TAKING HIGH-END GRAPHICS BEYOND THE LAB

Adding NVIDIA GRID™ technology with Citrix XenApp virtual application delivery shortened GIS projects and enhanced student learning and engagement at Drake University.

NVIDIA

NVIDIA GRID technology brings Esri ArcGIS into the field, allowing students to capture and analyze data in real time without having to return to the campus.

AT A GLANCE

CUSTOMER PROFILE

Company: Drake University

Industry: Education

Location: Des Moines, Iowa

Size: Approximately 5,000 students

SUMMARY

> Leading private university in Des Moines, Iowa, with a total enrollment of about 5,000 students.

> Saw the need to adopt BYOD support to increase flexibility for students and faculty.

> Adopted a virtualized platform based on NVIDIA GRID technology running on the proven Citrix platform.

> Students have unprecedented flexibility and performance with true anytime, anywhere access.

> Planning to double the number of users from 100 to 200 in the near future, with additional expansion being researched.

SOFTWARE

Hypervisor: Citrix XenServer

Desktop and Application Remoting: Citrix XenDesktop and XenApp

Key Applications: Esri ArcGIS, plus various office, financial, statistics, and tax applications.

HARDWARE

NVIDIA GRID Boards: K2

Servers: Dell PowerEdge R720

Clients: Various desktop, laptop, and mobile devices

Drake University is a mid-sized private university located in Des Moines, Iowa. Since its founding in 1881, the university has provided an exceptional learning environment that prepares students for meaningful personal lives, professional accomplishments, and responsible global citizenship. The current student body includes more than 3,300 undergraduates pursuing over 70 majors, minors, and concentrations. An additional 1,700 graduate students are working toward more than 20 graduate degrees offered through six colleges and schools.

CHALLENGE

Like most colleges, Drake University includes several large computer labs equipped with traditional desktop PCs. The increasing need for access to computing resources required ever-larger spaces for labs, and the additional computers required increased IT support for maintenance and upgrades. Further, the existing labs were inflexible; they were only open during certain hours, and students had to be in one of those labs in order to access the applications and data needed to complete their assignments and research projects. Meanwhile, current IT trends are moving toward increasingly flexible remote Bring Your Own Device (BYOD) access, and virtualized application and desktop deployments are becoming more common as IT departments respond to these demands.

"The whole idea behind the application and desktop virtualization project at Drake University was to give our students the flexibility to access applications and data from any location on any device," said Chris Mielke, ISS Network Systems Lead at Drake University. "Over the long term, we may see some significant savings from being able to reduce the number of labs and computers that we need to buy or refresh, but providing BYOD support was our immediate objective."

Four distinct user groups were identified as candidates for the initial virtualization deployment: First, the College of Business and Public Administration uses basic office applications and other tools (mainly financial and statistical) that don't require graphics acceleration. Second, Law School students engage clients for tax preparation and had to share a single desktop PC—a cumbersome arrangement that required clients

5 REASONS FOR GRID

1. Native support for NVIDIA drivers and full GRID vGPU support provided by Citrix XenServer with XenApp.

2. Remote access to Esri ArcGIS from any location on any device.

3. Workstation-like performance for up to 20 concurrent GRID users.

4. GIS projects that used to take days or weeks may now take as little as an hour.

5. Easy scalability for future growth.

to come to the campus with careful scheduling to avoid conflicts. Third, the Office of Alumni and Development needs access to Windows 7 desktops for accessing call center and other office applications. Finally, students enrolled in GIS and field ecology classes need access to Esri ArcGIS, which requires graphics acceleration in order to function properly.

"I use ArcGIS in two primary ways," explained Keith Summerville, Professor of Environmental Science and Associate Dean of the College of Arts and Sciences at Drake. "First, it is the primary teaching tool for a yearlong course in GIS. Second, it is an important component of our field ecology courses and research. ArcGIS requires large amounts of storage, processing, and graphics resources. Students are used to almost instantaneous responses on their personal devices, but our individual workstations could take several minutes to return results. Further, a typical project entailed gathering data in the field and then returning to the campus to input and analyze that data. The elapsed time between my introductory lecture and having final results could be days or even weeks. That drives down both student engagement and retention. Virtualization held out the promise of being able to gather and process data directly in the field, thus shortening project life cycles."

"Our initial virtualization tests revealed that we could adequately support the needs of the business, law, and Office of Alumni and Development users," Mielke continued. "However, we could not get ArcGIS to work without graphics acceleration. During our testing, even one or two users running ArcGIS could bring the server to a standstill. We needed to find a way to greatly improve performance in this area."

SOLUTION

Drake University kicked off the application and desktop virtualization project by assembling a team of project sponsors who would be responsible for promoting virtualization across the campus. A technical

committee made up of system administrators from the Law School, College of Arts and Sciences, College of Business and Public Administration, and the library was tasked with researching, building out, and deploying the virtual infrastructure.

After researching various options, the technical committee decided to proceed with a virtualization solution that would leverage the Citrix platform consisting of the XenServer hypervisor, with XenApp and XenDesktop providing the remote application and desktop delivery. They then reached out to virtualization solutions provider Choice Solutions, which specializes in solving complex virtualization challenges.

"We visited the university to assess their needs and see how best to implement virtualization to meet those needs," said Randy Kearn, Senior Solutions Architect at Choice Solutions. "They had already decided to use the Citrix platform because it can tailor application and/or desktop delivery to suit a wide range of use cases. We've had some experience with NVIDIA GRID technology and knew that it would make a perfect fit for Drake because XenServer is currently the only platform that loads the NVIDIA drivers directly into the hypervisor and gives virtual machines direct access to the physical GPUs.

"The fact that most of the professors needed application access without caring too much about the desktop made XenApp a natural choice, because XenApp supports NVIDIA GRID™ vGPU™ technology that allows a single physical GPU to support multiple users, unlike a traditional graphics-enabled virtual desktop deployment that uses a 1:1 user to GPU ratio. This level of flexibility would allow Drake to deliver the graphics acceleration needed by their students while simultaneously allowing the other user groups to access their virtual applications and desktops."

"We loaned Drake a GRID K2 card to use for testing purposes without having to completely buy into the technology," added Dana Steinlage, Senior Account Manager at Choice Solutions. "Adding the GRID vGPU support gave students the performance they needed, and the university went ahead with the deployment."

The virtualization deployment consists of two Dell PowerEdge R720 servers with 256GB of RAM and a single NVIDIA GRID K2 card per server. Each server includes local solid state drives for write caching, with the applications and data located on external EMC VNX storage. Each of the four NVIDIA GRID GPUs is assigned to a separate XenApp server that serves up to five users for a total of 20 GPU-enabled virtual environments available to the students running ArcGIS. The business and law students access virtual applications delivered by XenApp, while the Office of Alumni and Development uses pooled virtual Windows 7

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>
> Keith Summerville
> Professor of Environmental Science and Associate Dean of the College of Arts and Sciences
> Drake University

desktops provided by XenDesktop. Graphics acceleration is not required for these groups.

"We had some challenges with getting the applications to run and figuring out where to store everything because of the steep learning curve faced by the technology committee," said Mielke. "There was also some reluctance on the part of our faculty and students, particularly after the initial trials with ArcGIS failed for lack of GPU support. We also ran into some problems with applications hanging because we did not time out inactive sessions, but adding a 10-minute timeout fixed that. Even with these inevitable growing pains, the benefits of going virtual became clear once we got the GRID-enabled system up and running and resolved the challenges with the applications and storage."

RESULTS

The overall application and desktop virtualization project—and especially the GPU support provided by the NVIDIA GRID K2 cards supported by XenApp—has yielded significant benefits of Drake University.

The chief benefit for all users is full BYOD support that allows true anytime, anywhere access from any device.

Law students can access tax software on mobile devices in the field, allowing them to travel to clients instead of forcing clients to come to the campus, and resource scheduling is no longer an issue. Business students no longer need to work in specific locations at specific times, giving them the freedom to adjust their schedules to best suit their needs. The Office of Alumni and Development has also benefited from the same flexibility. Best of all, these groups can use their personal devices.

"The GIS and field ecology classes are where the combination of XenApp and the NVIDIA GRID cards really shines," said Summerville. "From a performance standpoint, NVIDIA GRID is three or four times faster than our previous workstations. We're talking about an absolute time savings of a couple minutes here and there for rendering and analysis, but that can mean the difference between effective learning and disengagement. Even better, students can take ArcGIS with them into the field by simply accessing the GRID-enabled virtual environment on their own devices, and that can literally cut a process that used to take days or even weeks down to a few hours. For example, we have students studying chimpanzee habitats in western Rwanda. Previously, they would collect data in the summer and then wait weeks or months to process and report on that data. Now they can come in from a day of research, access ArcGIS on their laptops, and get their work done within hours or days."

Drake University is currently expanding their virtualized environments by increasing redundancy, upgrading to XenDesktop 7.6, and increasing their license count from 100 to 200 seats. They are anticipating higher demand from the College of Business and Public Administration, and the number of classes using virtualized applications has more than doubled from the first to the second semester. Further, the College of Business and Public Administration has canceled plans to remodel a space into a computer lab with 20 or 30 desktop PCs, opting instead to create a new classroom and leverage the virtualized resources. Going forward, the university is in the early exploratory phases of creating a new Data Analytics major, and NVIDIA GRID technology will be a major part of making that program a success.

"Overall, rolling out virtualized applications and desktops has been a huge boon to the university, and NVIDIA GRID has totally transformed how the classes using ArcGIS work," concluded Mielke.

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