

**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/>



University of Colorado
Boulder

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

Bobby Bruce



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Noah Krim



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Matt Sinclair



Plan for the week

Day 1

Introduction

- [Computer architecture research intro](#)
- [Background on simulation](#)
- [Getting started with gem5](#)

Using gem5

- [gem5's standard library](#)
- [Modeling memory in gem5](#)
- [Traffic generators](#)
- [Modeling caches in gem5](#)

Day 2

Using gem5

- [Modeling cores in gem5](#)
- [Running applications in gem5](#)
- [Using gem5 resources](#)

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

Day 3

Developing gem5 models

- [SimObject intro](#)
- [Debugging and debug flags](#)
- [Event-driven simulation](#)

Day 4

Using gem5 for research

- Developing models to test secure memory

Day 5

Advanced running in gem5

- [Full system simulation](#)
- [Accelerating simulation](#)
- [Sampled simulation 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

- [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)

