

**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



Ivana Mitrovic



Harshil Patel



Erin Le



Mahyar Samani



Zhantong Qiu



William Shaddix



Samuel Thomas



Yuyi Li



Leo Redivo



Mitha Mysore



Alyssa Vallejo



Noah Krim



Saili Karkare



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

We'll be teaching each day from  
9:00 a.m. - 12:00 p.m. and from 1:00 p.m. - 4:00 p.m.

We will be in the laboratories of pavilion 0+inf, but we'll be in different rooms each day.

Día	Laboratorio
Lunes 25/11	Labo 1110
Martes 26/11	Labo 1111
Miércoles 27/11	Labo 1110
Jueves 28/11	Labo 1108
Viernes 29/11	Labo 1108

## Other admin things

# Important resources

## Bootcamp links

- [Bootcamp website](#) (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)

