

Making HPC ‘Open OnDemand’

Ohio Supercomputer Center gives scientists, students and others easy access to HPC resources to innovate with data.



Customer profile

 **Ohio Supercomputer Center**
An OH-TECH Consortium Member

Scientific Research | United States



“The biggest benefit of Open OnDemand is reducing the time to science.”

Eric Franz

Lead Engineer for Open OnDemand
Ohio Supercomputer Center

Business needs

Scientific researchers and industrial users need to access supercomputing resources from anywhere for their computationally intense projects.

Business results

- Simplifying access to supercomputing resources
- Accelerating scientific discovery and innovation
- Capturing community-driven innovation with an open source platform
- Opening the door to HPC for non-traditional users

Solutions at a glance

- [Dell EMC PowerEdge servers with Intel® Xeon® Scalable processors](#)
- CoolIT® Systems Direct Liquid Cooling
- EDR InfiniBand networking

Making HPC resources easily accessible

For more than 30 years, the Ohio Supercomputer Center has been on a mission to make High Performance Computing resources and expertise available to university and industrial researchers in Ohio and beyond. Whether researchers need to harness the power of a parallel-processor cluster to better understand deep space, a vector processor machine to do weather modeling, or a midsize shared memory processor system to model the human heart, OSC has the hardware and software solutions to meet their needs.

In addition to providing these leading-edge computational solutions, OSC offers a groundbreaking portal, called [Open OnDemand](#), that greatly simplifies user access to HPC resources. This web-based portal, built on open-source software developed at OSC, serves as a “one-stop shop” for accessing HPC from anywhere. With Open OnDemand, HPC users can upload and download files; create, edit, submit and monitor jobs; run GUI applications; and more via a web browser, without client software to install and configure.

Open OnDemand removes many of the complexities that come with accessing HPC systems by traditional methods, according to Eric Franz, the lead engineer for the Open OnDemand team at OSC.

“The biggest benefit of Open OnDemand is reducing the time to science,” Franz says. “Without OnDemand, if you’re a researcher or a student coming to OSC for the first time, you might have to install on your laptop a terminal emulator and a file-transfer application, and you’re going to have to do a lot of learning on how to craft a batch script in order to submit jobs on our clusters. But with on Open OnDemand, all you need is a URL, a username and a password, and you have access to our clusters. And so Open OnDemand makes it very easy for researchers and students to get started with HPC.”

Sharing the goodness

Open OnDemand is part of a trend toward operating HPC resources as cloud services with clean web-based interfaces and well-defined service-level agreements. Increasingly, systems that at one time might have been locked up in university and industry research labs and made available to only select power users are now within the reach of many users via cloud interfaces.

Today, more than 120 research institutions around the world are offering easy, web-based access to HPC systems via Open OnDemand. Among them is the University of Florida.

With Open OnDemand, researchers there can access the UF HiPerGator supercomputer with a simple web browser, according to Dr. Erik Deumens, director of research computing for the University of Florida.

“With Open OnDemand, all the intense computation is being done on the server,” Deumens says in a Dell Technologies case study.¹ “The only thing that is sent to the browser are the actual pixels that the user sees. You can do it even when you are connected on a relatively poor network connection. You don’t have to be in a super fancy room with a high-performance network connection.”

With this web-based access, researchers can interact with HiPerGator in a manner that is similar to using an app on a smartphone, Deumens noted.

“You have an app and you want to do something, and you want the results there immediately,” he said. “And now our researchers are going to do high performance computing calculations, deep learning, artificial intelligence and research tasks in much the same way. They just go to their browser and — zip, zip — they get the results right there.”

¹ Dell Technologies, “[HiPerGator: The University of Florida enables research with a powerful supercomputer from Dell Technologies.](#)” May 2020.



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An open platform

Open OnDemand is an open-source project. That means that in addition to using Open OnDemand to extend the goodness of HPC to more users, participating institutions can also work to improve the platform.

“A great thing about Open OnDemand is that it’s open source,” Franz says. “Anybody in the world can download it, and they can modify it and contribute their enhancements back to the project for everybody else to benefit from.”

The platform is also open to new interactive applications, which users can add via an easy plug-in architecture.

“A lot of the universities that run OnDemand are also adding new interactive applications, in addition to those provided by OSC,” Franz says. “That type of community is really helpful when it comes to expanding the capabilities of the platform.”



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Enabling COVID-19 research

The current projects benefiting from Open OnDemand resources include an ambitious project to arm educational administrators with information they need to help ensure a safe learning experience for students. This initiative at The Ohio State University, known as the COVID-19 Analytics and Targeted Surveillance System, or CATS, puts data analytics and visualization tools to work to allow school superintendents in central Ohio to make critical health and safety decisions with the confidence that comes with solid data.

From the outset, the CATS project was a computationally-intensive undertaking that brought its own set of technical challenges. To overcome these challenges, the CATS team leveraged the High Performance Computing resources of OSC, via Open OnDemand. The web-based portal made it easy for the CATS team, including its software developers, to run their HPC workloads in a timely manner.

The systems that are accessible via the Open OnDemand portal include OSC’s two main clusters, Owens and Pitzer. Collectively, these clusters built by Dell Technologies deliver the power of more than 50,000 Intel® Xeon® compute cores, along with hundreds of GPUs.

The OSC physical HPC resources and staff expertise were vitally important in the success of the CATs project, according to Dr. Ayaz Hyder, an assistant professor in the College of Public Health at Ohio State University who spearheaded the project.

“With the resources of the Ohio Supercomputer Center, we were able to set up 16 different dashboards that were going to be accessible by hundreds and thousands of people at the same time,” Dr. Hyder says. “We were really fortunate to have that kind of support from the Ohio Supercomputing Center.”

Making HPC more widely available

While saving time and simplifying life for seasoned users of supercomputers, Open OnDemand simultaneously opens the door to HPC to new users.

“Open OnDemand enables users who might otherwise be turned off to HPC because it’s too difficult, Franz says. “It makes it easier for new disciplines to take advantage of HPC, which is very important because we now have a lot of big data problems that we didn’t have in the past. Many non-traditional fields now have HPC problems.”

Franz notes that there's nothing that Open OnDemand can do that individuals with a terminal emulator couldn't do themselves. It's just that with a terminal emulator, it might take 20 or 30 steps, along with some systems expertise, to get a job up and running in a supercomputer. Today, thanks to Open OnDemand, users can accomplish the same steps with the click of a button.

"With Open OnDemand, researchers in many fields can get their results faster," Franz says. "And it's a heck of a lot easier than it was before."



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