Thermal Logic configuration of ProLiant BL460c server blade sets energy saving milestone

Key Take Aways

- Blade technology is proven to use less power and generate less heat than traditional 1U rack server technology
- The newest Thermal Logic configuration of the ProLiant BL460c sets a new milestone for blade power efficiency
- HP offers several power optimized configurations for blade and rack servers utilizing Thermal Logic technology
- HP power and cooling solutions deliver more sustainable IT environments that reduce total power and cooling costs and extend the working life of datacenters large and small.

Summary

On November 8, 2007, HP announced a new server blade configuration that uses up to 47 percent less power than traditional 1U servers. Based on a combination of the latest HP Thermal Logic technology and the most efficient industry standard server components currently available, the new server blade configuration beat the previous HP blade benchmark record by 26 percent without decreasing system performance.

New configuration delivers savings of:

- 230.5 watts per server (vs. previous test of 1U servers).
- 3,688 watts per BladeSystem c-Class enclosure (16 blades vs 16 1U servers).
- 32,306 kWh per year.

This equates to enough energy savings to power three average American households for a year saving the equivalent to 2.77 tons of oil per year. The average household in America consumes 10,656 kWh per year, according to the US Department of Energy.

These power savings allow customers to lower their electric bills and reinvest the savings in areas to improve their business or to install more servers without adding more power or air conditioning. For the same power required for 42 traditional 1U servers, customers can now support 80 server blades and still gain the cost, cable and space savings of the HP BladeSystem.

Test Summary

The results derive from an HP test conducted by BladeSystem engineers who examined the overall power consumption of a customer orderable, Thermal Logic server configuration of 16 HP ProLiant BL460c server blades inside a BladeSystem c7000 enclosure. This type of configuration would be very common in an enterprise environment looking to maximize power efficiency.

The new Thermal Logic configuration was created by HP engineers who tested dozens of combinations of the most energy-efficient system components tuned to the latest Thermal Logic technology and software built-in to every HP BladeSystem. The result is a power-optimized version that does not compromise system performance or reliability.

The results demonstrate that BladeSystem c-Class and the pooled power zoned cooling of HP Thermal Logic technology not only lower power usage through efficient power distribution but also optimize airflow, which is a significant component in keeping data centers cool.

Lowering server power consumption improves one part of the energy equation within a datacenter or other IT rooms. To help synchronize power efficiency across multiple elements, HP has introduced new technology solutions to meet the needs of its customers, particularly those building next-generation data centers. In addition to HP Thermal Logic technology, customers today benefit from HP Dynamic Smart Cooling, HP Modular Cooling System, HP Power Regulator and HP Insight Power Manager.

The new Thermal Logic configuration will be available on November 15, on the HP online store along with other energy efficient rack and tower server models.

Test Hardware Details

ProLiant BL460c (Thermal Logic Configuration)	IBM HS21 blade
▪ 2 dual-core Xeon Woodcrest 5148 CPUs ▪ 4 4G DIMMs interleaved ▪ 2 hot-plug 72GB SAS hard drives ▪ Onboard Administrator firmware v2.02	▪ 2 dual-core Xeon Woodcrest 5140 CPUs ▪ 8 2G DIMM interleaved ▪ 2 non-hot-plug hard drives ▪ Management module firmware v1.1
ProLiant BL460c (Standard Configuration)	**Dell 1950 1U server**
▪ 2 dual-core Xeon Woodcrest 5140 CPUs ▪ 8 2G DIMM interleaved ▪ 2 hot-plug 72GB SAS hard drives ▪ Onboard Administrator firmware v2.02	▪ 2 dual-core Xeon Woodcrest 5140 CPUs ▪ 8 2G DIMM interleaved ▪ 2x Western Digital WD800JD Caviar SE 7.2k 80GB SATA drive ▪ 2 PCMCIA slots unpopulated SATA drive

Load Simulation Software

Power tests were run with the servers heavily loaded, so that power consumption and airflow requirements would be near their maximum values. Typical workloads do not use as much of the systems and would likely yield lower results.

A program called PRIME95, which uses Fourier transforms as a filtering mechanism to identify very large prime numbers, was selected as the load simulator for these tests. PRIME95 attempts to locate Mersenne Primes, that is, prime numbers with specific mathematical properties. The software creates large tables in main memory for the Fourier transforms and then performs extensive computations against this data, thereby exercising the CPU and its registers heavily.

Test Execution and Instrumentation

Each test consisted of several specific sequence steps, the timing of which was controlled and carefully logged:

1. The operating system was booted (if not already running) on all blades and allowed to run at an idle state for at least 20 minutes, which was the amount of time empirically determined necessary to stabilize the system's power consumption in the idle state after start-up. During this phase, the PRIME95 software was prepared for execution in its multiple instances (four per blade) but not actually started.

2. The PRIME95 application was started on each blade, in backplane-position order, as rapidly as possible. The beginning and ending of the start-up period was logged and treated as a start-up transient when analyzing the result data.

3. The actual test period continued for a minimum of four hours, during which time the systems ran the PRIME95 application exclusively. No other operator-initiated tasks were performed on the servers except for minimally-intrusive checking to make sure the system had not crashed or issued errors.

4. The test period was officially stopped, and the time carefully noted in the log. Only after the end of the test period was the execution of PRIME95 interrupted by the operator.

Measured Results

	Thermal Logic configuration of ProLiant BL460c	Standard configuration of ProLiant BL460c	IBM HS21 blade	Dell 1950 1U server
Results in VA	251.1 VA[1]	340 VA[2]	469.29 VA[2]	481.60 VA[2]
Savings	- - - -	26.15%	46.49%	47.86%

Bottomline

The latest test results of this new Thermal Logic server blade configuration represent another milestone for blade technology and confirm the potential of the HP BladeSystem to improve power efficiency in a variety of environments.

[1] November 5, 2007 HP lab test results of a Thermal Logic configuration of the ProLiant BL460c replicating power measurement methodology outlined in the Sine Nomine report, Comparison of HP BladeSystem with Thermal Logic Technologies to Competitive Systems.

[2] Sine Nomine & Associates. Comparison of HP BladeSystem with Thermal Logic Technologies to Competitive Systems. February 2007.