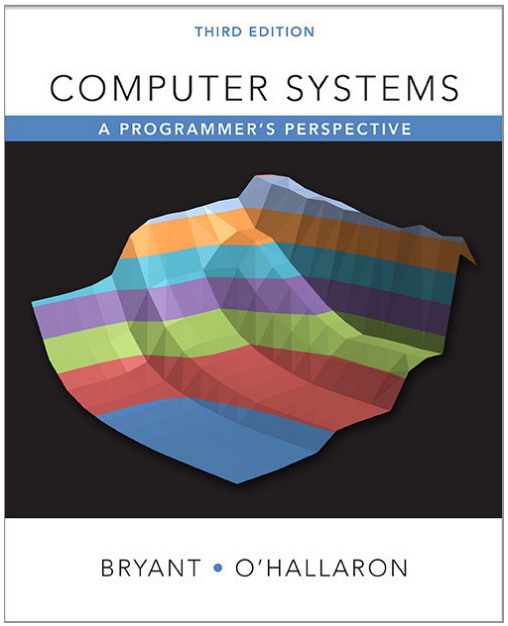
CS 4400 – Computer Systems



Instructor: Matthew Flatt

TAs: Derek Johnson
Shweta Singhal
Shobi Maheshwari

The New CS 4400

Offered in fall and spring semesters

Spring 2017 staff: Danny Kopta and Erin Parker

New course organization

- Video lectures
- Recitation-style class
- Lab sessions
- Revised lab assignments
- Less reundancy with CS 3810

Expected to be the same for Spring 2017

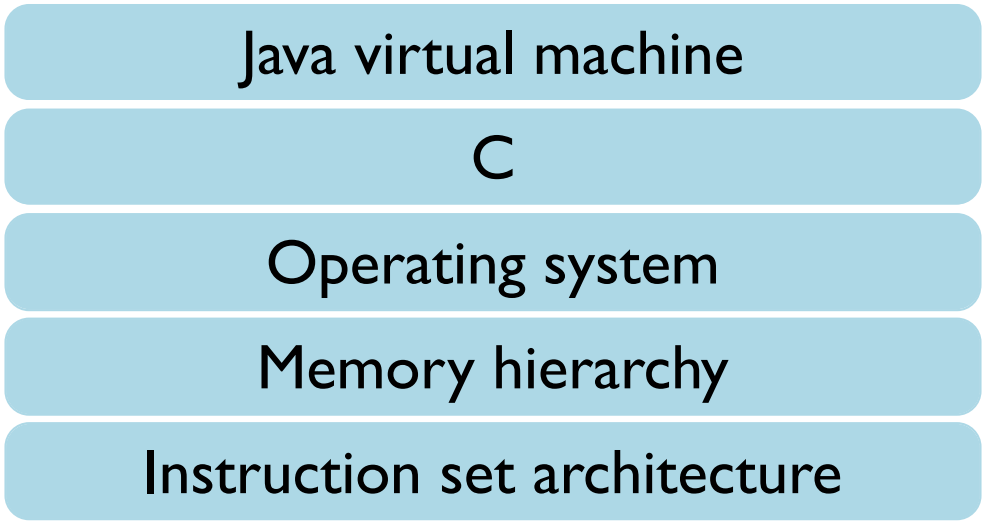
Course Information

`https://www.eng.utah.edu/~cs4400/`

- Prerequisite: CS 3810
- Recommended: CS 3505

Why CS 4400?

Explore layers of abstraction — especially the lower ones



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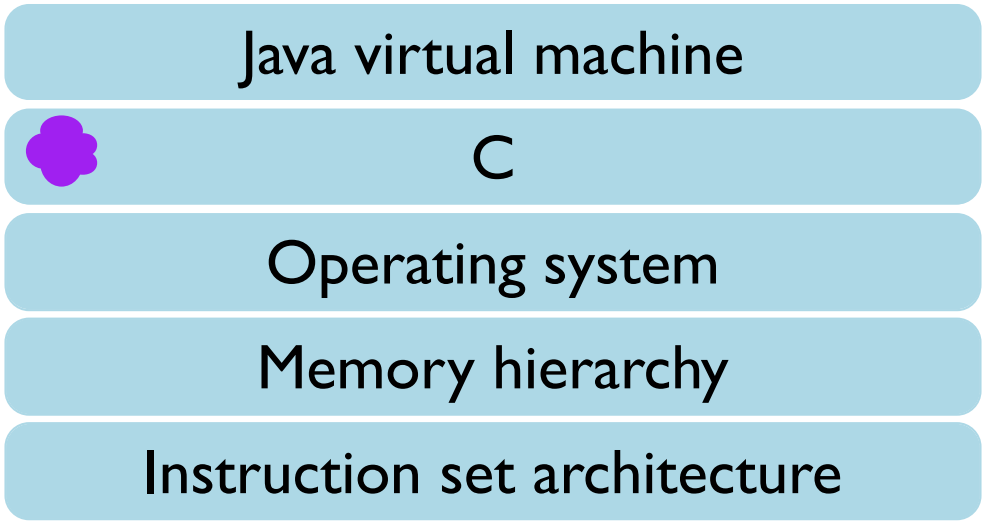

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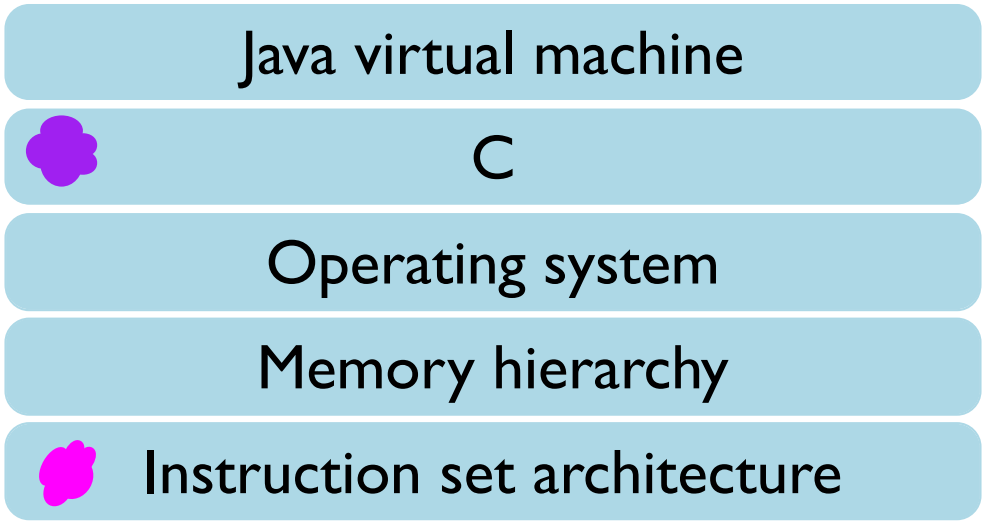


Course Skills

Unix both technically and culturally

- Processes, file descriptors, sockets
- Shells, **`gcc`**, **`gdb`**

C as a "portable assembly language"

- Exposed data representations
- Unsafe
- Manual memory management

x86-64 but transferrable to, e.g., ARM

Course Concepts

Representing data, especially numbers

Instruction sets

Optimization

Linking

Processes and signals

Memory allocation

Networking APIs

Concurrency

Course Structure: Lab Assignments

match

bomb (disassembly)

performance

linking

shell

malloc

server

1-2 weeks each, sometimes student-specific

Course Structure: Videos, Classes, and Lab Sessions

Before Monday & Wednesday:

- video lectures posted
- quiz posted, sometimes

Monday & Wesneday:

- class meets for extended examples

Thursday:

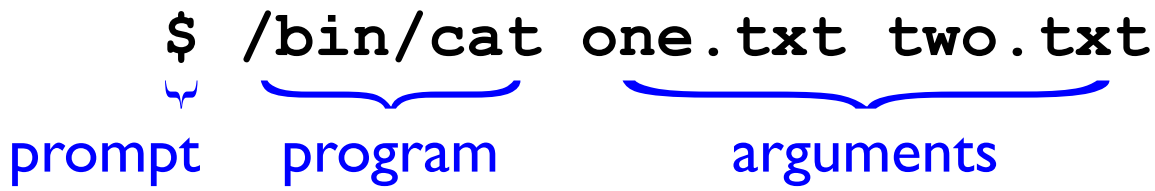
- lab session in CADE (WEB L224, not MEB 3225)

Command-Line Arguments

Running Programs at a Command Line

```
$ /bin/cat one.txt two.txt
```

Running Programs at a Command Line



Running Programs at a Command Line

A command line is itself a program known as a ***shell***

The default shell is **`/bin/bash`**

```
$ /bin/echo a   b
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```
$ /bin/echo a   b
          ↵   ↵
  argument    argument
```

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```
$ /bin/echo "a  b"
```

argument

Shell Quoting

Both

"

and

'

are quotes in **`bash`**, but with different rules

More information:

`man bash`

Useful Outcomes of CS 4400

You will be a more effective programmer

- detecting and fixing bugs more efficiently
- understanding and tuning program performance

You will be comfortable using the terminal and command line

You will have a firm foundation for specialized systems classes and real-word software development