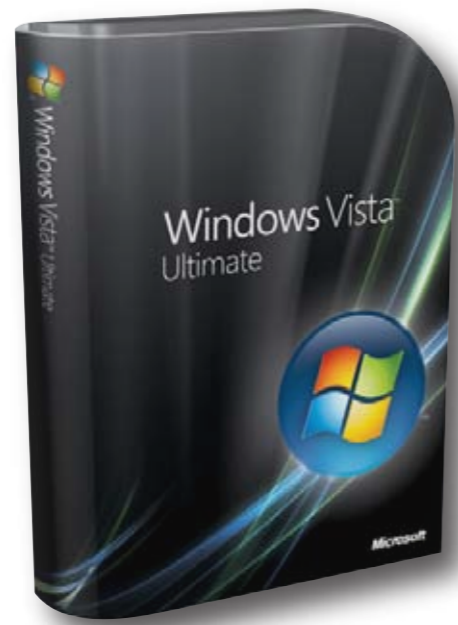
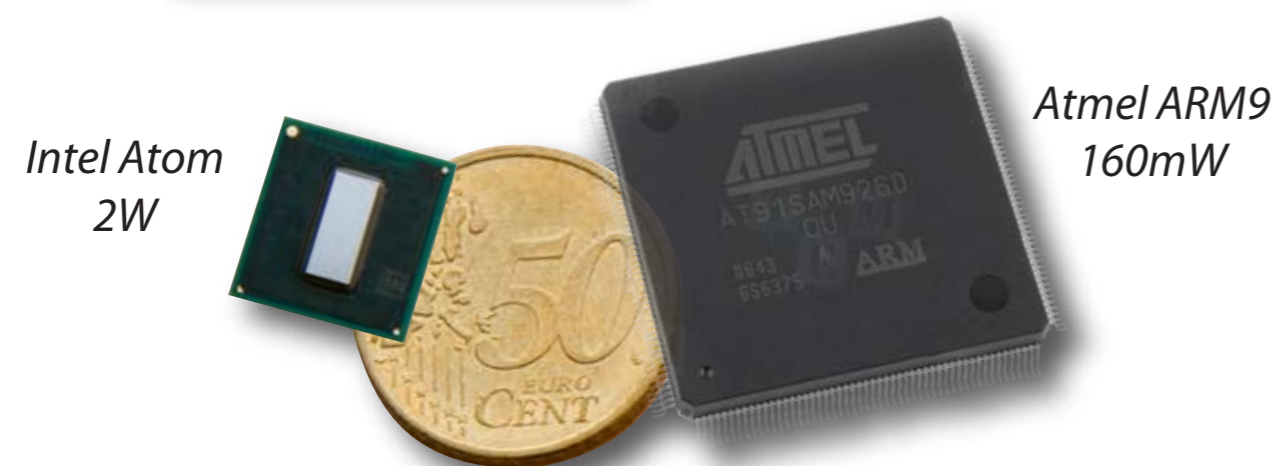
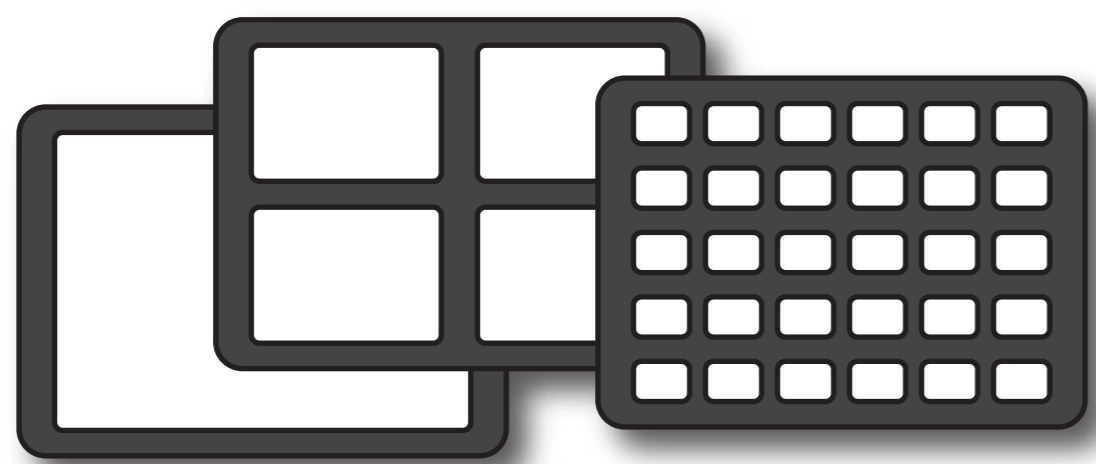
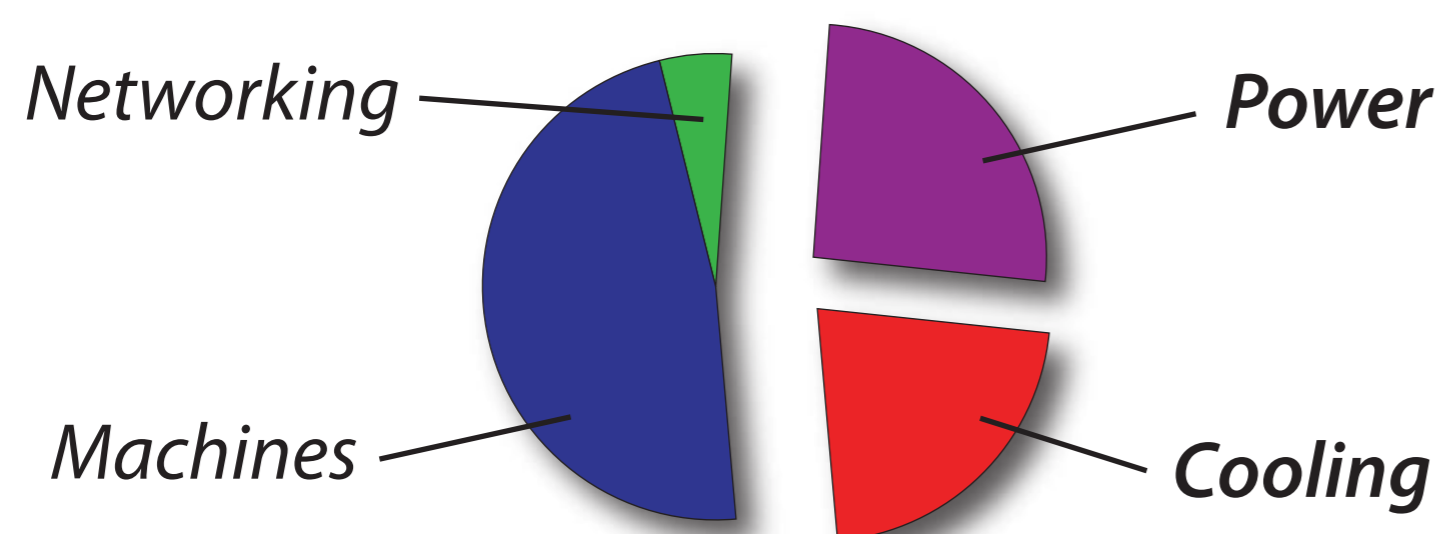


Low Energy Server Systems

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

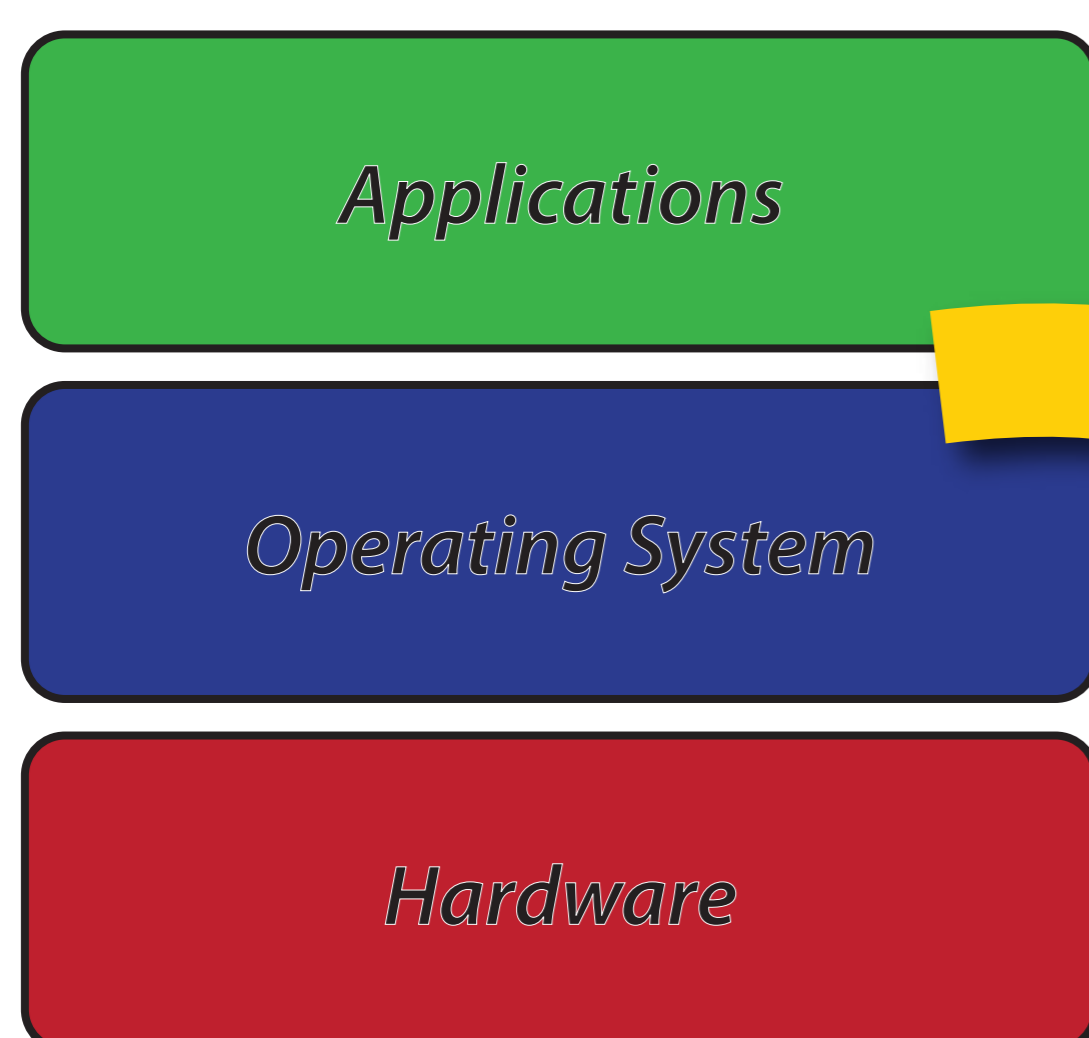
Low power hardware:

- 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