# Phoenix Rises on Virtualization Initiative

## Legacy apps mean virtualization challenges for Apollo Group's University of Phoenix

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Claudiu Budurlean oversees a successful Virtual Client Computing (VCC) initiative for Apollo Group, the company whose flagship University of Phoenix is a leader in for-profit, post-secondary education. Now serving as Apollo's technical director of client computing technologies, he has more than 15 years in the industry, and was previously responsible for 140,000 endpoint devices in 220 countries for logistics giant Deutsche Post DHL.

But Budurlean says the 22,000-desktop virtualization project he's managing at Apollo is one of the most complex projects of his career, and success is coming only after what he calls Herculean efforts by his team. The biggest single challenge: nearly 100 proprietary applications, many developed for Microsoft Windows* XP and Internet Explorer* (IE) 6.0. As an industry pioneer, Apollo considers those applications critical for its business success—but they caused significant problems for the virtualization team and at one point forced a change in strategy. "We sank our teeth into those applications," Budurlean jokes. "We broke our teeth on them."

## Standardize and Virtualize

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Budurlean came to Apollo Group in 2008 as part of a wave of change that also brought a new CIO and a commitment to modernize the technology foundation and position Apollo for further growth. Joining the enterprise architecture strategy team, Budurlean developed a plan to standardize, automate, and optimize the enterprise desktop. By 2010 he was leading both the VCC project and a closely interconnected desktop refresh (DTR) initiative.

"We had older and nonstandard technologies, and our OS environment was a mix of Windows XP with various service packs," Budurlean recalls. "We knew we could increase the productivity of our workforce, improve support, and achieve better efficiencies by getting rid of older technology, moving to a modern OS, and deploying virtualization."

## At a Glance

**Project**

- Virtual Client Computing initiative to deliver the benefits of desktop virtualization to approximately 15,000 enterprise users

**Accomplishments**

- Deployed virtual applications to 1,300 users, published desktops to 800 users, and hosted virtual desktops for 500 users
- Deploying 10,000 more virtual desktops through 2012

**Lessons Learned**

- Enterprise-wide virtualization isn't a one-size-fits-all solution. Analyze end-user needs and choose the right virtualization model for each user category.
- Legacy, browser-based proprietary applications can be very difficult to virtualize separately. Plan accordingly and secure the support of in-house software development resources.
- Coordinate across the enterprise to manage desktop virtualization's impacts on the network, storage, and server infrastructures.
- Stay flexible. Even with great up-front planning, application complexities can require adjustments.

Budurlean envisioned a client environment that would better suit the company's dynamic workforce. "We have student-facing groups that physically move every few weeks or months from building to building," he explains. "They have a lot of physical desktops with repetitive, locally stored data that they move along. There's a tremendous amount of duplicate data and cost involved with moving them."

Virtualization would allow greater mobility and centralized storage. "We want our users to have the performance benefits of thick clients, but decoupled from the physical desktop," says Budurlean. "If we can virtualize the session or virtualize the published desktop, we can allow these individuals to roam or even work remotely without having to move their systems along with them. We want to provide a computing platform that is ubiquitous, flexible, and adaptive to the business dynamic and growth."

But it was easier said than done.

## Starting from User Needs

Apollo applied a number of best practices to its desktop virtualization project, starting with a focus on user needs. "People think the desktop is easy, but the truth is far from that perception," Budurlean says. "The desktop is one of the most complex environments IT has to manage because you're dealing directly with the individual. People often believe the computer in front of their eyes is almost like private property. So, first we had to remind them that these are company assets and we need to manage them."

Budurlean's team wanted to clearly understand users' desktop environments before virtualizing them, but Apollo's application suite presented an immediate challenge. "We use tools such as Altiris* to scan the environment, but many of the tools don't function well when you have browser-based applications," says Budurlean. Instead, the project team conducted a manual discovery that queried users on their applications, work habits, and challenges, as well as capabilities they'd like to have on their desktops. The team then worked with external business analysts to aggregate the findings into a discovery report that served as the basis for the VCC project. Of course, the applications and activities users reported didn't always match their actual usage, so the team had to adjust accordingly as the project proceeded.

## The Center of a Tangled Web

Budurlean points to a second aspect of desktop complexity that raised the degree of difficulty for the VCC project. "The desktop is one component of the tangled web of technology that you have to deal with because the desktop connects to a network, to storage, to the data center," he says. In Apollo's case, all those elements were in flux. The same modernization drive that spurred the client refresh also led Apollo to overhaul its servers, storage, and network infrastructure. "Everything was in flight to be upgraded, uplifted, and renewed," Budurlean says. The virtualization project affected the desktop refresh rollout, and vice versa.

The VCC team has met the challenge through close coordination with other project leaders to balance priorities and orchestrate their approaches to avoid disrupting the business. "We have to carefully orchestrate our approaches to maintain the student focus at all times and not disrupt the business internally," Budurlean says. "It is a very fine line

that the project team, myself, and the other project and program management teams are trying to balance."

## Laying the Groundwork

The VCC and DTR teams spent more than a year laying the groundwork for their success. Among other actions, they established a test lab, conducted proof-of-concept (POC) deployments, developed a scorecard that balanced various selection criteria, created a physical-to-virtual transformation matrix, and chose client technologies, virtualization approaches, and virtualization technologies.

Apollo standardized on Lenovo* desktop and laptop PCs based on Intel® Core™ i5 and i7 vPro™ processors[1] and is proactively replacing laptops that are older than 2.5 years and desktops older than 3.5 years. The company also supports Apple Macintosh* computers with Intel Core i5 and i7 processors. "There will always be a need for rich clients, because there are applications and scenarios such as AutoCAD functionality or other processing-intensive tasks," he says. "If you're in a low-bandwidth scenario or have to be disconnected from the network, then a traditional desktop is a must."

After testing multiple approaches to virtualization, the VCC team decided on a mix of application virtualization, published desktops, and hosted virtual desktops (HVD). "We don't want a one-size-fits-all solution," says Budurlean. "We chose three distinct ways of virtualizing the desktop so we don't have to shoehorn everybody into the same virtual environment."

To standardize the movement from physical to virtual client computing, the team developed a transformation matrix that helps them map user requirements to virtualization approaches. Users are assigned to categories based on job descriptions, functions, and hardware types. Budurlean calls it a cookie-cutter approach with multiple cookie cutters. The plan was that most task workers would have published desktops, most developers would use HVD, and most applications would be individually virtualized.

The team developed an evaluation scorecard, identified VMware View* and Citrix XenDesktop* and XenApp* as suitable technologies, and worked with a consultant to conduct a POC of the VMware and Citrix solutions. Apollo chose Citrix based on its balance of technical, commercial, total cost of ownership (TCO), and return-on-investment (ROI) criteria. Citrix also scored points for its ability to use high-definition video and audio capabilities on a local client to improve the user experience.

## Browser Wars and Proprietary Apps

By September 2010, the desktop refresh was well underway and the VCC rollout was beginning, with an implementation team that included one program manager, two permanent project managers, two project coordinators, two architects, a director, a senior manager, and several technical resources, plus Budurlean as technical director and senior architect. Wherever possible, users got a new PC or laptop with a virtual image, and the goal was to transition everyone to a PC running Windows* 7 or a Macintosh running OSX*. The team expected to provide application virtualization to 70 percent of its users, published desktops to 20 percent, and HVD for the remaining 10 percent.

While most aspects of VCC proceeded smoothly, some areas of the network proved inadequate for the original scope of work, so processes and technologies had to be reevaluated. The biggest headaches came from Apollo's complex suite of home-grown applications. Like many companies, Apollo had business-critical apps that its programmers had developed over a period of years. "Many of these applications had outgrown themselves," Budurlean says. "They collided with each other. They were poorly documented. A lot of them were embedded in Internet Explorer 6, which is 13 years old and notoriously difficult to work with. They had multiple browser plug-ins, which made them difficult to virtualize by themselves." Adding to the challenges, Apollo's in-house software developers were focused on creating next-generation applications and couldn't give much time to the virtualization effort.

The VCC team engaged with Microsoft to test application compatibility and found that most apps should function successfully in the Windows 7 environment. But there was a catch. "We failed to test what we call the browser wars," Budurlean recalls. "There is such a vast and huge difference between Internet Explorer 6 and Internet Explorer 8 that we will face significant efforts in trying to uplift them to Windows 7 and Internet Explorer 8 or virtualize them using Microsoft App-V* or Citrix XenApp."

## Key Technologies

- VMware vSphere* ESXi Hypervisor
- Citrix XenApp* and Citrix XenDesktop*
- Microsoft Application Virtualization (App-V*) and AppSense* Environment Manager
- Lenovo PCs and laptops with Intel® Core™ i5 vPro™ processors; Intel® Solid State Drives for executives and software developers
- McAfee Endpoint Encryption* with hardware-accelerated encryption performance via Intel® AES New Instructions (Intel® AES-NI)[2]

Apollo Group's client virtualization started with a discovery process to understand users' applications, work habits, challenges, and unmet needs.

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## A Low Point and a Change in Tactics

By March 2011, the application challenges led to a major adjustment in the deployment plan—and one of the lowest points for the team. "We thought we could onboard the legacy applications into a virtual environment, move everyone to Windows 7, and put all the legacy apps in a virtual environment," Budurlean recalls. "But many applications behaved incorrectly in a virtual environment, and we were exhausting all the avenues into understanding how they worked. We had trouble getting the traction to make them work in a virtual environment. We couldn't virtualize them fast enough."

The team solved the problem—and bought time—by keeping nearly half of Apollo's PC users on Windows XP until the virtualization project was complete and modifying the mix of virtualization methodologies. Instead of 70 percent virtual applications and 20 percent published desktops, the team flipped those figures, deploying nearly 70 percent published desktops, with 20 percent virtual applications.

## Delivering Success

If the need to maintain many users on Windows XP is disappointing for the team, it doesn't detract from their significant accomplishments. Instead of managing 64 desktop images, Apollo now has three: one for Windows 7 desktops, one for Windows XP, and one for Mac OSX. Over 150 developers are using HVD, and that number is rising rapidly. Published desktops are in pilot, and an estimated 10,000 employees will begin accessing one or more published applications in the next few months. IT Services has established a robust framework that allows central management, application migration, and dynamic allocation of virtual resources. Both users and IT Services are enjoying a simplified support model with quicker rollout of new capabilities.

Going forward, IT has greatly increased its ability to support new usage models by providing ubiquitous, secure access to client computing from anywhere in the world. The virtual environment is also enabling Apollo to collaborate effectively with external developers while maintaining intellectual property inside the corporate data centers. With the experience and insights gained from virtualizing the employee desktop, the team looks forward to delivering the benefits of desktop virtualization to students. Budurlean is also looking to use Intel® vPro™ technology to enhance remote management and security on the virtual desktop.

Budurlean says
Apollo's experience underscores the need for in-depth, cross-functional discovery processes to analyze infrastructure and application impacts, and the importance of nailing down required resources for needed modifications or support. "To
an infrastructure IT manager or director or vice president who is planning desktop virtualization, I would say: don't go in thinking that you understand the depth of the application development or browser issues, or that you know how your network will perform," says Budurlean. "Just get in there and dig deep. You don't want to decide you're going to virtualize everything and then find that you can't deliver it to the farthest reaches of your network."

VCC was more difficult than Budurlean anticipated, and progress has been slower, primarily because of the broader than expected infrastructure overhaul and a lack of dedicated resources during the design and build phases. But he's proud of the project and the value it will deliver to Apollo Group. "I expect the final results to showcase the Herculean efforts from the project team to ensure maximum efficiency, both technologically and financially," he says.

And like any good educator, Budurlean offers a clear summary of the conclusions to be drawn from his experience: "Lesson 1: never underestimate your apps. Lesson 2: never underestimate the network. Lesson 3: always have a plan B."

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1 Intel® vPro™ technology is sophisticated and requires setup and activation. Availability of features and results will depend upon the setup and configuration of your hardware, software, and IT environment. To learn more visit: http://www.intel.com/technology/vpro/.

2 AES-NI is a set of instructions that consolidates mathematical operations used in the Advanced Encryption Standard (AES) algorithm. Enabling AES-NI requires a computer system with an AES-NI-enabled processor as well as non-Intel software to execute the instructions in the correct sequence.

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