The ARMv8 Simulator
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### ARMv8 architecture
- Next version of the ARM architecture
- First ARM 64-bit instruction set (A64)
  - Full compatibility with ARMv7
- Focus on power efficient architecture advantages

### Why need ARMv8 simulator?
- The first ARMv8 CPU are due in 2014!
- No ARMv8 performance simulator available
- Goal of Our ARMv8 Simulator
  - Easy to use
  - Easy to debug
  - Reliable
  - Accurate
  - Multiple CPU models
  - Power simulation

- It is the first open source ARMv8 performance simulator

### Implementation
- Implement A64 instructions based on gem5
  - Analyze “ARMv8 Instruction Set Overview”
  - Consult ARMv8 gcc compiler
    - Including integer and floating-point instructions
- Support System-call Emulation (SE)
  - Run binary executable files
  - Emulate the system calls
- Validation
  - Compare with ARMv8 Foundation Model
  - Evaluate some benchmarks

### Validation & Results
- “apple-to-apple” comparison with ARMv8 Foundation Model
- Workloads
  - Micro-benchmarks
  - Assembly instructions
  - SPEC CPU2006
  - Fhourstones
  - Dhrystone
  - Stream
- Supports a large number of statistics collection
  - Cache miss
  - Instruction execution status
  - Power consumption
  - ...

### Future Work
- ARMv8 simulator is working, but could be better
- More extensions possible
  - Full-system simulation
  - More system calls
  - Trace driven mode

### ARMv8 simulator features
<table>
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<th>Features</th>
<th>Support details</th>
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- Based on gem5
  - A modular simulation platform
  - Support most commercial ISAs
- Implement decoder of A64 instructions
- Support System-call Emulation mode
- Support to interface with other gem5 modules