Bloomberg Live Meets

Guest speakers

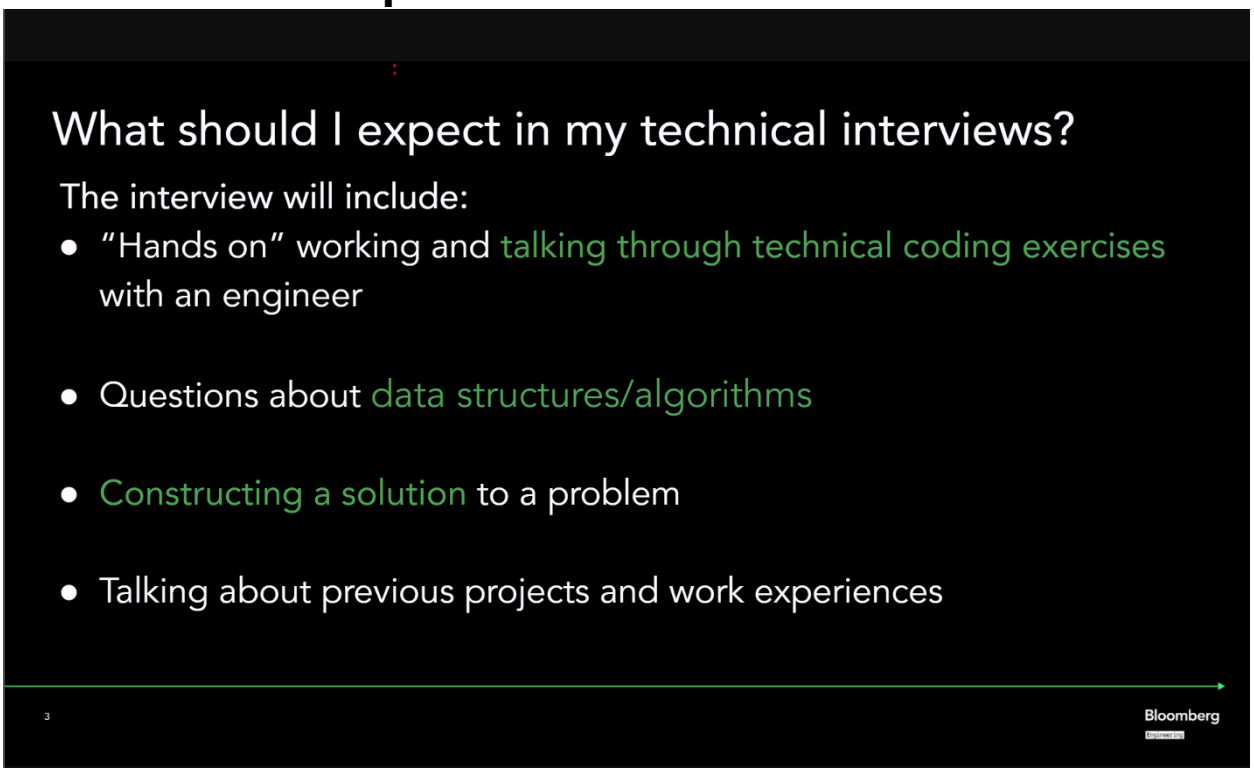
- Vidisha Shah:
  - fintech engineer
  - just joined in July
- Juan Uribe:
  - web solutions engineer
  - Princeton office

Intro video

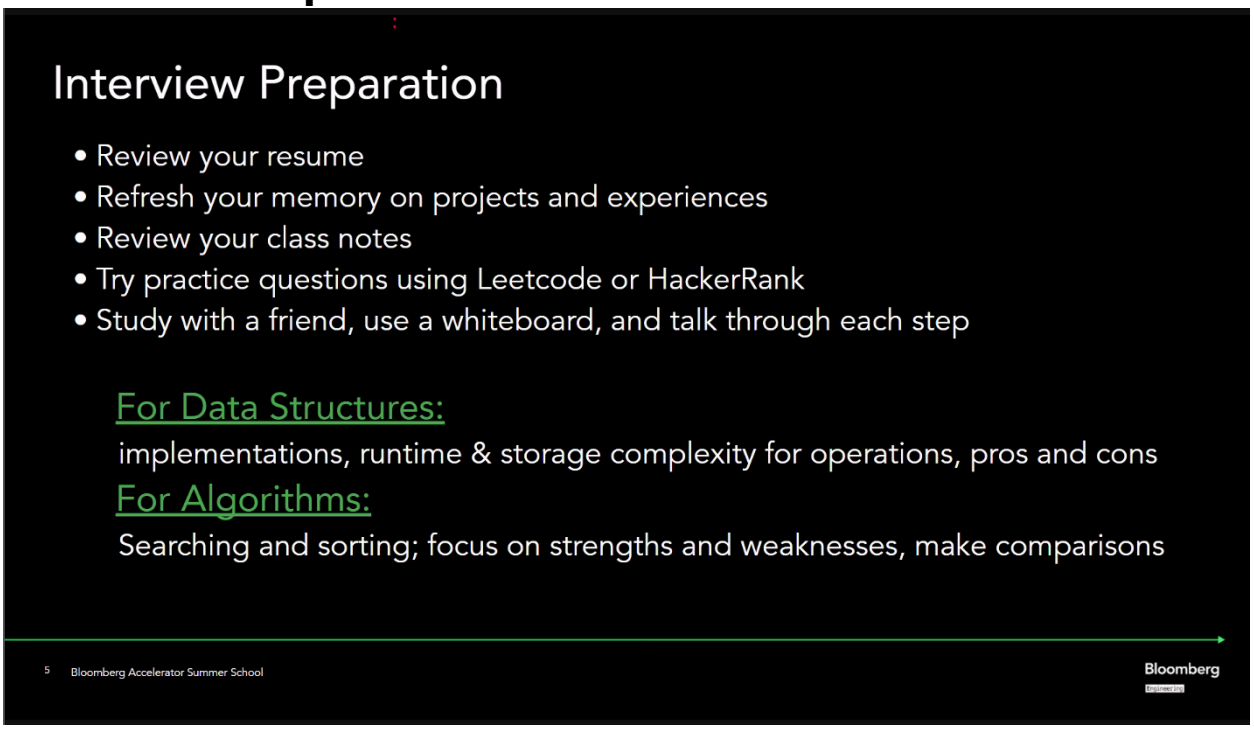
Bloomberg Think Bigger

- Elevate public opinion
- Bringing transparency to public about financial data
- 85% of income goes to philanthropy

What should I expect in technical interviews?

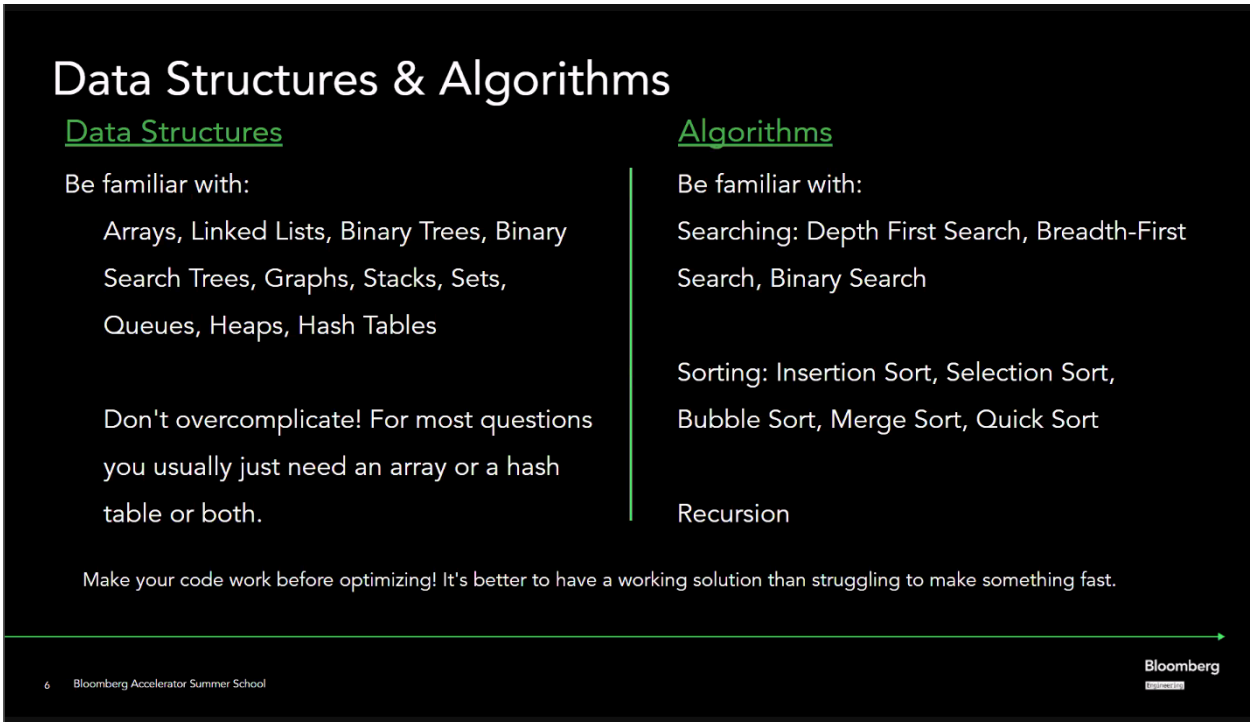


Interview Preparation



- Be able to talk about previous experience
- Explain cost benefit analysis
- How those project bettered you as an engineer

Data



Things to know

- Most common are the *Arrays … Graph*s
- Get familiar over the top 100 questions on LeetCode

How do we know which structures to use?

- Getting enough experience on problems
- Recognize those patterns
- Make a list of the data structures to run through when tackling a problem
  - Check off the ones that would help
- For a linked list questions…
  - ADD/ASK
- Ex: when to use a graph or BST over an array
- At times you may not know which structure to pick
  - Don’t waste time on this and focus on problem at hand
- Max 2 questions may be asked !!!

Interviewing Steps

- Listen to the problem
- Ask clarifying questions
- Restate the problem
- Start with which solution comes to mind then work towards a complete design

7

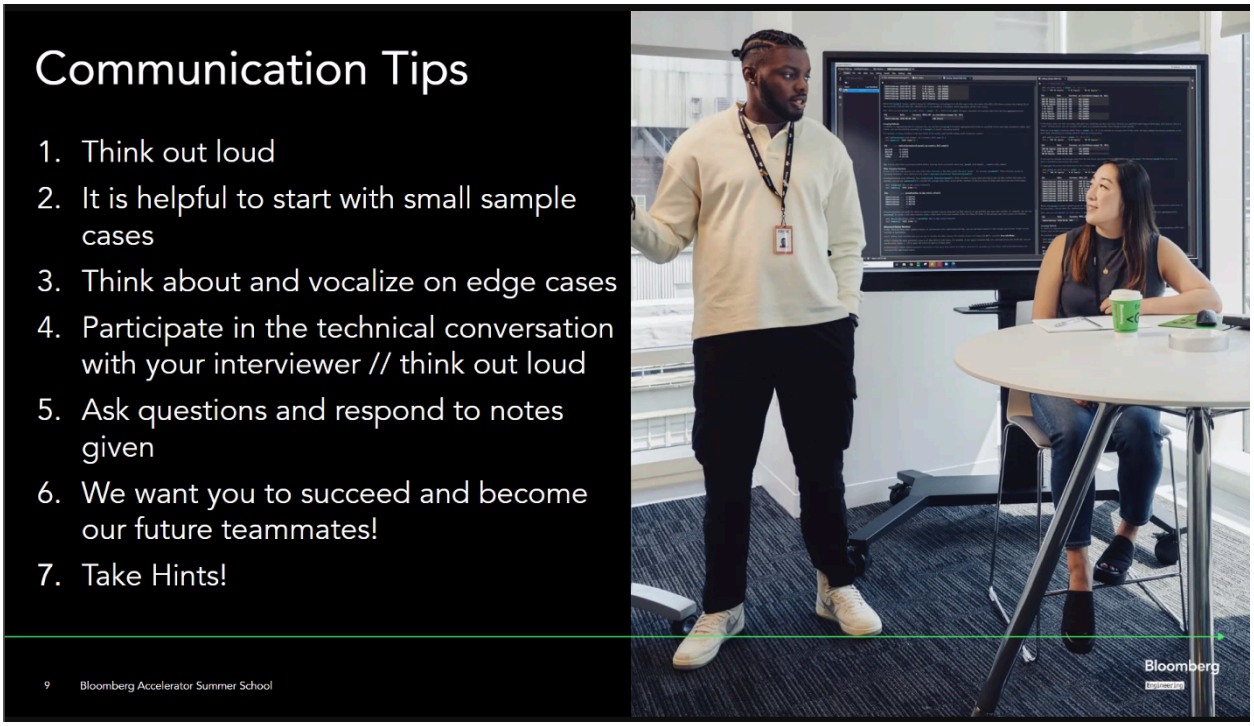
- Spend up to 5 minutes understanding problem & ask questions
- Code in the language you're most comfortable with
- Not completely getting solution to run DOES NOT disqualify you

Interviewing Steps

- Note: for Bloomberg interviews, you may code in your preferred language
- Walk through your solution, thinking about edge cases
- Discuss runtime

8

- It's ok to stop talking for a little bit to just code
- You can ask if you're on the right track



How do we best communicate if we don't understands hints interviewer is giving?

- Ask clarifying questions to figure out what the hint means

Demo of interview!

Prompt: Given a 2D matrix, where 1s mean clouds and 0s are the sky…
Goal: We want to find out how many clouds there are!

Interviewee —> Vidisha
Interviewer —> Juan

Vidisha's Assumptions
Can we assume that the diagonal means connected?
- No, only concerned with vertical and horizontal movement

Can we assume that there might be other values in the matrix besides 1s and 0s?
- No, there will only be 1s and 0s

Can we manipulate the original 2D list?

Vidisha's thoughts
- Apply a DFS solution could help
- Wrote down pseudocode

```
 7
 8    // for each element
 9    // check if cloud (value 1)
10    // recursively check hori/ vertically
11    // increment cloudcount
12
```

Vidisha's early solution (pt. 1)

```
4
5  int cloudcount(vector<vector<int>> sky){
6      int count = 0;
7      for(int i = 0; i < sky.size(); i++){
8          for(int j=0; j < sky[0].size(); j++){
9              if(sky[i][j] == 1){
0                  dfs(sky, i, j);
1                  count++; // 5
2              }
3          }
4      }
5      return count;
6  }
```

- We want to traverse each element, every column for every row
- The DFS pseudocode is to show that we want to go deeper and explore if there are anymore 1s connected either horizontally or vertically to original position
- We update the count once we come back from the recursion call

Vidisha's early solution (pt. 2)

```
void dfs(vector<vector<int>> sky, int i, int j){

    if(i < 0 || j < 0 || i > sky.size()-1 || j > sky[0].size()-1) return;
    if(sky[i][j] == 1)
    {
        sky[i][j] = 0;

        dfs(sky, i-1, j);
        dfs(sky, i+1, j);
        dfs(sky, i, j-1);
        dfs(sky, i, j+1);
    }
    return;
```

- We check the boundary, return nothing if breaks it
- We set the original position to 0 to not consider it
- Then we recursively call for U, D, L, & R positions

Vidisha's checking edge cases
- She goes through example edge cases or inputs on the editor
- She walks through the solution, explaining to interviewer

Space & Time complexity
- Time: ORIGINAL ANSWER: O(N*M) - since we are going through elements on each N column for each M row
- Space:
  - ORIGINAL ANSWER: O(1) - since we are manipulating the original matrix, BUT we are recursively calling
  - ANSWER AFTER HINT: O(N*M) - Maximum amount of times to recursively stack on frame is O(N*M)

Edge cases include:
- The matrix is a "zero" matrix
- The boundary check is an edge case technically

Vidisha's Final solution

```
// sky = [
//     [0, 0, 0, 0],
//     [0, 0, 0, 0],
//     [0, 0, 0, 0],
//     [0, 0, 0, 0]
// ]


// for each element
// check if cloud (value 1)
// recursively check hori/ vertically
// increment cloudcount
void dfs(vector<vector<int>>& sky, int i, int j){

    if(i < 0 || j < 0 || i > sky.size()-1 || j > sky[0].size()-1) return;
    if(sky[i][j] == 1)
    {
        sky[i][j] = 0;

        dfs(sky, i-1, j);
        dfs(sky, i+1, j);
        dfs(sky, i, j-1);
        dfs(sky, i, j+1);
    }
    return;
}

int cloudcount(vector<vector<int>> sky){
    int count = 0;
    for(int i = 0; i < sky.size(); i++){     // O(n)
        for(int j=0; j < sky[0].size(); j++){    // O(n)
            if(sky[i][j] == 1){
                dfs(sky, i, j);
                count++; // 5
            }
        }
    }
    return count;
}

// Space: O(m*n)
// Time: O(m*n)
```

This is considered as a “medium” question in Bloomberg!

How they can make it harder:

- Adding premise for adding recursive stacks if sky is a very big matrix
- Adding diagonal movements
- Making it a 3D sky instead of 2D

Final advice
- Practice and remember patterns
- The interviewers are they to help you

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