

# Lecture 1: Introduction

CMPE 120: Computer Organization and Architecture

Olivia Weng

# Staff

- Instructor: Olivia Weng
  - Assistant Professor in Computer Engineering
  - Office hours: TBA
- TAs:
  - Shinika Balasundar
  - Vikasni Kalahasthi

## Education

- PhD in Computer Science
  - MS in Computer Science
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- BS in Computer Science

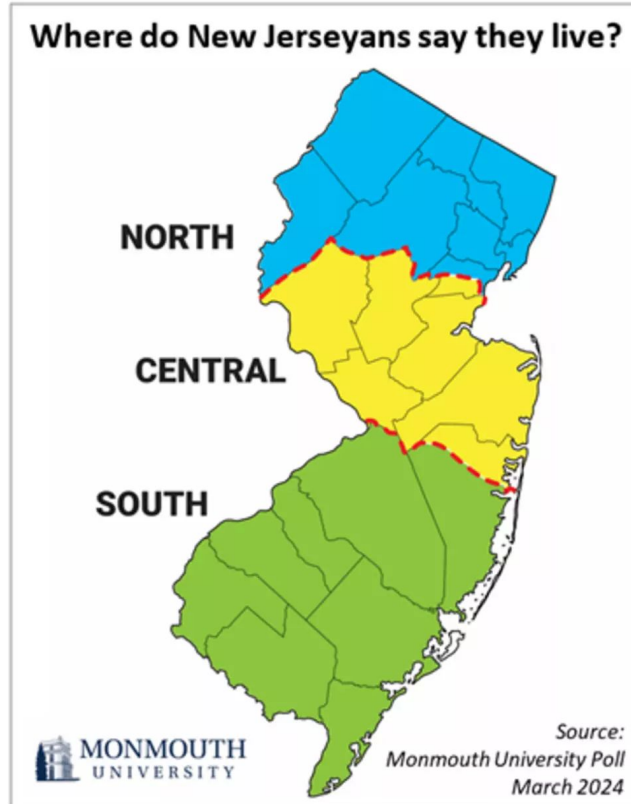
UC San Diego

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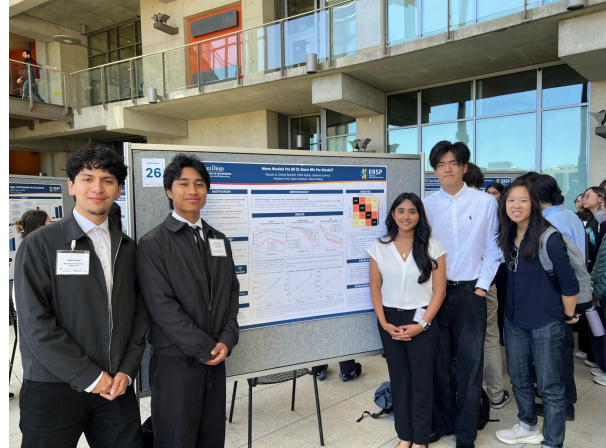
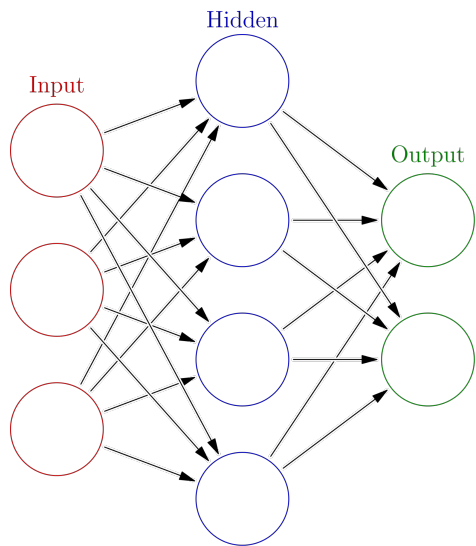
THE UNIVERSITY OF  
CHICAGO

# Where I am from



# Research interests

- How to run small AI models fast on cool hardware



# Fun things!



# Introduce yourself to your classmates

1. What is your **name**?
2. **Where** are you from?
3. What is your **major** (if any) and **year in college**?
4. Why are you **interested** in taking this class?
5. What is **one fun thing** about you?

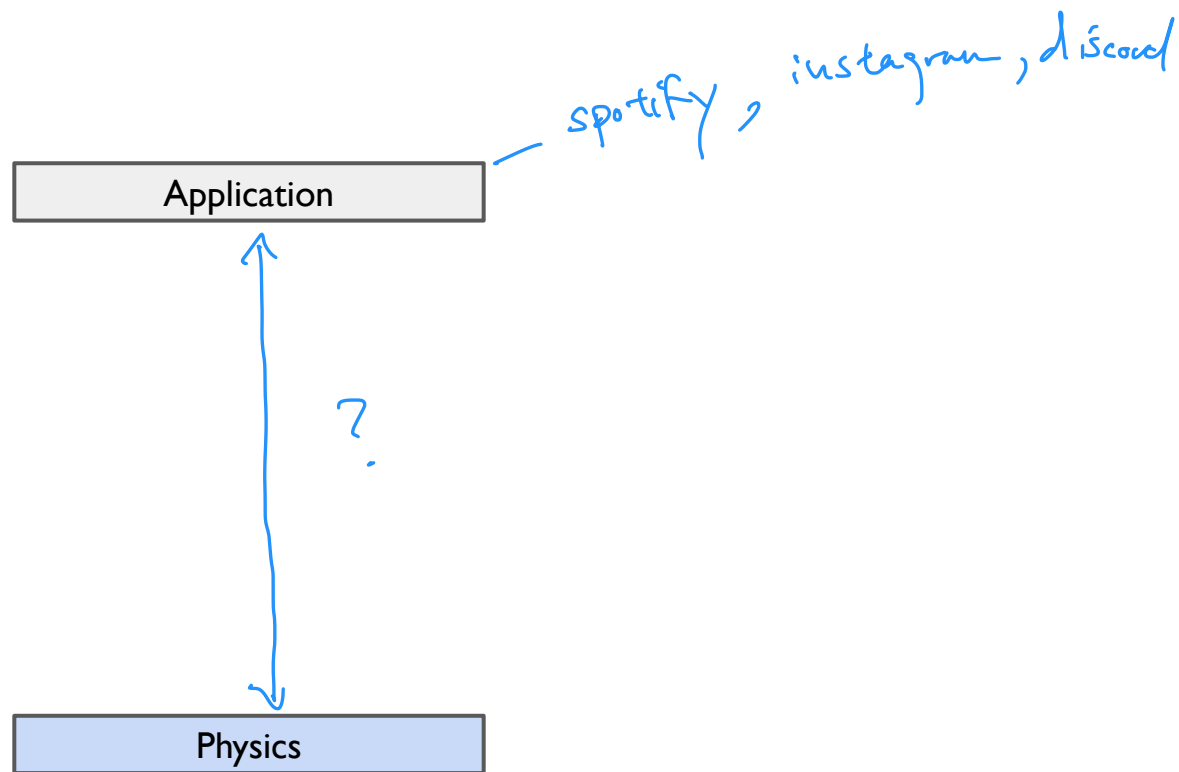
Memory

# How does a program **run** on a computer?

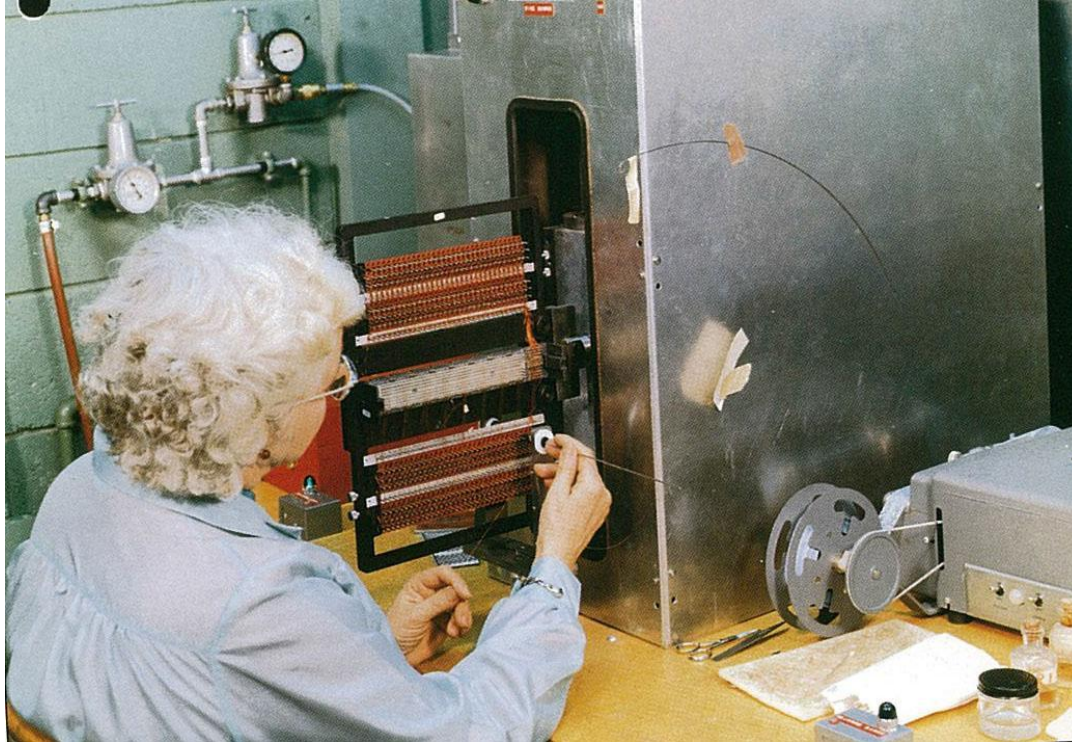
Write java program  $\rightarrow$  compile program  $\rightarrow$  java . program

javac

# How does a program **run** on a computer?

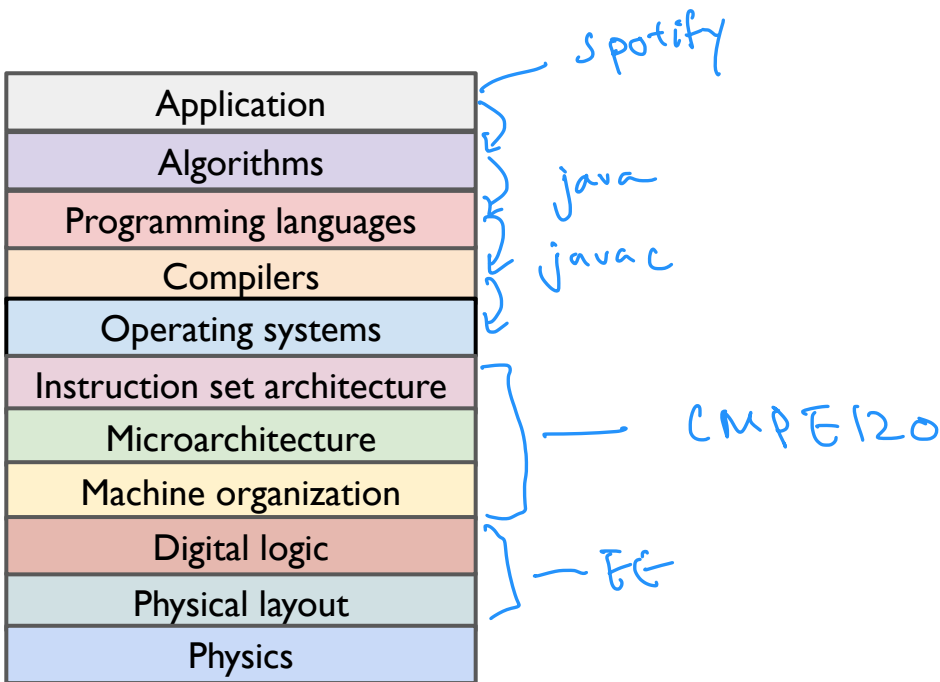


# Dealing with physics straight up...



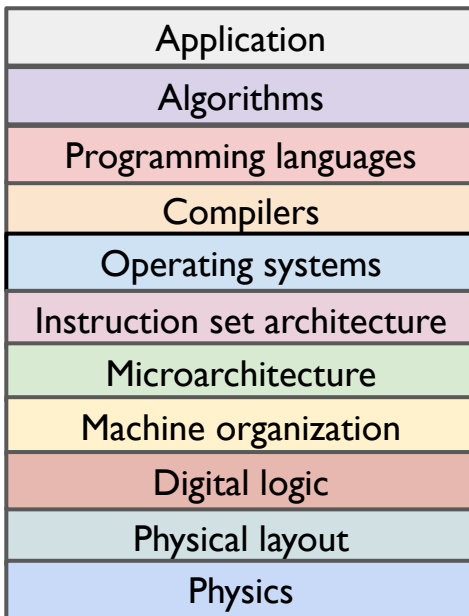
Ref: <https://www.righto.com/2019/07/software-woven-into-wire-core-rope-and.html>

# How does a program **run** on a computer?



# How does a program **run** on a computer?

- Abstraction allows us to reason about complex things in a simpler way
  - CS levels of abstraction



→ CMPE 120 lives here

# What is computer architecture?

- Computer architecture = Instruction set architecture + Machine organization



how we  
talk to the  
machine



What the hardware  
look like

Why take CMPE 120 and learn computer architecture?

# Why take CMPE 120 and learn computer architecture?

- Learn how computers run programs
  - Even multiple programs at a time
- Supplement your programming skills with computer architecture knowledge
  - Understand why your program is slow...
  - Learn how to make your programs run fast!
- Take a step from being a programmer to being an engineer

driver → mechanic

# Outline

- Logistics
- What happens when you run a program

# Testing out iClicker

- Sign up at <https://join.iclicker.com/AJVW>



How **excited** are you about the class?

A. Super excited!

B. A little excited

C. Not that excited

D. Not at all excited

Answer with iClicker

How nervous are you about the class?

A. Super nervous!

B. A little nervous

C. Not that nervous

D. Not at all nervous

Answer with iClicker

How are you feeling right now?

Answer with iClicker

# Class Website / Syllabus

- <https://www.oliviaweng.com/classes/2026/fall/cmpe120/>



A. 1k C

B. ~ C

C. ?? C

# Course components

- Textbook

free!

- Dive into Systems
- Computer Organization and Design RISC-V Edition : The Hardware Software Interface

- Homework

- 6 homework assignments (includes subsequent in-class quiz for programming assignments)
- Final homework grade min (in-class quiz, programming assignment grade)

# Course components

- Exams

- Midterm: in-class Tuesday, October 13th

- Final

- Sec 01: Thursday, December 10th, 10:45am - 12:45pm
- Sec 02: Tuesday, December 15th, 1 - 3pm

# Course components

- Participation

- iClicker
- If you receive  $\geq 70\%$  of the participation points, it will be rounded up to 100%

- Check-in

- Talk to me for 15min! Sign up [here](#)



# Grading breakdown

- Homework: 23%
  - Midterm: 30%
  - Final: 44%
  - Class participation: 1%
  - Check-in: 1%
  - Professionalism: 1%
- 

# How to Pass CMPE 120

- Participate in lecture and office hours
- Be able to do the homework on your own
  - The in-class quizzes will be easy if you do the homework yourself
- The exams will be similar to the iClicker questions solved in-class

# Academic Integrity & Honesty

- Cheating will be taken **very seriously**
- Examples:
  - Not cheating:
    - Discussing homework in groups, with your hands on your own keyboard, writing your own program yourself
    - Looking at lectures, practice problems & solutions, etc from “other CMPE 120’s”
  - Cheating:
    - Getting a walk-through from someone who has already done the homework
    - Looking at someone else’s completed work (even “just to check”)
    - Receiving, providing, or soliciting assistance from another student during an exam
- Consequences
  - Negative 100% on the assignment where you are caught

# Logistics

- HW0 released
  - Sign the academic integrity & honesty pledge and upload to Gradescope via Canvas

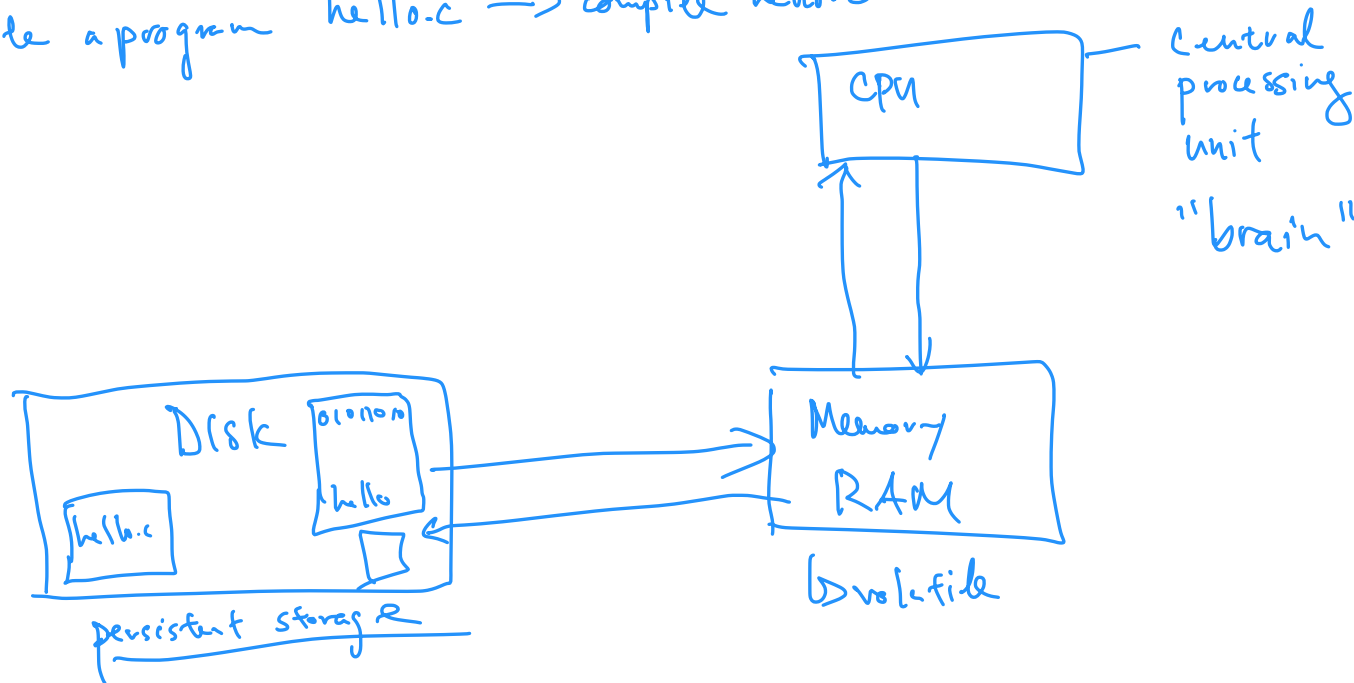
Time to start teaching

# What happens when you run a **program**?

- Hardware is involved?

- CPU? RAM? Disk??

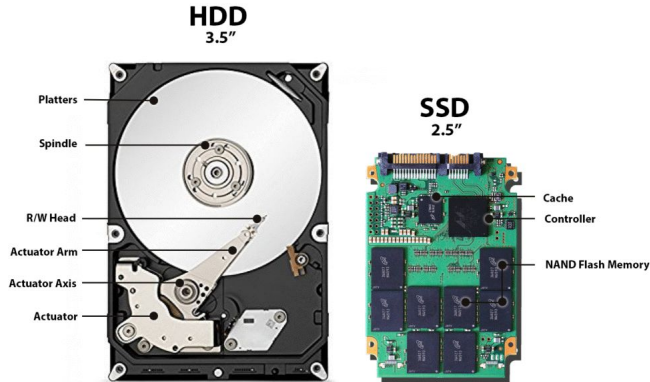
write a program  $\text{hello.c} \rightarrow \text{compile } \text{hello.c} \Rightarrow \text{hello} \rightarrow \text{run}$



# What happens when you run a **program**?

- Hardware is involved?
  - CPU? RAM? Disk??

Disk



RAM



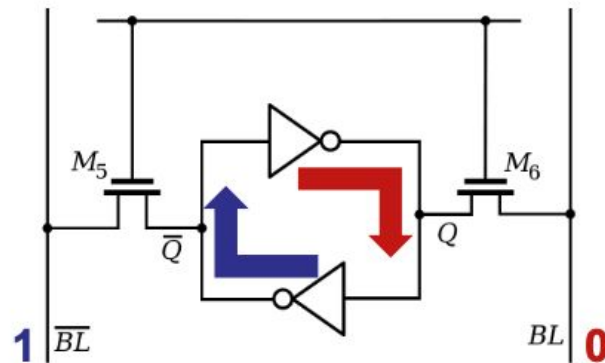
CPU



How do we **store** a **string** of **characters** inside a computer?

# How do computers store characters?

- SRAM cell
  - SRAM = Static random access memory
  - Stores state of a **single bit: 0 or 1**
    - High state: 1
    - Low state: 0
- Why?
  - **Cheap**: made of sand (silicon)
  - **Fast**: read/write billions of times per second
  - **Accurate**: nearly always correctly returns the stored bit
  - **Small**: fit billions inside a computer chip



How can we use bits 0/1 to represent characters?