



## SUCCESS STORY

# FATTWIN SUPERSERVERS POWER RUTGERS UNIVERSITY'S TOP RANKED NEW SUPERCOMPUTER

Here's a look at how Rutgers' new supercomputer ranks around the world:

- 2nd Among Big Ten universities
- 8th Among U.S. academic institutions
- 49th Among global academic institutions
- 165th Among supercomputers worldwide

Source: TOP500

## SUPERMICRO'S SUPERCOMPUTER CUSTOMER: RUTGERS UNIVERSITY

Ranked #2 among Big Ten Universities and #8 among U.S. Academic Institutions in the Top500 List, the new supercomputer built with Supermicro FatTwin servers is located at the Rutgers Discovery Informatics Institute (RDI2), New Jersey's Center for Advanced Computation. The institute uses advanced computation to address today's compute- and data-intensive grand challenges in science, engineering, and industry. The researchers there seek to broaden access to the state-of-the-art computing technology that enables large-scale data analytics, computational modeling and simulations, all of which play an increasingly important role in modern society.

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Ray Pang  
Director of Solutions Marketing

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Intel Inside®. Powerful Data Center Outside.



# FatTwin SuperServers Power Rutgers University's Top Ranked New Supercomputer

## CHALLENGES FOR RUTGERS

- Rapid growing computing needs of its world-class faculty
- Elevate the competitiveness of Rutgers researchers in the area of Big Data and Big Science
- Prohibitive costs of Supercomputing



**Figure 1.** Supermicro® FatTwin™ SuperServer®

Supercomputing costs can be prohibitive. Supercomputers can cost upwards of several hundred million dollars in capital expenditures (CAPEX), and many millions more in yearly maintenance, energy, and cooling operating expenditures (OPEX). So when Rutgers set out to acquire a supercomputer to support the computing needs of its world-class faculty, it utilized the most stringent criteria and a highly competitive bidding process to select the best infrastructure vendor that provides dramatic increase in computation power over current systems, greater speeds and expanded storage capacity to faculty, researchers and students across Rutgers and the state.

This HPC solution will significantly elevate the competitiveness of Rutgers researchers in computational and data-enabled science, engineering and medicine, as well as those in social science and humanities disciplines. The system manufacturer and integrator chosen after this rigorous bidding process is Super Micro Computer Inc. of San Jose, California. With the majority of research and development efforts done in-house at its Silicon Valley headquarters, Supermicro is in a unique position to build and deliver application-optimized solutions based upon Rutgers' requirements.

## Supermicro® Hardware Portfolio

- 560 FatTwin™ Compute Nodes
- 20,160 cores
- 140 TB of DRAM memory
- 218 TB of NVMe NVRAM
- 677 TFLOPS peak performance
- Intel® Omni-Path fabric
- Each FatTwin with dual Intel® Xeon® Processor E5-2695 v4 CPUs, 256 GB of RAM, and a 400 GB Intel NVMe drive

## SUPERMICRO SOLUTIONS

- Deployed high-density, high efficiency and high performance multi-node FatTwin solution
- One of the very first successful implementation of 100Gbps Intel Omni-Path Fabric
- State-of-the-art rear door cooling for the best TCO

With a \$10 million award from New Jersey Higher Education Leasing Fund, Rutgers built a new supercomputer named "Caliburn," using Supermicro's state-of-the-art FatTwin™ servers, the most powerful supercomputer system in the state.

The project was completed in three phases. Phase I, which went live in January 2016, provides approximately 150 TFLOPS of computational and data analytics capabilities and one petabyte of storage to faculty and staff researchers throughout the university. To date more than 100 faculty from 17 departments university wide have signed up to use the system. Among the heaviest users have been researchers in the Waksman Institute of Microbiology, the Department of Physics, Department of Chemistry, and the Center for Integrative Proteomics Research.



Powered by Intel® Xeon® Processors



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*"As the leading provider of high-performance computing (HPC) solutions, Supermicro is very pleased to help enable this state-of-the-art HPC solution at Rutgers based on our multi-node FatTwin SuperServers include support for E5-2600 v4 processors, NVMe, 100 Gbps Omni-Path fabric (OPA), and an innovative cooling architecture to deliver maximum performance while reducing the TCO for the Caliburn supercomputer which will supply high-performance computational and data analytics capabilities to researchers for years to come."*

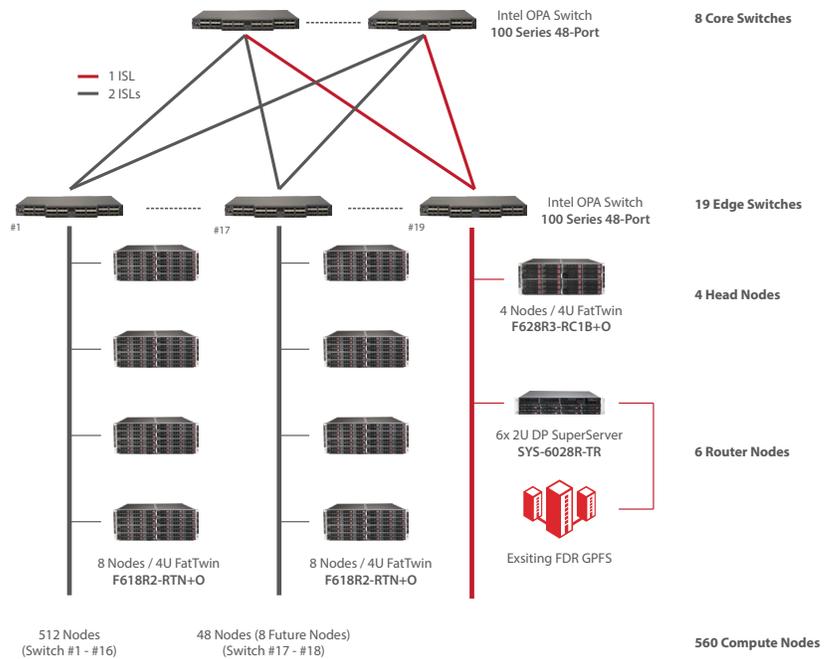
Dr. Tau Leng  
VP and GM of HPC  
Super Micro Computer, Inc.

*"The Intel Omni-Path 100 Gb Architecture is specifically designed for large scale HPC deployments such as Rutgers. As a large scale deployment of the Omni-Path technology, the integrated HPC solution at Rutgers achieves high levels of scaling and power efficiency, while demonstrating the industry leading capability of Omni-Path in large scale computing. As a lead partner for Omni-Path, Supermicro's optimized product portfolio and deployment capabilities were critical to bring the solution successfully online."*

John Beck  
GM of the Intel Omni-Path Fabric Division  
Intel Corporation

Phase II construction included a new self-contained modular data center at Rutgers University–New Brunswick. Phase III encompasses the installation of the Caliburn supercomputer and final elements of the network, which provides high-speed access to users.

The Supermicro solution is based on the FatTwin™ SuperServer system. The supercomputer includes 560 FatTwin™ nodes, each node equipped with two Intel Xeon E5-2695 v4 (Broadwell) processors, 256 gigabytes (GB) of DRAM, and a 400 GB Intel NVMe drive. Overall, the system has 20,160 cores, 140 TB of DRAM and 218 TB of non-volatile memory. As a multi-node system, the FatTwin™ provides not only the density but also supports NVMe SSD that eliminates storage bottleneck and comes with a PCI-E 3.0 x 16 expansion slot with enough bandwidth for 100Gbps Omni-Path Architecture. With high node density for compute, NVMe SSD for fast storage and native 100Gbps OPA for throughput, the FatTwin™ represents the perfect product for Rutgers' Caliburn supercomputer. The standard performance level is 603 TFLOPS with a peak performance of 677 TFLOPS.



**Figure 2.** Supermicro's Cost-effective HPC Architecture at Rutgers

To provide Rutgers with the best possible TCO, Supermicro professional service team deployed the world's most energy efficient and space-saving Coolcentric® Rear Door Heat Exchanger solution. A passive liquid cooled heat exchanger that replaces standard rear doors on IT racks, the Coolcentric® rear door cooling at Rutgers uses 90% less energy than regular indoor cooling units and is 80% space efficient.



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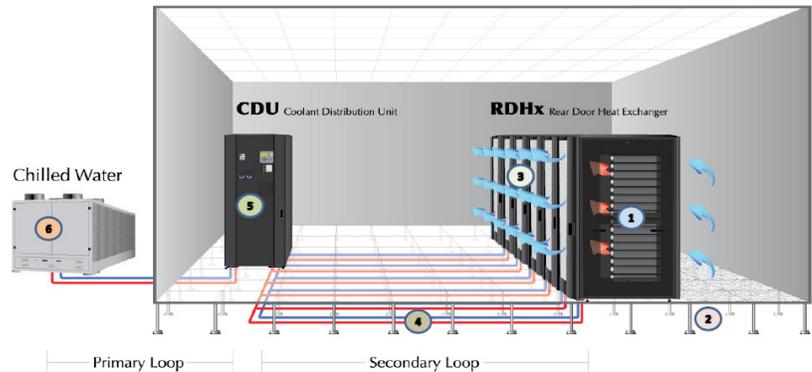


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*"We can train students on how use next-generation technologies and capabilities to better address problems that are relevant to industry today," Dr. Parashar said. "That's really what we're hoping to do — build a whole co-op and interactions of research and collaboration around this instrument that we have so that we can build better partnerships moving ahead."*

Dr. Parashar

Distinguished Professor of Computer Science  
Rutgers University



**Figure 3.** Coolcentric Rear Door Water Cooling System is Deployed on Each Rack

## RESULTS WITH SUPERMICRO

- 2# Among Big Ten universities in the Top500 List
- 8# Among U.S. academic institutions in the Top500 List
- 49# Among global academic institutions in the Top500 List

## FOR MORE INFORMATION

Supermicro® FatTwin™ SuperServer®  
[www.supermicro.com/products/info/FatTwin.cfm](http://www.supermicro.com/products/info/FatTwin.cfm)

Rutgers Caliburn Supercomputer  
[rdi2.rutgers.edu/caliburn](http://rdi2.rutgers.edu/caliburn)

Intel® Xeon® Processor E5-2600 v4 Product Family  
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Dr. Manish Parashar, distinguished professor of computer science at Rutgers and founding director of the Rutgers Discovery Informatics Institute (RDI2), heads the project. Dr. Parashar and Ivan Rodero, RDI2's associate director of technical operations, designed the system with a unique architecture and capabilities based on a new network interconnect developed by Intel (Omni-Path). The Rutgers supercomputer is among the first clusters to use the Intel Omni-Path fabric and the latest Intel processors.

Besides giving its scientists new power to rapidly solve complex calculations, Dr. Parashar, hopes to leverage its new capabilities by collaborating with private industry to train the emerging workforce.

Along with users at Rutgers, the system will be accessible to researchers at other New Jersey universities and industrial users. RDI2 will work with the New Jersey Big Data Alliance, which was founded by Rutgers and seven other universities in the state, to build an industry users program. The capabilities of this new system will establish New Jersey's reputation in advanced computing and benefit a broad spectrum of industry sectors and academic disciplines.



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## 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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