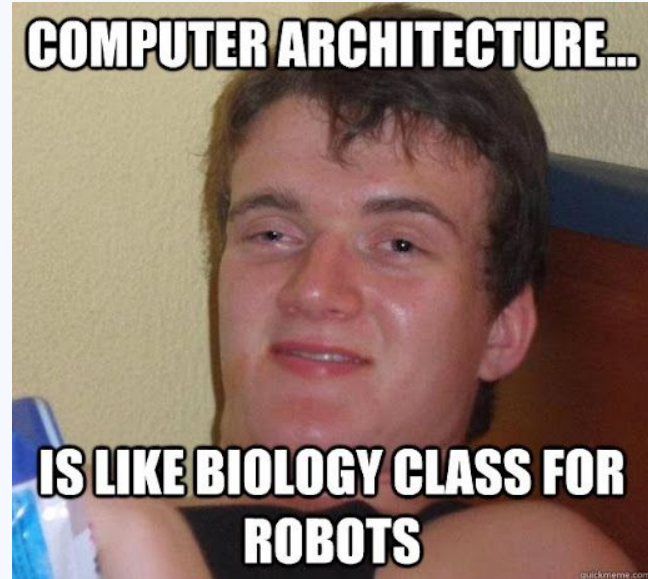


# Welcome/what is architecture?





# **Staff introductions!**



How does a computer actually run a program?  
Be as detailed as possible!



# Questions we'll answer

How is a program represented on a computer?

How does a CPU actually translate stored bits in memory into tasks?

How do we load and store data efficiently?

Can we speed it up by parallelizing instructions? Data?

What is the interplay between architecture and OS? Compilers? Security?

What is the history of the field? How do/did market forces shape engineering decisions?

What's fresh and what's next?



How do we measure whether one computer is  
“better” than another? Get creative – go  
beyond “speed”



# Fine, but what is architecture?

Like many terms in CS, “architecture” is overloaded

“Computer architecture” describes the structure/organization of a computer; specifically, how HW and SW interact

Three general parts:

- ISA (Instruction Set Architecture): what instructions can the computer execute and how are they defined?
- Microarchitecture: how does the CPU actually implement the ISA?
- Hardware system: what physically makes up the computer?



Computer architecture gets interesting when we consider the *interplay* between these parts!



# How will we study these things?

Try to “invent” them ourselves as much as possible

What we want a computer to do → Definition of ISA→  
Microarchitecture implementation

Simulate!

Ripes for low-level design, gem5 for more complicated design

Allows us to evaluate design choices

*Caveat:* need to understand our simulators and their drawbacks

Explore emerging applications



Why should software people care about how a computer works?



# Ways you can give me feedback

E-mail

In person (after class, in office hours)

Anonymous form

Via TAs (anonymous or not)

DE&I, accessibility, culture issues: department and university-wide resources

→ **Feedback only works if I follow up on it**

# Course structure and policies

Course website: [browncs1952y.github.io](https://browncs1952y.github.io)





## Course culture discussion

