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Just Enough is More: Achieving Sustainable Performance in Thermally-Constrained Mobile Devices

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Entrada libre hasta completar el aforo

Resumen:

Mobile processors integrate low-power and power-hungry cores together to combine energy efficiency with high performance. While running computationally demanding applications, current system management techniques greedily maximize quality-of-service (QoS) within thermal constraints using power-hungry cores. This talk first shows that such an approach delivers short bursts of high QoS, but also causes severe QoS loss over time due to thermal throttling. To provide mobile users with sustainable QoS over extended durations, we have designed "QScale" at PeacLab. QScale is a novel thermally-e fficient QoS management framework for mobile devices with (heterogeneous) multi-core CPUs. QScale leverages thread heterogeneity and on-chip thermal coupling information during runtime thread allocation. QScale coordinates closed-loop frequency control with its thermally-efficient allocation to deliver the desired QoS with minimal exhaustion of processor thermal headroom. Experiments on state-of-the-art mobile platforms show that QScale meets target QoS levels while minimizing heating, achieving up to 8x longer durations of sustainable QoS.

Sobre Ayse Kivilcim Coskun:

Ayse K. Coskun is an associate professor in the Electrical and Computer Engineering Department at Boston University. She received her MS and PhD degrees in Computer Science and Engineering from University of California, San Diego. Coskun's research interests include energy-efficient computing, novel computer architectures including using 3D stacking, embedded systems, emerging cooling methods, and intelligent management of data centers. Prof. Coskun has worked at Sun Microsystems (now Oracle), San Diego prior to her current position at BU. Coskun is a recipient of the NSF CAREER award and currently serves as an associate editor for IEEE Transactions on CAD. She also authors a bimonthly column on green computing in the Circuit Cellar magazine.