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







A bit about us

I am **Prof. Tamara Silbergleit Lehman** (she/her).

I am an assistant professor in the Electrical, Computer and Energy Engineering (ECEE) Department at the University of Colorado Boulder (CU Boulder).

Research Interests: Computer architecture security

Boulder Computer Architecture Research Lab (BCARL)

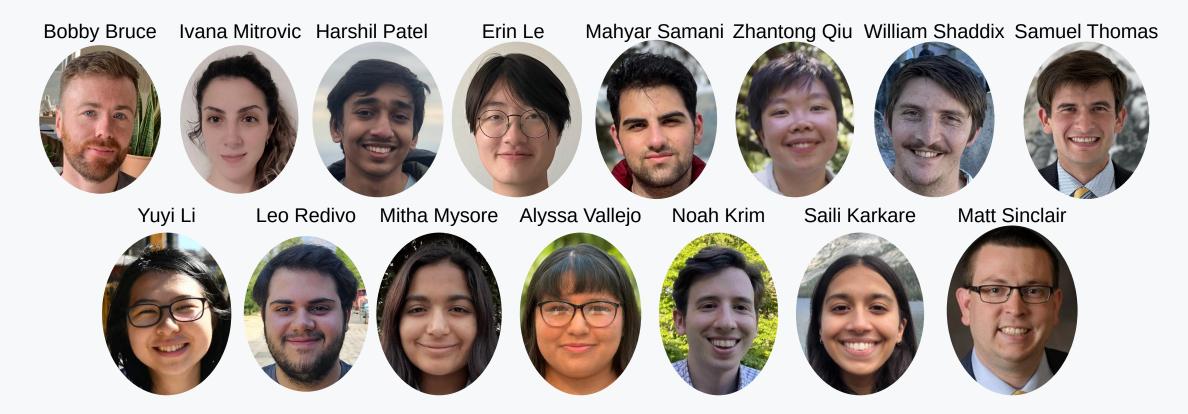
https://www.colorado.edu/faculty/lehmantamara/



Note: interested in applying to the PhD program at CU Boulder? Ask me how to waive the application fee. Application deadline is **December 15th 2024**.



Contributors to the bootcamp





Plan for the week

Day 1

Introduction

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

Using gem5

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

Day 2

Using gem5

- <u>Modeling cores in gem5</u>
- Running applications in gem5
- <u>Using gem5</u> resources

Now we have a full "baseline" that's running!

Day 3

Developing gem5 models

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

Day 4

Using gem5 for research

 Developing models to test secure memory

Day 5

Advanced running in gem5

- <u>Full system</u> <u>simulation</u>
- Accelerating simulation
- <u>Sampled simulation</u> with gem5

Putting it all together

 Running FS simulation with secure memory



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!
```



Exercises

Throughout the bootcamp, we'll have exercises for you to work on.

These exercises are designed to help you learn the material.

We will give you step-by-step instructions for each exercise.

Questions

We will also have questions for you to answer?



Slido

We'll be using Slido for questions and answers.

<iframe src="https://app.sli.do/event/qpr43XWrbjYJCdE3GHGCWg/embed/polls/428b4b2e-486e-47cb-be20-8bd2d5dd84a1" width="100%" height="440"></iframe>



Bootcamp logistics



Other admin things



Important resources

Bootcamp links

- <u>Bootcamp website</u> (Maybe you're here now)
- 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)

