The power and performance to meet research computing demands

With research computing needs expanding to new domains, Purdue turned to Dell Technologies for high performance computing (HPC).

Customer profile

PURDUE UNIVERSITY

Higher Education | United States

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Executive Director, Research Computing,
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Organization needs

When Purdue University wanted to build an HPC facility to deliver resources for computer-aided discovery to more faculty and staff on campus — as well as to researchers nationwide through the NSF’s XSEDE virtual organization — it chose Dell PowerEdge servers and Microsoft Azure powered by AMD EPYC “Milan” processors.

Solutions at a glance

- Dell PowerEdge C6525 servers powered by AMD EPYC™ processors

Organization results

- Delivers up to 39% faster performance compared to the previous generation.
- Enables very high computing density for efficient use of space and power.
- Won a $10 million National Science Foundation grant to create the Anvil supercomputer and boost computing capacity.
- Accommodates a greater number of users and moderate-sized computing tasks to meet growing research demands.
- Offers an ideal training tool to the next generation of the HPC workforce.
- Provides 1 billion CPU core hours annually to XSEDE researchers.

> “Whether we’re building a system for campus or proposing something for the NSF, the value delivered by Dell Technologies, Microsoft and AMD make it a no-brainer.”
>
> **Carol Song**
> Sr. Research Scientist and Scientific Solutions Director, Purdue University

For more than 150 years, Purdue University has stood as a highly regarded public land-grant university serving 41,000 students from multiple locations, including its flagship campus in West Lafayette, Indiana. A leading research institution with more than 400 labs, Purdue has a research budget of approximately $350 million annually.

As scientific exploration has expanded beyond traditional research domains, Purdue competed for a $10 million grant from the National Science Foundation (NSF) to create its Anvil supercomputer. Anvil serves thousands of researchers across the U.S. through the NSF’s Extreme Science and Engineering Discovery Environment (XSEDE).

“This is different from traditional NSF research programs,” says Carol Song, senior research scientist and scientific solutions director at Purdue University and the principal investigator of Anvil. “It’s about putting together and operating large systems to provide services to research users.”

Exceptional computing power and performance

Purdue tapped Dell PowerEdge servers in building an HPC platform for both its own team and the national research community. Anvil consists of 1,000 nodes with 128-processor cores featuring AMD EPYC “Milan” processors. The supercomputer delivers over 1 billion CPU core hours to XSEDE each year, with a peak performance of 5.3 petaflops.

Anvil is based in the same facility that has hosted HPC at Purdue since the 1970s, so data center space and power efficiency were priorities. “Being able to fit modern density computing into that space was paramount,” says Preston Smith, executive director of research computing at Purdue University. “One of the things that really makes PowerEdge and AMD EPYC processors so compelling is that they enable four 128-core nodes in 2U of rack space, which is extremely dense.”

The university also benefited from significant gains in power and performance compared to what it had been receiving from the community cluster it built a year earlier. The cluster comprised PowerEdge servers and previous-generation AMD EPYC “Rome” processors. Smith states, “Going from Rome to Milan processors on PowerEdge servers, we were seeing from 9% to 39% faster performance.”

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Value that’s a no-brainer

Purdue received $10 million in acquisition funding from the NSF as well as an additional $12.5 million for five years of operations to support a broad cross-section of users and jobs. “When we proposed the system, we found that a significant percentage of both the jobs run and hours delivered on XSEDE can fit on one Anvil node,” remarks Smith. “Having a thousand 128-core nodes allows us to fit lots of representative work from XSEDE onto Anvil.”

Song concludes, “We see Anvil as a system forging the future of computing. We’ve got great plans for how we’re going to use Anvil as a tool for training the next generation of the HPC workforce. Whether we’re building a system for campus or proposing something for the NSF, the value delivered by Dell Technologies, Microsoft and AMD make it a no-brainer.”