

Morgan Stanley Interview Process

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First Round

This was an online test taken at DJ Sanghvi campus with three sections:

DEBUGGING

7 questions of debugging, to be solved in 20 minutes.

Example:

```
for(i=0;i<n;i++)
{
    for(j=i;j<n;j++);
    {
        printf("%*n");
    }
}
```

Write a function to check if a set of three points forms a triangle or not.

CODING COMPETITION STYLE QUESTIONS

3 questions to be solved in 60 minutes, so 20 minutes each. Simple array and hash table based programs expected.

First one was about arranging numbers according to their frequency.

Another was eerily similar to 1/0 Knapsack problem, but I was unable to solve it so I'm unsure of the approach to use.

QUANTITATIVE ANALYSIS

10+ (don't remember the exact count) questions to be solved in 20 minutes.

Simple ones like "You have a cube, you paint the top half red, bottom half green, top face yellow, and bottom face blue. Cut the cube into 27 uniform smaller cubes. How many cubes have 2 or more colors on them?". The answer is 24 btw.

Second Round

From the online test round, out of 200+ TEs, 3 were shortlisted for Round 2, and out of 150+ BEs, 10 were shortlisted for Round 2. This took place at Morgan Stanley campus in Goregaon.

There were 4 rounds scheduled, Tech Round 1, Group Discussion, Professional Fitness, and Tech Round 2.

TECH ROUND 1

This was an elimination round, only 3 BEs and 2 TEs made it beyond this point.

I was asked straightforward questions about coding, like logic for a problem, algorithms, explaining stuff, etc but he grilled me for an hour and a half and I don't remember much of it.

Some of the questions I remember:

1. Given a string of characters, find the smallest string of characters to append to it, to make it a palindrome.

My Solution: $O(n^2)$ Time Complexity after 2 attempts

```
a = input()
for i in range( 0, len(a) ):
    if is_palindrome(a[ i : ]):
        a.append(a[ 0 : i : -1 ])
def is_palindrome( a ):
    if a == a[ : : -1 ]:
        return True
    else:
        return False
```

2. What is the deadlock condition, how to get out of deadlock?

3. Write an SQL query (don't remember the specifics but had to use GROUPBY and COUNT).

4. Explain QuickSort to me.

5. You have an array of 99 unique numbers between 1 and 100, find which one is missing without using another array.

My Solution: $O(n)$ Time Complexity after 1 other attempt using another Array

```
Sum = 0
Total = 1
l = 1
for val in a:
    l += 1
    Sum += val
    Total += l
print(Total - Sum)
```

GROUP DISCUSSION

This round was unfortunately canceled because they only had 5 of us left after round 1 and they felt that wasn't enough people for a proper GD.

PRO-FIT

This was taken after Lunch. It was a little more casual (not to imply Tech 1 was formal) in the way that it was more of a conversation than a pen and paper thing. There was a simple coding visualization problem about OOPs and DS, followed by 2 logic questions and then some generic-ish HR questions.

Coding Question:

You have a coffee shop. You want a data structure to store coffee data so you can use it to display the menu. I told him I'd use a hashtable with keys as menu items and values as prices. He then asked me how I'd do it using OOPs if we also had ingredients and specifically allowed combinations, so I showed him a database with ingredients and coffees

that can be made, using 2 classes and a relation. The classes were straightforward, Class Ingredient with name and price, and Class Coffee with a list of ingredients and total price.

Logic Questions: **I was unable to solve either of these 2 problems**

1. The 2 Rope problem: You have 2 ropes, each can burn in 60 minutes from one end to another. They are non-uniform and non-identical, you have no other means of measuring time and you must use your scissors and matchsticks such that you are able to measure exactly 45 minutes using just the ropes.
Solution: Burn rope 1 from both ends and rope 2 from one end, so rope 1 will burn off completely in 30 minutes. At this point, light rope 2 from the other end as well. Since 30 minutes of it has already burned off, and then you burn it from both ends, it'll burn up in exactly 15 more minutes, giving you a total of 45.
2. Josephus Problem: This is a generic problem, you can find it on Numberphile on youtube. Here's the link: <https://www.youtube.com/watch?v=uCsD3ZGzMgE>

HR Questions:

Q: Tell me about a project you have worked on while I read your file.

A: Told him about Unicode project.

Q: What line of computer science are you interested in?

A: Talked about how I'm still discovering, I've done web dev, augmented reality, basic CV and ML, digital payments, etc and I think I'm enjoying how tech is used in Finance. I made a hackathon project for stock market analysis, sat with my dad for it, interned with Atom for digital payments, hence I applied to Morgan Stanley as an Investment Banking Company.

Q: What subjects do you like at college?

A: DS, AOA mostly. My senior Maulik built his own Randomised Quick Sort algorithm, I was fascinated by that, so I wanna try something like that myself.

Q: If your best friend cheats on the final exam and gets placed in the same company as you, by passing the interviews, would you tell the company? (Interviewer kept repeating be honest to me while asking)

A: Sir, I won't lie to you, I personally would not have told on my friend since he passed his interview for the company fairly.

Q: Same situation, but now company asks saamne se cause they're suspicious?

A: Sir then I will tell them because I will not lie and hurt my own reputation for his fault.

Q: Are you planning for higher studies?

A: Sir I won't lie to you, I was considering it, and I'm giving my GRE this semester tentatively.

Q: Are you interested in learning more? Is that why you wanna do higher studies?

A: Yes sir I am academically inclined and my attendance at college is always high. I wanted to gain more in-depth knowledge.

Q: How do you prefer to be in a team? As a leader or not?

A: I do like to be the leader sir.

Q: What matters to you the most in a project, quality of project or people?

A: Sir I believe it's important that everyone involved gets to work comfortably and learn from the experience (basically completely threw him off his track here).

Q: What do you do if a team member is not contributing to the project.

A: Sir we had a member in our team during the Unicode project who was not working at all. I complained to my mentors.

Q: Do you think you're the pain in the ass or are others a pain in your ass?

A: He didn't let me answer this one completely, started chuckling as soon as I repeated "pain in the ass" back to him.

TECH ROUND 2

This Round was only taken for the BE's applying for Full Time. The people taking it seemed to be much more senior and experienced in position (I think there was some head of Research into ML or something, Maulik had him and he can tell you more about it).