

A Dialogue on Energy Efficiency

“O software experts, when will you start acting responsibly?”

“Ye architects, can you design something that will run efficiently?”



Discussion starting points

(from upcoming IEEE Computer column)

1. **Eliminate non-energy proportional HW and SW components**
 - Non-proportional components will determine system energy proportionality
 - HW: Memory, storage, I/O, VRMs, UPS, cooling, ...
 - SW: Periodic events, recomputation, ...

2. **Waste not, want not → Do not use resources needlessly (duh!)**
 - HW: Avoid “throwing resources” at problems (e.g., voltage margins)
 - SW: Do not assume available hw resources are free (especially memory)

3. **Do not build brittle components**
 - Components should not assume that other components operate at fixed point
 - *The rest of the system will change its behavior!*
 - *Tolerate unexpected changes in performance and latency bubbles*
 - HW: Coherence protocols must tolerate varying processor speeds, ...
 - SW: Databases that tolerate disk spin-up (10s), parallel apps that tolerate highly divergent per-thread performance, ...

4. **You cannot manage what you cannot measure**