SystemC Virtual Prototype:
Ride the earliest train for Time-to-Market!

Shweta Saxena, Mahantesh Danagouda
System Virtual Prototyping

- System Definition
- System Design
- Sub-System Design
- System Verification
- Early Software Development
- Architectural Analysis
- High Level Modeling and Synthesis
- System Commissioning
- System manufacturing
- Physical System Verification
- System Maintenance
Review of SW Development Methodologies

Virtual Prototyping
- Speed and Accuracy
- TTM and TTR
- Accuracy
- SW-driven Verification
- Analog
- HW-SW debug
- Speed
- Early
- No Analog
- Interoperability
- Slow
- Accurate
- HW debug

FPGA Prototyping
- Real Validation
- HW Debug
- Real Time
- HW Debug

HW Accelerator
- Speed improves
- HW debug and visibility degrades

RTL Simulations
- Early
- Accurate

Product Development Cycle

Virtual Prototyping
@ near silicon speed, manual effort
Earliest in design cycle

SW Development on Silicon
Problem Statement

Software development challenges
- Time and effort is invested in HDS development (3-4 months).
- Blocked for validation until FPGA is set up, losing initial project time.
- Limited boards available.

Software validation challenges
- UVM/System Verilog code difficult to navigate.
- No straightforward re-usability.
Our solution: Virtual Prototype (VP)

- SOC Data
- SystemC code Generator
- Generated VP
- Dependent libs
Inside the Virtual Prototype

Model
Vendor IP
Black Box
Unified Testing Framework

- Early SW testing/validation
- Flexibility of use for SW
- Single application for multiple platforms (VP/FPGA/Silicon)
- Single block validation
- Multiple parallel users
Simulation Speed: RTL vs VP

VP
CPU time: 30 seconds

RTL
CPU time: 311 seconds

1000X times faster

Just very slow. That's all
Benefits for Software Validation

- 1000X faster than RTL
- Ease of usage
- Debugging Advantage

Impacts Software Validation

Phased releases

Component Reuse
Conclusion and future work

- Accelerates time to market by up to 6 months
- Boost Customer Confidence
- Architectural Exploration
- Explore key algorithm performance
- In house automation
Questions