



AACHEN UNIVERSITY OF TECHNOLOGY

KEY HIGHLIGHTS

Company

Aachen University of Technology

Industry/Market

Education

Applications/Solutions

- Sun HPC supercomputer containing 32 Sun Fire™ 6800 servers

Products/Services

- 8 Sun Fire 6800 servers, expanding to a 32-node cluster
- 2 Sun Enterprise™ 450 servers
- 4 Sun StorEdge™ T3 disk arrays
- Sun HPC ClusterTools™ software
- Solaris™ 8 Operating Environment

Key Business Challenges

- Replace outdated vector approach to supercomputing with open, flexible, cost-effective clustered SMP system
- Provide the computational power to advance resource-hungry applications
- Establish strong, multi-faceted relationship with supplier of premier computing platforms

Key Business Solutions

- Most powerful supercomputer ever delivered by Sun being installed in stages
- Initial stage in production
- Center of HPC excellence established with Sun

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*Dr. Klaus Bruehl
Head of Group Data and Computing Services
Communications and Computing Center
Aachen University of Technology*

The Aachen University of Technology, one of the leading technical universities in Europe, has begun implementing the largest Sun Microsystems supercomputer in the world. Eight of an eventual 32 Sun Fire™ 6800 servers have been installed and entered production use – helping researchers in computational fluid dynamics and other especially compute-intensive applications. When completed in 2002, this clustered SMP system will be among the world’s most powerful computer systems, with total performance of 2.3 Tflop/second.

In an open RFP competition, Sun was selected over IBM, HP, SGI, Compaq, and NEC to replace a Fujitsu computer whose vector architecture is being obsoleted by more flexible and cost-effective open systems. The university chose Sun Fire servers for their scalability, their extensive third party application availability, their excellent price/performance, and Sun’s interest in collaborating closely with university personnel to make Aachen a center of HPC excellence.

One of Europe’s Premier Technical Universities Opts for Open Systems Supercomputer to Replace Vector Computer

The RWTH (Rheinisch-Westfaelische Technische Hochschule) Aachen, also known as the Aachen University of Technology, is one of Europe’s top technical institutions for research and higher learning.

Over 29,000 students pursue studies in engineering, chemistry, physics, medicine, and other fields, where applications such as computational fluid dynamics (CFD) tax the power of the highest performance computers the industry is able to produce. Until recently, the university dedicated a Fujitsu VPP300/8 vector computer to these most demanding applications. However, with the emergence of a new form of supercomputer – clusters of SMP nodes – “special systems” like vector computers and massively parallel systems fell out of favor both at Aachen and in the computing community generally. Clusters of SMP systems bring the benefits of open systems to supercomputing. They are much easier to use, run many more applications, and offer greater flexibility – all at far lower costs.

In early 2000, Aachen began a project to replace the Fujitsu with this modern form of supercomputer. The university's goal was to deliver higher performance for all institutes of the university and especially to make a new level of HPC compute power available for the particularly demanding applications. Following Germany's fixed procurement procedures, the school issued an RFP in June and soon received bids from Sun and five other computer system vendors.

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Sun Selected for Scalability, Third Party Software Availability, Price/Performance, and Collaboration-Oriented Attitude

In November, after thoroughly considering all options, Aachen made the decision for Sun. "We chose Sun over IBM, HP, SGI, Compaq, and NEC," said Dr. Klaus Bruehl, head of group data and computing services at Aachen's Communications and Computing Center. "The main reasons were Sun's scalability, its extensive third party application availability, the very favorable price Sun offered, binary compatibility throughout a broad range of computer sizes, computational power, and Sun's interest in working closely with university personnel to make Aachen a center of HPC excellence."

"We chose Sun's new Sun Fire servers for their binary compatibility and computational power," added Christian Bischof, Professor at Aachen. "This will allow us to champion portal and Internet technologies, while enabling researchers in dispersed communities to access Sun's compute power, which is important for a university with an open approach to science. Sun's seamless scalability from the desktop to teraflops greatly simplifies computing for both our scientists and engineers."

Beginnings of Sun's Fastest-Ever Supercomputer Installed and In Production

Sun delivered the first installment of Aachen's massive system in spring of 2001 – a cluster of eight Sun Fire 6800 servers connected by two 16-port FC-AL switches, along with two Sun Enterprise™ 450 file servers and four Sun StorEdge™ T3 RAID disk arrays. Myrinet switching technology from Myricom, Inc. is used to interconnect the Sun Fire cluster. All equipment is protected by SunSpectrum™ service, including SunSpectrum Platinum™ support for the data and file server complex. For smart support of the distributed computing environment, Aachen uses Sun HPC ClusterTools™ software.

The university's users immediately embraced their new system and despite its enormous computing capacity, quickly consumed its resources. They will not have to wait long for more processing power – with three additional clusters of eight Sun Fire 6800 servers each and other enhancements scheduled for installation in stages during late 2001 and early 2002. By the time the system is complete in summer of 2002, it will be the largest Sun supercomputer in the world. Its peak performance will reach 2.3 Tflop/second, ranking it among the most powerful systems anywhere from any manufacturer. Main memory will exceed one terabyte, and online disk storage will be over ten terabytes. To share these resources even more widely, Aachen will link the system into the computing network of the state of Northrhine Westfalia, a collaborative effort of several universities to share data, resources, and expertise.

Multi-Faceted Collaboration with Sun

Among the most prominent applications for the supercomputer are chemistry, structural dynamics, and especially CFD – an Aachen specialty and the focus of the HPC excellence in engineering relationship under Sun's global Center of Excellence program. The relationship's first joint project is the development of VISTA, a virtual reality toolkit for engineering applications that is written in the Java™ programming language. In addition, the university's experts are working closely with Sun to generate HPC courseware and documentation. Under the comprehensive collaboration agreement between the two organizations, Sun is also conducting a series of workshops, funding Ph.D. students, and reconfiguring Myrinet to accommodate new components as they are delivered and installed.

“The system is in production and accepted by our users,” said Bruehl in closing. “We're immersed right now in exploring our new technology to learn the most effective and efficient ways to deliver HPC services, especially for big parallel applications that need many CPUs. It's not necessarily an easy task, but Sun HPC ClusterTools software helps a lot. The HPC specialists on our staff regard Sun HPC ClusterTools software as essential for getting the most efficiency out of our parallel system. We're honored that by the time our system is complete, it will be the most powerful system Sun has ever delivered. There is absolutely no question that we made the right decision by choosing Sun.”

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