Welcome to the gem5 bootcamp!



About the overall structure of the bootcamp

These slides and are available at https://gem5bootcamp.github.io/latin-america-2024 for you to follow along.

(Note: They will be archived at https://gem5bootcamp.github.io/latin-america-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/latin-america-2024

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



A bit about us

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.

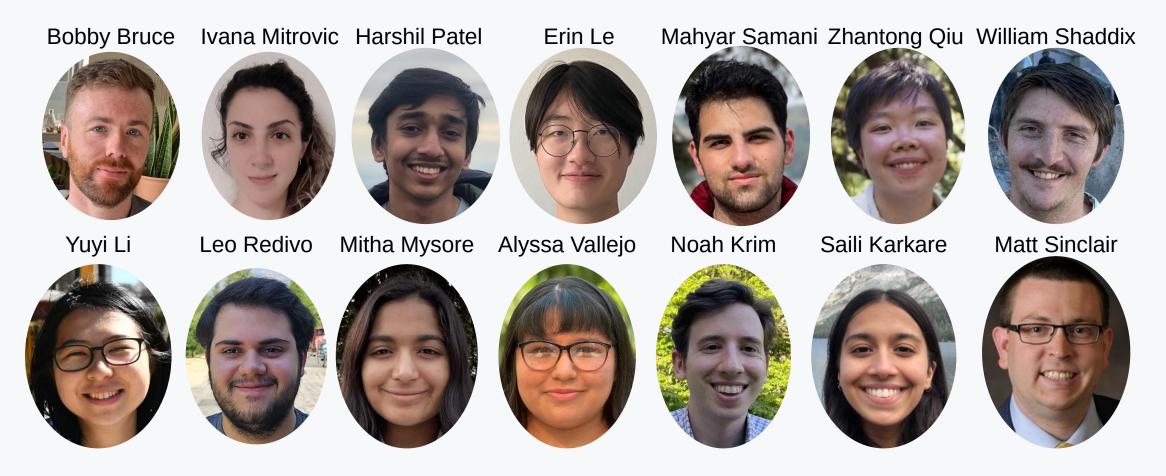
https://arch.cs.ucdavis.edu







The bootcamp team





Plan for the week

Introduction

- <u>Computer</u> <u>architecture</u> <u>research intro</u>
- <u>Background on</u> <u>simulation</u>
- Getting started with gem5

Using gem5

- gem5's standard library
- <u>Modeling memory in</u> <u>gem5</u>
- <u>Traffic generators</u>
- <u>Modeling caches in gem5</u>

- Modeling cores in gem5
- <u>Using gem5</u> <u>resources</u>
- Running applications in gem5
- <u>Full system</u> <u>simulation</u>
- <u>Accelerating</u> <u>simulation</u>
- Sampled simulation with gem5
- Power modeling

Developing gem5 models

- SimObject intro
- Debugging and debug flags
- <u>Event-driven</u> simulation

Developing gem5 models

- Modeling Cores
- Modeling cache coherence with Ruby and SLICC
- Extending gem5

GPU modeling

Day 5

Developing gem5 models

- Ports and memorybased SimObjects
- <u>Using the CHI</u> protocol
- Modeling the onchip network with Garnet

Other simulators

- 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



Other admin things



Important resources

Bootcamp links

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

gem5 links

- gem5 code
- gem5 website
- gem5 YouTube
- <u>gem5 Slack</u> (for asking offline questions)

