

CISC320

Introduction to Algorithms

Algorithms in Interviews

Logistics

- Yesterday you submitted the last assignment
- Today is the last lecture
- The last video will be released sometime in the next 10 days.
 - That will mark the true end of the course
- Final grades will be released sometime in the next few days, hopefully.
- If you have an issue with your grade, this is the time to email me about it.

Why **Are** You Taking Algorithms?



Getting Past a Job Interview

I am a smart man, but...

- I have never been through a Whiteboard interview
 - *Though I have given several*
- I have never been hired by a company
 - *Though I have been hired by universities*
- I have never worked in industry
 - *Though I have talked to several friends that have done hiring*

What the Interviewer Needs to Know

- Three primary questions:

Can you solve technical problems?

Can you communicate effectively?

Do you fit in their company's culture?

Types of Interviews

- Conversational
- Critical thinking
- Project architecture
- Whiteboard interview

- ...There are others!

Conversational Interview

- Just talk about things (usually technical)
- Right now, go find someone, and describe a software development project you have been involved in. Could be from a school project, but ideally shouldn't be.
- “I see you’ve worked on project X. Tell me about it.”
- “You worked on a team on this project, what role did you play?”
- “We use tools X, Y, and Z here. What’s your experience with them?”
 - It’s fine to say that you haven’t used them
 - Better have a good answer for anything listed on the posting

Why not have side-projects?

- I attribute most of my success in undergrad to the privileges I had growing up.
- But besides those, I also worked on a lot of side projects
 - Also privileged to have a lot of free time
- These put me way ahead of peers very quickly
- Also gave me a solid portfolio to show off
- Most of those projects were stupid and embarrassing, but I learned so so so much.
- Find something fun to code over the summer and put it on GitHub.

Critical Thinking Interview

- Right now, pick and answer one question in the chat:
 1. How many windows in NYC?
 2. How far is the sun from the Earth?
 3. How many pingpong balls fit in Smith Hall?
- Designed to see how you think through a difficult/impossible problem
- Becoming uncommon in CS
 - Why not just ask a coding/technical question?
 - Google stopped asking these because they have no relevance to anything useful

Project architecture

- More open-ended kinds of design
 - No right or wrong answers, they're interested in your process
- Answer might be:
 - Architecture diagram
 - Class diagram
 - Other kinds of high level diagram formats
- Examples:
 - Design the ultimate remote control
 - How do you test a vending machine/pen/keyboard?
 - "Tinder for Houses"
 - "Facebook for Dogs"



Whiteboard Interviews

Whiteboard Interview Scenario

- Given a problem, code a solution
- Usually no IDE's
 - Phone Interview and a Google Doc
 - In-person interview and a whiteboard
- Choose your language (Java, C++, Python, JavaScript, ...)

Example Problems

- Reverse a string
- Remove duplicates from an array
- Sorting algorithm
- Knapsack problem
- “Solve the Travelling Salesman Problem”
- ...
- Difficulty range can be pretty big!

Whiteboard Interview Scenario

- They want to know your thought process
- Ask clarifying questions
 - “what behavior should this have on the empty string?”
- Verbalize your thoughts
- They will talk you through things and help you out
- Important to communicate technically
- Get a correct+readable algorithm first, then get an efficient algorithm

Whiteboard Interview Scenario

- What data structures are useful here?
 - Dictionaries, queues, trees
 - Might need more than one!
 - Don't get caught up in syntax and implementation details
- What algorithms can we use?
 - Sorting
 - Backtracking
 - BFS/DFS/Dijkstra/etc
- What techniques can we use?
 - Reduction (use a known solution)
 - Approximation (perfect is the enemy of the good)
 - Dynamic programming (some answers build on smaller answers)

Whiteboard Interview Scenario

- Once you have a solution
 - What's the big-O runtime?
 - Could it be better?
 - Can you code the optimal solution?
 - What's the space complexity?
 - What if I change the requirements?

Do Whiteboard Interviews Work?

...
Maybe?



Max Howell
@mxcl



Follow

Google: 90% of our engineers use the software you wrote (Homebrew), but you can't invert a binary tree on a whiteboard so **** off.

RETWEETS
6,642

LIKES
6,781



10:07 AM - 10 Jun 2015



Sarah Mei @sarahmei · 19 Mar 2015

I mentor students at several coding boot camps. Every single school teaches "whiteboard skills" as a distinct unit.



18



16



Sarah Mei @sarahmei · 19 Mar 2015

They teach it separately because whiteboarding is a skill completely separate from actual software development.



18



24



Sarah Mei
@sarahmei



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Why do we keep doing whiteboard interviews, even though they tell us little about how good the applicant is at actual software development?

RETWEETS
49

LIKES
55



5:37 PM - 19 Mar 2015

So why do we do them?

- Maybe they measure subtle things?
- Opportunity for Interviewer to feel smart?
- Hazing/vengeance?
- What else could we do?
 - Actual coding tests, but...
 - Take-home tests, but...
 - Stick to conversational interviews, but...

Putting the candidate through the same bull. you went through.

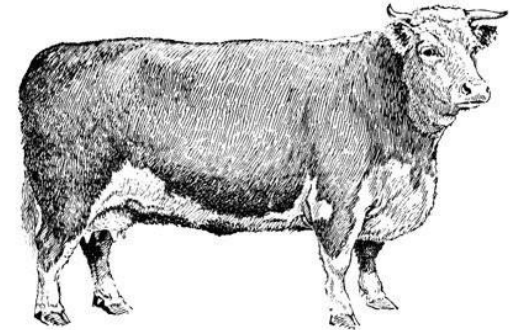


Useless

Whiteboard
Interviews



Useless skills for interviews at public tech companies.



Whiteboard
Algorithms

Not Updated Since 1999

O RLY?

Larry & Sergey

A dark blue, irregular ink splatter shape is centered on a white background. The splatter has a textured, painterly appearance with various shades of blue and grey. The text "Interview Recommendations" is written in white, sans-serif font across the center of the blue shape.

Interview Recommendations

Dress Professionally

- Once again, I am wildly unqualified to give advice here
- Exact dress depends on the position
- Business casual as a lower bound
 - Dress pants/skirt
 - Dress shoes
 - Dress shirt
 - Long sleeve
 - Tucked in
 - Open-collar (If you have a collar)
 - No tie

Communication

- When a team has poor communication
 - Poor software
- Variety of problems occur from poor communication
- Days of the closet coder are all but over
- Hacker writes the best code in the world that no one can read and the coder can't explain
 - Useless code
 - Difficult to maintain and update
 - Team becomes dependent on that hacker
 - Usually dump the code and start over
- Prevent this in the interview

Vocal Clarity

- Do not cover your mouth when you speak
- Face the person you are talking to, not the ground
- Speak slowly and clearly
- Be confident
- Project, do not be quiet or mumble

Body Language

- Good posture
- Firm handshake
- Lean forward a little when listening
- Hands above board
- Comfortable eye contact
- Exhibit enthusiasm and optimism
- For dog's sake, make sure you shower and use deodorant

Attitude

- Friendly
- Positive
- Not cloying
- Not too intense
- Walk a fine line!



Realities of Interviewing

Scenario

- You're a Software Engineer
 - You are busy
- A new position has opened up, and your boss wants you to do the hiring
- Hundreds of applicants of wildly varying quality
- Someone you trust says, "Hire Ms. Awesome"
- Hiring task just got a lot simpler!
- One resume, one interview, and you can get back to work
- Even better if you know Ms. Awesome directly

Realities of the Job Hunt

- [illegible]

How to network

- Be a naturally charming and engaging person
- Also be attractive and intelligent
- Doesn't hurt to be related to people who are good at networking

How to *actually* network

- Be an interesting person
 - Have projects, either from class or outside
 - Have hobbies and activities that involve socialization
- Put yourself in situations where you will encounter people
 - Internships
 - Undergraduate research
 - Hackathons
 - Clubs
- Don't force social interactions, people hate that
 - But don't be passive in social situations
 - A delicate game that can take years to develop skills in

Recommended

- "Cracking the Coding Interview"
- Practice practice practice
- UD Career Services
 - Interviewing
 - Resume prep
 - Finding internships
 - Networking
 - Negotiating
 - ...

In Summary...

- You'll probably end up doing a whiteboard interview at some point
- Practice algorithmic problems... within reason
- Have projects and hobbies, be an interesting person
- Network, network, network

Last chance to see you all!

- Thanks for a great semester.
- I hope you are looking forward to the last video
- Please do well in your other classes
- And please also complete the Course Evaluations!!

