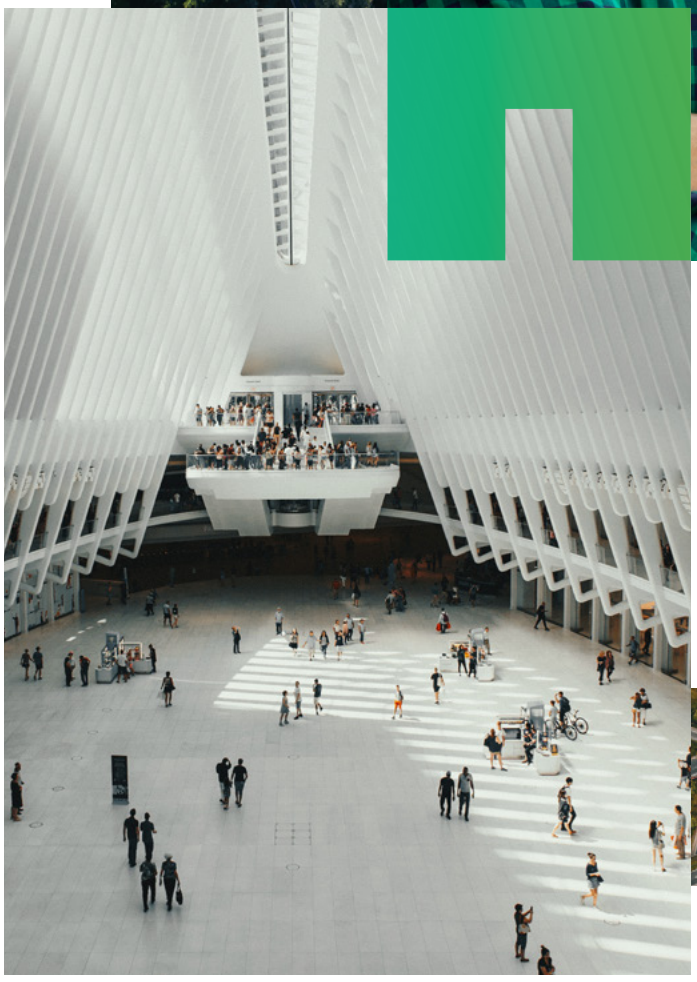

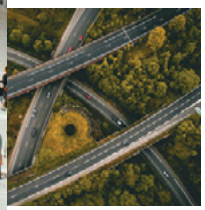

WHITE PAPER

Accelerate End-User Computing Deployments with NetApp HCI

NetApp®

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End-User Computing Requires a New Approach to Infrastructure

Digital transformation is having a profound effect on the workers in your company. Increased mobility and cross-functional collaboration have created a need to untether the digital workspace so that users can access applications and data anywhere on any device.

Virtual desktop infrastructure (VDI) began as a desktop-centric technology, with IT teams focused on optimizing per-desktop cost. In the digital era, end-user computing is moving beyond the desktop to become end-user centric, creating a need to focus on the entire user experience, including applications. This prompts new thinking about the infrastructure to support your end-user computing environment as you move to a next-generation data center.

VDI typically uses a pod-based architecture, resulting in an infrastructure in which VDI is siloed from other workloads and pods are siloed from each other to isolate failure domains and guarantee performance. Although this approach can accelerate desktops, it ignores applications and may fail to deliver the desired end-user experience. To deliver user productivity, you must accelerate the key applications and databases on which users depend in parallel with virtual desktops. End-user computing is about bringing the full digital workspace to life, while managing the security and compliance of the platforms, applications, and devices users rely on. This more comprehensive approach creates significant new business and technical challenges.

The complexity of the end-user computing environment can require the involvement of multiple teams and multiple vendors, making it take too long to get to value and increasing the risk that a project will stall or fail. Even if you're extremely careful, the result is often the proliferation of independent, purpose-built silos of infrastructure that are not integrated with existing data platforms.

Addressing unpredictable user workloads in a complex end-user computing environment might require painful redesigns. Introducing new workloads robs resources from existing workloads, leaving users unhappy. A better approach to infrastructure for end-user computing is needed.

NetApp HCI Simplifies End-User Computing

Run virtual desktops and important user applications on the same infrastructure

The NetApp® HCI enterprise-scale hyper converged infrastructure (HCI) solution simplifies and accelerates end-user computing deployments. Because virtual desktops and important user applications run on the same infrastructure, a complete end-user computing environment is faster to design and deploy and easier to manage and scale.

NetApp HCI integrates flexible compute options and proven all-flash storage in a turnkey scale-out solution that's simple to manage and easy to automate. This approach enables your end-user computing environment to expand with no disruptions and no costly surprises. The end-user experience is protected with guaranteed performance, avoiding the painful slowdowns that are common with conventional infrastructure. (See Figure 1.)

NetApp HCI addresses both the business and technical challenges of end-user computing with an innovative platform that is:

- **Automated** to deliver operational simplicity and efficiency
- **Predictable** to make sure that resources are provided where and when they are needed
- **Integrated** to allow data to move freely

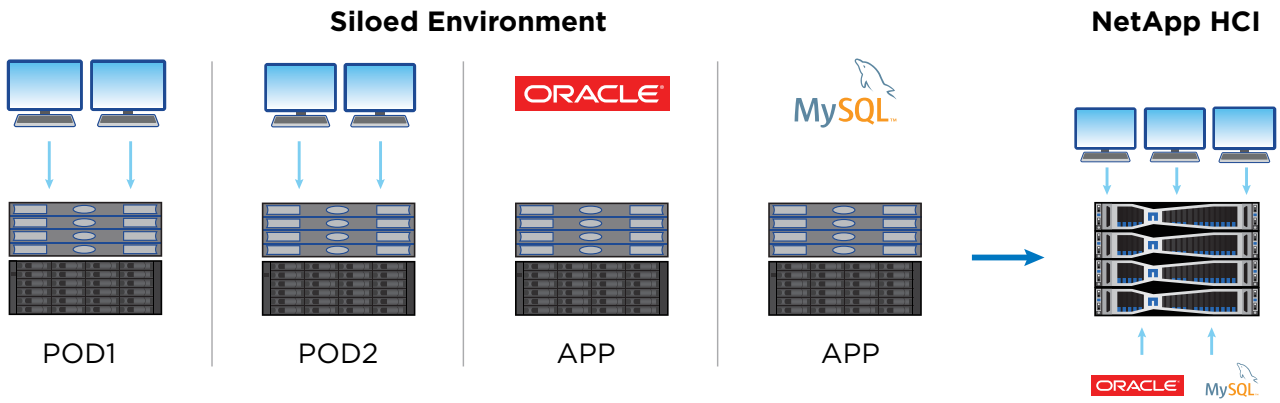

Figure 1) NetApp HCI allows you to consolidate siloed VDI and application environments on a single infrastructure with guaranteed performance and simple management.

Operational Simplicity and Efficiency

Take the pain out of managing, scaling, and automating end-user computing

NetApp HCI simplifies your end-user computing environment with an agile, scale-out architecture that future-proofs your investments. Start small and grow as needed without disruption to your users. NetApp HCI eliminates painful migrations and forklift upgrades, so you never have to wait three years for an upgrade. NetApp HCI provides:

- **Ability to scale compute and storage independently.** By allowing you to add compute and storage independently, NetApp HCI avoids the scaling challenges of other HCI solutions. If compute is the limiting factor, you can simply add more compute nodes. If you need more storage capacity or performance, simply add storage nodes. New storage nodes integrate seamlessly, so there's never any need to rip and replace the infrastructure that's already in place to scale your environment. You're never forced to add compute resources when you need storage or vice versa.

  NetApp HCI can absorb multiple concurrent faults without affecting application performance. Recovering from a drive or node failure takes only minutes and is fully automatic, requiring no operator intervention to restore redundancy and eliminating the fire drills that typically occur when a component fails.

- **Instant familiarity.** NetApp HCI is built using market-leading VMware vSphere virtualization. In combination with VMware Horizon, you can simplify and automate the management of thousands of desktops.

  NetApp HCI provides demonstrated compatibility with the VMware ecosystem, so it operates as a full partner in VMware environments. To support the needs of end-user computing, NetApp provides full compatibility with:

  - VMware Horizon 7, the leading platform for virtual desktops and applications
  - App Volumes for fast application delivery and unified management
  - vRealize Orchestrator, which provides automation for complex IT processes

- **100% programmability.** Automation is essential to success in the digital era. With NetApp HCI, you can rapidly deploy applications and services to address business needs. REST-based APIs and deep integration with management and orchestration platforms make sure that NetApp HCI interoperates with everything in your environment. (See Figure 2.) You can use popular automation tools and simplify management as you scale your end-user computing environment to support new users and applications.

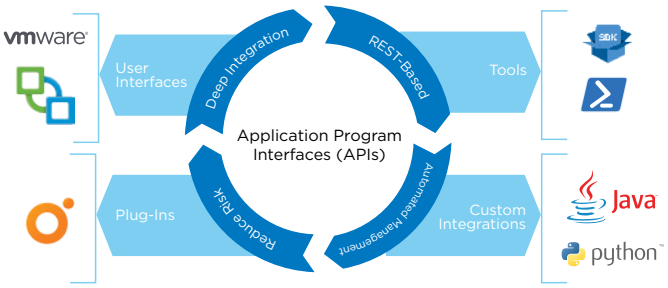

Figure 2) NetApp HCI has been designed to provide compatibility and programmability.

Predictable Performance Delivery

Guarantee performance for the most demanding end-user computing environments

In end-user computing environments, the predictability of performance is critical to end-user satisfaction. However, spikes in user activity are often hard to predict. With traditional approaches to storage infrastructure or previous approaches to HCI, this unpredictability leads to inevitable slowdowns and user complaints.

Virtual desktop environments are also well known for predictable spikes in activity. For example, hundreds of users often log in at about the same time each day. Because of the large number of users, this situation can create a spike in storage I/O that is difficult to architect for using conventional approaches.

By guaranteeing a minimum level of storage performance for each volume, NetApp HCI eliminates these problems. User desktops and applications deliver predictable performance, even in the face of big spikes in total user activity, increasing satisfaction and eliminating complaints. The unique architecture of NetApp HCI prevents noisy neighbors and runaway processes from interfering with other users. NetApp HCI manages performance automatically and gives you the tools to address any performance problems instantaneously:

- **Discrete storage performance for each application.** With traditional storage infrastructure, the penalty for getting capacity and performance allocations wrong is complicated and time-consuming data migration or even rearchitecting. NetApp HCI is ideal for end-user computing environments because you can allocate capacity and performance independently for every virtual desktop and application (see Figure 3) and easily adjust allocations as workloads shift or needs evolve.

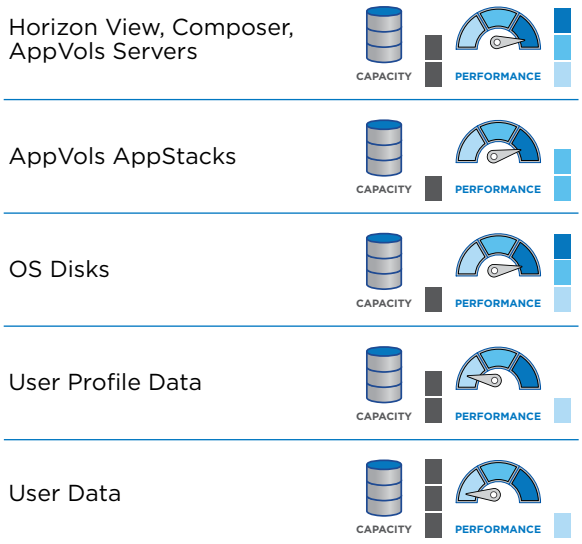

Figure 3) NetApp HCI allocates capacity and performance independently using quality of service.

- **Automated data distribution and load balancing.** To guarantee performance, NetApp HCI balances pools of performance and capacity across the HCI cluster. Resources are provisioned to meet the needs of each volume or virtual disk with performance defined in terms of minimum, maximum, and burst characteristics. Changes to these performance and capacity policies take effect immediately without the need to move data to different storage.

- Ability to address performance problems instantly. When you provision a new storage volume for a user or application, it can be difficult to know how much performance is going to be needed with certainty. If more performance is needed, the initial configuration can become a bottleneck. NetApp HCI eliminates the penalty for underestimating requirements. You simply modify quality-of-service policies to change the settings for minimum, maximum, and burst, and the new settings take effect immediately. You can define different classes of users for your end-user computing environment and "promote" a user to a higher class of service with ease.

Data Fabric Integration

Be sure your end-user computing environment isn't siloed from the rest of your operations

An end-user computing environment needs to integrate easily with your IT operations, both on premises and in the cloud. Otherwise, it becomes another infrastructure silo, making your data center more complex. In a next-generation data center, you must be able to manage and protect data globally and integrate with other important applications and services in your data center environment and beyond.

NetApp HCI increases the agility of your end users and your business by delivering predictable performance and simplified operations on a highly flexible and efficient cloud architecture. NetApp HCI is Data Fabric ready out of the box, so you can access all your data across any cloud: public, private, or hybrid. Because data is accessible both on premises and in the cloud, the Data Fabric enables your company to respond and innovate more quickly.

Integration with the Data Fabric allows NetApp HCI to provide robust data services, including file services using ONTAP® Select, object services using StorageGRID®, replication services using SnapMirror®, data visibility using OnCommand® Insight, and backup and recovery services using AltaVault™. (See Figure 4.)

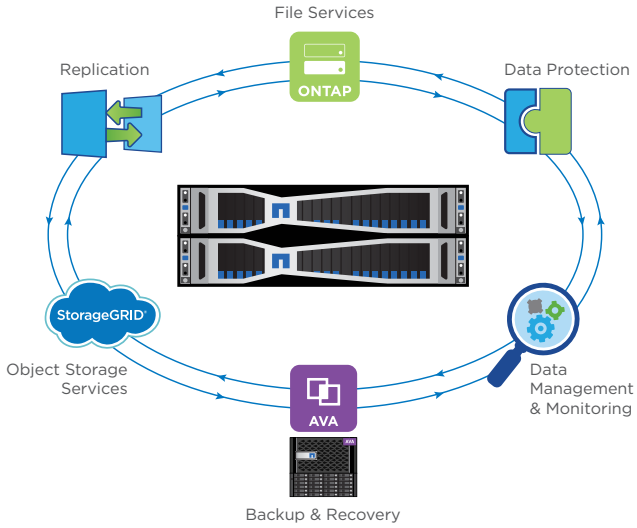

Figure 4) NetApp HCI provides full Data Fabric integration.

Through Data Fabric integration, your end-user computing environment has direct access to a range of NetApp Cloud Data Services, enabling data protection and other important workflows to take advantage of hybrid cloud.

HCI at Enterprise Scale

A smarter approach to HCI for end-user computing and other enterprise needs

Technology continues to shape our everyday lives, and user demands are relentless. No matter where you are on your end-user computing journey, NetApp can help you succeed. NetApp HCI delivers benefits for end-user computing that other HCI solutions can't match. You can run virtual desktops and other user applications side by side with guaranteed performance. Compute and storage scale independently, so you add only the resources you need.

NetApp HCI is an enterprise-scale hyper converged infrastructure solution that delivers predictable performance on a highly flexible, efficient architecture that is simple to deploy and manage. NetApp HCI allows you to meet the rapidly changing needs of your end users and your business so that you can focus on what matters most: growing your business.

Learn More

If you're ready to create tomorrow's end-user computing environment, NetApp is ready to help you. To learn more about NetApp HCI, visit:

- NetApp HCI 360º Demo
- NetApp HCI with VMware Horizon View 7
- A Hyper Converged Future for Digital Transformation
- Gartner Report: Competitive Landscape for Hyperconverged Integrated Systems

Refer to the Interoperability Matrix Tool (IMT) on the NetApp Support site to validate that the exact product and feature versions described in this document are supported for your specific environment. The NetApp IMT defines the product components and versions that can be used to construct configurations that are supported by NetApp. Specific results depend on each customer's installation in accordance with published specifications.

NA-299-0418