



INDUSTRY

Physics Research

CHALLENGES

- Decrease Simulation Times
- Increase Throughput and Additional Research

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THOUSANDS OF SUPERMICRO COMPUTERS WERE SUPPLIED TO CERN TO HELP ADVANCE HPC RESEARCH

Supermicro BigTwin® Multi-node Servers with over 230 thousand cores are anticipated to bring up to 10 Peta-Flops of additional computing performance to help advance physics-event reconstruction, data analysis, and simulation and support superior performance per watt.



Introduction

More than 17,000 scientists worldwide are brought together by CERN (the European Organization for Nuclear Research) to examine the smallest particles in our universe. Some of the biggest, most complex scientific instruments are used to better understand the fundamental structure of nature and advance the boundaries of human knowledge. Many of the discoveries already made at CERN have had a powerful impact on several areas of everyday life, ranging from medicine to computing.

As a long-standing supplier to CERN, Supermicro provides accelerated enterprise computing technology that supports cutting-edge explorations in particle physics. As the search for understanding the universe's origins expands, new computing resources are constantly being evaluated and updated.

The partnership between CERN and Supermicro helps introduce new technologies to the high-performance compute cluster that processes data from the Large Hadron Collider (LHC). CERN scientists continue to explore enterprise innovations for CERN in collaboration with other global technological manufacturers.

SOLUTION

Supermicro BigTwin

- * A+ 2124BT-HNTR
- * 4 Nodes Per System
- * AMD EPYC 7302 CPUs
- * 256GB Memory/Node

BENEFITS

Faster and More Complex Simulations

Lower Energy Usage

CERN

Physicists and engineers at CERN use the world's most complex scientific instruments, including the Large Hadron Collider, to study subatomic particles and advance the boundaries of human knowledge by delving into the smallest building blocks of our universe.

For more information, visit <https://home.cern/>

Challenges

CERN is constantly at the forefront of research in an effort to uncover what the universe is made of through the use of particle accelerators. However, to understand the results of the experiments, a significant amount of computing power is required. Therefore, it must be updated with the latest advancements in server, storage, and networking technologies, while keeping an eye on the total power consumption of the entire computing environment.

Solution

CERN's infrastructure technical team worked meticulously over many months before any procurement in accessing the market for the latest technological advances. It is a qualification process that, although it can be very time-consuming, is an absolute necessity in keeping CERN at the forefront and, more importantly, allows for a collaboration with suitable partners to assess solutions around performance, cost, operational costs, power, density, etc.

CERN selected the Supermicro AMD BigTwin A+ 2124BT-HNTR server following a lengthy process. As a result, CERN acquired over 900 Supermicro BigTwin systems, each with four nodes, for a total of approximately 3,600 server nodes.

Scientists at CERN perform many types of simulations and workloads. Most of them are used for running batch computing jobs related to physics-event reconstruction, data analysis, and simulation. In addition, part of them is used as front-ends to disk storage, collecting physics data from the experiments.

Supermicro BigTwin servers are smart yet affordable investments for enterprises and institutions that need to build, expand, or future-proof advanced computing infrastructures. The Supermicro BigTwin architecture is the foundation of the most advanced server platforms in HPC. These high-performance, high-density systems feature optimum airflow for energy-efficient cooling, easy maintenance, and high availability with hot-swappable nodes and redundant power supply modules.



Figure 1 - Supermicro A+ BigTwin System with Four Nodes

SUPERMICRO

Supermicro is a global leader in high performance, green computing server technology and innovation. We provide our global customers with application-optimized servers and workstations customized with blade, storage, and GPU solutions. Our products offer proven reliability, superior design, and one of the industry's broadest array of product configurations, to fit all computational need.

For more information, visit <https://www.supermicro.com>



Benefits

CERN saw an increase in the performance of many simulation applications. In addition, with the high density of the Supermicro BigTwin systems with AMD EPYC processors, the power usage was lower than expected due to the shared cooling and power systems. With the AMD EPYC™ 7XXX CPU, applications ran faster than previous generations of CPUs, helping scientists perform more research to understand more about the world we live in.



"We have worked alongside Supermicro for many years, and their attention to the design and engineering of the Supermicro BigTwin architecture has constantly increased. In 2021, thousands of compute nodes of the latest AMD EPYC based Supermicro BigTwin platform were deployed in the CERN computing facilities. This illustrates the high-quality of these systems, both in terms of performance and reliability."

- Eric Bonfillou of the CERN IT Facility Planning and Procurement