

Simics® Hybrid Simulation of the Freescale QorIQ™ P4080



Overview

The Simics Hybrid simulation solution mixes device and processor models at different levels of detail into a single coherent simulation system. For the Freescale QorIQ™ P4080, the Simics simulation solution combines Freescale's cycle-approximate performance model with Simics fast functional model. In a single simulation session, one can transition between the functional and detailed performance models providing for fast simulation and the ability to study parts of a workload or hardware of interest in more detail. One can switch between simulation modes at run-time using the fast functional mode to position a workload to a point of interest, and then continue in the performance mode to analyze the workload. The simulator also provides very good visibility into the behavior of the processor that is not possible to get on physical hardware. Functional and performance data is exposed to a user-scriptable graphical environment, permitting tailoring of performance analysis to a given application or problem.

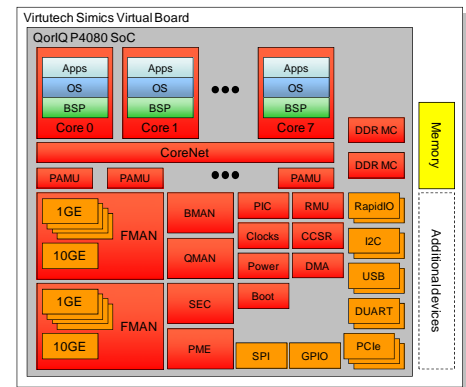
Use cases

- Explore multicore code and data partitioning trade-offs in a fast, informative environment. Partition and debug application functionality in fast mode and then determine and optimize the performance using the cycle-approximate model. What is the end-to-end throughput? What are the processor, device, and cache utilizations in different phases of the application? What are the performance impacts of different memory sharing styles? Is the code friendly to cache coherence?
- Investigate the actual performance of optimized performance-critical code. The performance mode will show you how the code runs with respect to the processor pipeline, cache architecture, memory controller and memory system, branch predictor, and other microarchitectural effects.
- Determine the performance of the datapath accelerators on the QorIQ P4080 chip and optimize timing-sensitive driver code. How do the accelerators handle a particular workload? Is the dataflow correctly setup for best performance? How do the accelerators and the memory system interact?
- Test the correctness and performance of multiprocessor communications code and storage management like barriers and flushes.
- Improve end-user understanding of how the QorIQ P4080 functions, down to very small timing details.
- Create performance test suites to be applied to the final hardware.

Benefits

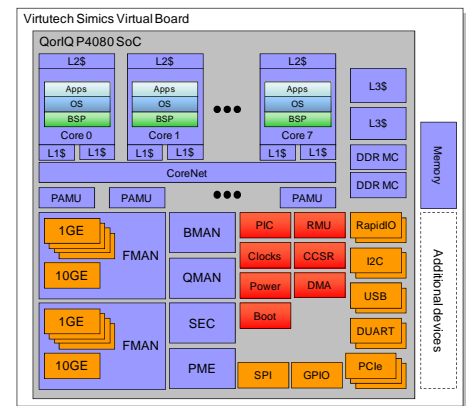
- Combine fast functional and cycle-approximate models for the best of both worlds. Cycle-approximate models are orders of magnitude faster than RTL simulation, providing fast simulation throughput.
- Rapidly determine end-to-end application performance.
- Quickly discover and correct performance problems.
- Analyze software architecture performance tradeoffs with system-wide visibility.
- Evaluate the QorIQ P4080 for a specific application prior to the availability of hardware.
- Leverage existing Simics infrastructure, like board models, traffic generators, and connections to the physical world.

Fast functional model



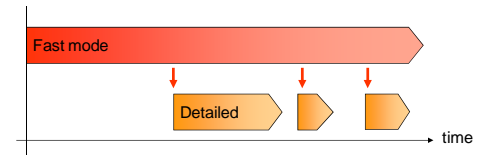
Run software on a complete QorIQ P4080 virtual machine.

Performance model



Run software in detailed performance mode.

Workload positioning



Switch to detailed performance mode at any point in the simulation for detailed analysis.