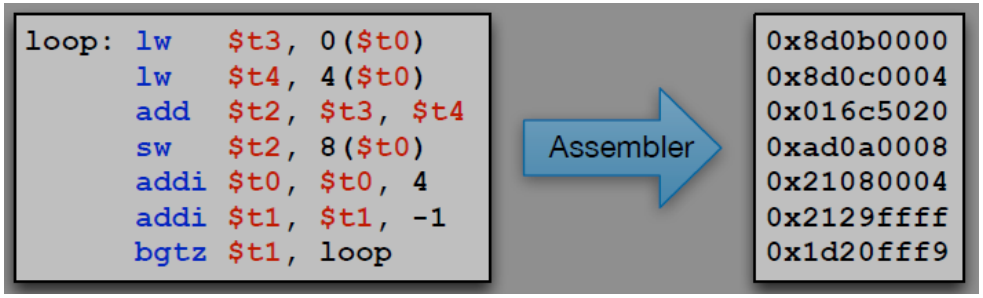
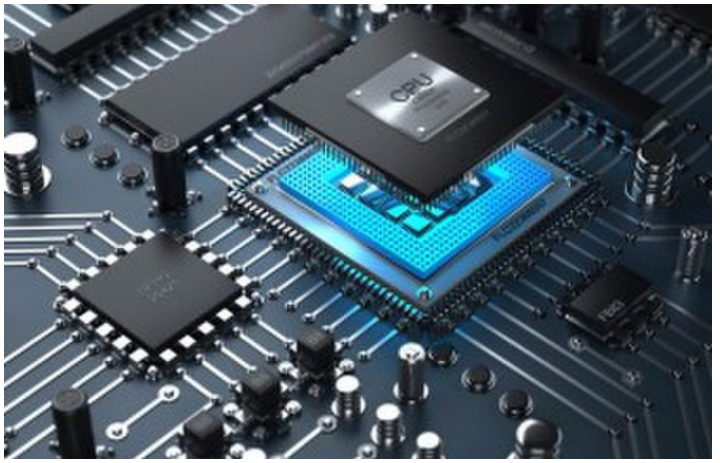




Welcome to "Computer Architecture"

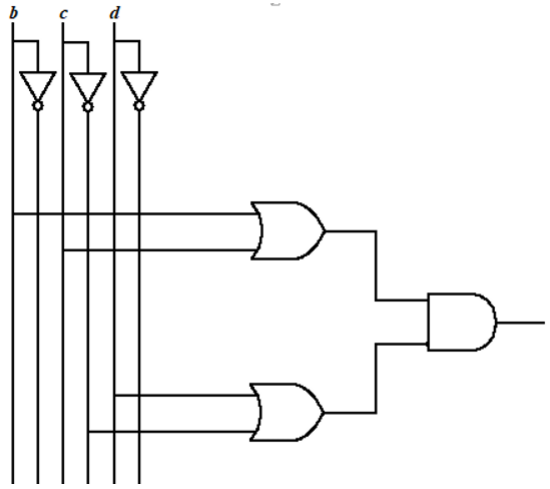
CS 154: Computer Architecture

Lecture #1

Winter 2020

Ziad Matni, Ph.D.

Dept. of Computer Science, UCSB



A Word About Registration for CS154

FOR THOSE OF YOU NOT YET REGISTERED:

- This class is **FULL *and*** there is a **WAITLIST**

```
if (want2add) && (on_waitlist)
{
    SeeMeAfterLecture(True);
}
else
{
    YoureGonnaHaveABadTime(True);
}
```

Your Instructor

Your instructor: **Ziad Matni, Ph.D.** *(zee-ahd mat-knee)*

Email: ***zmatni@ucsb.edu***

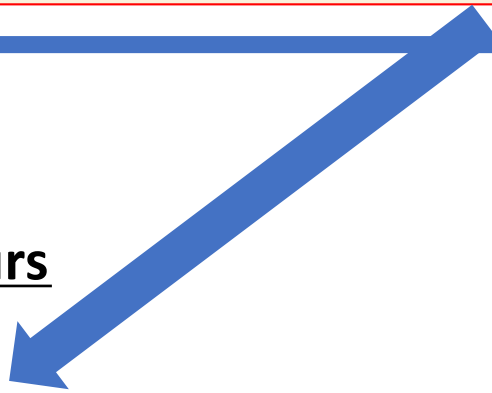
(please put CS154 at the start of the subject header!!)

My office hours:

Mondays 2:30 PM – 4:00 PM in **SMSS 4409**
(or by appointment)

Your TAs

All labs will take place in **PHELPS 3525**
All TA office hours will take place in **Trailer 936**



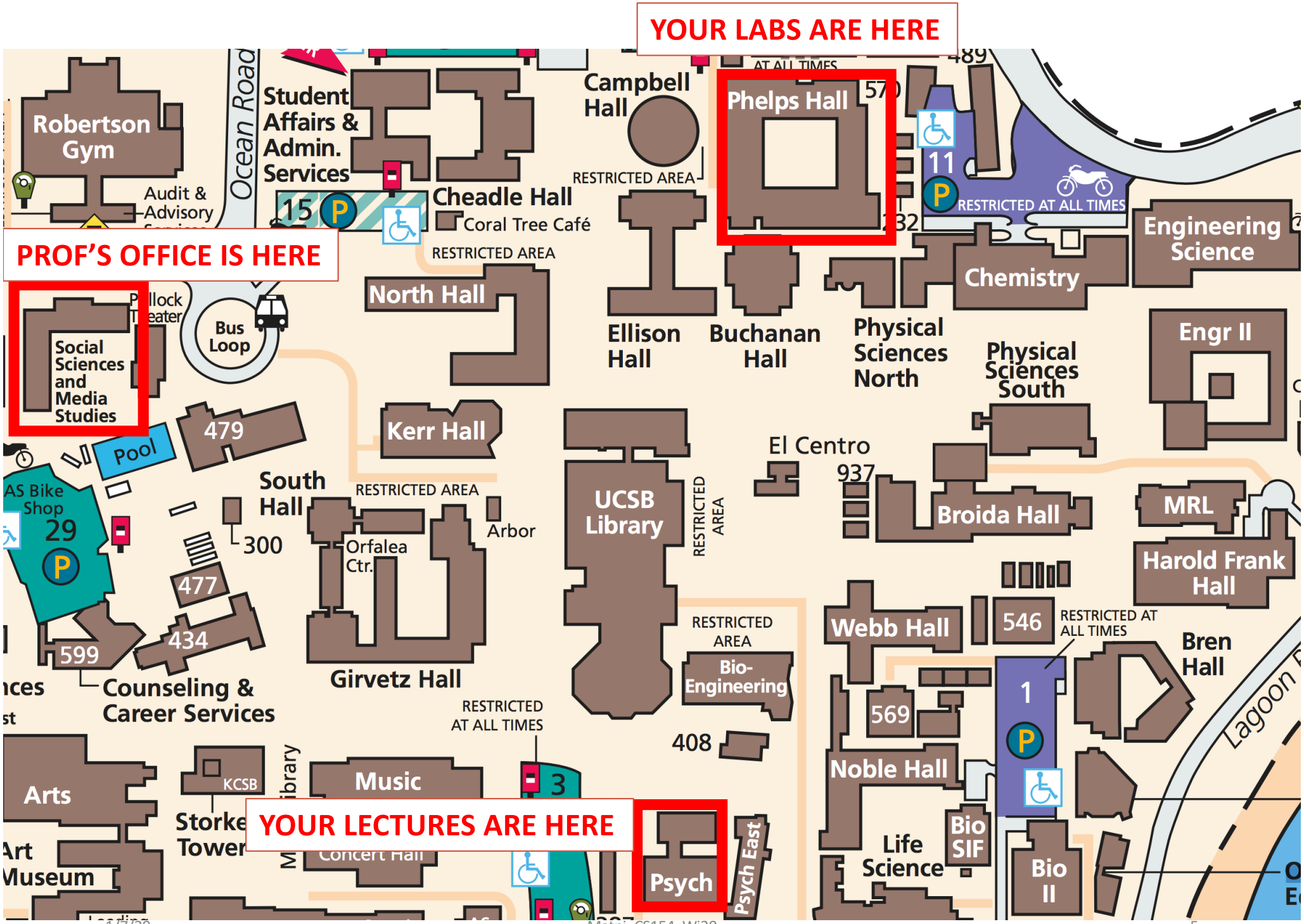
Teaching Assistant	Office Hours
George Tzimpragos	tbd
Sid Senthilkumar	tbd
David Weinflash	tbd

Your FIRST lab is THIS FRIDAY (Jan. 10th)!

Posted on Thursday

Labs are due on WEDNESDAYS!

(unless otherwise told)


YOUR LABS ARE HERE
PROF'S OFFICE IS HERE
YOUR LECTURES ARE HERE
Robertson Gym
Ocean Road
Student Affairs & Admin. Services
Audit & Advisory
Campbell Hall
RESTRICTED AREA
Phelps Hall
RESTRICTED AT ALL TIMES
Cheadle Hall
Coral Tree Café
RESTRICTED AREA
Engineering Science
Chemistry
North Hall
Social Sciences and Media Studies
Bus Loop
Ellison Hall
Buchanan Hall
Physical Sciences North
Physical Sciences South
Engr II
Kerr Hall
Pool
479
South Hall
RESTRICTED AREA
Arbor
Orfalea Ctr.
300
AS Bike Shop
29
477
434
599
Counseling & Career Services
Girvetz Hall
UCSB Library
RESTRICTED AREA
El Centro
937
Broida Hall
MRL
Harold Frank Hall
RESTRICTED AREA
Bio-Engineering
408
RESTRICTED AT ALL TIMES
Webb Hall
546
RESTRICTED AT ALL TIMES
Bren Hall
569
Noble Hall
Life Science
Bio SIF
Bio II
Lagoon
Arts
KCSB
Storke Tower
Music
Concert Hall
Psych
Psych East
Art Museum

You!

With a show of hands, tell me… how many of you…

A. Are Freshmen? Sophomores? Juniors? Seniors?
B. Are CS majors? Other?
C. Know: scripting language (PERL, csh, bash) programming?
D. Have NOT extensively used a Linux or UNIX system before?
E. Have NOT taken CS 64 at UCSB
F. Written/seen code for *firmware*?
G. Done digital design beyond CS 64-level?

This Class

- This is an **introductory/intermediary** course in **computer architecture**.

- We'll be talking about:
  - CPUs, Memory
  - Data paths and Control mechanisms
  - Peripheral devices (I/O) and Interrupt systems
  - Software versus hardware tradeoffs

- This class can sometimes move *fast* – so please prepare accordingly.

Lecture Etiquette!

- I need you to be INVOLVED and ACTIVE!

- **Phones OFF!** and laptops/tablets are for **NOTES** only
- No social media use in the classroom, please

- To succeed in this class, take thorough notes
- I'll provide my slides, but not class notes
- Studies show that ***written*** notes are ***superior to*** typed ones!

Main Class Website

Main Website:

https://ucsb-cs154.github.io/w20/

On there, I will keep:

- Latest syllabus
- Class assignments
- Lecture slides (after I've given them)
- Exam prep material
- Important handouts and articles

Other Class Websites/Tools

Piazza

https://piazza.com/ucsb/winter2020/cs154

On there, we will:

- Engage in Q & A and online discussions
- Make important announcements
- Have (maybe) Interesting handouts and articles

Gradescope

https://www.gradescope.com

On there:

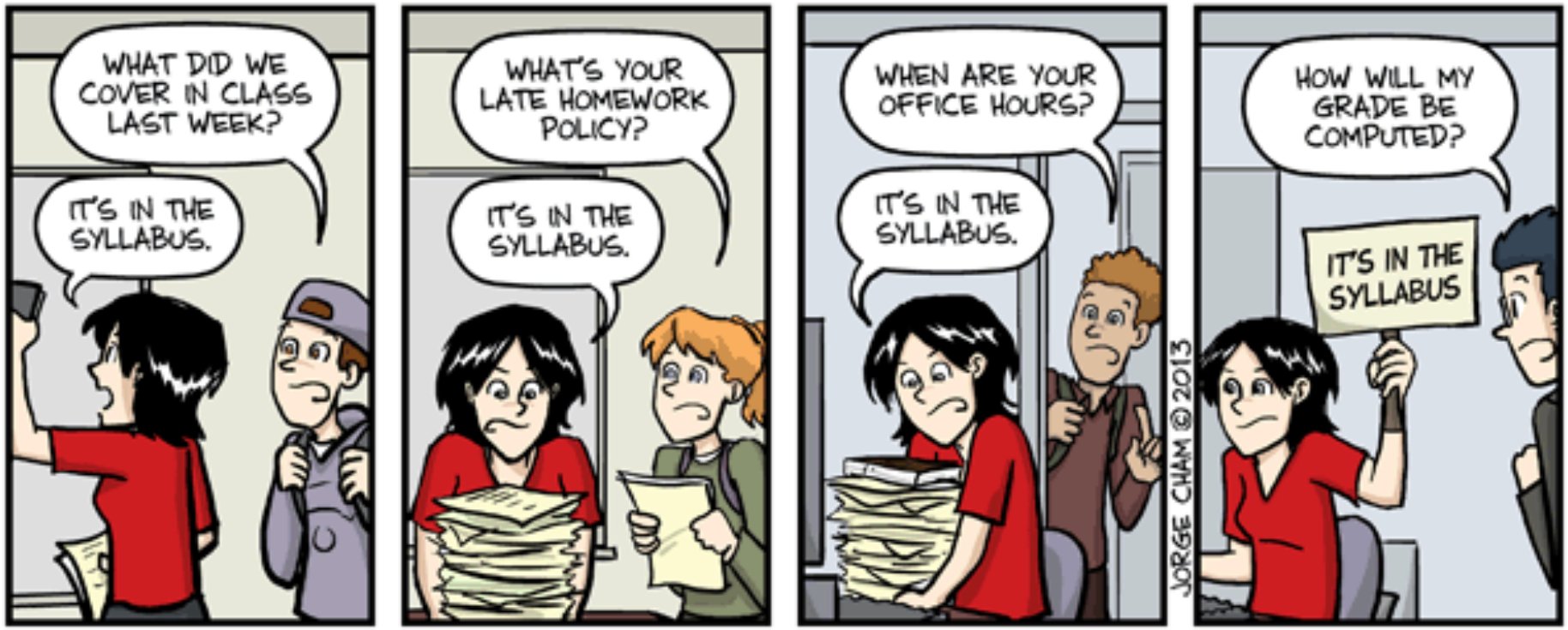
- You will submit all your assignments, typically as **PDF**s
- We will post your assignment grades

GauchoSpace

https://gauchospace.ucsb.edu

- This is where we will post your other grades

Just in Case…



IT'S IN THE SYLLABUS

This message brought to you by every instructor that ever lived.

WWW.PHDCOMICS.COM

So… let's take a look at that syllabus…

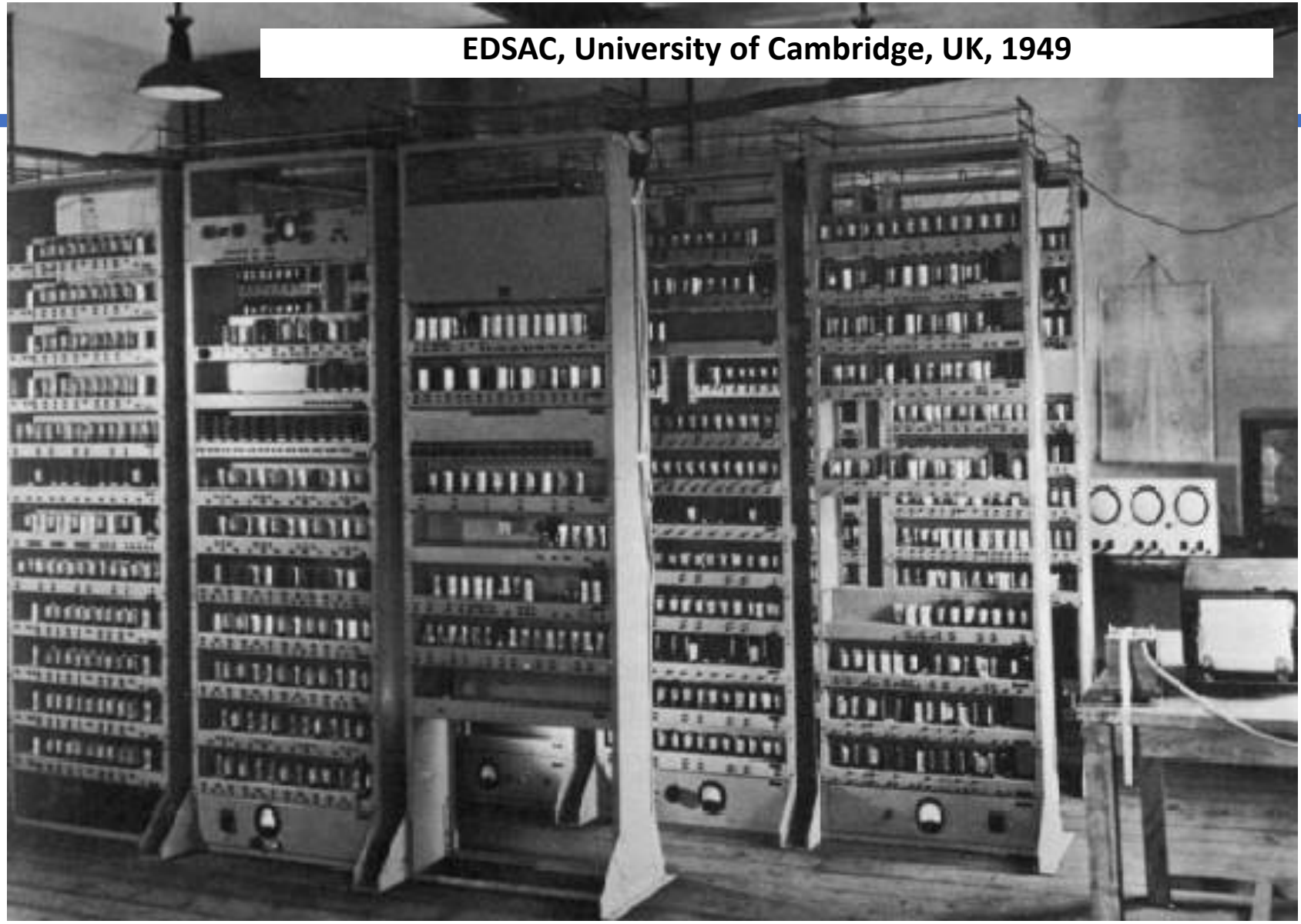
Electronic version found on Main Website *or* at:

http://cs.ucsb.edu/~zmatni/syllabi/CS154W20_syllabus.pdf

- Instructor & T.A.s' vital info
- Class websites' info
- Textbook info
- Class organization and expected conduct
- Grading info
- Lectures & participation
- Labs & assignments
- My policies (absences, make ups, my copyrights, academic integrity)
- Class schedule
- Extra resources for students

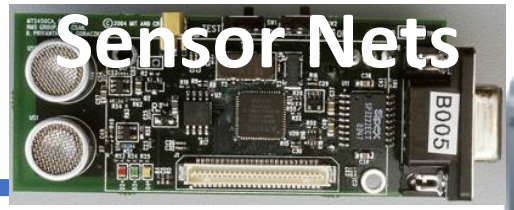
You are responsible for reading it (yes, the whole thing!)

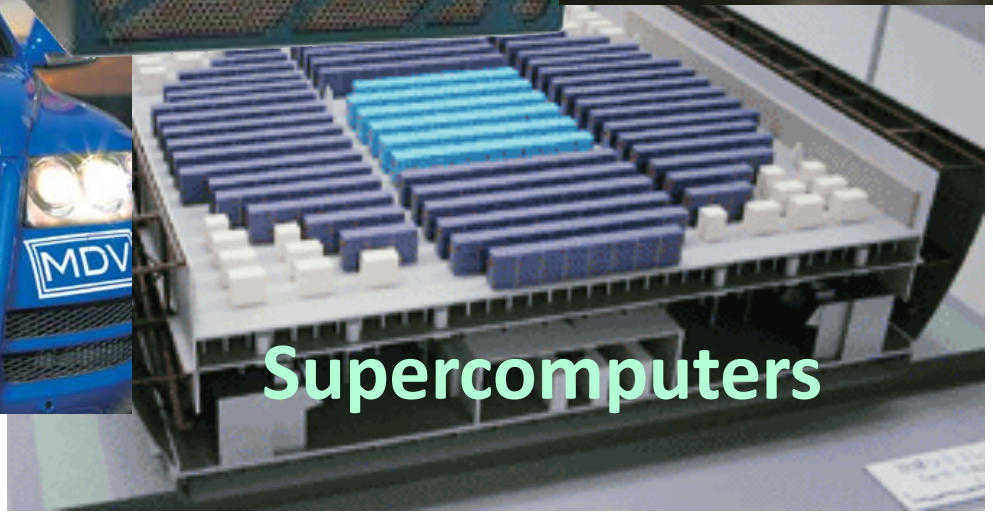
Computing Devices Then…



Source: K.Asanovic, UCB

Computing Devices Now





Source: K.Asanovic, UCB

The Computer Revolution

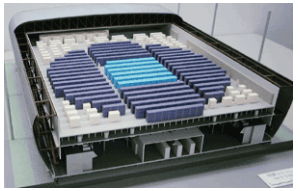
- Progress in computer technology
  - Underpinned by Moore's Law
- Makes novel applications feasible
  - Computers in automobiles
  - Cell (smart) phones
  - The Internet and the World Wide Web, etc…
  - Search Engines
- Computers are **pervasive** and **ubiquitous**

Classes of Computers

Where would you put smart phones and tablets??

- **Personal Computers**
  - General purpose, variety of software
  - Subject to cost/performance tradeoff

- **Servers**
  - Network based
  - High capacity, high performance, high reliability

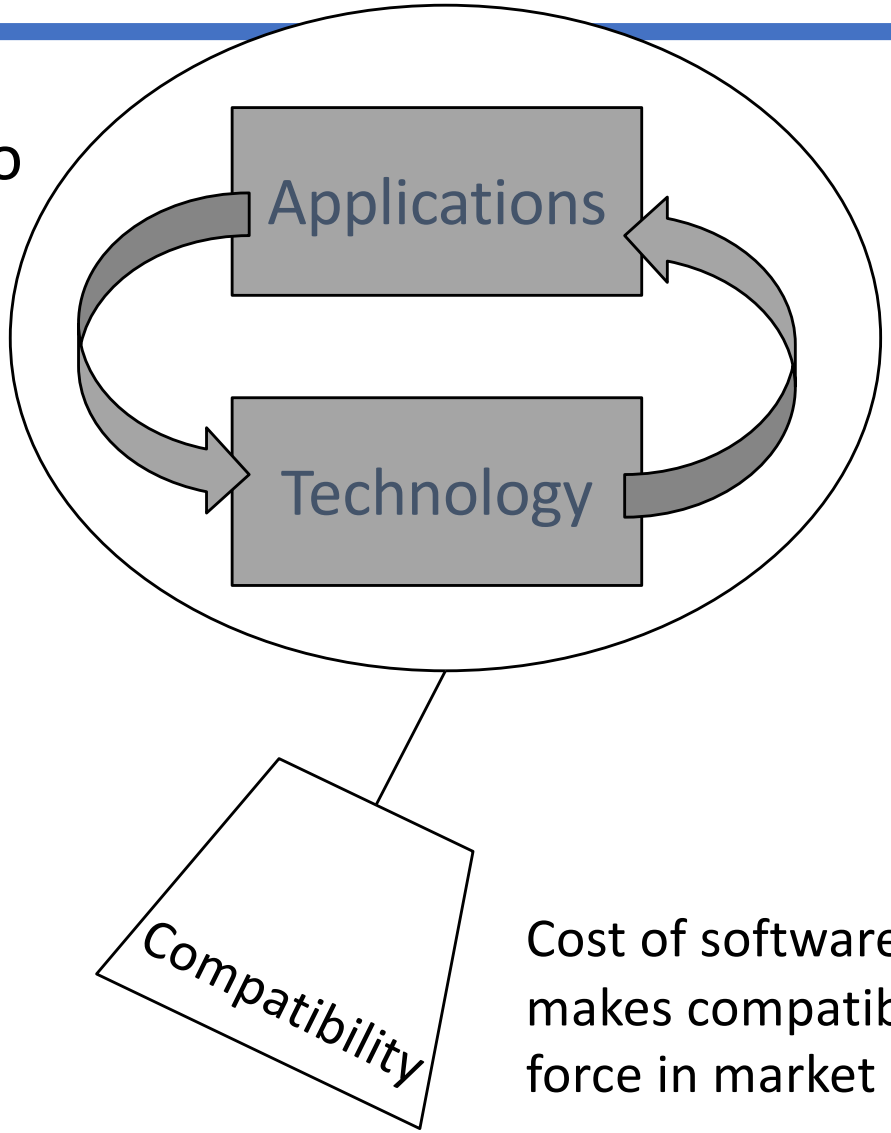


- **Supercomputers**
  - High-end scientific and engineering calculations
  - Highest capability but represent a small fraction of the overall computer market

- **Embedded computers**
  - Hidden as components of systems (computers in cars, in vending machines, etc
  - *Stringent* power/performance/cost constraints

Architecture Continually Changing

Applications suggest how to improve technology, provide revenue to fund development



Improved technologies make new applications possible

Cost of software development makes compatibility a major force in market

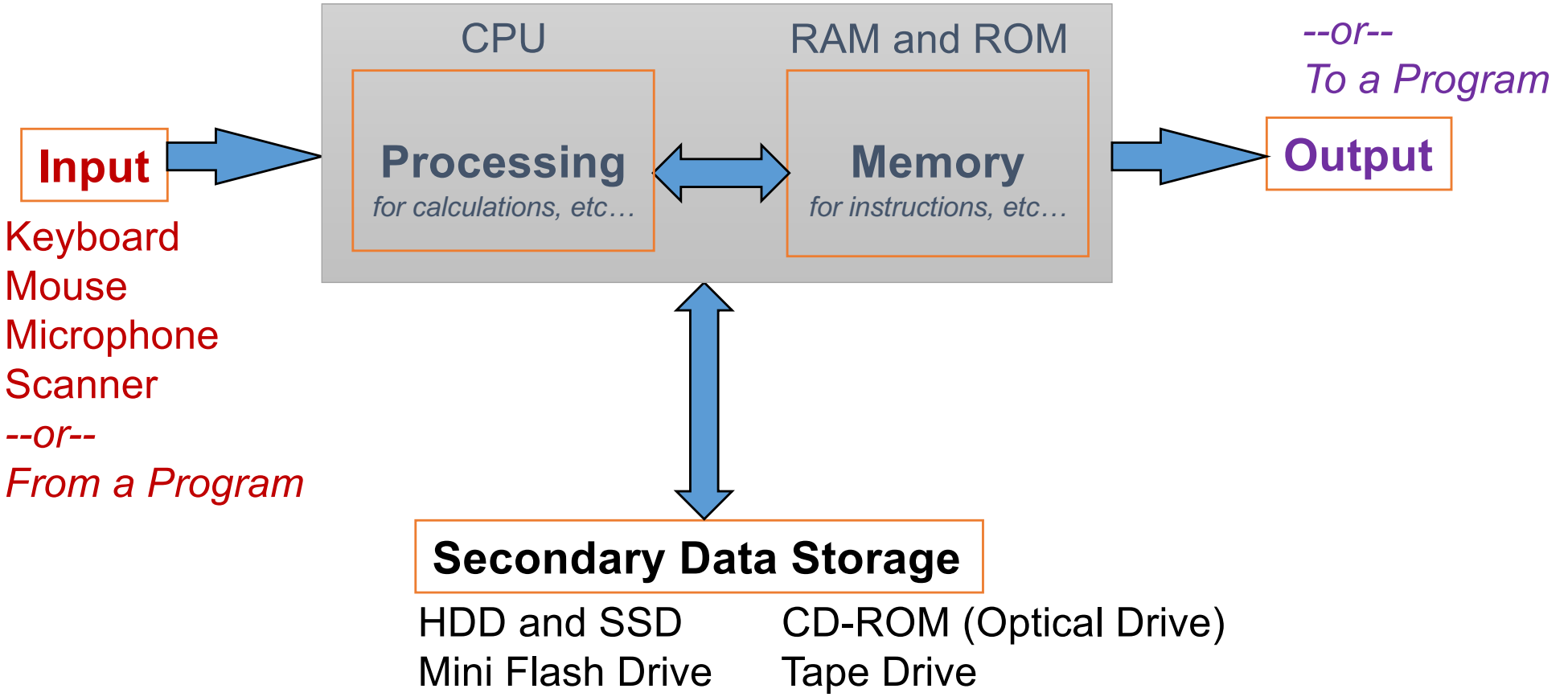
Source: K.Asanovic, UCB

A Simplified View of Modern Computer Architecture

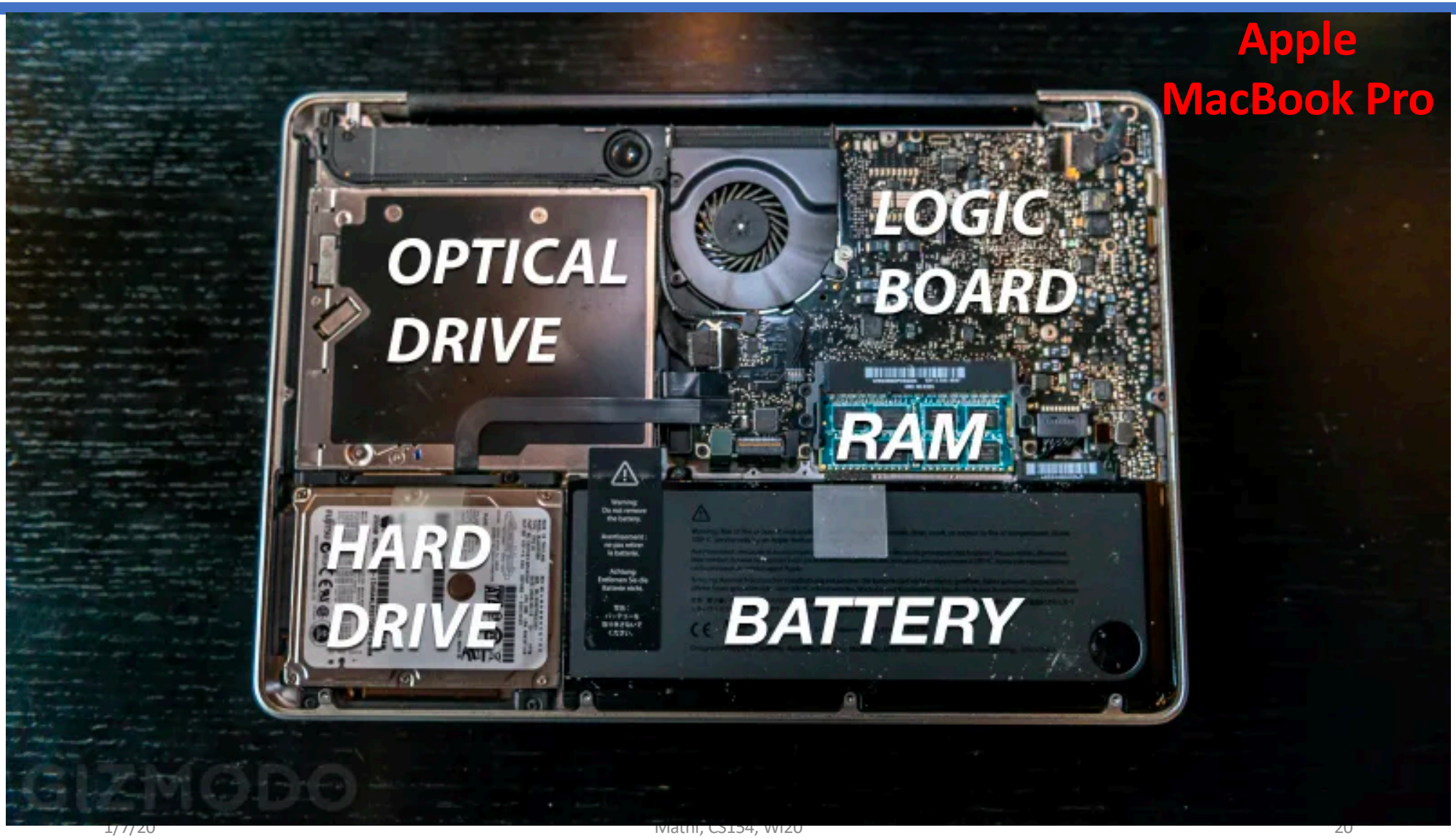
a.k.a von Neumann Architecture

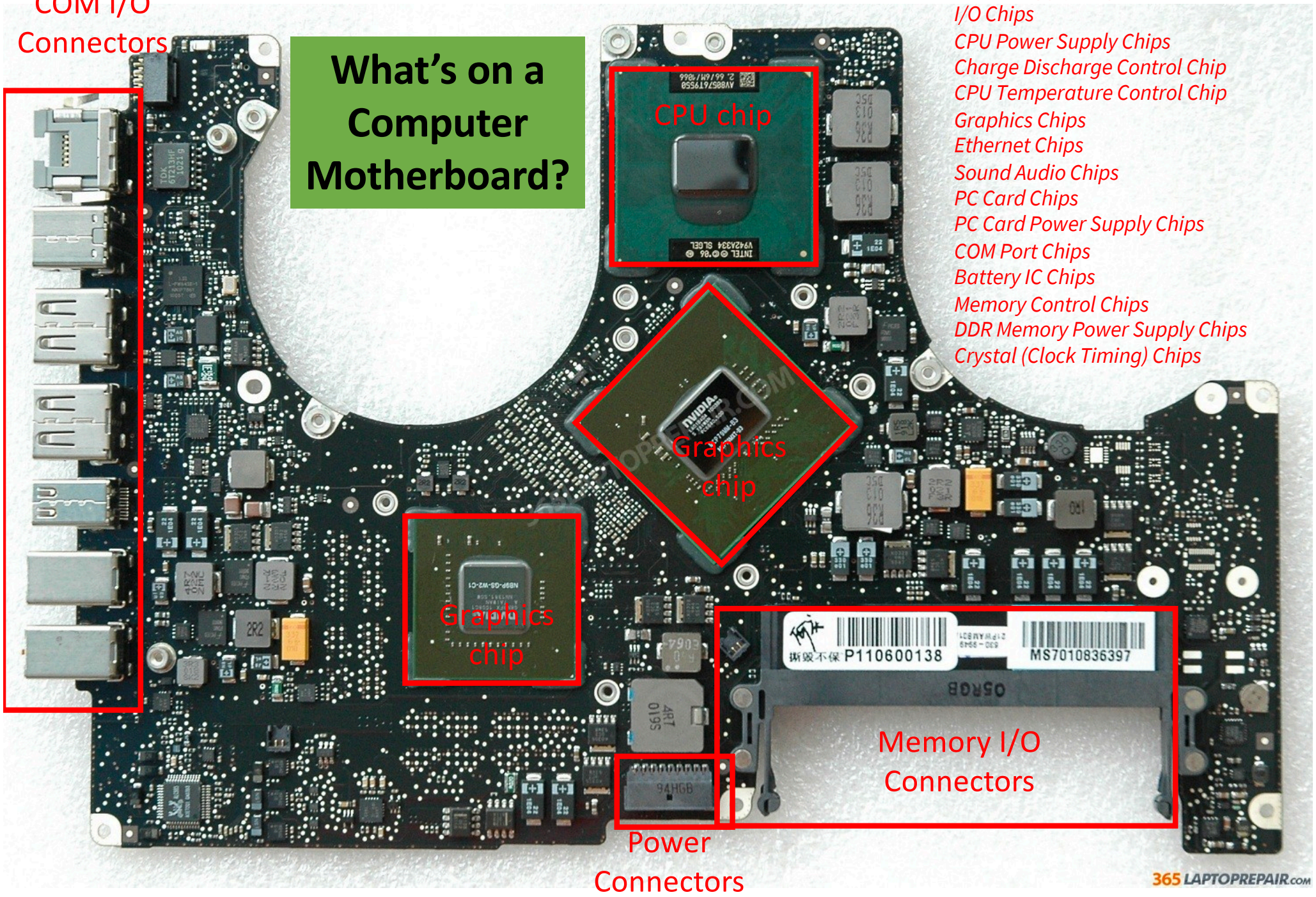
The 5 Main Components of a Computer:

1. **Processor**
2. **Memory**
3. **Input**
4. **Output**
5. **Secondary Data Storage**



Let's Peek Under the Hood…

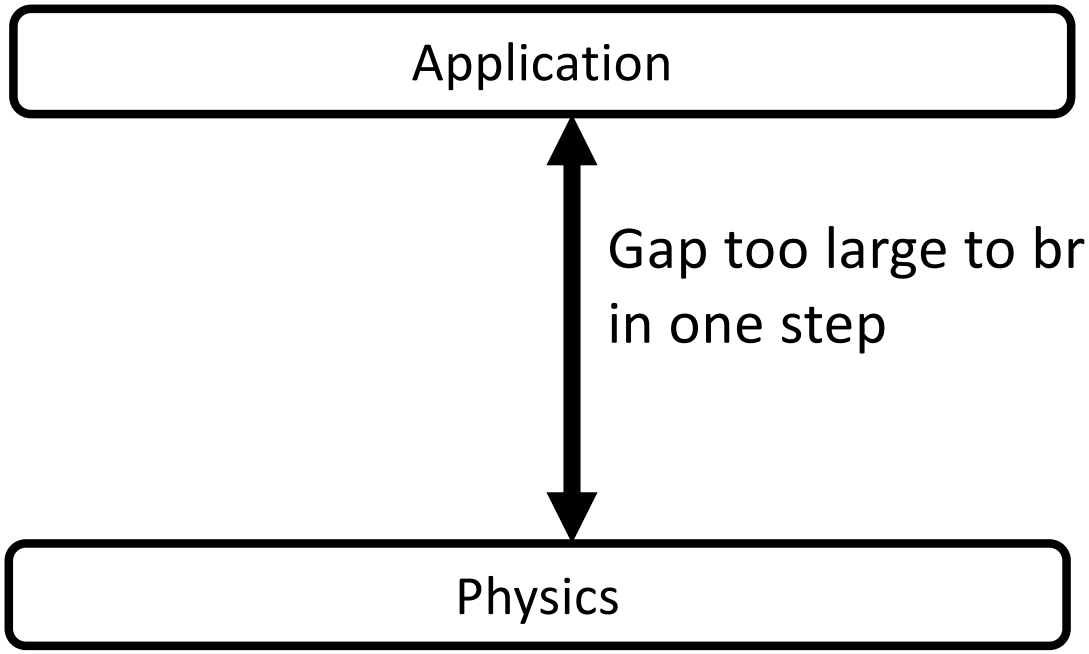




Typical Chips on a Motherboard

CPU Chip
Power Supply Chips
I/O Chips
CPU Power Supply Chips
Charge Discharge Control Chip
CPU Temperature Control Chip
Graphics Chips
Ethernet Chips
Sound Audio Chips
PC Card Chips
PC Card Power Supply Chips
COM Port Chips
Battery IC Chips
Memory Control Chips
DDR Memory Power Supply Chips
Crystal (Clock Timing) Chips

What is Computer Architecture?



In its broadest definition, computer architecture is the *design of the abstraction layers* that allow us to implement information processing applications efficiently using available manufacturing technologies.

Source: K.Asanovic, UCB

Abstraction Layers in Modern Computer Systems

- Application
- Algorithm
- Programming Language
- Operating System/Virtual Machines
- Instruction Set Architecture (ISA)
- Microarchitecture
- Logic Gates/Register-Transfer Level (RTL)
- Circuits
- Devices (Transistors, etc…)
- Physics

Computer Science

Computer/Electrical Engineering

YOUR TO-DOs for the Week

- Get accounts on Piazza and Gradescope
- Do your reading for next class (all of Chapter 1)
- Start on Assignment #1 for lab (***lab01***)
  - I'll put it up on our main website this Wednesday
  - Meet up in the lab this Friday
  - Do the lab assignment
  - You have to submit it as a **PDF** using ***Gradescope***
  - Due on **Wednesday, 1/15, by 11:59:59 PM**


</LECTURE>