

ORACLE: POWERING ACADEMIC RESEARCH



High-quality, data-intensive research is an important competitive differentiator for universities that want to attract more funding, students and talent. Yet research institutions face several challenges around the growing need to collect, manage, analyze and collaborate on data. These challenges include:

- Supporting bandwidth-intensive applications
- Protecting sensitive data
- Requiring massive data storage, but often only for limited amounts of time
- Operating with limited budgets

At Penn State, for instance, a Mars weather simulation needs to run on tens of thousands of cores at once, but only for a short time period. Meanwhile, another researcher must correlate physical data from fitness trackers with emotions and stress levels collected via an app.¹

Universities want to ensure research can happen when it needs to but struggle with how to cost-effectively facilitate it.

“To have all that computational capacity on site and sitting idle waiting for these types of requests is not a good use of university resources,” says Chuck Gilbert, technical director of Penn State’s Institute for Cyber Science and chief architect of the institute’s Advanced CyberInfrastructure.²

TOMORROW’S RESEARCH, TODAY

To keep costs down while accelerating data-intensive research, many academic institutions are turning to the cloud.

Oracle’s comprehensive and fully integrated stack of applications, platform and infrastructure cloud services give researchers maximum elasticity, security and ease of integration.

Oracle deployment models, which include public, private or hybrid cloud as well as on-premises, give researchers’ ultimate flexibility. Oracle’s complete solution is:



COMPREHENSIVE. The industry’s highest-performance compute, storage, data integration and security tools – all designed for maximum elasticity and simplified research provisioning.



FAST. Bare metal compute in a fully virtualized, high-performance network environment that is more than 11 times faster than competing solutions.



SECURE. Network block storage, object storage, identity and access management, VPN connectivity and software-defined Virtual Cloud Network (VCN) capabilities provide a secure environment for sensitive applications or data that require isolation and control.



EASILY INTEGRATED. Built on open standards and easy to integrate with other Oracle workloads, whether on-premises or in the cloud.



EASILY LAUNCHED. “Click to create” makes standing up cloud resources fast and easy.

RESEARCH UNIVERSITIES HEAD TO THE CLOUD

A recent eCampus News online survey of higher education institutions’ key technology decision-makers and purchasers found that, while cloud adoption varies among institutions, cloud-first strategies are on the rise.

Additionally, the survey indicated that most institutions prefer to keep their cloud applications, services and equipment private, though institutions also tend to use more than one type of cloud – private, public or hybrid – for different services and applications.

Other Findings:



ORACLE'S COMMITMENT TO ACADEMIC RESEARCH

Oracle has a long-standing tradition of supporting and partnering with academic research institutions through three key programs:

- **ORACLE LABS** seeks to identify, explore and transfer new technologies by investing in research collaboration with faculty, research directors and principal investigators at universities, labs and nonprofit research organizations worldwide.
- **ORACLE ACADEMY** advances computer science education globally by offering a complete portfolio of computer science education resources to more than 3.5 million students in 120 countries.
- **ORACLE EDUCATION FOUNDATION** engages Oracle employees as volunteer coaches to lead high school students in multiday projects that help them develop the technical acumen, creative confidence, empathy and grit to become outstanding designers of solutions to people's needs and the world's problems.

ACCELERATING ACADEMIC RESEARCH

Cloud infrastructure adoption varies widely across higher education institutions, but because Oracle offers flexible deployment, including hybrid options, universities can find a solution that works best for their environment.

At Penn State, researchers from several disciplines rely on high-performance computing. Chemistry professor Edward O'Brien is using supercomputing to create models that show how the human body makes proteins to better understand what causes mutations that lead to illness. Meanwhile, Zita Oravec, a professor of human development and family studies, relies on high-performance computing to combine and analyze real-time physical data with data entered in an app to create models that grasp the connections between bodies, minds and emotions.³

While Penn State has a high-performance, on-premises system that deploys six to eight petabytes of active storage, it is also using the cloud. Gilbert's team will direct workloads to the computing source — on premises or the cloud — that makes the most sense. For example, in a mechanical engineering simulation that relies on direct access to a microprocessor's built-in cache, Penn State is using Oracle's Cloud Infrastructure bare metal option to avoid hitting an over-subscribed shared server.

"We're talking about nanoseconds and microseconds, and that little bit of jitter can make all the difference in a simulation being correct or not correct," says Gilbert.

Using big data, analytics and the Oracle cloud, CERN, the European Center for Nuclear Research, is running tests

to find out whether its Large Hadron Collider (LHC) and other particle accelerators are operating at their full potential — and, if not, to identify what resources are needed so they can.⁴

"Over the next 10 to 15 years, we expect the total amount of data produced by the experiments on the LHC to increase significantly," says Alberto Di Meglio, head of CERN openlab, a public-private partnership that accelerates the development of cutting-edge solutions for the worldwide LHC community and wider scientific research network. "The cloud is becoming an increasingly important component of our research infrastructure."⁵

As academic research continues to push the boundaries of what's possible with the help of big data, the need for high-performance cloud computing solutions will increase. Research institutions must therefore think not only about the research they want to conduct today, but the technology they need now, and in the future, to support it.

ENDNOTES

1. Chris Murphy, "Penn State Researchers Turn to Cloud for High Capacity Computing," *Forbes*, Sept. 12, 2017, <https://www.forbes.com/sites/oracle/2017/09/12/penn-state-researchers-turn-to-cloud-for-high-capacity-computing/#6f511da32d78>.
2. Ibid.
3. Ibid.
4. Sasha Banks-Louie, "CERN Tests Data Exploration Using Big Data Analytics," *Forbes*, <https://www.forbes.com/sites/oracle/2016/09/12/cern-tests-data-exploration-using-big-data-analytics-and-the-cloud/#51bc2e285123>.
5. Ibid.
6. "Trends in Cloud Computing in Higher Education," eCampus News, 2015, <https://eschoolmedia.com/wp-content/uploads/2016/06/vion0622.pdf>.



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