SUCCESS STORY | UNIVERSITY OF MARYLAND

UNIVERSITY OF MARYLAND: A DIGITAL MANUFACTURING POWERHOUSE

NVIDIA

More access for more students - where and when they need it.

THE UNIVERSITY'S ENGINEERING DEPARTMENT MERGES RESOURCES IN TERRAPIN WORKS AND VIRTUALIZES THEM FOR ALL.

REASONS FOR VIRTUAL GPU

- Enables access to all engineering apps to 38,000 students, no matter location or device
- Allowed the Engineering school to grow from 3,000 to 4,000 students with no additional labs needed
- Powers a combination of all digital manufacturing resources across multiple locations around campus
- Enables breakthrough findings in biomaterials, energy, and micro-mechanical research
- Propelling the University of Maryland to the forefront of education and research worldwide

The University of Maryland's A. James Clark School of Engineering has created a digital environment for students to create, design, analyze, manufacture, and iterate on ideas. This digital thread, from concept through to physical objects, is made possible by using industry-leading software in combination with the latest digital fabrication tools and advanced manufacturing techniques. Most of this complex software is available to any student on any machine or device without the software being installed locally through an application virtualization solution. This software includes multiple different CAD/CAE/CAM solutions. The application virtualization platform for these solutions is only made possible with NVIDIA GPU technology.

Digital fabrication is introduced to students starting in their freshman year through a hands-on, project-based class that has them working in small teams to design and build an autonomous over-the-sand vehicle. Throughout their studies, students have access to a wide range of 3D printers that are able create objects in everything from metal and polymer to cells in sizes from 150 nm to 1 meter. Digital design, analysis, and fabrication are skills that every engineer will need in the future; the University is preparing future engineers with those skills today.

CUSTOMER PROFILE

Organization	Industry	Location	Founded	Size	Website
University of Maryland	Education	Maryland	1856	38,000 students	https://umd.edu/

PRODUCTS

Graphics Acceleration: NVIDIA GRID vApps

Hypervisor: Citrix XenApp/ XenServer and VMware

Monitoring: Citrix Director/ Edgesite and Splunk

GPU: NVIDIA Tesla® M60 GPU

Server: Dell PowerEdge R730

SUMMARY

- The University of Maryland is the flagship campus of the state's higher educational system and a top-ranked public research institution.
- The A. James Clark School of Engineering has virtualized all student apps and established Terrapin Works, a world-class digital manufacturing lab accessible virtually.
- Areas of research powered by virtualized digital manufacturing include robotics, tissue engineering, and energy research.
- More than $700 million worth of software and 100 3D printers powered by NVIDIA GPUs and Citrix XenApp have created a digital infrastructure to drive ideas through to products

MAKING PROCESSING-HEAVY APPS ACCESSIBLE TO ALL

The University of Maryland (UMD) is the flagship campus of the state's higher educational system and a top-ranked public research institution. Located just outside Washington, D.C., it is a diverse community of 38,000 students, 9,000 faculty and staff, and 352,000 alumni, all dedicated to the pursuit of fearless ideas. As the nation's first "Do Good" campus, the University is also strongly committed to social entrepreneurship.

AN EARLY ADOPTER OF VIRTUALIZATION

UMD's A. James Clark School of Engineering offers unique access to federal laboratories and groundbreaking industries due to its proximity to the D.C. area. In 2013, it was the recipient of the largest-ever software grant from Siemens, an in-kind grant with a commercial value of more than $750 million. Those funds have propelled UMD's Engineering department to be one of the most innovative in the country. And at the heart of it all is the NVIDIA virtualization product, NVIDIA GRID™ virtual Applications software (GRID vApps).

A decade ago, the team at UMD, led by Jim Zahniser, wanted to make its processing-heavy apps more accessible to all students, even ones not in the engineering department. "We had a basic computer lab and still do," said Zahniser. "But the CAD apps especially made it difficult to virtualize without NVIDIA virtual GPU software."

"The real power of virtualization is in access—making sure every member of the UMD community has the opportunity to work at the very edge of science, technology, and research. That simply wouldn't be possible without NVIDIA Tesla GPUs and GRID vApps."

Jim Zahniser
Executive Director,
Engineering
Information Technology
University of Maryland

SOLUTION

The department was an early adopter of the NVIDIA GRID K2, which made a huge difference in running high-end CAD apps. It and has now moved to Dell R730 servers with NVIDIA Tesla M60 GPUs and the latest GRID vApps software, enabling even more power and speed. Said Zahniser, "We're migrating all our apps onto servers running NVIDIA graphics accelerators and GRID vApps. Everything simply runs better with NVIDIA GPUs."

The engineering school has gone from 3,000 to 4,000 undergrads in a short amount of time with no additional labs needed, thanks to NVIDIA Tesla GPUs and GRID vApps software. And they're not stingy—any of UMD's 38,000 students can access the virtualized environment, not just engineering.

All of this is a boon to the University and places its engineering department among the best in the country. But the aforementioned Siemens grant has enabled UMD to take virtualization to the cutting-edge with the creation of Terrapin Works, a world-class digital manufacturing lab that is accessible to the campus and surrounding community virtually.

3D PRINTING FROM ANY MACHINE

Pulling together all the digital fabrication resources in Engineering, Terrapin Works offers production and design services, as well as access to equipment across a multitude of locations, thanks to virtualization powered by NVIDIA GRID vApps.

Said Zahniser: "We have $700 million worth of software running on NVIDIA virtual GPUs enabled by NVIDIA GRID vApps that allow the printing of metal, plastics, and cells across 100 3D printers. Researchers are enhancing their work with 3D printing, including in tissue engineering, bio-materials, and micro-mechanical devices."

The department charges a fee for service, allowing people to buy time on the machines. "3D printers are expensive, especially the larger ones," added Zahniser. "Paying a small fee to take advantage of our state-of-the-art hardware and software makes much more sense for most people than investing in a big machine."

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Jim Zahniser
Executive Director, Engineering Information Technology
University of Maryland

Labs powered by Terrapin Works include:

- MakerBot Innovation Center, where students and faculty get to know the basics of digital manufacturing with over 60 3D printers
- Rapid Prototyping Center, the main hub of Terrapin Works, with higher-end machines and electronics prototyping
- Research Prototyping Lab, home to the highest-end machines, capable of extremely high detail and durability
- Keystone Labs, for the exclusive use of first-year engineering students
- Terps Racing, home to subtractive CNC machines and where students collaborate to build race cars and compete in national competitions
- Tissue Engineering and Biomaterials Lab, which focuses on the study of biomaterials for the delivery of therapeutics, scaffolds for orthopedic tissue engineering applications, and the interaction of biomaterials and tissues
- University of Maryland Energy Research Center, studying the most efficient use of natural resources while minimizing environmental impacts and our dependence on imported energy

Collectively, the resources available from Terrapin Works—and the work it enables—are propelling the University of Maryland to the forefront of education and research worldwide. Concluded Zahniser, "The real power of virtualization powered by NVIDIA GRID vApps is in access—making sure every member of the UMD community has the opportunity to work at the very edge of science, technology, and research. That simply wouldn't be possible without NVIDIA's virtual GPU products."

To learn more about NVIDIA virtual GPU solutions visit:
www.nvidia.com/virtualgpu

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