

WHITE PAPER

VMware Infrastructure: A Guide to Bottom-Line Benefits



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Introduction

Larger Data Centers Mean Greater Risks

As the insurance provider that's *On Your Side™*, Nationwide differentiates itself in a commoditized industry by responding immediately to the needs of its customers. This speedy service revolves around one asset: information.

For years, Nationwide has built out its IT infrastructure to make customer information highly available yet highly secure. But the growing data center resource requirements of Nationwide's business applications recently threatened to make the company's data centers obsolete before their time.

At one point, Nationwide operated more than 75 percent of its 5,000 distributed servers at less than 50 percent utilization during peak demand periods. Underutilized servers and application growth led to an increase in power, cooling, and space requirements. Provisioning a new server typically took weeks or months. Total cost of ownership (TCO) remained high. And the rapidly increasing power and cooling requirements in Nationwide's Tier 4 data center forced the company to begin planning a new facility, with an estimated price tag of \$10 million.¹

Nationwide's situation was far from unique. Although every executive understands that data centers are expensive to build and operate, not all executives have considered the risks that increase as data centers grow.

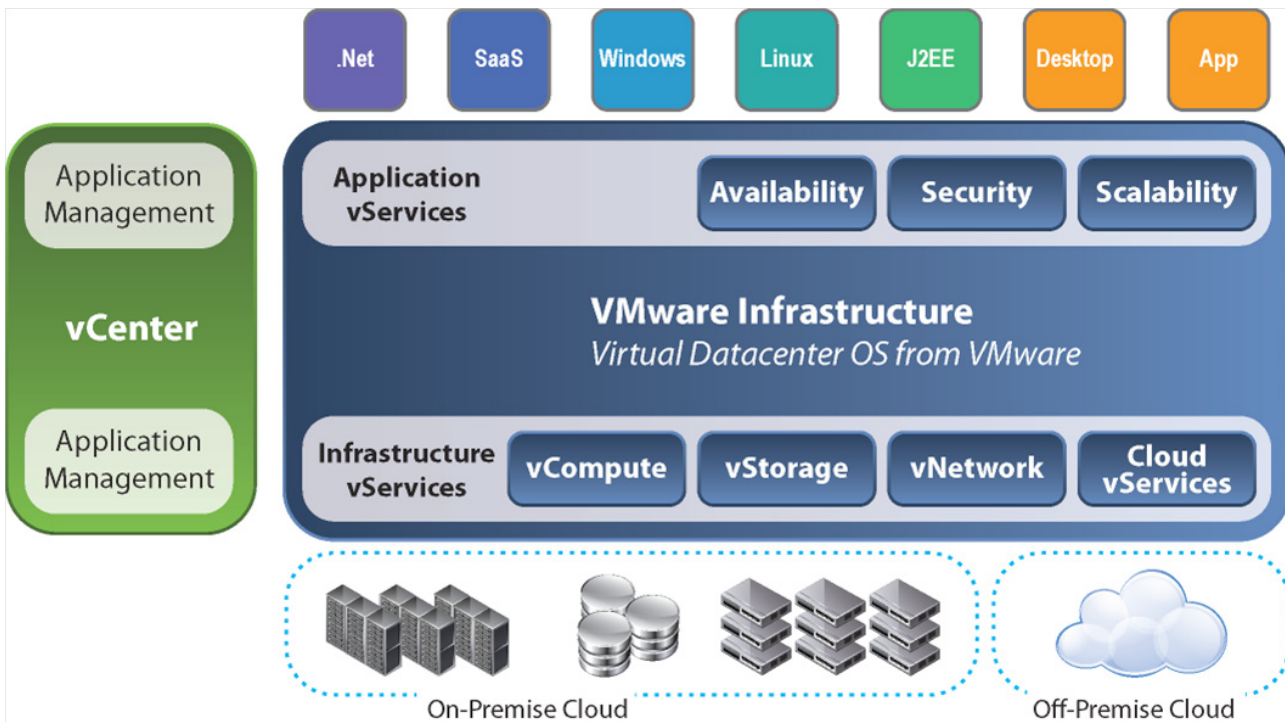
The virtual datacenter OS addresses customers' needs for flexibility, speed, resiliency, and efficiency by transforming the datacenter into an "internal cloud."

Costs and Concerns of Growing Data Centers

What's behind the rapid growth of data centers with underutilized servers? The myth that sophisticated business applications need dedicated hardware. That's why companies have responded by building out massive data centers—but it's almost impossible to keep up with server sprawl and increasing energy costs by using a model of one application per physical server.

A data center's electric bill may consume 25 to 44 percent of its budget.² In a 2007 Aperture Research Institute survey of data center operators, nearly 44 percent of respondents reported that their data centers were operating at over 90 percent electrical capacity.³ Some companies have tried addressing the problem by using more high-output, small-footprint blade servers. But in the same study, 87 percent of respondents reported running blade servers in their data centers—yet power challenges persist.

And power consumption is increasing as data centers expand. In 2006, data centers in the U.S. used 61 billion kilowatt-hours of electricity, at a cost of about \$4.5 billion. This figure was estimated to be more than twice the energy that data centers consumed in 2000, and represented 1.5 percent of the nation's total electricity use.⁴ If current trends continue, data centers will use 12 percent more energy with each year that passes.⁵



Eventually, of course, data centers grow to their limits—and then the IT and finance departments must budget for new facilities. According to a recent survey commissioned by Hewlett-Packard, one-third of CIOs fear that within two to five years, their data centers will no longer be able to meet the demands placed on them.⁶ In fact, Microsoft’s datacenter space requirements more than double every 24 months—which is forcing the company to explore alternative data center designs.⁷

What’s the price tag of a new data center? The largest data center developers spend about \$1,000 per square foot on their facilities.⁸ In 2007 alone, Google announced plans for four new data centers costing about \$600 million each.⁹ To cut costs from your bottom line, you want a solution that can help you not only conserve power and reduce electricity costs, but also postpone the need to build a costly new facility.

Meet Data Center Challenges with Virtualization

Frustrated by the costs of maintaining ever larger data centers—or building new ones—many companies are exploring virtualization.

Simply put, virtualization lets your IT staff turn your data center into an internal cloud of computing resources controlled by a single virtual data center operating system (VDC-OS). Customers across your organization can then specify the service levels, response times, and availability they need for their applications, and the VDC-OS can guarantee fulfillment of these requirements—at the lowest cost of ownership.

Many of the bottom-line benefits of virtualization are obvious. Because the VDC-OS seamlessly aggregates network resources, you can consolidate physical servers and reduce hardware costs. With fewer machines in the data center and the ability to automate routine processes, your management costs should also go down. But some of the greatest benefits of virtualization come from the increased agility your organization will gain.

By minimizing planned as well as unplanned downtime of servers, the VDC-OS removes obstacles to productivity. By delivering the right levels of availability, security, and scalability to all applications—regardless of hardware and location—the VDC-OS helps you speed strategic projects to market. And by letting you create detailed recovery plans that specify exactly how to power on and deploy virtual machines for different failover scenarios, the VDC-OS facilitates disaster avoidance and simplifies recovery.

Unlock the Value of Virtualization with VMware

Potential Cost Savings

Several technology companies offer virtualization technology, but so far only VMware has quantified its ability to deliver bottom-line benefits to its customers.

Virtualization reduces the need for costly servers—and VMware Infrastructure delivers compelling cost savings. Virtualizing on a moderate scale, the average company can save \$8,251 per workload over three years. That means they can save \$825,100 per 100 workloads virtualized, or \$8,251,000 per 1,000 workloads virtualized.

The typical return on investment (ROI) period for a virtualization project is six months or less—so most virtualization projects quickly pay for themselves.

Reduce Energy Consumption

So how does virtualization help you manage the tremendous cost of electrical power? One of the IT department’s greatest areas of waste is in powering and cooling servers that are not being used during off-peak hours. VMware Distributed Power Management (DPM) continuously monitors the resource requirements and power consumption across your server farm. When your computing needs decrease—for example, on weekends—DPM consolidates workloads and puts servers in standby mode to reduce their power consumption. When employees begin work again on Monday morning, DPM brings needed servers back online to support business applications.

3-Year Cost Savings/Application	
Server Hardware	\$5,816
Power Costs	\$759
Data Center Real Estate	\$949
Network Infrastructure	\$296
Total	\$8,251

With VMware DPM, your organization can:

- Reduce power and cooling costs during periods of lower computer usage.
- Automate the management of energy efficiency in your data center.
- Save about \$600 per server per year just in power and cooling costs.
- Dramatically increase the productivity of your system administrators.

Allocate Resources on the Fly

One key way you save money with virtualization is by dynamically allocating system resources. Instead of having to devote a full-time server to part-time processes, you can free up unused computing power on your network to help wherever it is needed—especially during peak times.

VMware Distributed Resource Scheduler (DRS) dynamically allocates and balances computing resources to help you align your IT infrastructure with your business needs. As your business users work, DRS uses your pre-defined rules to automatically and intelligently allocate available resources to the applications that need them. You can change the direction of your business on short notice, without having to worry about the details of your computing resources—they're always ready and highly available.

Of course, even virtual machines have resource limits. When your virtual resources become constrained, VMware DRS makes additional capacity available. Using VMotion, DRS automatically migrates live virtual machines to different—existing or newly added—physical servers that have spare or additional computing capacity. And it does so without impact to your business users, because they don't need to shut down their machines or applications. With DRS, you can keep your IT environment up and running while flexibly meeting increasing business demands.

The Bottom-Line Impact of Virtualization

Quantifiable Results

There's strength in numbers. Adoption of virtualization technology is reaching critical mass, which indicates that this technology is not just an experiment for well-heeled visionary CIOs. A 2006 market research survey of 1,700 management information systems (MIS) managers from companies of all sizes found that:

- Sixty-two percent of respondents had already put a virtualization solution in place or were in the process of doing so.
- Only 14 percent of the companies surveyed had not yet chosen a server virtualization vendor.
- Only 4 percent of the companies surveyed had no plans to install a virtualization solution.¹⁰

Project Your Savings Using VMware

Quickly find out how much your organization can save with VMware virtualization technology, using the VMware TCO/ROI Calculator. Independently developed by leading ROI and TCO consultancy Alinean, Inc., the VMware TCO/ROI Calculator enables you to enter precise information about your organization's IT infrastructure and receive highly customized results. The whole process takes less than 10 minutes.

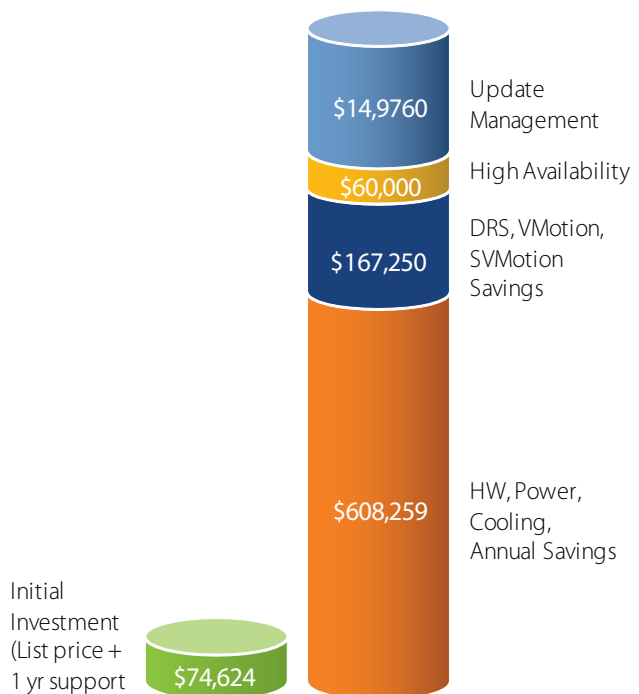
According to the VMware TCO/ROI Calculator, a typical company with 350 servers can use VMware to achieve:

- An ROI of 724 percent.
- \$4,439,584 in net present value savings.
- A payback period of just four months.

To estimate your potential cost savings and build your business case for virtualization, try the VMware TCO/ROI Calculator. Visit <http://www.vmware.com/products/vi/calculator.html> to get started.

Virtualization technology can deliver major cost savings, especially in relation to the initial investment required.

VMware Infrastructure Enterprise



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Leading companies have been able to quantify the exact results they have achieved with VMware virtualization technology:

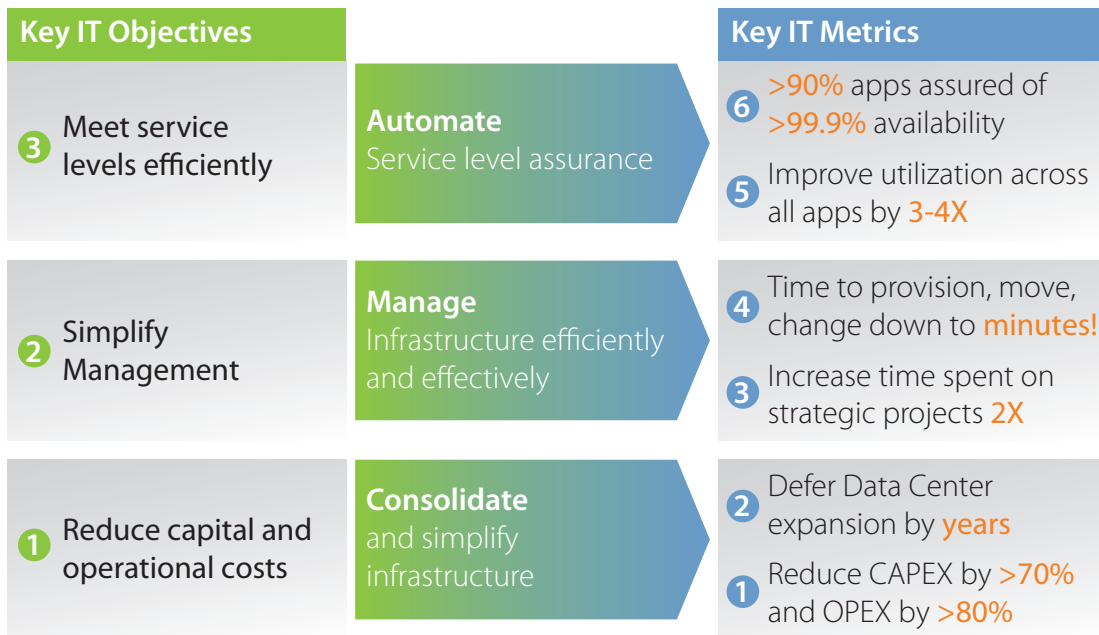
- **Avaya:** Cut lab power consumption by 50 percent—saving \$1,300 per month—and freed up 80 percent of the physical space in its test lab.
- **Cardinal Health:** Maintains a ratio of one desktop technician for every 300 call center workers, and can provide 100 new machines in less than one hour.
- **IBM:** Cut setup time of previously conducted complex tests from about eight hours to only a few minutes. The company reduced costs immediately upon implementing VMware by retiring some of its older Pentium and rack servers. IBM projects additional savings by reducing costs per virtual machine from the current \$1,100 per year to less than \$500.

- **Subaru:** Consolidated 45–50 servers to 15, and saved \$20,000–30,000 in hardware costs. The company also streamlined its server procurement and setup process from weeks or months to mere minutes.
- **U.S. Department of Energy’s Savannah River Site:** Avoided \$320,000 in hardware acquisition costs, and increased average uptime from 99.6 percent to more than 99.9 percent.

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Transforming Costs, Efficiency and Availability



Conclusion

Nationwide Ensures Cost-Effective IT Through Virtualization

Seeking to put off building a new data center while lowering the TCO of its existing facilities, Nationwide began to explore virtualization technology. The company used VMware Infrastructure as part of an overall transformation of its IT processes. As a result, Nationwide has:

- Eliminated more than 700 physical machines.
- Reduced its need to buy, deploy, configure, and discard hardware.
- Enhanced data center scalability by allowing IT to provision virtual machines quickly in response to urgent capacity needs.
- Freed up IT staff to focus on strategic initiatives.
- Extended the life of its primary data center by reducing power, cooling, and space requirements.¹¹

Nationwide's physical machines now host an average of 13 virtual machines each. The company expects to have more than 1,000 virtual servers running on 89 physical servers by 2009.¹² In addition, Nationwide has enhanced its ability to deploy new servers and systems quickly—so its employees and agents can keep providing seamless service to their customers and continue to deliver on Nationwide's On Your Side pledge.

Virtualization's Benefits Summarized

Virtualization is a proven technology that can help you:

- Postpone having to build a new data center.
- Minimize the need to add costly new servers.
- Dramatically cut your power consumption.
- Reallocate computing resources as your business needs dictate.

Your Virtualization Action Plan

Whether you're preparing a disaster recovery plan or simply trying to save money and avoid server sprawl, these three steps can help your organization reap the benefits of virtualization:

1. Find out if your organization has begun exploring virtualization. Meet with your IT leaders if necessary to assess the current status of virtualization projects.
2. Take one of two actions:
 - a. Recommend virtualization as a way to control or reduce IT costs.
 - b. Work to develop and approve any virtualization initiatives that your organization has already launched.
3. Once you have assembled your virtualization team from among your Finance and IT departments, increase your team's knowledge by registering for a free VMware webinar. Visit <http://www.vmware.com/events/webinars> to get started.

Learn more today. For a comprehensive overview of VMware's approach to virtualization, visit <http://www.vmware.com/virtualization>. To keep up with what VMware's leading minds are saying about virtualization, visit the VMware Executive Blog at <http://blogs.vmware.com/console>.

¹ "Case Study: Nationwide Uses Linux and High-Power Virtualization for Web Presence," Gartner RAS Core Research Note G00148213, John R. Phelps, Mike Chuba, June 29, 2007.

² "Power Scourge," *CFO Magazine*, August 27, 2007.

³ "Data Center Professionals Turn to High-Density Computing as Major Boom Continues," Aperture Research Institute study, 2007.

⁴ Report to Congress on Server and Data Center Energy Efficiency, Public Law 109-431, U.S. Environmental Protection Agency ENERGY STAR Program, August 2, 2007.

⁵ Fact Sheet on National Data Center Energy Efficiency Information Program, U.S. Department of Energy (DOE) and U.S. Environmental Protection Agency (EPA), March 19, 2008.

⁶ "Data Centers to Fall Short in 2-5 Years, HP Predicts," Charles Babcock, *InformationWeek*, March 17, 2008. <http://www.informationweek.com/news/infrastructure/management/showArticle.jhtml?articleID=206904227>

⁷ "Microsoft: Datacenter Growth Defies Moore's Law," Jason Snyder, *InfoWorld*, April 18, 2007. http://www.pcworld.com/article/130921/microsoft_datacenter_growth_defies_moorees_law.html

⁸ "Google Data Centers: \$3,000 A Square Foot?" Rich Miller, Data Center Knowledge blog, November 12, 2007. <http://www.datacenterknowledge.com/archives/2007/11/12/google-data-centers-3000-a-square-foot/>

⁹ "Google: No Plans Yet for Blythewood, SC Site," Rich Miller, Data Center Knowledge blog, July 30, 2008. <http://www.datacenterknowledge.com/archives/2008/07/30/google-no-plans-yet-for-blythewood-sc-site>

¹⁰ Yankee Group 2006 Global Server Virtualization Survey.

¹¹ "Case Study: Nationwide Uses Linux and High-Power Virtualization for Web Presence," Gartner RAS Core Research Note G00148213, John R. Phelps, Mike Chuba, June 29, 2007.

¹² "From Big Iron to White Boxes, Nationwide Goes Virtual," by Galen Gruman, *InfoWorld*, September 24, 2007. http://www.infoworld.com/infoworld/article/07/09/24/39FE-virt-case-nationwide_1.html



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