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

Bobby Bruce

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Matt Sinclair

Plan for the week

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

Developing gem5 models
- SimObject intro
- Debugging and debug flags
- Event-driven simulation

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

GPU modeling

Day 5

Developing gem5 models
- Ports and memory-based SimObjects
- Using the CHI protocol
- Modeling the on-chip 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!
```

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)