

Interview Experience

Amazon:

Online MCQs+ 2 coding questions(90 minutes):

19 Gate mcqs (exact ones from previous year GATE papers)

2 coding questions:

a) Connected cells

<https://www.hackerrank.com/challenges/connected-cell-in-a-grid>

b) Print anagrams as a group

<https://leetcode.com/problems/anagrams/>

I was able to do 2 coding questions and tried most of the MCQs.

I got shortlisted for F2F interviews.

Round 1:

The interviewer was the senior manager. It started off with brief introduction. He walked through my resume. Asked me abt previous experience. (he knew more abt my company than me!!).

Q1) Find (1/3)rd node in linked list?

i.e if length of list is 6 return the 2nd node.

He didn't want the brute force solution..!

So he gave me abt 5 minutes to think.. i got the idea of using two pointers.

Then a little bit of maths to figure out the pointer movements. He then

improvised the question to make it more general like:

Find (1/n)th node in linked list?

Find (m/n)th node of a linked list?

He asked to code it. I wrote the code. I felt he had some other approach in mind, but he was happy with what i did.

Q2) Given a character array we need to compress it in place as follows:

(Can expand the array size only if needed)!!

aaabcccdd----> a3b1c3d2 (no resizing needed)

abcd---> a1b1c1d1 (need resizing)

Tried the brute force approach, started doing it from beginning of the array. but it broke for aabccc...!!! I started overwriting over character to be visited..!

I understood the question was bit tricky. He gave me little more time to think.

So after a while i felt, starting from back wud be a good idea. So it seemed working.. but he had no words for it. So i thought of a recursive solution.. but

then he asked me why did I move from the 'backward parse'. So i felt I was in right direction.. but he still said it would break for a case. I couldn't figure it out then.

('abbbc' i think wud fail for this). I couldn't fully give him a convincing answer :(. But i think i was close to final solution.

He asked if i had question:

I asked why amazon concentrates on algo+ds during the interviews. How much does it come in day to day work for a fresher??

He gave a really good example and clear picture of the work.

Overall it was kinda 'Normal' interview.

Luckily i made it to the next round.

Round 2:

He said this round would be very important(i think it was the BR round). He

said he will give two questions. He asked me what data structure I am

comfortable with. I said trees!!

Q1) Top view of binary tree:

I used hashmap and a level order traversal approach.. i knew only this solution.

Then he asked to do it without a map. I was given 15 minutes to come with best solution and he left the room (As they were running out of time he was parallelly taking interview of another candidate).

For a moment i thought that "Is it possible!!!" .I somehow got an idea. Kept track range (min and max) of horizontal dist from root. He then came back and said it would work and asked me to code it. He then pointed out that i had mixed up python and java in the code ..!!!!

Q2) Find the max sum path from any node to node in a BT:

Same as this: <https://leetcode.com/problems/binary-tree-maximum-path-sum/>

Seen this question in leetcode but never tried to solve it as it was in the 'Hard' section. He gave 20 minutes to come up with an approach. Before he left i did ask about the time complexity and space complexity he was expecting. He wanted it in one pass with minimum space complexity. Couldnt figure out anything in first 5-10 minutes. But then somehow got an idea that a modified postorder traversal would work. He came back and I told him my approach. He was happy with it, but he threw in a corner case. He said my code wont work for trees which have negative numbers. And i missed one more case, when the tree is empty.. Finally he asked to write 'clean' code. I wrote it in java and he did a dry run over the code.

Overall this round went really really well and the interviewer was really helpful and supportive.

Round 3:

The interviewer said she will be concentrating on more of algorithms and data structures. She said she was working in amazon since an year.

Q1) Connect n ropes with minimum cost (Greedy)

I was asked to write a clean code for this. Used Priority Queue in java.

Q2) Given x and y swap two node in linked list (swap nodes and not data). Also the linked list contains distinct values.

This 'appeared' to be one of the easiest question. I got bit confused with the problem description (words like 'distinct'). I implicitly assumed x and y are distinct, and also that they are present in the linked list which i shouldn't have!!!! I wrote the code for it. There were about 4-5 horrible corner cases that I had missed which she pointed out (including my assumptions!!) and this later resulted in my elimination!!! :(

I did clear this round. But I was later informed that they are offering me 6 months Internship :) :) \

Morgan Stanley:

Online MCQ+ 2 coding questions(90 minutes):

MCQs were mostly on Data Structures , verbal, reasoning, general aptitude and probability mcqs

2 coding questions:

1) Given time in 24hr format and given n seconds. Find time after n seconds.

2) The question was wordy and long. But ultimately this is what it was:

There are n cities numbered from 1 to n. Cost of moving from city i to city j is |i-j|. Also an array of size n was given such that for city i there is shortcut to city A[i] which can be taken at the cost of 1. We need to find the minimum cost to reach the city n from city 1. (Also the array values were between 1 to n , need to be careful with indexing.)

I wrote a brute force recursion but it passed only 3/12 test case. My approach was wrong as i didnt think of back edges. (This had to be done using graphs.)

I was shortlisted for F2F interviews.

Round 1(Technical):

Brief introduction and then asked about which language I preferred . I said Java.

Difference between C, Java and C++?

What is goto? In C or Java? Why its not preferred. ? (Discussion went to assembly instruction like JMP etc.)

Why is java platform dependent?

He wrote two class and one with a main function with some function calls and object declarations and object creations. Asked where each thing is allocated in memory. He seemed impressed when i talked about String pools, heap , stack , call by value etc. He asked me "Isnt java using call by reference?". I said no.

"Object references are passed by value".

How hashmap works?(in depth) ?? when hashCode() and equals() get called?? collision ?? etc.

Write java code that causes deadlock ?? I said I dont know.!! (He smiled and said its ok and moved to next question)

Asked what is StringBuffer??Mutable vs Immutable!? String vs StringBuffer??

Asked me to implement StringBuffer and just the append() method!!?I used a character array and then he asked me what will I do if the append() call was made when the array was full. This went indepth like memcpy()??How realloc() is implemented?How memory managed in the heap ?? linked list!?Node structure?? little bit of virtual address??

Then he started asking question about multithreading:

How to print 1 to 10^6 in any order as fast as you can?? I said use 10 threads and assign a range to each thread. He then asked why i chose 10 threads. He wanted me how I will decide the number of threads to use. Discussion went deep into user level thread , kernel level thread and even number of cores in machine. I finally said it depends on the number of KLTs the JVM has.)

He then asked me whether I have heard of grep. I said I know its used for pattern searching in unix. He then ask me to write C code for grep functionality?

grep <pattern> <folder-path>

I have to return the list of names of files in the folder which contains the pattern.

I had no clue of where this was going.!!

I asked him whether I can assume a system call to get file names in the folder.

He said Yes. Then I wrote a for loop and for each file I used string matching(built-in) to check for the pattern. He was not satisfied with my approach. He said there is lot of room for optimisation. I felt that this can be done in parallel and told him that I would create threads for each file. He then asked me whether I am aware of any Map-Reduce Framework. I said NO..!

Round 2)

Group activity round.

We were split in groups of 6 and asked to come up with a start up idea. We were given charts and lego blocks. (I believe we never touched the lego blocks!!)

This din go well for me coz I didnt speak much..!!! But it was a good experience.

Round 3)(HR+Tech):

He started with a brief introduction. Then he askd me why I din speak much in the GD. I replied him with whatever came to my mind.! Then he asked me many HR type questions. My interest? Hobby?? Challenges faced?? Initiatives taken?? He found that I was Teaching Assistant for Java course.. so he asked abt what I did? Asked abt my projects and asked me how i worked in the team and wot role i played.

He also asked some question which was on multithreading. There was class with two functions func1() and func2(). obj1 and obj2 where two instances of the class. He wanted a way of synchronization where in obj1.func1() call should block obj2.func1() but not obj2.func2() and obj1.func2(). Although I knew it was wrong ,I told that we can use synchronized block in the functions around Critical Section. He said it was wrong because it uses the object as lock . I felt he had some other syntax in mind. He gave hints. But still i din get it. Finally it was something which was new to me. So i told him dat and den I was able answer the question. But in between he asked me "what is the simplest object u can make in Java??" .. I said "Object" . He said something like u cant create object of Object class !!!!! I wasnt sure what he meant.

After that he checked my resume and askd abt my achievements.

He asked whether I had any question.

I askd him what kind of candidates they are looking for core Technical guy or guy with Tech + Managerial skills. He said they want core tech guys. I then asked "What was the motive behind conducting a group activity round if they needed core tech guys!?!". He gave a smile and then told me the reason.Then some more small discussions.

Round 4)(Technical)

Q1)Design book store.

I gave a oops design in the beginning with some 4-5 classes. He then started adding new requirements. I later unknowingly started moving away from oops design and started using more of collections to meet his requirements to make it faster and time optimised.!!! (Which is not actually the intention of the round). The interviewer was not friendly at all...!! :(

Q2)String related question.

It went like:

Given a sentence with(words+punctuations). We need to reverse the string word by word by keep the relative positions of punctuations same.i.e if a punctuation was after 3 words,then in the final string it shud be after 3 words.

eg:

Input: "God, is Great"

Output: "Great, is God"

I started with a straight forward approach but then he gave a example were my code fails. Then i discussed some approaches. But then he dint seem to be happy with it.This round went bad.

I was not selected.

Directi (Platform Engineer):

Online Coding round 1(90 minutes):

There were 3 coding question.The platform was codechef and we were allowed to use IDE and internet...!!The deal is to do 2 questions fully to get a interview call.Question are really good. I was only able to do one fully and got timed limit exceeded on 2nd one. In codechef we need to pass all the hidden test cases to complete a question. I had never used codechef platform and took some time to familiarise it...!

Q1) Find the maximum path sum from one leaf to the other in a BT. We were given an array representation of a complete BT. We had to just fill up function body. Did it in about 30 minutes.

Q2) Given an 4xN matrix which is initialised to 0. We were given M lines which were of the form: <row_index> <col_start> <col_end>. For each of this input we should fill value 1 in the particular row from col_start to col_end. Finally required output was the largest submatrix size containing only 1. As time was less I picked up some code snippets of DP approach from some sites and it got timed out. This can be done without creating a matrix and by playing around with the ranges where we fill 1.We had write the code from scratch including the input taking part.

Q3) I didnt even read this...!!

One student did 2.Those who did one question in this round was given a second chance which was another Online coding round of the same format.

Online Coding round 2(90 minutes):

Q1) Given a 2D char array. We had find whether given words are present in it or not.

Similar to: <https://leetcode.com/problems/word-search-ii/>

I was able to do this in about 20-30 minutes.

Q2) **Problem Statement:**

Stock market is very unpredictable. Prices drop and rise every day. Our Chef has interest in Codechefs stocks. He has accumulated data for the stock price for the last N days. He wants to find out what is the maximum profit that he could have made if he knew these prices earlier under the following constraints:

- Our Chef has to pay a transaction cost of K i.e he has to pay K rupees every time he buys or sells a stock.
- He can own maximum one stock at any time
- short selling is not allowed, i.e he cant sell a stock he hasn't bought.

Since N can be pretty large, write a program to help him out.

Sample testcase:

N=6 K=10
stock_price[]={37 10 77 74 88 100}
Output=70

N=6 K=2
stock_price[]={2 100 2 100 2 100}
Output=282

I wrote a DP solution for this question and the sample test case worked on my local. But submission was giving me Wrong Answer and i felt my approach was wrong. Later after the test I heard that we needed to print the answers in one line with space separated for each testcase. I was printing it in a newline..!!! Still I am not sure whether my approach is right or is it with output format!!!

The Directi folks called student who did atleast one question in this round for F2F interviews to their office. I wasn't eligible coz I got FTE from MathWorks by then.

MathWorks:**Resume shortlisting+ Online video interview +survey****Online MCQ round (47 questions on hackerrank)**

The questions were mainly based on the choice of programming languages made during the survey. I went with C, C++ and Java.

The questions were pretty good and bit tricky. C code snippets involved pointer to a double pointer and some questions had multiple answers right!. C++ mostly the OOPS and Java question involving threads, strings, OOPS. There were a few datastructure and simple probability questions too.

One of the tricky algo question was:

Given a sorted doubly linked list with all the nodes having its previous pointer set to null. Which of the following is the time complexity of converting it to a BST??

O(1)
O(n)
O(nlogn)
O(n²logn)
??

Actual answer is O(1)!!!! Its already a BST!!! I went wrong :X
I didn't do the C++ part properly.

I was shortlisted for interviews.

Technical Round (90+ minutes):

I was interviewed for 45+ minutes each by two panels.

Panel 1(Java):

It started with basic introduction, discussion on projects and then my areas of interest, small discussion on ML.

Then he gave me a few sheets which had some java code snippets in it. Made me do 4 of them. One of the questions was to find out whether the code does the work mentioned in the description. I went through the code and finally was able to show that it was a totally wrong involving many syntax errors+ logical errors!! Then came one question which tested String immutability stuff in Java. One question was to test knowledge of scope rules, initializations of class data members, use of 'this', memory allocations etc and I was asked to use the board. Last question involved multithreading and it was a good question!.

Towards the end he asked whether i had questions, i asked whether he was part of software development team, but i was shocked when he said he was from Control Systems team. I asked him more about the work and opportunities. After Java I was

interviewed by the C/C++ panel.

Panel 2(C/C++):

The interviewer seemed to be fresh out of college!! In the beginning itself I made it clear that I had no working knowledge in C++. He started with the question to identify classes and objects in this room..! I was confused wot a class would be in real life.. He asked me whether i would call a chair in the room a class or object. I said I would call it an object. Then he showed another chair which was exactly same copy and asked what now? I said object generally have its own identity and behaviour. I would call the chairs together as a class. More discussion went into it and he never wanted the bookish definitions. He also asked me real life examples for polymorphism, i told him about an ATM where a user does a transaction and a transaction can be either withdrawal or balance inquiry . I was able to convince him by writing the pseudo code and then he asked me to write it in C++!!!! I was nt comfortable in C++ but i still managed to write but i mixed up Java syntaxes in it which he pointed out. He then asked about how run time polymorphism is implemented in C++. I didnt know it properly , but i said during run time 'some' table will be checked to see whether there are inheritance relations and overridden methods. He asked me what is that table and when it will be created?? I said i dun noe the name but it will created during compile time. Then he said whether i heard the name 'vtable'?? I said no. Then he moved to constructors, destructors and copy constructors. He asked me what if I dont define them in the class . I said the compiler will create it for u. Then he gave a scenario where he didnt want the copy constructor to be invoked. I told him to make it private in class. He said thats not what he wanted and gave a hint saying 'delete'. I said I dont know!! He wrote the answer on the paper and i said Im not aware of this syntax!. Then he asked about inline functions, const vs macro, memory leaks in multi level inheritance ,what is NULL ?, function pointers, structure vs class etc. Then he asked abt malloc vs calloc, new vs delete, can we mix new with free and malloc with delete??. The discussion then went on to heap ,stack, virtual addresses, some paging.

He then asked a good question. He asked whether an array defined in a program is contiguous in physical memory? I said may or may not be.!! He asked me why??? I said that if the array was too large it may not fit in a page and gets splitted across multiple pages. These pages may be placed anywhere in the physical memory. Then he asked why do we call it contiguous??! I said its contiguous in logical address space and the MMU will take care of the address translations. Then came the next question 'does the ordering in which data members are declared in a class/structure matter ??' (I knew what he was asking for, as I have implemented malloc, calloc etc as part of my RTOS course ,Thanks to Mouli Sir :))! I told him Yes, Compiler does padding to make aligned addresses and told that its a good practice to declare them in the sorted order of size of datatype. Then he asked me little bit about some preprocessor directives. He wanted the header file to be included only once and asked me how to do it.? I told him to use #ifndef #define #endif guards , but seemed not convinced. So i told abt #pragma. He asked me the full syntax. I told him I dont know. He then asked little more C++ stuffs like friend functions and its application etc. At end he told that he also was from Control Systems team!!!!

I felt the interviewers were too good and they seemed to know everything...!!

Round 2:(Managerial round)

This was a pretty much relaxed round. The interviewer was trying to understand more about me apart from the technical aspects. Most questions were HR type. He was asking for many real life situation i had faced. Many a times i felt being frank is the best thing. He was very keen to see how much I had understood about the job role. Also in between he took out a sheet and clearly explained me the job role. He asked many questions like weaknesses?? strengths?? how I overcame the weaknesses?? What am I planning to improve?? What reviews does your professor and friends say about me?? Greatest achievements?? extra-curricular activities?? Often he laughed at my answers (I went too much frank i guess :P). He asked me about my UG major project and he seemed to have thorough knowledge of that too!! I felt this guy was a genius. Later I came to know from other

candidates that he was Gate Rank 4!!

Round 3: (HR round)

I thought this round would be easiest but unfortunately I was wrong..!!! It went good in the beginning, but then gradually it ended up to be a stress interview..!!! It started with basic HR questions . The HR asked what did I had for dinner.. I couldn't recollect it properly and he started asking me whether I had any memory loss problem. He asked me what I understood from the ppt. I told a few points that I felt relevant and then again couldnt recollect it fully. He didnt seem to happy with that too. Then he asked what is my area of interest. I said ML. Immediately he said there is no ML in Mathworks India, so why do u want to join Mathworks!!?? He started stressing me out asking whether i really want this job, I can a job with a better pay , will I leave Mathworks for another job etc etc . He even said my communication was not good enough. He asked me whether I had enquired seniors about the work. Also he asked me what all sites I had referred to know about Mathworks. I accidentally told 'Glassdoor' on the flow. He immediately asked me what I found in Glassdoor. I gave a smile and he told me to be frank.! I told most it were bad reviews.. He then asked me why I want to join MathWorks????!! More questions came up and those were really hard to answer..! After while I was speechless and felt like "why is this not ending"!!! At the end I asked him a few questions too. I was really tired towards the end of the round and he asked me to go and sleep..!!!

Round 4: (HR round)

I was asked to come back as another HR person wanted to meet me. He felt I was bit sleepy and asked whether he should leave :X!!!! This too was again an extended version of the 3rd round. The interviewer grilled me further. He clearly asked to explain my understanding of the profile and also my expectations. After explaining he said some part of my understanding is clearly wrong. He also said that I talk like I have no interest in the company..! He asked me take out the handout and he clearly explained the profile to me. He then asked me to explain what I understood after that..!! Eventhough I dint tell him abt my interest he started saying there is no ML team in Mathworks India and Why I want to join Mathworks.!!? more n more questions which I had tough time answering. This one went a little far and I asked him for a glass of water to get a small break!!!! I had hard time convincing him that I am really interested to be part of Mathworks!!!

Note: I had to face the question "Why MathWorks???" about 20 times throughout the process..!!!! :P

I thot I screwed up the last two rounds.
But to my amaze I was offered Full Time in MathWorks :)
