Overview

Western Carolina University (WCU) was founded in 1889 to provide higher education to citizens of the western region of North Carolina. While it was founded as a teaching college, it has since expanded to provide comprehensive undergraduate and graduate programs to a total of more than 12,000 students today.

With more than 115 undergraduate majors and 40 graduate programs for on-campus students and distance learners, WCU needs a cost-effective, flexible, and high-performing IT infrastructure. Like many higher education institutions, WCU has found it challenging to achieve this objective given the budgetary constraints and increasing expectations from students, faculty, and other constituents for what IT should deliver.

According to Patrick McGraw, Senior Infrastructure Engineer, and Jason LaVigne, IT Manager, Data Center Services Team, VMware vSphere has delivered virtualization capabilities and higher overall IT performance that have provided the basis for WCU’s success in the past decade in extending IT capabilities while optimizing IT costs.

McGraw and LaVigne explained that WCU deployed VMware vSphere in the context of needing to find a way to expand its IT capabilities without incurring additional costs. To do this, it needed to operate a more cost-effective datacenter in terms of both hardware costs and IT staff time requirements. They noted that VMware vSphere has reshaped WCU’s IT cost structure, enabling significant virtualization to move away from a primarily physical infrastructure and reap substantial cost savings by lowering the number of physical servers required and staff time required for the university’s datacenter environment.

Business Value Highlights

LOCATION:  
Cullowhee, North Carolina

CHALLENGE:  
Reduce datacenter costs while improving ability to deliver high-quality IT services to employees, students, and other constituents

SOLUTION:  
VMware vSphere 6.7 ESXi and VMware Horizon, VMware vRealize Operations Manager

FINANCIAL AND OPERATIONAL BENEFITS:

» 309% three-year ROI
» 79% lower three-year cost of operations
» 95% fewer physical servers
» 73% more efficient IT infrastructure team
» >5x more new applications, 4x more new features
» 95% less unplanned downtime
» 96% faster VM recovery
McGraw and LaVigne noted that WCU has continued to invest regularly in updating its VMware vSphere environment and is now running almost exclusively vSphere 6.7 ESXi. The use of the most recent version of vSphere, along with other VMware technologies that include VMware Horizon and VMware vRealize Operations Manager, has ensured that WCU is serving students, faculty, and other constituents with a modern IT infrastructure that delivers expected levels of flexibility, availability, and performance. McGraw and LaVigne cited the importance for their university of having this IT foundation to meet changing demand patterns, including increased distance learning and the ever-accelerating digital landscape in which students learn and faculty teach.

Through interviews with McGraw and LaVigne, IDC quantified the impact of WCU’s use of vSphere in terms of IT costs, IT staff efficiency levels, and performance. Based on these discussions, IDC calculated that use of VMware vSphere results in strong value for the university, with a 309% three-year return on investment (ROI) demonstrating the efficiencies and performance gains it has achieved with the VMware vSphere platform.

**Implementation**

WCU realized more than a decade ago that its IT organization was at a crossroads. McGraw and LaVigne explained that the university had relied on an entirely physical server environment in its datacenter to deliver IT services to students, faculty, and other constituents. However, changing use patterns and increased data volumes placed strain on this approach, leading WCU to look for a new foundation for providing IT services. McGraw said: "When we first started, we were running out of datacenter resources. We were just adding server after server."

McGraw noted that WCU began looking at VMware vSphere in the context of searching for a way to change its IT cost structure: "We were looking for a solution to manage our datacenter costs. We found that we needed a costly upgrade to our datacenter, but we didn't have the money to expand our datacenter within the next year or two. We needed a way to grow our environment while offsetting our costs." LaVigne explained that WCU viewed virtualization of its compute and storage resources as a means of creating a more cost-effective IT foundation for WCU’s operations going forward.

WCU became familiar with VMware vSphere at a state conference where another state university demonstrated its use. It initially ran vSphere on around 10 physical machines and then waited to see user reaction. According to McGraw: "After confirming that the virtualization model with vSphere worked, we received approval to virtualize the entire datacenter with VMware vSphere." McGraw and LaVigne tied increasing virtualization over time to the decommissioning and retirement of significant numbers of physical servers for the university.

Over the past decade, WCU has continued to increase its reliance on virtualization driven by vSphere. At the time of the interviews, WCU had reached 90% virtualization levels even including virtualization hardware. McGraw commented: "We are absolutely all in on virtualizing with VMware vSphere. It’s our preferred environment for deploying anything these days." Further, nearly all of WCU’s applications, including the student portal, financial transactional workloads, and police and security systems, were in the university’s vSphere environment.

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To support its increasing virtualization objectives over time, the university has regularly upgraded its vSphere environment. Before upgrading to vSphere 6.7, WCU considered several options through a proof of concept but chose instead to invest in upgrading vSphere after concluding that "the basics of virtualization were there with other options, but the magic sauce of virtualization with VMware vSphere was not, such as management tools, vMotion, and having a single interface." McGraw and LaVigne linked these continued upgrades to the ability of the university to get more out of its virtualization efforts as well as efficiencies that link to functionality gains that enable WCU to improve its security posture, better use cloud resources, and establish a hybrid cloud environment that may include VMware Cloud on AWS for disaster recovery and bursting capabilities.

**Benefits**

McGraw and LaVigne linked WCU's use of VMware vSphere to running a much more cost-effective and efficient IT infrastructure and improved IT agility and performance. As a state university, WCU faces budgetary limitations common to public educational institutions. The IT department must also operate with budgetary constraints while finding new ways to meet user expectations. McGraw and LaVigne noted that students and faculty members have heightened expectations for IT performance and ubiquity, while the university relies on IT to support changing pedagogical methods both in the classroom and in terms of new forms of instruction such as distance learning.

**More Cost-Effective and Efficient IT Operations**

WCU needed to find a way to solve a tricky equation that involved needing an IT upgrade to meet increasing demand placed on IT infrastructure but without having the financial resources to continue with its hardware-focused approach. WCU's investment in VMware vSphere opened the way to both significant hardware-related cost savings as it virtualized its datacenter infrastructure and staff efficiencies as infrastructure, security, help desk, and development teams benefited from having a virtualized, higher-performing IT infrastructure foundation.

As noted, McGraw and LaVigne described running almost entirely a physical server environment before deploying VMware vSphere. This approach made less sense for WCU as application numbers and data volumes grew, and the university found it challenging to manage IT infrastructure costs. Virtualization with the vSphere platform provided the breakthrough WCU needed, and the university has gone from running around 300 physical servers to 20 physical servers with VMware vSphere that run 400+ virtual machines (VMs). McGraw and LaVigne explained that while WCU had to invest in new physical servers to support virtualization, the overall impact of retiring 300 physical servers and avoiding the purchase of at least 50 more physical servers — thereby running an environment that requires more than 90% fewer physical servers for like workloads — has dramatically altered its IT cost structure.

"We would have needed to increase our physical footprint with another solution to support the same amount of capacity that we get with vSphere, which would have increased hardware costs."
VMware vSphere has been especially beneficial in bringing down server-related costs because it supports higher virtualization density levels than even comparable hypervisor solutions per WCU's analysis: "We would have needed to increase our physical footprint with another solution to support the same amount of capacity that we get with vSphere, which would have increased hardware costs." WCU's reduced physical server footprint carries many additional benefits beyond direct server cost savings. Server consolidation with VMware vSphere not only has reduced WCU's space requirements by at least 20 racks but also has allowed the university to make much more cost-effective use of application and operating system (OS) licensing, thereby realizing hundreds of thousands of dollars in savings per year.

Meanwhile, virtualization with the VMware vSphere platform transformed the IT infrastructure team from a group trying to keep up with day-to-day maintenance and support to a team with bandwidth to support broader IT activities. According to McGraw and LaVigne, use of vSphere has coincided with team efficiencies for IT infrastructure activities of around 73%. This has helped WCU's IT organization keep up with escalating demand for IT services and support new initiatives such as distance learning and virtual desktop–based applications that depend on the IT organization.

Meanwhile, WCU's security and help desk teams have also benefited from vSphere, gaining efficiencies from increased functionality such as encryption as well as enhanced agility and performance. McGraw cited specific benefits of vSphere 6.7 in terms of improved security, noting that "encryption and security features such as VMs in motion and VMs at rest are encrypted with vSphere 6.7, which is beneficial." McGraw and LaVigne reported efficiencies of 50% and 80%, respectively, for these two teams related to use of VMware vSphere.

**Improved Ability to Meet Student and Faculty Expectations**

For WCU, ensuring that IT infrastructure can meet demands created by operating a 21st century university is just as important as securing cost and staff efficiencies. McGraw and LaVigne noted that this means various things by constituent type:

- **On-campus students** expect ubiquitous wireless access and digital-first learning approaches and interfaces, including conversion of all labs and classrooms to virtual desktops with VMware Horizon running on vSphere.
- **Remote students** require robust performance of applications related to their distance learning programs and allowing access to learning materials from various locations.
- **Faculty** need the ability to support and supplement classroom instruction with digital learning as well as requisite performance for distance learning classes.
- **Parents** increasingly expect unfettered and constant access to university IT systems.
- **Students and teachers** will benefit from the completion of a new STEM building that will be completely virtualized.
McGraw and LaVigne linked WCU's use of VMware vSphere to important gains in overall IT agility and performance that have noticeably impacted the ability of the IT organization to serve its various constituents:

» Increasing agility associated with virtualization has substantially improved the development team's ability to move quickly to meet demand for new applications and features, resulting in dramatic changes to both the volume of new applications (>5x more) and features (4x more) and the time required to deliver them (85% and 77% faster, respectively).

» Delivering more reliable IT services with virtualization and vSphere functionality has reduced the frequency and impact of infrastructure-related outages, with 95% less staff and other employee time lost due to unplanned outages. As importantly, students who expect consistent and uninterrupted access to applications and systems experience fewer noticeable disruptions, thereby increasing their satisfaction with WCU's IT services.

» Improving IT performance has helped the university extend the reach of its distance learning programs, thereby enabling it to serve more students and secure new tuition streams.

» Reducing risk through much faster recovery of VMs when problems do arise has limited the potential for data loss or breaches that could be consequential when it comes to confidential student data that WCU maintains.

» Supporting potential use of VMware Cloud on AWS for creating a hybrid cloud IT environment has increased IT flexibility. McGraw noted: "vSphere helps us to maintain control of our environment even in a hybrid cloud environment. Having vSphere means that we can do the things we are used to, don't need to retrain our people, as well as making sure that we have control of upgrades."

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**Quantifying Benefits**

To quantify the benefits achieved by WCU through its use of VMware vSphere, IDC spoke several times with McGraw and LaVigne. Overall, IDC’s analysis shows benefits for the university worth an average of $1.21 million per year in IT infrastructure cost savings, more efficient IT and development teams, and reduced productivity losses associated with unplanned outages.

**Lower IT Infrastructure Costs**

WCU requires significantly fewer physical servers with virtualization enabled by VMware vSphere. The ability to deliver applications and IT services via virtualized infrastructure requires 95% fewer physical servers. This enables not only the creation of a more cost-effective IT foundation but also savings related to application and OS licensing. IDC calculates that WCU spends 86% less on physical servers with VMware vSphere and saves an average of $262,500 on licensing costs.

**More Efficient and Productive IT Staff**

WCU needs much less staff time to manage, secure, and support its IT infrastructure with VMware vSphere while enabling development teams to work more effectively. IDC quantifies value for those teams as follows related to WCU’s use of VMware vSphere:

- IT infrastructure team: 73% more efficient, for efficiencies worth an average of $311,100 per year
- IT security team: 50% more efficient, for time savings worth an average of $62,200 per year
- IT help desk team: 80% time savings, for efficiencies valued at $172,100 per year
- Application development team: 50% more productive, for enhanced effectiveness worth an average of $388,900 per year

IDC calculates that in total, these IT team efficiencies and productivity gains have an average annual value of $934,300 over three years.

**More Reliable IT Operations**

WCU has reduced the frequency, duration, and impact of unplanned outages with the VMware vSphere platform. The university reported decreasing the frequency of outages by 80% and speeding up resolution of outages by 75%. As a result, employees are losing 95% less time related to infrastructure outages with VMware vSphere, saving productive time worth an average of $17,900 per year. As importantly, having more reliable IT operations brings substantial but less tangible benefits in terms of the experiences of students and other users.

**Lower Overall Cost of Operations**

Based on efficiencies in cost, IT staff, and reliability achieved with VMware vSphere, WCU has established a much more cost-effective and efficient IT platform. In total, over three years, IDC calculates that WCU will incur costs that are 79% lower as a result of VMware vSphere, thereby saving $3.40 million over three years in terms of lowering infrastructure costs, improving IT staff time efficiencies, and reducing the impact of unplanned downtime (see Figure 1).
**FIGURE 1: Three-Year Cost of Operations**

![Diagram showing cost comparison between Without VMware vSphere and With VMware vSphere.]

Source: IDC, 2019

**ROI Analysis and Methodology**

IDC conducted several interviews with McGraw and LaVigne to understand the impact of WCU's use of VMware vSphere on areas such as IT infrastructure costs, IT staff productivity levels, and IT performance. Based on these interviews, IDC quantified both the benefits and investment costs related to WCU's use of VMware vSphere. Table 1 provides IDC's ROI analysis, calculating that WCU realizes $2.91 million in discounted benefits over three years from use of VMware vSphere compared with discounted investment costs of $0.71 million. These levels of benefits and investment costs mean that WCU achieves somewhat more than four times more benefits than investment costs, realizing a 309% three-year ROI.

**TABLE 1: Three-Year ROI Analysis**

<table>
<thead>
<tr>
<th>Description</th>
<th>Three-Year ROI Analysis</th>
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<tbody>
<tr>
<td>Total three-year benefits (discounted)</td>
<td>$2,908,100</td>
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<tr>
<td>Total three-year investment costs (discounted)</td>
<td>$711,500</td>
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<tr>
<td>Total three-year net present value (benefits minus investment costs)</td>
<td>$2,196,600</td>
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<tr>
<td>Return on investment (ROI)</td>
<td>309%</td>
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<tr>
<td>Discount rate</td>
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</tbody>
</table>

Source: IDC, 2019
IDC calculates the ROI and payback period in a three-step process:

1. Measure the financial benefits directly resulting from use of VMware vSphere, including lower IT infrastructure costs, higher IT staff productivity levels, and user productivity gains from reducing unplanned downtime.
2. Ascertain the total investment in VMware vSphere.
3. Project the investment and benefit over three years and calculate the ROI and payback period. The ROI is the three-year net present value (NPV) divided by the investment. Payback period (expressed in months) is the time required to pay back the initial investment and establish a positive cash flow. To account for the time value of money, IDC bases the ROI and payback period calculations on a 12% discounted cash flow.

About the Analysts

Matthew Marden, Research Director, Business Value Strategy Practice
Matthew Marden is a Research Director in the IDC Business Value Strategy team. He is responsible for carrying out custom business value research engagements and consulting projects for clients in a number of technology areas with a focus on determining the return on investment (ROI) of their use of enterprise technologies. Matthew’s research often analyzes how organizations are leveraging investment in digital technology solutions and initiatives to create value through efficiencies and business enablement.