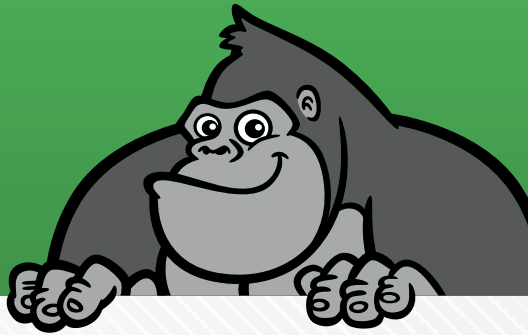


THE
GORILLA
GUIDE TO...®

EXPRESS EDITION



AMD and Nutanix Solutions to Best Run Your Applications in a Hybrid Cloud Environment

Larry Miller, James Green
& Brian Cox

Inside the Guide

- Get insight into the technologies that enable digital transformation
- Realize the value of hybrid cloud infrastructure in obtaining the scalability, performance, and security features for critical business applications
- Learn how several leading companies used hybrid cloud technologies to drive growth and meet operational goals

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Express Edition

By Larry Miller, James Green & Brian Cox

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ENTERING THE JUNGLE

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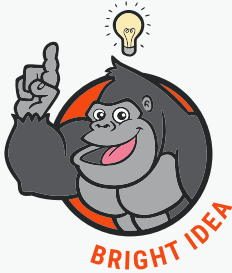
CALLOUTS USED IN THIS BOOK



The Gorilla is the professorial sort that enjoys helping people learn. In the School House callout, you'll gain insight into topics that may be outside the main subject but are still important.



This is a special place where you can learn a bit more about ancillary topics presented in the book.



When we have a great thought, we express them through a series of grunts in the Bright Idea section.



Takes you into the deep, dark depths of a particular topic.



Discusses items of strategic interest to business leaders.

ICONS USED IN THIS BOOK



DEFINITION

Defines a word, phrase, or concept.



KNOWLEDGE CHECK

Tests your knowledge of what you've read.



PAY ATTENTION

We want to make sure you see this!



GPS

We'll help you navigate your knowledge to the right place.



WATCH OUT!

Make sure you read this so you don't make a critical error!



TIP

A helpful piece of advice based on what you've read.

INTRODUCTION

Welcome to The Gorilla Guide To...[®] (Express Edition) AMD and Nutanix Solutions to Best Run Your Applications in a Hybrid Cloud Environment. If you're struggling to manage a complex hybrid IT environment in a scalable, secure, and resilient manner, this book is for you. We live in an era of unprecedented opportunities for businesses who take advantage of modern technology. Digital transformation is driving innovation and change for entire industries and has enabled the global workforce to adapt to a challenging new world. Companies that have invested in modern technologies and embraced change are now well-positioned to compete in global markets in ways that were once unimaginable.

This Guide is for those fine folks that are responsible for the technologies that enable digital transformation in their companies. That group might include system administrators, database administrators, cloud architects, storage architects, security engineers, site reliability engineers (SREs), and IT decision makers of all sorts. Throughout this book, you'll get solid, actionable information to help you maximize the value of your hybrid cloud infrastructure by delivering scalability, performance, and security features for your critical business applications.

Exploring Use Cases Where Infrastructure Runs Your Applications

Whether in the energy industry, doing scientific research, providing financial services, running a major league sports operation, or just selling sourdough bread, the success and subsequent profits of today's businesses are largely dependent on how well they capitalize on available technology.

Every business-critical application requires infrastructure underpinnings, including compute, storage, and networking. When it comes to realizing the full potential of any contemporary business, having the right infrastructure in place can mean the difference between feast and famine. The right infrastructure saves time and money, which can be better invested elsewhere to deliver business value.

Modernizing Your Datacenter

Time is money. The ability to crunch data and process orders translates directly into dollars and cents for many businesses. It follows, therefore, that being able to perform those key tasks faster will lead to better results. Faster infrastructure equates to faster applications, which results in a highly efficient user experience that yields better business outcomes.

Traditional approaches to datacenter infrastructure can't keep up with the speed of business today. Managing separate silos for compute, storage, virtualization, and networking is too slow and requires too much IT specialization. Yesterday's infrastructure powerhouse has become today's boat anchor, thanks to rigidity in deployment. Extending legacy infrastructure today can be difficult and costly. The modern approach to infrastructure lets you bake flexibility and scalability into your environment, allowing you to stay agile, flexible, and current.

Companies need to invest in modern infrastructure that's capable of supporting the business needs of today as well as those that emerge in the future—infrastructure that's simple to provision, operate, and manage, yet flexible and scalable enough to support the innovations of tomorrow in a hybrid cloud model.



Hybrid cloud, in which organizations operate application environments that span both on-premises and one or more public cloud environments, is the world's most popular computing paradigm.

Running Any App at Scale

Business-critical software includes popular enterprise databases like Oracle, Microsoft SQL Server, SAP HANA, IBM DB2, MongoDB and PostgreSQL, as well as applications such as Microsoft Dynamics, SAP S/4HANA, Oracle Financials, Sage ERP, CommVault and many others.

Running these applications and workloads across complex, siloed infrastructure is inefficient and limits the performance and scalability needed to meet rapidly changing business demands. Nothing undermines—almost imperceptibly—business priorities quite like the insidiousness of inefficiency. Complexity is a notorious breeder of inefficiency and waste. It can lead to inordinate time spent “keeping

the lights on” rather than focused on more productive activities. Infrastructure built to give businesses an edge needs to feature a disarming level of outward-facing simplicity and ease of use. The efficiency that simplicity creates will pay serious operational dividends.

To improve efficiency, productivity, and customer experience, businesses need to run their mission-critical apps and workloads on a single platform that delivers unparalleled availability, performance, and simplicity across on-premises and hybrid cloud environments.

AMD EPYC™ CPUs operate on a philosophy of *choice without restriction*, making them the ideal complement for the Nutanix software layer that does the same. With up to 64 x86 architecture processor cores per socket, customers can choose the number of cores and sockets that meet their exact needs without sacrificing key features like memory and I/O. This enables industry leading VM capacity and helps to optimize cost. Examples of helpful sizing variations include:

- High core density, single socket systems to save money when you’re using applications with socket-based software licenses
- Right-sized VDI nodes with the ideal core count to memory ratio so you aren’t overpaying for CPU cores that just sit idle
- Lower core count data-centric nodes where I/O bandwidth and storage capacity are the stars of the show and CPU cores are not overprovisioned

Choosing AMD EPYC processors as the companion for Nutanix hyperconvergence allows you to leverage AMD EPYC CPUs high core counts per socket—up to 64 cores—coupled with an impressive number of I/O channels for native connectivity to storage. The result: Fewer hardware nodes required! Furthermore, single and dual socket systems integrated with Nutanix software are available from the likes of HPE, Lenovo and Dell so customers can optimize deployments in either 1U or 2U rack-height chassis options.

Making HCI a reality with AMD EPYC processors

Software-defined storage is the magic ingredient that gave rise to hyperconverged infrastructure (HCI). To perform well, the underlying hardware must be capable of high-speed I/O, have large memory bandwidth, and significant memory capacity. Conveniently, the AMD EPYC System on a Chip (SoC) architecture meets these needs by providing 128 PCIe® Gen 4 lanes, 8 memory channels per socket, and support for up to 4TB of memory per socket.



The Nutanix operating system, known as Acropolis, also maximizes performance by ensuring that applications and their associated data are placed on the same node in the cluster using a concept called data affinity. This helps avoid performance slowdowns due to having data stored across multiple nodes, forcing the application to constantly retrieve that remote data over the storage network.



In addition to improving performance by having applications and data on the same node, in certain cases having all related application VMs and their data on the same same node can save money with regards to application licensing fees.

Managing All Your Clouds

The hybrid cloud model has become the IT operating model of choice for enterprises around the world. But though enthusiasm for the hybrid model has been strong, most businesses still struggle to

fully adopt it. Among the reasons, according to the 2020 *Third Annual Nutanix Enterprise Cloud Index* by research firm Vanson Bourne, are:

- **Tools for managing mixed cloud environments so far have been scarce or immature.** However, experts say that the supply side of hybrid cloud management tools is “coming of age” in 2020, so significant improvements are likely to follow.
- **IT teams are short on in-house skills that bridge on-premises and public cloud technologies.** More than a third of respondents (37%) say their organizations lack the skills to manage hybrid cloud infrastructure, in part because the various cloud technologies work differently.
- **New cloud options complicate decision-making.** From public clouds extending into a customer’s IT environment to private clouds running in different locations, the widening array of offerings is causing IT pros to reevaluate their overall cloud strategies.
- **Changing privacy laws.** Stricter laws about where customer data can be stored have forced IT leaders to rethink where their existing workloads are allowed to run.

Running computing in on-premises and off-premises locations requires enterprises to invest in both private and public clouds, which ultimately become integrated with common management and security policies and enable application portability among them. Many global enterprises have taken the initial key steps to successfully running a hybrid cloud environment, including adopting HCI in their datacenters and decommissioning non-cloud-enabled datacenters in favor of private and public cloud usage.



Hyperconverged infrastructure is a software-defined combination of compute, storage, virtualization, and other ancillary services that form the basis of a robust infrastructure environment on which to run applications.

Respondents also reported running a mixed model of private cloud, public cloud, and traditional datacenter more often than any other model (26%), likely a stepping stone toward a fully integrated hybrid cloud environment. Their primary motives for modernizing their IT infrastructures include:

- Getting greater control of their IT resources (58%)
- Gaining the flexibility to meet dynamic business requirements (55%)
- Improving support for customers and remote workers (46%)
- Cutting costs (27%)

Better Together: The Nutanix+AMD Infrastructure Solution

Great solutions are built on great alliances. As you plan the next evolution of your technology infrastructure, consider the results of the powerful partnership between microprocessor thought leader AMD and hybrid cloud leader Nutanix. This combination yielded a meticulously designed and thoroughly tested infrastructure solution that delivers a flexible and scalable foundation for businesses to compete and succeed in a global market defined by agility and innovation.

From the bottom of the silicon silo all the way up the stack to security and orchestration, the AMD+Nutanix solution offers uncompromising security features and reliability while also delivering the scalability, performance, robustness, and ease of use required by modern businesses.

Nutanix Hybrid Cloud Infrastructure

The Nutanix hybrid cloud infrastructure leverages HCI, a technology that erases the barriers between CPUs, software-defined storage, hypervisors, and much more—and has proven transformational for thousands of organizations. This design is a foundational element of the AMD+Nutanix solution because, as you'll see, AMD EPYC processors and HCI are a match made in computing heaven.

A critical part of HCI is the software layer that gives business applications a place to actually run. For this, Nutanix provides the foundational Acropolis operating system (OS) software with its AHV hypervisor. This dynamic duo creates a 100% software-defined stack that integrates compute, virtualization, storage, networking, and security to power any application, at scale. Because it uses the same architectural approach as leading cloud companies such as Google, Facebook, and Amazon, there's truly no limit on the number of nodes you can have in a cluster. Even better, what you deploy today isn't what you're stuck with tomorrow. The nature of the solution means you can keep cycling nodes in and out as your replacement cycle dictates. No manual data migration and no forklifts necessary!

Rather than providing a piecemeal assembly of various infrastructure parts from different vendors requiring a small army of IT server, storage, networking, and security engineers, the Nutanix platform is a simple and fully integrated solution that can be managed by IT generalists. The management interface—called Prism—intelligently guides users to the most contextually relevant operations at any given time, and then presents them with one-click actions for routine tasks like provisioning, upgrading, and scaling various resources.

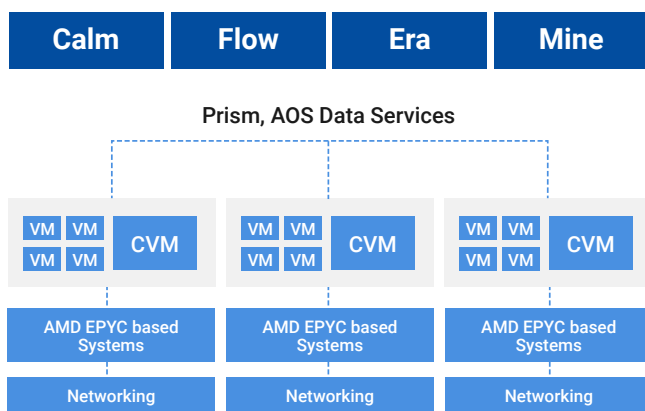


Figure 1: The Nutanix full-stack hybrid cloud infrastructure platform.

Building on the foundation of AHV and Acropolis, Nutanix supplies a rich suite of software for making infrastructure nearly effortless to manage and fundamentally secure, as shown in **Figure 1** and described in the following sections.

Super Easy Operation with Prism Management and Calm Orchestration

The Nutanix hybrid cloud infrastructure natively converges compute, storage, virtualization, systems management, and operations management into a turnkey platform that can be deployed in minutes to run any application out of the box. Nutanix offers powerful virtualization capabilities, including core virtual machine (VM) operations, live migration, VM high availability, and virtual network management, as fully integrated features of the infrastructure stack rather than as standalone products that require separate deployment and management.



The Nutanix solution has three primary product families—Acropolis, Prism, and Calm (see **Figure 2**).

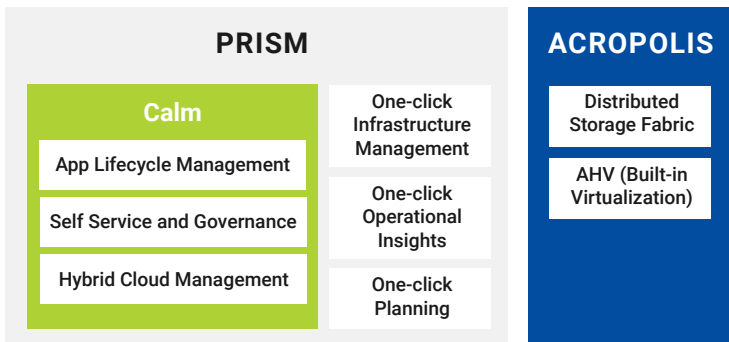


Figure 2: Nutanix Enterprise Cloud

Acropolis is the distributed data plane that provides storage, virtualization, backup, and disaster recovery (DR) services. Acropolis doesn't rely on a traditional storage area network (SAN) or network-attached storage (NAS) or expensive storage network interconnects. It combines highly dense storage and server compute (CPU and memory) into a single-platform building block. Each building block delivers a unified, scale-out, shared-nothing architecture with no single points of failure.

The Nutanix solution requires no SAN constructs, such as LUNs, RAID groups, or expensive storage switches. All storage management is VM-centric, and I/O is optimized at the VM virtual disk level. The software solution runs on nodes from a variety of manufacturers that are either all-flash for optimal performance, or a combination of solid-state drives (SSDs) and hard disk drives (HDDs) that provides both performance and additional capacity. The Distributed Storage Fabric (DSF) automatically tiers data across the cluster to different classes of storage devices using intelligent data placement algorithms. For best performance, algorithms make sure the most frequently used data is available in memory or in flash on the node local to the VM.

Prism is the centralized management solution for Nutanix environments. It provides central access for administrators to configure, monitor, and manage virtual environments in a simple and elegant way. Powered by advanced data analytics, and heuristics, and rich automation, Prism offers unprecedented simplicity by combining several aspects of datacenter management into a single, easy-to-use, one-click solution. Using innovative machine learning technology, Prism can mine large volumes of system data easily and quickly and generate actionable insights for optimizing all aspects of virtual infrastructure management. Prism is a part of every Nutanix deployment and has two core components:

- **Prism Element.** Prism Element is a service built into the platform for every Nutanix cluster deployed. It provides the ability to fully configure, manage, and monitor Nutanix clusters running

the supported hypervisors of Nutanix AHV, VMWare ESXi or Microsoft Hyper-V. Because Prism Element manages only the cluster it's part of, each Nutanix cluster in a deployment has a unique Prism Element instance.

- **Prism Central.** Prism Central allows you to manage different clusters across separate physical locations on one screen and offers an organizational view into a distributed Nutanix environment.

Nutanix Calm¹ supplies application automation and lifecycle management natively integrated into the Nutanix platform. With Calm, applications are defined via simple blueprints that can be easily created by generalists and control all aspects of the application's lifecycle, such as provisioning, scaling, and cleanup.



Once created, a blueprint can be published to end users through the Nutanix Marketplace, instantly transforming a complex provisioning ticket into a simple one-click request.

Calm's versatility makes it easy to maintain control over provisioned virtual workloads and applications through its centralized provisioning structure, governance, infrastructure, and application management capabilities. For example, administrators can use Calm to manage applications and associated VM life cycles through built-in orchestration processes for:

- Request
- Approval
- Provisioning

¹ <http://www.nutanix.com/products/calm>

- Management
- Scaling
- Reclamation
- Decommission



Orchestration is a set of processes that automates the configuration and management of various computing resources in order to improve operational efficiency, enhance the overall security posture, and enable faster time-to-market for new initiatives.

Highly Secure with a Minimal Attack Surface and Flow Microsegmentation

Data is your organization’s lifeblood. The safety of business data and that of your customers and users is a dominant concern today, and for good reason. Businesses of all shapes and sizes are under attack, as front-page headlines confirm on a frequent basis. Business-critical applications—which have their own security considerations—require infrastructure for which security is built in and applies across the environment.

Good security, however, can’t come at the expense of user experience or application performance. As you build a plan for your organization’s next infrastructure strategy, consider elements that don’t require outsized tradeoffs in either security or performance. Believe it or not, you can have it all! Ongoing developments in both hardware- and software-based security make this possible.

It’s impossible to overstate the criticality of security in today’s information-centric businesses. With boardroom-level scrutiny, all

aspects of the IT environment need to address this important element. To that end, AMD Infinity Guard² contains the industry's first dedicated security processor embedded in an x86 server CPU SoC (system on a chip). This unique processor manages secure boot, meaning that it checks the firmware it's loading against a known-good copy of that firmware to ensure it hasn't been compromised with malware. The chip also provides a memory encryption feature which requires no changes to applications. Moreover, AMD conducts protection checks when accessing the Translation Lookaside Buffer (TLB). If the protection check fails, AMD processors operate as if the memory address is invalid and no data is accessed from either the cache or memory. This occurs whether the access is speculative or non-speculative and can help protect against many side-channel attacks. Best of all, the encryption keys that secure everything never leave the system so they cannot be exposed to intruders via the network.



Unvalidated or poorly validated infrastructure patches are a key attack vector. The more discrete vendors and solutions you have in your hybrid environment, the greater the likelihood that something undesirable may slip through.

When it comes to security, a fully integrated stack of ingredients baked in brings incredible benefits. Customer-integrated systems from multiple vendors too often aren't tested together thoroughly, which increases their potential attack surface for intruders and makes them inherently more vulnerable to threats. The Nutanix platform is a fully integrated system that's security hardened by default "at the factory." This hardening model stands in stark contrast to the self-managed approach that DIY infrastructure often requires.

² All Infinity Guard features are not available on all AMD EPYC™ Processors. AMD Infinity Guard security features on EPYC processors must be enabled by server OEMs and/or Cloud Service Providers to operate. Check with your OEM or provider to confirm support of these features. Learn more about Infinity Guard at <https://www.amd.com/en/technologies/infinity-guard>.

Nutanix Flow³ delivers advanced network security, providing visibility into the virtual network, application-centric protection from network threats, malware, and ransomware, as well as security and compliance monitoring. Flow allows organizations to deploy software-defined virtual network security without the complexity of installing and managing additional products that have separate management and independent software maintenance requirements.

Flow's microsegmentation provides granular control and governance of all traffic into and out of a VM or groups of VMs. It ensures that only permitted traffic between application tiers or other logical boundaries can get through, and protects against advanced threats propagating within the virtual environment. As shown in **Figure 3**, Nutanix Flow differs from traditional perimeter firewalls by allowing network policy to be attached to VMs and applications, rather than to specific network segments (for example, VLANs) or identifiers (IP addresses).

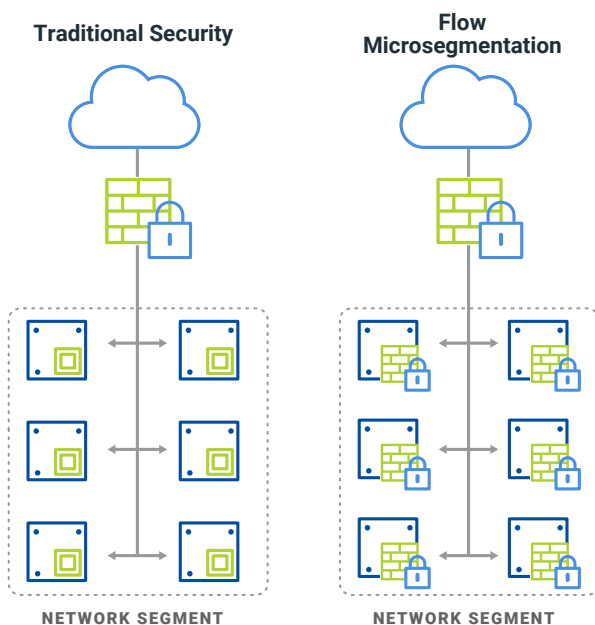


Figure 3: Traditional perimeter firewall security vs. Flow microsegmentation.

³ <http://www.nutanix.com/products/flow>

Which way is up?

Microsegmentation is used to control VM and intra-VM traffic, commonly referred to as East-West traffic, which restricts an attacker's ability to roam the jungle (your network, that is) freely in the event of a breach. In contrast, North-South traffic flows between two networks, such as a corporate network and the internet, and is usually protected by a traditional perimeter-based firewall.



Through centralized management via Prism, policies are auto-updated throughout the VM lifecycle, eliminating the burdens of change management.

Always-On Availability with Built-in Resiliency, Redundancy, and Quick Recovery with Era, Mine, and Leap

Nutanix Era⁴ automates and simplifies database administration. By combining the benefits of hyperconverged infrastructure with the flexibility and operational simplicity of database-as-a-service (DBaaS), Nutanix Era delivers the best of both worlds to enable one-click provisioning, patching, and creating clones or snapshots across multiple popular database engines. And it does so without the restrictions of single-vendor solutions that are database, cloud provider, or location or deployment-specific.

Nutanix Mine⁵ is a turnkey data protection solution that integrates with popular back-up products, including those from Veeam and

⁴ <https://www.nutanix.com/products/era>

⁵ <https://www.nutanix.com/products/mine>

Living a database administrator's dream

Customers around the world have simplified their database lifecycle management by standardizing processes using Nutanix's database-specific best practices and controlling operations through the single control plane provided by Nutanix Era. Across first-day operations, such as provisioning, and second-day operations, such as patching, backing up, restoring and copy data management, Nutanix Era increases availability, improves efficiency, and reduces time-consuming, error-prone manual operations.



HYCU. Mine is a comprehensive data protection and management solution that includes all the hardware and software components required to support any virtualized or legacy environment. It enables granular data recovery for mission-critical applications and a path to longer-term data retention solutions.

Nutanix Leap⁶ frees you from the complexity of managing a full-blown data center for disaster recovery. Instead, rely on flexible, cloud-based DR-as-a-Service (DRaaS). Leap DRaaS is natively integrated with Nutanix AOS making it a component of the larger hyper-converged infrastructure design. With Nutanix Leap, customers enjoy sizeable TCO savings compared to other disaster recovery solutions.

⁶ <https://www.nutanix.com/products/leap>

Putting It All Together: Case Studies

With a thorough understanding of the hardware and software potential in the Nutanix+AMD hybrid infrastructure, let's take a look at three real-world examples of how customers are taking advantage of this architecture.

Multinational Pharmaceutical Company

A large multinational pharmaceutical company is adding AMD EPYC™ based HPE ProLiant DX systems integrated with Nutanix cloud software. The primary interest in these AMD processor-based systems is the increased core count per socket to optimize database licensing costs. As a result, fewer hardware systems are required due to the higher core count processors. The application licensing costs are also reduced, thus freeing up more budget to be used on other IT projects or taken as a cost savings. These AMD EPYC™ based HPE ProLiant DX systems have the potential to be rolled out to the company's more than 350 global locations.

Global Healthcare Company

A global healthcare company is running numerous custom-built apps to deliver healthcare services for patients worldwide. These apps will be using databases from Microsoft and Oracle running on Microsoft Windows Server and Red Hat Linux. In addition, packaged applications such as OpenText Documentum and SAP are being considered

for deployment on the AMD EPYC processor-based infrastructure. The company's production site is expanding, and they needed to address capacity constraints to fulfill their business requirements. They were looking for a system that offers “bite-sized” infrastructure consumption, easy scale-out capacity, and a small form factor with more processor cores and non-volatile memory express (NVMe) capabilities. It was provided with the AMD EPYC processor-based systems running Nutanix software.

Fast-Growth Technology Startup Company

An innovative, fast-growth Silicon Valley startup company in the field of quantum computing is developing a purpose-built computer that relies on quantum mechanics. This will add a new dimension to a variety of industries, eliminating traditional computers and enabling organizations to exponentially increase their productivity.

The company began with a cloud-first strategy and is heavily utilizing public cloud services today. However, they quickly realized that hosting 90 % of their infrastructure in the public cloud was not optimal for them—from both a cost and operational perspective. Among the challenges the team faced were overprovisioning and managing the spikes in their cloud spend. There was a huge push at the executive level to move workloads out of the public cloud and stand them up on-premises to reduce future costs. The company began exploring a hybrid strategy and evaluated several solutions before choosing AMD EPYC processor-based infrastructure with Nutanix.

After showcasing the Nutanix+AMD platform, the company recognized that the simplicity and flexibility of the solution fits nicely with their growth and operational goals and enables them to achieve their vision for a hybrid cloud environment. The compact footprint of the solution reduces datacenter space needed for consolidation and allowed them to implement a hybrid strategy with 80% on-premises

infrastructure and 20% in the public cloud. AHV will be a huge cost savings and reduces multivendor management complexity. Prism Pro will enable the customer to understand their capacity runways and manage their environments with greater granularity, helping them scale appropriately for the future. They will also see a significant reduction in cost for files that were hosted in the public cloud by leveraging Nutanix Files. Finally, with Flow, they're now confident that their on-premises production workloads are secure and protected. They also loved the fact that clusters will be available for them to leverage down the road.

Call to Action

For more information, please visit www.nutanix.com/AMD. Take a free test drive and see for yourself how simple and easy it is for Nutanix to provision, manage, and expand infrastructure to power all your application needs. Just visit www.nutanix.com/one-platform to take it for a spin.

ABOUT NUTANIX



Nutanix makes infrastructure invisible, elevating IT to focus on the applications and services that power their business. The Nutanix Enterprise Cloud OS delivers the agility, pay-as-you-grow economics and operational simplicity of the public cloud, without sacrificing the predictability, security and control of on-premises infrastructure. Nutanix solutions leverage web-scale engineering and consumer-grade design to natively converge compute, virtualization and storage into a resilient, software-defined solution that delivers any application at any scale.

For more information, visit www.nutanix.com

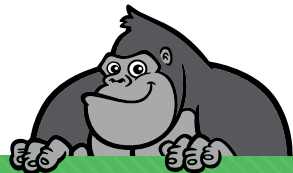
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ActualTech Media's team speaks to the enterprise IT audience because we've been the enterprise IT audience.

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