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Power Provisioning for a Warehouse-sized Computer Paper critique

Summary

In this paper, the authors study the power consumption of large scale datacenters with many types of workloads using their power estimation model. From the observations, the authors estimate power usage characteristics of Warehouse-sized systems. Some important findings from the study:

- The difference between real maximum power usage and theoretically power usage can be quite large (up to 40%).
- Dynamic power management is useful as a safety mechanism.
- Power gaps and power management techniques is more useful at the datacenter level.
- CPU Voltage and frequency scaling is useful for reducing maximum power consumption even at a large scale.
- Managing power consumption at every activity range, instead of only at maximum loads can be more beneficial.

Strength

The paper is the first of its kind to study the power consumption of systems at datacenter level. It helps future computer architects grasp the general characteristics of large scale computing systems power usage, consequently design more efficient systems.

The authors also emphasizes the importance of considering power and energy when designing a computing infrastructure, which may save the cost of building additional datacenters or reduce the risks of exceeding capacity.

Weakness

Workloads that they used to characterize power usages are very specific to Google and are highly optimized. They may not represents workloads from general datacenters.

The paper only take into consideration power management aspect of the system, without considering impacts of power optimization techniques on system performance.

Improvement suggestions

A standard for power capacity rating can be introduced to rate power consumption of hardwares more accurately.

Both power consumption and system performance should be taken into consideration when evaluating an approach.