, tell which is the best scenario in 1 and 2 for cache and then tell which is the best scenario in 2 and 3.
  Scenario 1: The memory access is linear (i.e. non random).
  Scenario 2: The memory access is random.
  In which scenario of 1 or 2 would cache usage be helpful and why
  Scenario 3: The memory access is random, but we are not using any cache.
  Take scenario 2 with cache and scenario 3, which is better?
- What is AXI and AHB protocols
- What are the different transactions and channels in AXI protocol
- What do you understand by Valid, ready and what is a handshake.
- In which layer, you would route CLK in 10 layer design and why?
- Why is clock routing critical ?
- Do you know what analytical placer is, define the difference in HPWL and analytical way of routing measurement.
- What is a frame and page in cache
- How was your written, and discussion about the questions I think I did wrong in written
- What is Clock domain crossing, what is the need of synchronizer and FIFO buffer.
- Why is scripting important in VLSI? Tell us names of different scripting languages you know and which would you prefer and why?
- What is metastability, explain with an example
- Why can we reach a metastable state in case of hold and setup failure.
- What is latch up?
- What is difference in MOS and BJT
- Please visit the google doc for written questions
  https://docs.google.com/document/d/1DrSjFT2rzpXjF12Srxuno1LBqXmTleitcCVbaJ1qTM4/edit

Online Tests:
- Explain briefly the steps involved in RTL to GDS flow?
- What is logic optimization in logic synthesis?
- Suppose the RTL code had 100 gates, whereas the netlist has just 90 gates. Then what happened to those 10 gates during logic synthesis?
- What is the difference between the scan flip flop and ordinary flip flop?

- What is synchronous and asynchronous reset?
- What is metastability? Explain with an example
- When and why do we use an asynchronous reset?
- What are the different types of buses?
- Give an example of one peripheral bus.
- Which protocol have you worked on the system bus?
- Explain the AXI Protocol.
- If you send a video to your mobile phone, but your mobile's system bus is not accepting the data, what will you do in that case?
- What is Arbitration?
- If two masters send data to one slave using a single system bus, how will you send that data?
- What do we call this technique?
- If traffic is coming from two different roads and there is a traffic light to manage the traffic. If the Prime minister's car arrives, how will you handle the traffic in that case along with the PM's car?
- What is a heterogeneous system and Interconnect?
- What is Cross clock domain crossing?
- Why do we use FIFO? Explain the use of FIFO in two asynchronous domains?
- What are synchronizers?
- Is there any other technique than FIFO and synchronizers?
- Draw the use of Handshake in the synchronizer circuit along with waveforms.
- Draw the frequency by two dividers.
- Draw the waveform.
- One tricky question was asked, then- why have you made data edges just below clock edges? In the real world, this doesn't happen, and what is the reason behind this.
- Why the clock always starts from zero, and which reset is used for this.
- make a counter using JK ff, timing analysis of a logic circuit, fsm circuit design, make a differentiator using op amp; rest were standard MCQs

Internship Interviews:
- 1 sta numerical
- Vth,=vdd/2 proof
- 1 linked list loop question
- Cmos basic mcq

HR:
- Puzzle (https://www.geeksforgeeks.org/puzzle-18-torch-and-bridge/)
- What is your job profile preference? and why?
- What time duration do you think is good (like you would feel guilt free) to leave NXP as a company.
- Rtl to gds flow

Paytm:

Full TIme Interview:
- Given an array count distinct elements in windows of size k
- bottom view of binary tree
- given a singly linked list and a pointer to a node delete the node without using the head pointer.
- Insert an element in a sorted circular linked list

- Print all the nodes that are visible by right side view of a binary tree
- Given a array nums and a sum k, find 2 elements in nums with sum equal to k in O(n)
- Given the root of a binary tree having distinct elements, find the parent of a given value. Return -1 if not found.
- Given an array of integers, for each integer find the nearest next greater element in O(n)
- given 1000 elements, find element x time complexity
- given sorted array, where elements occur multiple times. Find the number of occurrences of a number in log n time.
- print left image of binary tree
- Divide the tree into two parts and find that node which divide tree into two parts.(left tree and right tree same number of nodes not necessary root node of tree)
- Life cycle of thread
- Given 2 strings in the same order with one extra character in the second one. Find that extra character (in log N time).
- How to find the element which occurs odd number of times in array where all other elements occur even number of times
- Given a stream of numbers, find out the closest smaller number to every number and output the list. e.g. Q: 9 5 4 9 10 8 , ans: -1 -1 -1 4 9 4
- Given a queue which tells how many tickets a person wants, tell the time it would take for the nth person to get all tickets. One person can only buy one ticket at a time and then moves to the end of the queue.
- Volatile Keyword in Java.
- Spiral traversal of string
- diff between hashset and treeset
- Print the Right view of a given Tree (Parameters provided: TreeNode Root)
- Stock Buying and Selling Problem: Given an array of 'n' integers denoting the price of stocks on a given day, maximize your profit value at the end of 'n' days.
- How does the garbage collector work in Java?
- How does Java handle pointers (that are seen in C/C++ language)
- Are function parameters passed by value or by reference?
- How is Java more secure?
- Given an Array of people standing in a queue to get movie tickets and a position 'pos'. Tickets are given '1' at a time and if a person wants to buy more, he/she has to go back to the end of the queue. So for example: people= [2,1,4,5] @ time=0, Then @time=1, people=[1,4,5,1] (the first person gets 1 of his tickets and moves to the back of the queue) Find out after how many units of time the person standing at 'pos' will get his final ticket.
- Given a stream of integers, figure out the nearest small number for every index in the array. If there is no such number, fill '-1' for it. For example: arr=[9,5,3,4,6,10,8], answer= [-1,-1,-1,3,4,6,6]
- Are you familiar with Stream API?
- Have you used Collections in Java? Difference between HashCode and equals function.
- Which version of Java do you use? What new things did you come across?
- ACID properties of databases.
- SQL queries. Join. Types of joins Nested SQL Query question
- What is the difference between having and where clause?
- What do you mean by synchronization?
- Edit Distance
- Threading in java , threading in general (concept and how it works)
- Java MVC architecture
- Data sharding

- Find the nearest smaller element to the left for each element in the given array.
- Water trapping between the towers problem.
- Rotate array inplace k time
- Given a list of index, find min distance between two element, 2 pointer approach
- 1. Find the nearest smallest element in an array so far for every index. For example, if an array is [11, 9, 3, 4, 7, 5, 10], for every index the nearest smallest element so far would be [null, null, null, 3, 4, 4, 5]. (Hint: Can be solved using stacks)
- Print zig-zag level order traversal of a binary tree. (Hint: Can be solved using stacks)
- https://leetcode.com/problems/coin-change/
- Lowest common ancestor of two nodes in a binary tree
- Given an array of strings with multiple occurrences process queries in which a single query takes two different strings, find the minimum distance BY INDEX in the given array between all the occurrences of both strings.
- You have to find minimum path sum from top left to bottom right in a matrix
- Kth smallest element in BST without using extra space to store inorder
- Given an array you have to find products of all elements except ith element(2-3 approaches) they want O(n) solution with no extra space
  Eg [1, 2,3,4] output=[24, 12 , 8,6]
- Print LCA of two keys in B tree(if any of the keys is not present then return null) you cannot use search function individually to find whether the elements are present or not
- Then printing nodes in Binary tree(print nodes of level one from left to right, print nodes of last level from right to left, print nodes of second level from left to right, print nodes of last second level from right to left and so on)
- How hashmap internally works in Java some more question related to functioning of hashmap Why keys of hashmap are immutable
- How arraylist is implemented internally in Java(how memory is allocated, how overflow is tackled and different functions work)
- What happens if we are overriding static methods
- Write an update query
- Difference between inner and outer join
- Arraylist vs linked list
- Final vs finally
- How are threads implemented? Which method is better(extending thread class or implementing runnable interface)
- Can finally run even if an exception occurs in the try block and there is no catch block available?
- Given a number k, find all pairs in the array which sum to k
- Add two numbers represented by a linked list and return the sum as another linked list
- questions on multithreading
- You have to take n steps and options are to take either 1 or 2 or 3 steps at a time. How many choices you have
- Find the diameter of the binary tree.
- Find articulation points in the graph.
- Total duplicate subtree in binary tree.
- Arrange array of 0,1,2 in sorted form in O(n) time.
- Find all left leaf nodes.
- What is name mangling
- VPTR and VTable.
- Multithreading concepts

- LRU cache, sort 0,1,2 , bottom view of binary tree, diamond problem in inheritance, oops in java, join query

Online Tests:
- 1. Given a modified number system, where 0 is 9, 1 is 8, ... and 9 is 0, convert numbers from the current number system to the new one.
- Given notes of denomination Rs. 1, 2, 5, 10, 20, 50 and 100, find the minimum number of notes needed for any given number.
- 1Given a set of n integers, divide the set in two subsets of n/2 sizes each such that the difference of the sum of two subsets is as minimum as possible. If n is even, then sizes of two subsets must be strictly n/2 and if n is odd, then size of one subset must be (n-1)/2 and size of other subset must be (n+1)/2.
- Find the maximum length continuous subarray such that all elements in the sub-array are distinct.
- Change a number to a new number system where 0 -> 9, 1 -> 8 ...... 9->0.
- Generic minimum no. of notes needed to get X bucks problem. Given what currency is in the nation.
- Given reference to the root i.e. Node* root and a Node X find the distance to the closest leaf of Node X.

HR:
- Situation based question. Suppose it's Friday morning and you came to your office and told your manager about a great idea that could be a part of a product that is going to be released on the coming Monday. The Manager loves your idea but that idea will take 2 days to implement and it will put the product launch at 'risk'. The manager instead gives a fairly good idea (not good as your idea) which can be implemented within 5-6 hours. What will you do?
- What do you expect from Paytm?
- Puzzle : You and your two other friends went to goa on a beech and you have 5 wooden sticks and one has 3 and the last one has none so you burn those sticks to get heat from the cold on the beach, other day the friend with no sticks felt guilty and gave you 8 rupees how you will distribute among your friends?

Phillips:

Full Time Interview:
- Given an integer array, print the number of occurrences of each integer.
- Make your own string class and implement a method that returns length of string and a method that reverses the string
- Insert element at second last position in linked list using only one loop.
- What do you understand about ICMP, wireshark, gdb ?
- What is cloud computing ?
- Have you worked on Json and APIs ?
- Are you familiar with MS-SQL ?
- Explain the android app project.
- Rate yourself in terms of languages known.
- Is it possible to hide IP addresses ? If yes, give a scenario and reason.
- Given an array, sort half of the array in ascending order and half as descending order.
- quicksort algorithm
- Given a linked list check whether it is a palindrome or not.

- OOPS concepts with examples.
- Give a scenario where your operating system can crash.
- Deadlock and mechanisms to avoid deadlock.
- Questions regarding project and resume.
- Find square root upto 2 decimal points without using inbuilt function.

HR:
- How do you choose your group partner?
- Where do you see yourself after 5 years?
- Why Philips?
- Do you like working in a team or not and why ?
- Are you open to criticism or get offended if someone criticizes you about your work ?
- Explain your best project, give reason.
- Tell me about your hobbies.
- Why should we hire you ? Which quality of yours do you think is best?

Qualcomm:

Full Time Interview:
- Difference between mutex and binary semaphore ?
- What are volatile variables in C ?
- Name scheduling algorithms, Difference between them.
- How does the dispatcher work?
- WAP to print fibonacci sequence
- Tell me about different types of caches?
- STA , Setup hold questions ,verilog question related to synthesis , projects related questions, avoid setup hold
- Find out the two missing numbers of an array of length N-2 which are having numbers from 1 to N.
- What is priority inversion in the Operating system?
- Tell me about the methods by which 2 processes communicate with each other?
- Add two numbers without using the plus operator.
- Reverse a number without using extra space.
- find out the max of two numbers without using conditions and loops.
- Draw Process's Memory Layout
- How does Heap and Stack grow?
- Program to update bits from position 2 to 5 in an integer making sure the other bits remain unchanged after overriding.
- What is the use of extern variable? dangling pointers? memory leak? Delete the node with even data? Storage classes?
- Divide by 3 counters. Also draw the waveforms.
- Does setup and hold violation occur in only master-slave flip flops?
- Write code for synchronous set and asynchronous reset. Also draw the hardware.
- When do you prefer mealy or moore machines?
- What is coverage?
- What is a synchronizer? How does it work?
- Explain working of CMOS inverters.

- Draw the charge discharge capacitance curve of the CMOS inverter
- Explain the DC characteristics of CMOS inverter
- Explain the process of fabrication of CMOS inverter with diagram
- Explain what is short circuit power and how does it occur in CMOS
- Explain the RTL to GDS flow in brief
- What is the difference between pre CTS STA and post CTS STA
- Explain Floorplanning and power planning
- Setup and hold time
- What is the impact of clock uncertainty on the setup time and what will happen to the clock period after STA due to this
- Explain physical design in short
- What are the input files to floorplanning
- What is lef file and what all does it have
- What is technology lef and cell lef file
- Draw a 3 bit Asynchronous Counter and explain its working
- Difference between Floorplan and placement
- What is core utilization in floor plan
- Why power rails are used in the circuit instead of directly using power rings for making connections
- What all is included in clock uncertainty
- The metrics of routing
- Given a circuit calculate the maximum frequency of operation of it
- Given 2 integers, tell which is the minimum and maximum without using a for loop or any conditional operator(if, switch etc)?.
- Heap and stack section in the operating system. Question about what is dll and how linking is done in case of these.
- Volatile keyword in c
- Optimisations done by compiler
- where does program code reside in memory , stack, heap or somewhere else?
- Different sorting algorithms you know and comparison in them on the basis of use case.
- What is Deadlock? Conditions for deadlock, solution for deadlock. Deadlock detection.
- Dynamic memory allocation. Malloc vs calloc vs realloc.
- Allocate 2d array memory using a pointer.
- Is there any memory leak in the system?
- Find memory leaks in large system code.
- Paging concepts.
- Multithreading vs multiprogramming. (threads vs process) with code for threads.
- thrashing and belady's anomaly.
- What is process scheduling? Name a few techniques for scheduling. What are the disadvantages in RR?
- What is a context switch? Why do we need that? What happens during a context switch? (This was a detailed question)
- Puzzle - There are 27 balls. All of them are of the same weight, except one which is heavier than the other 26. You have a beam balance. How many times do you need to use the beam balance to find out the heavy ball?
- Create a design that takes input and implement a method canCarRun()? (I answered using specialization/Generalization like concepts to create a robust design)
- An interface has two pointers. Many team members are using it. What kinds of error handling needs to be implemented so that the system does not crash?

- What are callbacks? What is the practical use of callbacks?
- What is virtual memory? Why do we need it?
- What is demand paging? Explain in detail the links between degree of multiprogramming, thrashing, demand paging and schedulers.
- Basic C programming questions on structures and case, basic verilog questions on blocking non blocking, clock gating, make a f/2 counter, synchroniser, questions from resume.
- Half a number using bitwise operators.
- Syntax of function pointer, pointer to a const int, const pointer to an int.
- Write C code to delete a linked list node.
  Pseudo-code to find 'n' Pythagorean triplets.
- 25 horses 5 tracks 3 fastest puzzles.
- Arguments for pthread_create.
- Difference between break and continue.
- int arr[10]; Difference between a and &a.
- Write a function to compare two strings
- Dynamic memory allocation. Malloc vs calloc.
- Diff b/w char arr[] vs char *arr ?
- Puzzle - 8 batteries are there in which 4 are dead and 4 working. A torch which needs 2
- working batteries to glow. Find the minimum number of iterations in which the torch glows.
- Wap to check if any header file is repeated. Assuming no preprocessing is done and
- there are nested header files also.
- Write a function which takes an integer value and a memory address. I have to take out
- last 3 bits from LSB from value and set these bits to the 2nd,3rd & 4th bit position of the integer whose address is given(keeping rest bits the same)6. Virtual memory? Use?
- Draw layout consisting of register,Alu, cache , main memory and Hdd.
- Write back vs write through cache.
- Code in C to dynamically allocate a 2D array of integers?
- Why do we use Cache? What can be the problems in having a single cache in a multiprocessor environment?
- How does the system detect overflow in the function stack, and how is it handled? a1. With each process, there is a PCB (Process Control Block), which has a field Protection.. This field stores information about process boundaries. If suppose inserting a new activation record, in the function stack, tries to cross the process boundary (stack overflow condition), then the system call, made for inserting the activation record, detects it using the PCB's protection field and doesn't insert the record and throws an exception.
- How would you write this expression :-   A && B using conditional operator and the variables A and B only(No other operator use allowed)? a3. If A is True, then expression result depends on B. If A is False, expression result is False (i.e. A). Thus we can write the expression as :   (A) ? B :
- If 2 linked lists are merging at a point, how can you detect their merging point(node) ?
- Uses of Page table, TLB and cache. What are the problems with decreasing or increasing page size? a5. Each process loaded in memory on average does internal fragmentation of half a page. So, if we increase page size, total memory wasted in internal fragmentation would increase. If we reduce page size, then no of page faults can increase, also size of page table would increase due to more no of entries (pages). Thus, page table overhead would increase on decreasing page size.
- Even after being CSP profile the interviewer kept a blank sheet on my resume and told me that there are no CSP vacancies and he would consider me for the computer science domain. The questions asked were about linked list puzzles, reducing complexities of algorithms, graph and tree traversal techniques, turtle rabbit race questions, etc.

- Latch up in a CMOS device
- Draw the layout of a CMOS inverter
- Half Adder, full adder
- Which is better NAND or NOR
- Setup and Hold
- Fan in and Fan out
- delay, logical effort
- What is the VLSI design flow? Also describe each of the steps in the flow.
- What does a constraint file contain?
- Draw state machine for input 101 etc
- Big Endian or Little Endian
- find occurrence of 00 and 01 in a 32 bit integer using bit wise operation.
- extern variable, volatile variable their use
- Write code to count the number of times a number is occurring as binary in the other number. Example - 2 and 10 then we 2 as output.
- Kth smallest element
- QuickSelect.
- What happens when an interrupt occurs? he wanted to know the complete functionality , like where the running program goes,
- which program/process will run next? who will handle that?
- Difference between continuous allocation and non contiguous allocation of memory to process
- External Fragmentation
- Who converts LA to PA
- Who maintains the Page table. Where is the page table stored?
- How OS provides protection
- First round: 1. Blocking and non-blocking 2. Setup and Hold concept 3. What will happen if setup time and hold time is violated after tapeout? 4. What is time borrowing? 5. Draw an FSM 1011101. Where are FSMs used? 6. What did you do at VECC (Had interned there in the past)? 7. If given a preference, where would you choose to go? 8. Tell me something about yourself. 8. How do you remove setup time and hold time violations?
- Topics of computer architecture: Contents of a standard microprocessor pipeline, What are the structures present in modern day processors, how is interfacing done between different elements of the processors, from cores to memory to peripherals. What are peripheral and what are the different kinds, what caches, DRAMs, processor registers made of and the differences between their technologies. Also different types of memory layouts and cache coherence techniques like snoop controllers etc. What are interrupts, what is their use, and what are the different types and how are they handled. What do you understand by Virtual memory? About overflow, like what is integer overflow, when can it happen in a system/processor, can a basic n-bit full adder encounter overflow in any case. Integer overflow vs buffer overflow..
- Analog topics: What are diodes, Implement And gate using diodes, capacitors and resistors, draw the circuit for full/half wave rectifiers.Explain Thevenin Theorem, Draw the thevenin equivalent of a given circuit, questions on maximum power transfer theorem. Explain the internals and structure of op amps, how are the op amps useful, Input and output properties (gain, impedance) of op amps, what is the purpose of that feedback given in op amp circuits. How can we use op amps as comparators, then using this idea, build a 2-bit adder circuit using op amps and make its truth table and explain.
- Derive pythagorean triplets
- How can spin lock permanently block a high priority process
- Make tree from inorder preorder

- Which data structure will you use for implementing preemption in OS
- How will you implement a circular doubly linked list
- Difference between latch and flip flop? Where do we use latch and flip flops? Name some applications where latch is preferred over flip flop....
- MOSFET characteristics...
- Race around condition and meta stability...
- Single ended and differential sense amplifier...
- Low power design…
- If there are 3 header files, header file A includes header file B and B includes header file C. How would you ensure that for a file P you can include only A header file?
- Difference between struct and class?
- Difference between new and Malloc?
- Storage classes in c. Is volatile a storage class?
- questions about synchronization in OS.
- RTL to GDS flow
- Given a Circuit and find the max operating frequency
- Types of Memories , basics about SRAM
- DFT related questions

Online Test:
- Convert (1000) (octal) to Hexadecimal
- DIFFERENCE BETWEEN STACK AND HEAP
- DIFFERENCE BETWEEN NULL AND VOID
- Rtl to gds flow
- Drc clean question
- Digital circuits-latches/flip flops.
- MOSFETs,DAC,BJT, probability,profit and loss,percentage.,time and work,logical reasoning.
- Basic technical questions of btech level.mainly digital and Analog electronics asked in the written technical section.like counters, kmap, logic gates, sequential circuits questions were more.in aptitude, time and work, speed, percentages, profit and loss ..etc.in c section they asked more from pointers, structures and some basic questions.overall written is easy to moderate level
- Aptitude questions based on time speed and distance, probability. Operating system questions based on scheduling algorithm, disk scheduling, banker's algorithm.
- The Quants section was very easy and included basic questions from Profit and Loss, Time and Distance, Time and Work, Simple Interest, Average and Mixtures and Alligations. Logical Reasoning was of average level with questions from Series, Coding-Decoding, Blood Relations and Seating Arrangements.

Internship Interview:
- CMOS Inverter characteristics and explanation and circuit
- CMOS NAND and NOR gate implementation
- Benefits of CMOS vs BJT and CMOS vs PMOS and NMOS separately
- Setup and hold time analysis theory
- SR latch NOR gate diagram
- Stick diagram of a mosfet(Not taught to us in IE)
- static and dynamic power dissipation in a MOS inverter
- Difference between Flip Flop and Latch

- Sorting algos, heap sort, 2 eggs and 100 floors puzzle, resume project based questions, full adder, detect loop in a linked list, delete k-th element from last from a linked list
- Find the middle node of a linked list.
- C output questions.
- Set/Unset the nth bit of a number.
- Swap two numbers without using extra space. (Hint: using xor)
- Static and constant variable in C.
- Scheduling algorithms (OS).
- Program to swap bytes in a hexadecimal number.
- Producer Consumer Problem + Code to solve using semaphores and mutex.
- What is asymmetric and symmetric cryptography?
- What is a volatile keyword?
- Use of static and global variables.
- What is write through and write back cache?

Online Test:
- 1.5 hr test on HirePro having 3 sections : Aptitude,C, and CS/ECE (you can choose one) each section had 20 questions with a time limit of 30 mins
- Aptitude - Work, ratio & proportions, relationships, bar graphs etc.,
- C- Questions on function output, pointer based questions, error detection, etc.
- CS - OOPs concepts, OS, CO

HR:
- Reason for leaving my last company
- Why shouldn't Qualcomm hire you?
- Which department interests you more?
- Calculate 45 minutes using two rods and a matchstick.
- Apple, orange and a mix of these buckets are placed but with all having incorrect labels. Find correct labels by just taking fruit from one bucket.
- 1000 wines, 10 prisoners can be killed, find the only wine that is poisoned. (These types of puzzles are good in numbers in geeksforgeeks).
- Why qualcomm>

RBS (Royal Bank Of Scotland)

Full Time Interview:
- A puzzle to pour 4 litres of water using two jugs of 3 and 5 litres resp.
- Which technologies have you worked on ?
- Difference between data mining and data warehousing?
- Factorial of a number, Thread based output questions, OOPD based output questions (parent and derived class with virtual keyword), object overloading and overriding.
- Given sorted array and a number X. Find if any pair exists in an array whose sum is equal to the number. Algorithms should be in O(N) time.
- Given arraylist whose values are the indices. Find if the cycle exists or not.
  Arr[1, 2, 1] : should return true
  Are[1, 2, 3] : should return false

- What are the functions of multithreading
- How inter thread communication happens
- How inter process communication works
- Why thread pool is important
- What is cache invalidation
- How do you eliminate false sharing from cache
- Technical questions were mainly based on the projects mentioned in the CV, apart from that basic
- Applications of Stack.
- What is Cloud Computing?
- What are NP Hard and NP Complete problems
- difference between C++ and python
- questions on dbms tier architecture

Online Tests:
- Find if there is a circle of indices in a given array.
- Find if there exists a pair with a given sum X.
- Left Rotation of array
- Find the sum of k greatest integers in an array
- Given a string containing words and dates. Assume that date is given in the format - 'dd-mm-yyyy'. Find the total number of distinct years present in the string.
- print odd and even numbers in alternative fashion such that the smallest number is printed first whether it be odd or even. If the first number printed is odd then the next number printed should be even and vice versa.
- press the number pressed by the ALT+TAB key and place it in the first position

Internships Interview:
- Do u have any idea about Atomicity, durability, consistency ?(context DBMS)
- Was your front end synchronous or asynchronous?
- How did you fetch multiple entries from the database?
- How did you integrate the front end and the back end?
- What is blockchain? Inter process communication. Pattern matching.
- ACID properties of a database
- In depth discussion on the DBMS course project : ERD , How data is fetched & processed ? Unique features of the project?
- Technical questions from DBMS : How database transactions take place ? What protocols are followed? (Focus was more on theory rather than tools & implementation)
- Gave a list of features of an RWA app and asked how I would proceed with its development from initial design phases to implementation phases.
- Difference between raspberry pi and arduino.
- 7 layers of osi model
- What does the static keyword in java main class stand for?
- What is the computer RAM made up of?

HR:
- Cut the cake into 8 pieces by 3 cuts.
- I have made a game as a project from which they asked how to save the current state of the player if the player pauses or leaves the game and how to restart the game from the same place where the player left.

- He Asked me to show him the prototype of the project (fit bit tracker) that I made as a project.

Sandisk

Full Time Interviews:
- What are monolithic kernels ?
- How is RAM different from ROM?
- Explain how a computer runs.
- What do you understand by Linkage?
- How is it different from Scope ?
- Rate yourself in C and CoA.
- Questions on image classification without using the AI models
- Discussion on my projects

Online Tests:
- Moderate Aptitude questions
- C Output questions mainly based on pointers
- 2 Questions from OS and Computer Organisation

Internship Interviews:
- Architecture of Processor
- What happens when a pc is turned on ? (detailed steps)
- What are the signals transferred from and to a UART port?

Synopsis:

Full Time Interview:
- Draw a cross-sectional diagram of pmos and explain different regions of operations. How channel will look like in different scenarios.
- Explain a few 2nd order effects in MOSFET .
- Explain channel length modulation in details
- Explain different types of leakages using nmos device cross-sectional view.
- How can you change the Vt of a device without changing the body source potential difference?
- What is subthreshold leakage and how to deal with it?
- Draw a 6T cell and explain its working and sizing.
- Name some read and write assist schemes and what are their advantages and disadvantages.
- Explain channel length modulation .
- Explain velocity saturation and mobility degradation
- Draw waveform during Read and Write .
- Explain the same if bitlines are precharged to vdd/2.
- Explain read and write assist schemes that can be applied on 6T SRAM cell
- Draw a conventional sense amplifier how it works with a waveform .
- How will you size the sense amplifier?
- How will you generate sense enable signal (replica bitlines)
- Questions on Digital Vlsi design like Inverter characteristics, setup & hold.

- What is multi-patterning? What are its limitations? Any other process for lithography without any multi-patterning?
- If we have a CMOS inverter, Vin = 3V and Vdd = 5V find Vout. Now we Vin = 5V and Vdd = 3V. Find out?
- What happens if instead of a sense amplifier we use inverters to read (No constraints on access time)?
- How read is impacted if we lower the bit-line voltages (instead of pre-charging to VDD we pre-charge to lower voltage)?
- What is bump voltage? How does it affect the reading? How can this be controlled?
- On what factors does the offset of sense amplifiers depend, how can we control the offset of sense amplifiers?
- If let's say we have a big driver which is driving a wire of long length has delay = 10 ps at near end and delay = 30 ps at far depends. How will delay changes if we increase the wire width?
- Draw 8T 1RW SRAM Cell, explain read and write operations.
- Define read SNM and write margin, how you find read SNM and write SNM. What are the other techniques to find write margin?
- What is the reason for data getting corrupted while reading a cell?
- Graphically define write margin.
- What is the difference between latch and flip-flop? How flip-flops are made?
- What is set-up time and hold time?
- What is RTL to GDS flow? What are the tools you have used? What are the inputs to the synthesis tool, what are the reports it generates.
- Draw VTC of CMOS inverter? What will be the output at Vin = VDD/2? What are the assumptions for this output?
- Connect two inverters, one's input is the other's output as in SRAM latch. Now draw its transfer characteristic. Mark all the input-output voltages.
- Connect NMOS on both sides. Now explain how these NMOS will affect the inverter performance. Will now it provide full voltage swing?
- Which transistor passes a good zero and which passes a good one. What will be the output if we give 0 and 1 to NMOS and PMOS? why such behaviour.
- Draw first order R-C circuit. Draw voltage across the capacitor. What time constant signifies?
- What is power w.r.t to the device? How is leakage power different from this.? What are the various leakage powers? How are they dependent over the voltage?

Internships Interviews:
- Basics of DC - Ripple Adder and Look Ahead Adder, advantages and limitations.
- Flip flops - FSM to FF, given waveform, draw circuit
- Verilog - Write a code for sequential circuits

TCS Research:

Full TIme Interviews:
- Derivation of KL divergence.
- How is PCA/ICA different? What is anomaly detection ? Neural networks, Back propagation
- How to import .bit file in python, how to connect matlab to python
- Adaptive signal processing algorithms RLS, LMS, NLMS, BLMS.
- Eigenvalues and Eigen Energy

- Deep Learning very in depth topics (because i applied for DL)
- How Adam works, Hyperparameter selection using RL
- What is precision, recall, type1, type2 error, Eigenvalue?
- Difference between Bagging and Boosting
- Types of Regularisation
- Measuring cluster quality
- Silhouette Coefficient
- How to decide number of levels in Decision tree
- How does overfitting happens in random forest
- How to build a random forest
- What is bias and variance
- K fold cross validation
- Naive Bayes model
- Difference between probability and likelihood
- Intuition of Bayes theorem
- Given two documents, come up with some sort of venn diagram where we have some similar text, some text exclusive in doc A, and some text exclusive in doc B.
- Given a software Requirement Document, create a model that will prioritize the requirements and create a sequence as to which these guidelines must be implemented.
- Related to FPGA and delay
- clustering vs classification
- generative vs discriminative models
- Can a random forest / decision tree have 100% accuracy on training data?

Internship Interview:
- difference between AI,ML,DL
- SVM's (functioning)
- Why neural networks? and its drawbacks

HR:
- Did you reject TCS in your BTech?
- If you did get placed in your BTech then why did you waste those opportunities for other students when you were planning for higher studies?
- Why didn't you prepare more for GATE and go for IITs?
- Do you want to do Phd?
- You might be asked to work in Pune etc, are you suitable to work in Pune, Mumbai etc, as I was hesitant to move out of Delhi.
- What do you think about India's take on Covid?
- What is your passion?
- If there was no concept of money then what would you love to do?

Telekom Digital

Full Time Interview:
- Distributed Cache subsystems, heaps, minimum length sub-array with maximum sum
- Tell the difference between Java and Python
- Is Bash similar to Python
- How is Python and Object oriented language

- 0/1 Knapsack in consideration with multiple objects can come.
- Array reordering with index array given.
- Find out the number of maximum guests in the party provided in and out time.
- Maximum sum contiguous subarray, Indexing in DBMS, LRU implementation, count the number of subset with sum k

Internship Interview:

- You have been given 10 bags each containing coins. 9 of the 10 bags contain coins with 1 gram weight and the last bag contains coins weighing 1.1 grams. Determine the bag with 1.1 gram coins using a digital scale only once.
- Given a tree node, return a node containing a mirror image of the given tree.
- Return a string with all vowels in reverse order. Eg- hello to holle
- Given a node of a linked list, you must delete that node. [Head node is not given].
- Given a string, reverse the words in the string.
- Check whether the given binary tree is BST or not.
- Find the length of the longest palindrome substring in the given string.
- Find the middle element of the linked list using only one pass over the linkedlist.
- Difference between arrays and linked lists. Implement a linked list.
- What do you mean when you say that strings are immutable?
- There is a function that returns true 50% of the times and otherwise false. What changes can you make so that it returns true 75% of the time and false otherwise ?
- Given a string of characters, return if the permutation of the string is a palindrome or not.
- What are Semaphores ? Conditions for deadlock.
- Comparable vs Comparator.
- Bottom view of binary tree
- Print the levels of tree in reverse order
- Print the k most frequently occuring elements in the array
- Questions on multithreading and immutability of objects, singleton design pattern
- Linked List data structure , Tree Traversals, Vertical distance problem in trees
- Given a string, find a substring that can be repeated any number of times to recreate the original string
- Zig zag order tree traversal , android DVK , sharing data between fragments , system design for an app where a parent can monitor location of child and give alert when close to dangerous locations, projects in depth, internships , OS scheduling algorithms, benaly's anomaly , paging , DBMS , no SQL databases , server design, cloud databases , NETWORKS lock on browser , what happens when we go to url , DNS , servers , APIs , HTTP vs HTTPS , packet sniffing, page certificates
- Stable sort/ Unstable sort
- Paas Iaas Saas difference

Zomato:

Full Time Interviews:
- Average waiting time for processes under preemptive scheduling.
- Number of possible order of input of keys under a hashing scheme so that a specified final arrangement is generated.

- Write a function to check if 2 strings have the same letters in the same order eg: hhhhhiiiirrrreeed and hired returns 'yes' and ghired and hired returns 'no'
- Find whether a pair with sum =k is present in a sorted array or not.
- Question on data structures, and problem on the standard maze problem.
- In depth discussion about my internships and technologies used.
- Various questions on Python internals - pass by value vs pass by reference, weakly typed vs strongly typed languages.
- Given a number of orders placed and peak timings, how many riders would zomato need for a day?
- Given n sticks of lengths l1, l2, ... ln, the cost of combining two sticks is li+lj (the sum of their lengths). Find an efficient way to combine all the given sticks into one while incurring minimum cost.
- Given a very large number of strings, you have to find the product of the lengths of strings that have no characters in common. Return the maximum such product possible in complexity less than n^2 (n= no. of strings). Why would your method work, and what is the worst case complexity for it?
- A system has the following functions. Insert (A, B). Query 1: Return all pairs of (A, B) sorted using B value. Query 2: Return all pairs sorted with B value where B is in range (B1, B2). Design the system.

Online Tests:
- Given an array of strings consisting of left and right parentheses, write a function to find the number of possible pairs that can be made such that the pair of strings concatenated forms a balanced parenthesis sequence.
- Mcq based on calling of constructor and destructor in a class.