Integrating Cycle-Accurate Chisel Models with gem5’s System Simulation

Nima Ganjehloo, Jason Lowe-Power, Venkatesh Akella
Selective Accuracy For Faster Iteration

- gem5 is a cycle-level simulator
  - Uses event driven model to simulate cycles
  - BUT does not necessarily represent actual hardware implementation
  - High Level Emulation (HLE)

- Need Cycle Accurate simulator
  - C++ model generated from verilog by verilator
  - Accurately models hardware components for each clock cycle
  - Low Level Emulation (LLE)

From Hennessy and Patterson Turing Lecture
Integrating The Models

- Verilator Wrapper
  - Uses Verilator generated code
  - Set verilog signals in C++ model

- Write Wrapper For Any Component
  - Chisel and Verilog BlackBox for HLE targets
  - Gem5 Wrapper for LLE targets
Future work & questions for you

- Can we use FIRRTL to simulate?

- Other ideas and models to integrate

- How would you use cycle accurate gem5?