International Exchange Team, SCS, IIT BHU

presents

Intern Diaries

INTERN DIARIES

A guide to help you prepare for, and ace the selection process of internships for different profiles.

ACKNOWLEDGEMENT

We, the Student Counseling Services (International Exchange Team), IIT BHU, are elated to present to you the first edition of the Intern Diaries.

We thank the Training and Placement Cell, IIT BHU without whom this would not be possible. We also thank the faculty heads members of the Student Counseling Service, and the student helm of SCS 2020-21 who trusted us with this responsibility.

This is an effort from our side to encourage and help you all in your intern preparation. In these tough times of COVID, we all need to muster up courage and move forward with confidence to achieve greater heights. Let this dairy be a tool to uphold the values and prestige of our institution.

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Kindly treat this as a reference source to streamline your preparation.

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INTRODUCTION

Hello everyone,

We won't be wasting your time by bombarding with too many advices right at this budding phase of your journey. An early start always gives an edge and help you take the leap you have always wanted.

Why this diary at all?

"Well begun is half done" – You are at an important point that will decide your professional career. Few things we believe this diary has to offer:

- Provides a one stop solution with all the relevant and authentic experiences shared by our students and alumni during their intern and placement phase.
- It covers the overall process of interview and recruitment for various profiles like software, data analyst, business development, web development, machine learning, operations and techno managerial roles, etc.
- Required reference books, sources of preparation attached (as links) wherever required.
- The company wise sorted format in the diary allows you to get a general idea on what specifically needs to be done for certain companies.

So dive right in. Start looking at what your dream companies have been asking. Good luck to you all!

Software Development

Company Name: Adobe
Profile: Product Engineer

Coding Test Round:

There were 12 MCQs based on probability, Eigen Values taught in MA102, properties of a matrix (taught in 12th), Debugging, Oops and etc [No Negative Marking].

The test also had the following coding questions:

- You have an infinite supply of n kinds of umbrellas the ith umbrella can save $s(i)$ people from rain, using a minimum number of umbrellas you have to save k people(exactly). Print the minimum number of umbrellas or "-1" if it's impossible.
- Write Pseudo code of printing a matrix spirally.
  https://www.geeksforgeeks.org/print-a-given-matrix-in-spiral-form/
- Write an essay on "What are IoT (Internet of Things) devices and what will be their impact on the future?"

Interviews:

Student 1:

- Time complexity of finding the nth Fibonacci number without dynamic programming and with dynamic programming
- Time complexity of changing base, first decimal to binary and then to any general base
- Searching for an element in an infinite size sorted array.
  https://www.geeksforgeeks.org/findposition-element-sorted-array-infinite-numbers/
- Find the meeting point of a Y shaped linked list[two heads and same ending points] O(n)? https://www.geeksforgeeks.org/write-a-function-to-get-the-intersection-point-of-two-linked-lists/

- Given two identical array one element is deleted from one of the arrays find the index of the deleted element in the other array? O(log(n)) n is the size of the array. https://www.geeksforgeeks.org/find-lost-element-from-a-duplicated-array/

Puzzles:

- 3 Candles burn in 60, 80, 100 min. Exactly 1 burn at a time for 40 minutes, 3 of them burn together for exactly 30 minutes. For how long do exactly 2 candles burn together? https://brilliant.org/problems/burning-candles/
- Find a number that is between [51,60] if it is divisible by 3, is between [61,70] if it is not divisible by 4 or is between [71,80] if it is not divisible by 6. https://puzzling.stackexchange.com/questions/3728/unhelpful-house-number-reminders
- A 5 digit number with digits a,b,c,d,e i.e. abcde when multiplied by 4 becomes edcba. find a,b,c,d,e? http://www.gottfriedville.net/mathprob/nt-5digitmul.html

Student 2:

The interviewer started with some general questions related to the resume, the achievements and experience of the candidate, and asked the candidate to explain any one of the projects that they had done. The candidate was given two standard questions based on stack:

- Implement push at bottom functionality in a stack without using any extra memory. Interviewer was looking for a recursive solution involving the use of a function call stack.
- Use the push at bottom function from the previous program to reverse the stack.
- Difference between binary semaphore and mutex, the definition of wait and signal functions of a mutex and to implement how they work.

Questions from OOPS, virtual keywords in C++, const keyword and how it affects a variable and a function and why it is used in some class procedures.

Student 3:

- Given a stream of integers, find mean and std deviation at any point in it
- You are given 1000 bottles of wine. One of them is poisoned. You can test by poisoning a person. A person can drink multiple wine samples. You need to find the poisoned bottle. What's the minimum number of dead persons? (Hint: Answer is not n, n-1 Solve using bit masking)
- There are 100 students in a class, each one of them guesses a number between 1 to 100 and writes it on a sheet of paper. You collect them all and find the average value. You tell them that the one who guesses the closest to ⅔ of the average will win. What's Nash equilibrium in it?
- You have n biased coins with probability of Head P. How will u simulate a series of k tosses?
- You have a stream of n characters. At any point in the stream, you need to sample k characters from it such that the distribution of characters in sample matches that in stream. How to do it?(Make hash, create a cumulative frequency array, do BS over answer)
- What's hashing? Diff between map and unordered_map in STL
- Find the closest leaf node in a tree
- Check whether a binary tree is BST or not
- Find subarray with sum of elements 0 in an array of integers
- Find the Kth smallest element in array

Student 4:

- Tell us about yourself.
- https://www.geeksforgeeks.org/find-element-appears-array-every-element-appears-twice/
  The candidate gave an O(n^2) and constant space algorithm answer. The interviewer later asked for it to be optimised, and the candidate coded the XOR method.
- Find the total number of 'a' such that x%a=y for given x and y.
  The candidate started by taking example values of x & y and generalising it further. The interviewer was interested in the approach and asked the candidate to lower the webcam over the notebook to observe the work on paper and helped the candidate when they got stuck through the process.
- There are 1000 wine bottles. One of the bottles contains poisoned wine. A rat dies after one hour of drinking the poisoned wine. How many minimum

rats are needed to figure out which bottle contains poison in an hour?
(https://www.geeksforgeeks.org/puzzle-19-poison-and-rat/)
- Check if all leaf nodes are at the same level in a binary tree.
(https://www.geeksforgeeks.org/check-leaves-level/)
The candidate gave a recursive approach. The interviewer questioned about
the time and space complexity. The candidate was later asked to write
pseudo code for it.

Profile: Media and Data Science Research

Coding Test Round:

- There were 15 MCQs based on probability, eigenvalues and eigenvectors,
and basic data structures and algorithms.
- One coding question was asked with code. Sample –
  - Given 3 numbers, n, lowerLimit, and upperLimit. You have to tell the
  number of different arrays of size n you can form such that array
  elements should be in the range [lowerLimit, upperLimit] with the
  condition that every element should be coprime with the first element.
  https://www.geeksforgeeks.org/equilibrium-index-of-an-array/
- One coding question without code. Only pseudocode was required –
  - 'Painter's Partition Problem', https://www.geeksforgeeks.org/painters-partitionproblem-set-2/
  - https://www.geeksforgeeks.org/maximum-length-chain-of-pairs-set-2/
- One essay type question (approx. 200 words): Give an example where
technology can improve your daily life.

Interviews:

Student 1:

- "Tell me about yourself", and questions based on resume and projects.
- How many times do the hour and minute hand overlap in 1 day. Explain?
(Asked for mathematical proof). (Answer: 22)
- Given infinite coins of denominations 6,9 and 20, what is the maximum
value that you cannot make using these coins? (Answer: 43)
- Given 100 statements as follows:

Statement 1: At Least 1 of these 100 statements are wrong.
Statement 2: At Least 2 of these 100 statements are wrong. . .
.
Statement 100: At Least 100 of these 100 statements are wrong.
Question was to find how many of these statements were wrong and how many were right.
(Answer: First 50 statements are correct, Last 50 statements are wrong.)

Student 2:

- Given a traffic light which has only 2 types of light, green and red. It is given that Green light is ON for 15 secs Red light is ON for 45 secs, then what will be the expected waiting time.
- Find the median of the running stream of numbers. .
- Find a three digit number with digits x, y and z, such that xyz=x!+y!+z! (Solution-: 145=1!+4!+5!)
- Puzzle: Given 9 balls out of which 1 is heavy. You are given a beam balance. Find the minimum number of trials required to identify the heavier ball.
  Solution-: Two trials. https://www.mathsisfun.com/puzzles/weighing-9-balls-solution.html
- Questions related to student's project were asked.

Student 3:

- "Tell us something about yourself that is not in the resume", explain any one of the projects mentioned in the resume, and questions related to the project and explanation were asked.
- The candidate was given a scenario with an image (contained eye) to write a few code lines for its training model. (The interviewers were looking for the problem solving approach rather than the correct answer.)
- You are given a system which is having temperature supply at irregular intervals of time. You are required to find out the average temperature of the system at any given time.
- (related to above question) Find out the standard deviation to find the stream of temperature.
- (related to above question) How will you find out the median temperature of the running stream of temperature? (Similar to:

https://www.geeksforgeeks.org/median-of-stream-of-running-integers-using-stl/)

- Build a function for biased coins with a rend function to find out probability for head and tail.
- Write an approach to find out the longest path using the Djikstra algorithm as a function.
- Questions about activation functions like rely, softmax etc and their differentiability.
- Draw and comment on the differentiability of the given functions.

https://www.geeksforgeeks.org/median-of-stream-of-running-integers-using-stl/)

- Build a function for biased coins with a rend function to find out probability for head and tail.

Company Name: Amazon
Profile: SDE

Coding Test Round:

The online test consisted of four sections, a code debugging section (20 minutes), a reasoning ability section (35 minutes), a coding section (70 minutes) and a work-style survey (10 minutes). Everyone got different sets of questions.

Student 1
Coding Test Round:

The candidates' set contained:

- It was based on hashing. After a little thinking, the question simply got reduced to calculate two values in an array having sum equal to a given integer k. Simple 5-7 lines of code were sufficient to pass the given test-cases.
- Given a string consisting of words separated by spaces or punctuation. It was required to return a vector consisting of strings without spaces and punctuation having a maximum frequency in the given string after excluding particular words. The words to be excluded were given in a form of a vector of strings. It was a hashing and string-based question, there were some strong corner cases which were to be handled.

Interview:

The interviewer told the candidate to introduce themselves. Then 4 coding questions were asked.

- https://www.geeksforgeeks.org/count-distinct-elements-in-every-window-of-size-k/
- https://www.geeksforgeeks.org/convert-a-given-tree-to-sum-tree/
- https://www.geeksforgeeks.org/partition-problem-dp-18/
- https://www.geeksforgeeks.org/trapping-rain-water/
  The interviewer first asked about the brute-force solution and the optimal approaches were asked afterward.

Student 2
Coding Test Round:

- You are given an array containing the weight of n different pallets. A person can lift two pallets at a time with the maximum limit of the sum of their weights K. You have to choose two different pallets from the given array such that the sum of their weight is as close to K as possible. It was a simple problem of binary search.
- The question was about an amazon bot searching for the desired item in a working arena; it was framed as follows: I was given an n*m matrix consisting of zeros, ones and a single 9 in it, where zeros represented the blocked regions for the bot, the ones represented the allowed regions, and the 9 represented the location of the desired item to be searched. The starting position of the bot was (0,0). I had to print 1 in the case where the bot was able to search the desired item, or 0 otherwise. This was a simple problem of BFS or DFS implementation.

Interview:

- Questions on the projects mentioned in the CV.
- Basic concepts of OOPs like inheritance, data abstraction, static class and virtual function, etc.
- Two coding questions were asked (interviewer was primarily concerned with the approach):
  - The first was to remove the duplicates in a linked list. Interviewer asked the student to optimize the solution and write test cases to check on corner cases.
  - The second question was of DP:
    https://www.geeksforgeeks.org/edit-distance-dp-5/

Student 3
Coding Test Round:

- https://www.geeksforgeeks.org/search-in-row-wise-and-column-wise-sorted-matrix/
- The question was on implementation of round robin scheduling algorithm with given burst time and calculation of average waiting time.

Interview:

- Few questions on the projects mentioned in the CV.

- Two coding questions were asked (interviewer was primarily concerned about the time and space complexity):

  - The first was to print the left and right view of a binary tree. The node visible from both sides should be printed only once. It has to be done in O(1) extra space.
  - The second question was to group values less than k, equal to k and greater than k within the array without using extra space in O(n) time.
- Question about a singleton set.
- How to identify and solve a dynamic programming problem?

Student 4
Coding Test Round:

- To search the given element in a M x N matrix where each row and each column is sorted in ascending order.
- Finding your way through a Maze, a M x N matrix with elements marked as 0 or 1 where you can't move on 0s. Given a starting and an ending point, return 1 if there exists a path.

Interview:

- Few questions on the projects mentioned in the CV.

- Write an algorithm for top and the left view of a binary tree, the time and space complexity and a few variations of it.

- Find the median for stream of integers, what data structure would you use, the time complexity. Then discussion went to the possibility if it was stored in a self-balancing tree.

Student 5
Coding Test Round:

- https://www.geeksforgeeks.org/search-in-row-wise-and-column-wise-sorted-matrix/
- Implementation of round robin scheduling algorithm with given burst time.

Interview:

- Few questions on the projects mentioned in the CV.

- You are given an array of numbers. You have to replace each array value by the value which is smallest among all the largest values present after that index of the array. Interviewer asked for the O(n) solution.

- https://www.geeksforgeeks.org/find-maximum-possible-stolen-value-houses/

- https://www.geeksforgeeks.org/diagonal-traversal-of-binary-tree/
  You have to print the answer in the correct sequence.

Student 6
Coding Test Round:

- https://www.geeksforgeeks.org/search-in-row-wise-and-column-wise-sorted-matrix/

- The question was about an amazon bot searching for the desired item in a working arena; it was framed as follows: Given an n*m matrix consisting of zeros, ones and a single 9 in it, where zeros represented the blocked regions for the bot, the ones represented the allowed regions, and the 9 represented the location of the desired item to be searched. The starting position of the bot was (0,0). You had to print 1 in the case where the bot was able to search the desired item, or 0 otherwise.

Interview:

- Basic introduction and how the student developed interest in coding.
- Math and implementation based question: Initially you are on the number line at 0 and in first step you can move either one step forward or one step backward (by +1 or -1) and in next step you can move by +2 or -2 from the point on which you are currently present like if you are on +1 then you can either go to +3 or -1 means in ith step you can move by +i or -i from the point on which you are standing. Find the minimum no of steps to reach a given point "n" and what steps you will take to reach there.
- Remove duplicates from a sorted linked list without using extra space.
- Reverse a linked list without using extra space.
- Standard questions on BT, BST and heaps, graphs, OOPs (in-depth questions on virtual functions and polymorphism).

Company Name: AQR
Profile: SDE

Coding Test Round:

- Given an alphanumeric string (consisting only of lowercase/uppercase characters and digits), rearrange the characters such that all lowercase characters are as left as possible and all uppercase characters are as right as possible. The relative ordering of characters of each type should not be disturbed. This has to be done without using extra space. O(n2) was getting accepted.
- There are n people numbered 1 to n. Two people can either be friends, enemies or may not know each other. Given a sequence of relations like (Friend/Enemy A B), print all conflicting relations as they appear. Initially, no person knows any other person. Also, the following rules apply:

  Friend's friend is a friend, Friend's enemy is enemy, Enemy's friend is enemy, Enemy's enemy is a friend.

  Constraints were of the order of a few hundred so brute-forcing would do.

Interviews:

Round 1:

- Describe a data structure with some properties with structural code.
- Find a point equidistant from 3 other points.
- Questions on DP, Max-heap, Min-heap, Linked-Lists. Student was asked to explain their approach as well as write pseudo-code for the program.

Round 2:

- "How do you handle pressure and unforeseen situations, how do you decide something without having important information", tough times in student's life and how they dealt with them and questions of the like.
- Questions based on resume, technologies used and the reason to choose a specific library/framework over other.

Company Name: BNY Mellon
Profile: SDE

Coding Test Round:

- Question on strings (https://www.geeksforgeeks.org/lexicographical-maximumsubstring-string/).
- Question on Matrices. Input - A transformed matrix (transformation was explained in the statement). It was based on retrieving the original matrix.
- Question on graph traversal and string permutation.

Interviews:

Round 1:

- "Tell me about yourself", and questions based on resume and projects.
- Based on the project, the interviewer asked questions about the basics of ML+DL+NLP such as the difference between Lasso, Ridge and Elastic-Net, PCA and LDA, Ensemble models and missing data, TfIdf, n-grams, Transfer Learning(VGG-16) basics. The interviewer also gave some theoretical problems and asked what approach the candidate would take.
- Student was asked to solve two questions.
  The first one was based on string implementation (codeforces div2 A-type).
  The second question was similar to this DP problem
  (https://www.interviewbit.com/problems/minimum-difference-subsets/).

Round 2:

- Few personality assessment type questions (pertaining to interests, hobbies etc) were asked. Discussion about candidate's interests, knowledge of the same (books they had read) and technical questions regarding the same.
- The interviewer asked about candidate's projects and explanations.

Company Name: Cisco
Profile: SDE

Coding Test Round:

This round had 2 coding questions and 15 MCQs to be done in 60 mins with section switching allowed. MCQs were based on Logical and Quantitative aptitude, OS, Networking, OOPs and output predicting questions. Basic knowledge of the above topics was enough to get all of them correct. The coding questions were:

- Array implementation based question: Given entry and exit time of several employees in HH::MM::SS format as a string and you were supposed to print the number of employees who worked between a given time frame.
- https://www.codechef.com/problems/H1

Interviews:

Student 1
Round 1:

- Questions based on resume, technologies used in project were asked.
- Question on the implementation of LRU Cache. Student's first solution was based in deque which he later optimised using DLL and Hashmaps.
- Questions based on recursion were asked.

Round 2:

- Questions based on resume and asked general questions like, why he was going for software jobs despite being from XYZ branch, why he wanted to join the company.
- Which operating system do you work on?
- Why did you choose the mentioned technologies (React and Django) for your project?
- If you have ever worked in a team project, what was your contribution in it?
- Questions from topics like OOPs, OS and some standard problems from Tree data structure were asked.

Round 3:

Student was asked if they was aware of the stipend and could start working from XYZ date. Was asked the kind of work environment he would prefer and the preferred location.

Student 2
Round 1:

- Exhaustive Discussion on student's project (student was allowed to choose project of his choice from the resume). Student was asked about how everything was being implemented, most challenging part of this project, further improvements, scope, scalability, etc.
- "Talk about an OOPs feature used in any of your projects" (the student chose inheritance). The following discussion was focused on OOPS and Inheritance - what is inheritance, how to implement it, why is data hiding important, function overloading and overriding.
- Student was then asked to implement a class to store a binary tree node (Important to write the constructors and overloaded forms of constructor as well – this was the main check he expected).
- "When to use arrays and when to use linked lists?"
- Two questions on binary trees were asked. One was a simple inorder traversal based and the other was a slightly modified version of this problem (only the base case was different).

Round 2:

Questions were asked from DSA, Theory, HR/personality assessment questions.

- Question on how to implement queue using stack. The question can be found here.
- Student was asked to explain his contribution in one of his PORs.
- Questions on virtual functions and static variables.
- "How would you handle new projects which may not be aligned to your interests?"
- Fundamental questions on memory management, followed by a vast discussion on networks – interviewer asked about various theory topics in brief like what does HTTP Protocol do, how does a DNS Server Work, how do you find the mac address (ARP), to which device's IP address the first

network packet is sent? And what does IP layer add to the segment received from transport layer.

- Talk about one challenge faced in any of the projects mentioned and how they solved it.

Round 3:

Only one question was asked– WHY CISCO? This round was only informative and no other questions were asked.

Student 3
Round 1:

- Student was asked to introduce themselves, followed by a project discussion, followed by theoretical questions on OS and OOPS.
- These were the coding questions asked thereafter:
    - https://www.geeksforgeeks.org/diagonal-sum-binary-tree/
    - https://www.geeksforgeeks.org/python-program-to-validate-an-ip-address/
    - https://www.geeksforgeeks.org/search-in-row-wise-and-column-wise-sorted-matrix/
    - Detect and remove the loop in a linked list.

    Code was required only for the first 2 questions. Approach/idea for the rest.

Round 2:

- A short introduction was followed by 2 coding questions:
    - https://www.geeksforgeeks.org/longest-bitonic-subsequence-dp-15/
    - https://www.geeksforgeeks.org/reverse-a-doubly-linked-list/
- Questions on Operating System and OOPs.

Round 3:

The round was largely informative. Student was told about the stipend, the work expected of a summer intern, the duration among other things.

Company Name: Citi Corp
Profile: SDE

Coding Test Round:

Coding section (25 MCQs) with questions on OS, OOPS/Java, Quantitative Aptitude (25 MCQs) with Basic maths , Logical Aptitude (16 MCQs), Verbal ability ie English (16 MCQs) Comprehension based and Basic English Grammar.

Coding section -

- Max no of operations to convert a string into another string. Only make_permutation (STL) operation allowed.
- Take square matrix dimensions as input and return A*transpose(A), where A is a matrix with incrementing values beginning from 1.

Interviews:

Student 1
Round 1:

- Questions based on resume and introduction.
- Questions regarding the previous summer research internship and the work done there. Code of a simple question, technical questions were from GFG.

Round 2:

- Questions related to OOP concepts such as virtual functions and its working.
- Difference between python and C++
- "Explain any one of the projects on your resume." And then questions were asked on the projects and the challenges faced during their implementation. There were a few questions regarding interests and the family background of the candidate.

Student 2
Round 1:

- Questions based on resume and introduction.
- Concept of Abstract Class in OOPs, and the code snippet for that.

- What are the types of traversals in a tree and write the code for each of them along with an example.
- A Dynamic Programming question based on a strategy involved in a game between 2 players.

Round 2:

- Questions based on resume and introduction.
- Asked why the candidate prefers C++ over other languages?
- Questions based on concepts of OOPs, virtual functions, classes, data abstraction etc.
- Questions on the concepts of Data Structures and Algorithms, like Hashing and its various collision handling techniques.
- Difference between an Array and Linked List along with the conditions where it is to be used in the cases of insert, delete and search operations.
- Questions on traversals of a tree were asked along with an example and also with the function call stack algorithm in recursion method for postorder traversal.
- Diamond Problem based on the concept of Multiple Inheritance was also asked. (https://medium.freecodecamp.org/multiple-inheritance-in-c-and-the-diamond-problem7c12a9ddbbec)
- Questions on methods of how to balance a tree were also asked which involved the concept of AVL tree.
- Question on Normal Distribution and its expression
- Monty Hall Problem. (https://www.geeksforgeeks.org/puzzle-6-monty-hall-problem/)

Student 3
Round 1:

- Questions based on resume and introduction.
- The candidate was asked to code a question on paper, the question was "Reversing a Linked List".
- The candidate was asked the "A max score by a batsman" puzzle.

Round 2:

- Questions related to OOPS.
- "Explain about your favorite Data Structure" and why it interests them.
- The difference between Java and C++.
- The candidate was asked about Huffman Coding.
- Questions regarding interests and weaknesses of the candidate, how they managed their problems while other teammates were not contributing to the project.

Company Name: De Shaw
Profile: SDE

Coding Test Round:

- Variant of https://www.geeksforgeeks.org/largest-sum-contiguous-subarray/
- Customers are given seats in order in a shop. Each customer has an arrival no. A customer may or may not have a booking number. Given arrays denoting booking numbers and arrival numbers (no booking number denoted by 0) and an integer array of query where the answer to a query is the arrival no of customer given seat on that turn, return a vector of answers to the query array.
- Given a string on which the following operations can be performed: a. Remove 1st character of string. b. Remove a prefix of the string if this prefix is same as the eqaul length prefix of leftover string. (Eg – for "abcabcd", "abc" can be removed but for "abcab", only 'a' can be removed) Find the minimum number of operations required to finish the string.

Interviews:

Student 1
Round 1:

- Questions based on resume (projects and work experience on the resume).
- Questions on Python, Django, C++ were asked.
- A question of system design - Design a browser history application keeping read, search, append, edit complexity minimum (Answer is a combination of linked list and TRIE type of structure).

Round 2:

- What is dynamic polymorphism (OOPS)?
- Design Database for an online retail marketplace.
- Coding question - Given an array find largest contiguous sub array with sum greater than some number k.

Round 3:

- Student was asked about things they liked outside work, about hometown and family.
- "What motivates you to work?".
- Discussion on what is a good working environment. What all he had learned during his past work experiences.
- Why would you like to work at D.E. Shaw?

Student 2
Round 1:

- Find the intersection point of 2 linked lists.
- Find number of different occurrences of a word in a character matrix, with movement in all 8 directions allowed. (Note : Only the approach was asked for the above questions.)
- Puzzle – A and B are separated by n blocks, in one turn a player can remove either 1 or 2 blocks, the player who removes the last block(s) wins, if A starts the game, find the values of n for which A wins.
- Puzzle – 27 coins of which 1 is heavier, rest of same weights, find minimum no of weighings required to find heavier coin.

Round 2:

- Discussion on student's projects.
- Josephus Circle problem and its variation – if k = 1, i.e. each person kills the next one in the circle, find the values of n for which the 1st person is safe.
- There are n people, m houses, k sets of people where the people within a set are not comfortable with each other (a person may belong to more than 1 set), find a strategy to accommodate these people optimally, i.e a house should not have too many people or too less people as compared to other houses.
- The student was asked about the language they were most comfortable with followed by questions on OOPS in detail – mostly about function overriding and virtual functions.

Round 3:

- Interviewer asked about the difficulties they faced in their projects and the solutions they came up with to solve them, and what according to them was the most important thing for successful completion of projects.
- "What irritates you the most?"
- "Why do you want to join us?"
- Discussion about their interests and hobbies and what kind of project would the student like to work on.

Student 3
Round 1:

- The interviewer asked what their favorite programming language was after which questions mostly based on virtual functions and runtime polymorphism were asked.
- An algorithmic problem based on binary search.
- Few questions on operating systems involving Belady's anomaly, page replacement algorithms.
- Algorithmic problem which is to accommodate N people in M rooms with k constraints such that two people can't be in the same room.

Round 2:

- A truck driver is going opposite traffic on a one-way street. 10 police officers see him but don't arrest him. Why didn't the police officer stop him?
- Number of rectangles in a chess board. Number of polygons in a chessboard.
- You are in a dark room where a table is kept. There are 50 coins placed on the table, out of which 10 coins are showing tails and 40 coins are showing heads. The task is to divide this set of 50 coins into 2 groups (not necessarily the same size) such that both groups have the same number of coins showing the tails.
- A problem on probability. Easy.
- Print numbers from 1 to 100 without using any loops or recursion.
- Three switches, three bulb puzzle.
- 5 lanes 25 horses puzzle. Find the best 3 in the minimum number of races.
- A simple dp problem.

Round 3:

- Tell me about yourself.
- What makes you different?
- Why DE Shaw?
- What is your biggest strength?
- About candidate's past technical experience.

Company Name: Fidelity
Profile: SDE

Coding Test Round:

It consisted of four sections. The first section consisted of basic multiple choice questions that checked your proficiency in the English language. They were quite easy and mainly focused on Grammar. The next section included multiple choice questions, again. They consisted of questions based on fundamentals of Computer Networks, Operating Systems, OOPS, SQL and C++. Followed by a coding section.

- There was an array and a number 'k' given. Here k was the number of partitions that had to be made. The partition had to be made in such a way that the maximum sum of numbers in any partition was minimized across all the partitions.
- To convert an infix expression to a prefix expression.
- There are N villages arranged in a circular pattern located at varying distances. At every village, you get an energy drink. You can go the next village only if your current energy was greater than or equal to the distance between the current village and the next one. You need to tell which village should a traveler start so that he could visit all the villages, with initial energy zero. The similar question at GeeksForGeeks: https://www.geeksforgeeks.org/find-a-tour-that-visits-all-stations/
- Pseudo Code for Floyd Warshall Algorithm.
- String based question: You are given two strings. You need to sort the first string based on occurrences of characters in the second string. The characters present in the first string and absent in second should be placed at the last in the same order as in the original string. For example, if the two strings are "aafbbhccgddz" and "dbca", then the output should be "ddbbccaafhgz".

Interviews:

Student 1
Round 1:

- Discussion on student's projects followed by detailed explanation and questions about the project as the candidate discussed its implementation.
- Mention the advantages of doubly linked lists over singly and where they can be exploited and the types of hashing.
- Convert a binary tree to a doubly linked list.
- Pseudo code and procedure in designing a voting system based on face recognition and what were the various things one had to keep in mind while doing so.

Round 2:

- "Why do you want to join Fidelity?"
- "Why should we you"
- "What are the two things that you would like to change about the college?"
- "If not Fidelity then what would you do"

Student 2
Round 1:

- How to prove that the smallest factor of any number is prime.
- Partitioning an array with respect to a pivot (same as in Quick Sort).
- "How will you check if a binary string is transmitted correctly without any errors?"
- If the days of the week are enumerated as {0,1,2,3,4,5,6}, given a day-number how will you determine a day-number before or after k days.

Round 2:

- Explain a project and they gave the candidate some conditions and asked how the project model would act.
- "Why do you want to join Fidelity?"

Company Name: GE Healthcare
Profile: SDE

Coding Test Round:

The test consisted of three sections: Aptitude, Technical and Coding.

In aptitude, there were fifty basic aptitude questions. In Technical, there were thirty questions based on OS, DS, Algorithm, OOPS, DBMS, Networking. In coding, there were two coding questions:

- https://www.geeksforgeeks.org/count-number-triplets-product-equal-given-number/
- https://www.geeksforgeeks.org/convert-a-given-tree-to-sum-tree/

Interviews:

Student 1
Round 1:

- Questions on OOPS.
- Make a class of a water bottle shown.
- Give an approach for inserting a node in a binary tree and write code for the same.
- "What is the time complexity of searching an element in a linked list and how would you do it?"
- The candidate was also asked for logic of quick sort and its time complexity.
- How to derive time complexity?

Round 2:

- Student was asked to explain the mentioned project briefly and questions based on it were asked.
- "Why should we hire you?"
- "What are your strong points?"
- "Did you face any challenges in your life?"

Student 2
Round 1:

- Write code for the tower of Hanoi problem and explain it.
- Which data structures do you know?
- What is an array?
- What is a Binary Search Tree? Explain insertion and deletion.
- Which language do you prefer?
- What is data abstraction?
- What is overriding?
- What is operator overloading?
- What is an interface?
- What is constructor overloading?

Round 2:

- Introduce yourself.
- Explain your best project.
- What is your best moment in college till now?
- Why did you apply for this profile?
- Why should we prefer you over others?

Student 3
Round 1:

- Why did you want to become an engineer?
- What is your biggest achievement?
- Explain about your projects.
- Questions based on OOPS, such as: "What is inheritance, Polymorphism, Abstraction? Its uses?"
- Design a basic framework/structure for an app like Uber/Ola.

Round 2:

- The interviewer asked about the candidates' interests.
- Asked about projects done by the candidate followed by "Why did you choose this project?"
- "Why GE?"
- "What programming languages do you know? Will you be able to do the project on AI and ML?"

Company Name: Goldman Sachs
Profile: SDE

Coding Test Round:

There were two sections: Coding and Quant.

- You're given a DFA: number of states, starting state, accepting states list, it's transition table. How many strings of length l can be accepted by it?
- It was modified Camel Banana Puzzle (https://www.geeksforgeeks.org/puzzle-15-camel-and-banana-puzzle/). In the original puzzle, the camel needs a banana to move. In this question, camel eats a banana if it is carrying some but it can move even if it carries no banana at all.
- Along the lines of – There were 4 friends in a 2D matrix, each can move in any of the 4 directions (N,S,E,W). Given their initial coordinates, find the point where they should meet such that some of distance covered by each of them is minimized.
- https://stackoverflow.com/questions/3719150/square-of-a-number-being-defined-using- define
- What's the output of this snippet: https://ide.geeksforgeeks.org/nS7QOeQcUv ? Compile time error, runtime error?
- Suppose a const int pointer is initialised with value 6 in C++. Can you increment/++ it? If yes, what'll be its output when you try to access it: 7 or some garbage value?
- https://www.quora.com/Four-points-are-chosen-uniformly-at-random-on-the-surface-of- a-sphere-What-is-the-probability-that-the-center-of-the-sphere-lies-inside-the-tetrahedron-whose-vertices-are-at-the-four-points
- $a+b+c+d = 63$. What's $max(a*b+b*c+c*d)$? All are naturals (Ans is 891)
- You keep on throwing a dice and add the digit that appears to a sum. You stop when sum $>= 100$. What's the most frequently appearing digit in all such cases? 1 or 6 ?
- Sum of two tan inverse numbers (https://www.emathzone.com/tutorials/math-results-and-formulas/formulas-for-sum-and-difference-of-inverse-trigonometric-functions.html)
- Simple integral of an expression (involving sin(x), cos(x))
- What's the biggest challenge ever faced in your life?

Interviews:

Student 1
Round 1:

- Make stack using class (Oops) in C++?
- Write a code of reversing a string without using stl lib?
- Write code of reversing a number in O (1) Space?
- Why did you opt for this profile?

Round 2:

- This round has questions from the candidate's projects dealing with probability, statistics and ML algorithms.
- Interviewer gave them questions to calculate expectation (probability) of the function?
- There were 20 balls each one is labelled from 1 to 20. Calculate the probability of selection of three balls always having a maximum 18?
- What is K-means clustering? Explain in brief (they explained it by graph and pseudo code).
- Having a financial dataset which contains a date column and a bonds column makes a prediction of whether to trade / not to trade? How would you make a prediction?

Student 2
Round 1:

- Explain your projects in brief. (Followed by discussion and questions related to the projects)
- https://www.geeksforgeeks.org/k-largestor-smallest-elements-in-an-array/
- The implementation of the heap and its various related operations were also covered.

Round 2:

- https://www.geeksforgeeks.org/find-the-only-missing-number-in-a-sorted-array/
- https://www.geeksforgeeks.org/find-repeating-element-sorted-array-size-n/
- https://www.geeksforgeeks.org/check-whether-two-strings-are-anagram-of-each-other/ (in linear time complexity)

- https://www.geeksforgeeks.org/finding-median-in-a-sorted-linked-list/ (in single traversal and in constant space complexity)

Student 3
Round 1:

- Explain the project you are most comfortable with.
- https://www.geeksforgeeks.org/write-an-efficient-c-function-to-convert-a-tree-into-its-mirror-tree/ (The interviewer then asked the candidate to optimise the solution further. The hint given was to use parallelisation. The candidate wanted to use Threadpool Executor in Java, but the interviewer insisted on a C++ based solution using fork())

Round 2:

- Formal introduction followed by discussion about the candidate's projects.
- https://www.geeksforgeeks.org/find-pythagorean-triplet-in-an-unsorted-array/ Answer: The candidate came up with a O(N^2logN) solution but the interviewer wanted a better answer. After some hints, the candidate was able to come up with a O(N^2) solution.
- What is the limit of ratio of two fibonacci numbers? Answer: https://www.quora.com/How-is-the-golden-ratio-related-to-Fibonacci-numbers/answer/Gary-Meisner

Student 4
Round 1:

- https://www.teachingideas.co.uk/problem-solving/squares-on-a-chessboard
- https://www.geeksforgeeks.org/puzzle-mislabeled-jars/
- Search an element in row-wise and column-wise sorted matrix in O(n)
- Code for the number of digits in any number.
- The second largest element in a BST.
- An element is at the wrong position in a BST. Find that element and place that element in its correct position.
- The student was asked to make a class having 2 functions int read() and void write(). There was a circular array of size n, the read and write pointers are at the 0th position. You can't read any index if you haven't written anything there. Your index will be moving in circular form, but you can write at any

index in the following 2 conditions- If the index is empty or If the index is not empty and You have read that element.

Round 2:

- The chocolate bar of size m*n. You can break an existing piece of chocolate horizontally or vertically. You can give any of the pieces to the other person. He will again do the same thing. One wins if the other one can't cut the chocolate anymore. If you are going to start the game, find a strategy to win.
- Make a stack using queues. Then two questions on expectations.
- Questions on probability, statistics, limit and mathematical induction were asked.
- Questions were asked about projects.
- You are at the origin. In the first step you can move one step forward or one step backwards, in the second step you can move 2 steps forward or 2 steps backwards, and so on… Find the minimum number of steps to reach N.
- Design a data structure for the lift moving downwards. Suppose the lift is at 11th-floor, someone presses the 5th-floor button, lift starts to stop at 5th-floor. When the lift reaches the 9th-floor, someone pressed the 7th-floor button, so the lift will first stop at 7th-floor then 5th-floor.

Student 5
Round 1:

- Convert number to words.
- Reverse a string.
- Find number of digits in a number.
- Find a number in a row wise and column wise sorted matrix.
- Find median in a row wise sorted matrix. They just wanted to know the approach and for the student to optimize the solution.
- Questions related to expectation.
- The student was asked to describe dijkstra's algorithm as they had mentioned it in one of their projects.
- Difference between bottom up and top down was asked and what will be preferred in a particular type of situation.
- Monty hall puzzle was also asked.
- https://www.geeksforgeeks.org/puzzle-15-camel-and-banana-puzzle/

- https://www.geeksforgeeks.org/puzzle-12-maximize-probability-of-white-ball/

Round 2:

- Check if a linked list is a palindrome.
- Given a vector of strings, make sets of these strings such that strings in a particular set are anagrams of each other.
- Standard minimum coin problem.
- Few questions related to projects asked.
- Spiral traversal of matrix.
- Given a binary matrix, find the maximum size rectangle binary-sub-matrix with all 1's.
- Find the row with maximum number of 1's in a row wise sorted binary matrix. Optimal solution was asked. The student gave them an O(m+n) approach (which is the best). The interviewer asked them to further optimize it for a few corner test cases.
- There is a server which takes requests from various client, the student was asked for a suitable data structure which could help you in accessing the request with the highest rank. (Ans. Max heap He further asked about the approach to define Max_heapify and extractMax functions of max Heap.)

Student 6
Round 1:

- The interviewer went through the resume and they discussed one of the projects. Few questions were asked related to their projects.
- https://www.geeksforgeeks.org/program-for-nth-fibonacci-number/
- https://www.geeksforgeeks.org/detect-and-remove-loop-in-a-linked-list/
- https://www.geeksforgeeks.org/find-a-repeating-and-a-missing-number/
- https://www.geeksforgeeks.org/word-ladder-length-of-shortest-chain-to-reach-a-target-word/
- https://www.geeksforgeeks.org/puzzle-12-maximize-probability-of-white-ball/
- https://www.geeksforgeeks.org/puzzle-15-camel-and-banana-puzzle/
- Suppose we have a graph of temperature vs time and a particular portion of the data is missing. How will you predict the trend during that interval?

- Basic questions related to BST like insertion in BST and asked some time complexity related questions to it.
- Questions related to expectation, probability, distribution functions.
- They asked about various measures to analyze data like mean, median, etc and situations in which one is better than the other.
- The student was then asked about the differences between top down and bottom-up approach in DP.

Round 2:

- Question on trie and the contact searching problem - https://www.geeksforgeeks.org/implement-a-phone-directory/
- Reverse a given string.
- Convert a number to words.
- The interviewer asked which cs topics the student knew and then asked the following- There is a server which takes requests from various clients. The server can only store requests that have been received till nth instant prior to the current instant of time. Suggest a suitable data structure. (Ans – deque)
- Given a chocolate bar of size m*n (m not equal to n). You can break an existing piece of chocolate horizontally or vertically. You have to give any of the pieces to your opponent and the process is repeated until one person cannot break the chocolate bar anymore. Assuming you start the game, find a strategy to win.

Student 7
Round 1:

- The interviewer asked the student whether they liked topics in finance. They then asked them about the topics which they knew in finance (it was mentioned that these questions were just for fun and would have a very little impact on the interview in case the student wasn't able to solve them).
- Describe the various derivative products they know. Particularly describe how 'Options' work. Draw the profile of a Call Option.
- Write the code for finding the nth Fibonacci. They were asked to use only recursion and optimize the time and space complexity as much as possible.
- Solve the N-Queen problem. The interviewer then went through the resume and asked them to explain one of their projects in brief.

- The student was then asked about Expectation Theory in probability and the formula to calculate expected. The interviewer gave them a problem regarding lottery tickets which involved expectations.
- The interviewer asked them about the various distributions that they knew. Student proceeded by asking about the properties of the uniform and normal distributions. The student was asked to draw their curves and mark points of interests. Student asked them the formulas of all standard quantities such as variance, standard deviation, expected values etc.
- A problem was asked based on expectation theory - "What are the expected number of coin tosses if one keeps tossing until he gets 3 consecutive heads?"

Student 8
Round 1:

- Puzzle - 1000 Coins and 10 Bags.
- The interviewer then asked me to detect a cycle in a directed graph in $O(n)$ time and $O(1)$ space. (The student said it is not possible in $O(1)$ space. The best solution comes in $O(n)$ time and $O(n)$ space using topological sort or graph coloring. The interviewer said that $O(1)$ space can be achieved using graph coloring). The student wrote the pseudo code for this and showed that space is $O(n)$. The interviewer seemed satisfied according to the candidate.
- They asked about the student's algorithmic knowledge of graphs, asked them what are strongly connected components.
- Simple problem to maintain the maximum element in a stream of numbers. Simply maintain a variable for maximum value. Then the interviewer asked if there are queries of type insert into data and delete from data, how would they keep track of max? The student said that they can simply maintain a priority queue. The student was asked to write the code for it.
- A standard problem to sort the array of zeros and ones and pseudo code for it. The code was supposed to be written on paper.

Round 2:

- How would they design the Facebook friend recommendation system? The student answered that in the graph for a particular node, we can simply apply BFS, set a threshold for distance and recommend someone if he/she is above

that threshold. Also, using the API we can have the number of mutual friends of a person. So, this can be another threshold.

- Then the interviewer asked about quicksort. When is quicksort better than mergesort? Answer: The student said as far as time complexity is concerned, never. But if our goal is to optimize space complexity, quicksort is always better. The interviewer asked about the time and space complexity of each. Then they asked them when the worst case time complexity of quicksort is achieved. Answer: When the array is increasing or decreasing. The interviewer asked for a case apart from those two. Answer: The student replied with bitonic array (an array which is first increasing then decreasing).

Company Name: JP MORGAN
Profile: SDE

Coding Test Round:

- To sort a sentence in order of their increasing lengths while keeping the first alphabet of the first word capital and the rest of them small (similar to: https://www.geeksforgeeks.org/sort-arraystrings-according-string-lengths).
- The second one was a SUDOKU solving problem. (same as: https://www.geeksforgeeks.org/sudoku-backtracking-7).
- Rearrange the words of sentence according length of words and keeping first alphabet of first word capital and rest of them small.
- Priority job scheduling (standard problem from GFG)
- Convert a 2D matrix into a 1D vector according to the specified instructions.
- Find a path in a given matrix with some obstacles. (Can be solved using BFS or Backtracking)

Interview:

Student 1
Round 1:

- The round started with a brief introduction of the candidate.
- Candidate was asked about the applications of various data structures and algorithms like the application of heap data structure and merge sort algorithm in real life.
- Questions from OOPS concepts.
- The interviewer asked the candidate to implement a function to compare the two parameters provided. The parameters can be two strings, two numbers or two arrays.

Round 2:

- The interviewer then asked in-depth questions from the candidate's resume. The various projects and their implementation were asked.
- Questions from ML concepts were asked.
- The interviewer was also keen to know about the achievements and extracurricular of the candidate.

Round 3:

- Basic questions regarding the candidates' interests, family background, etc. were asked.
- The interviewer was interested in the Position of Responsibility of the candidate.
- They also asked the candidate "How I utilized my Lockdown period".

Student 2
Round 1:

- "Tell me something about yourself".
- Given a number N, find first N terms of the Fibonacci Series. ([Program to print first n Fibonacci Numbers | Set 1 - GeeksforGeeks](#))
- The 'Interval Scheduling' problem using Greedy Approach. ([Attending Workshops | HackerRank](#))

Round 2:

- 'Tell me something about yourself', 'Walk me through your resume'
- 'Why JPMorgan'
- 'Why are pursuing a career in Computer Science'.
- The interviewer asked multiple situational questions such as, 'What will you choose if you are given a choice between Google and JPMorgan', 'Choose between Google and Tesla'.
- 'If given a choice between working in an innovation-driven department and a department that deals directly with clients, during your internship, what will you choose'.

Round 3:

- Interviewer asked the candidate to introduce themselves, about family background, about plans for higher education.
- They asked why the candidate applied to JPMorgan and what the general perception of JPMorgan in people is.

Student 3
Round 1:

- Find the distances between two given nodes of a binary tree.
  (https://www.geeksforgeeks.org/find-distance-between-two-nodes-of-a-binary-tree/)
- Find the next greater number with the same set of digits.
  (https://www.geeksforgeeks.org/find-next-greater-number-set-digits/)
- The interviewer asked some questions about the projects mentioned in the resume. The Interviewer seemed interested in the ML project and asked some basic questions regarding the same.

Round 2:

- The interviewer then asked about the candidates' area of interest, which was Data Structure and Algorithms.
- How to find the Nth node from the end in a linked list using a single traversal and LRU Cache implementation.
- The interviewer discussed the ML Project and asked to explain it in brief following which the candidate was given a situation wherein they had to make a model for a self-driving car.

Round 3:

- Interviewer asked why the candidate chose JPMC and why they aspire to become a software engineer.
- They were asked about their skill set and how the candidate will enhance it if they got selected.

Student 4
Round 1:

- The interviewer asked to explain the projects mentioned in the resume in brief, after which, some follow-up questions about them were asked.
- The questions involving technical scenarios in which the projects would fail and how to handle the issues.
- An m*n grid and a set of queries are given. Each query is an integer 'l' which refers to the number of blocks in the grid that were removed from the

leftmost block of the middle row. Print the number of squares of any size possible in the grid for each query.

- A set of coordinates (x,y) on a 2D plane is given which refer to some city locations. Design an optimal road between the source city and the target city. The optimal road is defined as the one which maps as many intermediate cities as possible but is also as short as possible.

Round 2:

- Questions related to the work at the company in order to understand how the candidate would function at the company.
  The candidate was asked questions such as the field that they would choose if coding never existed and the one global challenge that they would pick to solve etc.

Round 3:

- The interviewer asked the candidate to explain their projects in brief.
- Standard HR questions like "What is JPMC according to you?", "Why JPMC?", "Why should we hire you?" etc.
- The candidate was also asked to explain Investment Banking in brief.
- The interviewer then asked why the candidate applied for this role.

Student 5
Round 1:

- "Why aspiring for opportunity in CSE field while being from XYZ background?"
- Discussion on student's projects.
- Then he asked about "pros and cons" of C++ and python and basic questions on numpy.
- Questions about OOPs like polymorphism were asked and was told to make some functions.
- Questions on basic Data Structures like array, linked list etc.
- Asked about teamwork and how student managed to work in a team and make others to do their tasks even if they were reluctant.

Round 2:

- Questions were based on the resume. In depth knowledge of your projects and technologies used is required.
- Questions on student's achievements and extra-curricular activities.
- "Why JP Morgan?" and "why should I hire you?".

Round 3:

- HR type questions like family background, strengths, weakness etc. were asked.
- "What qualities make a team successful?".

Student 6
Round 1:

- Why CSE field if your branch is XYZ.
- Questions on OOPS and its advantages in the real world.
- Basic questions on Data Structures and algorithms were asked.
- Questions on projects.
- Questions on OS.

Round 2:

- Basic questions about the student, hobbies, desires etc.
- Questions related to projects.
- "Why JP Morgan?"
- "What are your technical Interests?"

Round 3

- Standard HR Questions like Family Background, Job Location, Strength, Weakness, Team building its pros and cons were asked.

Student 7
Round 1:

- The round started with basic introduction. Followed by question like how you developed interest in coding and for how long have you been coding.
- A couple of puzzles were asked (from GFG).
- The "Stock Buy Sell" problem to maximize profit.

- Basic questions on vectors.

Round 2:

- In depth questions based on projects and technologies used.
- Question related to OOPS.
- Questions like strength, weakness and expectations.

Round 3:

- What is unique about you, why JP Morgan, future plans.
- Student was given a few scenarios and they wanted to know how they would handle them.
- Student was asked to give a feedback about their selection process.

Student 8
Round 1:

- Brief introduction of the student.
- "Why JP Morgan?"
- Prefix/infix evaluation and conversion.
- Sort a given array using a binary tree.

Round 2:

- Questions about the resume explanation of the projects in detail.
- Student's weakness and strengths and what they did to overcome the weaknesses.

Round 3:

- Questions about family background and other HR type questions - The difficulties student had faced till now, "What are your future plans?", "Will they go for higher studies", "What are his unique abilities?", "Why JP Morgan?"

Student 9
Round 1:

- Three questions were asked respectively on dp, stacks and greedy search. Student was asked to write the code on paper and explain to them the logic.

Round 2:

- They asked about the resume (projects and technologies student was interested in).
- A scenario of a Hotel where customers would leave a feedback after their stay, was given and asked how to implement a Recommendation System there to prioritise and sort positive and negative feedbacks. (Objective was to test student's concepts and understanding in a real life scenario.)
- Basic questions like strengths and weaknesses, any experience of working in a team etc.

Round 3:

- Questions about the student's family background, home town, higher education and why he opted XYZ branch.
- Questions like - Why do you think you are eligible to work here, Have you ever participated in any Hackathon or any such event?
- Your branch is XYZ so why do you want to work in this field?

Company Name: Kla Tencor
Profile: SDE

Coding Test Round:

30 MCQ questions from topics Algorithms, OS, DS, OOPs, DBMS, logical reasoning, aptitude and 2 basic coding questions. The coding questions were as follows:

- https://www.geeksforgeeks.org/recursively-remove-adjacent-duplicates-given-string/
- https://www.geeksforgeeks.org/trapping-rain-water/

Interviews:

Student 1
Round 1:

- The interviewer asked the candidate to solve a few MCQ questions from the online test, and explain the approach to solve the particular problem.
- The interviewer then asked some basic questions from OOPs and data structure.
- https://www.geeksforgeeks.org/count-pairs-two-linked-lists-whose-sumequal-given-value/
- https://www.geeksforgeeks.org/find-number-of-islands/

Round 2:

- First, the interviewer asked a question related to image processing: Given an image of size 100 GB, give your approach to blur the background of the given image. The interviewer asked how one should iterate through each pixel in an optimal way and what would be the minimum storage required for this approach.
- Then the candidate was asked another image processing related problem(math problem):
  Given two graph-plots with large number of scattered points in both the graph and given an epsilon $\sim 10^{-16}$. Find the number of pairs of points s.t. the distance between the points is less than epsilon in both the graphs. The

points in the pair can belong to same graph or different graph. Finally, the interviewer asked about the projects and candidates' family background and hobbies.

Round 3:

- Firstly the interviewer asked about candidates' family background, extra-curricular activities, hobbies and their previous internship experiences. Then they began to talk about the company and its branches and the projects they were working on.

Student 2
Round 1:

- The candidate was asked to solve some MCQ from the coding round.
- Tthe interviewer asked questions based on C++ such as the difference between malloc and calloc and free and delete.
- Basic OOPs questions were also asked from the candidate.
- https://www.geeksforgeeks.org/count-pairs-two-linked-lists-whose-sum-equal-given-value/

Round 2:

- The candidate was given 2 sets of points in the cartesian plane in which 2 points are considered the same if distance between the points is less than epsilon. The candidate was asked to find all unique points, with min space complexity

Round 3:

- The interviewer went through the resume and asked the candidate to explain the project briefly. The candidate was asked some general HR questions like "Why should I hire you?", "What are your strong points?", "What are your weaknesses?" etc.

Company Name: Mentor Graphics
Profile: SDE

Interview:

- Tell me about yourself.
- Do you have knowledge about multiplexers? (The candidate answered that they had basic knowledge of gates and K-maps. So the interviewer moved onto DSA questions.)
- Given a running stream of keys, you are required to make a binary search tree by taking the keys in each step. A key once fixed could not be changed. (Only the approach was required.)
- Find the loop in a linked list. (Answer: Using a two-pointer approach.)
- How to find the length of the loop and the list.
- A puzzle was asked: There is a toy car having 1L fuel tank capacity and a trunk which can fit only a bottle of 1L fuel at a time. Initially the car is at the starting point and it has 1L fuel in the fuel tank and there are 3 bottles having 1L fuel each kept at the starting point. You are required to find the maximum displacement the car can have(we have to come back to the starting point to take another bottle of fuel when all the fuel is used). The mileage is 1km/L.
- A: The interviewer gave the hint: 'The bottles can be kept at different points in the way to come back to them for fuelling.' (The answer is 2.25 km.)
- Find the factorial of a number in different ways. (Answer: The candidate gave recursion based and loop based solutions)

Company Name: Microsoft
Profile: SWE

Coding Test Round:

- Evaluate postfix expression: https://www.geeksforgeeks.org/stack-set-4-evaluation-postfix-expression/
- Largest sum contiguous array: https://www.geeksforgeeks.org/largest-sum-contiguous-subarray/
- Dice throw (DP problem): https://www.geeksforgeeks.org/dice-throw-dp-30/
- Few candidates given an opportunity to appear directly for the interview without giving the coding round as they were a part of the **Microsoft Engage Program.** Students can be a part of this program by qualifying through Codess, Codefundo, or through the Engage qualification test itself.
- Given two numbers a and b, if the number of digits in a+b and a are same then print a else print a+b.
- Reverse every k nodes of given linked list.
- https://www.geeksforgeeks.org/minimum-positive-points-to-reach-destination
- Check if the given code has the correct bracket sequence or not.
- Given an array of strings representing numbers. You have to count the number of strings which is equal to sum of a number and its reverse. Ex- "121"=92 + 29;
- There are n students and m schools. Given a 2D matrix of size n*m, where data(i,j)=1 if i student had applied for admission in j school ,otherwise data(i,j)=0. You are required to count the maximum number of students that can get admission in any one of the school they had applied for. One student can get admission in only one school.
- Find the nth term of the sequence: 6,8,9,66,68,69,86,88,89,96,98,99,666,668,.................
- Given a 2D matrix of size n*m. Make two diagonals of the matrix after converting it to a square matrix of max(n,m)*max(n,m). and print all the elements in 1 and 3 quadrant.
- There were n rows in a stadium and each row had a certain number of vacant seats given in the form of an array of size n. Price of the ticket in i-th row is equal to the number of vacant seats in that row at that time. There were k people in the queue to buy tickets. You have to find the maximum amount that can be earned by selling tickets to k people one by one.

- You are given two arrays. Find the sum of all elements which are not common in both the arrays.
- https://www.geeksforgeeks.org/reverse-a-list-in-groups-of-given-size/
- Find minimum number that you can get by removing exactly 'n' digits from a string containing digits from 0-9 (leading zeros allowed).
- https://www.geeksforgeeks.org/find-duplicate-rows-binary-matrix/
- https://www.geeksforgeeks.org/find-number-of-islands/
- Given a mathematical expression as a string consisting of numbers,+,-,*,/. Evaluate its value.
- https://www.geeksforgeeks.org/minimum-positive-points-to-reach-destination

Interviews

Student 1
Round 1:

- The student was asked to introduce themself.
- A coding question related to event scheduling was given and was asked to code it. Some constraints were changed and was asked to approach the same question.

Round 2:

- The round started with some basic discussion on the resume, followed by some networking related questions.
- Next question: Suppose you have a text file of 500mb and you only have 100mb of space to load it and a pattern is given to you. You have to search this pattern in this large file without accessing the whole file in one go. Student was asked to code the algorithm. (Student used KMP algorithm)

Round 3: (Technical)

- How did you develop interest in coding since your branch was XYZ?
- Some questions related to machine learning were asked as the student had done two projects related to it.

- A question related to backtracking was given and was asked to code it. Similar to this question: https://www.geeksforgeeks.org/rat-in-a-maze-backtracking-2/

Student 2
Round 1:

- Brief discussion on Process Synchronization Techniques (Mutex and Semaphores).
- Question was a slight variation of Minimum Platforms Required.
- Question was Painters partition. The interviewer put some constraints on the question.

Round 2:

- Basic discussion on Process, Threads and Multithreading, followed by some networking related question.
- Discussion on time complexity of various search and sort algorithms.
- Write pseudo code for quick sort and explain how to improve time complexity of quick sort.
- A question primarily focused on insertion, deletion and search operations in a trie was asked.
- Standard problems on linked list and the data structure behind the undo command (i.e. Stack).

Round 3:

- Student was asked how the interest in coding developed, followed by discussions on OOPs concepts like abstract class, interface and virtual functions.
- They had a brief discussion on Page Replacement Algorithms and Bealdy's anomaly.
- The major section for this round was to implement the Minesweeper game. Student was asked to write its pseudo code and they had discussions on various corner cases.

Student 3
Round 1:

- The student was asked to introduce themself, talk about hobbies and why the interest in coding and not core branch etc.
- Interviewer asked about the Codess Project, what she liked about it, what all was learned, played the game developed by the student (the link was given in resume). Few questions were asked about the algorithms used in different levels of the game.
- The interviewer showed their daily calendar filled with meetings which were sometimes overlapping. Student was asked to write a program that would take in a start and end time (t1, t2) and a duration and return all heir free slots of that duration present between t1 and t2. The input was in the form of a structure they defined as "Interval". Student explained the approach and optimized it while thinking out loud. Interviewer asked to code it using any text editor. Questions about some special cases with overlaps were asked.
- Questions were asked about memory allocation in compilers, how local and global variables are stored and how the compiler decides when to free the memory allocated to a local variable. (No further rounds were conducted for the student. Their performance was evaluated by this round itself)

Student 4
Round 1:

- Question on Tree Data Structure, similar to this.
  First the student clarified that the only path considered was from the root as, if this assumption was not there it would greatly affect the solution. Then explained the approach (based on bfs). The student was asked to explain it with an example and made sure it works for every corner case. The interviewer asked to explain the situation if dfs was used. Also to comment on time complexities and space complexities of the student's approach and dfs approach.

Round 2:

- Why the student opted for this job profile while being from XYZ department etc.
- A word problem similar to this was given. Student at first gave him a brute force solution and was asked to optimize it. After optimization, the

interviewer asked them to write on the notepad and share the screen. Was asked to display an error message if the number of odd and even numbers were not equal. Was asked to display it without using any variables to count them. (No further rounds were conducted for the student. Their performance was evaluated by these rounds)

Student 5
Round 1:

- The student was asked to give a self-introduction and explain all the projects mentioned in the resume in brief. Discussed about the Codess Project. Questions were asked related to the algorithms and platform used in developing the project. Since the algorithms used were mainly on finding the shortest path in a graph, the interviewer asked to explain and write code on the Dijkstra Algorithm.
- Given a compressed string eg."a2b3c5", the string has lowercase characters and numbers. We need to return the expanded form of this string as "aabbbccccc". Constraint: space-complexity should be O(1)
- The student was asked if there were any questions for the interviewer. A few questions about his job at Microsoft, the work culture at Microsoft, and the type of work that the student will be doing if hired as an intern were asked. . (No further rounds were conducted for the student. Their performance was evaluated by these rounds)

Student 6
Round 1:

- The candidate was asked to code the following problem: https://practice.geeksforgeeks.org/problems/connect-nodes-at-same-level/1
- https://practice.geeksforgeeks.org/problems/maximum-of-all-subarrays-of-size-k3101/1. The candidate was later asked what can be done to solve the same question for 2D window.

Round 2:

- Explain one of the projects you have written in the resume.
- https://practice.geeksforgeeks.org/problems/k-sum-paths/1

- The interviewer gave a situation and asked the candidate which algorithm would apply in the situation. It was based on the application of a sliding window.
- Do you have any questions?

Round 3:

- Introduce yourself.
- https://practice.geeksforgeeks.org/problems/smallest-window-in-a-string-containing-all-the-characters-of-another-string-1587115621/1
- You are given an array of integers of size 900MB and you have to sort the integers using merge sort and you are allowed to use only 100MB of extra space. How will you do it?
- Do you have any questions?

Student 7
Round 1:

- Student was asked to go through the resume.
- Interviewer asked a question which was variation of diameter of tree.
- A question on dynamic programming was asked, to find all the possible string combinations when a number is dialled (on old phones). For each problem they asked the student to form test cases to check the correctness of the algorithm.

Round 2:

- Initially the interviewer asked about the projects.
- Questions on BST and D.P.
- How is the allocation of data done?, When is the space allocated from heap and when from stack?.
- Question on topological sort and asked to code it.

Round 3:

- The interviewer asked about the student's background. Was asked why XYZ branch and why Microsoft.

- Given an array in which 3 colours are distributed, an array which tells the cost to change the given colour to any of the other two, find the minimum cost such that balls of the same colour are grouped together.

Student 8
Round 1:

- Given a matrix of characters.
  a. You have to check if there is a path in matrix which can form a given word.
  b. Output the path from which the word is formed.
  c. If there are multiple paths, output all of them.

Round 2:

- https://www.geeksforgeeks.org/word-break-problem-dp-32/
- Asked if the student knew about LRU cache and its implementation.
- Design a class Scorecard. Three types of query were given:
  a. Insert a new entry (name and score of the person).
  b. Update or delete score of a person.
  c. Find rank of any person in the score card on the basis of their scores.(all in O(logn) or if possible O(1).)

Round 3:

- https://www.geeksforgeeks.org/merge-two-sorted-arrays-o1-extra-space/
- Few basic questions based on C++ were asked.
- Given a huge file containing millions of words. You have to sort them. (The student came up with an approach based on merging k sorted arrays using min heap.)

Student 9
Round 1:

- Student was asked to briefly tell about the resume.
- Find running median for a stream of numbers.

- Find a number occurring at least N/4 times in a sorted array of size N. Expected time complexity: O(logN)
- Some questions from Operating Systems.

Round 2:

- Student was asked to explain his resume and projects.
- https://www.geeksforgeeks.org/given-a-number-find-next-smallest-palindrome-larger-than-this-number/

Student 10
Round 1:

- Given a stream of numbers find the k-th maximum number at any moment. A solution using priority queue was expected. (note: Make sure you know the implementation of heaps.)
- Given a wall made up of rows of bricks of different length, find a position to cut so that minimum no of bricks are broken.

Round 2:

- Given a string, find the number of tokens in a string where a token is either a string enclosed within quotes or a word if it is not enclosed by quotes.
- Find the longest common substring of two strings.

Round 3:

- The interviewer asked about student's interests.
- They asked about memory allocation on stack and heap.
- How to allocate a pointer in C++ so that one does not have to worry about freeing it explicitly.

Profile: Data Science

This was a Data Science Internship. All the eligible students had to fill the Internship application form on the Microsoft Career website with a resume.

Coding Test Round:

62 Multiple Choice Questions, which touched almost every aspect of machine learning.

- Questions ranged from various topics such as Linear Regression, Logistic Regression, SVM, Decision Trees, Random forests, Underfitting Overfitting, Bias, Variance, Bagging, Boosting, Clustering, Recommender Systems, PCA, LDA, and Neural Networks. There were some basic questions from Probability and Statistics.
- Most of the questions were conceptual, such as the SVM's kernel function or the central limit theorem.
- There were fewer questions on Neural Networks, so the students were expected to be well versed with traditional Machine Learning algorithms.
- There were no coding questions or questions like the correct code for this algorithm using sklearn etc.

Interviews
Round 1:

- Interviewer asked to give self-introduction and speak about the interests.
- Explain the working of a convolutional layer and design a CNN for Image Classification. Explain the loss function, regularization, and activation function used for it.
- Explain the Decision Tree algorithm. Also, explain the bagging and boosting algorithm with Decision Trees. Explain the weighting function used in the boosting algorithm.
- Design a spam classification system. Also, explain the feature extraction, algorithm, and metrics used for evaluation.
- Explain the in-depth working of Support Vector Machines(SVMs). Also, explain the convex optimizations, kernel functions, and what is support vectors.

Round 2:

- What is the difference between bias and variance?
- Explain multiclass classification using Logistic Regression. Also, explain the softmax activation, cross-entropy loss, and write the equations for the same.
- Explain the working of RNNs, GRUs, and LSTMs. Also, explain the pros and cons of each type of network. Also, explain why transformer-based models are better than these.
- Explain the training procedure to obtain Glove embedding.
- Design a spam classification system. Also, explain the feature extraction, algorithm, and metrics used for evaluation.
- Explain the in-depth working of Support Vector Machines(SVMs). Also, explain the kernel functions. And how SVM classifies when there is no linear separation between different classes?
- Which algorithm should be used to extract Nouns from search engine queries? And explain why.
- Derive the equations for the forward and backward pass in a Linear Regression.

Round 3:

- Given an array A=[a1,a2,a3…an,b1,b2,b3…bn], convert the array into the array B=[a1,b1,a2,b2…..an,bn] using only O(1) space.
- In the previous question, given an index, an array A, return the index it would have in array B.
- You have an array of '2N' elements consisting of 'N' even and 'N' odd elements; using the minimum number of swaps, make sure that even elements are at odd indexes and odd elements are at even indexes.
- In the previous question, assume that the number of even is equal to the number of odd elements is not given, so verify the same while using the minimum number of swaps and only in one iteration on the array.

Company Name: Morgan Stanley
Profile: SDE

Coding Test Round:

- Aptitude: 10 questions, Debugging: 7 questions, Coding: 3 questions
- The aptitude section consisted of easy to moderate difficulty level questions but the time limit was the main constraint. Incase one has lost touch with solving aptitude questions then solve a few problems beforehand to be able to solve them quickly during the test.
- The debugging section had compilers for each question and had test cases so that one can check their solution too. Errors consisted of both compilation and logical kinds but most were simple to moderate and after identifying the correct logic, one can solve them by changing a few characters. One can run the code and look for hints in the error messages of compiler output. Some topics that might be helpful: Typecasting, OOP and different ways of passing arrays to functions.
- Merge overlapping intervals problem.
- Find the maximum size palindrome square sub matrix in a given matrix.
- Problem was on trees which required one to find the sum of children node values for every node.
- You are given n persons and a number m. The next m lines consisted of 2 numbers a and b denoting that a reported to b. These persons followed a hierarchical order in office for copying documents and each junior will also copy the documents of his/her senior. We had to find the maximum number of documents a person would copy.
- [Print level order traversal of given binary tree in spiral fashion](#).
- Search element in linked list (can modify structure of linked list as you want)
- [Find median of two sorted arrays](#)
- Can different threads modify each others stack or not(Operating system)?.
- Student told him the answer and also clarified that he didn't know much about Operating System. So, the interviewer didn't ask much about it.
- Working of hash tables
- Vertex cover problem in a tree
- Given 3 vertices of a parallelogram lying on a matrix find the fourth vertex

Interviews

Student 1
Round 1:

- The interviewer started by asking the candidate to introduce themselves and later asked questions related to projects mentioned in CV.
- The first question was similar to this: https://www.geeksforgeeks.org/multi-source-shortest-path-in-unweighted-graph/
The interviewer wanted to know pseudocode, name of data structures and the time complexities.
- Sort a stack using another stack.
- Design a coffee machine. (The candidate picked up an object-oriented design solution and answered about the data structures and techniques used in it.)
- Some questions from C++, OOP and OS like differences between pointers and references, and related to virtual functions, multitasking by CPU etc were asked.

Round 2:

- Questions about a Deep Learning project that the candidate had done. Questions about the layers used and the reasons behind it, softmax function etc were asked.
- Some behavioural questions were also asked to see how the candidate would react in several situations when working with a team.

Student 2
Round 1:

- https://www.geeksforgeeks.org/flood-fill-algorithm-implement-fill-paint/
- What is map data structure and the types of it? How are they implemented?
- A few questions were asked about hashing, collision and collision handling.
- https://www.geeksforgeeks.org/hashing-set-1-introduction/
- https://www.geeksforgeeks.org/hashing-set-2-separate-chaining/
- https://www.geeksforgeeks.org/hashing-set-3-open-addressing/
- What is a linked list? What is the difference between arrays and a linked list?
- What is the difference between doubly linked list and singly linked list?
- Design a data structure to map student to student information in a school using a separate changing concept for the collision and using the student

name as key and information as value. Write a pseudo code. (Answer by student: https://docs.google.com/document/d/1RHOGX7VCzgwgiOEfuxWOzM-M1XMvDw7ICIzOZnGH15w/edit)

- Questions from OS, OOPS like difference between process and thread, virtual functions, access modifiers, inheritance, abstract class, importance of abstract class were asked.

Round 2:

- Introduce yourself.
- Explain any one of the projects that you've worked on. A few questions about the project were asked.
- What are the risks that you have taken in your life? Were they worth it?
- What are the things that you consider to be achievements in life?
- What are the things that you regret the most?
- Have you been in a situation where your teammate is not working on the project? What will you do to solve this problem?

Student 3
Round 1:

- What is the difference between dynamic and static memory allocation? Where are these memories allocated on: heap or stack?
- Some piece of code including pointers and double pointers were given and the candidate was asked about where the pointers were allocated.
- You are given an array or list in which elements are sorted and there is a function called binary search. You have to implement that function to search for key 'x', if that is present in the array or not, but there is another function which keeps appending the elements in the end of array in increasing order and we can't control that function. So, you have to implement the binary search on the array but its size is increasing even when the search is going on.

Round 2:

- Introduce yourself.
- How was your JEE preparation?
- Explain your projects in depth.
- Some behavioural questions were asked.

Student 4
Round 1:

- "Why Morgan Stanley?", "What will you choose if get to choose between Google and Morgan Stanley?", and similar for "Goldman Sachs and Morgan Stanley?", and "Why I want to pursue career in field of Computer Science and why not their own branch?"
- Given a matrix of characters and a dictionary of words, we have to find how many word are there in the grid if we search only horizontally and vertically. (student used Tries to implement the dictionary, but interviewer mainly focused on his approach to problem solving.)
- Given a Linked List with integers. We have to remove the contiguous nodes form the linked list which sum to zero. (Student's solution was using maps/sets but the interviewer insisted to give a solution based on recursion.)

Round 2:

- Round was focused on student, their family and educational background, interests apart from academics, and how they developed interest in computer science.
- A puzzle (https://www.geeksforgeeks.org/puzzle-mislabeled-jars/) was asked.
- Given 2 strings r and t, how many times (minimum) the string r should be repeated, so that the string t occurs as a sub-sequence in newly formed string.

Student 5
Round 1:

- Interviewer then asked to find the intersection of 2 sorted arrays. Link: https://www.geeksforgeeks.org/union-and-intersection-of-two-sorted-arrays-2/
- Asked if he knew how Google shows word predictions on searching and how student would do that. Student told that it was based on Trie and explained the approach. Student was asked to explain his approach through pseudo code.
- Was asked to store data of students in a school and which subjects they were studying. Basically wanted to design a Data Structure. Was asked what came to mind and student said map and class. Was asked to explain and write the code using both approaches individually and combined. Student included vector, string, int, map, class, objects and a lot more.

Round 2:

- The interview started with basic questions like introduction and "Why Morgan Stanley?", "What is a Fintech/ Investment Banking Company?", "What would you do if your closest friend/colleague is doing fraud in the company for 2 years which is not affecting the company and he is not listening anything you say to him?"
- Discussion on projects and what difficulties student faced and how they overcame them.

Student 6
Round 1:

- Add two numbers represented as linked list
- Manually calculate square root of a number on paper, and find square root of a number with given precision.
- Have you ever been in a situation where your teammate is not working on the project? What will you do to solve this problem?
- What is the bad habit you have that your friends always warn you about?
- Why should we select you?

Student 7
Round 1:

- Given a stream of incoming data, questions on doing various operations on it.
- Questions on data structure and algorithms and more than just seeking the solution, they discussed the different approaches and their complexities and improvements.
- Questions related to oops and os.
- Explain any one or two of the student's projects very briefly.
- Interviewer asked the student to brief their approach on a parking lot design problem.

Round 2:

- Question related to designing a vending machine.
- Interviewer asked about the risks student has taken and whether they were worth it and the things that they considered achievements in his life.

Student 8
Round 1:

- Asked about student's academic interests.
- Question related to airstrip management system, along with some requirements and constraints and asked to use appropriate data structures and algorithm which will meet all the requirements.
- Question based on binary search. Interviewer asked them to write the code without using any pre-implemented C++ method related to binary search.
- OOPS related problems were asked.

Round 2:

- Asked about the student's extracurricular activities and interest.
- What risks the student has taken in life and the discussion went to different topics from there on.

Company Name: MyKaarma

Coding Test Round:

- Depending on the profile, 20-30 MCQs of Logical Reasoning and coding questions were asked. The MCQs had questions on Probability, REST APIs, Basic HTML, Internet Error Codes, and Basic Linux commands.
- Question on Anagram
- Subarrays of an Array of specific size (refer GFG)
- LIS (Mediocre DP question)
- N food items, M persons. Array of size N with count of each food item given. A person can eat only one type of food. Each day a person will need 1 count of food items to survive. Find the maximum number of days that M persons can survive. (I solved it using Binary search. Constraints were small so brute force was also working).
- https://codeforces.com/contest/665/problem/F
- https://codeforces.com/contest/1195/problem/C
- Given an array of 'n' positive integers, you can perform one operation - Choose one element and increase rest 'n-1' elements by 1. What is the minimum number of steps required to make all the elements in the array equal?
- It was a prefix-sum implementation on arrays.
- Given a string of lowercase English characters and a mapping of each character from 'a' - 'z' to a binary string of 0s and 1s; where 0 represents a normal character and 1 represents a special character. What is the maximum length of substring which contains at most 'k' normal characters?
- DP Problem to get maximum value in a 2xN matrix such that no adjacent cells are selected.
- DP Problem to get maximum sum in 3xN matrix traversing connecting cells of next block only.
- String Problem to predict rhyme pattern of a string (of 4 words) as abab, abba, aabb, aaaa, or none (two strings are of same rhyme if their substrings from the last vowel are same).
- Math Problem which was a trick question (Only they could pass all cases which simply printed N/2 as output, after analysing the sample cases).

Interviews

Student 1
Round 1:

- Basic HR questions like Introduce yourself, why do you think you are the perfect candidate, what is your biggest achievement, your hobbies and achievements.
- Questions on Linked List, Binary Tree, Binary Search Tree, Graph.
- One line answer questions like, difference between BST and BT, time Complexity of searching an element in LL, advantage of LL over others etc. He then asked to code using LL, BST.
- How to check for a loop in LL ?
- Find the sum of all nodes at a specific depth of Binary Tree
- A trivial graph Question.
- 2 questions on Breadth-first and Depth-first traversal of Tree and Graph.
- Reverse a LL, remove a node, add a node in between/beginning/end of LL.
- A code was given and the expected output was asked. The code was:
  int x=1;
  int y=pow(x+1,2);
  cout<<y;
- Edit Distance (Simple DP question)
- Find the maximum of all the contiguous-subarray of size k of an array (maximum for each subarray)
- Clone a binary tree
- Questions from Probability and Logical Reasoning.
- A glass of milk and A glass of water each having same volume. I take 1 tea spoon of milk and mix it with water and then I take 1 tea-spoon from water mixture and mix with Milk. Which now has higher percentage, MILK IN WATER or WATER in milk? (Answer=They are equalsmilesmile)
- https://leetcode.com/problems/airplane-seat-assignment-probability/
- In a consecutive throw of Dice, what is the probability of getting 4 on first throw and not 6 on second throw?

Round 2:

- General introductory and HR questions were asked.
- Discussion of all the projects/certified courses student had mentioned in the resume. The student was asked to explain the project in brief, and "WHY?"

was asked for everything they said. Questions on specific topics included in the project were asked (web development in this case).

- 5 puzzles of intermediate level were asked. One of them were – There are 10 bags, each having infinite coins. Out of 10, 9 bags have 1 gram coins, and 1 bag has 1.1 grams coins. You have a digital weighing machine. You have to find that "One different bag". You can weigh the coins as per your wish on the weighing machine. In what minimum operations, can you identify the 1.1-gram-coin-bag? (Our first instinct says 3/4, the answer is 1).

Student 2
Round 1:

- Puzzle - S knows the sum of two numbers and P knows the product. Their conversation goes like,
    - S: I don't know what the numbers are
    - P: I also don't know what the numbers are
    - S: Now I know what the numbers are
    - P: Now I also know what the numbers are
  What are the numbers?
- Given array of length n and values in array can be negative, given a window size of k, output first negative element of each window?
  Example: arr = [12,-1,-7,15,-8,9,11,15] k=3
  Output: -1 -1 -7 -8 -8 0
  Constraints: Time Complexity O(n), Space Complexity O(n)
- Kth element from last in linked list in one iteration only? Constraints: Time Complexity O(n) and no recursion, Space Complexity O(n)

Round 2:

- Given string s contains only '(' and ')'. Print the length of maximum valid substring.
  Example: s = "(( ))) (( ) ( ))"
  Output: 6
  Constraints: Time Complexity O(n), Space Complexity O(1)
  Explanation: (( ) ( )) is the longest valid substring
- Given some queries of push and pop. Print the max element in the stack after every query.
  Example: Push(10), Push(9), Push(20), Pop(), Pop(), Push(25)

Output: 10 10 20 10 10 25
Constraints: Time Complexity O(n) , Space Complexity O(<n)

- Given price of stock for n days. At each day you can either buy or sell. What is max profit?
  Example: arr = [1, 2, 3, 2, 1, 4, 6, 9]
  Answer: 10
  Explanation: buy on 1 sell on 3 buy on 1 sell on 9
  Constraints: Time Complexity O(n), Space Complexity O(n)

Student 3
Round 1:

- Introduce yourself, your interests, etc.
- Do you know what DevOp (the profile) is? "You seem to have an SDE profile, would you be interested in working as a DevOps Engineer?" (questions to check your awareness about the profile.)
- Student had done a project on Image Forgery Detection using Deep Learning & Transfer Learning and compared the models; Questions based on the same were asked: What did you infer from the comparison and do you think training the Transfer learning model for more epochs can alter the results? They asked what all tools student had used, any specific domain he was interested in under cybersecurity, and to explain a few challenges he solved in CTFs (Capture the Flag). (Student told them about a few automation challenges, a few steganography and file forensic challenges, cookie analysis in Wireshark, etc.)
- Student had done an internship in a cybersecurity firm. He built a smart firewall (Basically it was a networking heavy project). Questions on the same were asked-
  • What is a firewall?
  • Did you use any cloud-based solution?
  • Why do you call it a smart firewall?
  • Explain the whole development process.
  • Problems you faced while development.

- Loop detection and Loop head detection in a singly linked list: Student proposed the two-pointer solution in GFG using a slow and a fast pointer. What is the time complexity of the proposed solution? What will happen to the time complexity of this solution if the fast pointer was moved by say 3

instead of 2 steps and also is it always guaranteed that they will meet if there is a loop in the linked list?

- Mirroring of a Binary Tree
- Given the following sequence - 2,9,22,29,92,99,222,229,292,….Find the position of 9292929292 in the sequence.
- Memory management in Linux (kill, top, ps commands, and PIDs).
- Linux file systems, directory traversals, and some more commands like grep, find, etc.
- Piping and input-output redirection in Linux.
- Situational commands like they gave the student a situation and asked him to write the command he would use to accomplish the task.
- IP addresses and their types - Private and Public IPs
- Port numbers and their classification

Round 2:

- What are inbound and outbound traffic?
- What is Port forwarding?
- What cloud services are you aware of and have you used any?
- What is docker and what does an isolated container mean? (This was probably asked because student had used a virtual machine in his previous internship)
- What tools does a DevOp use?
- IP addresses (private and public) - Their ranges and why are they used?
- Some technical details on IPv6 and IPv4
- IPv6 is still not used so often, why?
- Since IPv4 has a limited range so how is it that we are still able to use it?
- IPv4 address classes
- Port number ranges
- Ports for specific protocols like eg. TCP, SSH, SSL, HTTP, HTTPS, DNS, etc.
- How long have you been using Linux? Which Linux distro do you use?
- Linux file system
- Directory traversal, memory management, pattern matching, finding with their various options (ls, find, grep, ps, top) - most useful for DevOps and Sysadmins.
- Linux file permissions (both numerical and letter-based)
- What are groups in Linux and why is it necessary?

- sudo command and why is it used?
- su command
- Difference between -A normal/non-root user using "sudo su <username>" and root using "sudo su <username> "
- File, directory and link identification in a long listing of a directory.
- Follow-up question: Symbolic links and command used to create it (Use "ln -s" command)
- Setuid Binaries in Linux
- Gid and Uid in Linux
- PIDs
- Why do you think Linux is preferred over windows for servers?
- **Puzzle** - There are 10 bags, each having infinite coins. Out of 10, 9 bags have 1 grams coins, and 1 bag has 1.1 grams coins (forged coins). You have a digital weighing machine. You have to find the bag number of the bag which contains the forged coins. You can weigh the coins as per your wish on the weighing machine. In what minimum operations, can you identify the forged coin bag?

Student 4
Round 1:

- After a brief introduction himself, student was asked his approach on the online test round's problem, and why all his test cases did not pass.
- Number Line problem to check if a number can be reached if we begin from origin and jump i places in the ith step.
- Approach for minimal steps to reach a number in the number line problem.
- Compute multiplication of two numbers, without using the * Operator. Both O(n) and O(log n) approach were required.

Round 2:

- Questions on data structures like Array, Tree, String, and Trie.
- Iterative and Recursive Height of Binary Tree, Subarray with Given Sum, Reverse individual words in a sentence, among others were asked.
- Questions on student's project on Machine Learning, basics of ML, and was asked to device a video processing model to predict no. of scratches in a car from a given sample car exterior video.

- Questions of Problem Solving. The puzzle of lion goat and hay was extended to an array of n elements instead of these 3, and boat capacity was passed as a parameter too, and the no. of boat trips were to be calculated.
- Student's doubts about Mykaarma was asked, to which he asked a question related to the company's workflow.
- "Why we shouldn't hire you?" and "Favourite traits from your parents" and "How do you motivate yourself".

Student 5
Round 1:

- The candidate was asked for their introduction and their areas of interest. Then they were asked to give a brief explanation about their project.
- Array given with frequency of all numbers even except one number and also the numbers with even frequency are present in pairs of two. Find the number with odd frequency. example : (3,3,2,2,1,4,4)
- In a given array one can perform an operation such that they merge adjacent elements and the value of the merged element will be the sum of two values. What will be the minimum steps required to make the array palindrome.
- Then the interviewer asked the candidate to tell about MySql as it was written in their resume. They were asked to tell the difference between a normal text file and MySql, advantages of MySql and its implementation.

Round 2:

- First, the candidate was asked questions from the topic of Operating Systems about memory management: segmentation, fragmentation, paging etc.
- Then they were asked the following question: In the following sequence: 012345678910111213141516171819202021……… find the nth digit of the sequence. $1<=n<=1e12$.

Student 6
Round 1:

- The candidate was asked for their introduction and their areas of interest.
- Questions on operating systems mostly about fragmentation, virtual memory, paging and how it is performed in real-world operating systems.

- Print all the numbers less than N whose sum of digits is equal to its number of divisors. Then, they had a small discussion on the technologies the candidate would get the opportunity to work upon if they were shortlisted and a brief discussion on networking as it was mentioned in the interests section of the resume.

Round 2:

- Discussion on Mutex and Semaphores (Operating Systems) and what different problems they can solve and their codes.
- Two sorted arrays are given and the candidate had to find the median when they are merged. Refer: https://www.geeksforgeeks.org/median-two-sorted-arrays-different-sizes-ologminn-m/

Company Name: Myntra
Profile: SDE

Coding Test Round:

- Questions based on classes and objects, priority queues and on dynamic programming & vectors were asked.

Interviews

Student 1
Round 1:

- Candidate had to type in the answer and tell their approach towards the problem, and run some sample test cases on solutions. The questions were based on Data Structures and Algorithms.

Round 2:

- The candidate was asked to explain their project mentioned in the resume. The interviewer then asked questions related to the project.
- What is the hardest situation the candidate had faced in their life.

Student 2
Round 1:

- Zig-zag order traversal of a binary tree.
- A sorted array of numbers from 1 to n which is k right rotated, the candidate had to find the value of k.
- Least common ancestor of two nodes of a binary tree.

Round 2:

- Boundary traversal of a given binary tree.
- The merging of intervals, a standard problem on Leetcode, Interviewbit.
- A simple graph problem, it stated given an array of size n, there is a number 0 in the array for sure, they have to print yes or no such that if they can reach

0 from a given starting position, a move is defined such that if one is standing on ith position then they can only move to (i+a)th or (i-a)th position such that they remain within the array size limit.

Company Name: Nutanix
Profile: SDE

Coding Test Round:

- String implementation question.
- Based on dp on trees.
- Given a sorted and rotated array, find the index of the given element or say it does not exist in the array. Binary search code was given.
- Morris order traversal of the binary tree was given and it was to be debugged.

Interviews

Round 1:

- Given n nodes and m edges, you can travel each edge via bus or via train. Corresponding time taken to travel are given. During your whole journey, you can change the mode of transport at most once (ie shift from bus to train or train to bus at most once). You need to tell the minimum time required to travel from starting point to end point. Expected solution is by Dijkstra algorithm.
- Brief discussion on the project written in CV.

Round 2

- Given a string, delete all the duplicate characters of the string.
- In above question, delete the characters in such a way that the final string obtained is lexicographically smallest among all the possible strings.(Eg: initial string is abcb, we need to remove one b from this string, we can get both acb and abc, but abc is the desired string in the output).Output the final string.
- Given a matrix, start point and end point, determine if it is possible to reach the end point given that some of the cells are blocked.
- Given an array of strings of equal length and q queries. In each query, you are given an initial string and a final string. You need to tell if it is possible to reach final string from this initial string, and you can jump from current

string to any other string in the array (or to the final string) only when exactly one character is different in the current string and the next string. (ie you can jump from abc to abd but not to aed).

- You are given an array of non-negative integers. You need to choose the numbers from this array in such a way that maximum three consecutive numbers can be chosen from this array (Eg: you cannot choose index 1,2,3,4). You need to maximize the sum of these chosen numbers.

Company Name: Nvidia
Profile: SDE

Interviews

Student 1
Round 1:

- Question on digital design to design a 128 bit priority encoder using 2:1 mux.
- Explain any one of your projects. The candidate explained the hardware implementation of the shortest path algorithm (Digisim'19). The interviewer asked multiple follow-up questions and tried to relate the approach to the other questions. And finally the candidate was asked to brief about the other projects.

Round 2:

- Discussed interests as mentioned in the resume, and some HR type questions.
- The interviewer asked if the candidate was comfortable with questions on computer architecture. Question on Data Bus, memory hierarchy and OPCODE formats.
- They asked about 8085 microprocessor address sizes and instruction sizes.

Student 2
Round 1:

- Explain the projects mentioned and asked questions related to them.
- Questions on: Doubly linked lists, OOPS, Dynamic Programming, Computer architecture
- Write code for multiplying 2 n x n matrices. What would happen if we used cache for this process?
- 101 length array having numbers from 1 to 100, find the duplicate number. Time complexity should be $O(n)$ and space complexity should be $O(1)$
- Write code for merge sort.
- Find numbers at k distance from a node in BST

Round 2:

- Asked the candidate for their future goals.
- The candidate was asked about the concept of Amazon Go, how everything worked according to them, what changes can be implemented.
- Then the interviewer gave a system design problem where the CCTV cameras are not being monitored by any person; still, if someone tries to break into a house, immediate action should take place.
- A situation was presented that if the candidate gets job offers from Google, Amazon and Microsoft which have the same pay, location, etc. then which job would they choose?
- If we are being fed with an infinite stream of 0/1, then we need to see if the number till now in the decimal base is divisible by 5 or not.

Student 3
Round 1:

- Student was asked about their projects.
- To code flip flop in verilg.
- The interviewer asked the candidate about how google map knows about the traffic in the route and if one enters a place for example a restaurant how it knows that the device is inside the restaurant.
- Then the interviewer asked if one travels by a train from Delhi to Varanasi which takes three stops in between. On an average how many people travel through it.

Round 2:

- Design a sequence detector with a variable sequence.
- There is an array of 101 elements and 1 to 100 no. are stored in it such that only 1 no. is repeated and they are arranged in a random order now you have to find the no. that is repeated and also finding its position by going through the array only one time.

Student 4
Round 1:

- Explain one of your projects, which was particularly related to Computer Architecture.
- Question on implementation of a set of instructions on a stack (comp. arch.)
- Questions on cache and what are the different types of cache and how each of them is implemented, the candidate was asked to explain each one with an example.
- Question on digital design, based on setup and hold time and propagation delay.

Round 2:

- The interviewer asked HR related questions.
- How to make a 4 bit multiplier using 2 bit multipliers and adders.
- Question based on FSM.

Student 5
Round 1:

- Questions based on projects. In one particular project, the interviewer asked questions by giving different situations.
- Design a 4-bit multiplier with the help of 2-bit multipliers and adders.
- Design a fully Autonomous Supermarket in which no people are involved, and payment will be automatic too.

Round 2:

- "Why do you want to work at NVIDIA?"
- Question was related to Setup and Hold Time Violation. (http://www.vlsi-expert.com/2011/04/static-timing-analysis-sta-basic-part3a.html)
- There is an array of 101 elements and 1 to 100 no. are stored in it such that only 1 no. is repeated and they are arranged in a random order now you have to find the no. that is repeated and also finding its position by going through the array only one time.

Company Name: Oracle
Profile: Server Technology

Coding Test Round:

- MCQ type questions related to aptitude and logical reasoning, data interpretation, English comprehension, OOPs, DBMS and other computer science subjects, data structures and algorithms (flow chart based) were asked.

Interviews

Round 1:

- Questions based on their django based web development project. The interviewer gave situations related to the project and asked him to come up with solutions.
- Some standard HR questions like where do you see yourself in 5 years, and if you had a choice of working with a startup or a big organisation like Oracle, which organisation will you choose and why?, were asked.

Round 2:

- The interviewer went through each and every line written in the resume.
- Interviewer asked them about the projects, student's motive and role in the projects, why they liked C++, why and how they started programming (since student was from XYZ branch), will they ever leave programming for something else etc.

Company Name: Publicis Sapient
Profile: SDE

Coding Test Round:

- A function was provided with a certain number of arguments and it was asked to return another function with arguments in the reverse order.
- A dataset was provided with date and time as input variables and humidity values as the output and it was asked to create a model which will predict the humidity for a few given dates and times.
- Question where the first line of input consisted of a continuous string, which consisted of names, separated by full stops. The second line consisted of one of the names present in the first line of input. (Let's call it "nm") We had to find out the number of swaps 'nm' would undergo if we apply bubble sort to the first line input.
- MCQs on outputs, OOPS, SQL, Probability & stats, ML etc.

Interviews

Student 1:

- The candidate was asked about the projects and courses that were mentioned in their resume.
- Questions about various ML/DL concepts like overfitting, underfitting, cost functions, forward & backward propagation, gradient descent, exponentially weighted averages, Adam's optimization etc. (Since their project was based on the same).
- The interviewer gave a couple of case studies to analyse and discuss:
  - Create a model using all the parameters that are suitable/necessary for predicting the team which is going to win the Indian Premier League 2020.
  - Suppose you are working in a telecom company. Create a suitable business model to ensure that the volume of pain calls received gets reduced and the problems of the customers also get solved simultaneously in a limited budget.
- Candidate was asked about what Publicis Sapient does, how they came to know about Data Science, its applications in the real world, their personal

interests (not necessarily academics), their strengths & weaknesses and how can they contribute to the company if they are given an opportunity.

Student 2:

- Interviewer asked about student's strengths and weaknesses. There was a long discussion about student's passion.
- An output based question of multi-threading in JAVA was asked.
- Given a string, convert each letter to the next letter (and Z to A), without using any extra space or any if-else conditions.
- Basic SQL query based on UNION.
- Design problem based on inheritance and encapsulation was asked.

Student 3:

- Questions on resume and about the projects student had done. The emphasis was kept on real world problems as what should be the thinking if these projects were used on a large scale.
- How would you design a website for a given motor company who wants to launch its website in different countries?
- An aptitude question was asked.
- Questions related to java and its compiler and main method.

Student 4:

- "Tell me about yourself". Questions were asked based on the student's response.
- Problem solving skills were tested, and a situation was given where the student had to come up with a solution.
- A string "ABCD" had to be converted to "BCDA" without using any extra space (not allowed to even take a new variable or even add an extra space to string).
- Questions on multi-threading in java and some basic questions on OOPs were asked. A question to tell the OOP concept used in a given problem was asked.
- Question about DBMS was asked in which SQL queries were asked (of Join and Union).

Company Name: Qualcomm
Profile: SDE

Coding Test Round:

- MCQs on Aptitude & Logical Reasoning, General Programming, CS core concepts.
- General programming section questions were mainly from C language and Object Oriented Programming. This section also had some code output and error detection questions. Basic C programming concepts like Pointers, Storage Classes etc were included. Some questions were also from Number System Conversion like convert a given number from binary number to hexadecimal number.
- CS Core concepts section had questions from Operating Systems, Computer Networks, OOPs. This section also comprised of some code output and error detection questions. There were two gates(AND,NOR) questions too.

Interviews

Student 1:

- Tell us about yourself.
- Where do you see yourself in the next two years?
- What were the most challenging times during your college years?
- Explain your project in brief.
- Plot given waveforms. (Related to digital waveform processing)
- Swap two numbers using bitwise operator
- Count the number of set bits in a number.
- Detect loop in a linked list (fast-slow pointer technique). Find the length of the loop.
- The interviewer wrote two C pointer based questions and asked the candidate to tell the output of each line and point out errors if any.
- Asked about the size of some structures and unions.
- Show difference in code between "CallByValue" and "CallByAddress".

Student 2:

- Tell us about yourself.
- Rate yourself in your C++ skills.

- In-place reverse the given array using index variable and loop without using in-built reverse function. (The candidate solved it using 2-pointers.)
- Implement the swap function rather than using the in-built one. (The candidate solved using a temporary variable. The interviewer then asked not to use an extra variable. The candidate solved it using the XOR operator. The interviewer wanted another method and the candidate solved it using arithmetic operations.)
- Given a number, you are supposed to tell whether it is a palindrome or not. (The candidate solved it using extra space, using string.)
- Have you used malloc? Where does it allocate memory?
- When does memory get allocated to stack?
- Where does the written code in the compiler get stored?
- What is the difference between ML and CNN?

Student 3:

- Explain your exploratory project. Some questions based on the programming environment they used and the reason why they chose that project.
- Questions on student's other project which was based on self-driving car using applied deep learning. Student explained about the lane detection algorithm. "Why did you choose machine learning" and give examples related to its applications in your branch.
- Basic questions related to digital electronics, transistors, AC-DC applications were asked.

Company Name: SRI-B (Samsung Bangalore)
Profile: SDE

Coding Test Round:

- https://www.geeksforgeeks.org/minimum-characters-added-front-make-string-palindrome/
- https://www.geeksforgeeks.org/convert-a-given-tree-to-sum-tree/
- https://www.geeksforgeeks.org/remove-bst-keys-outside-the-given-range/
- https://www.geeksforgeeks.org/number-of-ways-to-reach-nth-floor-by-taking-at-most-k-leaps/
- https://www.geeksforgeeks.org/maximum-sum-such-that-no-two-elements-are-adjacent/
- https://www.geeksforgeeks.org/count-palindrome-sub-strings-string/
- https://www.geeksforgeeks.org/print-nodes-distance-k-given-node-binary-tree/
- https://www.geeksforgeeks.org/find-distance-between-two-nodes-of-a-binary-tree/
- https://www.geeksforgeeks.org/check-binary-tree-subtree-another-binary-tree-set-2/
- https://leetcode.com/problems/minimum-swaps-to-make-sequences-increasing/description/
- https://www.geeksforgeeks.org/convert-a-given-tree-to-sum-tree/
- https://www.geeksforgeeks.org/change-a-binary-tree-so-that-every-node-stores-sum-of-all-nodes-in-left-subtree/
- https://www.geeksforgeeks.org/given-a-number-find-next-smallest-palindrome-larger-than-this-number/
- https://www.geeksforgeeks.org/deepest-left-leaf-node-in-a-binary-tree/
- https://effprog.wordpress.com/2011/04/05/create-a-singly-linked-list-of-leaf-nodes-from-a-binary-tree/
- https://www.geeksforgeeks.org/print-nodes-dont-sibling-binary-tree/

Interviews

Student 1
Round 1:

- Questions on the projects done by the candidate, especially on the application part of the projects.
- Basic questions related to Deep Learning were asked and conceptual knowledge of CNN's was tested. Questions like: "What are the challenges the model is going to face in real time?"
- Reverse a linked list
- Diameter of n-ary tree
- Longest common sub-string problem.
- Basics of OOPS.

Round 2:

- Tell me more about yourself.
- Questions related to graphs (Prims algorithm, Djikstra, Bellmanford)
- Code the complete KMP algorithm.

Student 2
Round 1:

- What are the differences between ML and Deep learning?
- What data structure do you like?
- Two arrays are given. You are required to say whether you can to the second array by only changing the positions of elements in the first array. (Time complexity of $O(1)$ and $O(n)$ solutions were asked)
- Pop the middle element in the stack. (Use a STL function which is in built, or use another stack to store all the elements above the middle element and store them in the second stack and after deleting the middle element we can pop the elements in the second stack and push them in the first stack again.)
- There are two binary search trees and you are required to merge both of them: https://www.geeksforgeeks.org/merge-two-balanced-binary-search-trees/
- Puzzle: http://learningroots.in/cat-and-omet/minimum-number-weights-required-using-powers-2-3/

Round 2:

- Explain your project (based on Deep learning).
- What is softmax function?
- Some questions about fourier transform, eigen values, eigen vectors and hashing functions etc were asked.
- What are the four main properties or importance of OOPS?
- Question on operator overloading.
- What is Prim's algorithm?
- Explain the graph algorithms -Djikstra and Kruskal
- The interviewer explained about the Hamiltonian Circuit and asked the candidate to write a pseudocode for it.

Student 3
Round 1:

- Solve the jigsaw puzzle and find the number which would be on the middlemost piece. (The candidate used trie to solve this)
- Design a Unix File System, create search, remove and change directory functions.

Round 2:

- Discussion on the projects or skills mentioned in resume.
- Basic machine learning questions (the candidate had two machine learning projects in their resume).
- Basic Operating System questions.

Student 5
Round 1:

- Write data structures used and pseudocode for the functions to be implemented for the given question – implement a database of given record structure. Perform add, remove, search, replace operations on it (candidate used hash tables for efficient operations). The interviewer asked questions

regarding hashing like which hash function is the most suitable in this problem and also regarding collision.

Round 2:

- Discussion on ML and a Django web development project done by the candidate.
- What is the MVC architecture
- Name some classification algorithms in ML.
- Implement a directory structure and a function to retrieve all text files in the system. (Approach only)
- Write code of Partition function in Quick sort.
- What is the difference between Quick and Merge sort?
- Questions regarding 'Scheduling Algorithms' in OS.

Student 6
Round 1:

- Given n is odd and n-square one cross one tiles which can be arranged to form a unique n cross n grid. Find the centre most tile(n is odd makes sense). There is only one way in which tiles can be arranged in a grid, so the answer remains unique. (The candidate gave a recursion based solution which involved using a trie for pattern matching)
- The interviewer modified the question and asked to write a solution if some more waste tile pieces are also present.
- What are the two ways to implement Depth First Search? (candidate answered recursion and stack.)

Round 2:

- Basic HR questions, discussion on projects and extra curricular activities apart from coding.

Student 7
Round 1:

- Design a UNIX File System.

- Questions on pointers, traversals of a tree and pattern matching.
- Find the anagrams of a given pattern in a long string. (The candidate used hashing to solve it)

Round 2:

- Discussion on projects and skills mentioned in the resume.
- Questions on APIs and Python.

Student 8
Round 1:

- Given a file hierarchy, implement a UNIX File System with functions for searching, deleting files with given file names and changing directories. A pseudocode for the functions was sufficient.

Round 2:

- Introduce yourself, tell about your hobbies and extra curricular activities.
- Question on tuples in python and how they can be implemented in C++.
- Explanation of projects mentioned in the resume.

Student 9
Round 1:

- Design a text editor with the functionalities to insert, undo, change cursor and gesturing operations.
- Few algorithmic problems like the detection of cycles in directed and undirected graphs were asked.

Round 2:

- Discussion on non-academic experiences of the candidate in college.
- Discussion on the projects.
- Given an array of integers of size n with values from 1 to n. There is one missing value and one duplicate value. Find out both of these values.

- Given k sorted arrays. Merge them into a single sorted array.

Student 10
Round 1:

- A standard dp problem – longest palindromic substring (https://www.geeksforgeeks.org/longest-palindromic-substring-set-2/). The interviewer asked about the time and space complexities of different approaches.
- Basic questions related to C,C++ and DS Algo.

Round 2:

- Explain your recent web development projects on Django as well as exploratory project based Internet of things.
- Questions on MVC architecture.
- Basic questions on DS and Algorithms.
- Some general HR questions.

Student 11
Round 1:

- A number is called floppy number if it can be written as $K*(K+1)/2$ where K is any positive integer. A number is a coolest number if it is the sum of two floppy numbers. You are given t number of test cases and in each test case you are given an integer n. If n is coolest number then find all pairs of floppy numbers whose sum is n.

Round 2:

- "Tell me something about yourself?"
- Asked about the students previous summer internship.
- "How good are you in C++ on a scale of 10?"
- Swap two strings without using a temporary variable.
- What is Selection sort?

Student 12
Round 1:

- The selected students were divided in groups of 5 and each group was given a question and assigned a mentor. They had to come up with a solution individually in 20 minutes and then explain the approach to the mentor. Question asked: https://www.geeksforgeeks.org/check-if-two-nodes-are-cousins-in-a-binary-tree-set-2 .It was necessary to give the most optimised approach. Brute force solutions were not accepted.
- Question was asked on Trie data structure, regarding searching for strings.

Round 2:

- Candidate was asked to explain two of their recent Computer Vision projects and a few questions about the architecture of their model and about CNN were asked.
- Question about insertion sort, then asked to code selection sort.
- Swap two strings without using a temporary variable and write pseudocode for it.
- Some general HR questions.

Company Name: SRI-N (Samsung Noida)
Profile: SDE

Interviews

Student 1:

- What is your favourite data structure? (student answered trees)
- Convert a Binary Tree into a linked list without using extra space.
- Implement heapsort.
- Questions related to C - importance of void*, structure padding and structure packing.

Student 2:

- Write the code to delete a given node in a doubly linked list.
- https://www.geeksforgeeks.org/collect-maximum-points-in-a-grid-using-two-traversals/ (with DP and DFS variations)
- Why do we use Copy Constructor instead of memcpy?
- What are virtual functions and their use? (The interviewer made the candidate write the code to explain the examples that were given)
- What is virtual memory and how does it work?

Student 3:

- What is your favourite data structure? (student answered Hashing and Linked list)
- https://www.geeksforgeeks.org/print-left-view-binary-tree/
- https://www.geeksforgeeks.org/lowest-common-ancestor-in-a-binary-search-tree/ (without using extra space)
- What is structure padding? Questions in Storage class in C, Virtual Function, Run-time Polymorphism, etc. in OOPs.

Student 4:

- Which data structure are you most comfortable with? (student answered Arrays, linked lists and trees)

- Given a definition of inversion, find out the number of possible inversions in an unsorted array of size n. (The candidate gave a solution to count the number of inversions but the interviewer wanted an optimised solution. A hint was given and the candidate was able to solve and give an O(NlogN) solution.)
- What are the time complexity of the various sorting algorithms (for all the three cases: best, worst and average)
- https://www.geeksforgeeks.org/a-program-to-check-if-a-binary-tree-is-bst-or-not/ (The candidate answered it using ignorer traversal. The interviewer added a few variations which were basically corner cases related to the same problem.)
- Explain any one method to reverse a linked list. (The candidate explained an algorithm involving use of stacks.)

Student 5:

- Find Lowest Common Ancestor in a Binary Tree.
- Reverse a linked list using recursion
- Find longest length palindrome list in a linked list using O(1) space.
- How does 'free" work in C?
- Questions related to Dynamic Memory Allocation, Structure Packing and Structure Padding were also asked.

Company Name: Societe Generale
Profile: SDE

Coding Test Round:

- There were 4 sections: Basic Aptitude Questions, Computer Fundamentals (OS, SQL, OOPS), English (Basic Grammar Questions), Coding Questions -
  o Basic Question related to hashset with constraints.
  o Question based on recursion on a 2D matrix where the decision was provided explicitly in the question, we just needed to implement the decision.
  o Count pairs with given sum

Interviews

Student 1
Round 1:

- Explain in brief about all the projects mentioned in the resume.
- Write code for the triangular pyramid made of stars.

Round 2:

- Questions based on resume.
- The interviewer asked the candidate about their role in the college during their term as PoR.
- How can one increase the consumer experience on the company's website?

Round 3:

- Basic HR questions.
- The activities done by the candidate during their time in the institute were also discussed.

Student 2
Round 1:

- Explain in brief about all the projects mentioned in the resume.
- Questions on Object oriented programming.
- Reverse a string without reversing words
- Reverse individual words without reversing string
- Post order tree traversal
- Algorithm of quick sort
- Basic question related to hashset.

Round 2:

- Discussion on projects.
- Question based on OOPS design- Design a chess board.
- Mirror a binary tree.

Round 3:

- Questions regarding the hobby of Aeromodelling.
- Discussion on projects.
- Short term and long term goals of the candidates.

Company Name: Standard Chartered
Profile: SDE

Coding Test Round:

Round 1: Situation based questions on human values and ethics where one had to prioritise the answers. There were no correct or wrong answers.

Round 2: Logical Reasoning Round.

Round 3: Numerical Reasoning Round.

Round 4: Coding round. MCQs, SQL question and a coding problem.

Group Discussion round:

Discuss whether Standard Chartered should continue its relationship with a firm in Bangladesh based on some reports.

Interviews

Student 1:

- Thorough questions based on projects and resume.
- How can you use your skills in healthcare?
- "Why should we hire you?", "Why Standard Chartered?" etc.

Student 2:

- Thorough questions based on projects and resume.
- Questions on Database Management.
- Questions from OOPS
- A coding problem.

Student 3:

- Thorough questions based on projects and resume.
- Question related to reversing a string (solve using STL).
- Basic HR questions.

Company Name: Tesco
Profile: SDE

Written Test:

- Priority queue implementation question.
- Calculate the maximum depth of a k-ary tree

Interview:

- Clone a linked list with random pointers ([Clone a linked list with next and random pointer in O(1) space - GeeksforGeeks](#))
- Longest Increasing Subsequence (https://www.geeksforgeeks.org/longest-increasing-subsequence-dp-3/)

Company Name: Tower research
Profile: SDE

Interview:

- Count the number of elements in the array with a frequency greater than a given number.
- Aproblem on binary search.
- A square matrix of size n is given. Find a maximum length l, such that all the sum of all the square submatrices of size l is less than a given number k. The interviewer asked the candidate to write the dp state of pre-processing and the equation for finding the sum using inclusion-exclusion. Submatrix Sum Queries - GeeksforGeeks
- Questions from Operating Systems- What is OS?, Process scheduling, Convoy effect, Belady's anomaly, Synchronization, about mutex and semaphores, difference between them, deadlock and conditions required for deadlock, Zombie processes. Virtual memory, Paging, TLB.
- Questions from SQL wherein the candidate had to write queries.

Company Name: Uber
Profile: SDE

Interviews

Round 1:

- Introduction of the candidate.
- The "Rotten Oranges Problem"- https://www.geeksforgeeks.org/minimum-timerequired-so-that-all-oranges-become-rotten/

Round 2:

- Introduction of the candidate.
- Find the total number of intersection points of given lines and circles in a 2-d plane.

Round 3:

- Explain your projects thoroughly and various questions like- how to scale it for a larger audience, etc. were asked.
- What motivated you towards software technology and some other life experience based questions.

Company Name: Visa
Profile: SDE

Coding Test Round:

- Find minimum number of contiguous unselected packets which are of the form 2^k in a given array (excluding some packets that were already selected from given array) –https://www.geeksforgeeks.org/count-set-bits-in-an-integer/

- Sort of vector of pairs using compare function – https://www.geeksforgeeks.org/closestpair-of-points-using-divide-and-conquer-algorithm/

- Given different strings consists of two substrings one consisting of a name and other consisting a Roman number from 1-50. You have to sort the strings first by their name and then by value represented by Roman string. The implementation requires to design a function to convert Roman string into corresponding integer value. Refer: https://www.geeksforgeeks.org/converting-roman-numerals-decimal-lying-1-3999/

- Palindromic sub-strings – https://www.geeksforgeeks.org/findpalindromic-sub-strings-given-string-set-2/

- Variation of maximum no. of guests in a hotel at a time. Given n, the number of lanes numbered from 1 to n. m cars are standing in lanes where start and finish of each car is given. Find the longest gap in the lanes which are empty. Refer: https://www.geeksforgeeks.org/find-the-point-where-maximum-intervals-overlap/

- Longest sub-array with k zeros in a binary array. https://www.geeksforgeeks.org/longest-subsegment-1s-formed-changing-k-0s/

- Variation of 'no. of islands' question. Given two binary matrices of same dimension, return the number of identical islands in both the binary matrices. Refer: https://www.geeksforgeeks.org/find-number-of-islands/

Interviews

Student 1:

- How your interest got shifted towards CSE and IT field being an XYZ branch student? How you managed to learn all those CSE stuff without them being in your course curriculum? What all things you do to maintain your interest in coding?
- Questions on resume and project.
- Questions on array rotation: You are given a sorted array with k times rotation and k is unknown. So, you need to write and run that code to find k for 2-3 test cases.
     Example array: {6, 7, 8, 1, 2, 3, 4, 5} Ans: k = 3.
- Find two numbers in that rotated array whose sum is equal to a given number in the most optimized way. Refer: https://www.geeksforgeeks.org/given-a-sorted-and-rotated-array-find-if-there-is-apair-with-a-given-sum/
- Why did you choose Visa?
- Why do you think Visa should hire you?
- How does Visa match your interest and what do you intend to contribute to Visa?
- Why do you think Visa should not hire you?

Student 2:

- Candidate was asked about the approach towards the questions in the online test round.
- Discussion on projects.
- Sort a doubly linked list with optimization.
- Longest palindromic substring in a given string.
- Why software field when from XYZ branch?

Student 3:

- Thorough questions related to project. Pros and cons. of different process scheduling algorithms (Round Robin, FCFS, SJF, etc.), handling multiple requests at the same time? Etc.
- What are the improvements you want to suggest regarding the content of the coding test round and the platform?
- Why did you choose Visa?
- How does Visa match your interest and what do you intend to contribute to Visa?
- Why do you think Visa should not hire you?
- How will you coordinate among your group members if you are given an opportunity here and you have to lead your group? How will you distribute the work among them?
- What makes you different from all others exploring the same domain as you?
- Despite knowing your interest, what if I inform you that Visa no longer invests in that, will you still accept the opportunity or not? If yes, will you change your interest accordingly, or continue exploring your current interest?

Company Name: Walmart
Profile: SDE

Coding Test Round:

- MCQs based on OS, DS, Algorithm, OOPS, Aptitude, and coding questions.
- https://www.geeksforgeeks.org/length-smallest-sub-string-consistingmaximum-distinct-characters/

Interviews

Student 1:

- Introduce yourself.
- Explain your work at the previous Intern.
- Where you see yourself in 5 years?
- Why did you choose your branch?
- General HR questions.

Student 2:

- Introduce yourself.
- Questioned on how they managed to pursue ML and Block-chain (from student's resume) despite being in a non-CS branch.
- Discussion on the projects mentioned in the resume, questions related to technical aspects and implementation were asked.
- HR related questions such as "Describe a situation when you were in a tough spot and had to think on your feet"

Analyst Profile

Company Name: OYO
Profile: Project Associate

Online Test:

- Aptitude (Data Interpretation, Logical Reasoning, Quantitative Aptitude, Verbal Ability)
- SQL Query Writing
- MCQ on Python, SQL & R.

Group Discussion:

- Different case studies were given to different groups. Example - Business Case Study was given which required putting forward feasible, sensible and optimal solutions with a good business sense, with fluency and clarity in communication.

Interviews

Student 1
Round 1:

- Resume Based. Was given a small case study at the end of the interview.

Round 2:

- HR Interview. Questions revolved around resume.

Student 2
Round 1:

- Was asked about college experience followed by a guesstimate, a SQL query writing, a case study and questions based on my summer internship. Discussed about the company in brief.

Round 2:

- Questions were mostly related internships, areas of interest, achievements, and certifications.

Student 3
Round 1:

- Some HR questions and questions about the company were posed. Was asked about summer internship in an elaborated fashion with cross-questioning in between. A guesstimate, a case study and some SQL queries were questioned.

Round 2:

- Two case studies and four guesstimates were discussed.

Profile: Business Analyst

Online Test:

- Aptitude
- SQL query writing
- MCQs on Python, SQL and R.

Group Discussion:

- Some groups were given abstract topics, while others got a Business Case study to discuss. Abstract topic was based on: https://medium.com/@pierrelias/the-three-stone-cutters-the-cathedral-da152712e4c

Interviews

Student 1
Round 1:

- Was asked about college experiences, ambitions, projects and interests. The student was asked about important metrics for a company operating in the hospitality segment. A case study was questioned where basic number-crunching skills were tested. Question based on guesstimates were asked. Asked to describe resume projects.

Round 2:

- Questions revolved around SQL. Asked about family background, etc. Given a guesstimate to estimate the number of black swift cars in Delhi.

Student 2
Round 1:

- Revolved mainly around resume, right from internships and projects to PoRs and college experience. A SQL query followed by a Business Case towards the end.

Round 2:

- A real-life case study from OYO was given.

Student 3
Round 1:

- Resume Based and questioned about PORs and Project.
- Case Study: "A hotel was recently added to the hotel chain of OYO, initially profit increased but gradually it decreased, estimate scenarios of problems that would have arisen and give a possible solution." Guess-estimates and a few SQL queries were also asked.

Round 2:

- General HR questions.

Guidelines

For Analyst profile preparation – refer to Business Club, IIT (BHU) Varanasi's "Case Book". Other than content in the mentioned, some additional resources are (via the selected students) –

- For guesstimates, refer FMS Case Compendium.
- For Case Study, read Case in Point, practice Case Studies.
- For Aptitude, practice on Pariksha.co, Indiabix under a time constraint.

General Tips:

- Know your resume well. Don't write anything in your resume that you don't know. Don't lie on your resume.
- Try to add good projects in your resume that you can explain well. Projects allow for a wider area of discussion with the interviewer.
- During Technical rounds, keep discussing your approach with the interviewer as they may throw hints and help you and can assess you accordingly.
- Whenever any interviewer asks if you have a question, always ask them something. At least prepare two questions, one for the technical interviewer and the other for HR.
- Never lie to an interviewer if you do not know something. If they catch you lying, then it leaves a bad impression.
- Learn a bit about the company before sitting for the interview. This is important as it shows your interest in the company, and might help in HR rounds and making a good decision for yourself.
- Questions like 'what are your interests' and 'walk me through your resume' can be used for your advantage to highlight your strong competencies. This will help you to direct the course of the interview and help establish a good image before the interviewer.
- Give answers in a confident way, do not panic.
- Listen to the questions carefully and if not comfortable with any topic then convey it to the interviewer.
- Don't feel down when you are not shortlisted or rejected in the interview. There are other opportunities, focus on your target and learn from your mistakes. :)