

PARAID: A *Gear-Shifting* Power-Aware RAID

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Motivation

- Energy costs are rising
 - An increasing concern for servers
 - No longer limited to laptops
- Energy consumption of disk drives
 - 24% of the power usage in web servers
 - 27% of electricity cost for data centers
 - More energy → more heat → more cooling → lower computational density → more space → more costs
- Is it possible to reduce energy consumption without degrading performance while maintaining reliability?

Challenges

- Energy
 - Not enough opportunities to spin down RAIDs
- Performance
 - Essential for peak loads
- Reliability
 - Server-class drives are not designed for frequent power switching