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CASE STUDY

SUPERMICRO MICROBLADE DISAGGREGATED SERVER POWERS ONE OF THE WORLD'S MOST ENERGY EFFICIENT 1.06 PUE DATA CENTERS AT FORTUNE 100 COMPANY



SUPERMICRO® 3U MICROBLADE™ SYSTEM

EXECUTIVE SUMMARY

Supermicro MicroBlade System Deployed at the Fortune 100 Company

- 30,000+ Intel® Xeon® Processor based Supermicro® MicroBlade™ Server blades
- Each 3U MicroBlade enclosure consists of 14 hot-swap server blades
- 56% better data center space utilization / density
- High efficiency shared Titanium Level (96%+ efficiency) digital power supplies and cooling
- 45% to 65% CAPEX savings due to disaggregated hardware architecture

A Fortune 100 Company has deployed over 30,000 Supermicro® MicroBlade™ disaggregated Intel® Xeon® processor based servers at its Silicon Valley data center, one of the world's most energy efficient data centers with a PUE of 1.06, to support its growing compute needs. Compared to a traditional data center running at 1.49 PUE, the new Silicon Valley data center achieves an 88% improvement in overall energy efficiency. When the build out is complete at a 35 megawatt IT load power, the company is targeting \$13.18M in savings per year in total energy costs across the entire data center.



Supermicro MicroBlade is a compact and flexible all-in-one system that supports 14 hot-swappable server blades in 3U and 280 Intel Xeon processor based servers in a 9 foot (60U) rack, the highest server density in the industry*. With high-efficiency shared power and cooling for the entire enclosure, integrated network switches and a single out-of-band management Ethernet cable for all 14 blades, MicroBlade system lowers overall IT operating costs and improves data center space utilization by 56% compared to the incumbent solution. MicroBlade's disaggregated rack scale design optimizes data center refresh cycles and delivers better overall data center performance at 45% - 65% reduced CAPEX costs.

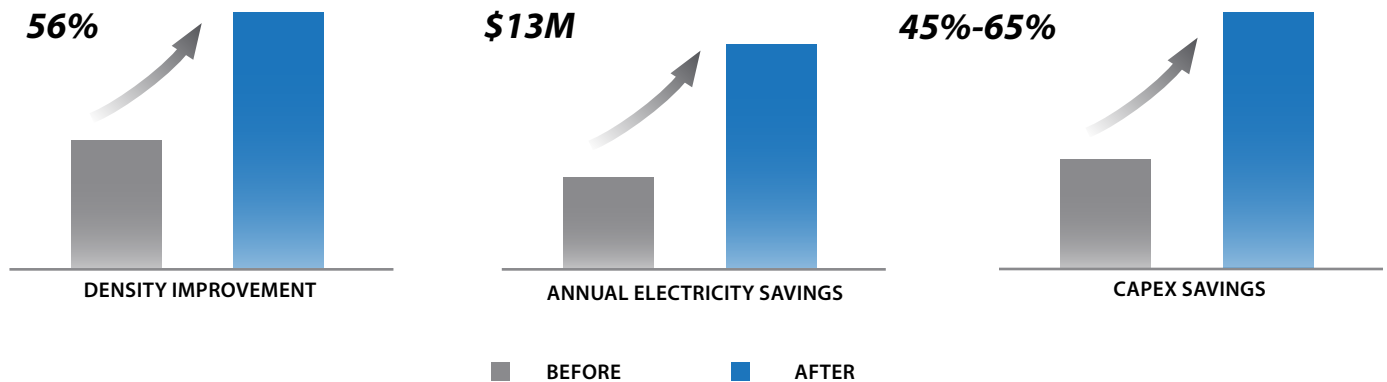


Figure 1. Density improvement, annual electricity savings and CAPEX savings per refresh cycle for the new Data Center of the Fortune 100 company

* Each blade can be configured with one or more server nodes. 280 Intel Xeon processor based servers per 9 foot rack density is achieved with one server node per blade.

THE FORTUNE 100 COMPANY'S INTERNAL IT STRATEGY AND BUSINESS MANDATES

- Meeting up to 40 percent annual growth in compute, storage and networking with fixed physical space and power budget
- Taking advantage of the latest compute technology (CPU + memory) without upgrading the entire infrastructure
- Lowering TCO Continuously while providing business units the best Service-Level Agreements (SLAs) and Quality of Service (QoS)

There are three pillars of this Fortune 100 Company's internal IT strategy: providing its business units with the best Service-Level Agreements (SLAs) and Quality of Service (QoS); continuously minimizing IT infrastructure costs; and optimally increasing the resource utilization of infrastructure assets.

The tasks the Fortune 100 Company IT face

1. How to future proof the investment to incorporate next generation compute module (CPU+memory or NIC+DAS) without changing the rest of the components
2. How to deliver more computing power with same power per rack budget while maintaining or lowering PUE
3. How to continuously lower the CAPEX and OPEX while providing the business units the best possible SLAs and QoS

Leveraging its vertically integrated full service capabilities, Supermicro collaborated closely with this Fortune 100 Company and delivered a solution from design concept to optimally tuned, high quality product with full supply chain and large scale delivery support in five weeks.

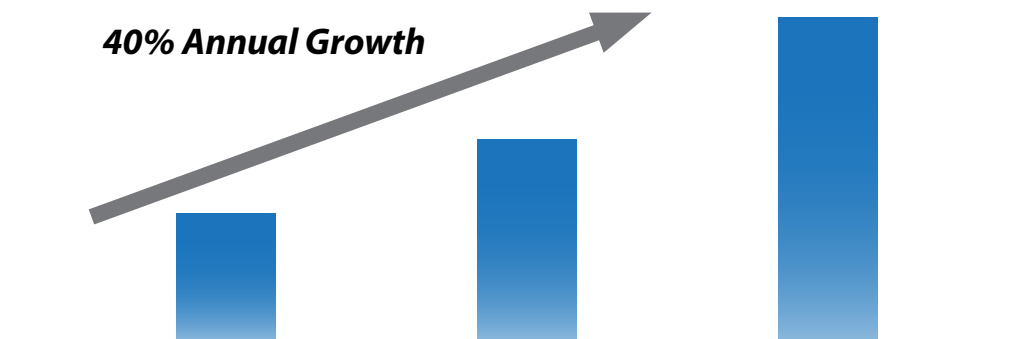


Figure 2. Up to 40% annual growth in compute, storage and networking at the Fortune 100 company

WHY SUPERMICRO'S MICROBLADE IS AN OPTIMAL SOLUTION

MicroBlade Product Family Advantages

6U/3U DP/UP Server Systems*, support up to:

- 112 nodes - Intel® Atom™ processor (C2750/C2550)
- 56 UP nodes - Intel® Xeon® processor E3-1500 v5 (1585/1578L)
- 56 UP nodes - Intel® Xeon® processor D-1500 (1581/1541)
- 56 UP nodes - Intel® Xeon® processor E3-1200 v5
- 28 DP nodes – Intel® Xeon® processor E5-2600 v4/v3
- High-efficiency Supermicro® system design (as low as 10W per node)
- Redundant (N+1 or N+N) Titanium Level (96%+ efficiency) digital power supplies
- Redundant 10/2.5/1Gbps SDN switches
- Redundant chassis management modules with unified remote management software
- Front-loading blades for easy access and servicing

- High-density, high-efficiency and cost-effective MicroBlade with integrated network switching
- Modular, Rack Scale Design (RSD) ready hardware enabling independent update of compute modules (CPU + Memory)
- High ambient temperature at 40 °Celsius operation

Supermicro Microblade solution is based on high-density, high-efficiency and cost-effective all-in-one chassis that features 14 hot-swap server blades in 3U. The MicroBlade enclosure is configured with a Chassis Management Module for unified management, integrated network switches to reduce within-rack cabling by up to 99%, and redundant 2000W Titanium Level certified digital power supplies for high energy efficiency (96%+). Up to 86% improvement in cooling fan power efficiency is achieved by sharing four cooling fans and integrated power modules across all 14 MicroBlade server blades*.

With reduced cabling and less parts, the serviceability of MicroBlade system is significantly enhanced. Supermicro MicroBlade is shipped with industry standard IPMI 2.0 and Redfish API designed to lower management overhead in large scale data centers. To maximize the utilization of the physical space in the data center, the company uses 9 foot (60U) racks, and packs 20 x 3U MicroBlade enclosures delivering the industry's highest server density at 280 Xeon processor based servers per rack**.



Figure 3. Front View of 3U MicroBlade System

* DP: Dual or Double Processor
UP: Uni or Single Processor

* Compared to 14 traditional 1U rack mount servers each configured with six cooling fans and two power supplies.

** Each blade can be configured with one or more server nodes. 280 Intel Xeon processor based servers per 9 foot rack density is achieved with one server node per blade.

“With 280 Intel Xeon processor based server blades packed into a 9 foot rack, the high-density, high efficiency and disaggregated MicroBlade architecture is a game changer and for the first time allows for the independent refresh cycles of the server compute modules. This will unleash a new wave of disaggregated hardware architecture.”

Shesha Krishnapura
Intel Fellow and Intel IT CTO

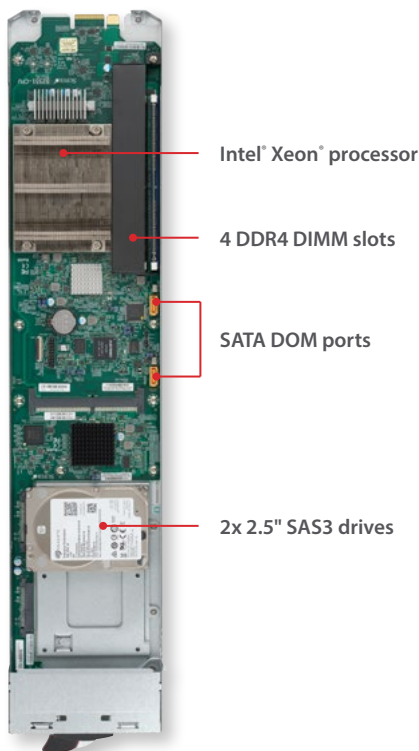


Figure 5. 1 of 14 hot-swap MBL-6119G-C2 Server Blades

Electronic Design Automation (EDA) workloads are compute intensive and require many servers to complete the complex simulations rapidly. Shortening the design cycle directly translates into Go-To-Market (GTM) competitive advantages for the company.

To support its business goals while minimizing IT infrastructure costs, IT at this Fortune 100 Company has deployed over 30,000 Supermicro MicroBlade server blades in its Silicon Valley data center. In addition to industry leading server density and power efficiency, the new innovative MicroBlade architecture enables the independent upgrades of the compute modules without replacing the rest of the MicroBlade enclosure including networking, storage, fans and power supplies, which refresh at a slower rate.

By disaggregating CPU and memory, each resource can be refreshed independently allowing data centers to reduce refresh cycle costs (Why change the entire light fixture, when all you need is a more energy efficient and powerful light bulb?). When viewed over a three to five year refresh cycle, disaggregated rack scale design will deliver on-average a higher performance and more efficient servers at lower costs than a traditional rip-and-replace model by allowing data centers to independently optimize adoption of new and improved technologies.

Supermicro MicroBlade is equipped with advanced airflow and cooling design. The ambient temperature for MicroBlade servers can be as high as 40 °C or 104 °F. Green computing features such as this give IT at this Fortune 100 Company more latitude to operate their data centers.



Figure 4. Rear View of 3U MicroBlade System

RESULTS THE FORTUNE 100 COMPANY ACHIEVED WITH SUPERMICRO SOLUTION

“The disaggregated server architecture is a perfect fit for our data centers, just like when a homeowner upgrades lighting, they will only replace the bulbs with the most energy efficient ones without replacing the entire lighting fixture, Intel IT prefers to upgrade just the compute modules with the latest technologies without replacing the entire server infrastructure.”

Shesha Krishnapura
Intel Fellow and Intel IT CTO

- MicroBlade makes the world's most efficient data center with a PUE of 1.06 even more effective by optimizing the maximum use of power and space allowed per rack
- Future proof and disaggregated RSD ready architecture to incorporate next generation compute module (CPU+memory) without changing the rest of the design
- Improves data center space utilization by 56% and saves 45% to 65% in CAPEX per refresh cycle

According to a recent IDC data center research report*, two thirds of US enterprise data center facilities have a PUE (Power Usage Effectiveness) over 2.0, spending money on uncontrolled cooling and power costs. The PUE measure divides total power delivered to the data center by the actual power the IT equipment consumes. An ideal PUE is 1.0 meaning that all of the energy needed for a data center facility goes to the computing devices instead of overhead such as cooling or power conversion.

With a PUE rating of 1.06, the Fortune 100 Company operates the world most efficient data centers in Silicon Valley, California**.

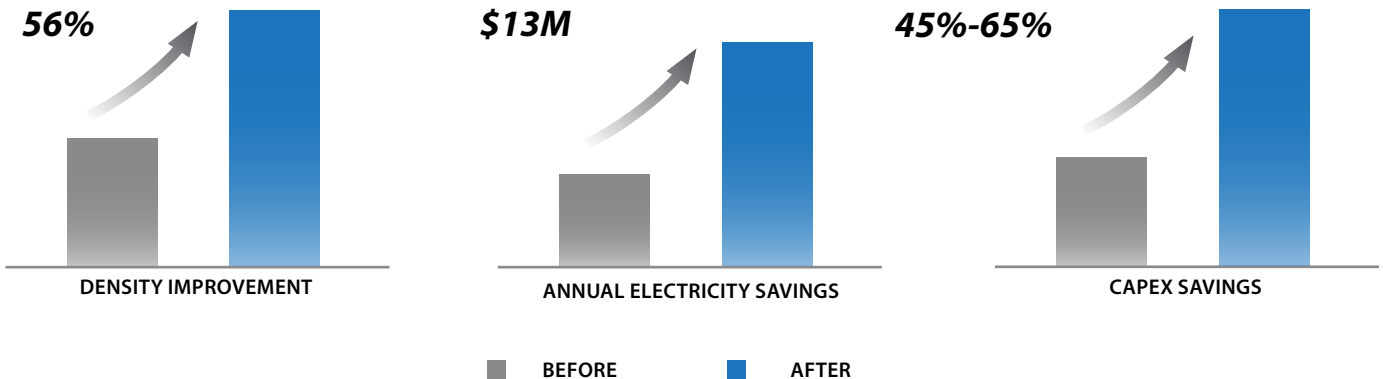


Figure 6. Density improvement, annual electricity savings and CAPEX savings per refresh cycle for the new Data Center of the Fortune 100 company

* Quinn, Kelly. "Power Issues in the Datacenter: IDC Survey Results". IDC Doc# US40885516. March 2016

** King, Rachael. "Intel CIO Building Efficient Data Center to Rival Google, Facebook Efforts". Wall street Journal. Nov. 9, 2015

FOR MORE INFORMATION

- Supermicro® MicroBlade™ Solutions
www.supermicro.com/products/MicroBlade/
- Supermicro Rack Scale Design
www.supermicro.com/solutions/SRSD.cfm
- Intel® Xeon® Processor
www.intel.com

To further optimize the world's most efficient data centers, IT at the Fortune 100 Company searched for ways to maximize the number of servers that can be fitted in the 9 foot rack with minimum amounts of power consumption. With 14 hot-swap server blades in a 3U MicroBlade enclosure, IT is able to fit 280 server blades into one 9 foot rack, the most number of servers per cabinet footprint in the industry. This Fortune 100 Company has improved data center space utilization by 56% with Supermicro MicroBlade servers compared to previous solution. The MicroBlade architecture centralizes and shares high efficiency Titanium Level power supplies, and fans across all 14 server blades, further reduces operating expenses***. With up to 99% cabling reduction for the MicroBlade architecture, airflow is significantly improved, which in turn reduces the load on the cooling fans, resulting in even lower OPEX.

The future-proof, disaggregated MicroBlade hardware architecture provides the company the flexibility to upgrade the compute modules (CPU + memory) at a faster pace while preserving the existing investments made in the networking, storage, power supplies, and cables, resulting in lower CAPEX (spend only a fraction of what otherwise has to spend), lower OPEX (replacing a module involves less work and manpower than replacing the entire server) and hence the overall data center TCO. For CAPEX alone, it is estimated that the savings is between 45% and 65% by upgrading only the compute module while keeping the rest of the system intact.



Figure 7. MicroBlade systems Inside the Data Center of the Fortune 100 company

*** Supermicro internal analysis comparing MicroBlade solution to previous one deployed at the Fortune 100 company

About Super Micro Computer, Inc.

Supermicro® (NASDAQ: SMCI), the leading innovator in high-performance, high-efficiency server technology is a premier provider of advanced server Building Block Solutions® for Data Center, Cloud Computing, Enterprise IT, Hadoop/Big Data, HPC and Embedded Systems worldwide. Supermicro is committed to protecting the environment through its “We Keep IT Green™” initiative and provides customers with the most energy-efficient, environmentally-friendly solutions available on the market.

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