



HiPerGator

The University of Florida enables research with a powerful supercomputer from Dell Technologies.



Scientific research

United States

Business needs

University of Florida faculty members and partners need access to leading-edge high performance computing resources for computationally intense applications.

Solutions at a glance

- Dell EMC PowerEdge servers
- Intel® Xeon® processors
- Lustre parallel file system
- Mellanox® interconnect

Business results

- Accelerating data-intensive scientific studies
- Supporting 1,300 highly diverse applications
- Enabling scientific discovery and technological innovation
- Helping UF scientists win grants for funded research

The HiPerGator supercomputer accelerates research workloads with the power of more than

46,000
CPU cores



In 2019, UF research faculty members attracted funding of

\$776
million



A commitment to research

From its earliest days as a land grant college, the University of Florida has placed a strong focus on scientific discovery and technological innovation. Today, the University stays true to its roots by supporting a far-reaching research program that ranks among the best in the nation for public universities.¹

From medicine to agriculture, from engineering to the social sciences, UF research faculty members conduct research that leads to new knowledge, new treatments and new technologies. For example, an entomologist develops new weapons in the fight against malaria and Zika. An ophthalmologist seeks cures for children suffering from congenital blindness. A psychologist is making discoveries and advancements for healthy aging. An agronomist fights invasive plants. These are just a few of the use cases, given the broad reach and deep impact of the UF research program.

Just consider the numbers. The university is currently supporting more than 10,000 active research projects, and in 2019, UF research faculty members attracted \$776 million in funding from government agencies, industry and private foundations.²

And this is where high performance computing enters the UF picture — because the lion's share of the research conducted at the University of Florida requires the computational power of the HiPerGator supercomputer.

Fueling scientific discovery with HPC

“The majority of the research faculty are leveraging the resources and services that HiPerGator provides to carry out the work they are awarded to do,” said Dr. Erik Deumens, the University's Director of Research Computing. “In that sense, we basically have proven our worth, and our return on investment, in that we are helping faculty at the University of Florida be more successful.”

¹ University of Florida, [UF Research](#), accessed January 9, 2020.

² University of Florida, [UF Research 2019 Annual Report](#), accessed January 9, 2020.

HiPerGator is an evolving system, growing with the needs of the UF research faculty. Its first iteration, built by Dell Technologies, went into production in 2013 with 16,000 cores. In 2016, UF Information Technology's (UFIT) Research Computing department greatly expanded the system, adding 30,000 Intel® Xeon® processor cores in Dell EMC PowerEdge C-series servers and an extra petabyte of storage. That expansion, known as HiPerGator 2.0, yielded a system with a total of 46,000 cores and a 3-petabyte high performance Lustre file system. The system also delivers the power of 120 terabytes of RAM, a Mellanox interconnect and multiple types of accelerators.

The theoretical maximum speed of the original HiPerGator is 157 teraflops, or 157 trillion floating point operations, and the 30,000-core HiPerGator expansion adds another 1,100 teraflops of speed, equal to 1.1 petaflops. And looking ahead, more teraflops of speed are on deck, as Dr. Deumens and his team lay the groundwork for the next iteration of the system, HiPerGator 3.0.

“It's a big compute cluster that is used for anything — you name it,” Deumens said. “The University of Florida is a big place. We have ~50,000 students. We have a lot of researchers. We do all kinds of work. We support over 1,300 different applications on HiPerGator that people are using to carry out their research.”

HPC on demand

Over the years, Dr. Deumens and UFIT's Research Computing team have seen a change in how researchers use the HiPerGator system.



For a closer look at the HiPerGator 2.0 supercomputer and the computationally intense applications running on it, see the YouTube video [“Expanding the HiPerGator Supercomputer.”](#)

Rather than just scheduling batch jobs and waiting for the results to come back whenever the system has the availability to run the job, researchers now increasingly want interactive access. They want to start a calculation or visualization, look at the results, make changes, and then run more calculations or visualizations.

To meet this demand for interactive access, the research computing team has launched a pilot project called Open OnDemand. Open OnDemand is a National Science Foundation-funded open-source HPC portal based on the Ohio Supercomputer Center's original OnDemand portal. With Open OnDemand, researchers can access HiPerGator with a simple web browser.

"With Open OnDemand, all the intense computation is being done on the server," Deumens said. "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."

Open OnDemand access is part of a trend toward operating HPC resources as a cloud service 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 being made available to many users via cloud interfaces.

"More and more we are operating HiPerGator as a cloud service," Deumens says. "It's like an internal cloud."

Working with Dell Technologies

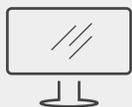
In working with Dell Technologies on the evolving HiPerGator supercomputer, the University of Florida is building on a well-established relationship.

"We've been working with Dell for many years now," Deumens said. "Initially, we just got a good price for a good system, so that's how we got started. But then we worked together as partners over several years on multiple challenges. Things always happen, and Dell has been a really good partner, stepping up to do the things that were necessary, and we got the technical solutions."

That proven partnership was one of the reasons that the UFIT chose to work with Dell Technologies for the development of the HiPerGator 2.0 system, following a competition with multiple vendors.

"Since then, Dell has again proven to be a good partner," Deumens said. "We think it's a good partnership, so that's where we keep going."

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