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 Twin²® 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 Twin²®, 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 Twin² power savings were calculated.
Configuration

In this study, two Supermicro systems were reviewed, a 4U 8-Node FatTwin™ with Front I/O (SYS-F617R3-FT) and a 2U Twin²® (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.

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.

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.

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 Twin²® 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 Twin²® during a 4-year server lifetime is substantial: the front I/O FatTwin™ configuration saves $184 per node followed by the 2U Twin²™ 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.