CS 4400 – Computer Systems

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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 redundancy 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

- Java virtual machine
- C
- Operating system
- Memory hierarchy
- Instruction set architecture
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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 & Wednesday:

• 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

$ /bin/cat one.txt two.txt

prompt program arguments
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
```
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
```

```
argument argument
```
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"
```

```bash
$ /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