The LoCal Computing Cluster

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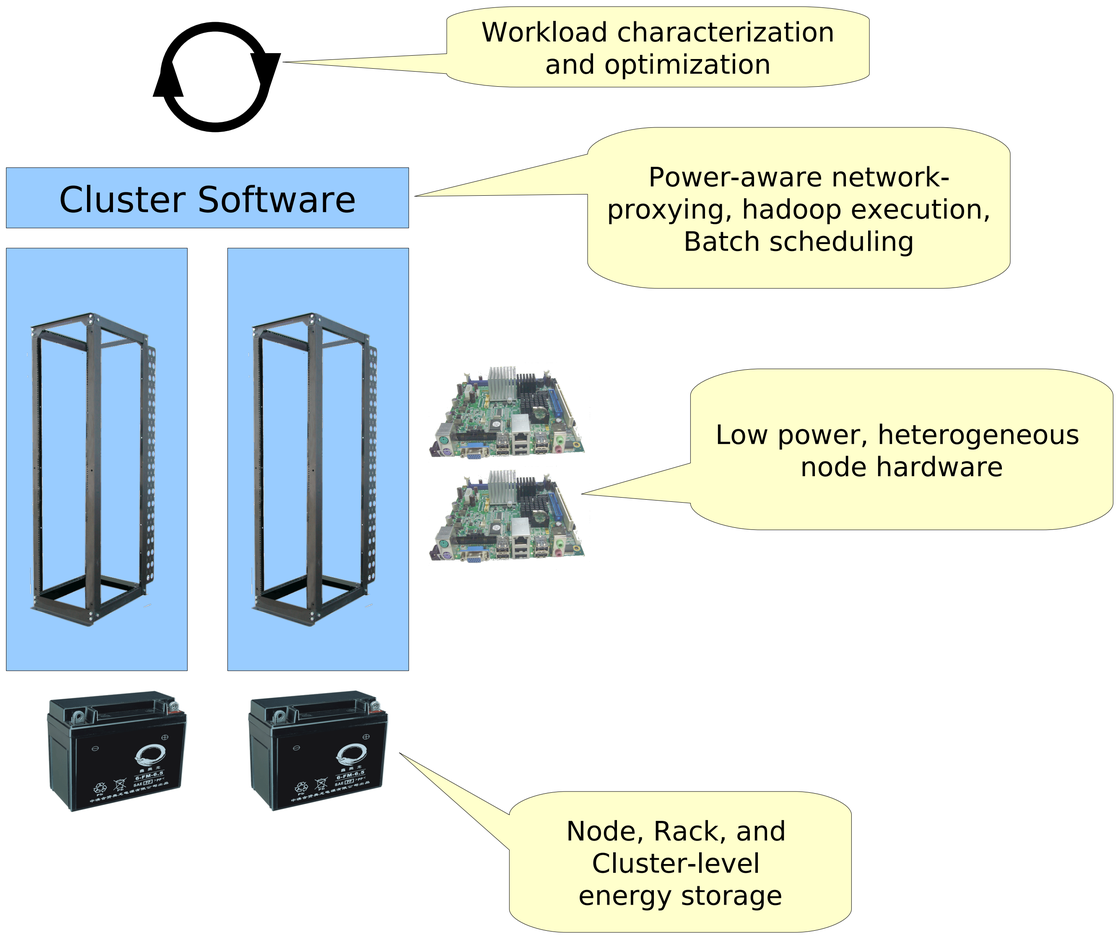
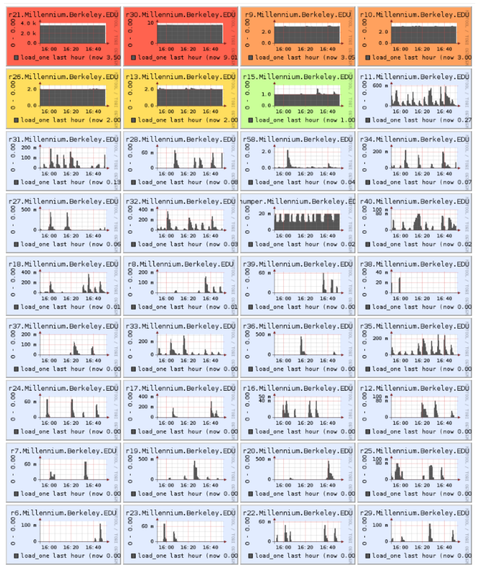
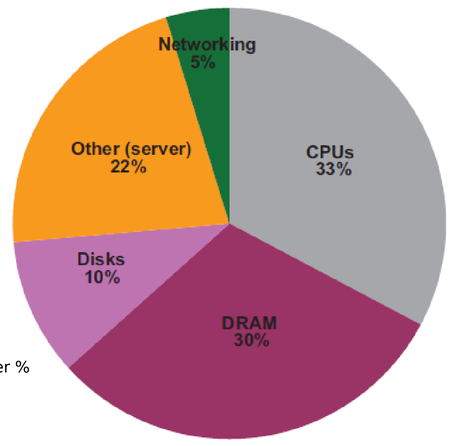
Local Cluster Architecture



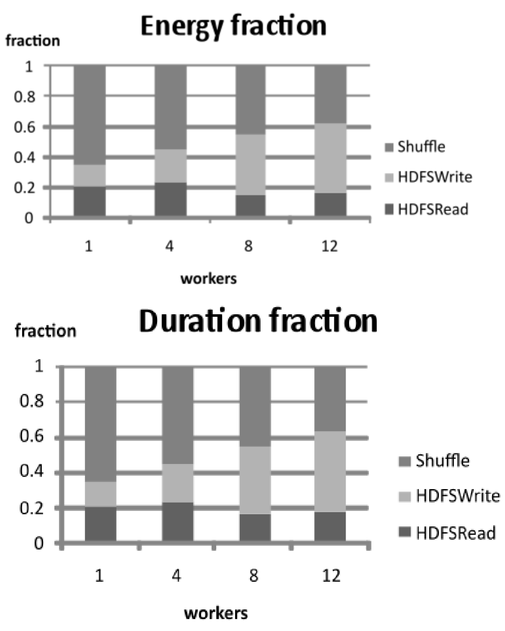
Sleep-Enabled Cluster Software

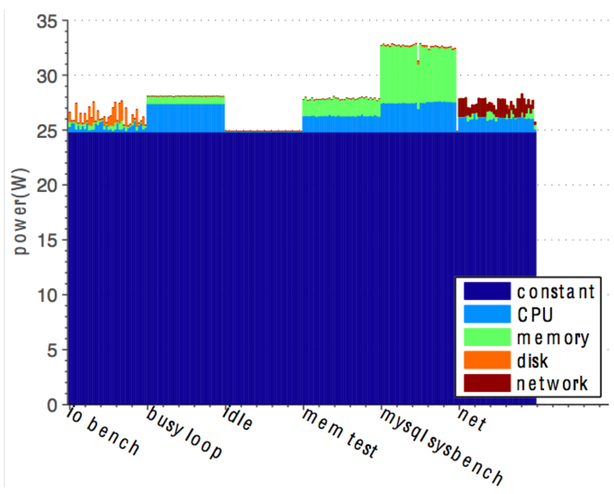




- Many clusters are very underutilized, but don't sleep
- Network protocols maintain maintain liveness with keepalives,
- Local projects
  - “Green” Ganglia: update ganglia to put machines to sleep when not in use
  - Network Proxying: explore the cost of maintaining an always on illusion with protocol proxies

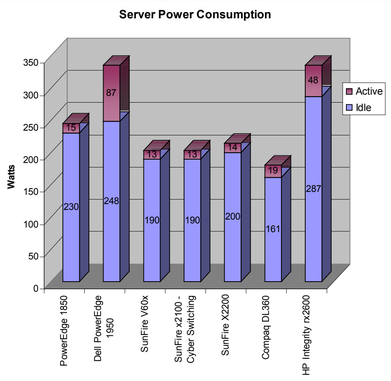
Workload Characterization

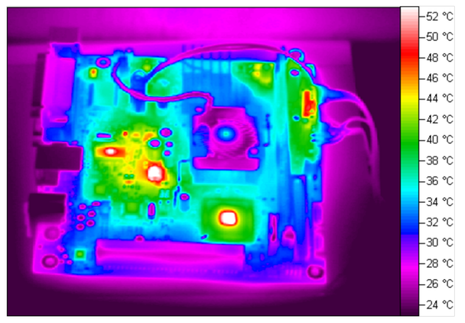




- How well do we need to understand a workload to execute it efficiently?
- Locate most efficient execution point based on parallelization overhead and available hardware
- Local projects:
  - Examine workload efficiency on different architectures of hadoop, SPECInt, *etc.*
  - Explore job assignment algorithms: power proportional Hadoop?
  - Build a distributed JouleSort competitor
  - Develop tools to measure and attribute power drain

Hardware





- The hardware is what uses the power!
- Examine power distribution, architectural features
- Local projects:
  - Build a cluster computing resource platform:
  - Node, rack, and cage-level storage elements
  - Energy-efficient hardware with low idle powers and usable sleep (S3) states.