Technische Universität Darmstadt selects a sophisticated supercomputer based on System x technology

Overview

For universities, staying at the forefront of academic research depends increasingly on providing scientists with access to powerful, flexible and energy-efficient supercomputing facilities. TU Darmstadt deployed a new supercomputing environment based on System x iDataPlex dx360 M4, System x3850 X5, System x3550 M4, System x3650 M4 and System x3750 M4 servers. The solution offers 38 times the performance of the previous supercomputer, and allows administrators to cut time spent on routine management. High energy efficiency reduces total cost of ownership.

Technische Universität Darmstadt (TU Darmstadt) offers first-rate education in 110 undergraduate and graduate degree programs to more than 25,000 students. The university's pioneering achievements in research have earned it a deservedly strong international reputation for excellence.

TU Darmstadt receives federal and state funding to maintain a supercomputer, which is used by scientists from the university as well as other universities and public research organizations, in particular institutions based in the German state of Hesse, to conduct complex research projects. TU Darmstadt knew that its previous supercomputer would be unable to support the increasingly large and complex simulations required to stay at the forefront of research, so it began looking for a new solution that could cope with the rising demands.

Boost compute capacity to drive research

The university deployed a supercomputer based on 768 System x iDataPlex dx360 M4 nodes with four System x3850 X5, six System x3550 M4, twelve System x3650 M4 and four System x3750 M4 servers—all powered by intelligent Intel® Xeon® processors. TU Darmstadt uses Rear Door Heat eXchanger solutions—dramatically improving cooling efficiency.

"The highly sophisticated System x supercomputer will enable us to make huge progress in our research."

—Dr. Andreas Wolf,
Head, High Performance Computing Group,
University Computing Center,
Technische Universität Darmstadt

The System x servers run SUSE Linux Enterprise Server, running IBM General Parallel File System (GPFS) software. The GPFS software delivers high-speed access to files, helping to accelerate research and facilitate the sharing of results.
TU Darmstadt's supercomputing environment provides three distinct architectures, each designed to suit a particular class of computations. This enables optimal performance across a broader range of research, helping the institution maintain its international reputation.

The first part of the solution, the iDataPlex cluster, is designed to support highly parallelized applications that use the Message Passing Interface (MPI). Computations can be run on thousands of cores in parallel, providing excellent performance for distributed memory applications commonly used to support complex simulations. The second part of the solution, the System x3850 X5 server cluster, is designed to support grid generators for large simulation models or applications with dynamic or unpredictable load profiles. The third part of the supercomputer is designed to support applications whose code takes advantage of accelerator processors. Some 44 of the iDataPlex compute nodes feature Nvidia GPU accelerators, while a further 26 nodes are equipped with two Intel Xeon Phi coprocessors apiece—each of these coprocessors provides more than 1 teraflops (trillion floating-point operations per second) of double-precision peak performance. This part of the solution is particularly well-suited to applications that model biological or chemical phenomena.

Supporting state-of-the-art research

Dr. Andreas Wolf, Head, High Performance Computing Group, University Computing Center, TU Darmstadt, comments, "Our old supercomputer offered 10 teraflops, while the new System x supercomputer boasts an impressive total performance of 380 teraflops. This huge increase in performance enables us to support studies that previously would have taken a prohibitively long time.

"The System x technology is highly energy-efficient, helping us to keep our power consumption and costs relatively low for a supercomputing environment. We estimate that energy costs make up approximately 28 percent of the total cost of ownership for the supercomputer over five years, so even small efficiency gains translate into major cost avoidance."

Solution components

Hardware

System x iDataPlex dx360 M4
System x3550 M4
System x3650 M4
System x3750 M4
System x3850 X5
Intel® Xeon® processors

Software

IBM General Parallel File System (GPFS)
SUSE Linux Enterprise Server

Dr. Andreas Wolf continues, “Choosing a solution that is easy to manage allows us to spend more time on optimizing cluster management techniques and training scientists to use the supercomputer, equipping students with valuable skills for their future careers and academic pursuits.

“The highly sophisticated System x supercomputer will enable us to make huge progress in our research. We look forward to further expanding our research facilities, paving the way to groundbreaking achievements.”

For more information

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For more information about Technische Universität Darmstadt visit: www.tu-darmstadt.de

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