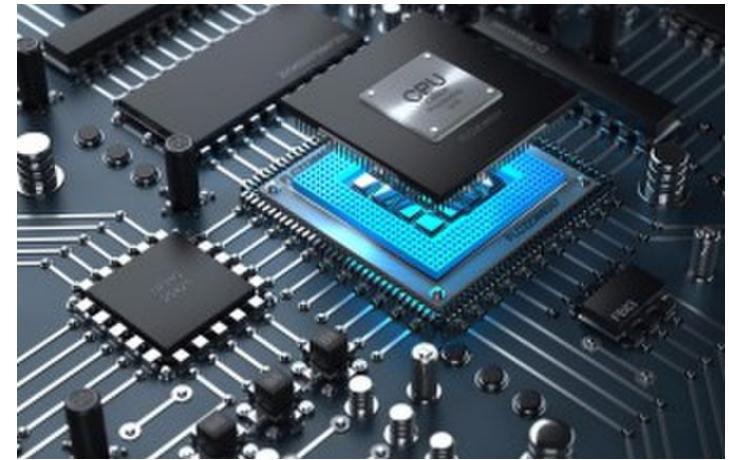


```
loop: lw    $t3, 0($t0)
      lw    $t4, 4($t0)
      add   $t2, $t3, $t4
      sw    $t2, 8($t0)
      addi  $t0, $t0, 4
      addi  $t1, $t1, -1
      bgtz $t1, loop
```

Assembler

```
0x8d0b0000
0x8d0c0004
0x016c5020
0xad0a0008
0x21080004
0x2129ffff
0x1d20ffff9
```

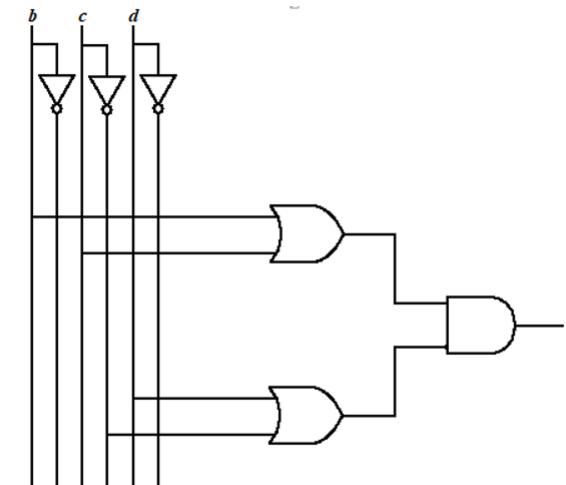


Welcome to Assignment Project Exam Help “Computer Architecture”

<https://tutorcs.com>
CS 154: Computer Architecture
WeChat: cstutorcs

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**
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```
if (want2add) && (on_waitlist)
{
    WeChat: cstutorcs
    SeeMeAfterLecture(True);

}
else
{
    YoureGonnaHaveABadTime(True);
}
```



Your Instructor

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

Email: **zmatni@ucsb.edu** Assignment Project Exam Help

(please put CS154 at the start of
the subject header!!)
https://tutorcs.com
WeChat: cstutorcs

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**

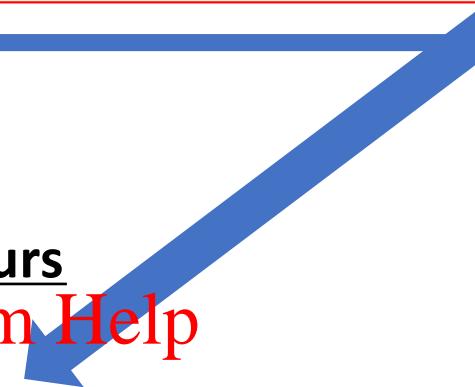
Teaching Assistant

George Tzimpragos Assignment Project Exam Help
tbd

Sid Senthilkumar https://tutorcs.com
tbd

David Weinflash WeChat: cstutorcs
tbd

Office Hours



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

Posted on Thursday

Labs are due on WEDNESDAYS!
(unless otherwise told)

YOUR LABS ARE HERE

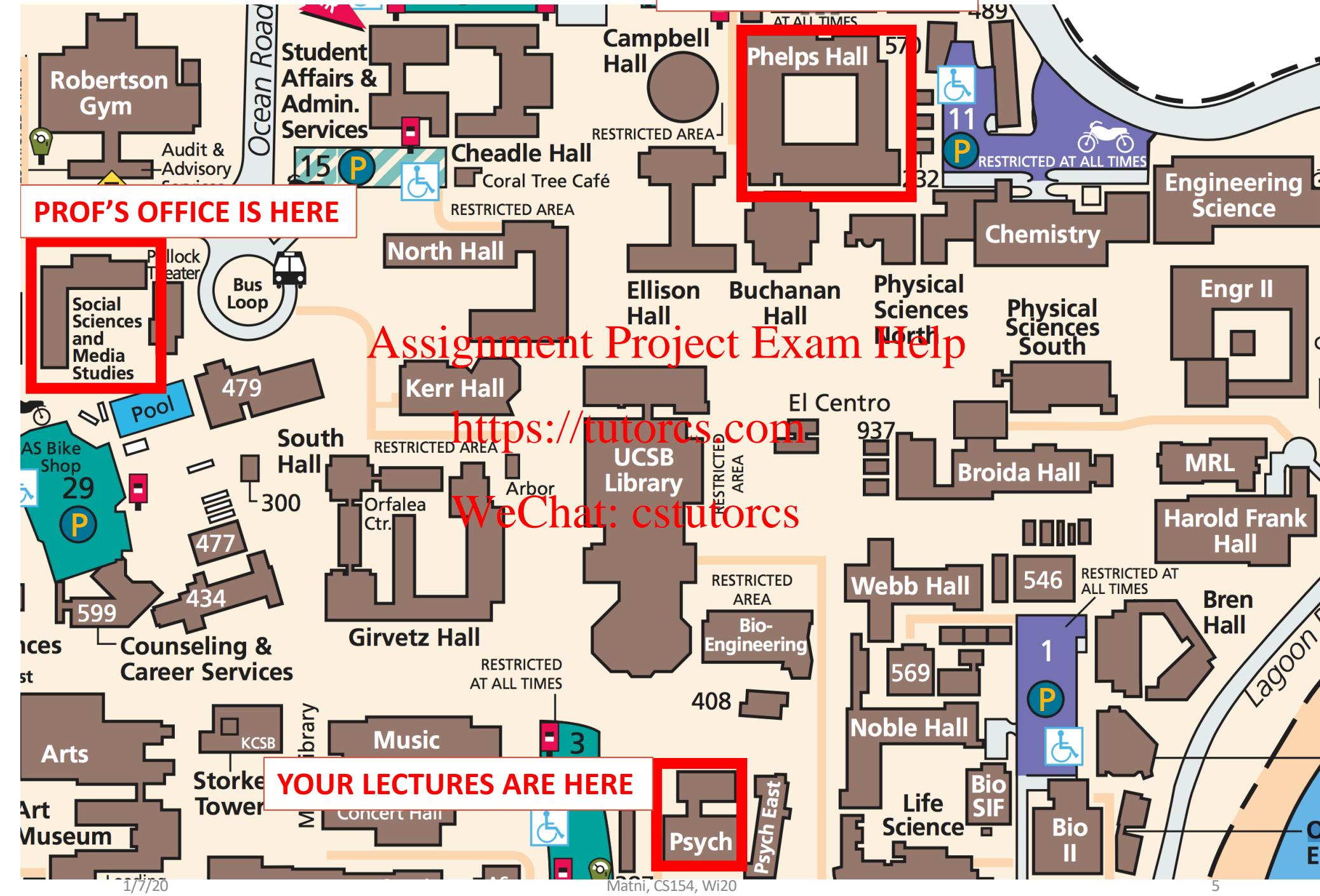
PROF'S OFFICE IS HERE

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<https://tutorcs.com>

WeChat: cstutorcs

YOUR LECTURES ARE HERE



You!

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

- A. Are Freshmen? Sophomores? Juniors? Seniors?
- B. Are CS majors?<https://tutorcs.com>
- 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**.

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- We'll be talking about:
<https://tutorcs.com>
 - 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
~~Assignment Project Exam Help~~
- No social media use in the classroom, please
<https://tutorcs.com>
- To succeed in this class, take thorough notes
~~WeChat: cstutores~~
- 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/>
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On there, I will keep: <https://tutorcs.com>

WeChat: cstutorcs
• 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
<https://tutorcs.com>

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Register Today!

Gradescope

WeChat: cstutorcs
<https://www.gradescope.com>

On there:

- You will submit all your assignments, typically as **PDFs**
 - 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 **Assignment Project Exam Help**
 <https://tutorcs.com>
- Class organization and expected conduct
 WeChat: cstutorcs
- Grading info
- Lectures & participation
- Labs & assignments
- My policies (absences, make ups, my copyrights, academic integrity)
- Class schedule
- Extra resources for students

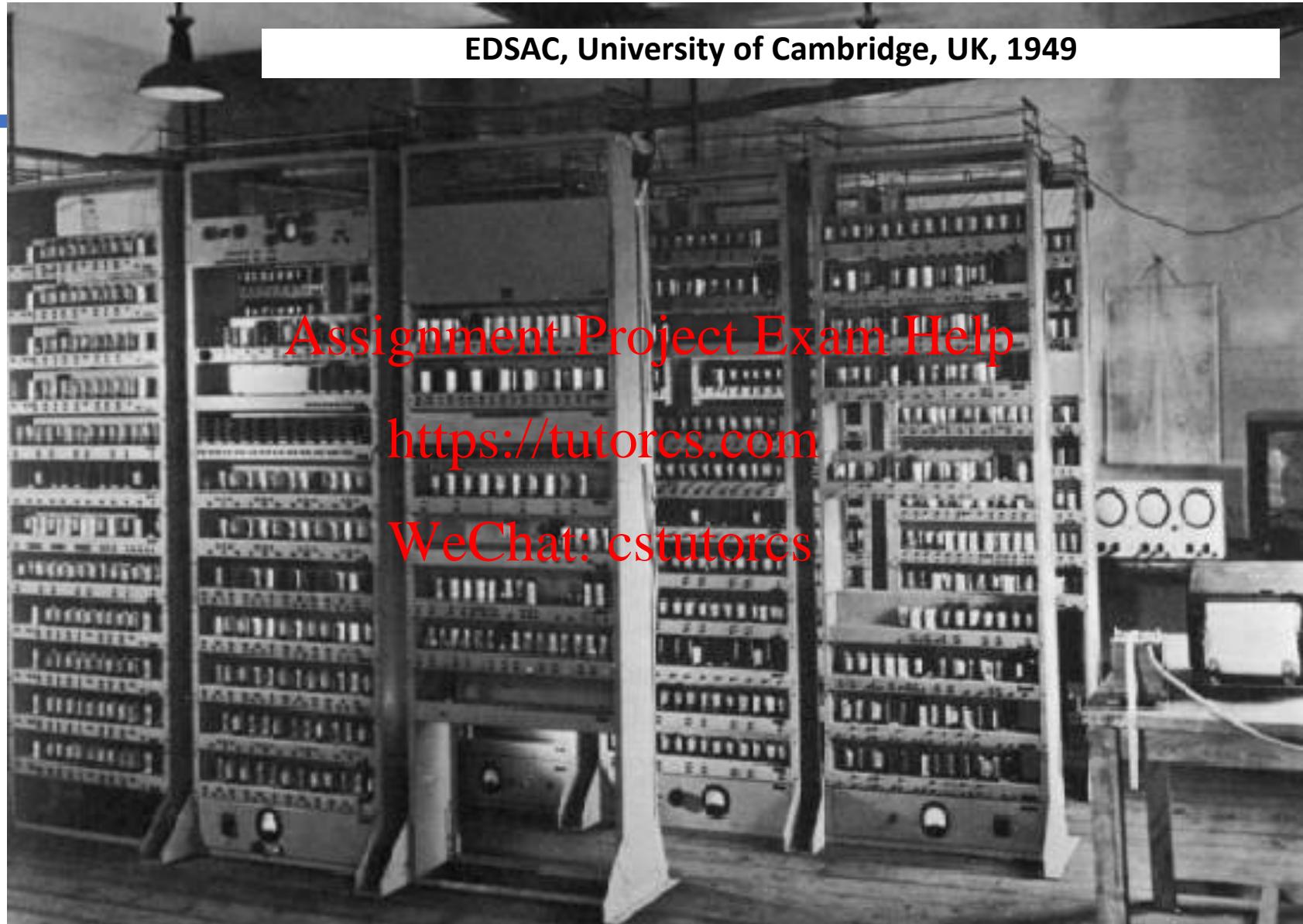
**You are responsible for
reading it
(yes, the whole thing!)**

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Computing Devices Then...



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<https://tutorcs.com>

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Source: K.Asanovic, UCB

Computing Devices Now



Sensor Nets



Cameras



Media
Players



Smart
phones



Automobiles



Set-top
boxes



Games

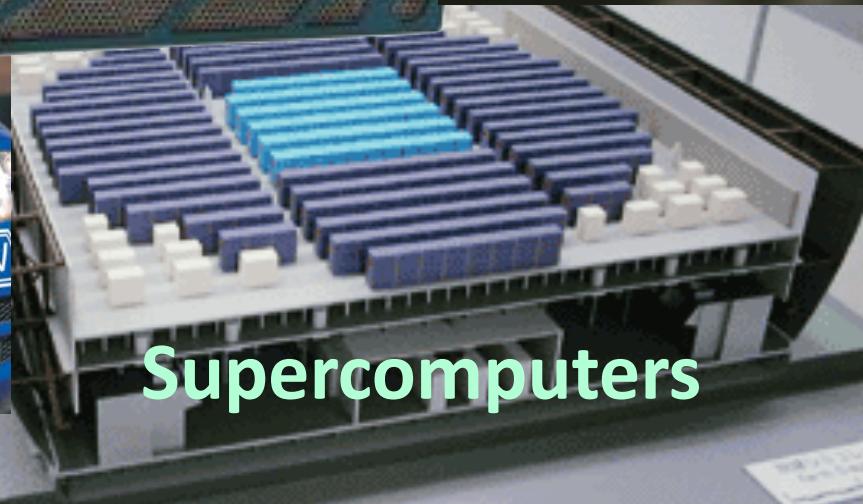


Servers



Robots

Routers



Supercomputers

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Laptops
<https://tutorcs.com>

WeChat: cstutorcs

Source: K.Asanovic, UCB

The Computer Revolution

- Progress in computer technology
 - Underpinned by Moore's Law
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- 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

- **Personal Computers**

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



Where would you put
smart phones and tablets??

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- **Servers**

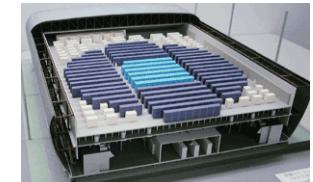
- Network based
- High capacity, high performance, high reliability

<https://tutorcs.com>



- **Supercomputers**

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



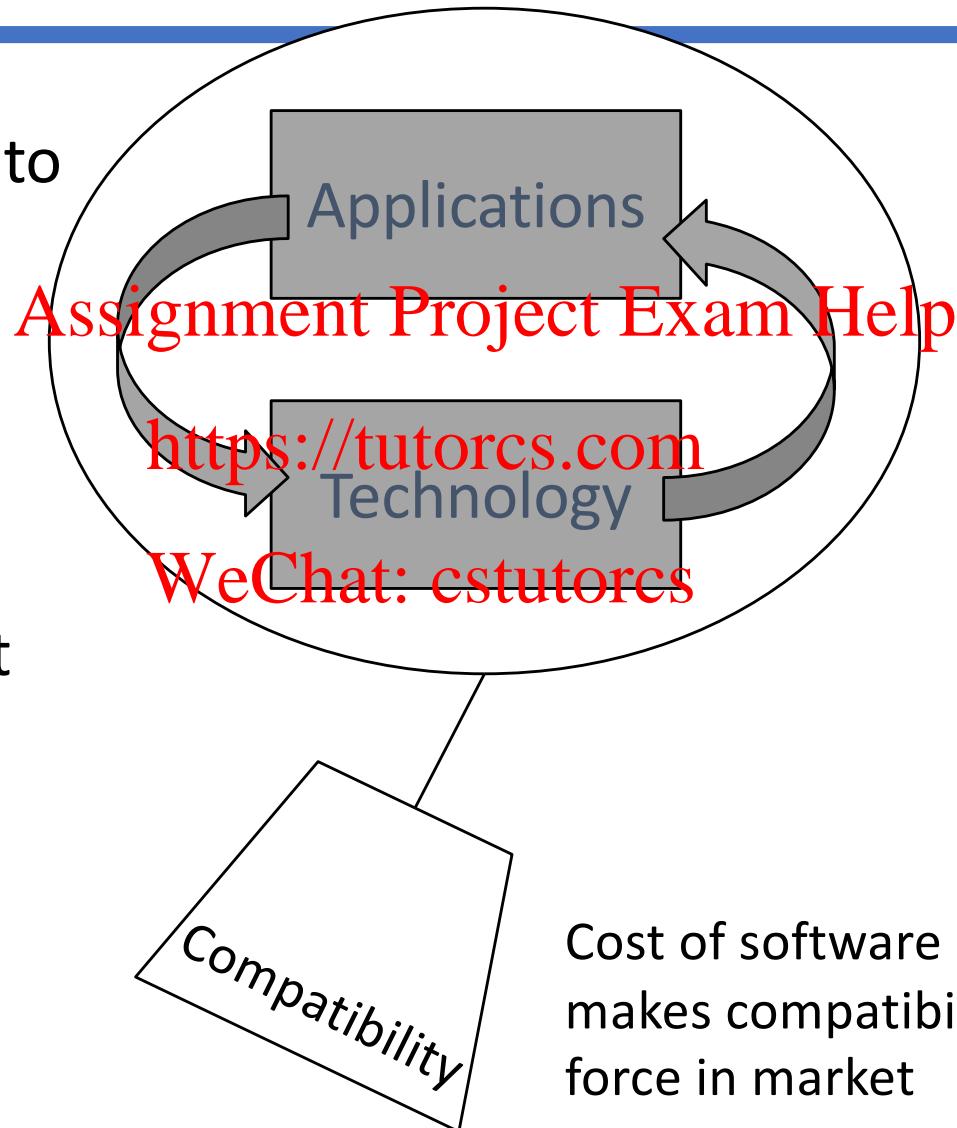
- **Embedded computers**

- 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

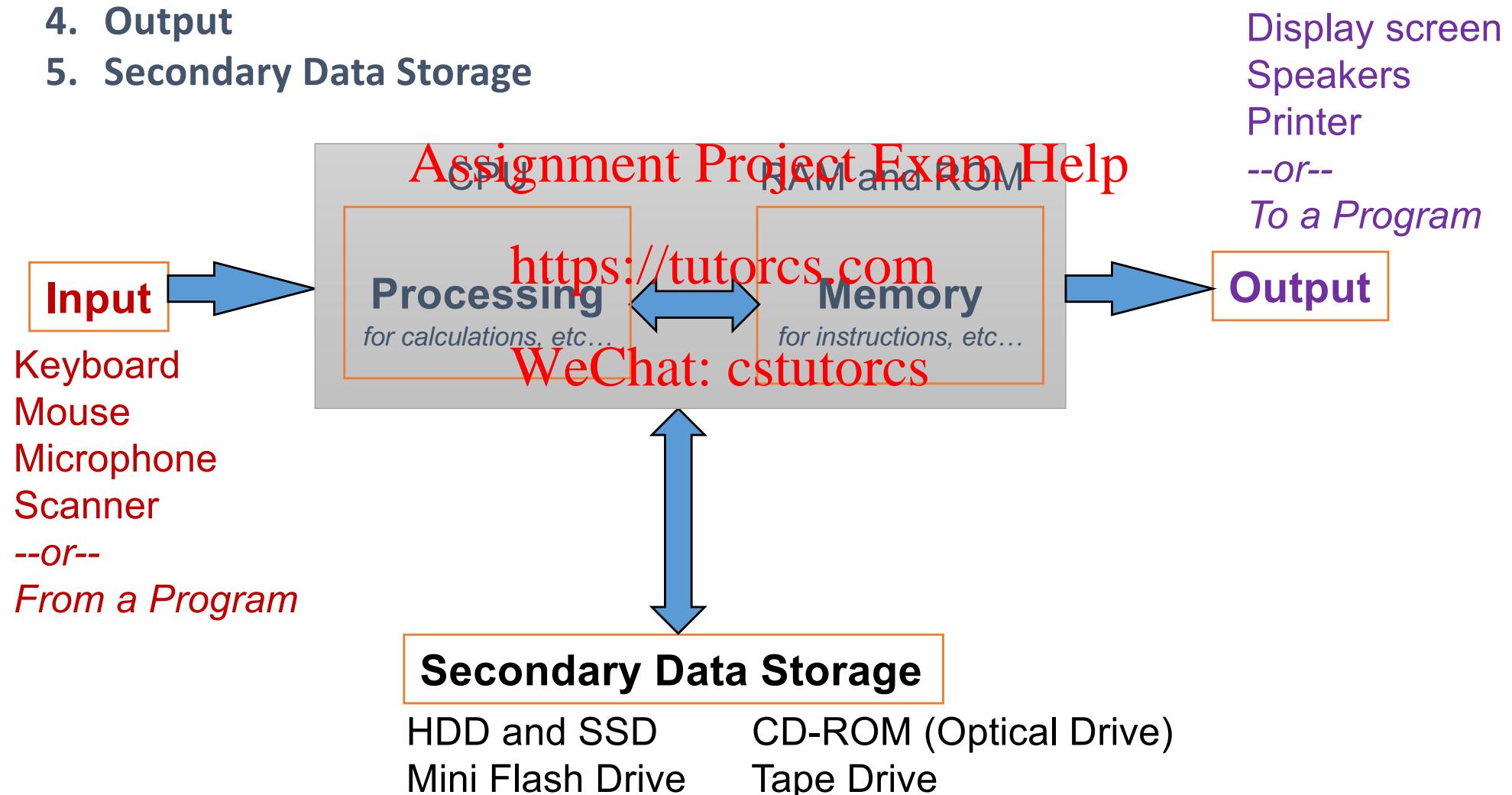
Source: K.Asanovic, UCB

A Simplified View of Modern Computer Architecture

The 5 Main Components of a Computer:

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

a.k.a von Neumann Architecture



Let's Peek Under the Hood...

Apple
MacBook Pro

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<https://tutorcs.com>

WeChat: cstutorcs

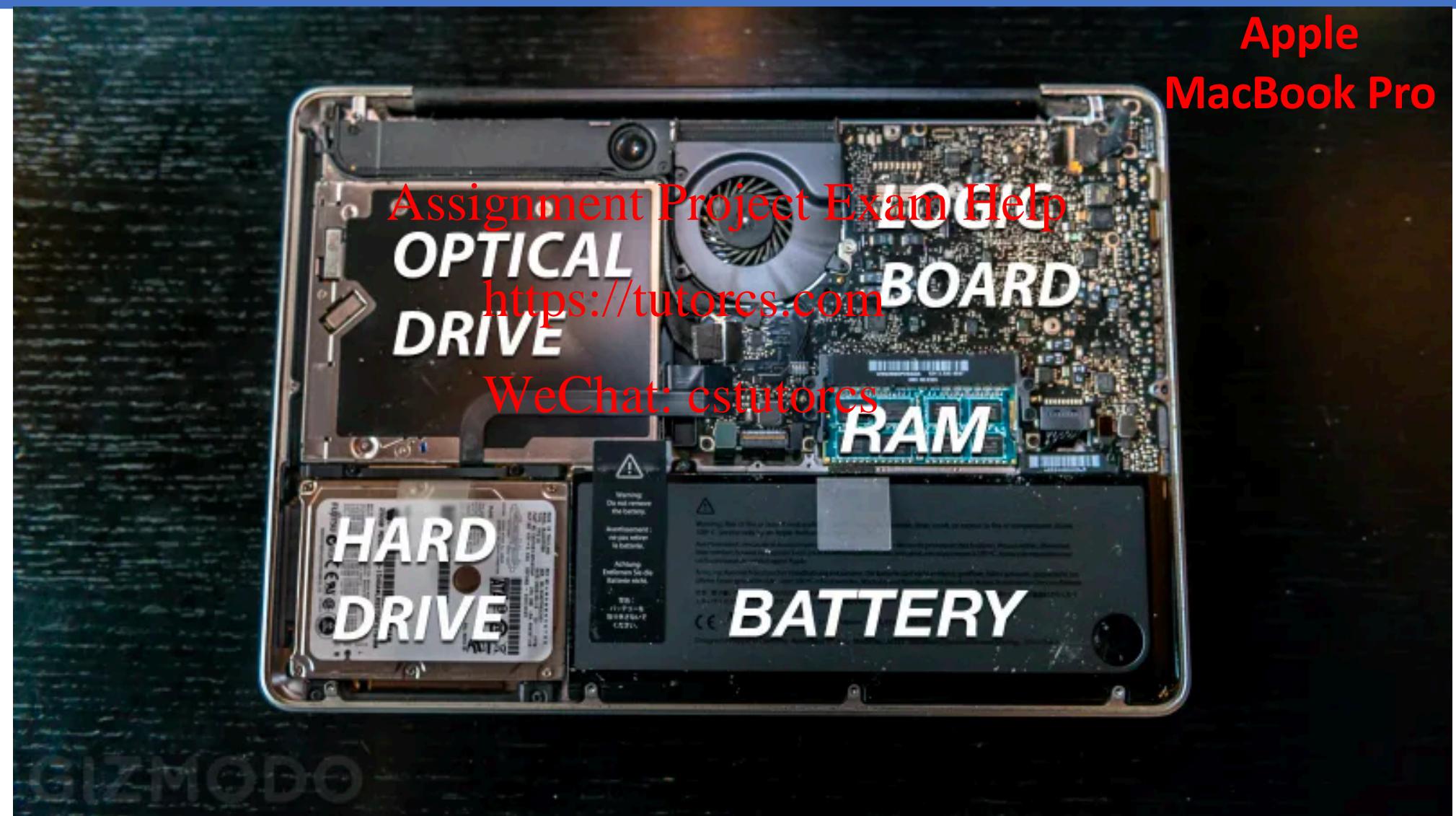
HARD
DRIVE

RAM

BATTERY

OPTICAL
DRIVE

LOGIC
BOARD



COM I/O
Connectors

What's on a Computer Motherboard?

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<https://tutorcs.com>

WeChat: cstutorcs

Graphics
chip

CPU chip

Power
Connectors

Memory I/O
Connectors

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

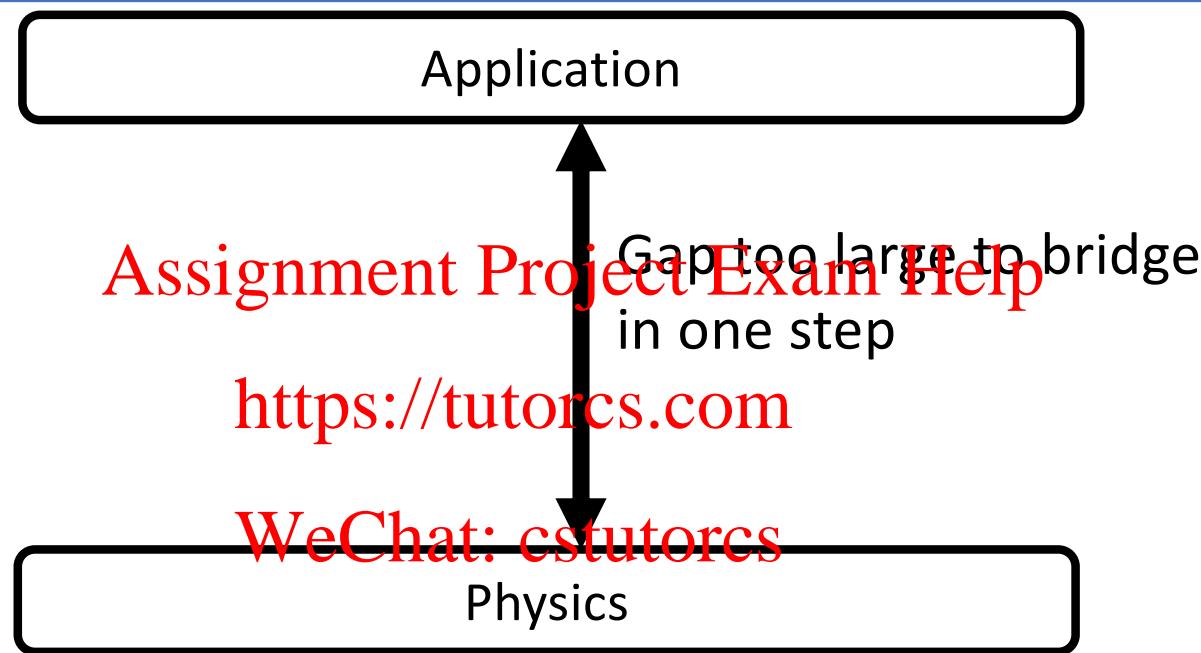
Battery IC Chips

Memory Control Chips

DDR Memory Power Supply Chips

Crystal (Clock Timing) Chips

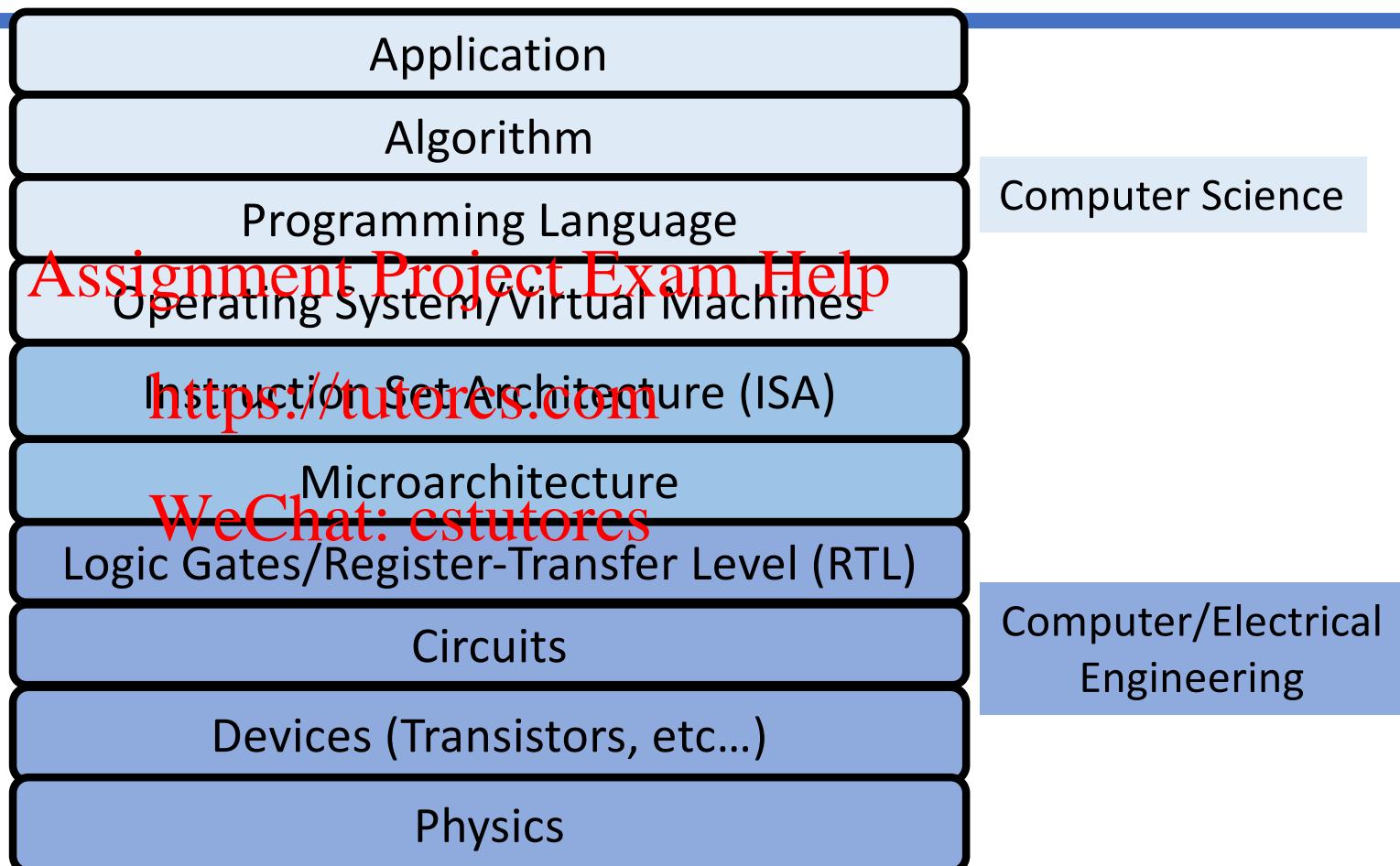
What is Computer Architecture?



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



YOUR TO-DOs for the Week

- Get accounts on Piazza and Gradescope
- Do your reading for next class (all of Chapter 1)
<https://tutorcs.com>
- Start on Assignment #1 for lab (*lab01*)
WeChat: cstutorcs
 - 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**

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