

University of Notre Dame Center for Research Computing empowers researchers with state-of-the-art supercomputer from Lenovo

LenovoTM

The Center for Research Computing (CRC) at the University of Notre Dame is an innovative and multidisciplinary research environment open to academics from across the university and collaborators around the world. The CRC manages and provides access to HPC resources, as well as expert guidance and support services for scientific users.

Meeting growing demand

A major research hub, the University of Notre Dame is committed to helping faculty deliver cutting-edge, globally-significant scholarship that is a force for good in the world.

According to Paul Brenner, Associate Director of High Performance Computing at the CRC: “We connect faculty with the compute resources they need to work on extremely complex problems, such as mapping the trajectory of hurricanes or understanding how global economies interact.”

Supporting everyone from physicists working with data from CERN to find evidence of the Higgs Boson particle, to psychologists analyzing social networks, the CRC works with academics from almost every department on campus.

Overview

To advance human understanding of everything from metrology to quantum physics, academics from the University of Notre Dame rely on high-performance computing (HPC) systems to run advanced data analyses and simulations. To equip researchers with the tools they need to make the next great discovery, Notre Dame's Center for Research Computing implemented a cluster based on 500 Lenovo NeXtScale nx360 M5 compute nodes. With more compute power available than ever before, researchers can accelerate exploration and discovery.

“Thanks to the Lenovo system’s impressive CPU horsepower and high RAM/core ratio, we can support bigger, more complex and more ambitious research projects than ever before.”

— Paul Brenner,
Associate Director of High
Performance Computing,
Center for Research Computing
University of Notre Dame



“There has been a real boom in demand for HPC in recent years, which shows no sign of slowing,” says Paul Brenner. “More and more ‘non-traditional’ subjects, such as the arts, humanities and social sciences, are taking advantage of HPC to support research. Physical scientists and engineers, meanwhile, use the HPC systems both to test out theories and to support practical experiments.”

To meet growing demand, the CRC needed to find a new HPC system capable of supporting both growth in the number of researchers and the degree of computational work performed by existing faculty.

Teaming up with Lenovo

After evaluating offerings from several vendors, the CRC selected a Lenovo Intelligent Cluster, based on Lenovo NeXtScale System technology.

Paul Brenner recalls: “Having worked with Lenovo in the past, we knew that we could rely on them to deliver a powerful pre-tested, pre-integrated cluster that would meet all of our technical requirements. Lenovo also offered an excellent price-performance ratio, ensuring we got the best value for our money.”

Working closely with Lenovo, the CRC team implemented a cluster based on 500 Lenovo NeXtScale nx360 M5 compute nodes. Powered by the Intel® Xeon® E5 family of processors, the supercomputer delivers the high levels of performance needed to support a wide range of compute-intensive research workloads. With 256 GB of RAM per server, the Lenovo cluster can also support very complex data simulations.

All 500 compute nodes in the cluster are connected with Juniper 10GbE switches, which enables users to move data onto the CRC’s storage systems rapidly and at high capacity. For cluster management, the Lenovo system runs Red Hat Enterprise Linux and Extreme Cluster/Cloud Administration Toolkit (xCAT).

Paul Brenner comments: “The speed and flexibility with which the Lenovo team worked really impressed us. They were only too happy to revise quotes and specifications – sometimes at short notice – during the acquisition process to ensure that we met our moving deadlines. And once all the paperwork had been signed, they got the cluster up and running in no time.”

Advancing academic research

With the new Lenovo Intelligent Cluster in place, the CRC is better equipped to support cutting-edge research in a wide variety of fields.

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Solution components

Hardware

Lenovo Intelligent Cluster

- Lenovo NeXtScale System M5
- Lenovo NeXtScale nx360 M5 compute nodes with Intel® Xeon® E5 family of processors
- Juniper 10Gb Ethernet switches

Software

Extreme Cluster/Cloud Administration Toolkit (xCAT)
Red Hat Enterprise Linux



For example, chemists at Notre Dame are using the Lenovo infrastructure to run large-scale molecular dynamics simulations. Other research teams use the system to investigate everything from protein synthesis and drug design to genomics and environmental change.

“Feedback from users has been great,” says Paul Brenner. “Researchers are delighted to be able to increase the scale and complexity of their simulations and analyses. The sheer scale of compute power we can now offer researchers will also help them to get their results faster – a win-win situation.”

He concludes: “The Lenovo Intelligent Cluster enables us to deliver powerful, world-class HPC resources to researchers from increasingly diverse disciplines, enabling them to delve deeper into their data and unlock new knowledge.”

For more information

To learn more about Lenovo Data Center Systems solutions, contact your Lenovo Sales Representative or Lenovo Business Partner, or visit: lenovo.com/systems

For more information about the Center for Research Computing at the University of Notre Dame, visit: www.crc.nd.edu or connect with @UNDRResearch

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