



Managing Computer Power and Performance

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WARF: P140071US01

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing smarter controls for monitoring a computer's energy consumption and performance to meet user preference.

Overview

Energy consumption is a major constraint in computer design because of factors like power costs, operating life and heat. The tradeoff between energy consumption and performance is managed to some degree by modern processors, which have the ability to adjust the operating states of their components. For example, the operating voltage and/or clock frequency of a processor may be lowered to reduce energy usage (with a corresponding drop in execution speed). Similar adjustments may be made to cache size, memory access speed and data channels.

While these adjustments in operating state tend to impact performance and energy consumption in predictable ways, the interactions of such adjustments can be unexpected. In fact, the overall impact is not assessed, making precise power limits or performance standards impossible.

The Invention

UW-Madison researchers have developed a set of predictors to monitor the energy consumption and performance of a computer's individual components in runtime. This information can be used to manage the system based on user needs (i.e., higher power/higher performance; reduced power/reduced performance).

The predictors work by establishing predicted tradeoffs between power and performance for a particular workload while it is being executed. The predictions are combined in a system model to identify a limited number of operating state combinations. This allows operating states to be readily adapted during program execution based on a particular workload. Pareto optimal settings can be used to simplify adjustment of the system during runtime.

Applications

- System configuration methods for managing power usage and performance

Key Benefits

- Enables sophisticated power/performance management
- Boosts efficiency by reducing the set of useful operating state combinations
- Responsive to changing workload conditions
- Helps achieve power/performance goals

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Stage of Development

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Simulations using industry accepted software and benchmarking data have been performed. The overall impact of the method depends on workload and desired output, but two-fold changes in power and performance have been observed.

Additional Information

Related Technologies

- [WARF reference number P130076US01 describes a cache system that improves computer performance and reduces energy usage.](#)

Tech Fields

- [Information Technology : Computing methods, software & machine learning](#)
- [Information Technology : Hardware](#)

For current licensing status, please contact Emily Bauer at emily@warf.org or 608-960-9842

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