Physics & Astronomy Career Workshop #4

Finding a job:

The interview

24 April 2024

Congratulations! Your skills-based résumé got you called for an interview!

Don't panic! *Prepare.*

What is the purpose of the interview?

Harass you until you cread into tears

What is the purpose of the interview?

Assess your *technical fitness*

- Do you have the background and skills to learn the tasks the job requires?
- Do you understand how the equipment (or software) you have used works?
- Do you understand how your work contributed to a larger project?
- Do you understand the physics concepts relevant to your project?
- Do you understand how to accomplish computational tasks relevant to your project?
- Can you synthesize complex data and concepts and convey them clearly and accurately?

Assess your *behavioral fitness*

- Can you show initiative to solve a problem or complete a task?
- Can you employ a methodical and logical approach to problem-solving?
- Can you ensure accuracy in a task?
- Can you contribute successfully to achieving a team's goals?

Interview goal sheet for MS-level manufacturing job at Intel

Responsibilities:

- Executing and analyzing experiments necessary to meet engineering specifications for their process.

- Participating in the development of intellectual property.

- Developing the equipment necessary to leverage understanding gained in research (in collaboration with equipment suppliers), identifying shortcomings, and proposing and evaluating hardware and software modifications to mitigate issues or enable new capabilities.

- Overseeing unique layer(s) in a manufacturing line which integrates thousands of steps necessary for the manufacture of complex microprocessors, while simultaneously transferring the technology to counterparts in manufacturing sites across the globe.

The candidate should exhibit the following behavioral traits:

- Rapid analysis of complex process issues and identification of a solution path.

- Ability to be self-directing and show initiative.

- Communication skills and ability to summarize complex data sets for technical and non-technical audiences.

The STAR method

Many questions will be of the form "what did you do?" or "what would you do?" (or are topologically equivalent to that form).

Use the STAR method: give an example from your experience in which you:
- Describe the **S**ituation
- State what the **T**ask was
- Explain what **A**ction you took
- Say what the **R**esult was

The STAR method

DO:
- Tell a story, not a bullet list
- Choose a story that responds to the question
- Choose an example that could connect with the job
- Be specific
- Keep the focus on what YOU did ("I" rather than "we")
- Include what you learned from it
- Keep it short

DON'T:
- Recite your résumé
- Be too negative—if something didn't work, what did you learn and what did (or would) you do differently next time?
- Speak hypothetically—use a real example
- Stretch the truth
- Be too modest
- Include irrelevant details
- Omit tangible results

The STAR method

Choose one of these (real*) interview questions and formulate an answer using the STAR method. Then practice your answer on your neighbor.
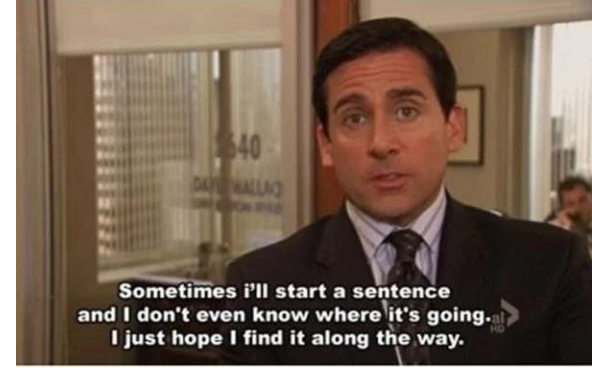
Tell me about a time when you…
- Failed at a technical task
- Decided to learn something without being told to
- Experienced a conflict within a team
- Took a risk to achieve a goal
- Thought you had successfully handled a task only to discover it was a symptom of a larger problem
- Had to think creatively to solve a problem
- Failed to keep a commitment

*All provided by UNC P&A alums

Types of questions

"Tell me about yourself" questions

- Describe your research (or background)
- What do you find particularly attractive about [the field of the job, e.g. data science], or about this job in particular?
- Highlight a few items on your résumé that are particularly relevant to this job.
- Tell me about your role in the summer project from three years ago that is listed on your résumé.
- How do you handle detail work and the review of that work?
- When you have different tasks, how do you prioritize the order in which those tasks are done?
- If there were no computers, technology, internet etc., what would your job be? What career would you want instead?
- Give me a specific example of how you have helped create an environment where differences are valued, encouraged and supported.

*All provided by UNC P&A alums

Types of questions

Behavioral questions

- What's something you think your advisors might say you could be better at?
- Tell me about a time when you...
  - demonstrated leadership.
  - had to settle a dispute between team members. How did you go about identifying the issues? What was the result?
  - were utterly overwhelmed by complexity and found a way to simplify things.
- What role does failure play in the workplace, in your mind?
- How do you handle a work environment where there are competing priorities and deadlines? What strategies have you used to ensure that you are successful on both long-term and short-term goals?

See also questions on earlier slide

*All provided by UNC P&A alums

Types of questions

Technical challenges

- Given some tables of data what is the SQL to get some piece of information?
- Suppose you have a deck with only three cards: one is white on both sides, one is black on both sides, and one is white on one side and black on the other. The cards are put in a bag and shuffled around. You draw a card and place it flat on the table, and reveal that the face up side is black. What is the probability that the face down side is also black?
- You have two variables X & Y that are both uniformly distributed at random between 0 and 1. What is the average distance between X and Y ? Write down the integral that would calculate this, and if you can, solve it analytically. Pseudo-code an experiment to estimate the value of this integral. What is the uncertainty associated with this estimated value? How does it depend on the number of samples taken?
- Derive Euler's equations of rotation starting from conservation of angular momentum.
- You are in a casino with $50, and unfortunately a bus ticket home costs $100. In this particular casino, the only game available is roulette with double-or-nothing betting options. Given that the likelihood you win any particular bet is less than ½, what betting strategy will maximize the likelihood that you get $100 and can take the bus home? E.g. repetitive bets of a small amount? One massive bet of $50? Some dynamic betting amount?
- What is the object oriented paradigm?

Technical challenge types

- Coding proficiency test in a language of your choice (companies are currently most interested in Python, MatLab, Java, R, and C++)
- Probes of proficiency in basic statistical modeling, including linear regression, covariance estimation, basic hypothesis testing
- Math proficiency, often an analytic solution followed by pseudo code
- Fermi estimation-type questions, usually related to the company's technology
- "Walk me through the details of this experiment from a project on your résumé."
- Relevant physics challenge—describe the basic physics of the transistor, write truth tables for AND, NOT and OR logic gates and explain how the gates work, explain the Doppler effect…
- Laboratory or manufacturing challenge—how would you … [determine if a process is working correctly, improve the functionality of a product, etc.]
- "Have you heard of…[some obscure technology/algorithm/approach]?"

Types of questions

Job parameter questions

- How do you feel about ... *travel/overtime/shift work/remote work*?
- What are your compensation expectations?
- What are some must-haves in an organization and role for you?
- Do you have any questions for us?

HAVE SOME!

Things that you need to know to make an informed decision about this position.

- *What kind of projects would I work on?*
- *What kind of specific skills would I be using?*
- *What would a typical day look like for me?*

HEAD OF MAYFLY EMPLOYMENT
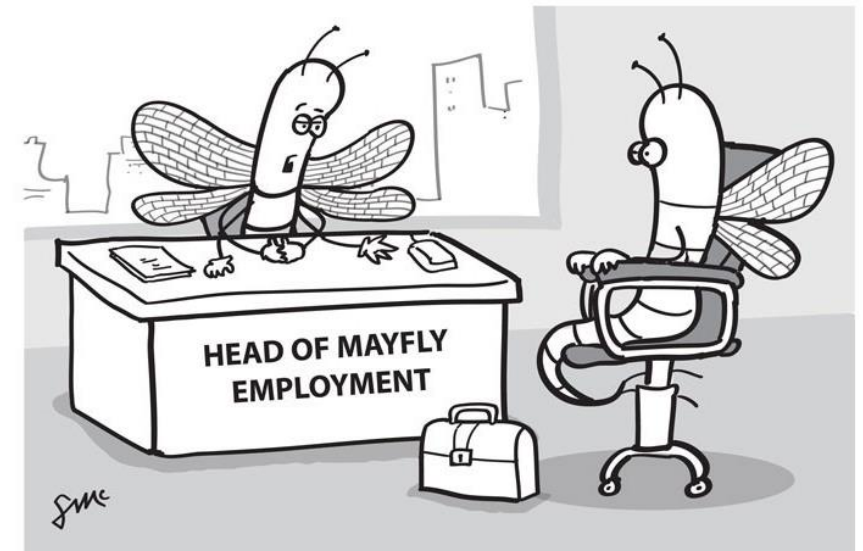
"So... where do you see yourself in 5 minutes time?"

Tips for video interviews
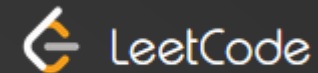
- Dress as for an in-person interview—all the way down
  - How you are dressed changes how you present yourself
  - Shoes (and pants) change your body language
- If possible, stand up!
  - Better posture
  - Energized voice
  - Better focus
- Look at the camera, not at your face (or theirs)
  - Appears as if you were looking them in the eyes
  - Your appearance won't distract you
- Be mindful of your background and surroundings
  - Neutral (or professional)
  - Nothing (and nobody) moving
  - Keep the cat away
- Practice! (and record)

Technical challenge resources

Textbook covering data structure and algorithm questions as well as company-specific questions and advice about negotiating offers, etc.

Technical interview websites, e.g. HackerRank or CodeSignal or LeetCode have questions on data structure, SQL, and algorithm questions that are commonly asked in interviews for software development jobs.

Industry publications and websites/blogs, e.g. Nanotechwire, EETimes, Laser Focus World, Bioengineer.org, Solar Power World, etc. show current technical issues and future prospects in the industry.