Welcome to the gem5 bootcamp!

About the overall structure of the bootcamp

These slides and are available at https://bootcamp.gem5.org/ for you to follow along.

(Note: They will be archived at https://gem5bootcamp.github.io/2024)

The source for the slides, and what you'll be using throughout the bootcamp can be found on github at https://github.com/gem5bootcamp/2024

> Note: Don't clone that repo, yet. We'll do that in a bit.

A bit about me

I am **Prof. Jason Lowe-Power** (he/him).
I am an associate professor in the Computer Science Department and
the *Project Management Committee chair* for the gem5 project.

I lead the Davis Computer Architecture Research (DArchR) Group.

https://arch.cs.ucdavis.edu

The bootcamp team

Bobby Bruce

Ivana Mitrovic

Harshil Patel

Erin Le

Mahyar Samani

Zhantong Qiu

William Shaddix

Yuyi Li

Leo Redivo

Mitha Mysore

Alyssa Vallejo

Noah Krim

Saili Karkare

Plan for the week

Day 1

Introduction
- Background on simulation
- Getting started with gem5
- Background on Python and gem5

Using gem5
- gem5's standard library
- gem5 resources

Day 2

Using gem5
- Running things in gem5
- Modeling cores in gem5
- Modeling caches in gem5
- Modeling memory in gem5
- Full system simulation

Day 3

Using gem5
- Accelerating simulation
- Sampled simulation with gem5
- Multisim
- Power modeling

Developing gem5 models
- SimObject intro
- Debugging and debug flags
- Event-driven simulation
- Ports and memory-based SimObjects

Day 4

Developing gem5 models
- Modeling Cores
- Modeling cache coherence with Ruby and SLICC
- Modeling the on-chip network with Garnet
- Extending gem5

GPU modeling

Day 5

Other simulators (subject to change)
- SST
- DRAMSim/DRAMSys
- SystemC

Contributing to gem5
- gem5 contributing process
- gem5 testing

Our goals for the gem5 bootcamp

- Make gem5 less painful and flatten the learning curve
- Give you a vocabulary for asking questions
- Provide a reference for the future
- Give you material to take back and teach your colleagues

Other likely outcomes

- You will be overwhelmed by the amount of information and how large gem5 is
  - That's OK! You can take these materials with you and refer back to them
- You will not understand everything
  - That's OK! You can ask questions as we go

How this is going to work

- We'll be going mostly top-down
  1. How to use gem5
  2. How to each model can be used
  3. How to develop your own models and modify existing models
- Highly iterative:
  - You'll see the same thing over and over
  - Each time it will be one level deeper
- Lots of coding examples
  - Both live coding and practice problems

Coding examples

You can write the following code

```
print("Hello, world!")
print("You'll be seeing a lot of Python code")
print("The slides will be a reference, but we'll be doing a lot of live coding!")
```

And you'll see this output.

```
Hello, world!
You'll be seeing a lot of Python code
The slides will be a reference, but we'll be doing a lot of live coding!
```

Bootcamp logistics

We'll be here from 9am - 4pm each day.

Lunch will be ~12 - 1pm.

We'll have a breaks in the morning and afternoon.

Afternoon break will have coffee/snacks.

Tonight: Reception at Dunloe Brewing (Olive Drive Brewery)
5:30pm - 8:00pm. Walking over at 5pm from here.

Wednesday: Social event at UC Davis "Games Area" (Bowling, pool, video games, etc.)
6:30pm - 9:30pm.

Other admin things

Important resources

Bootcamp links

- Bootcamp website (Maybe you're here now)
  - Bootcamp archive (If you're coming to this later)
- Source for bootcamp materials (You'll work here)
- GitHub Classroom (Needed to use codespaces)

gem5 links

- gem5 code
- gem5 website
- gem5 YouTube
- gem5 Slack (for asking offline questions)