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Reducing the energy consumption of scientific computing resources on demand

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The Rutherford Appleton Laboratory (RAL) data centre provides large-scale High Performance Computing facilities for the scientific community. It currently consumes approximately 1.5MW and this has risen by 25% in the past two years. RAL has been investigating leveraging preemption in the Tier 1 batch farm to save power.

HEP experiments are increasing using jobs that can be killed to take advantage of opportunistic CPU resources or novel cost models such as Amazon's spot pricing. Additionally, schemes from energy providers are available that offer financial incentives to reduce power consumption at peak times.

Under normal operating conditions, 3% of the batch farm capacity is wasted due to draining machines. By using preemptable jobs, nodes can be rapidly made available to run multicore jobs without this wasted resource. The use of preemptable jobs has been extended so that at peak times machines can be hibernated quickly to save energy.

This paper describes the implementation of the above and demonstrates that RAL could in future take advantage of such energy saving schemes.

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