

# Swinburne Knowledge Commercialisation Opportunity



## Supercomputer Energy Saving System

### Background

Modern high-end academic supercomputers, such as the Swinburne supercomputer, and mid-range industrial and commercial supercomputers are commonly built as clusters of 100 to 200 'off-the-shelf' computers (nodes). At peak capacity, a present-day 100-node cluster directly consumes approximately 55kW, and indirectly (e.g. by air-conditioning systems) a further approx. 25kW.

Supercomputer facilities are typically designed and purchased to satisfy or exceed peak demand and, accordingly, many supercomputer facilities operate below their peak capability for a considerable fraction of their useful life. The potential energy savings in extended periods of lower demand are substantial.

For a typical cluster, whose energy use is dominated by the cluster nodes themselves, physically switching off nodes will yield a direct energy saving proportional to the number of nodes switched off (e.g. switching off 20 nodes of a 100-node cluster will reduce the direct, instantaneous power consumption by approx. 11kW). The lower heat load will also result in an additional indirect saving.

More specifically, for Swinburne's 150-node supercomputer, a realistic usage pattern for this system might be as follows:

- aggregate 2 months per year: 100% (peak) utilisation
- aggregate 4 months per year: 80% utilisation
- aggregate 6 months per year: 50% utilisation.

The direct energy savings available in this example are approx. 230MWhr annually. The projected direct fiscal saving is AUD 35,000 per annum. Indirect savings will contribute further but are not calculated here.

### Further information

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### Invention

Researchers in the Swinburne Centre for Astrophysics and Supercomputing have developed autonomous software that continuously monitors the usage level of the Swinburne supercomputer. In periods of low usage, the software detaches individual computers from the supercomputer, and based on a usage pattern, they are switched off to save power.

In periods of high usage and elevated demand for processing, inactive computers are switched on and reattached to the supercomputer. The software thereby reduces the total energy footprint and operating cost of the Swinburne supercomputer. These savings are achieved without user intervention.

### Market

Of the top 500 supercomputers listed in the November 2008 list (<http://www.top500.org>), only one is in Australia (#144, Animal Logic, a leading film animation company). There is a significant world market for a product or service based on the Swinburne system, particularly with increased emphasis on sustainability and climate change.

### Opportunity

Swinburne is seeking development partners or licensees to take the system to market.



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