National Aeronautics and Space Administration

Assessing and Analyzing Energy Usage of NASA Workloads on HPC Systems

Assessing and analyzing the performance and energy usage of NASA applications on current and emerging HPC architectures are key to understanding their suitability for meeting the agency's needs. The Application Performance and Productivity team in the NASA Advanced Supercomputing Division implemented a framework for measuring and monitoring the power used by applications. The framework builds on the availability of real-time power readings on newer generations of Intel processors, and reports power usage on a per-job or per-application basis. Using this framework, the team successfully investigated the power usage of a representative set of codes to find out how those statistics correlate to application performance, and to understand the power efficiency of different architectures.

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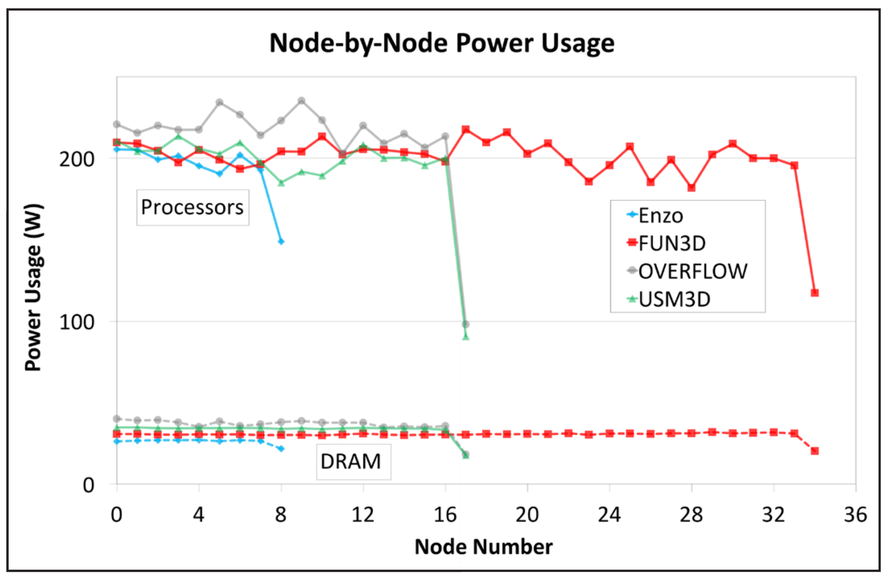

Power used by the processors and dynamic random-access memory (DRAM) of each node during runs of four benchmark applications on NASA's Pleiades supercomputer (shown above). Each run shows a large drop in power used by the last node, due to less workload on the node. The different amounts of power usage by DRAM correlate with different memory traffic of each application. *Jahed Djomehri, NASA/Ames*