SUPERMICRO®

Supermicro FatTwin™ Power Savings

Introduction

The Supermicro **FatTwin™** is the latest addition to Supermicro's evolving line of Twin server solutions. The FatTwin™ greatly expands compute and storage capacities beyond Supermicro's existing 2U Twin^2® and 2U Twin SuperServer® systems to achieve increased performance with lower power consumption. The FatTwin™ was designed to realize extremely low PUE in data centers and significantly reduce electric power costs even in free-air cooled environments. Due to its shared components the FatTwin™ improves reliability and TCO, while its modular design greatly increases its configurability, serviceability and maintainability.

The FatTwin™ is available in high-density 8/4/2 hot-plug system node configurations with a choice of memory capacities, number of hard disk drives, front or rear I/O, PCI and networking options, and 1280W and 1620W Platinum Level power supplies. These many options allow the FatTwin™ to be optimized for customer-specific environments. For example, high-performance applications requiring 16 DIMMs and high-power CPUs can be fully supported with the FatTwin™ model utilizing fully redundant 1620W power supplies, while competitive systems do not have this capability. The FatTwin's high-efficiency, highly effective shared cooling architecture allows it to operate in high-temperature, free-air cooled environments up to 47°C, providing considerable cost savings and improved TCO. The FatTwin™ offers versatile configurations and high-temperature support with cost, power, and space savings, effectively targeting Data Centers, Cloud Computing, and HPC; Engineering, Research, and GPU projects; File and Storage Server deployments, and General Server and Enterprise Server applications.

The reference system used in this study was a competitor's 2U 4-node server H2312WPJR. The system is integrated with four server board units, supporting up to twelve 3.5" hot-swap SATA hard drives, with redundant power supplies.

The power utilization of the Supermicro FatTwin™, 2U Twin^2®, and H2312WPJR systems were measured under identical operating conditions and configurations, utilizing the High Performance LINPACK (HPL) benchmark. Continuous power measurements of idle, average, and peak power values were recorded via power meters. From the measurement results, the Supermicro FatTwin™ and 2U Twin^2® power savings were calculated.

Supermicro FatTwin™
SYS-F617R3-FT

Supermicro 2U Twin^2®
SYS-6027TR-HTRF+

Competitor's System
H2312WPJR

Configuration

In this study, two Supermicro systems were reviewed, a 4U 8-Node FatTwin™ with Front I/O (SYS-F617R3-FT) and a 2U Twin^2® (SYS-6027TR-HTRF+). Both the systems were tested with redundant 1620 watt Platinum Level (94%) and 1280 watt Platinum Level (95%) digital power supplies respectively. The competitive system reviewed was the H2312WPJR, a 2U 4-node Twin system with redundant 1200 watt Platinum Level power supplies.

These systems and configurations are outlined in Figure 1. The number of nodes (4 nodes) used, the components (including CPUs, memory, and SSD), the BIOS settings, and the test environments were identical for all the testing.

System Configuration	Supermicro F617R3-FT (1280W)	Supermicro F617R3-FT (1620W)	Supermicro 6027TR-HTRF+ (1280W)	Supermicro 6027TR-HTRF+ (1620W)	H2312WPJR (1200W)
Processor/ node	2x Intel® Xeon® E5-2630 2.30GHz 6-Cores TDP 95W				
Memory/node	8x Hynix 16GB DDR3-1600 2Rx4 ECC REG 1.50V				
Storage/node	1x Intel SSD 320 Series 300GB SATA 2.5" 3Gb/s				
Power Supplies	2x 1280W	2x 1620W	2x 1280W	2x 1620W	2x 1200W
Hyper-Threading	Enabled				
Turbo Mode	Disabled				
C-States	Enabled				

Figure 1: Hardware and software configurations
The systems were tested in a 220 volt power environment and with a room temperature of 21°C. The operating system used was Red Hat Enterprise Linux 4.0 update 4 (64 bit).

Results

All systems were run utilizing HPL. Power usage for each system was continuously monitored during each test run by power meters. The result is displayed in Figure 2 below. Due to the identical configurations all systems generated a performance of 204 GFLOPS per node utilizing a LINPACK problem size of 125,000.

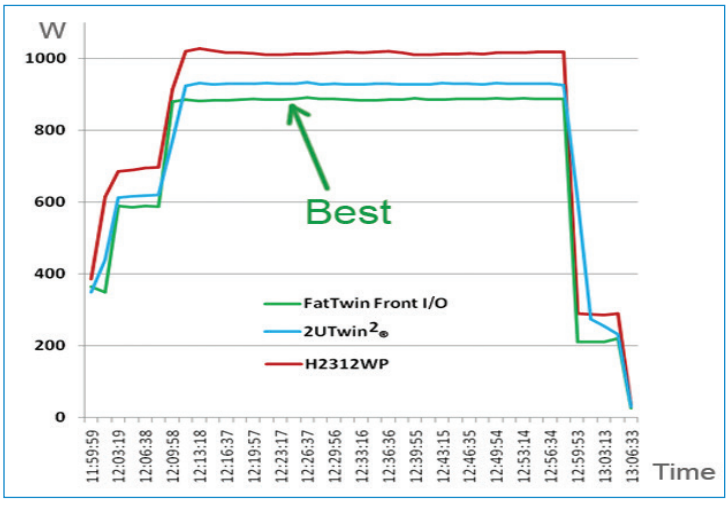

Figure 2: Power usage with running HPL – High Performance LINPACK (4 Nodes)

Analysis

The peak and average power levels of each system were compared under maximum LINPACK loading. These power levels were then converted to power savings in dollars using a cost of $0.10 USD per kilowatt-hour for electric power cost. By using the H2312WPJR result as the baseline, the savings for each Supermicro system configuration was then calculated for a four-year estimated lifetime, under the assumption of PUE=1.5. The power and cost saving results are summarized in Figure 3 below.

Per Node	Supermicro F617R3-FT (1280W)	Supermicro F617R3-FT (1620W)	Supermicro 6027TR-HTRF+ (1280W)	Supermicro 6027TR-HTRF+ (1620W)	H2312WPJR (1200W)
Peak Power	224W	226W	235W	237W	259W
Peak Power Savings	52.5W	49.5W	36.75W	33.75W	0W
$ Savings (4 yrs.)	$184	$173	$129	$118	$0
Average Power	222W	223W	233W	234W	254W
Average Power Savings	48.75W	47.25W	32.63W	30.75W	0W
$ Savings (4 yrs.)	$171	$166	$114	$108	$0

Figure 3: Supermicro FatTwin™ power and cost savings per Node
*The Supermicro FatTwin™ Front I/O configuration with a 1280 watt power supply performed the best, with **a $184 cost savings per node** over the competitor H2312WPJR system at peak power.*

Conclusions

By virtue of shared power and cooling components, the Supermicro Twin server improves cost-effectiveness, power efficiency and reliability. The new FatTwin™ modular architecture design not only maximizes the I/O capacities but also makes the system highly flexible to configure and exceptionally easy to maintain.

Supermicro optimizes FatTwin's thermal airflow via innovative chassis mechanical architecture. Advanced circuit designs for motherboard and power distribution with redundant Platinum Level high-efficiency (95%) digital switching power supplies allow the system to deliver by far the highest energy efficiencies without sacrificing system performance. The FatTwin™ is designed to operate within an extended **ambient temperature range (0°C to 47°C)**, ideal in free-air cooled environments, to help further reduce energy consumption and reliance on costly traditional air conditioning.

Based on this study, the Supermicro FatTwin™ and 2U Twin^2® outperform a competitor's comparable 2U 4-node server system in terms of power efficiency. The power cost savings of the Supermicro FatTwin™ and 2U Twin^2® during a 4-year server lifetime is substantial: the front I/O FatTwin™ configuration saves $184 per node followed by the 2U Twin^2® at $129 per node at peak power, or $171 and $114 per-node savings respectively at average power. For customers deploying thousands of these Supermicro systems in their data centers, the savings are clearly significant.