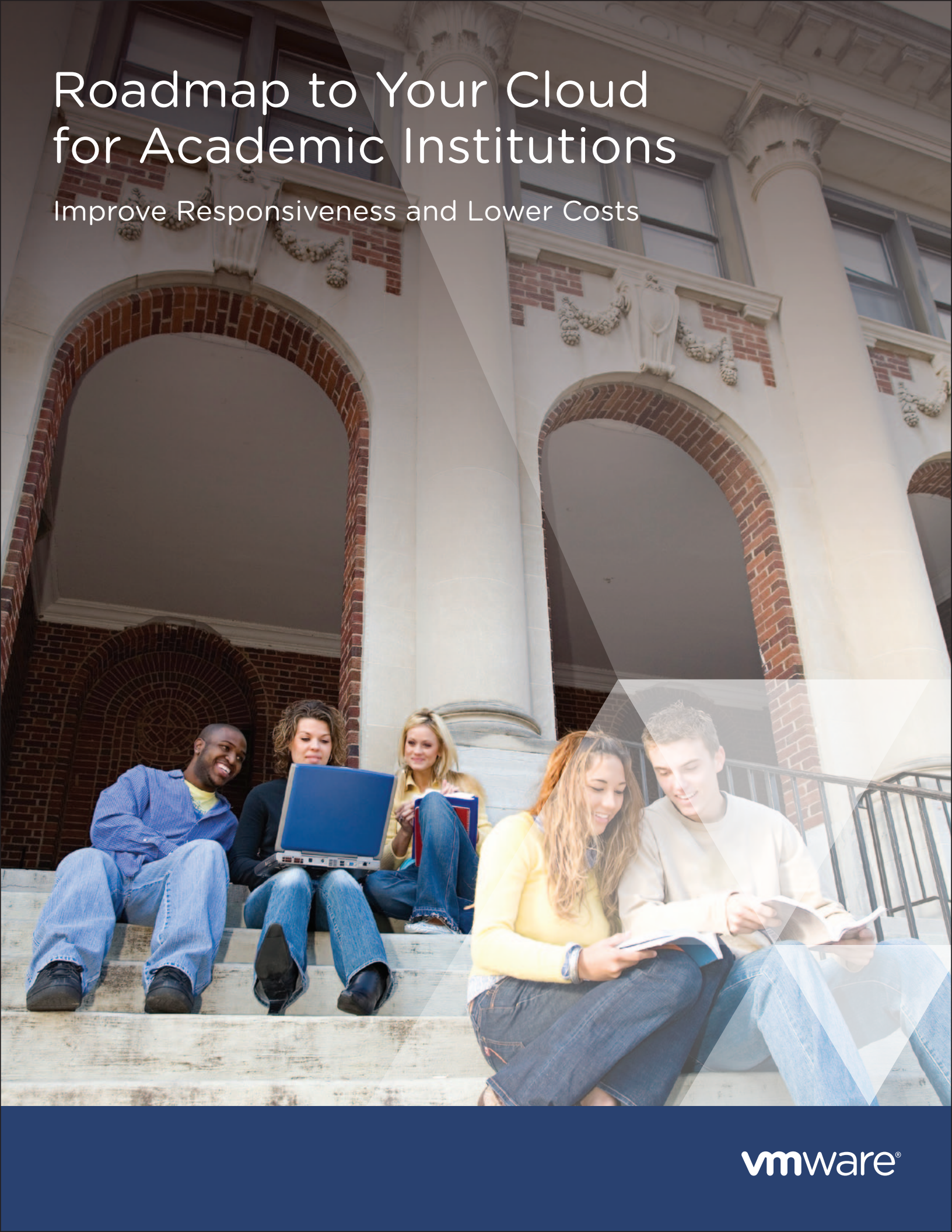


Roadmap to Your Cloud for Academic Institutions

Improve Responsiveness and Lower Costs



“By reducing the time and costs associated with maintaining our IT infrastructure, VMware lets us put more resources into our primary business, which is delivering an exceptional learning environment to our community.”

Michael Russell, Ed.D.

VP of Instructional and Information Technology

Chief Information Officer

Montgomery College

IT Transformation in Education

CLOUD COMPUTING

Cloud computing offers a new model of computing that cuts through IT complexity by leveraging the efficient pooling of on-demand, self-managed virtual infrastructure, consumed as a service.

Reduced funding, rising costs and increased competition are driving change across academic institutions. From private and public universities to community colleges, IT leaders are seeking ways to improve service delivery to meet the needs of diverse student, faculty and alumni populations while lowering costs.

Academic institutions want to invest in state-of-the-art solutions that improve IT efficiency as they continue to ask staff to do more with less. IT leaders responsible for expanding centralized core services are assessing how to effectively knit legacy and new applications and infrastructure together into modern working IT environments while meeting the unique requirements of departmental IT teams. Most important, they are managing an increasing volume of data in datacenters, which now consume more space and power than many institutions with restricted campus boundaries can afford.

These challenges are amplified in a world in which an increasing number of students and faculty have more educational and career choices than ever. To attract and retain students and staff, IT leaders strive to provide the most advanced educational environment in the classroom and online. Yet, they must implement improvements within limited, sometimes diminishing budgets and with as little disruption as possible to learning. One IT director says that “every dollar we don’t spend on IT is funding we can allocate to other priorities, in support of research, faculty and academic programs that are at the core of our school’s mission.”

In response to these pressures, college and university IT leaders are looking to cloud computing as the most strategic approach to:

- Consolidate existing datacenters.
- Drive down costs while providing access to more services and users.
- Keep data and applications secure and available.
- Protect privacy and sensitive information.
- Manage the proliferation of end-user devices.
- Maintain and improve service-level agreements (SLAs).

When institutions begin their journey to the cloud with virtualization—an IT transformation starting point that preserves existing investments—they realize significant agility, cost and security benefits.

CLOUD SERVICE MODELS

Private Cloud

Operated solely for an organization, usually onsite (internal). Often favored, because it is easier to control and entails lower risk.

Public Cloud

Made available to the general public or a large industry group. Owned by an organization selling cloud services.

Hybrid Cloud

Composed of two or more cloud models that remain unique entities but are bound together by standardized technology that enables data and application portability.

Community Cloud

Shared by several organizations and supports a specific community that has like concerns.



Vision for the Future

The VMware® vision for cloud computing in education focuses on enabling academic institutions to realize the efficiencies and flexibility of cloud computing while preserving existing investments. With virtualization as the foundation, colleges and universities can build cloud architectures that are flexible enough to support a unified private and hybrid cloud model.

In academic institutions around the world, most applications and services are built on top of tightly coupled technology stacks that are challenging to update and costly to manage. The capital and operational costs of supporting these complex and brittle application silos—coupled with a growing need for on-demand services—have academic IT leaders looking for a more efficient, flexible and cost-effective model for computing. Cloud computing, with its improved service-delivery model, allows IT to operate much more efficiently and respond faster to the needs of students, faculty and alumni.

“We own and operate a 3,000+ core datacenter prototype, managed exclusively by the VMware cloud management software stack. VMware virtualization and cloud infrastructure provides us with an environment that is cost-effective, flexible, reliable and efficient,” says Dr. Ada Gavrilovska, Research Scientist at the Center for Experimental Research in Computer Systems (CERCS) at Georgia Tech. “In our virtualized datacenter, access to vSphere and vCloud APIs allow us to customize our monitoring and management processes and conduct research on a range of topics related to virtualized cloud management. Starting this Fall, this datacenter will be used more broadly by the Georgia Tech community, for research and instruction.”

By leveraging virtualization as cloud’s foundation and deploying applications to a private, public, hybrid or community cloud, including those provided by consortiums, IT leaders can make their organizations more responsive. They can deliver IT as a Service, creating improvements at each critical layer of a modern IT architecture: infrastructure, applications and end-user computing.

Virtualization First, Then the Cloud

Virtualization is the foundation for cloud computing because it removes the dependencies between software and the hardware that runs it. Institutions are no longer held to the traditional inefficient ratio of 1:1:1 for servers, operating systems and applications. This decoupling enables IT to turn underutilized infrastructure into an elastic, resilient, partitioned and secure pool of compute resources available to users on demand.

Today, nearly every university, department and college operates at least one datacenter. Imagine if each undertook a simple 2:1 server-consolidation effort. They could presumably reduce the number of physical x86 servers by half and achieve significant cost savings for this basic effort. However, their potential for cost savings would be dramatically greater, considering that VMware customers achieve average consolidation ratios of 12:1, with many attaining much higher rates.

In the most recent Gartner, Inc. Magic Quadrant for x86 Server Virtualization Infrastructure, VMware was placed in the leaders quadrant.¹ As an industry leader in virtualization, VMware is defining the new era of cloud computing.

Evolutionary Approach to Your Cloud

VMware provides an evolutionary path to cloud computing based on your unique needs to build the most important cloud—your cloud. Our approach allows academic IT leaders to transform server, storage and networking resources into secure, efficient resource pools to enable IT as a Service. We support private, public and hybrid cloud infrastructure that delivers agility, security, flexibility and cost savings.

VMware offers three complementary on-ramps to cloud computing: Cloud Infrastructure and Management, Cloud Application Platform, and End-User Computing. Colleges and universities can pursue initiatives in these areas in any order or simultaneously, experiencing benefits that accelerate IT and learning throughout their transformation.

Cloud Infrastructure and Management

Over the years, academic IT departments have added servers and datacenters to meet the growing demand for new services and applications. Consequently, they are now dealing with server sprawl and growing IT complexity, which has brought with it higher costs, decreased

Agility

“Done well, server virtualization makes fundamental changes that can lead an organization down the path to private and public cloud computing.”

Thomas Bittman
VP and Distinguished Analyst at Gartner

VMware Solutions for Your Cloud

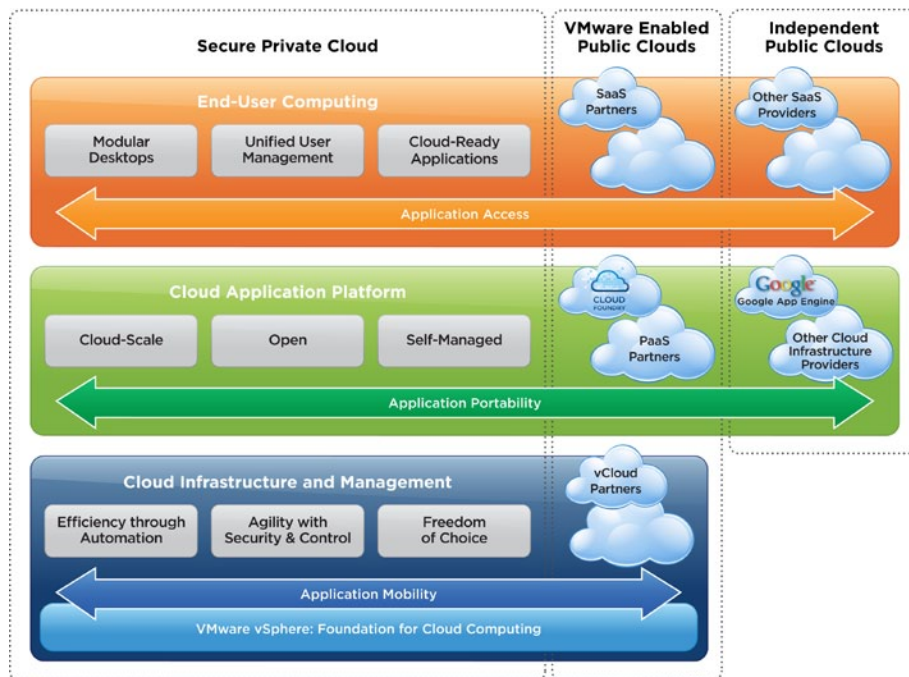


Figure 1: VMware delivers customer-proven cloud infrastructure and management, cloud application platform, and end-user computing solutions.

CARNEGIE MELLON UNIVERSITY

“Our research center explores efficiency and automation of large-scale infrastructures, like clouds. Working with VMware’s software and people has allowed us to provide robust service to various research users at Carnegie Mellon while capturing resource usage data and exploring new computing styles like data-intensive computing in a cloud.”

Greg Ganger
Jatras Professor of ECE
Carnegie Mellon University



ROI, decreased manageability and reduced efficiency. With virtualization—which decouples software and hardware—IT leaders can increase responsiveness while dramatically reducing capital and operational expenses.

For example, colleges and universities are using VMware solutions to reduce datacenter and capital costs by as much as 60 percent, decrease time spent on routine administrative tasks by about a third, and cut datacenter energy costs by up to 80 percent—all without sacrificing compute performance.

VMware cloud infrastructure and management solutions enable academic institutions to:

- Virtualize mission-critical applications, such as student management systems, to deliver IT services more effectively without compromising on performance.
- Increase the control and security of IT infrastructure with automated operations, disaster recovery and compliance.
- Leverage existing investments while bridging to the cloud deployment model of choice.

VMware Solutions Deliver Agility, Manageability and Choice

VMware solutions extend the useful life of existing institutional IT investments for both IT production applications and mission-critical applications. By virtualizing critical applications such as Blackboard Inc.’s Blackboard solutions and SunGard’s Banner solutions, academic IT leaders accelerate application delivery. They improve quality of service during peak periods including enrollment through dynamic scaling and high availability. Additionally, they enable disaster recovery without needing to move operations off campus. VMware solutions allow institutions to run critical applications with higher reliability, at lower cost.

“We’re proving here at UBC that VMware is very viable. It works in production environments, it works for Oracle database servers, and everywhere in-between. VMware technology lets you architect a very reliable, very dynamic solution to your computing needs,” says Michael Thorson, director of infrastructure at the University of British Columbia.²

VMware virtualization and cloud management allows institutions to be proactive and to respond to new demands on their infrastructure. Our solutions automate operations, including change management, capacity planning, business continuity and disaster recovery. Through a single dashboard, IT leaders can comprehensively view real-time performance to intelligently pinpoint, analyze and prevent potential issues before they affect end users. VMware management features virtualization-aware security and continuously automated compliance. With VMware, institutions can better manage the lifecycle of their datacenter infrastructure.

“VMware’s track record both within our organization and across the industry speaks for itself in terms of the huge cost savings and gains in operational efficiencies we were able to achieve,” said Link Alander, associate vice chancellor for technology services at Lone Star College System.³

Through the enterprise hybrid cloud, VMware gives academic institutions the security, performance and control of a private cloud with the cost savings and business agility of a public cloud. We support application portability—seamlessly moving applications between private, public and hybrid clouds—by working closely with service providers to leverage our secure and managed infrastructure platform. Our hybrid cloud model provides freedom of choice and dynamic scaling to meet demands. Institutions can work with preferred providers and move in and out of a public or hybrid cloud according to their needs—without vendor lock-in. With our open and evolutionary approach, academic IT leaders can minimize both risk and disruption.

Cloud Application Platform

The limitations and weaknesses of outdated approaches to application infrastructure have become painfully apparent to colleges and universities, causing them to modernize the way they build and deploy new applications. The heavyweight, application-server and database-centric architectures of old are giving way to lightweight development and runtime platforms that accelerate the application deployment cycle, provide elastic scale and reduce costs.

With VMware solutions, institutions can modernize the applications they use today and build the ones they will need tomorrow.

The VMware cloud application platform enables academic institutions to:

- Build modern, Web-oriented applications in less than half the time.
- Deliver cloud-ready applications that are optimized to run on virtual infrastructure.
- Enhance application portability between public and private clouds.
- Overcome relational database bottlenecks and enable real-time data.
- Increase the reliability, availability and scalability of applications.

Institutions are leveraging widely used frameworks and tools, including Spring—a core component of the VMware cloud application platform—to reduce the amount of coding required and to enable innovation.

Other campuses are using VMware services to take advantage of the hybrid cloud and incorporate new consumer application paradigms, such as social networking and collaboration, into existing and new applications.

End-User Computing

Today's faculty and students expect and require access to coursework, data and a growing number of applications on a variety of devices from on and off campus. Securely meeting these needs in a timely manner with existing resources poses new challenges for IT leaders in education.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

“Research is an important aspect of the academic experience and here at MIT, we are using VMware's flexible and reliable software to inform a ground-breaking study. VMware vSphere and vCloud were extremely easy to configure and they provide us with comprehensive usage monitoring. We have already observed significant resource usage efficiency and reduced management time.”

Una-May O'Reilly, PhD.
Principal Research Scientist
Computer Science and Artificial
Intelligence Laboratory
Massachusetts Institute of Technology

Flexible

All five of the cloud providers placed in the leaders quadrant in the most recent Gartner, Inc. Magic Quadrant for Cloud Infrastructure as a Service and Web Hosting are partially or wholly VMware based.⁴

Proven

“Our VMware View environment gives us control and stability, but also flexibility. We have the tools we need to manage our desktop environment more efficiently, which means we’re doing a better job at supporting our college’s desktop users.”⁵

Stan Pope
 Director of Technology for the College of Business Administration
 Central Michigan University (CMU)



VMware Delivers Comprehensive Solutions that Enable Your Cloud

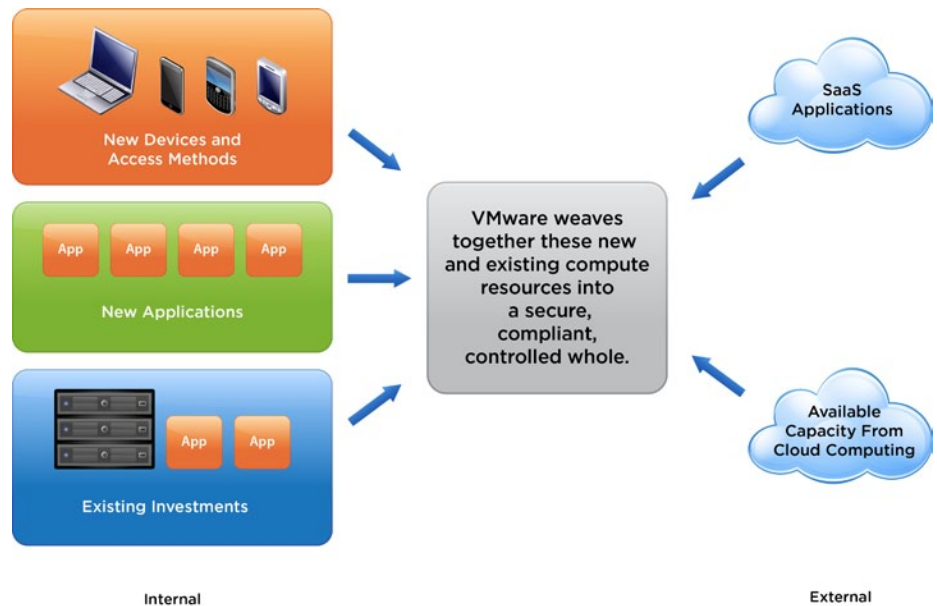


Figure 2: VMware offers a pragmatic approach to your cloud that transforms the datacenter, application development and end-user computing.

VMware end-user computing solutions can be used to:

- Provide students and faculty with secure and flexible access to applications and data any time, anywhere.
- Reduce the cost and complexity of desktop management.
- Reduce power consumption and carbon emissions.
- Help students and faculty transition from traditional email to next-generation email and collaboration software.

VMware end-user computing solutions enable IT to deliver desktops as a service. IT leaders can quickly and securely provision and deploy customized virtual desktops, applications and data to users across a range of devices and platforms. Faculty, students and even alumni can securely access these resources through campus-owned endpoints or their own devices across locations.

“We had an aging desktop infrastructure, obsolete management tools and a limited budget for renewal. Our solution goals were to simplify management, cut costs, reduce environmental impact and improve service to end users. VMware View™ pays off on all of these fronts,” says Mario Therrien, director, Office of Users Services, Information Technology and Communications Services at the University of Montreal.⁶

Colleges and universities are using VMware end-user computing solutions to save up to 50 percent on desktop management costs, extend the borders of the classroom and deliver a superior end-user experience to students and faculty.

Providing Security and a Proven Path

Stronger security proven through direct monitoring—providing greater control and visibility—is the highest standard for trust in the cloud. Together, VMware and RSA, the security division of EMC, are delivering this proof-driven standard of trust today. Through the transformative power of virtualization and our industry-leading solutions, we are making security and compliance in the cloud logical and information-centric, built-in and automated, risk-based and adaptive.

Since virtual infrastructure is inherently more secure and stable than traditional physical infrastructure, it reduces the attack profile of the institution and makes it easier to isolate breaches or contaminated infrastructure. Through significant investments in security solutions, VMware provides an additional layer of protection for more sophisticated virtual environments. VMware provides academic institutions with a single comprehensive framework for securing virtual datacenters and cloud environments at all levels—host, network, application, data and endpoint. With VMware security solutions, institutions can centralize security across the virtual datacenter, secure the edge of the virtual datacenter, protect applications from network-based threats, and offload antivirus and anti-malware processing for endpoints.

Value Along the Way

VMware helps academic institutions transition to cloud computing in three phases: IT Production, Business Production and IT as a Service. Colleges and universities will experience significant benefits during each phase of the journey, rather than having to wait until all phases are complete.

The Journey to Your Cloud

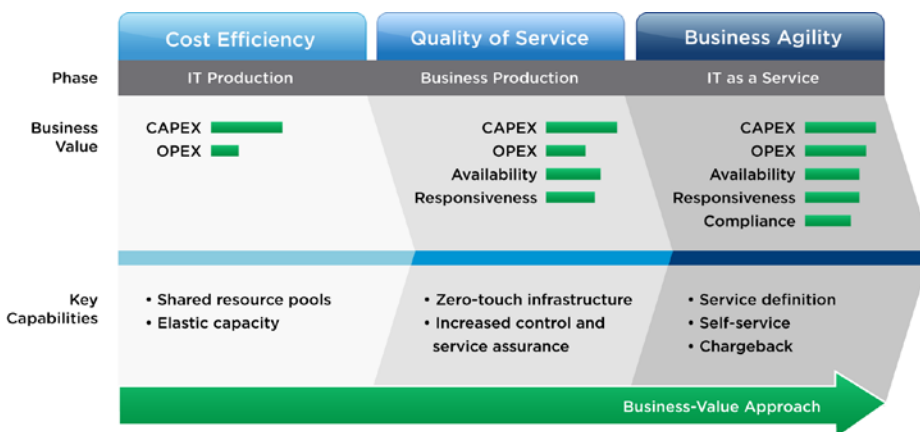


Figure 3: VMware offers a practical, three-phase journey to IT as a Service for organizations transitioning to a cloud computing approach.

Secure

VMware is partnering with industry security leader RSA, the security division of EMC, to deliver the most secure solutions for the cloud.



Trusted

The VMware ecosystem includes more than 25,000 partners, 3,500 service provider partners, 59,000 certified professionals and one million community members.

Only VMware Delivers Your Cloud

More IT infrastructure is virtualized on VMware than on any other platform. Today, more than 250,000 customers worldwide rely on VMware solutions to reduce capital and operating costs and increase control over IT infrastructures while preserving investment. In fact, leading public and private universities, as well as community colleges, across the United States and around the world trust and depend on VMware virtualization and cloud solutions.

In these institutions, virtualization and cloud computing are enabling significant benefits beyond cost savings, including greater agility, increased efficiency, faster application development and deployment, and decreased real estate, power and energy consumption.

VMware introduced x86 server virtualization, the foundation for cloud computing, to the world in 1998. Now, VMware is the global leader in virtualization and cloud infrastructure.

Since VMware provides cloud infrastructure to both academic institutions and service providers, we enable secure interoperability between private, public and consortium clouds—bringing you all of the benefits of a hybrid cloud approach. VMware solutions are based on open standards and extend to a global ecosystem of public cloud providers, allowing colleges and universities to move applications and data between clouds quickly and easily.

Dramatically reducing IT complexity is the VMware mission. Our award-winning solutions have transformed IT for customers for more than a decade. We provide an evolutionary and pragmatic path to the cloud based on the industry's most widely used virtualization platform. VMware solutions are complete and completely flexible, so you can build the most important cloud in the world.

Your Cloud. Accelerate IT. Accelerate Learning.

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 - 3 VMware Case Study. "Lone Star College System Virtualizes 14 Campus Datacenters, Slashes IT Costs and Improves Disaster Recovery." 2010.
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Learn more

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