TWO SIGMA

Technical Interview Workshop Day II @ UCSD

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Yongwhan Lim

Senior Quantitative Software Engineer at Two Sigma

- Currently:
  - Senior Quantitative Software Engineer at Two Sigma
  - Lecturer in EECS at MIT
  - Associate in Computer Science at Columbia University
  - Visiting Instructor at Cornell-Tech
  - ICPC Head Coach at Columbia University
  - ICPC Judge for Greater New York and Mid-Central Regionals in North America
  - ICPC Judge for North America Qualifier
- Previously:
  - Research Software Engineer at Google Research
- Education:
  - Stanford
    - Math (BS ‘11) and CS (BS ‘11)
    - CS (MS ‘13)
  - MIT
    - Operations Research (PhD, started in 2013 but on an extended leave-of-absence since 2016)

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Overview

- Part I
  - Behavioral interview (must for any SWE)
  - System design interview (> entry level)
  - Machine learning interview (ML engineer)

- Part II: Questions and Answers (Q&A's)

Part I

Part I-A
Behavioral

Behavioral Interview (for everyone)

- Becoming an industry standard to have **at least one** session in typical Software Engineer (SWE) interview loop.
- Wants to assess leadership potential.
- Tests soft skills (e.g., effective communication, conflict resolution, etc.)
- Open-ended: **not** about getting it right or wrong!

Example Question #1

- Tell me about a time when you led a team to successfully complete a project.

Example Question #1: Sample Answer

- Best if you led a hackathon/passion project.
- Otherwise, if you led a project as an intern, highlight it.
- Be **concise**!
- Include hard **metrics** in terms of %, $, etc.
- Provide **concrete** examples.

Example Question #2

- How do you set up priorities for the work you are facing each day?

Example Question #2: Sample Answer

- Priority queue idea:
  - Most **essential** responsibilities first!
  - Respond to emergencies as needed.
  - Non-essential tasks can be delayed.

Example Question #3

- What experiences do you have relevant to this job?

Example Question #3: Sample Answer

- Highlight a technical project you have done that lasted **at least** one year.
- Discussing technologies is a **must**! (programming languages, databases, algorithmics, development tools, etc.)

Resources

- There are number of preparation books.

- For example:
  - *Behavioral Interview Questions and Answers* by Horatio Bird.
  - *Leadership Interview Questions You'll Most Likely Be Asked* by Vibrant Publishers

Part I-B
System Design

System Design Interview (for > entry level)

- Identify large components of the system and describe how each component is connected.
- Actual implementation details are **not** as important.
- Tests whether you can design an architecture using standard design patterns.

Example Question #1

- Design YouTube

Example Question #2

- Design Instagram

Resources

- Must reads are:
  - *The System Design Interview, 2nd edition* by Lewis C. Lin, et. al.
  - *System Design Interview* by Alex Xu

Resources

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  - *The System Design Interview, 2nd edition* by Lewis C. Lin, et. al.
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- If you have time to dig deeper, consider:
  - *Understanding Distributed Systems* by Roberto Vitillo
  - *Designing Data-Intensive Applications* by Martin Kleppmann

Part I-C
Machine Learning

Machine Learning Interview (for ML SWE)

- **Hands-on experience** using TensorFlow/Keras/PyTorch: comfortable using data to feed into a baseline model.
- **ML foundations** (e.g., linear regression, support vector machine, etc.)
- **Recent trends** (reinforcement learning, deep learning architectures, etc.)

Machine Learning Interview (for ML SWE)

- **Hands-on experience** using TensorFlow/Keras/PyTorch: comfortable using data to feed into a baseline model.
- **ML foundations** (e.g., linear regression, support vector machine, etc.)
- **Recent trends** (reinforcement learning, deep learning architectures, etc.)
- **In-depth knowledge** of a specialization can be a plus, but not required (e.g., computer vision, natural language processing, etc.).

Example Question (Theory)

- What is a difference between unsupervised learning and supervised learning?

Example Question (Hands-on)

- How do you avoid overfitting?

Example Question (Implementation)

- Given stock market data, predict the future stock price.

(Must!) Resources

- **Textbooks**
  - *Deep Learning* by Ian Goodfellow, et. al.

- **Courses**
  - CS 229 (Stanford): Machine Learning

- **Tools**
  - PyTorch
  - Keras
  - TensorFlow
  - Jupyter

Part II
Q & A's

Mock Interview Opportunity!

- If you attended both Day I and Day II of this special workshop series, you are invited to do a mock interview with me should you like to.

- The link to the request form is available here: calendly.com/yongwhan/one-on-one/

Contact Information

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  - Feel free to send me a connection request.
  - Always happy to make connections with promising students!