THE DEFINITIVE GUIDE TO

Enterprise Applications on Hyperconverged Infrastructure

NUTANIX™

ABOUT THE AUTHORS

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Philip Trautman has almost 25 years in the IT industry with a strong focus on storage and data management. He worked previously for Auspex Systems where he was the senior manager of technical support before becoming a technical marketing consultant. He has done extensive work for current and past industry leaders, including Alacritech, Auspex, Data Domain, LSI, Legato Systems, Microsoft, SGI, SUN Microsystems and others. Philip has authored numerous white papers, success stories, and other strategic and technical documents.

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1. A New Approach to Application Challenges

Despite a seemingly continuous stream of enhancements in IT hardware and software, the application challenges faced by datacenter infrastructure teams continue to mount. Most enterprises run a diverse set of business applications. Because each enterprise application has unique requirements for performance, availability, scalability, and management, the IT infrastructure—including virtualization—needed to meet the collective needs of all your applications can be both complex and expensive. And of course IT budgets rarely, if ever, keep pace with increasing business demands. That is why Nutanix has pioneered hyperconvergence and Invisible Infrastructure—a fundamentally different approach to enterprise application needs.

Key Infrastructure Challenges

Silos and Low Utilization: The silos of IT infrastructure required to meet unique application demands drive up direct capital costs. Because it's impossible to share resources across silos, utilization is often low. It's not uncommon to see servers operating at just 20% CPU utilization much of the time. Inefficiencies like that translate to more hardware to get the job done.

Operating expenses are high because of the complexity of deploying and managing siloed infrastructure and the power, space, and cooling required by all that "extra" equipment. Administrators focus too much time and effort worrying about infrastructure—and too little time thinking about application enhancements or additions that can help the business.

High Availability: Despite the known impact of application unavailability and data loss, the majority of business-critical applications are under protected or completely unprotected. Legacy data protection and DR solutions have failed to adapt to the needs of modern virtualized applications and infrastructure.

Multi-hypervisor Environments: The overall IT landscape isn't getting any simpler. Enterprise IT environments increasingly depend on multiple hypervisors. This adds to infrastructure complexity and overhead. According to IDC, more than 72% of enterprises in 2015 are using more than one hypervisor, up from 59% in 2014.

Cloud: Another recent IDC survey found that half the enterprises on Amazon Web Services were using cloud for traditional enterprise applications. Much of the new enterprise application development is focused on cloud-native development. It may not be obvious how to connect your current applications and infrastructure to the cloud.

To make the most of the cloud, you'll need on-premises infrastructure that spans both worlds—be able to accommodate both traditional enterprise applications as well as cloud applications and technologies—while facilitating your ability to move workloads and data back and forth.

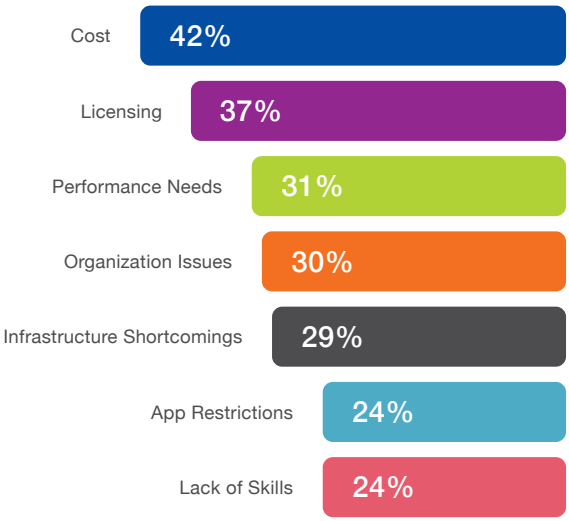


Figure 1:
Inhibitors faced when virtualizing enterprise applications (source: Nutanix survey on Virtualizing Enterprise Apps Q4/2014)

TIME FOR A BETTER ALTERNATIVE

With all these challenges, sometimes it's easy to forget that applications—not infrastructure—are the reason for IT in the first place. The truth is that traditional three-tier enterprise infrastructure—storage, storage networks, and servers—is increasingly ill-suited to meet the growing demands of enterprise applications and the fast pace of modern business.

In the last few years, hyperconverged, web-scale infrastructure has emerged as a better alternative. Taking cues from web giants like Amazon, Google, and Facebook, hyperconverged infrastructure combines x86-based compute and storage resources—including flash—with intelligent software to create flexible building blocks that eliminate many of the pain points of deploying and managing IT infrastructure.

Nutanix, a pioneer in web-scale infrastructure for the enterprise, takes hyperconvergence a step further with Nutanix Invisible Infrastructure. This approach eliminates the guesswork and removes the constraints of traditional infrastructure, allowing you to start small, get started quickly, and scale forever. Because Invisible Infrastructure just works, IT administrators are free to focus more time on enhancing their portfolio of enterprise applications and adding business value.

WHAT THIS eBOOK COVERS

This eBook takes a closer look at enterprise applications and explains how Nutanix Invisible Infrastructure adapts to meet application needs while eliminating silos and increasing resource utilization. The Nutanix Xtreme Computing Platform —with Acropolis and Prism technologies— eliminates the need for forklift upgrades, simplifies multi-hypervisor operations, and extends to the public cloud to support hybrid cloud operations.

2. Enterprise Application Requirements

Let's start by taking a closer look at the various types of applications that are typical in enterprise IT:

Tier 0 and Tier 1 Databases and Applications

Messaging and Collaboration

Custom Applications

Next-generation, Web-based Apps

Performance

Availability

Scalability

Manageability

Criteria for Infrastructure

TIER 0 AND TIER 1 DATABASES AND APPLICATIONS

These are the databases and associated applications that are mission critical to your organization. You probably rely on important databases such as Oracle, IBM DB2, and Microsoft SQL Server plus business software from leading companies such as SAP, Oracle, IBM, and Microsoft for financials, enterprise resource planning (ERP), customer relationship management (CRM), e-commerce and the like. Infrastructure requirements for these mission-critical applications are stringent.

Performance. Performance measured in transactions per minute (TPM) with low latency is the key for tier 0 and tier 1 applications. This means active data must be on flash media; cold data may still be stored on spinning disk.

Availability. Because these apps are mission critical, they require both regular backup (the more frequent the better) plus replication for disaster protection. Whether you need synchronous replication or can get away with asynchronous replication depends on your recovery point objective (RPO) and recovery time objective (RTO). Data protection and disaster recovery should align to the application rather than storage.

Scalability. These application workloads tend to grow rapidly in terms of total data, size of the active data set, and the compute needed to satisfy growing transaction requirements. No matter the resource being scaled, it's critical to be able to do so without downtime.

Manageability. Installation, deployment, and ongoing management for these applications can be a big headache. It shouldn't be a 6-month effort to put up new infrastructure, nor should it be necessary to optimize performance on an ongoing basis.

SHOULD YOU VIRTUALIZE YOUR TIER 0 AND TIER 1 DATABASES

Database administrators are increasingly turning to virtualization to consolidate datacenter footprint, control costs, accelerate provisioning, and deal with rapid performance and data growth. Studies have shown that modern hypervisors are very lean and don't significantly impede database performance when used in conjunction with today's multi-threaded, multi-core servers.

For virtualized database deployments, server and storage infrastructure must deliver performance and availability while remaining simple to deploy, manage, and scale. Nutanix Invisible Infrastructure can help you:

- Consolidate on a single converged platform with performance typical of local storage
- Remove storage complexity and reduce storage costs without giving up availability, scalability, and manageability
- Eliminate planned downtime and protect against unplanned issues for continuous availability
- Keep pace with rapidly growing business needs without big upfront investments or disruptive forklift upgrades

CUSTOM APPLICATIONS

The applications in this class—developed in Java, .NET and other languages—are considered important and are typically backed by relational database management solutions such as Microsoft SQL Server, MySQL, and PostgreSQL databases. As with tier 0 and tier 1 applications, these environments also include middleware for managing distributed applications.

Performance. Performance for this category can be measured in TPM, but there are also other application-specific metrics, and latency remains important. Active data is in flash. Flash capacity on remote hosts may be used if necessary to provide fast access to data.

Availability. These applications are typically business critical with 1 hour or greater RPO and RTO, making asynchronous replication the appropriate DR option.

Scalability. Application workloads grow over time in terms of total data, size of the active data set, and the compute needed. Scaling must be accomplished without downtime.

Manageability. Consolidation is typically the name of the game. Enterprises want to run these apps as densely as possible in a virtual environment while avoiding noisy neighbor problems.

Ready for Microsoft SQL Server 2005 End of Support?
Microsoft SQL Server 2005 reaches the end of extended support in April 2016 and support for Microsoft Windows Server 2003 has already ended. New server hardware will be needed by most organizations planning upgrades.

You should keep in mind that Microsoft has switched from "per-socket" to "per-core" licensing for SQL Server 2012 and 2014; this change can lead to a big increase in software licensing costs after upgrading. Evaluate your hardware choices carefully. If you can maximize CPU utilization, then you will reduce the total number of cores you have to license.

MESSAGING AND COLLABORATION

This class of apps includes Microsoft Exchange, SharePoint, Avaya, and others. Email and collaboration applications are critical to staff productivity and increasingly complemented by unified communication solutions such as Microsoft Skype for Business (formerly known as Lync).

Performance. Email/messaging and collaboration applications require adequate compute and storage performance. For example, Exchange database write latencies must be consistently below 20 milliseconds across the entire mailbox database.

Availability. Apps such as Microsoft Exchange are business critical, so ability to recover individual mailboxes and continuous access to the application, even if a site goes down, is highly desired. However, applications may have their own resiliency features such as the Database Availability Groups (DAGs) used by Exchange. Snapshots and asynchronous replication can be important in other cases such as reseeding.

Scalability. Messaging and collaboration applications grow steadily. Density and capacity are important considerations for accommodating large numbers of mailboxes and enterprise content repositories.

Manageability. The emphasis for these apps is simplifying management, including eliminating the need to optimize and rebalance storage and mailboxes on an ongoing basis.

Hosted and Hybrid Deployments with Exchange 2013 and Beyond

Small to midsized IT organizations are increasingly looking at managed and hybrid on-premises/cloud deployments using service providers. Managed environments leverage offerings from cloud service providers that specialize in hosted Exchange deployments. Choose a provider based not only on the cost, but also service levels, scalability, and security.

Hybrid Exchange deployments (possible with Exchange 2013 and later versions) give you the ability to extend administrative control to the cloud, providing the seamless look and feel of a single Exchange environment, but spanning on-premises Exchange and Exchange Online.

NEXT-GENERATION, WEB-BASED APPLICATIONS

Enterprises are increasingly focusing efforts on web-based application frameworks for development, often using NoSQL databases such as MongoDB and Cassandra. You will sometimes see this type of application referred to as software-as-a-service (SaaS) or as a twelve-factor app. These applications may use container technologies such as Rocket and Docker.

Performance. Performance is achieved by scaling out. Application instances are added dynamically in response to workload. This requires a flexible pool of resources from which to draw.

Availability. Resiliency is often built into the application. Multiple instances of each application service are spread across a cluster or across different locations.

Scalability. Applications are built to scale out by adding new instances in the form of additional virtual machines or containers.

Manageability. Management for web-based applications may require the ability to support virtualization and containers as well as cloud frameworks such as OpenStack.

Accelerate Application Deployment through Better Dev/Test

Development and testing are key functions for any enterprise application environment. Efficient development and test (dev/test) can help drive developer productivity, improve time to market, and have a direct impact on return on investment. For these reasons, dev/test is often the first place you should introduce new technologies in the datacenter.

Look for the ability to deliver efficient, high performance dev/test environments with private copies of production data to individual developers and QA teams to create, compile, and test the latest code. It may also be valuable to consider:

- Ease of deploying new test environments (e.g. self service portals)
- VM or application-centric cloning and replication
- Automation using REST APIs and PowerShell Commandlets
- Ease of insight into storage and VM performance

MEETING THE NEEDS OF ENTERPRISE APPLICATIONS

Wouldn't it be great if a single infrastructure could:

- **Meet the needs of a diverse set of enterprise applications**
- **Reduce IT costs**
- **Eliminate infrastructure complexity**
- **Increase application availability**
- **Scale performance and capacity without disruption**
- **Eliminate the need for planned downtime**

An infrastructure capable of doing all that would just purr along on its own, freeing up IT staff to focus on enterprise applications and respond to business needs. You might even call infrastructure capable of doing all that "invisible."

3. Introducing Nutanix Invisible Infrastructure

Hyperconverged infrastructure from Nutanix takes a different approach to enterprise storage and compute. In five short years, hyperconvergence has gone from being an outlier to gaining mainstream adoption by businesses of all sizes.

With most businesses embracing a hybrid cloud strategy, enterprise infrastructure must mirror the public cloud in terms of both how it is built and the experience it delivers. Nutanix Invisible Infrastructure makes that a reality, bringing cloud-like simplicity, agility, and scale to the enterprise datacenter.

MILESTONES IN THE JOURNEY TO INVISIBLE INFRASTRUCTURE:

Make Storage Invisible. Traditional storage and storage area networks (SANs) add a lot of complexity to your enterprise application environment. Most enterprises have multiple types of storage to address different application needs—each with its own management and its own idiosyncrasies. SANs add another layer of complexity with LUNs, zoning, masking, and so on.

Make Virtualization Invisible. While there are lots of good reasons to adopt multiple hypervisors in your datacenter—support for important applications, controlling license costs, and minimizing vendor lock-in are often mentioned—each hypervisor adds another layer of management complexity and another infrastructure silo that could reduce flexibility.

Make the Cloud Invisible. Finally, there's the cloud. You have to be able to connect your enterprise datacenter with public cloud services such as Amazon Web Services and Microsoft Azure, but each cloud is unique. And with multiple types of storage and multiple hypervisors, you're probably looking at significant headaches to make everything work together.

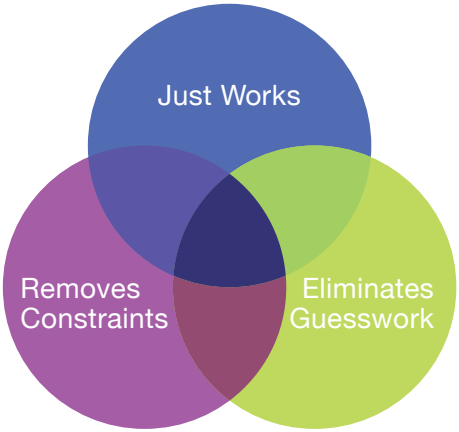
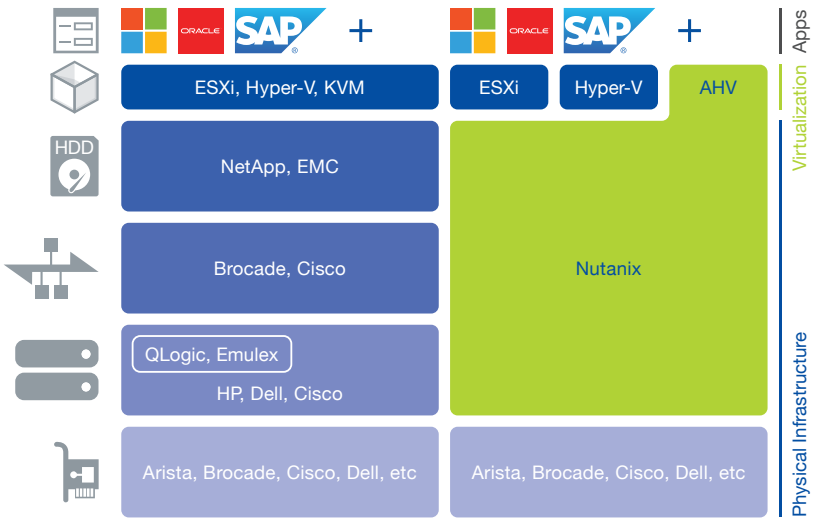


Figure 2:
Nutanix Invisible Infrastructure eliminates the complexity of traditional IT infrastructure, making it easier to purchase, deploy, and manage.

Nutanix Invisible Infrastructure excels in these areas. Nutanix Xtreme Computing Platform (XCP) makes storage and virtualization complexity invisible, and it is on a path to make the cloud invisible as well.

Figure 3:
Nutanix eliminates the complexity of three-tier infrastructure to make it invisible.



TEN REASONS TO DEPLOY ENTERPRISE APPS ON NUTANIX INVISIBLE INFRASTRUCTURE

Whether you are looking at refreshing your current business applications, servers and storage, or scaling to facilitate growth, Nutanix helps make your infrastructure invisible.

1. **Any Application at Any Scale.** Nutanix delivers predictable scaling with the economics of web-scale architectures. Run any application mix at any scale, on a single platform.

2. **Fast Time to Value.** Go from unboxing to running virtualized applications on your choice of hypervisor in an hour.

3. **Simplified Storage.** Eliminate the need for specialized skills, separate storage and complicated configuration, provisioning, and mapping with disks, RAID, and LUNs.

4. **Predictable Performance.** Deliver predictable storage performance without any complex configuration or tuning. Get optimal performance for critical apps right out of the box, even with multiple workloads.

5. **Built-in Resiliency.** Ensure that applications can always access data with no single point of failure, storage access failover, and ongoing data integrity checks.

6. **Application and Data Protection.** Integrate data protection and affordable and efficient disaster recovery. Schedule space-efficient snapshots and efficient replication over the WAN.

7. **Enhanced VM Cloning.** Create high-performance, space-efficient clones of VMs, and accelerate time to production with practical and efficient dev/test.

8. **Non-Disruptive Upgrades and Scaling.** Eliminate planned downtime with non-disruptive software updates and modular scaling. Maintenance windows for SW upgrades and scaling become a thing of the past.

9. **Virtualize Tier 1 Apps Without Risk.** Get deeper insight including trending, real-time analysis, proactive monitoring and root cause analysis, and alerting. Confidently deploy using validated designs and Nutanix enterprise services.

10. **World-Class Services and Support.** Nutanix Invisible Infrastructure is coupled with world-class support and a wide range of enterprise services.

4. Nutanix Xtreme Computing Platform

Nutanix XCP is a software-defined infrastructure that combines web-scale engineering with a consumer-grade user experience. At the heart of XCP is hyperconverged infrastructure that natively converges compute, storage, and virtualization into a turnkey solution. It was built using industry-standard platforms with state-of-the-art Intel processors, locally attached flash, and hard disk drives. XCP can also leverage all flash systems for cases requiring predictable low latency across the entire dataset.

XCP leverages Nutanix Acropolis and Prism, creating Invisible Infrastructure that eliminates infrastructure complexity for a simpler, more uniform environment. IT teams focus on managing enterprise applications, not wrestling with infrastructure.

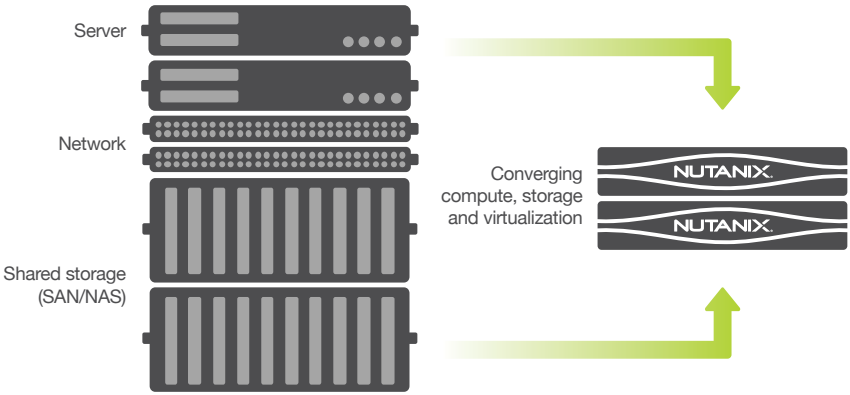


Figure 4:
Nutanix natively converges storage, compute, and virtualization on a single 100% software-defined platform

Web-Scale and Consumer-Grade?

Nutanix XCP brings capabilities similar to Amazon, Facebook, and Google to the enterprise datacenter. That's why users consider the technology "web-scale" and "consumer-grade."

Web-Scale

Cloud leaders replace expensive, proprietary storage, networking, and servers with uniform building blocks that are inexpensive, flexible, and—with the right software—highly scalable. XCP adopts the same approach, allowing you to scale from a few servers and a few terabytes of storage to thousands of servers and petabytes of storage.

Consumer-Grade

Once upon a time, consumer-grade meant "not enterprise ready". The cloud has turned this upside down. Consumer-grade is now synonymous with simple, bullet proof, intuitive, and easy to use. As Paul Maritz (current Pivotal CEO and former VMware CEO) wrote for GigaOm Research, "The former lightweight is the new heavyweight. Consumer-grade will become the new benchmark."

BENEFITS OF NUTANIX XCP

Business

- Lowers TCO by 40% to 60%
- Increases datacenter efficiency
- Reduces cost and complexity of virtualization
- Enables pay-as-you-grow model

Technical

- Simplifies infrastructure with a single software stack
- Drives maximum performance for the most demanding applications
- Scales compute, storage and virtualization more efficiently
- Eliminates the complexity of managing separate storage and SANs

HETEROGENEOUS SCALING ELIMINATES FORKLIFT UPGRADES

XCP offers a rich set of x86-based building blocks that can be deployed in an XCP cluster as needed to meet the performance and capacity needs of your enterprise applications. XCP hardware includes compute-rich, all-flash, and capacity-heavy platform options.

Different types of Nutanix nodes can be mixed in a single cluster for heterogeneous scaling. Because you can add new nodes and transparently migrate workloads and data off older nodes to retire them, an XCP cluster can run forever. You never need a forklift. Planned downtime and painful technology refreshes are avoided—as are late nights and long weekends in the datacenter.

Nutanix Community Edition
Community Edition is a 100% software solution enabling you to easily evaluate the latest Nutanix technology at zero cost on your own hardware. Experience the full functionality and consumer-grade simplicity of XCP—including Acropolis and Prism—with any workload on up to four servers using a broad range of supported hardware.

Sizing with Nutanix

The Nutanix Sizing Tool recommends the right Nutanix products for your environment and applications. Simply input your requirements to get the "best fit." You can:

- Size based on popular applications like VDI, Exchange, SQL Server, and Server Virtualization
- Visualize homogeneous and heterogeneous mixed workloads in racks and clusters
- Model various "what-if" scenarios for predictable, on-demand scaling

FLEXIBILITY OF MANY WITH THE SIMPLICITY OF ONE

XCP platforms give you a great deal of configuration flexibility. Each platform can be configured in order to meet specific needs and requirements for memory, cores, disk, and flash. The Nutanix Sizer converts your requirements into an appropriate configuration, making XCP hardware simple and easy to consume, and allowing Nutanix to deliver the flexibility of many with the simplicity of one.

NUTANIX XCP ARCHITECTURE

XCP has two foundational software components:

Nutanix Acropolis. The turnkey software foundation for delivering storage, compute, and virtualization services.

Nutanix Prism. An integrated management platform delivering one-click simplicity for all infrastructure operations.

The following chapters look at Acropolis and Prism in more detail.

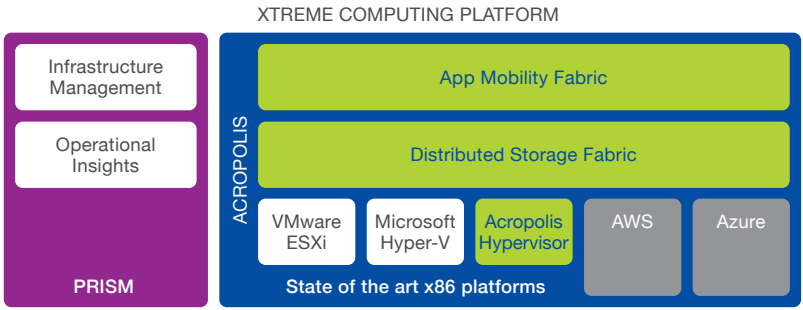


Figure 5: Nutanix XCP has two components: Nutanix Acropolis and Nutanix Prism running on state-of-the-art x86 platforms

5. Nutanix Acropolis

Nutanix Acropolis delivers enterprise-class storage, compute, and virtualization services for enterprise applications. The key innovations in Acropolis, including its Distributed Storage Fabric and App Mobility Fabric, deliver the performance, availability, scalability, and manageability that enterprise applications need.

Acropolis offers a new level of flexibility in terms of where and how you run applications. You are free to choose the best virtualization technology for each enterprise application—traditional hypervisors, emerging hypervisors, or containers. Infrastructure decisions can be made based on the performance, economics, scalability, and resiliency requirements of each application.

Acropolis consists of three main components: a Distributed Storage Fabric, an App Mobility Fabric, and the Acropolis Hypervisor. These let you run enterprise applications at any scale with:

- Integrated management of physical and virtual infrastructure
- End-to-end operations
- Unfettered application mobility
- Up to 80% lower virtualization costs

MAKING STORAGE INVISIBLE

The web-scale Distributed Storage Fabric (DSF) delivers enterprise data storage as an on-demand service using a shared-nothing distributed software architecture. Nutanix DSF pools local flash and hard disk drive storage and exports it out to the virtualization and application layer, eliminating the need for SAN and NAS. Hypervisors, VMs, and applications get access to VM-centric, software-defined services, including replication for high availability and disaster recovery, VM snapshots, clones and more. DSF also includes native support for deduplication, compression, and erasure coding.

For more information on the Nutanix architecture including details on how Nutanix delivers excellent random storage I/O performance, read the Nutanix Bible (www.nutanixbible.com).

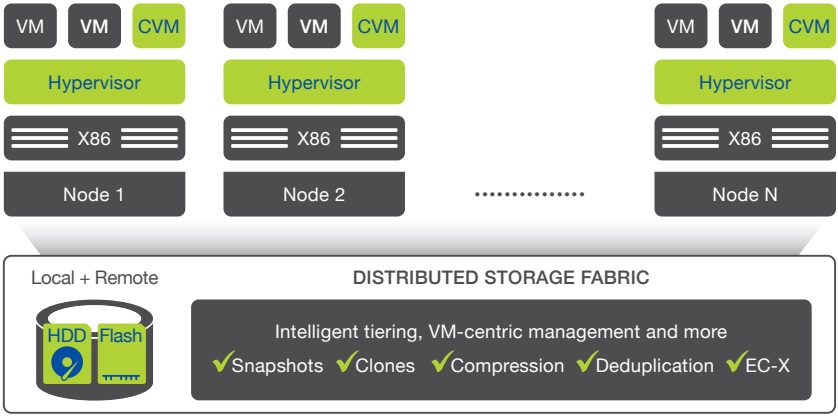


Figure 6:
Nutanix leverages a web-scale architecture to create a VM-centric Distributed Storage Fabric

Erasure Coding

Like our web-scale cloud brethren, Nutanix recognizes that RAID hasn't stood the test of time. Instead, Nutanix systems rely on a user-selectable Replication Factor (RF), creating either 2 or 3 data copies across a cluster. Checksums ensure data redundancy and availability.

Nutanix erasure coding (EC-X) extends the benefits of tunable RF while greatly reducing the extra capacity needed to store cold data. EC-X works by creating a mathematical function around a data set such that if a member of the data set is lost (up to entire nodes), the lost data can be recovered easily from the other members.

EC-X can take capacity utilization to 80%. Unlike savings from deduplication and compression, EC-X applies to pretty much all cold data across all workloads; the savings are therefore deterministic.

These capabilities simplify data management, protect availability of critical applications and data, and reduce the amount of total storage capacity you need through data reduction and increased efficiency.

With software-defined intelligent tiering, application/VM data is automatically tiered between (1) local flash, (2) remote flash, (3) local disk drives, and (4) remote disk drives. Frequently read data is deduplicated and cached into RAM and local flash, and data is always written to a distributed flash-based storage buffer called OpLog. This ensures that critical applications, such as transactional tier 1 Oracle and SQL Server databases, receive excellent random storage read/write performance. For analytics databases, intelligent tiering ensures excellent sequential read/write performance using both flash and disk drives for very large datasets.

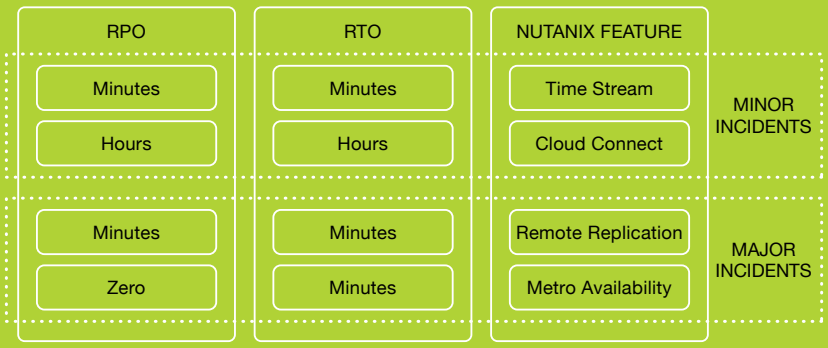


Figure 7:
Nutanix XCP offers a variety of options to meet your RPO and RTO needs

Nutanix Data Protection and High Availability

Nutanix offers a range of integrated VM-centric data protection options to help you meet enterprise application SLAs in the event of component failure, node failure, rack failure, or an entire datacenter outage.

You can back up VMs and applications locally to a Nutanix system at a remote site, or to a public cloud service provider. Nutanix Prism simplifies backup management by giving you centralized control of backup policies for multiple sites.

For disaster recovery, choose from asynchronous or synchronous replication. By compressing and deduplicating data before it is sent over the wire, these technologies reduce storage footprint and network bandwidth by as much as 70%.

For critical workloads requiring zero RPO, and RTO measured in minutes, Nutanix offers Metro Availability, which uses synchronous replication to ensure continuous data availability across different sites during planned maintenance or disasters. Metro Availability greatly simplifies disaster recovery without having to rely on secondary solutions.

Additionally, Nutanix eliminates the need for planned downtime for tasks such as software upgrades and scaling. These tasks are non-disruptive in nature and require little to no action on the IT administrators' part outside of triggering the upgrade/scaling action.

As you'd expect from Nutanix, we've decreased the complexity and increased the effectiveness of enterprise data protection. Check out the Nutanix Solution Note, Data Protection and Disaster Recovery, for details.

MAKING VIRTUALIZATION INVISIBLE

The Nutanix App Mobility Fabric is an open environment capable of delivering intelligent VM placement, VM migration, and VM conversion across hypervisors and—in the future—clouds. It also provides cross-hypervisor replication for high availability and disaster recovery. Acropolis supports all virtualized applications and will provide a seamless path to hybrid cloud computing.

The App Mobility Fabric provides a layer of virtualization on top of existing hypervisors, simplifying management in multi-hypervisor environments and eliminating the risk of vendor lock-in. VMware vSphere, Microsoft Windows Server with Hyper-V, and Nutanix Acropolis Hypervisor are all supported. It allows you to easily move running VMs between nodes in a cluster and to convert existing VMs to run on other hypervisors.

NUTANIX ACROPOLIS HYPERVISOR

While the Distributed Storage Fabric fully supports hypervisors such as VMware ESXi and Microsoft Hyper-V, Acropolis also includes a native hypervisor built for VM-centric infrastructure. With enhanced security, self-healing capabilities based on SaltStack, and enterprise-grade VM management, Acropolis Hypervisor delivers the best overall user experience at the lowest TCO. The Nutanix Acropolis Hypervisor is certified by Microsoft under its SVVP program for SQL Server, Exchange, SharePoint and more; Citrix for XenApp, XenDesktop, ShareFile, NetScaler VPX, and more; SUSE; Canonical; CentOS; and others to supports a rich ecosystem of guest VMs and applications.

SECURING THE VIRTUALIZATION LAYER

The Acropolis Hypervisor is hardened to meet the most stringent enterprise security requirements. It utilizes the principle of least privilege and delivers a true defense-in-depth model. Acropolis leverages SaltStack to self-heal any deviation from the security baseline configuration of the OS and hypervisor. The custom security baseline (security technical implementation guide, or STIG) exceeds the requirements of the U.S. Department of Defense.

Nutanix STIGs eliminate the grey area that normally comes with security. Anytime you need to check compliance you can simply run the STIG reports. Using automation embedded in XCP, a system can be put into compliance quickly. You can reduce the time it takes to meet compliance or regulatory standards for security from 9-12 months to just 20 minutes with the intrinsic hardening properties of the Nutanix development lifecycle.

Figure 8:
Nutanix Acropolis Hypervisor boasts a rich ecosystem of partners and solutions

6. Simplifying Management

Nutanix Prism gives administrators an easy way to manage Nutanix environments from end to end. Prism is powered by proprietary algorithms to trend and mine large volumes of system data and provide insights to optimize infrastructure and guest VMs and applications; it combines several aspects of datacenter management into a single consumer-grade solution.

Prism is designed for an uncluttered experience with an intuitive user interface that simplifies and streamlines common datacenter workflows, eliminating the need to have different management tools for different tasks. For enterprise applications such as databases, Prism provides a simplified representation of the infrastructure stack, allowing IT infrastructure and database administrators to get easy access to actionable data such as performance, latency, and related events. Prism enhances admin productivity through features such as:

Instant Search: Integrated "Google-like" search experience lets you query and perform actions quickly.
Customizable Operations Dashboard: Visually rich dashboards give you an at-a-glance summary of application and infrastructure state.
One-Click Design: Infrastructure management, operational insights, and problem remediation are just a mouse click away.

ONE-CLICK INFRASTRUCTURE MANAGEMENT

Prism manages your entire infrastructure stack all the way up to virtual machines (VMs) including:

Cluster Management: Streamlined deployment, maintenance, and scaling of a Nutanix system with a single click.
Virtual Network Management: Simplified set-up and management of virtual networking for hosts and virtual machines/applications.
VM Management: End-to-end management of VMs from creation and initial placement to high availability and migration.
Storage Management: Intuitive VM-centric control of storage services from a single pane of glass.

ONE-CLICK OPERATIONAL INSIGHT

Today, Prism provides one-click insight to simplify routine operational tasks including:

Capacity Trending: Predictive analysis of capacity usage and trends based on workload behavior. It's an ideal feature to track fast growing applications requiring constant infrastructure scaling.
What-if Analysis: Proactive modeling of infrastructure scenarios to support new applications and business initiatives.
Root Cause Analysis: Identify root cause and resolve infrastructure issues quickly with deep insight to performance metrics and general events.
Proactive Alert Analysis: Proactive analysis and isolation of alerts to display fewer, more actionable alerts.

Nutanix continues to enhance Prism functionality to provide further detailed insight and trend analysis for the future.

COMPLETE INTEGRATION

Nutanix offers Acropolis REST APIs and corresponding Windows PowerShell Commandlets for comprehensive integration. With Commandlets, you can leverage expertise in PowerShell to configure and manage Nutanix clusters running Windows, ESXi and Hyper-V. You can also use these interfaces for orchestration and automation with:

- Configuration management tools including Chef and Puppet
- Orchestration tools including Microsoft System Center Orchestrator, VMware vCenter Orchestrator, and BMC Atrium Orchestrator
- Customized scripts

7. Invisible Infrastructure and the Cloud

Enterprises are looking for the best ways to take advantage of the cloud to reduce costs and increase agility. Whether you're backing up to the cloud, using it for DR, or moving enterprise applications into the cloud, your on-premises infrastructure decisions must be made with the cloud in mind. Complex infrastructure will hamper your efforts and affect results. Nutanix Invisible Infrastructure accelerates your path to the cloud.

More than 65% of Enterprise IT teams are planning to leverage a hybrid cloud architecture to meet future data and application needs. Nutanix enables hybrid cloud by seamlessly integrating cloud services with your Nutanix infrastructure.

CLOUD CONNECT

Nutanix Cloud Connect lets you use public clouds as a long-term backup destination for all types of workloads. Cloud Connect, together with asynchronous and synchronous replication, extends your datacenter boundaries to include the public cloud and cloud service providers.

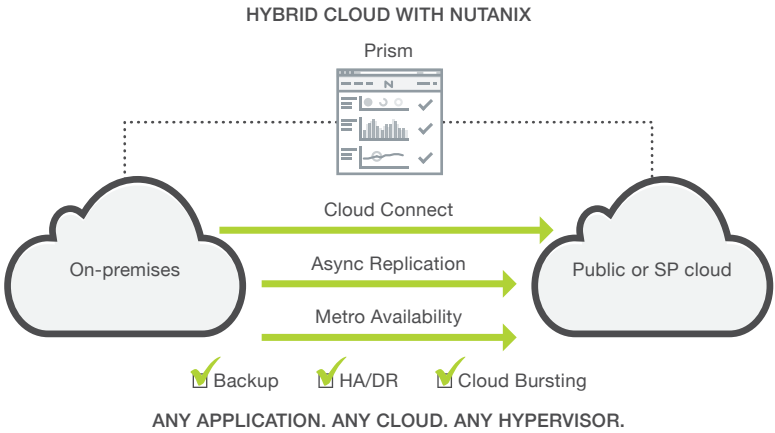


Figure 9:
Nutanix XCP makes it easy to create a hybrid cloud environment

WHICH APPLICATIONS SHOULD YOU RUN IN THE CLOUD

Enterprise apps fall into one of two categories: elastic or predictable. Elastic applications have resource consumption patterns (compute, memory, bandwidth) that vary widely over time – e-commerce is an obvious example. Resource consumption for predictable applications, on the other hand, stays within a relatively narrow range with uniform growth.

A recent survey of enterprise IT organizations conducted by Nutanix found that roughly 75% of enterprise applications were predictable and 25% were elastic. Whatever the mix is for your organization, predictable applications are best run on your own infrastructure, while elastic applications are best run in service provider or public clouds where they can access all the resources they need during bursts of activity.

This guideline is really just common sense. For example, if you go to Hawaii for 10 days, then you stay in a hotel. If you go for 10 months, then you lease. If you go for 20 years, then you buy.

8. Getting Started

We hope you're intrigued by the possibilities that Invisible Infrastructure offers for enterprise applications—including Oracle databases and applications; SAP applications; and Microsoft SQL Server, Exchange, and SharePoint.

Nutanix XCP replaces the complexity of separate servers, storage, and storage networks with web-scale building blocks that eliminate silos of infrastructure, increase resource utilization, and scale into the future without wholesale replacement.

Nutanix Acropolis brings together all the storage, compute, and virtualization services needed to support your enterprise applications with predictable, scalable performance, a full suite of data protection services including asynchronous and synchronous replication, compression, deduplication, and much more. It lets you move applications seamlessly between nodes—and between hypervisors. You choose the hypervisor that best meets your needs, whether it's VMware vSphere, Microsoft Hyper-V, or Acropolis Hypervisor, with the freedom to migrate from one to another as needs change.

Nutanix Prism delivers a superior management experience with consumer-grade design that lets you accomplish complete infrastructure and virtualization management, gain access to operational insights, and fix problems with a single click.

If you're ready to give Invisible Infrastructure a try for your enterprise applications, Nutanix Community Edition lets you run Nutanix software on your own hardware at no cost.

WHEN IT IS TIME TO CHANGE

It should come as no surprise that we've put a lot of thought into figuring out the best ways for you to move to Invisible Infrastructure.

Understanding Your Current Environment:

The process starts with a full understanding of your current environment including:

- Application-specific metrics: Gather the steady state statistics and trends for each application to be moved as well as working set size, execution times for any batch processes, and average and peak transactions per second.
- Infrastructure-specific metrics: Gather appropriate specifications, utilization, and capacity for server CPUs and memory, networks, and storage. Also gather performance metrics, latency, throughput, etc.
- Mapping everything to service owners: Accountability is a key success factor.

Sizing the New Environment:

With the above information in hand, you can accurately size your new environment. Nutanix Sizer makes this task straightforward, but keep these guidelines in mind:

- The working set requiring low latency access should fit into the flash tier
- Always factor in HA for both compute and storage
- Additional infrastructure and/or additional clusters may be required based on the following considerations:
  - Business: SLAs, licensing, security, budget, politics
  - Technical: Locality, cache amplification, traffic patterns, affinity

Planning the Migration:

Follow Nutanix application-specific best practices and guidelines and be sure to use Nutanix, partner, and native tools such as Storage vMotion when possible.

Validating the New Environment Post Migration:

Compare current metrics to sizing metrics.

Naturally, Nutanix Global Services can help you with any or all of these steps to put you on a path to greater infrastructure success.

Ready to learn more about Invisible Infrastructure for enterprise applications? Contact us at info@nutanix.com, follow us on Twitter @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 your organization make the most of its enterprise applications.

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

Nutanix delivers Invisible Infrastructure for next-generation enterprise computing, elevating IT to focus on the applications and services that power their business. The company's software-driven Xtreme Computing Platform natively converges compute, virtualization and storage into a single solution to drive simplicity in the datacenter. Using Nutanix, customers benefit from predictable performance, linear scalability and cloud-like infrastructure consumption. Learn more at www.nutanix.com or follow us on Twitter @nutanix.

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