Low Energy Server Systems

Motivation

Energy costs money:
• Energy (power and cooling) costs make up almost 50% of the operational costs of a data center

CPUs consume energy:
• Chip manufacturers double the number of cores and transistors every 18 months
• We are reaching a phase where transistors can not be made more energy efficient

Low power hardware:
• In the future, we will not be able to power all transistors of a chip at a given time
• Low power server hardware is becoming popular

Software is oblivious to energy:
• Code has always been optimized for performance
• Server software was never designed for energy efficiency!

Objectives and Challenges

Towards a 1W server system:
• Only provide the minimum feature set necessary for efficient operation
• Identify and implement more energy-efficient algorithms
• Identify logic that should be implemented in hardware
• Propose and use special components for low power operation