

WHITEPAPER

How to virtualize your workspace during a time of disruption



Introduction

- Virtual desktop infrastructure (VDI) technology decouples the workplace environment from the device used to access it, enabling users to create a workspace instance from anywhere, on any device, and at any time, in today's hybrid/multicloud world.
- Business trends addressed by VDI:
 - Pressing need for streamlined, flexible business processes
 - Spread of geographically distributed organizations
 - Enabling remote work
- This white paper covers:
 - Why VDI is important in the “new normal”
 - Managing VDI anywhere hybrid/multi-cloud: VDS
 - Opportunities and challenges in hosting VDI in the hybrid/multicloud world
 - NetApp® solutions for the hybrid/multicloud world
 - Customer success stories

VDI—driving your virtual personalized work environment

What is VDI?

Virtual desktop infrastructure is a virtualization solution that uses virtual machines to provide and manage virtual desktops. VDI hosts desktop environments on a centralized server and deploys them to end users on request. They are accessed over the network with an endpoint device (laptop, tablet, phone, etc.). VDI delivers a virtual desktop with a virtual machine that includes all the necessary user profiles, apps, and data, from a centralized hosted environment, which enables the customized virtual desktop to follow the user, not the device.

Potential benefits of VDI solutions include:

- Centralized management
- Users can work anytime, anywhere, on any device
- Easy access to always-synced shared files from any connected device
- Support for a diverse range of remote and mobile devices
- Protected and secured data in a centralized data center or cloud center or cloud

Why is VDI so important?

Globally, the number of employees permanently working remotely is expected to double in 2021¹. Multiple company workspaces have already gone virtual with many of their employees working from home for the long term. Enterprises now have increasing demand for secure VDI environments at scale to support the needs of an expanded and elastic remote workforce. This demand has catapulted VDI to an enterprise-class, tier 1 workload, on a par with SAP or Oracle. It is valued for its operational flexibility and increased security profile when compared to conventional desktop approaches. It organizations are advancing their VDI environments to enterprise class with hybrid/multi-cloud support, especially in light of the “new normal” of the global remote workforce.

Managing VDI anywhere, on premises or in the cloud

Businesses continue to embrace the movement of shifting their workforce productivity model from a traditional desktop environment to cloud-driven virtual desktop solutions. Integrating virtual desktop solutions in hybrid/multi-cloud environments results in operational cost efficiencies with the flexibility to support desktops and software access regardless of where the user is physically located.

VDS

NetApp Virtual Desktop Service removes the complexity of deploying and managing virtual desktops globally. VDS is a SaaS-delivered global control plane for VDI deployment, management, and optimization. VDS enables you to manage your VDI environment through a single pane of glass, across hybrid/multi-cloud worlds. VDS uses automation and machine logic to streamline hundreds of tasks required for deploying desktops to reduce deployment time from days or weeks to hours. After deployment, management of the virtual infrastructure is automated by intelligent toolsets and is event driven, including the full application stack to keep your workspaces up to date, in sync, and performing in accord with your service level expectations.

Enterprise scale

VDI is now a tier 1, enterprise-class workload, and VDS delivers enterprise-scale deployment, management, and optimization, integrating with the top three enterprise public clouds, the NetApp enterprise-class Cloud Volumes storage family, and cloud services.

Simplified virtual desktop deployment

Accelerate time to workforce productivity through rapid provisioning of workspaces that are synchronized with real-time data, software, and your applications.

Automated virtual desktop management

Leverage virtual desktop data orchestration, resource allocation, and workload movement seamlessly across all users, no matter their location.

Optimize and scale virtual desktop capacity

Scale workloads across multiple global cloud environments to adapt to desktop user surges, while reducing cloud infrastructure costs by up to 50%.

Virtual Desktop Service is NetApp's SaaS-delivered solution to automatically provision, deploy, manage, and optimize virtual desktops in any hybrid/multi-cloud environment. It extends your cloud capabilities by delivering a global control plane to manage virtual desktops through all phases of their lifecycle. VDS is a flexible solution, with open REST APIs, that is interoperable with your private, public, or hybrid cloud deployment strategy and your users' chosen endpoint devices.

The different flavors of VDI

VDI can be deployed and managed in hybrid and/or multi-cloud environments. Let's take a look at the options.

Multicloud

Opportunities and challenges of VDI in the multi-cloud environment

Opportunities

- Having the choice to host VDI in multi-clouds provides data protection and no cloud lock-in.
- Hosting VDI in public cloud mitigates the complexity and cost of self-hosted VDI environments.
- With a cloud solution, VDIs are easily scalable, so companies can scale up and down to meet the needs of elastic remote workforces.
- Nearly 70% of IT leaders say that their organization currently uses multiple cloud platforms.²

Challenges

- Performance reliability can be affected by the wide range of access devices, types of connectivity, and diverse VDI devices (gateways, brokers, etc.). Typical end-user problems that may be encountered due to these complexities include not being able to connect, poor latency, user interfaces not working properly after connection, and the inability to access certain applications.
- Unpredictable VDI usage patterns place significant storage scalability demands on the organization's environment. The current work from home (WFH) means that enterprises must be able to scale cloud storage capacity up and out, with agility and without affecting performance.
- There are some inherent limits to the hyperscaler reach for users to be able to connect easily and quickly, which is evident in large-scale implementations.
- With a truly global workforce, accessing the "single source of truth" data without incurring latency can be difficult, and it can mean the downfall of a successful VDI environment.
- Without careful management and monitoring, VDI cloud costs can incur without warning.

NetApp solution for cloud: Virtual Desk Service (VDS) Sites

One of the challenges of managing a global workforce is that users are often widely dispersed. For very large implementations, users may have a difficult time connecting because of significant latency or disruption. Hyperscalers may have bounded limits for user connections, or they may not have a zone near the user. This creates a poor experience for the user and can lead to decreased business productivity. What if there were a way to move beyond those limits?

There's a new approach to how companies can overcome the hyperscaler rules and unbound the limits: NetApp Virtual Desktop Service (VDS) Sites.

NetApp VDS Sites is a component of VDS that further extends the enterprise scale of the SaaS-delivered global control plane for VDI deployment, management, and optimization. VDS Sites clears away the hyperscaler limits for deployment and scale, in a sense bringing the hyperscaler zone to the user.

VDS Sites extends the hyperscaler zone limits to the user by:

- Managing logical groupings that are not bounded by the hyperscaler limits
- Easily managing separate cloud region targets, including the network details, file locations, and regional segmentation containers, and locating the virtual desktops and applications close to the end users
- Easily scaling large implementations and adding multiple cloud resources to enable concurrent build outs, and avoiding cloud API and other limitations
- Managing users across hybrid/multi-cloud environments with single user identity and administrative scope control
- Supporting mobile user data by integrating VDS and NetApp Global File Cache, allowing accessibility to the user and data profiles from the VDS Site location data store

Now businesses can extend the hyperscaler functionality to the actual user location and across hybrid/multi-cloud environments, improving the experience of remote users and improving performance, thus improving business continuity. VDS Sites is the enterprise-class solution to extending hyperscaler and hybrid environments to where your users are located, easily and quickly.

NetApp solution for cloud: Virtual Desktop Managed Service (VDMS)

Businesses find that providing virtual desktop infrastructure to a growing number of enterprise users can be complex and resource intensive. DaaS solutions are an increasingly attractive tool to allow enterprises to support virtual desktops by leveraging a streamlined managed service model. Unfortunately, DaaS offerings are often limited in scope, or they are built on a “lowest common denominator” infrastructure that isn’t enterprise class or doesn’t scale. Imagine a better approach to DaaS that integrates the virtual desktop with the industry’s leading cloud data services and management tools. That’s DaaS at enterprise scale. That’s NetApp Virtual Desktop Managed Service (VDMS).

VDMS is a turnkey managed solution for your end-to-end virtual desktop infrastructure. Powered by NetApp Virtual Desktop Service, our VDI SaaS-delivered global control plane for virtual desktop deployment, management, and optimization functions as an extension of the cloud.

VDMS goes beyond traditional DaaS solutions by integrating:

- NetApp Cloud Volumes family of storage to optimize your cloud storage and performance while enhancing data protection, security, and compliance
- NetApp SaaS Backup for Microsoft 365, which offers a secure, straightforward solution that protects your users’ Microsoft 365 mission-critical data to help protect against data loss from a variety of threats
- NetApp Cloud Insights diagnostic reports for complete visibility into your VDMS usage and applications
- NetApp Cloud Compliance to meet GDPR, HIPAA, and PII requirements and protect you against fines
- NetApp Global File Cache to ensure that your distributed VDI datastores are managed centrally and to keep user access at the highest performance level

Now businesses have an option to reduce the complexity of VDI provisioning, orchestration, and management by outsourcing these functions to NetApp. VDMS does not require additional IT staff or incremental cloud investment to operate. All it takes to get world-class, cloud-driven modern workplace solutions is to subscribe to VDMS for a simple monthly fee per user.

NetApp solution for cloud: Cloud Volumes ONTAP (CVO)

NetApp Cloud Volumes ONTAP® can reduce the complexity and costs of running a desktop as a service (DaaS) solution. Cloud Volumes ONTAP enables users to optimize management of the native cloud resource used in their VDI environment and reduces the cloud storage footprint and cost with enterprise-grade storage and data efficiency features.

Scalability

To support the shift to working remotely, companies must be able to scale cloud storage capacity up and down to meet the needs of remote workforces—without affecting performance. Cloud Volumes ONTAP supports enterprise-grade, scalable, and agile cloud data management on your preferred public cloud, featuring:

- A flexible licensing model to cost effectively and dynamically provision storage resources as usage rates fluctuate

- Easy instance and volume management, with the ability to change instance types, aggregate volumes per disk type, dynamically resize or expand volumes, and cost effectively create read-only or writeable volume clones
- Built-in storage efficiencies, optimizing the storage footprint so that you can do more with your provisioned resources

Availability

When employees work remotely, downtime is even more disruptive. In this new era of remote workforces, VDI environments must be highly available, with rapid remediation time and minimal loss of data. Cloud Volumes ONTAP builds redundancy into VDI environments, preventing data loss, and it provides a robust and cost-effective disaster recovery solution with NetApp Snapshot™ technology. Cloud Volumes ONTAP also supports both NFS and SMB/CIFS file share protocols, ensuring that your cloud file shares will be easily and reliably accessible to your workforce, wherever they are.

Automation

IT teams are being pushed to the limit to keep remote workforces running smoothly. Automating data management processes isn't just a "nice-to-have"; it's a necessity to avoid provisioning bottlenecks, downtime, failures, and data loss. Cloud Volumes ONTAP supports IT automation in the following ways:

- Single-pane visibility into and management of both on-premises and cloud environments
- Easy REST API integration for programmatic control over cloud storage management processes
- Integrated tools to automate processes, including Ansible and Terraform
- Automated data protection
- Integration with DevOps stack to automate the storage of CI/CD pipelines

It takes a wide range of cloud capabilities to solve the challenges of running VDI in the cloud. Cloud Volumes ONTAP offers options for scalability, high availability, and easy cloud orchestration and automation.

NetApp solution for cloud: Global File Cache (GFC)

Another area of opportunity to improve user access and data stores is in the single source of truth for distributed data. With most users working remotely and even globally, maintaining file integrity, accuracy, and accessibility can be difficult. With distributed VDI, businesses are finding it difficult to ensure that data is accessible and properly versioned. They need an enterprise-class centralized data management system that will work across the entire multi-cloud world. NetApp Global File Cache (GFC) is the enterprise-class answer to meeting this need.

GFC enables regional VDI farms to keep user productivity high and keep data close to the VDI farm and users without replication and syncing overhead. GFC is the centralized data management tool for distributed VDI. It is integrated with NetApp Virtual Desktop Service and NetApp VDS Sites, allowing customers to manage through its SaaS-delivered global control plane and single pane of glass.

GFC goes beyond other data management solutions by:

- Keeping regional VDI workspaces "closer" to the user population with ~30ms or less latency
- It does so for all locations by using VDI centralized data, providing one place for backup, scale, audit and compliance, etc.
- It provides a single version of truth for all users
- It enables easy roaming capabilities for mobile and transient workforces

With GFC, businesses can improve data access and performance, keep regional VDI data stores closer to the user, and solve the problem of data versioning mismatch in a global distributed VDI environment. GFC can also reduce replication and syncing costs. Finally, all of this can be done through the VDS SaaS-delivered global control plane and its single pane of glass, without requiring highly skilled IT resources to manage VDI distributed data stores. NetApp GFC is the enterprise-class solution for distributed VDI and centralized data management.

Hybrid

Opportunities and challenges of VDI hybrid environments

Opportunities

- Most customers are connecting to a multi-cloud environment while their VDI resides in their on-premises environments, thus creating a hybrid environment.
- Hybrid VDI allows customers restricted or choose to deploy VDI on-premises for performance, regulatory, compliance, and security objectives have the flexibility to leverage the cloud to scale up or down during fluctuating periods when acquisition, technical expertise, or data center access is not available.
- Hybrid VDI deployments have the flexibility to quickly scale when pressures of remote access fluctuate like in times of crisis, during shift work, seasonal workers and the like.
- When VDI is hybrid, users have direct, high-speed connectivity with real-time access.
- On-premises VDI deployments deliver predictable costs, even when user workloads fluctuate.
- On-premises IT has complete control over back-end infrastructure; companies can use any management, monitoring, and capacity planning tools they like, versus a cloud provider's proprietary management tools.

Challenges

- Hybrid VDI deployments often require disparate management interfaces and additional licensing.
- Hybrid VDI deployments are at high risk for underutilized resources that sit dormant or unused.
- Managing any VDI environment is complex and requires specialized expertise and more resources from an enterprise.

NetApp solution for hybrid: Converged Infrastructure (CI) NetApp

NetApp FlexPod delivers standardized converged infrastructure for VDI. FlexPod can handle mission critical VDI applications from hundreds to up to tens of thousands of users.

Scale quickly and easily without disruption

Growth of a VDI solution is all but inevitable, so a solution must scale, and scale predictably. FlexPod delivers software-driven scalability that provisions in software quick changes to the infrastructure. You can granularly and non-disruptively repurpose, add, or subtract compute, storage, and network resources. FlexPod VDI truly delivers infrastructure as code.

Increase scalability, agility and reliability with security

FlexPod UCS servers provide the core of the data center infrastructure for desktop virtualization. UCS drastically reduces the number of servers, switches, network interface cards (NICs), and host bus adapters (HBAs) needed, and the number of cables used per server. Because IT can rapidly deploy or re-allocate servers by using FlexPod UCS service profiles, operations are significantly simplified. Thousands of desktops can be provisioned quickly and efficiently through our ecosystem broker partners, including Citrix and VMware Horizon. This ease of provisioning makes end users productive more quickly, improves agility, and frees up IT resources for other tasks.

Harness a software-defined experience for both IT and End users

FlexPod abstraction comes from UCS compute and NetApp ONTAP® storage software offers plug-ins, management packs, and command lets that allow orchestration from UCS Director or other third-party software.

The fifth-generation Cisco UCS Server platforms support the new Intel Xeon Scalable processors, delivering faster CPUs and memory with increased core counts. The Cisco UCS M5 Server portfolio, which includes half-width blade servers, supports NVMe and industry-leading GPU density. These innovations allow you to address general compute infrastructure along with VDI, real-time analytics, deep learning, and machine learning with a common system-based approach.

Deploy a high-performance VDI solution with confidence

VDI designs are available for both VMware Horizon and Citrix Virtual Apps and Desktops. Designs are continually updated to highlight the latest FlexPod innovations.

Yesterday's brittle infrastructure can affect your satisfaction and bottom line. Today's FlexPod infrastructure is software-defined, standard, and proven to change as your VDI demands change. In lab tests, in real-world IT use cases, and throughout the world with thousands of customers, FlexPod delivers.

NetApp solution for hybrid: Hyper Converged Infrastructure (HCI) NetApp HCI

NetApp HCI is a hybrid cloud infrastructure that has a scalable architecture to meet your growing VDI demands. NetApp HCI delivers an elastic hybrid cloud infrastructure that enables customers to start anywhere, run anywhere, and manage everywhere.

Streamline your infrastructure

NetApp HCI is designed to deliver a public cloud consumption experience with simplicity, dynamic scale, and operational efficiency to hybrid/multi-clouds. NetApp HCI is built to seamlessly orchestrate containers on the premises. Infrastructure and cloud architects can easily access industry-leading services from any third-party cloud provider, run them on their premises, and mix and match these services to optimize resources for specific workloads and applications.

- Easily manage and run multiple applications with predictable performance
- Scale compute and storage resources independently, so you never pay for more than you use
- Deploy in minutes with a turnkey cloud infrastructure that eliminates the complex management of traditional three-tier architectures

Lower your TCO

Data centers don't scale linearly because business needs are constantly changing, and each application requires different things from the infrastructure. The NetApp HCI node-based shared-nothing architecture delivers independent scaling of compute and storage resources. This approach enables you to dynamically scale up or down on demand, avoiding costly and inefficient overprovisioning and simplifying capacity and performance planning.

To reduce TCO, start as small as two nodes and add exactly what you require to scale your infrastructure in a granular fashion over time. Third-party analysis shows that NetApp HCI is the lowest-cost all-flash HCI on the market today, reducing TCO by as much as 59%. By decoupling market-leading software from the underlying hardware under the term-capacity model, NetApp offers a modern purchasing model that aligns with how storage is bought and consumed today.

Increase your operational efficiency

One of the biggest challenges in any data center is to deliver predictable results, especially in the face of proliferating applications and workloads. Any time that multiple applications share the same infrastructure, the potential exists for one application to interfere with the performance of another. NetApp HCI solves predictability challenges with unique performance guarantees that:

- Provide granular control of every application
- Eliminate resource contention
- Deliver 3 times the storage performance
- Increase compute efficiency by 22%

Customer success stories

VDS

Brady Ware looks to NetApp for an automated, secure platform that supports the entire portfolio of Brady Ware software solutions and applications.

Brady Ware is an accounting firm that guides its clients through complex financial and tax issues. The firm transacts and engages with its clients through more than 40 different software applications. Brady Ware selected NetApp Virtual Desktop Service as the global control plane to deploy and manage a software-led virtual desktop environment to protect the identity, security, and management of the firm and its clients. [The full story >](#)

NetApp HCI

Internet safety service Family Plus uses NetApp HCI to balance application performance and infrastructure costs

Startups often struggle to meet demands for both service performance and future growth. Family Plus, a technology company that focuses on the healthy use of online technology, is a typical case. A primary consideration for Family Plus is that internet use peaks in the evening, and service cannot be interrupted. NetApp HCI, a hybrid cloud infrastructure that enables rapid expansion of resources, offers the flexibility, high performance, and fast scalability that Family Plus needs to meet these current and future demands. [The full story >](#)

Cloud Volumes ONTAP

Global company scales VDI capacity infinitely in 24 hours

This company is a prominent U.S. financial advisory enterprise that serves 140+ countries and markets with a global workforce of 45,000. They were already using Cloud Volumes ONTAP for Azure to meet their data retention, backup, disaster recovery, and availability use cases, while their self-hosted VDI

solution was using NetApp on-premises arrays to handle the SMB/CIFS file-sharing element. With the increased WFH demands, the company's internal IT team had to expand overnight the capacity of their self-hosted VDI environment to meet the needs of thousands of employees beginning to working from home. That's when they turned to NetApp Cloud Volumes ONTAP.

Using the flexible and cost-effective pay-as-you-go (PAYGO) model, it took the company's IT team just over 24 hours to deploy three new instances of Cloud Volumes ONTAP across three different Azure regions. They also replicated their on-premises VDI data to the cloud instances and configured the instance parameters to match their on-premises environment, ensuring that the company's global standards are maintained.

The immediate benefits the company gained from deploying their VDI with Cloud Volumes ONTAP include:

- Being able to burst into Azure quickly and agilely to meet WFH VDI demands when the capacity of the self-hosted environment reaches its limit
- Seamless transfer of VDI data to and from the cloud with no need for reformatting
- Enterprise-grade protection of VDI data in the cloud: encryption of data at rest as well as automated backups

Conclusion

- Virtual desktop infrastructure technology is powering the "new normal," enabling companies to create digital workspaces anywhere, any time.
- VDI is not a one-size-fits all solution; it includes configurations on the premises and in the cloud
- NetApp's portfolio of VDI solutions gives users flexibility, scalability, and cost savings

1 World Economic Forum, "The number of permanent remote workers is set to double in 2021." <https://www.weforum.org/agenda/2020/10/permanent-remote-workers-pandemic-coronavirus-covid-19-work-home/>

2 Tech News World, "Skills Shortage Rains on Cloud Advances." <https://www.technewsworld.com/story/86906.html>





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