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

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
- Using gem5 resources
- Running applications in gem5

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!
```

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)