7 Reasons to Migrate from NetApp 7-Mode

NUTANIX™

Introduction

We are seeing a fundamental shift in the datacenter from legacy architectures that are overly complex, difficult to scale, and costly to purchase to modern datacenter architectures that are simple to deploy, easy to scale, and built on commodity hardware with intelligence in software. Over the last several decades, the incumbent storage vendors have built significant businesses around legacy architectures. But over the last few years, ` service providers like Amazon, Google and Microsoft have changed expectations on how modern datacenters should operate.

Business units are now expecting IT services to be delivered with a self-service, on-demand consumption model. However, most IT organizations are handcuffed by the limitations of legacy architectures that are unable to support rapid elastic scalability and fractional consumption of resources. Proprietary hardware, physical storage controllers, multiple data stores, resource silos, high costs, and complex time-consuming deployments simply cannot deliver the agility of software-defined cloud computing.

NetApp, who has been developing NAS/SAN storage systems for over 23 years, is now forced to significantly evolve its product offerings to address the needs of next generation datacenters. Thus far, they have been largely unsuccessful because their approach has been to continue to put band-aids on storage software that supports legacy architecures rather than build a new platform that takes a fresh and innovative approach to addressing the needs of next generation datacenters. As a result, NetApp customers have been looking elsewhere. New and emerging players, including Nutanix, are disrupting the traditional storage industry by focusing on real customer problems and delivering innovation through new platforms built in the era of virtualization, flash, and cloud computing.

Nutanix brings the same web-scale technologies and architectures that power leading Internet and cloud infrastructures, such as Google, Facebook, and Amazon and makes them available to enterprises in a simple turnkey appliance that can be deployed in minutes to run any application out of the box.

A Little NetApp History

NetApp started out with a single storage operating system and continued to evolve that platform over the last 20 years. The platform supports a shared storage architecture and was designed to provide storage to applications running on many physical servers, long before server virtualization. This operating system is known as Data ONTAP. Today the legacy version of this OS is referred to as Data ONTAP 7-Mode (or simply 7-Mode). Not only is 7-Mode still around, 83% of NetApp's current Fabric Attached Storage (FAS) install base is running 7-Mode (source: NetApp Q1FY16 earnings call).

Within the last decade we saw a fundamental shift in the datacenter from bare metal servers to server

virtualization. The software architecture behind 7-mode was not designed to effectively deal with server virtualization. It was also difficult to scale and the addition of one isolated storage array after another created infrastructure silos and additional complexity within larger datacenters. NetApp recognized these issues early on and in 2004 acquired Spinnaker Networks, a start-up that specialized in scalable system architectures, distributed file systems, clustering technologies, and virtualization. At the time of acquisition, the SpinOS supported both NFS and CIFS and could cluster up to 512 servers and over 11 PB in a single global file system. Following the acquisition, NetApp created a new operating system called Data ONTAP GX (which was supposed to be a combination of key scale out features of SpinOS and traditional Data ONTAP capabilities) and then spent the next decade bringing GX up to feature parity with its legacy operating system Data ONTAP 7-Mode.

The problem with GX is it never really delivered on the vision of a highly scalable distributed storage platform. In today's version, there is no global distributed file system, only a distributed namespace. It uses a paired node approach and traditional hardware RAID to provide data redundancy and high availability. It can only scale to a maximum of 4 HA pairs for SAN and 12 HA pairs for NAS deployments.

In 2010, NetApp merged Data ONTAP 7G and GX into a single operating system, Data ONTAP 8, which shipped with two distinct operating modes: 7 mode and cluster mode. Cluster mode became known as Clustered Data ONTAP or cDOT.

At this point we were in the middle of the next major fundamental shift in the datacenter - the transition from magnetic spinning disks (HDDs) to flash memory based solid state drives (SSDs). Traditional storage operating systems were ill prepared for flash and now had to worry about things like garbage collection and wear leveling. Many storage controllers and storage fabrics couldn't handle the IOPs provided by SSDs and became performance bottlenecks. The underlying infrastructure and storage operating systems were not able to support all flash arrays and most storage vendors including NetApp had to take a bolt on approach to flash and simply added a few SSDs to existing arrays to function as a simple read cache and/or write buffer.

In 2011, NetApp acquired Engenio (from LSI) along with the SANtricity OS. This platform was used for both the E-Series (traditional disk with flash acceleration) and EF-Series (all-flash). However, SANtricity had issues of its own. This platform had a very limited feature set, no modern storage efficiency, and limited data protection options. Therefore, it did not fit with NetApp's high value data management messaging and today is positioned primarily where price/performance are key motivating factors.

Then in 2013, NetApp started a 'skunk works' project to build yet another operating system called MarsOS and announced a new product line called FlashRay. The Mars project was started based on the assumption that existing platforms could not compete in all flash market.

By the time FlashRay was anywhere near complete both EF-Series and AFF (All Flash FAS) were well established. Early beta units of FlashRay had significant limitations (e.g. only supported fiber channel protocol, had no high availability capability, etc.). FlashRay has never shipped, the core team left NetApp and they eventually rolled MarsOS into the core Data ONTAP team.

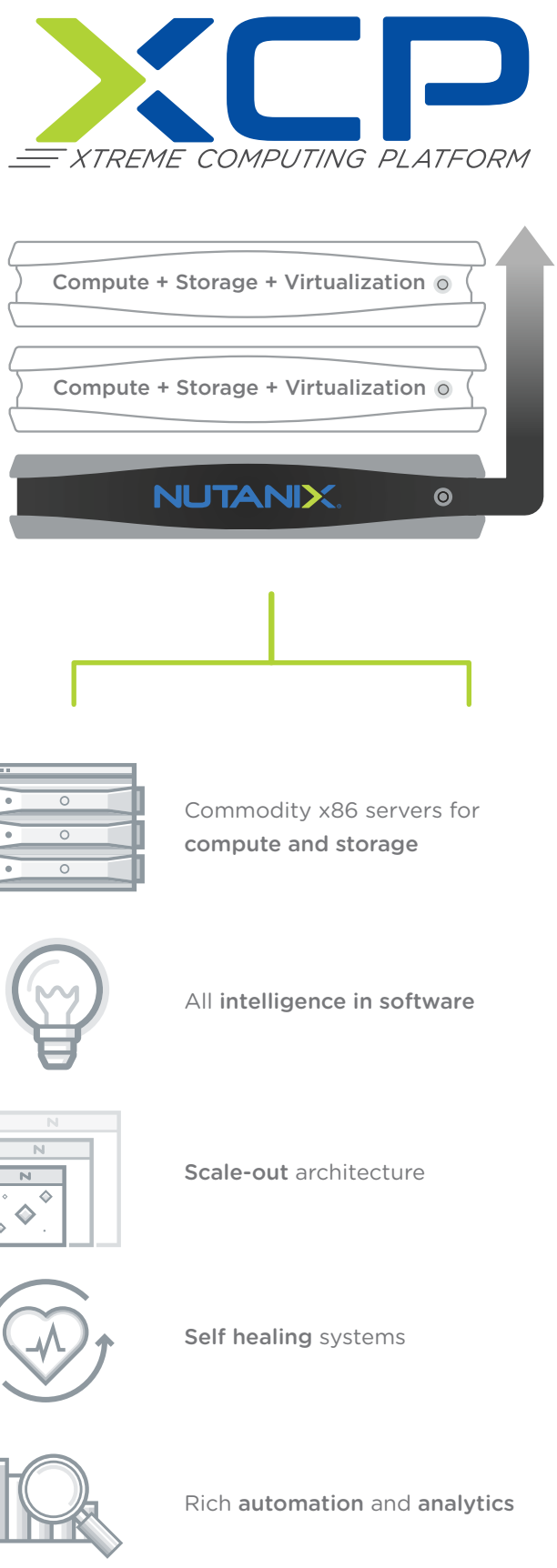
Over the last couple of years, NetApp has been trying to migrate its customers to cDOT. However, moving to cDOT requires customers to learn an entirely new operating system, and there is currently no direct upgrade from 7-mode to cDOT (limited direct upgrade scenarios are coming in CY16). Data migrations are very complex and require the purchase of new storage or the use of temporary swing storage. Furthermore, cDOT still hasn't reached feature parity with 7-mode. Not surprisingly, customer adoption of cDOT has been very slow.

With the release of Data ONTAP 8.3 in October 2014, NetApp removed the 7-mode option, effectively declaring end of life for its legacy OS. NetApp has also significantly increased annual maintenance costs on older filers running 7-mode. Both moves are heavy handed attempts to force customers to migrate to cDOT. However, cDOT just isn't that compelling, and for many customers, it simply isn't worth the painful migration process. Instead many NetApp customers are transitioning to new and emerging players, including Nutanix, to build their next-generation datacenters.

The Nutanix Xtreme Computing Platform

The Nutanix Xtreme Computing Platform is a 100% software-driven infrastructure solution that natively converges storage, compute, and virtualization into a turnkey appliance that can be deployed in minutes to run any application out of the box. Datacenter capacity can be easily expanded one node at a time with no disruption, delivering linear and predictable scalability with pay-as-you-grow flexibility. Nutanix eliminates complexity and allows IT to drive better business outcomes.

Nutanix is built with the same web-scale technologies and architectures that power leading Internet and cloud infrastructures, such as Google, Facebook, and Amazon. The Xtreme Computing Platform brings together web-scale engineering with consumer-grade management to make infrastructure invisible and elevate IT teams so they can focus on what matters most – applications.



7 Reasons to Migrate from NetApp 7-Mode

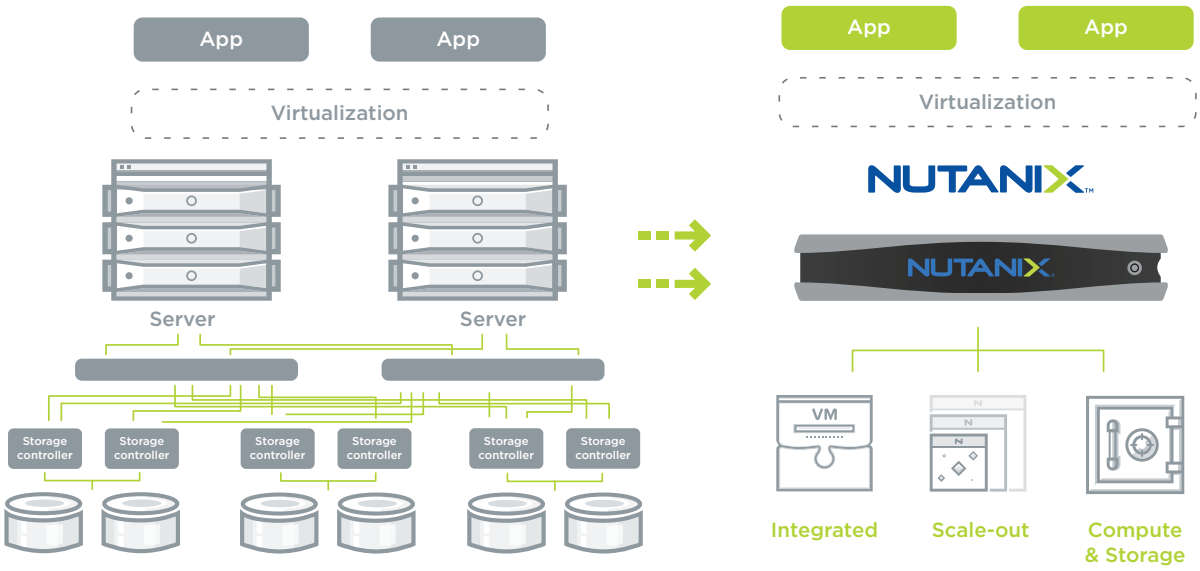
1 Modern Web-scale Platform that is Built for Virtualization

NetApp storage systems are deployed using a complex 3-tier architecture consisting of a separate compute tier connected to a separate shared storage tier via a dedicated storage network. This architecture was made popular in the 1990's when most applications were running on bare metal servers. NetApp storage systems still use traditional storage constructs like LUNs, volumes, and disk groups that map poorly to VMs and virtual disks. All NetApp storage replication and management features are implemented at a LUN or volume level and fail to deliver the VM-centric level of granularity today's IT administrators are looking for.

Storage in these environments typically use a dual controller architecture where performance is limited by the CPU and throughput of the hardware controller. To allow for failure and maintenance events, the controllers must be sized for max 50% utilization which is inefficient and contributes to the high cost of traditional storage arrays. Not to mention, sizing the controller is never easy and remediating an undersized controller could result in having to replace the controller. At the end of the usable life of the hardware, customers still face a painful forklift upgrade.

A legacy 3-tier architecture also creates challenges when customers want to run multiple high performance applications on the same shared storage. These environments typically can't deal with IO blender effect and many have not been designed to apply appropriate quality of service (QoS) guarantees to virtual machines. Because of this, traditional datacenters often have silos of resources where SQL, Exchange, etc. are all running on their own set of infrastructure, with separate administrative teams supporting each solution. This adds to the complexity and cost of managing traditional datacenters.

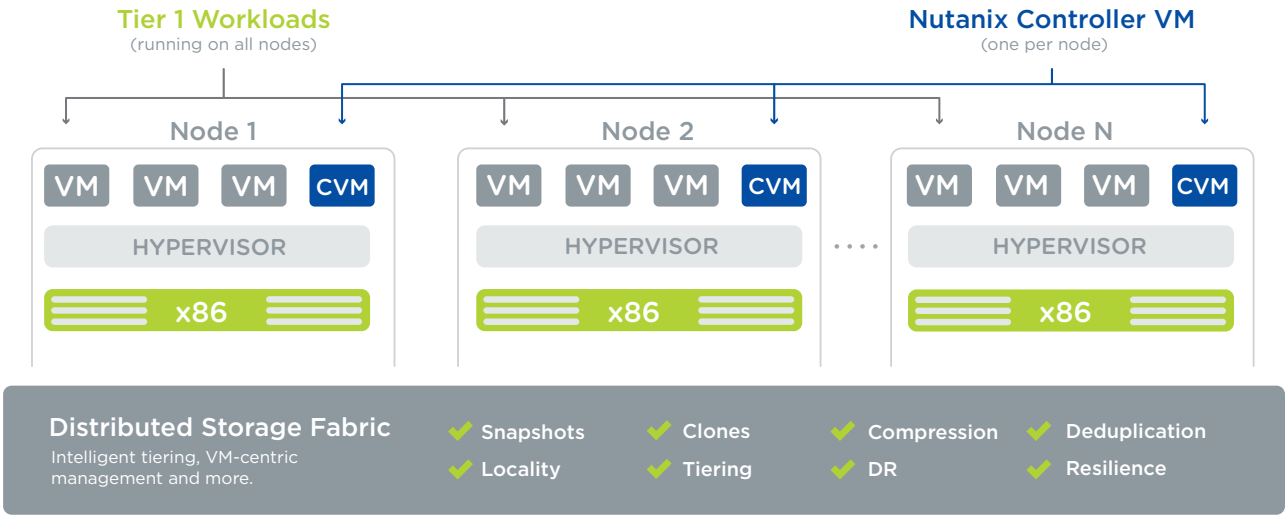
The components that make up a NetApp solution deployment are procured from many different vendors. This introduces challenges around solution design, workload sizing, interoperability testing, product roadmaps, hardware lifecycles, patching, and upgrades. Administrators find these environments very difficult to troubleshoot and often have to engage multiple vendor support organizations for problem resolution. This also adds to the complexity and cost of managing traditional datacenters.



Nutanix was built in the era of virtualization, flash, and cloud computing. The Nutanix Xtreme Computing Platform natively converges compute, storage, and virtualization into a turnkey hyperconverged solution.

Nutanix converged architecture incorporates local direct attached storage for faster performance and greater flexibility. Each node in a Nutanix cluster includes flash based storage to deliver massive IOPs for high performance as well as hard disk drives for low cost high capacity storage. Adhering to the principles of a software defined solution, Nutanix implements all control logic as a software based service. A virtual storage controller runs on each node in the cluster improving scalability and resilence while eliminating performance bottlenecks.

With storage and control logic now local to the guest virtual machines, there is no more need for expensive centralized storage or dedicated storage networks.



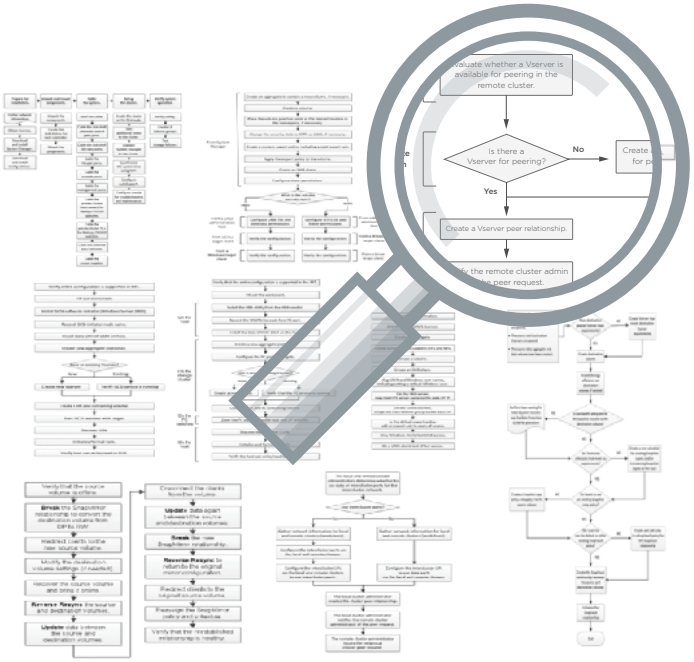
The Nutanix distributed file system aggregates local storage across all nodes, creating a single storage pool that can be partitioned into one or more datastores. These datastores are now presented to the hypervisor using the standard NFS protocol to provide storage for all hosted virtual machines.

Because the hypervisor communicates to the Nutanix software exactly as it would a traditional storage array, there is zero change to the virtual environment. Virtual machines are provisioned and manged as before, but without having to configure LUNs, volumes or raid groups. Each node runs independently and leverages the Nutanix distributed software architecture to create a completely unified cluster.
The Nutanix Xtreme Computing Platform is delivered as an integrated turnkey appliance that eliminates the need for multi-vendor technology integration, complex interoperability testing, and multiple support organizations.

Nutanix integrates as many as 4 independent nodes into a space efficient 2U appliance. For more overall cluster capacity, nodes can be added seamlessly one at a time with zero downtime and without expensive over-provisioning. With Nutanix you can start small and easily expand to achieve truly massive scale.

2 Quick Time-to-Value

One of the major issues with legacy infrastructure deployments is the length of time required to plan, purchase, deploy, integrate, and validate infrastructure. The end to end process typically spans weeks or months and the time to value is very slow.



On the other hand, Nutanix has streamlined workload sizing, removed the complexity of piecing together components from multiple vendors and conducting extensive interoperability testing, and eliminated lengthy infrastructure deployment and configuration times.

This enables customers to be up and running in days or hours instead of weeks or months like traditional infrastructure deployments with NetApp storage.

Once a Nutanix system is racked, cabled, and connected to the network, administrators conduct a few simple steps and they are ready to create their first VM.

Simple Nutanix Setup Process:

1. Rack and cable
2. Power ON
3. Run Foundation to create the initial cluster
4. Log in to the Nutanix cluster
    a. Assign the cluster name
    b. Assign cluster IPv4 IP Address/Subnet Mask
    c. Assign DNS & NTP server information
    d. Set Up VLAN tags (if required)
5. Create a Storage Pool
6. Create a Storage Container
7. Add Nutanix Cluster to VMware vCenter or Microsoft System Center Virtual Machine Manager
8. Create VM

The following graphic is a compilation of the setup and configuration process for deploying a NetApp FAS filer. Without focusing on the individual steps, you can see that there is a significant number of complicated steps that expert level administrators need to conduct in order to deploy and configure a NetApp storage system.

3 Pay-As-You-Grow Economics

Web-scale service providers like Amazon, Google and Microsoft have changed expectations on how modern datacenters should operate. Business units are now expecting IT services to be delivered with a self-service, on-demand consumption model.

However, most IT organizations are handcuffed by the limitations of legacy architectures that are unable to support rapid elastic scalability and fractional consumption of resources. Proprietary hardware, physical storage controllers, multiple data stores, resource silos, high costs, and complex time-consuming deployments simply cannot deliver the agility of software-defined cloud computing.

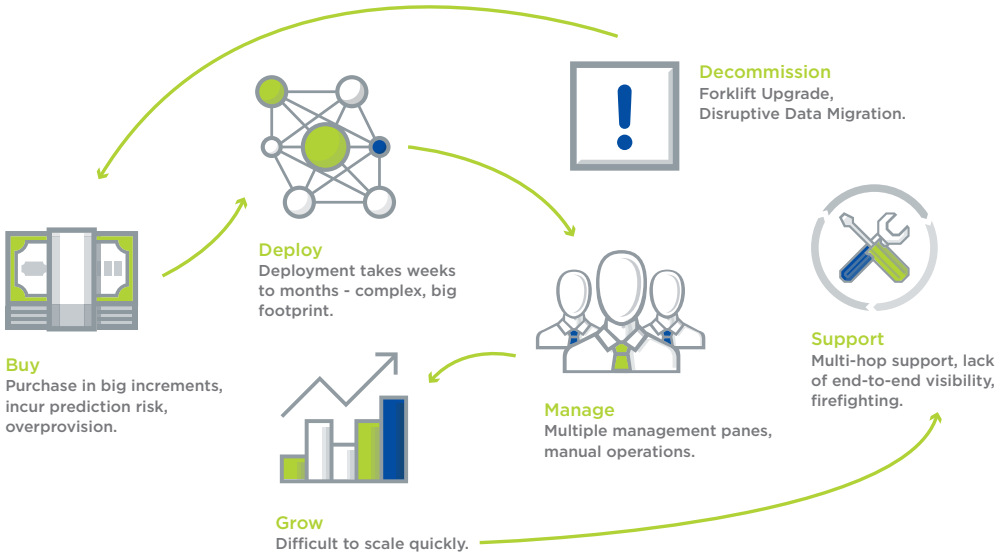
NetApp customers typically follow 3-5 year planning cycles where they attempt to estimate compute, network, storage performance, and storage capacity requirements. They are faced with a decision to purchase a lower end controller that meets current needs or a higher end controller that will cover future needs. A lower end controller will reduce cost upfront but usually requires the purchase of a higher end controller down the road and a rip and replace upgrade.

A higher end controller will cost more upfront and push out the forklift upgrade a few years down the road, but results in expensive overprovisioning as they are paying upfront for a system that will be significantly underutilized for the majority of its lifetime.

NetApp attempted to address this situation by building clustered Data ONTAP, which was supposed to be a true scale-out storage system enabling customers to seamlessly and non-disruptively add storage resources to a distributed global storage system.

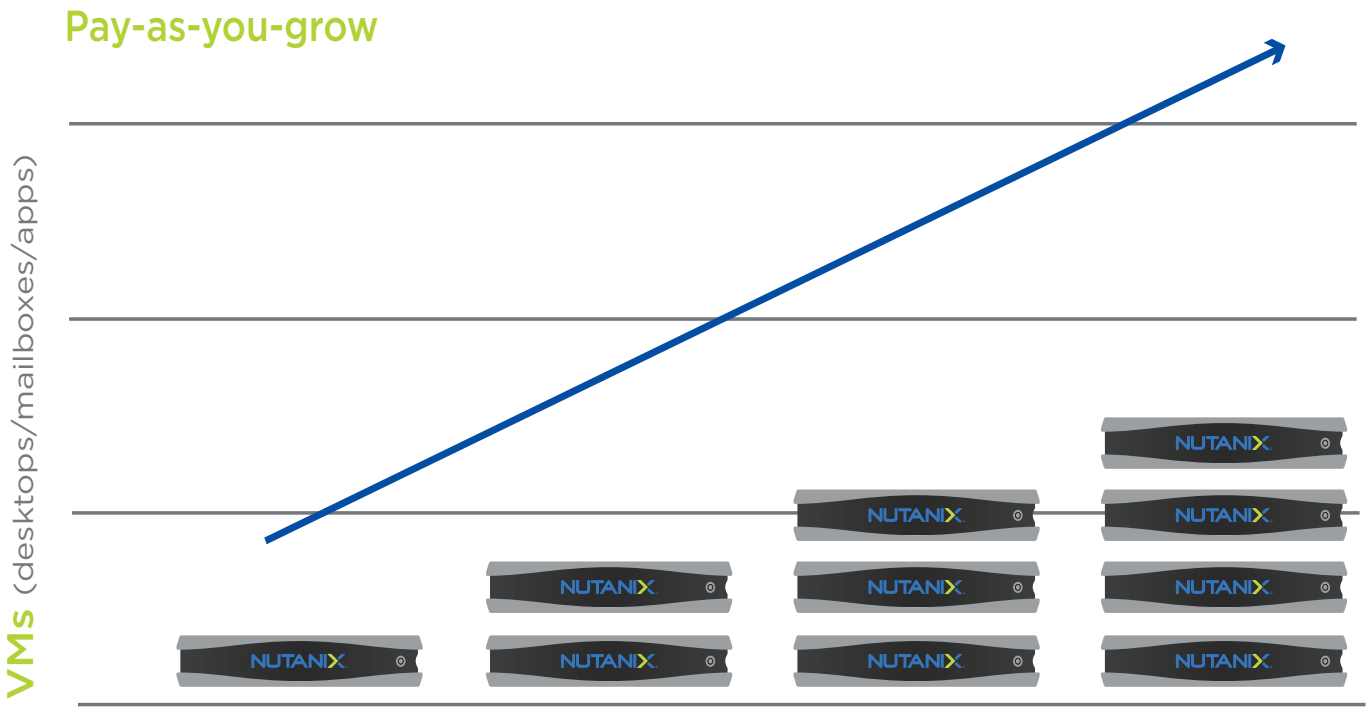
NetApp failed to deliver on that vision with cDOT. The cDOT architecture still uses HA pairs in which two storage controllers are interconnected by the same set of disks.

You can add multiple HA pairs to the same cluster and present data from all nodes in the cluster through a single unified namespace. When a customer needs to add additional storage, they can add another HA pair to the cluster, and migrate data from an old HA pair to the new one without having to reconfigure client side connectivity.



However, the architecture does not support granular incremental additions of storage and controller resources, nor does it have a distributed file system that allows it to intelligently scale as a true distributed system. The Nutanix Xtreme Computing Platform scales one node at a time, facilitating a true pay-as-you-grow deployment model.

Being able to quickly add compute and storage resources at a very granular level whenever you need it with predicable scale, predicable cost, and near-zero downtime is a true game-changer for modern datacenters.



“The **Nutanix** team promised they could have the systems up and running **in less than half a day**. We were skeptical at first, since it usually took weeks—and sometimes months—to get our previous solutions procured, installed, configured, and operational. The Nutanix boxes showed up at our datacenter, we put in a rack, and quickly configured the systems. **Within just a few hours, the systems were operational** and our engineers were poking around and making things happen. We were surprised that the **installation could happen that fast.**”

Jon Walton, CIO
San Mateo County, California

4 Datacenter Efficiency

Legacy architectures are not very efficient in terms of space, power, and cooling. A typical NetApp deployment has pairs of storage controllers, many disk shelves, complex interconnects between the controllers and disk shelves, dedicated storage networks with fiber channel switches or Ethernet switches and a separate compute layer with various servers.

As a result, NetApp deployments can consume multiple datacenter racks. Because many of these environments are sized to accommodate 3+ years of growth, they are highly overprovisioned at the time of initial deployment. Customers are still paying to spin and cool all of those magnetic disks (HDDs), regardless of the capacity actually consumed.

Nutanix packages compute and storage into a very dense building block and eliminates the need for additional infrastructure. Because customers are able to add Nutanix nodes as needed, they are never paying to power and cool infrastructure that is not in use.

The Nutanix Xtreme Computing Platform drives very high performance from a very small footprint. Nutanix customers are able to consolidate multiple racks of legacy infrastructure into just a portion of a rack, significantly reducing space, power, and cooling requirements.

Before
(NetApp)

After
NUTANIX

> “The space efficiency of the Nutanix appliances is simply amazing. We are transitioning from four full 48U racks to just one rack using only 12U of space with the Nutanix platform. The 16:1 reduction in footprint is very impressive!”

Jeff Babcock
IT Technical Infrastructure Manager
Empire Life

5 Easy to Learn, Simple to Use

A significant number of NetApp customers are still running 7-mode, even after NetApp removed 7-mode from Data ONTAP 8.3 and effectively declared the legacy operating system end of life. As of late 2015, 35% of new FAS systems are still being deployed with 7-mode. It's very telling when over 1/3 of new purchases are still not being deployed with cDOT.

One of the primary reasons why customers are staying on the legacy 7-mode operating system is there is a huge learning curve to move to cDOT. It's an entirely new storage system with concepts, constructs, and nomenclature that does not exist in 7-Mode. Existing NetApp 7-mode administrators must invest hundreds of hours to learn cDOT.

There is also an entirely new CLI in cDOT. Most organizations that have been using NetApp 7-mode storage have a mature set of scripts, automation tasks, and administrative processes in place. When moving to cDOT, organizations will need to create an entirely new set of processes and recreate all of their automation and scripts.

Like most of the large incumbent storage vendors, NetApp has introduced an incredible amount of complexity into its solution portfolio.

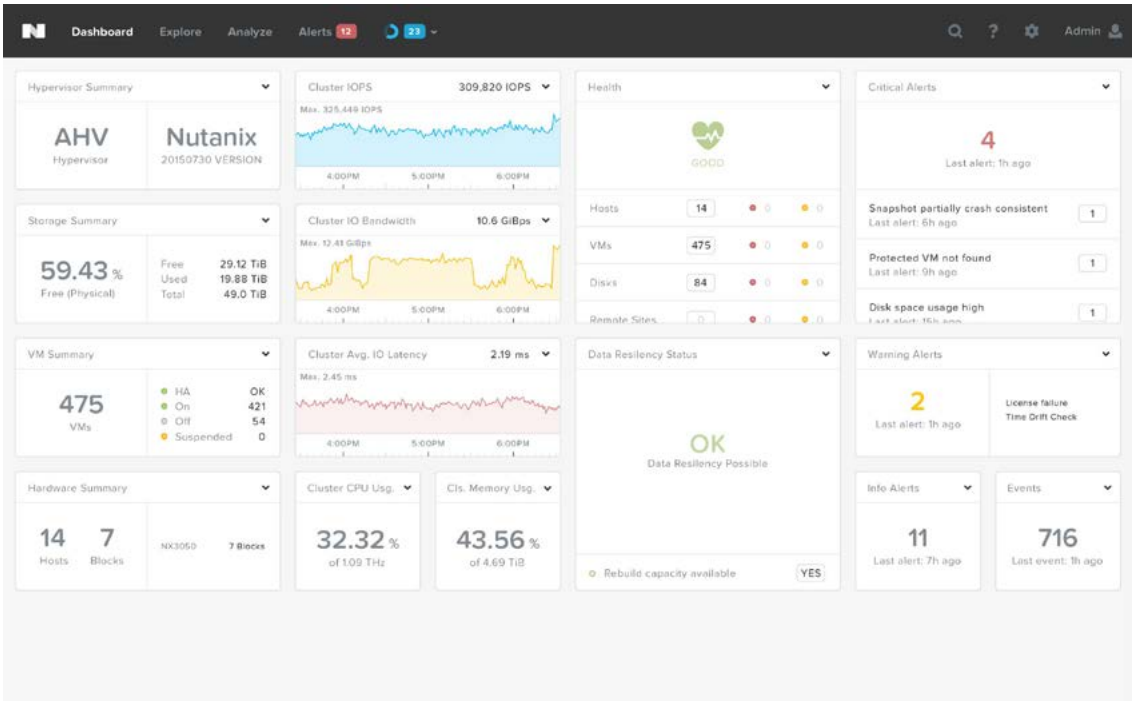
Currently, NetApp has over 23 different management tools and plug-ins to manage its product portfolio.

Unlike Clustered Data ONTAP (cDOT), the Nutanix Xtreme Computing Platform can be mastered in a few days, even if you have very little experience with back-end storage systems.

You no longer need a team of specialists to manage your infrastructure, allowing your experts to focus on high value-add activities rather than mundane low value-add administrative tasks. Nutanix can be managed with a small team of IT generalists.

The Nutanix Xtreme Computing Platform was designed from the ground up with simplicity in mind. The Nutanix Prism management tool incorporates consumer-grade design to simplify deployment, optimization, and operations of advanced IT infrastructure.

Prism provides one-click infrastructure management, one-click operational insights, and one-click troubleshooting for both storage and compute.



“**Simple, linear scalability** is very critical for us. With our traditional architecture solution, **we were always trying to figure out how many** Fiber Channel switches we needed, **how much** storage our applications required, and how much processing power we had to purchase in advance. **We spent far too much time and effort** architecting and re-architecting the solution, scaling it to meet current compute needs and preparing for future projects. **With Nutanix, we can buy just what we need** to solve our current problems, and easily add more Nutanix blocks **as we grow**.”

Jon Walton, CIO
San Mateo County, California

6 Lower Risk Migration

Customers that want to upgrade their filers from 7-mode to cDOT are forced to go through a painful double migration process, which requires temporary swing storage because there is currently no direct upgrade path from 7-mode to cDOT. This is complicated by the fact that cDOT breaks feature compatibility with 7-mode and the specific migration steps can be very different depending on what version you are migrating from or migrating to.

NetApp has created a 7-mode transition tool (7MTT) which is available as a free download. However, the tool has many limitations and caveats. Even with the tool, the migration is very complex and customers have to resort to paying NetApp partners to come in and execute the migration for them.

The migration from NetApp 7-mode to the Nutanix Xtreme Computing Platform is easier, lower risk, and less disruptive than upgrading to NetApp Clustered Data ONTAP. The Nutanix Global Services Organization provides experienced migration specialists that facilitate customer data migration while minimizing risk and disruption to production workloads.

With Nutanix, the migration process can be completed with a few simple steps:

1. Deploy the Nutanix Extreme Computing Platform cluster
2. Inventory the NetApp environment
3. Copy the namespace and directory structure
4. Transfer existing ACLs
5. Complete a baseline data migration
6. Complete an incremental data migration
7. Migrate VMs
8. Verify Data Access
9. Migration Complete
10. Decomission old NetApp storage

To demonstrate the migration complexity, here is a list of the additional items not covered by the 7MTT that administrators need to plan for and mitigate:

You cannot transition the following 7-Mode volumes:

- Volumes with LUNs and LUN clones (SAN transition)
- Restricted or offline volumes
- Traditional volumes
- Volumes with NFS-to-CIFS character mapping (charmap)
- Volumes with Storage-Level Access Guard configurations
- SnapLock volumes
- FlexCache volumes
- 7-Mode volumes in a 64-bit aggregate to a 32-bit aggregate in clustered Data ONTAP
- FlexClone volumes
- FlexClone volumes can be transitioned as FlexVol volumes, but the clone hierarchy and storage efficiency will be lost
- Root volume of a vFiler unit, where the root volume is based on a qtree that belongs to the default
- vFiler unit

You cannot transition the following 7-Mode configurations:

- IPv6 configurations
- SnapVault relationships: While SnapVault source volumes can be migrated, you must first break the SnapVault relationship. SnapVault relationships or a volume that is the destination of a SnapVault relationship cannot be migrated.
- Sub-volume NFS exports other than qtree-level NFS exports
- Note: Transition of qtree-level NFS exports is supported if the target cluster is running Data
- ONTAP 8.2.1 and later
- Fencing of NFS clients from one or more file system paths
- Transition of volumes serving CIFS data that is being accessed by local users and groups to a Data ONTAP 8.2 destination cluster
- 7-Mode Transition Tool supports the transition of local users and groups only to clustered Data
- CIFS NT4 authentication
- CIFS NetBIOS aliases
- FPolicy configurations
- BranchCache configurations
- Antivirus configurations
- FCoE configurations
- PC-NFS
- WebNFS
- NFSv2
- FTP
- CIFS share-level ACLs with UNIX-style permissions
- Configuration to allow the administrator to connect to the CIFS home directories of other users (cifs.homedirs_public_for_admin option on the 7-Mode system)
- Synchronous SnapMirror
- Qtree SnapMirror relationships
- MetroCluster configurations
- Disaster recovery vFiler unit (vFiler DR)
- Only the volumes in the source vFiler unit can be transitioned
- NDMP configurations
- SFTP server
- TFTP server
- GARP VLAN Registration Protocol (GVRP)
- NIS for host name lookup
- Settings in the /etc/hosts.equiv file

(source: NetApp 7-Mode Transition Tool 1.4 Data and Configuration Tranistion Guide)

7 A Questionable NetApp Future

For most of it's 23 year existence NetApp has been a great storage company. But over the last few years, the company has been in decline and scrambling to remain relevant. NetApp recognized early on that 7-mode was not the storage operating system that would allow them to be successful in an all-virtualized all-flash datacenter environment. After several attempts to build a new relevant operating system to carry NetApp into the future, NetApp has ultimately failed.

Product revenue peaked in 2013 and has declined every quarter since. As of November 2015, NetApp sells more maintenance and services ($671M) for aging storage than new products ($664M).

Nutanix, on the other hand, has been growing its customer base at an incredible rate and has been successful at disrupting and displacing the current storage incumbents, including NetApp. Nutanix was born in the era of virtualization, flash, and web-scale cloud providers and has been designed for modern datacenters and the new challenges of this todays businesses. Nutanix is laser-focused on technology innovation that addresses real customer pain, and positions customers' IT organizations as a critical enabler of company growth and long-term success.

Gartner has recently recognized Nutanix as a leader with the strongest vision in their latest Magic Quadrant report for Integrated Systems. In addition to the strong position for Nutanix, this is a compelling win for web-scale architectures and how the vision of web-scale is transforming how enterprise datacenters are designed, managed and scaled. Ultimately, it continues to disrupt the overall IT vendor landscape.

Additional Resources

- **How Nutanix Works** (video)
- **The Nutanix Bible**
- **Nutanix Xtreme Computing Platform Datasheet**
- **Nutanix TCO – Cut Infrastructure Costs By Up To 60%**
- **IDC Compares TCO & ROI of Nutanix vs. Traditional Infrastructure**
- **From Spiraling Costs to Streamlined IT: The Journey to Invisible Infrastructure** (webinar)
- **Nutanix Workload Migration Service Overview**

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In addition to the **strong position for Nutanix**, this is a compelling win for webscale architectures and how **the vision of webscale is transforming how enterprise datacenters are designed, managed and scaled.** Ultimately, it continues to disrupt the overall IT vendor landscape.

Version 0.1 / December 2015

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 up on Twitter@nutanix.

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