

Are You Still Paying for Virtualization?

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Does the hypervisor even matter?

Do you use AWS or Azure? Do you know what virtualization solution these services use?

Virtualization has played a critical role in radically improving enterprise datacenter design, operation, and efficiency over the past decade. Purchasing, licensing, and managing hypervisor software—along with supporting administrative tools—is considered a business necessity for just about any IT manager.

But is it really? Are there viable options that make virtualization an invisible resource? Alternatives that eliminate separate virtualization software, independent management consoles, and expensive hypervisor license renewals? Popular public cloud services have demonstrated that this is indeed possible.

In a public cloud, virtualization is simply an embedded service. Few IT professionals, for example, are concerned with the specific hypervisor, or virtualization technology, running in Amazon Web Services (AWS). Virtualization is simply one of many native features and services. So, it's important to periodically question whether the business benefits derived from commercial virtualization products justify the expensive licensing costs, as well as the inherent complexity of consuming a full "suite" of software that is packaged with the core hypervisor. Too many organizations discover (painfully) that they are paying for tools and software their teams do not use, or for which they are receiving minimal benefit. The proliferation of virtualization 'shelfware' simply adds to datacenter costs—with little apparent return.

Beyond hypervisor licensing, there are numerous easy-to-overlook soft costs, the majority of which increase datacenter expenses. The soft costs imposed by virtualization vendors, such as VMware, are fueled by complicated management tools that require ongoing training, independent software lifecycles that impact resource availability, non-intuitive IT workflows, and inconsistent APIs across products—all of which must factor into a true cost analysis.

Nutanix virtualization offers an attractive alternative when streamlining datacenter operations and driving costs out of the datacenter. It's done with Nutanix AHV, a built in, license-free hypervisor delivering virtualization capabilities needed by the most demanding applications. With thousands of deployments worldwide, AHV provides an open platform for virtualization and application mobility. When combined with comprehensive operational insights and virtualization management from Nutanix Prism, Nutanix provides a complete solution for virtualization and enterprise cloud.

By adopting AHV, your organization can not only eliminate the direct costs associated with the hypervisor licensing but drive down soft costs and reduce the OpEx associated with virtualization. The Nutanix Enterprise Cloud OS offers multiple advantages versus VMware vSphere:

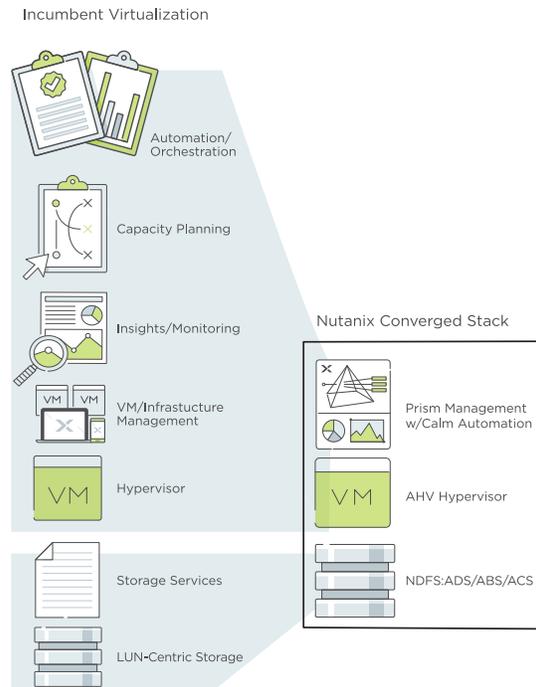
- Manageability
- Security
- Scalability
- Flexibility
- Resiliency
- Economics
- Analytics
- Automation & Orchestration

Keep reading to find out how.

How much time and resources are needed to manage the virtualization management layer?

MANAGEABILITY

A busy IT team doesn't have the time for complex management that make routine operations cumbersome. VMware vSphere comes with significant management complexities. Nutanix AHV liberates IT teams, raising the bar by simplifying all aspects of virtualization management.



PRODUCT COMPLEXITY

If you've worked with VMware for many years, you are most likely well aware of how complex the VMware ecosystem has become. The latest version of the VMware Product Guide is over 70 pages long and includes dozens of products and more than twenty bundles and suites to choose from. Due to this complexity, VMware publishes a knowledge base article that defines the multi-step process and order of operations required just for software upgrades. Though sold in bundles or suites, most of the tools are loosely integrated independent software packages (many from acquisitions) with their own management consoles and software lifecycles.

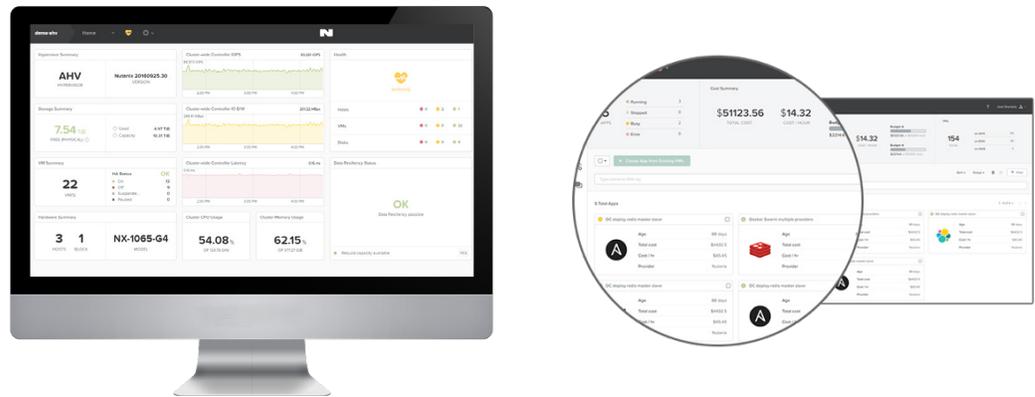
Even modest VMware environments can require multiple products to be installed, configured, and maintained, adding to your workload and the complexity of your virtual environment. License restrictions may impose limits on the functionality of the installed components. Your team probably spends significant time keeping just the management environment running.

For example, a production vSphere environment starts with considerations on what vCenter form factor will be used (e.g. vCenter Appliance (VCA) vs stand-alone). There are important input factors like scale, level of resiliency, authentication methods, and then performance monitoring and capacity planning goals that will expand the menu of products that need to be deployed. Based on those inputs, the results could potentially require 5+ application servers and guest OS instances just to provide VM management and operational insights.

AHV is included with your Nutanix purchase and comes with everything you need to run and manage a virtual environment. Nutanix Prism then replaces components like vCenter, VUM, vROps, and vRA. With AVH and Prism, there is no planning or guessing for sizing management as there are no additional products to install or manage. Lifecycle management is simple, and upgrades are non-disruptive and accomplished with a few clicks.

USER INTERFACE AND WORKFLOWS

The VMware user interface experience has been going through an interface transition for many years. In vSphere 5, VMware added a flash based client to the existing desktop or “thick” client, creating an environment where some tasks could only be accomplished from one of the two interfaces, adding to the complexity of common workflows. In vSphere 6.5, a new HTML5-based client is set to replace the flash and thick clients, but initially some functions will only be accessible via the legacy clients. This multi-interface challenge extends to the ecosystem struggling to migrate plugins from the legacy, Adobe Flash, to the new HTML5 interfaces.



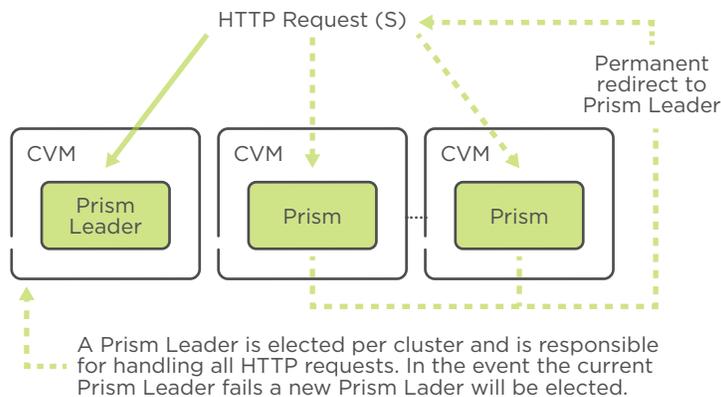
With Nutanix Prism, a single intuitive user interface covers not just virtualization but the functions required to operate entire infrastructure stack:

- Prism integrates management for AHV and all Nutanix infrastructure and services. It can also manage common vSphere tasks when used in mixed hypervisor environments.
- Virtualization management in Prism has been designed for an uncluttered, consumer-grade experience without compromising on the actions and information needed to maintain and monitor enterprise applications.
- Prism simplifies and streamlines common workflows for hypervisor, virtual machine (VM) management, and virtual networking from VM creation and migration to virtual network setup and complete software upgrades.
- Prism Central can be used to manage a single datacenter or Nutanix deployments distributed across datacenters and offices globally.
- Prism provides detailed capacity analytics, resource forecasting, and dynamic alerts based on machine learning.
- Prism can be automatically deployed in a highly available configuration that can scale as your environment grows.
- Nutanix Calm, part of Prism, provides native application orchestration and lifecycle management for on-premises or any public cloud environment.

MANAGEMENT AVAILABILITY AND SCALING

VMware vSphere management, provided by VMware vCenter Server, is not intrinsically highly available, nor does it seamlessly scale along with the growth of the environment. You must protect the availability and accessibility of VMware management separately and scale-up the resources allocated to vCenter as capacity needs grow. vCenter and its other vSphere management tools can require dedicated infrastructure or external databases with independent management, availability and scaling requirements. As a VMware cluster grows, it often becomes necessary to alter design and deployment decisions to meet the expanding resource demands of the vSphere management tools.

In contrast, the Prism Element UI service runs on every node in a cluster and there are no external servers or databases to install, configure, or manage. VM and host configurations are stored using the same web-scale distributed manner as the Nutanix Distributed Storage Fabric (DSF). Additionally, Prism Central has a native multi-VM availability (HA) configuration. As a result, Prism scales with your Nutanix environment and is always highly available. There’s no added burden to manage the management solution.



MANAGEABILITY		
	Nutanix with AHV	vSphere
Product complexity	Low – Consistent with scale	Dependent on environment
Installation	Ships w/ Hypervisor and management Software from Factory	Multi-factor decision tree for appropriate environment
Availability	Native	Additional Configuration and servers required
Upgrades	One-click (full stack)	Independent software lifecycles
UI/UX	<u>Single interface for all tasks</u> <ul style="list-style-type: none"> • Infrastructure Management • Virtualization Management • Performance Monitoring • Capacity Planning • Self Service Portal • Reporting / Analytics • Automation / Orchestration 	Multiple Task-based products/ Management interfaces

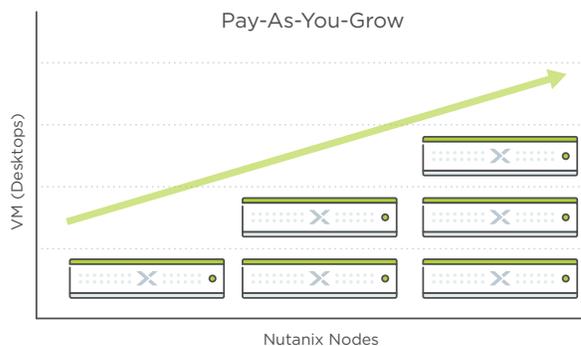
Scalability

To support growing data center needs, every aspect of your virtualization solution must be able to scale. As you learned in the previous section, management scalability is extremely important, and AHV offers significant advantages in terms of management scaling as it does for other aspects of scalability.

Scaling Performance and Capacity

Scaling performance and capacity in a VMware environment built on traditional infrastructure consisting of separate servers, storage, systems, and storage area networks, can be a complicated proposition. You add new servers to support additional VMs up to the point where storage performance or capacity becomes an issue. Then, you either must add another storage system or replace what you have with something more powerful. And you may need a SAN upgrade at the same time. It is an expensive and disruptive process and can end up increasing the complexity of your environment. This initial problem was addressed by Nutanix's web-scale hyperconverged infrastructure (HCI) solution but it did not address the management challenges of the virtualization stack riding on this infrastructure.

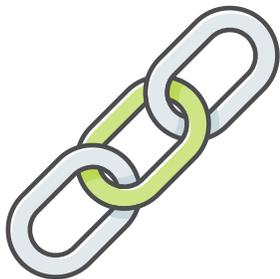
Nutanix Enterprise Cloud Platform with AHV takes the converged traits of our HCI solution and applies them to virtualization with the same goals of optimization and simplification. When you combine AHV with the web-scale design of Nutanix HCI, the scalability of your virtual environment is no longer a primary concern. Nutanix compute and storage scale linearly as new nodes are added, and virtualization scales along with it.



Every aspect of the Nutanix Enterprise Cloud Platform, including storage and management, is built on a highly distributed, scale-out architecture. Infrastructure scales by adding more nodes to the cluster. These nodes are discovered automatically, and can be configured using existing policies with a single click. AHV imposes no cluster size limits from a compute or storage perspective.

With AHV, running VMs continue to benefit from Nutanix's unique approach to data locality which reduces network latency and helps eliminate noisy neighbor effects that can hamper performance. Because Nutanix has complete control of AHV, it is also possible to ensure that the hypervisor is optimized and tuned for Nutanix storage.

The result is a virtualization environment that allows your cluster to grow and meet your operational requirements without artificial limits, while enabling individual VMs to have the resources they need.



Resiliency

In today's datacenter, downtime—whether planned or unplanned—is to be avoided. Your virtual environment must be resilient to downtime of all types. This requires resiliency both from the physical infrastructure and your virtualization solution.

Infrastructure Resiliency

For infrastructure resiliency, VMware ESXi is reliant on the resilience of the underlying physical hardware. A typical VMware environment is built on traditional multi-tier infrastructure with separate servers, storage networks, and storage systems that use RAID to protect data. Because this infrastructure is complex, IT teams must be careful to identify and eliminate single points of failure.

AHV takes advantage of the inherent resiliency of the Nutanix Enterprise Cloud Platform. Enterprise Cloud replaces traditional approaches to resiliency with a self-healing architecture. When a drive or server fails, full redundancy is quickly and automatically restored without administrator involvement.

A Nutanix cluster becomes even more resilient as it scales out. Using availability domains, a larger cluster can survive the failure of entire server blocks (up to 4 server nodes). Traditional infrastructure typically requires administrator intervention and may run in degraded mode for long periods during drive rebuilds or when controller hardware must be replaced.

Hypervisor Resiliency

VMware vSphere provides high availability for running VMs using vCenter High Availability (vCenter HA). Distributed Resources Scheduler (DRS), which can move VMs automatically based on resource constraints, is recommended with vCenter HA, but is not available in all license tiers. These services, though considered essential features by most, require additional licensing and can require manual tuning thus place further constraints on cluster configurations.

AHV takes high availability for virtual machines to a new level. Out of the box, a Nutanix cluster running AHV is pre-configured to provide “Best Effort High Availability.” It automatically responds to node failures by restarting VMs on healthy nodes as long as the cluster has available capacity. When VM-HA is explicitly enabled, the AHV software dynamically reserves capacity to ensure that HA is available to all powered-on VMs.

Nutanix has implemented VM High Availability (VM-HA) in such a way that the software minimizes the need for configuration or tuning; it simply does “the right thing.” However, VM-HA also offers finer-grained control for advanced users.

Acropolis Dynamic Scheduling (ADS) is native to AHV. It is akin to VMware's DRS in that it can automatically move VMs based on resource constraints or “hot spots”. With full stack visibility, ADS considers networking, storage and I/O resource contention in addition to VM resources, providing a higher level of accuracy and functionality with no need for configuration and tuning.

How many additional tools are required to provide the business-level insight needed to operate and manage your virtual environment? Is the cost and complexity proportional to the business value?

Analytics and Data-Driven Insight

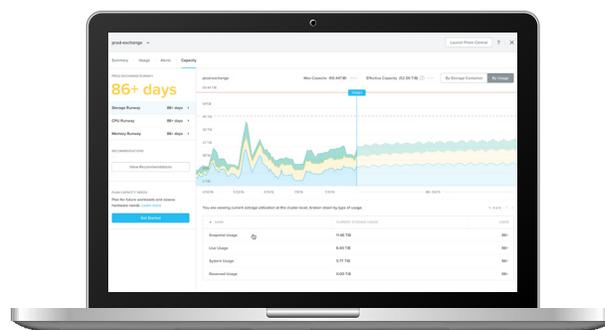
Busy IT teams are increasingly reliant on management and monitoring tools to optimize the operation of virtual environments, track resources, plan for growth, and quickly troubleshoot any problems that arise.

With VMware, it can be difficult to determine exactly what tools you'll need upfront. If you license vSphere and vCenter, will the features you need be available in the Standard Edition, or do you need Enterprise Plus? Do you need Operations Management? What about vRealize Automation or other vRealize tools? And even if you license all of that, you'll still need to use separate tools to manage the underlying servers and storage.

Once again, the Nutanix Enterprise Cloud Platform and AHV virtualization deliver the tools and information you need in a straightforward fashion. Rich analytics and heuristics-driven insights are built into the Prism platform, and cover the entire infrastructure stack including networking, storage, compute and virtualization to give you complete visibility into the infrastructure stack. Additionally, Nutanix enables extensive automation and system-wide monitoring for data-driven efficiency combined with REST-based APIs for integration in addition to the new CALM automation and orchestration features.

AHV does not require external databases to load the data extracted from the environment. The hypervisor feeds all system and audit logs to Prism for real-time situational awareness used in forensic support and root cause analysis. Nutanix Prism combines analytics and machine learning that help identify and diagnose issues, and the control mechanisms required to remediate them.

Nutanix Prism Central lets you visualize data across multiple Nutanix clusters spanning geographic regions. When enabled with the Pro license, Prism Central provides additional capacity planning and forecasting features that are highly useful in managing busy virtual environments and would typically require additional software packages from VMware or other 3rd party providers.



- Customizable Dashboards. Create specific views to meet your operational needs.
- Capacity Runway. See how many days remain before a resource—storage capacity, CPU, memory—is fully consumed.
- Capacity Planning. Explore how expanding an existing workload or adding new workloads to a cluster will affect resource utilization. Get specific hardware recommendations when a cluster needs to scale.
- Advanced Search. Enter common tasks or the name of entities into the search bar to quickly locate what you need with a web-like search engine.

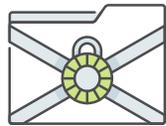
Security

Unsurprisingly, security is consistently identified as one of the top IT concerns; almost every week there's another set of horror stories major corporations that have been hacked and new security vulnerabilities.

Security in the VMware environment is very much an ad hoc process. VMware hardening guides have dozens of entries that spell out the manual configuration and verification needed to secure your virtual environment. In addition, VMware must interact with hardware and software products from many different manufacturers, creating a fragmented view of security with potential vulnerabilities where products intersect.

A VMware environment may also include a variety of management, analytics, and automation tools from VMware and others that were built separately or acquired and are not security hardened, thus increasing the attack surface and compounding any hardening effort as each product will have its own independent hardening guide.

The approach taken by Nutanix is completely different, with a security-first design philosophy. Nutanix creates and maintains Security Technical Implementation Guides (STIGs) that are used to automate security and compliance against rigorous common standards. Nutanix Security Configuration Management Automation (SCMA) continuously assesses and heals Nutanix clusters to ensure that all regulatory requirements are met, analyzing and correcting more than 1,700 security entities.



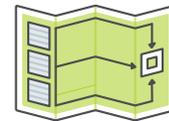
SecDL Integration

Security is incorporated into every step of the product development lifecycle and covers the entire infrastructure stack, including storage, virtualization, and management.



Automated Testing

SecDL testing is fully automated during development and all security-related code modifications are timed during minor releases to minimize risk.



Threat Modeling

Threat modeling is used to assess and mitigate customer risk from code changes.

The result is a more secure datacenter that can meet even the most stringent cybersecurity regulations for the most stringent industries. As an example, Nutanix can reduce the time it takes to complete the U.S. Department of Defense Information Assurance Certification and Accreditation Process (DIACAP) from as long as a year to less than half an hour.

Flexibility and Choice

Today's business environment is more dynamic than ever. Many enterprises are in the midst of a digital transformation, seeking to engage with customers and satisfy their needs through advanced digital and cloud technologies. An important consideration for any IT team is how to deploy IT infrastructure that gives you the maximum flexibility and choice to move in different directions in the future.

The VMware ecosystem is largely about lock-in. The more VMware products you license, the more entrenched you become.

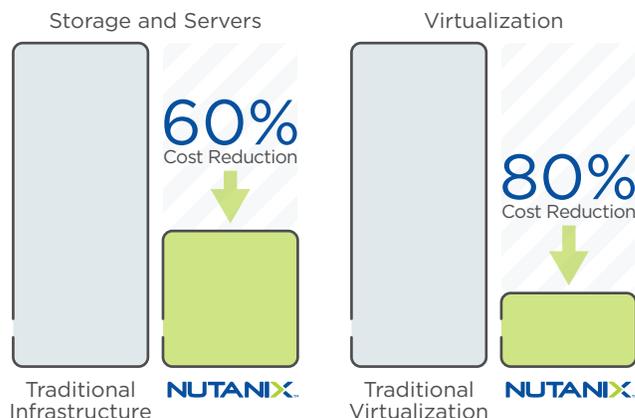
Nutanix is committed to provide flexibility and choice. The Nutanix Enterprise Cloud Platform has been designed in full recognition of the fact that it's a multi-hypervisor and multi-cloud world, and that virtualization is increasingly seen as a feature that should simply be integrated with the rest of the infrastructure stack. Choice of hypervisor should not equate to a choice in cloud vendor or application framework. Choosing AHV, allows enterprises to keep options open, choosing public clouds and services based on their own business needs vs vendor bias or alliance.

Nutanix Enterprise Cloud fully supports VMware ESXi, Microsoft Hyper-V, and Citrix Xen-Server in addition to AHV, giving you the freedom to choose the hypervisor that is best for a particular need. The Nutanix Enterprise Cloud OS with Calm enables applications and data to leverage multiple hypervisors and public clouds, incorporating features for cross-hypervisor backup, disaster recovery, and migration. The Nutanix Foundation tool allows your IT team to automatically install the hypervisor of your choice on a Nutanix cluster, or perform in-place hypervisor conversions with minimal disruption.

Virtualization Economics

Given the tightness of IT budgets and the growing demands on IT to move faster, it simply makes sense to look at the overall economics of virtualization in your datacenters and take action to reduce or eliminate the hard and soft costs of traditional enterprise virtualization.

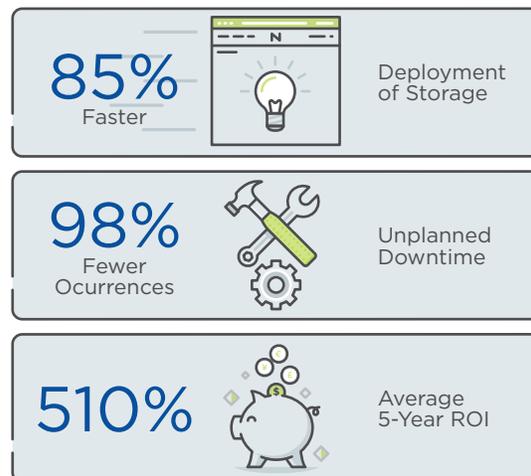
If you're a current VMware customer, you already understand VMware's hard costs. AHV delivers an up to 80% cost reduction versus traditional virtualization technologies such as VMware; Nutanix Enterprise Cloud Platform delivers as much as a 60% cost reduction versus traditional infrastructure. These are statistics that don't account for the additional savings from removing the other vStack of applications(vROPs, vRA, etc) and yet are still hard to ignore.



When you factor in the soft costs due to the complexity and inefficiency as described earlier in this paper, the argument for going “all in” with Nutanix and AHV becomes even more compelling.

- **More than Virtualization Management.** The broader Nutanix Prism management provides features and functions for performance management and operational insight that are only possible through additional vSphere management products.
- **Design/Implementation/Support.** Out-of-the- box availability and auto-scaling simplifies the design and implementation of the AHV environment. Support costs are included as part of the overall Nutanix Enterprise Cloud Platform.
- **Ongoing Administration Expense.** Fewer moving parts and end-to-end integration ensures that all your hardware and software works together. One-click operations save time and reduce the need for arcane storage, virtualization, and networking expertise. One-click upgrades eliminate one of the major pain points of datacenter management.
- **Superior Security Footprint.** Overall smaller software footprint based on a secure development lifecycle that is shipped hardened from factory with built in remediation.
- **Software Licensing Costs.** AHV is included with Nutanix for no additional cost.
- **Freedom of Choice.** Choosing Nutanix provides the optionality to choose based on business need and reduces vendor bias towards any specific cloud solution.

A recent IDC study found that Nutanix Enterprise Cloud Platform deployments were 85% faster, had 98% less downtime, and delivered a 5-year return on investment of 510%.



The AHV Difference

AHV offers a superior virtualization experience in every dimension. Nutanix eliminates the need for many common tasks or reduces them to intelligent, one-click operations. By integrating virtualization, infrastructure, and operations management with a single intuitive interface, manageability is greatly improved. Virtualization teams find it easy to learn and transition to from VMware or other virtualization solutions. Nutanix hyperconverged infrastructure scales easily with no surprises, with a self-healing design that reduces the urgency of hardware failures. Hypervisor resiliency features, including high availability and dynamic scheduling are included at no additional charge, and security is integral to every aspect of the system from the ground up. Nutanix also provides the operational intelligence and predictive analytics capabilities needed to troubleshoot problems and streamline infrastructure planning.

This all adds up to greater flexibility and greater choice. When you factor in the elimination of virtualization licensing and management tool costs along with significant improvements in both CapEx and OpEx, the benefits to your business are clear.

To learn more about Nutanix Enterprise Cloud Platform and AHV virtualization, contact us at info@nutanix.com, follow us on [Twitter @nutanix](https://twitter.com/nutanix), or send us a request at www.nutanix.com/demo to set up your own customized briefing and demonstration to see how validated and certified solutions from Nutanix can help you build your Enterprise Cloud.

Stay engaged with Nutanix experts and customers on the Nutanix Next online community (next.nutanix.com).

AT-A-GLANCE BENEFITS		
	Nutanix with AHV	vSphere
Manageability	Single interface for virtualization, infrastructure, operations and orchestration/automation.	Multiple tools and separate products needed
Scalability	Linear scaling of performance and capacity	Complex scaling using traditional infrastructure model
Resiliency	Self-healing; Hypervisor HA and dynamic scheduling included	Dependent on license tier and hardware; hypervisor resiliency and DRS adds cost and complexity
Analytics	Included	Add-on
Security	Built-in	Complex configuration
Flexibility & Choice	Multi-hypervisor; Multi-Cloud	Vendor lock-in; Cloud Bias



Nutanix makes infrastructure invisible, elevating IT to focus on the applications and services that power their business. The Nutanix enterprise cloud platform leverages web-scale engineering and consumer-grade design to natively converge compute, virtualization and storage into a resilient, software-defined solution with rich machine intelligence. The result is predictable performance, cloud-like infrastructure consumption, robust security, and seamless application mobility for a broad range of enterprise applications. Learn more at www.nutanix.com or follow us on [Twitter@nutanix](https://twitter.com/nutanix).

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Your Enterprise Cloud Platform