would you rather

a) give a surprise 10 min talk to your CS340 class? on anything

b) have 24 hours to write a 10 page paper on CS 340 so far

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ICB

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CS 340

Part 1 Overview

Updates

1. MP 0 - Setup due next week Tuesday.
    a. You may need 2-3 days to get it working
2. HW 1 Due Thursday 1:59pm
3. MP 1 - Released

Today's Agenda

1. MP 1 Release
2. CS Degree Learning Goals
3. CS 340 Specific Learning Goals
4. CS 340 Part 1 Overview
    a. Layers of abstraction
    b. Hello world at multiple levels
    c. Our path forward

CS Degree Learning Goals

LG: Learning how to learn. How to approach problems.

LG: Learning how to manage your time to complete tasks by a deadline.

LG: Learning how to use logical reasoning to solve complex problems.

LG: Learning how to communicate your understanding AND confusion on topics.

LG: Developing an intuition on how computers and programming work to be able to adapt to new situations.

CS 340 - Demystifying Computer Systems

LG: Getting experience working on unstructured, substantial coding projects.

LG: Understanding abstraction and how it relates to computer systems.

LG: Understanding enough about computer systems to be able to dive deeper on your own if needed.

LG: Learning how we get from electricity to the CS 340 Website displaying your grade.

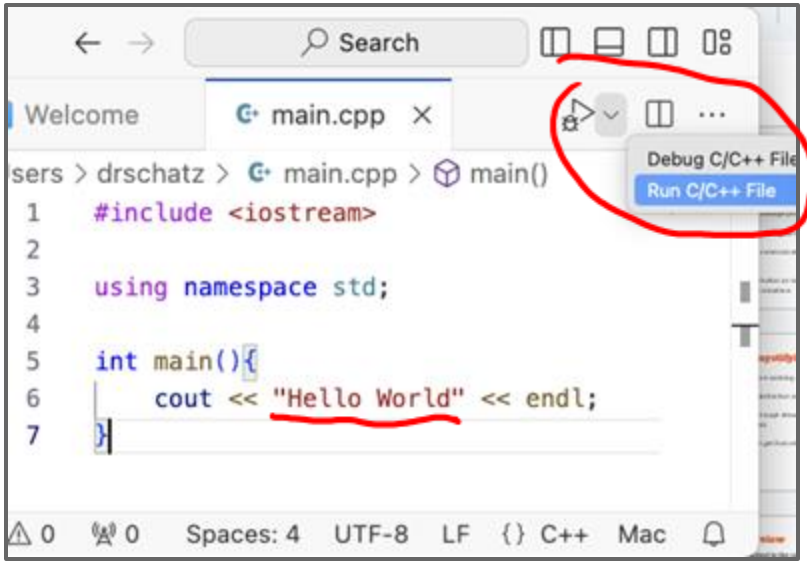
340 Part 1 - Overview

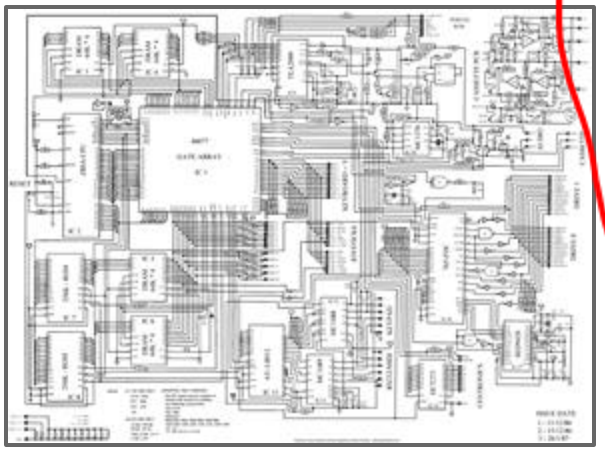
Today's LG: To give context to the course material to start seeding concepts and how they fit into the big picture.

1. What do we mean with abstraction
2. Big ideas
3. Running "Hello World"
    a. Deeper! DEEPER! and DEeEEEeEEeEeeeEPER!!!!!!!!!
4. Part - 1 Path

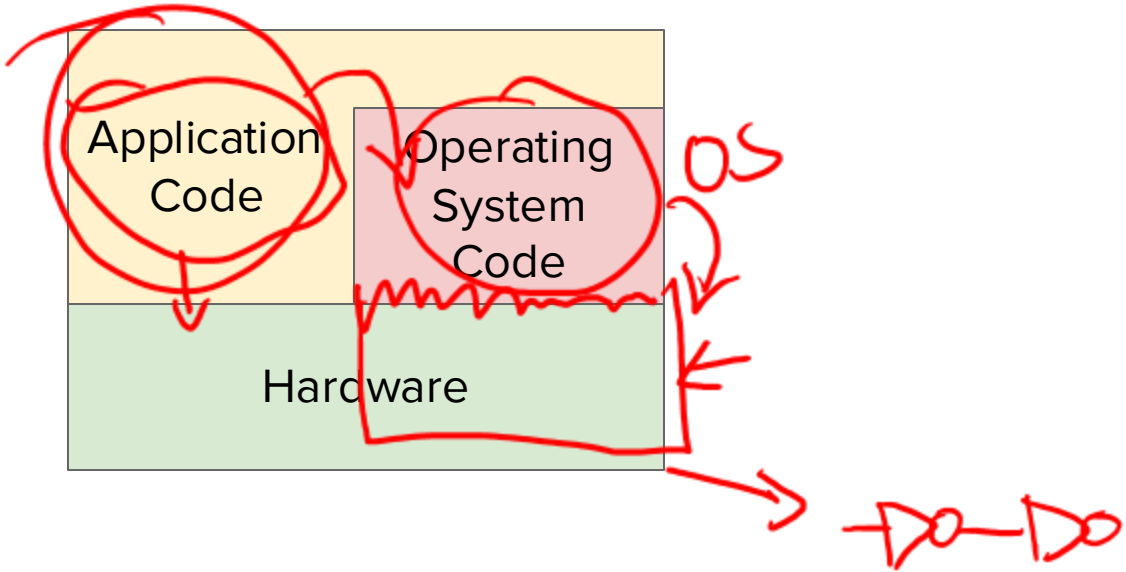
What we mean by abstraction

Computer Layers of Abstraction



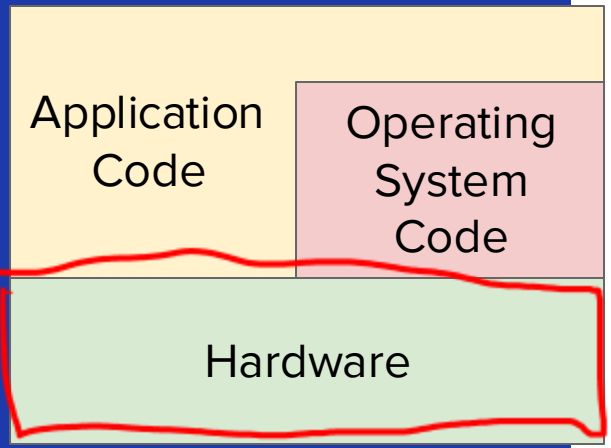


Big Ideas



What should you remember?

- 340 is about looking into some of the details that have been abstracted away that will help us be customize, debug, and understand computers better.
- This graphic is a simple representation of a computer system.
  - Application code are things you interact with directly.
  - OS code helps your computer run and manage resources.
  - All code interacts with the hardware which is what actually executes logic.

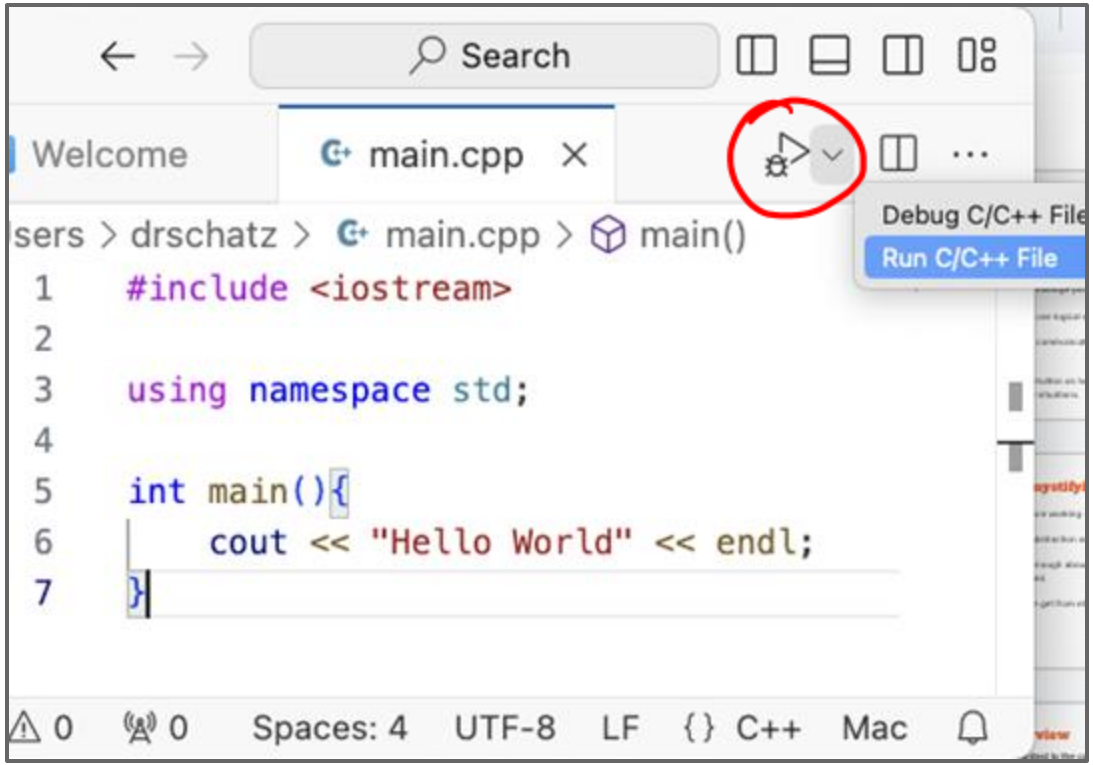


340 Part 1 - Overview

Today's LG: To give context to the course material to start seeding concepts and how they fit into the big picture.

1. What do we mean with abstraction
2. Big ideas
3. **Running "Hello World"**
    a. **Deeper! DEEPER! and DEeEEEeEEeEeeeEPER!!!!!!!!!**
4. Part - 1 Path

“Hello World”

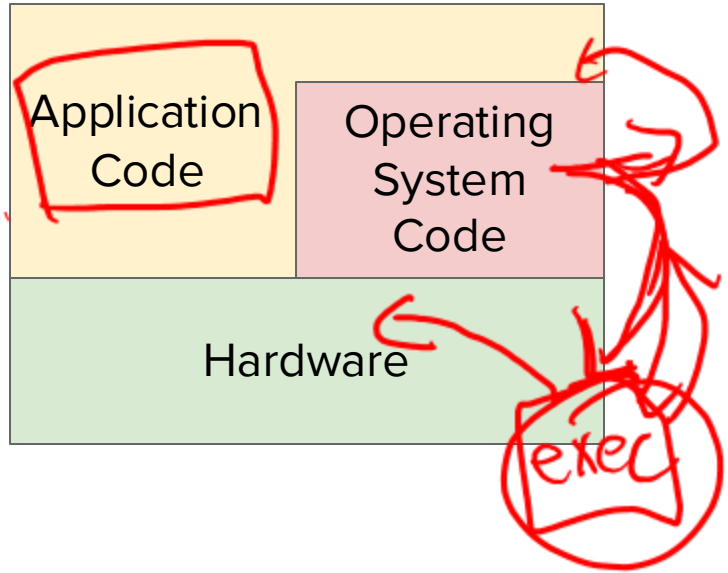


Hello World

"Hello World" - Deeper

```
g++ hello.cc -o exec
./exec
```

"hello world"



If we remove the operating system can we still execute/run the program?

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Q1

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340

A) Yes
B) No
C) Unsure

If we delete hello.cc can we still execute/run the program?

exec

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Q2

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A) Yes
B) No
C) Unsure

“Hello World” - Deeper!

g++ hello.cc -o exec

./exec

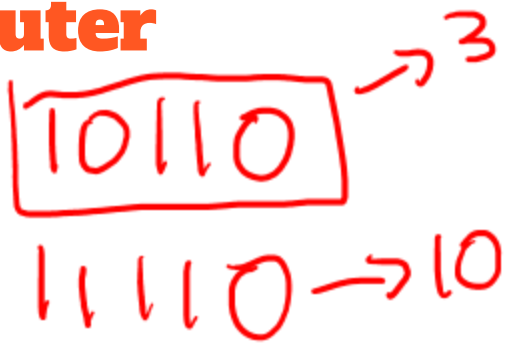
Information in a Computer

Bit - 0, 1

Byte - 8 bits

Octets

Word - 4, or 8 bytes



8 bits

How many Bytes are in this sequence?

1011 0011 1001 0001

A) 0
B) 1
C) 2
D) 4
E) 16

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Q3

~Code~
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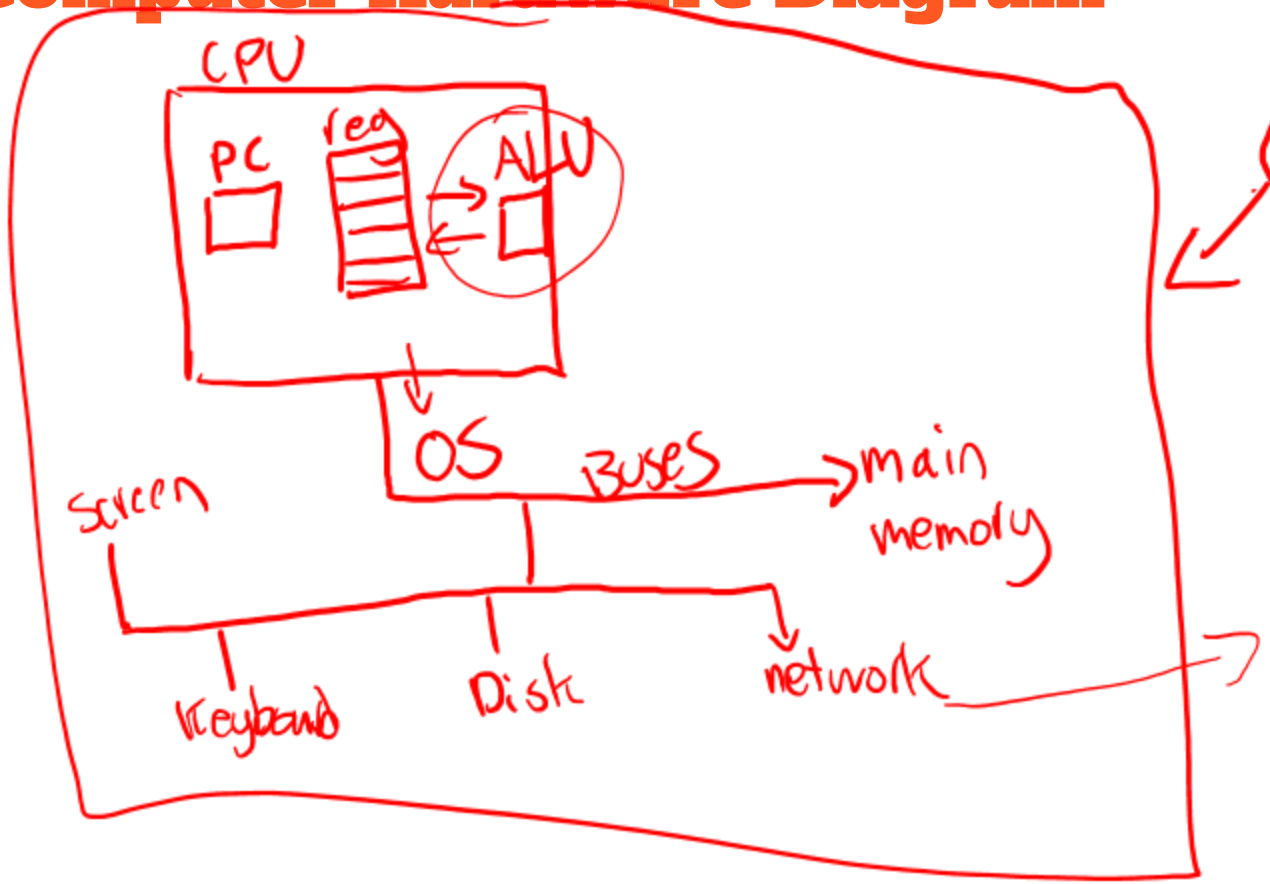
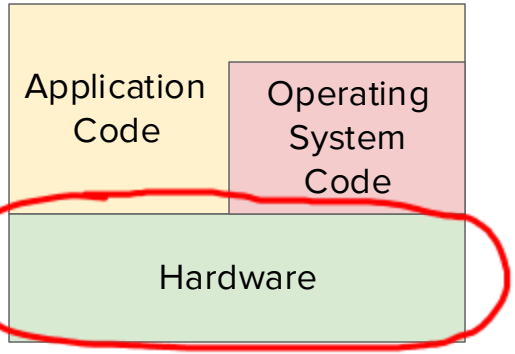
Computer Hardware Diagram





“Hello World” - Deeper!

```
→ g++ hello.cc -o exec
  ./exec
```

DEEPER!

Every step involves:

- AND, OR, NOT, XOR: Building blocks of all logic
- Multiplexers
- D Flip-Flops: Storing 1-bit state
- Clock signal: Synchronizing all activity

DEeEEEeEEeEeeeEPER!!!!!!!!

Every action is controlled by:

- Binary voltage levels (e.g., 0V = 0, ~5V = 1)
- A square wave oscillator
- Buses that carry multi-bit voltage patterns across the chip and board

What should you remember?

- There is a lot you don’t YET know and a lot of details you may never care to know. Abstraction allows us to often ignore aspects we don’t need to dive into.
- All code is run on hardware.
- The following terms exist - Compiler, application, CPU, PC, ALU, OS, memory, disk, I/O.
- The OS has a major role
  - Switches between running programs
  - Interfaces with many parts of the hardware like memory and other devices

True or false? I can run code on the operating system?

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Q4

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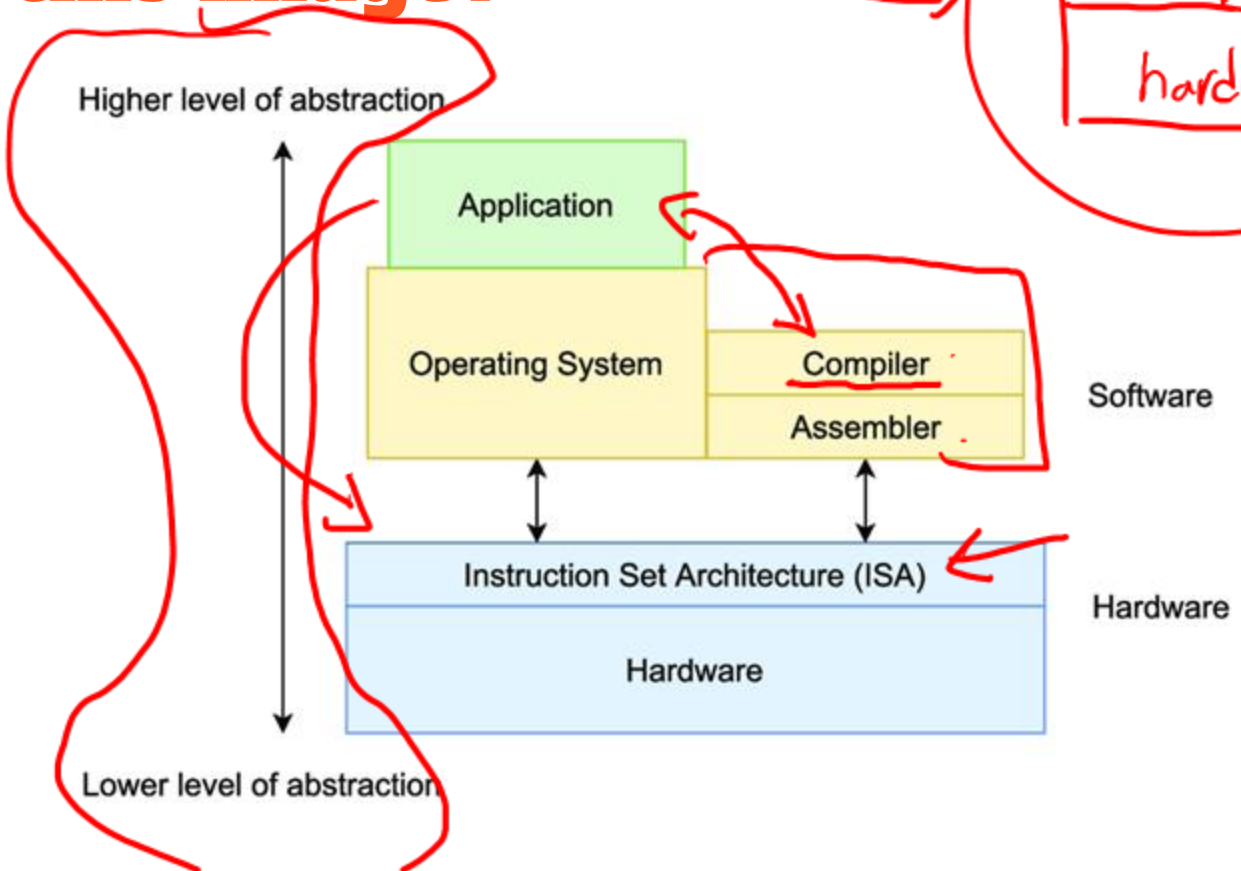
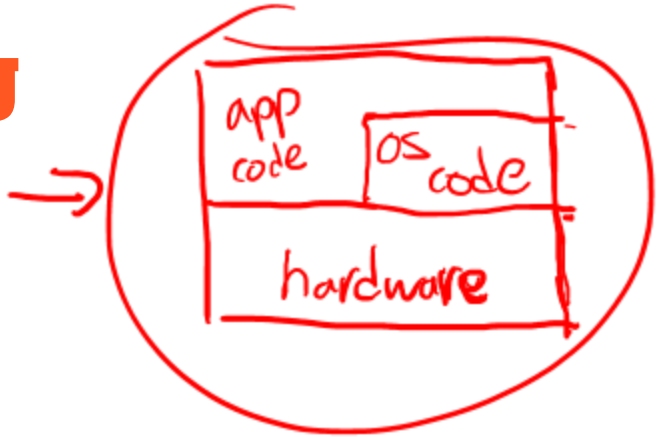
A) True

B) False

What is wrong/misleading about this image?





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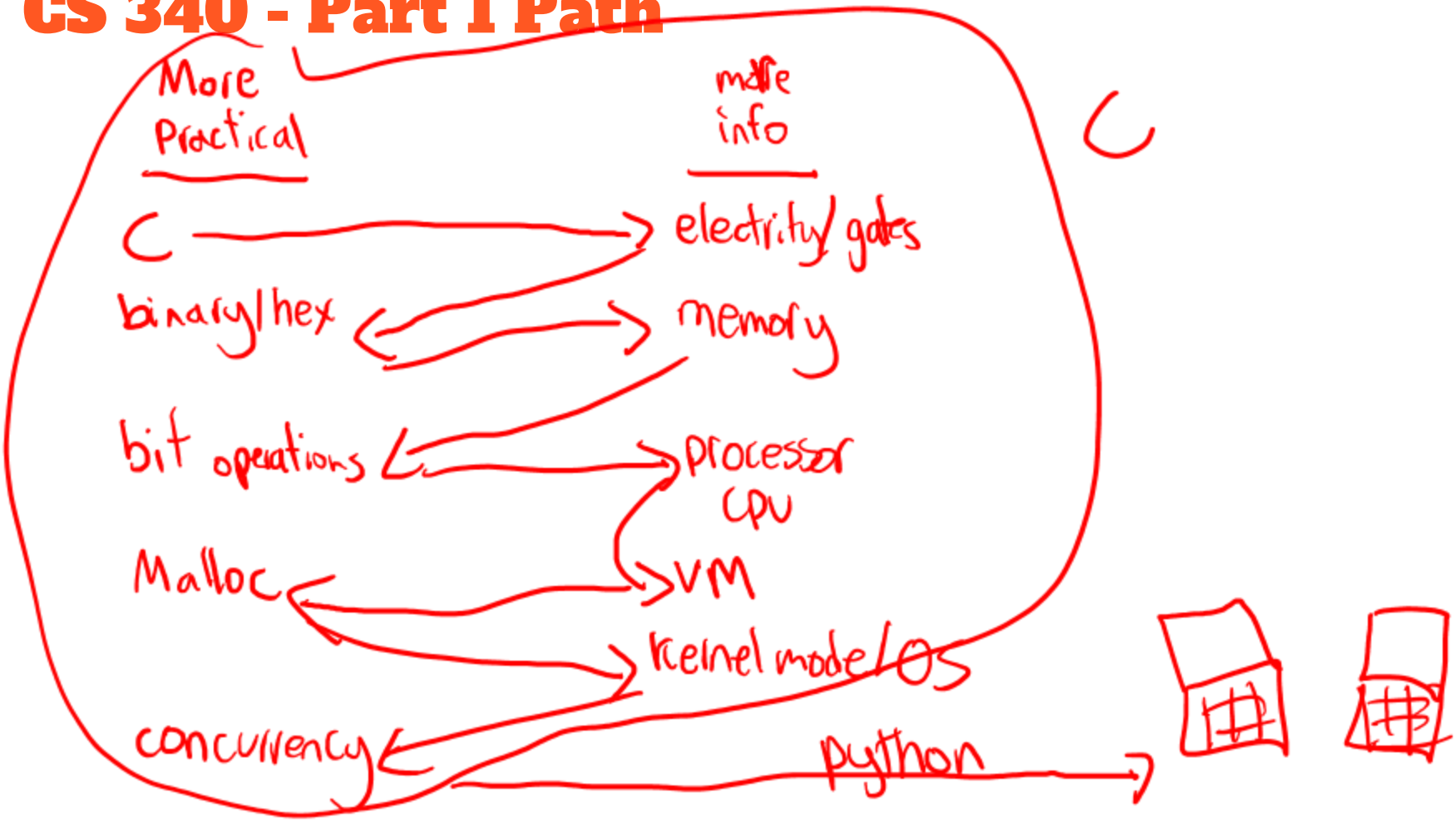
CS 340 - Part 1 Path



How we will get there?

Lecture - Informational and practical skills

MPs - practice working on unstructured coding projects related to systems and topics covered.

HW - conceptual and smaller tasks around topics learned in class.

Exams - Covers some lecture clickers, MPs and HW

Next Up...