Sustaining Performance Scaling in a Physical World: Implications for Modeling and Simulation

With the end of Dennard scaling and as industry moves to increasingly small feature sizes, performance scaling will become increasingly dominated by the physics of the computing environment. There are fundamental trade-offs to be made at the microarchitectural level between performance, energy/power, cooling technologies, and reliability. This places new demands on modeling and simulation capabilities to capture such interactions.

This talk will cover some of the physical challenges in sustaining performance growth in an increasingly physical world and examples of the corresponding modeling and simulation challenges. As a motivation, the talk will share some ideas and preliminary results from modeling at levels across the stack—applications, microarchitecture, circuit, and physical package.

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