CS 492
Career Paths

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Agenda

- What can you do with a PhD in CS?

The Academic Route

- After you get your PhD, you can work as a University Faculty
  - Often, this means a combination of doing **research and teaching**, i.e., a "tenure-track" job.
  - At research-focused universities (like ours), emphasis is on research
  - You start as an assistant professor, you have n years (typically, n=6) to demonstrate ability to lead a research group.
  - After the "tenure clock" is up, you submit your collected output for review, and if it's good you "get tenure," meaning you've got a job for life (!)

Most of Academic's Time is spent:

- Managing and advising grad students

- Reading and writing papers

- Getting funding to support said grad students (i.e., writing grants)

- Teaching

- Service: serving on faculty committees, reviewing papers, attending and organizing conferences, advising students, reviewing grants

- If you're lucky: technical research – coding, experimenting, building, "bench work"

Caveats: Postdoc'ing

- Faculty jobs are very competitive: fresh PhDs are expected to have published several papers in top venues

- Relatively new phenomenon in CS, but some will get a postdoc position to bolster their publication or switch focus, better positioning them as a faculty candidate

- Usually postdoc

Caveats: Teaching Positions

- Good schools will require a PhD for a teaching position, but this is not always the case

- If you know you enjoy teaching (you should TA as a PhD student to find this out), but don't care so much for research, this might be a good route

- These roles aren't usually tenured, however.

The Academic Route: Pros

- Great job security: if you get tenure, you essentially don't have to worry about it

- Intellectually satisfying: it will always be challenging and interesting work

- Self-determinism: You get to determine what you work on*

- Flexibility: you pretty much get to determine your own schedule

- Impact: you get to make impact on students' lives, and potentially more broad intellectual impact

* One caveat is that what you work on had better be of interest to funding agencies, otherwise you're going to be working on it without any help from students

The Academic Route: Cons

- Hours can be long, workload is high (you will have many concurrent tasks to juggle)

- Pay is pretty good, but not anywhere near industry salaries

- You might not get to do as much low-level technical work

- Impact: short-term impact may be limited; this largely is determined by what you work on though

- Recruiting PhD students can be tough, especially at lower ranked Universities

Industry Research

Industry Research

- Many software/hardware companies hire PhDs to do research

- What constitutes "research" varies, but often fairly short-term
  - In some cases, this means R&D for new products/services. Research will drive development. Close interaction with product teams.

- Some companies (rarer) have what amount to academic labs
  - Employees can conduct basic/applied research with fewer concrete ties to products/services
  - Employees can write papers, publish, attend conferences etc.

Industry Research: Pros

- The pay is great (usually starting >$200K), great benefits
- Can be easier to balance work/life than academia
- Usually internal mobility good
- Potential for short term impact is high
- Companies run into many interesting problems that need solving: these often aren't visible to academics

Industry Research: Cons

- Less self determinism: you work on what interests the company
  - The degree of flexibility varies: MSR, Vmware research etc. are different
- "Research" might mean more of the D in R&D (for some, this is a plus!)
- Your position is never guaranteed, depends on economic conditions etc.
- Corporate culture
- Maybe harder to match your values

Industry Sidenote

- If the pay is the main draw, and you don't care so much about *research*, take a moment to consider:
  - PhD gets you on a higher pay scale, but it may not be *that* much higher than, say an MS
  - Time spent doing (~4-6 years) PhD you're losing money:
    - As PhD student you're probably making a stipend ~$30K, depending on location
    - Your peers might get an entry level software engineer position at $120K, and reach same level as your entry as PhD 5 years later
    - So you've lost ~$450K ending up at the same place...

Industry Interviewing

- Study your algorithms/data structures

- Code for fun (you should do this anyway). Build things and put them in Github, Gitlab, etc.

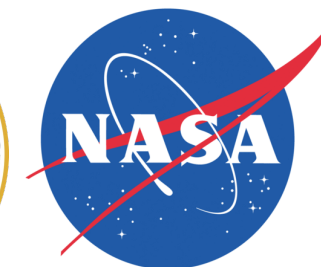- Practice: Leetcode, Hackerrank, etc.

Government Research

OAK RIDGE
National Laboratory
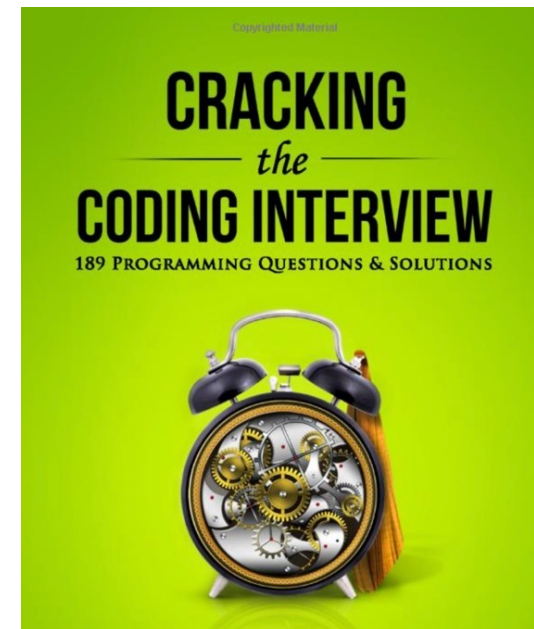
Pacific Northwest
NATIONAL LABORATORY

BROOKHAVEN
NATIONAL LABORATORY

Sandia
National
Laboratories

Argonne
NATIONAL LABORATORY

Fermilab

Lawrence
Livermore
National
Laboratory

BERKELEY LAB
Bringing Science Solutions to the World

Los Alamos
NATIONAL LABORATORY
— EST.1943 —

NIST
National Institute of
Standards and Technology
U.S. Department of Commerce

NATIONAL SECURITY AGENCY
UNITED STATES OF AMERICA

NASA

U.S. DEPARTMENT OF
ENERGY
Office of Science

NSF

NERSC

TACC
TEXAS ADVANCED COMPUTING CENTER

DEVCOM
ARMY RESEARCH LABORATORY
ILLINOIS INSTITUTE OF TECHNOLOGY

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

SDSC
SAN DIEGO SUPERCOMPUTER CENTER

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

CENTRAL INTELLIGENCE AGENCY
UNITED STATES OF AMERICA

Government Research

- Work as a research scientist at a National Lab (or other government institution)

- These labs often do basic science and fundamental research, more long-term outlook

- This research is often thematically focused around a core mission, e.g.:

  - national security

  - developing energy technologies

  - protecting the nuclear stockpile

  - etc.

Government Research: Pros

- Research here might be more long term
- Typically quite stable, and great benefits
- Easier to do "true" open-ended research

Government Research: Cons

- You might be writing grants to support your own job (e.g., "soft money" positions)

- Budgets can be affected by political whims

- Pay is good, but not as good as industry

- Limited locations (typically not near urban areas)

- Some do not hire foreign nationals

Startups

Startups

- Start your own company!
  - or join someone else's
- Many ambitious startups hire PhDs to do R&D
- Your experience will vary widely based on whether the startup is funded or in its early stages

Startups: Pros

- Fast-paced, exciting, learning opportunity
- Get to work in more roles than one (also maybe con)
- Potential to disrupt/change an industry
- Potential to monetize research
- Potential short-term, significant impact
- Get to work with small teams, camaraderie
- Pay vs. equity (also con)
- Big change-up from academia if you don't like it

Startups: Cons

- Pay probably not as good as established company
- The startup may fail
- Possibly longer hours
- You may take on more roles (also pro)
- Equity vs. pay (also pro)
- Many start-ups don't know how to hire PhDs
- You may be building lots of infrastructure ("glue code")