NetApp®
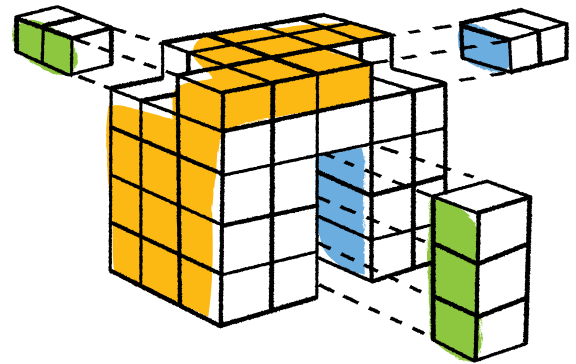
Solution Brief

NetApp Storage Solutions for VMware: Virtualize 100% of Your Data Center with Confidence

The Challenge

Addressing the perceived risks of 100% virtualization

Most organizations are hesitant to expand virtualization across their entire data center and instead tend to adopt it for some IT zones or noncritical applications. The complexity of virtualized infrastructures and specific concerns around cost, performance, availability, security, and agility have caused firms to delay the rolling out of an end-to-end shared, virtualized IT infrastructure.

High IT infrastructure costs

Explosive storage growth and complexity increase capital expenses as well as operating expenses associated with maintaining disparate tools and processes for storage and virtualization solutions. These costs combined with flat IT budgets place additional constraints on power, cooling, floor space, and headcount, making it increasingly difficult to manage and scale virtual infrastructures.

Complex, ineffective data protection and disaster recovery

Backing up or replicating data from a large number of virtual machines (VMs)

can create performance bottlenecks, making it even more difficult to meet stringent backup windows or recovery point and recovery time objectives (RPOs/RTOs).

Inability to meet changing business needs

Enterprises are often unable to rapidly deploy, resize, or update VMs and storage on a large scale to meet changing business requirements. Typical VM provisioning or cloning methods can be expensive and inefficient, requiring full copies of VMs and time-consuming scripting to integrate cloning processes with storage solutions.

Incomplete visibility across the entire data center is another factor that hinders IT agility, making it difficult to quickly determine how virtual server resources are being used and where potential bottlenecks reside. The lack of integrated storage and server management tools and automated provisioning and protection processes can further delay time-to-market objectives.
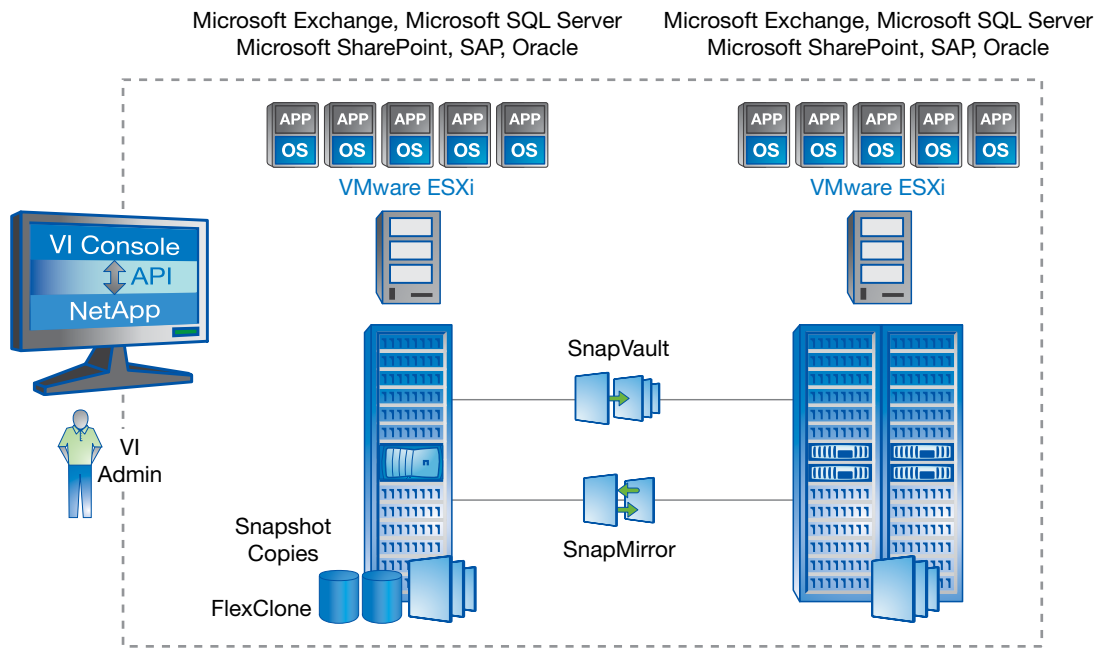
Microsoft Exchange, Microsoft SQL Server
Microsoft SharePoint, SAP, Oracle

Microsoft Exchange, Microsoft SQL Server
Microsoft SharePoint, SAP, Oracle

VMware ESXi

VMware ESXi

VI Console

API

NetApp

VI Admin

SnapVault

Snapshot Copies

SnapMirror

FlexClone

Figure 1) Virtual Server Architecture on NetApp

The NetApp Solution

Nearly 100% virtualization with minimal risk

NetApp offers a comprehensive, future-proof IT solution with an agile data infrastructure that helps you move toward 100% data center virtualization and get the most out of your virtual server environment. Our advanced storage virtualization capabilities complement the resource consolidation and cost savings offered by server virtualization while mitigating the risks of evolving to an end-to-end shared IT infrastructure.

Our strong technology partnership has resulted in tightly integrated solutions specifically for your VMware® environments. We've also integrated our technologies with business applications that run on virtual servers, including Exchange, SQL Server®, SharePoint®, Oracle®, and SAP®.

Be Fast and Efficient

50% lower power, cooling, and space costs for virtual servers

NetApp offers a variety of built-in storage efficiency capabilities that fully complement virtualized server environments without requiring extra equipment or affecting system or application performance.

- **Deduplication.** Virtual server environments create large amounts of duplicate data, including countless

OS instances and redundant application and user data. Our block-level deduplication technology eliminates redundant data transparently—on primary, backup, archive, and disaster recovery storage—helping you slash your power, cooling, and space needs. You can realize an average storage space savings of 60% to 70% for virtual servers and over 85% savings for backup, archive, and desktop data.

- **Thin provisioning.** Rather than overprovision your storage to meet unexpected workloads, you can resize your VM storage on demand with policy-based provisioning from an available storage pool. Thin provisioning provides a just-in-time approach, based on user-defined thresholds, that helps you increase storage utilization to 70% or more.

- **Virtual machine cloning.** Unlike other cloning solutions that require full VM copies, NetApp FlexClone® technology lets you provision thousands of VMs within minutes, leveraging space-efficient NetApp Snapshot™ technology. You can set up development and test environments or even new production environments using almost zero disk capacity. FlexClone also lets you cost-effectively use your DR site for additional purposes such as DR testing.

Cost-effective performance

Performance often represents a roadblock for organizations looking to expand virtualization to their business-critical applications. The NetApp Data ONTAP® operating system maintains high performance with resource efficient technologies, including Snapshot, FlexClone, deduplication, and the patented WAFL® (Write Anywhere File Layout), which enhances performance with built-in *write* I/O optimization

- **Virtual Storage Tiering.** NetApp delivers intelligent, dynamic virtual storage tiering that puts the right data at the right place at the right time. NetApp provides end-to-end data coherency across SSDs, disk drives, and server cache, increasing I/O throughput up to 80% and response time up to 90%.

- **VM host I/O Offloads.** NetApp's integration with virtualization solutions enables many resource-intensive tasks to be transferred from physical servers to storage arrays. Our integration with VMware vStorage APIs, for example, makes sure that rapid VM creation, provisioning, migration, and other advanced capabilities can be managed by NetApp storage, significantly reducing server CPU and memory loads and improving network bandwidth.

NETAPP CAPABILITY	KEY DIFFERENTIATOR
Extreme storage savings	NetApp is the only vendor that guarantees 50% storage savings in virtualized environments[1].
Unified architecture	NetApp is the only vendor that supports all protocols and data types across all its storage platforms with a single architecture.
Deduplication	NetApp is the only vendor that can deduplicate primary data, even on volumes up to 100TB.
Cost-effective performance	Deduplication-aware Flash Cache improves performance by 50% for resource-intensive applications without adding storage tiers.
Integration with virtualization solutions	Superior NetApp integration with VMware empowers VI administrators with advanced storage capabilities from a single console.
Integrated data protection	A single, integrated D2D2T data protection solution enables instant backups, user-based restores, cost-effective DR, and tape management.
Visibility across virtualized infrastructure	End-to-end visibility, insight, and fast root-cause analysis from a single console that also integrates with virtualization and orchestration solutions.
Data mobility	Nondisruptive data and application mobility eliminates planned downtime for upgrades, maintenance, load balancing, and technology refreshes.
Secure data isolation	NetApp delivers maximum flexibility of your shared storage infrastructure with secure multi-tenancy.

Table 1) Key Differentiators

Simplified virtualization operations

Studies show that enterprises spend much more money managing their virtual infrastructures than they spend on implementation.

- **Unified storage architecture.** Unlike other storage vendors, NetApp provides a single architecture that can support FC, iSCSI, NFS, and CIFS protocols across all its storage systems. By using the same management tools and process across all systems, you can greatly simplify administration and reduce operational costs for both SAN- and NFS-based virtual server environments.
- **Automated, integrated management.** NetApp enables you to manage and automate practically all frequently recurring storage and data management activities with well-defined policies from a single NetApp OnCommand™ console. This includes VM backups, provisioning, resizing, failover, replication, and alerting for proactive capacity and health monitoring.
- **Empowering VI administrators.** NetApp plug-ins and API integration with VMware vCenter™ empowers your VI administrators, enabling them to better manage server and storage resources without affecting existing storage policies. With NetApp Virtual Storage Console, VI administrators can easily and

directly manage storage tasks such as discovery, health monitoring, storage provisioning, VM cloning, backup, and restore from existing virtualization user interfaces.
- **Empowering application administrators**. NetApp has also integrated advanced data protection capabilities with popular applications that run on virtual servers, including Exchange, SQL Server, SharePoint, Oracle, and SAP. Using SnapManager® software within the OnCommand suite, application administrators can easily back up and restore data or set up automated policy-based schedules for local backups or replication for off-site disaster recovery using familiar application user interfaces.

Automate Application Availability
Integrated data protection

NetApp addresses the broad spectrum of data protection challenges with the integration of core Data ONTAP technologies, including point-in-time copies (to disk or tape), failover clustering, and data replication, that automate and simplify backup, high availability, and disaster recovery operations.

Continuous data availability with minimum cost and impact

NetApp's integrated technologies can help you achieve over 99.999% system availability for your virtualized server environment by eliminating both planned and unplanned downtime.

NetApp clustered Data ONTAP offers continuous business operations, seamless scaling of capacity and performance, and elastic scaling of VMware environments.

- **Eliminate unplanned downtime.** NetApp MetroCluster™ is the industry's only solution that combines array-based clustering and synchronous data mirroring to ensure zero downtime and zero data loss at half the cost and complexity of competitive solutions. MetroCluster automatically and transparently coordinates storage failover with server fault tolerance capabilities for continuous operation of critical applications. To protect your data from site disasters, MetroCluster also enables failover to another site up to 160 kilometers away.
- **Eliminate planned downtime.** Now you no longer have to schedule downtime for storage maintenance, upgrades, patching, or load balancing. NetApp DataMotion™ technology lets you transparently encapsulate and move applications and data from one storage system to another nondisruptively, with negligible performance impact.

Fast, cost-effective disaster recovery operations and testing

Today's global organizations need a multisite solution that can rapidly recover data from local outages as well as disasters that extend beyond a metropolitan area.

- NetApp SnapMirror®—the industry's leading storage replication software[2]—mitigates the risk of wide area outages, enabling you to replicate your VM data consistently across unlimited distances over IP or Fibre Channel networks. You can recover data for your business-critical applications within minutes versus hours or days with traditional solutions. SnapMirror also optimizes network bandwidth and minimizes storage requirements at your DR sites by eliminating redundant data and replicating only changes to data blocks. We've also integrated SnapMirror and FlexClone with DR technologies from VMware for automated, reliable disaster recovery workflows and zero-cost, zero-downtime DR testing.

Removing backup challenges for virtual servers

NetApp Snapshot—the industry's fastest and most space-efficient point-in-time copy technology—enables you to back up your VMs instantaneously, at any time of the day and as frequently as desired. Snapshot copies consume virtually zero disk space, making your backup window a thing of the past—and they can be used to restore your VMs within minutes or even seconds.

- **Disk-to-disk backup.** NetApp SnapVault® leverages Snapshot technology to deliver fast, space-efficient backups directly from disk to disk, between NetApp systems. SnapVault also uses thin replication to capture only incremental block-level changes with each backup, not entire copies of files.
- **End-to-end, unified backup and recovery**. Many firms still use tape for low-cost, long-term data retention. NetApp SnapProtect™ eliminates the need for multiple tape and disk backup solutions across storage tiers. It simplifies and accelerates backup processes with integrated disk-to-disk-to-tape data protection that manages and tracks Snapshot copy creation, replication, and tape

movement. You can provide local point-in-time copies, backups to tape, and replication to a DR site with a single unified solution that doesn't require complex scripting or process management. SnapProtect also provides a file catalog and indexing for fast data search and restore across all storage tiers.

Align to and Accelerate the Business

Agility is a key reason why organizations choose to virtualize their infrastructures; however, IT responsiveness often slows down as virtual environments grow. Resources typically can't be deployed or serviced quickly enough to meet rapidly changing business requirements, and bottlenecks can't be averted because firms don't have the right tools to quickly determine the capacity and health of physical and virtual resources.

Faster time to deployment

NetApp enables you to leverage a shared pool of dynamic resources that can be rapidly provisioned for new or test environments or used to scale existing applications nondisruptively.

- **Zero-cost, large-scale VM provisioning.** NetApp FlexClone lets you provision virtual servers and applications up to 97% faster than methods that rely on full VM copies (clones). FlexClone uses writable Snapshot copies that take up almost no disk space and can be used to clone and deploy 1,000 VMs in 10 minutes or 10,000 VMs in less than an hour. Development and test environments that used to take weeks or months to set up can now be created in a fraction of the time, improving your time to production.
- **Automated provisioning and protection.** With NetApp OnCommand you can easily maintain application SLAs by selecting a specific service level from a service catalog when deploying new storage. OnCommand automatically encapsulates the appropriate storage resources with the required provisioning and protection policies, so you can meet critical

application requirements for performance and availability.

Faster response to changing business needs

NetApp provides a simple, open approach to service analytics and the overall management of virtualized infrastructures. Our single, integrated OnCommand solution removes complexity and delivers much greater responsiveness and specialized tools to integrate with orchestration frameworks.

- **End-to-end visibility and management.** With OnCommand Insight you can gain visibility and insight from applications to volumes for more accurate forecasting and capacity planning and faster troubleshooting and root-cause analysis—from a single console. A combination of trend-based projections and real-time information helps you prevent overprovisioning and performance bottlenecks and accelerates management decisions.

NetApp Professional Services

NetApp not only provides an ideal virtualized destination, we also help you get there—faster and reliably—with service and support offerings tailored for your virtual server environment. NetApp Services for Virtualization span all stages of your solution lifecycle, including assessment, consulting, deployment, and on-site managed services. Leverage our expertise across NetApp and VMware solutions to further reduce your TCO and risk and get the most out of your virtualization technology investment.

1. NetApp Virtualization Guarantee Program. See *www.netapp.com/guarantee* for details.
2. Source: IDC, June 2011.

About NetApp

NetApp creates innovative storage and data management solutions that deliver outstanding cost efficiency and accelerate business breakthroughs. Discover our passion for helping companies around the world go further, faster at *www.netapp.com*.

Go further, faster®

NetApp®

www.netapp.com

Follow us on: