

Accelerating Virtualization

VMware and NetApp

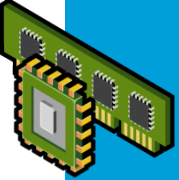




Thomas Kraus, VCDX
Director of Engineering
Siwel Consulting

A History of Corporate Partnership



- Over 8,000 joint ESX customers
- Mutual Global Alliance Partners
- Established Virtualization Joint escalation team
- NetApp is the reference platform for iSCSI and NFS development
- Entire NetApp product portfolio is VMware® certified
- NetApp working to define the vStorage API standards

Technical Synergy

	VMware Technologies	NetApp Technologies
 Server	Transparent Page Sharing	Deduplicated Array Cache
 Storage	Linked Clones	FlexClone® Zero Cost Clones
 Storage	VMDK Thin Provisioning	Volume Thin Provisioning & Dedupe
 Connectivity	FC, iSCSI, NFS, FCoE	FC, iSCSI, NFS FCoE, CIFS
 Application Performance	Shares, Reservations, Limits, vApps	Dynamic QoS FlexShare™

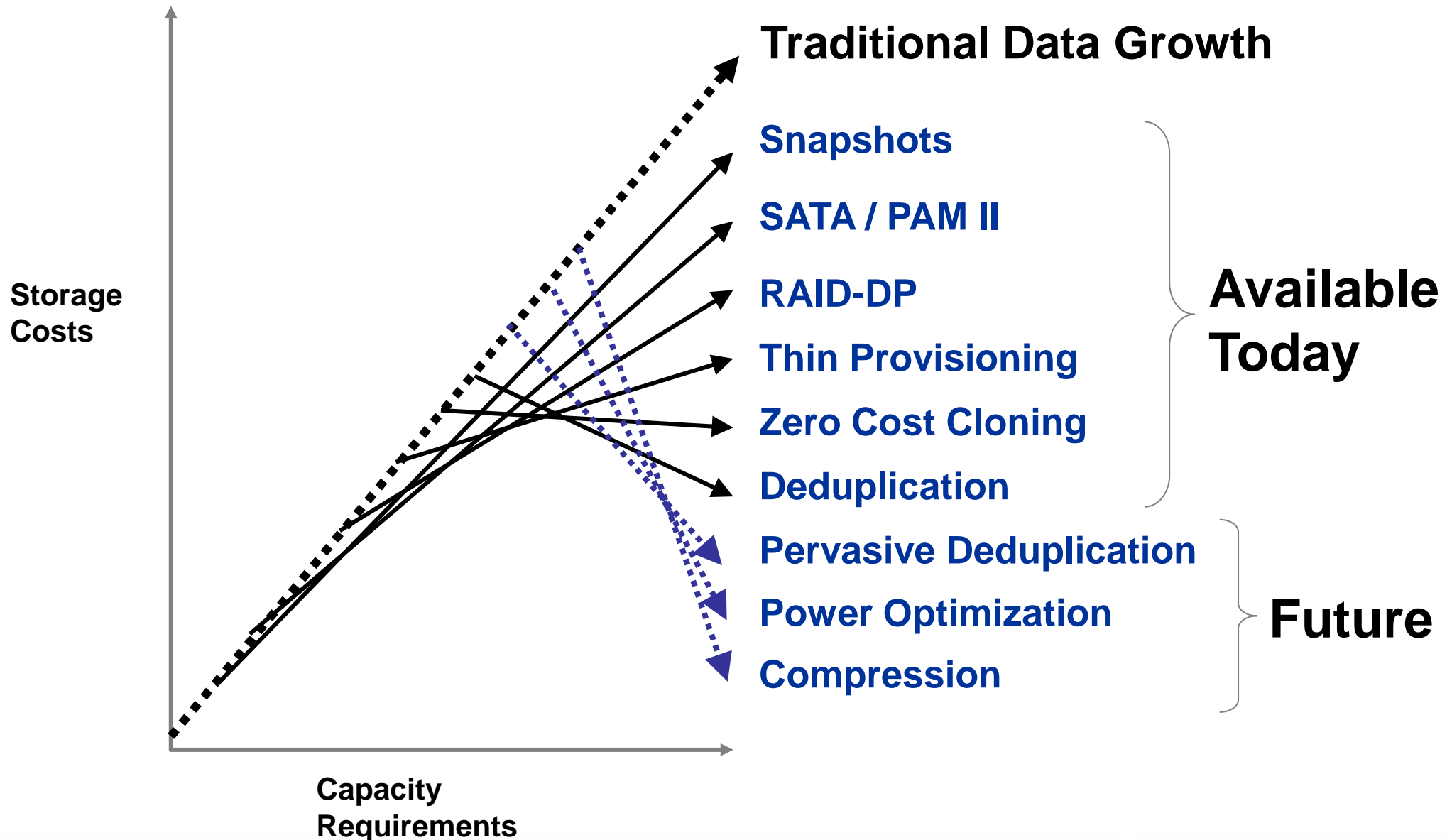
VMware's Effect on Storage

- Enterprise features of VMware require shared storage
 - VMotion
 - Storage VMotion
 - HA / DRS
 - Fault Tolerance
- Additional capacity required for VMware snapshots, vmkernel swap, and VMFS overhead
- Reasons for migration to network storage:
 - Increased **mobility** (66%)
 - Cost effective **Disaster Recovery** (61%)
 - Increased Uptime and **Availability** (56%)

NetApp reduces storage consumption and address the costs associated with the storage infrastructure

Source: Enterprise Strategy Group, 2007

NetApp Storage Efficiency



Cost-Effective Data Reliability

The Problem:

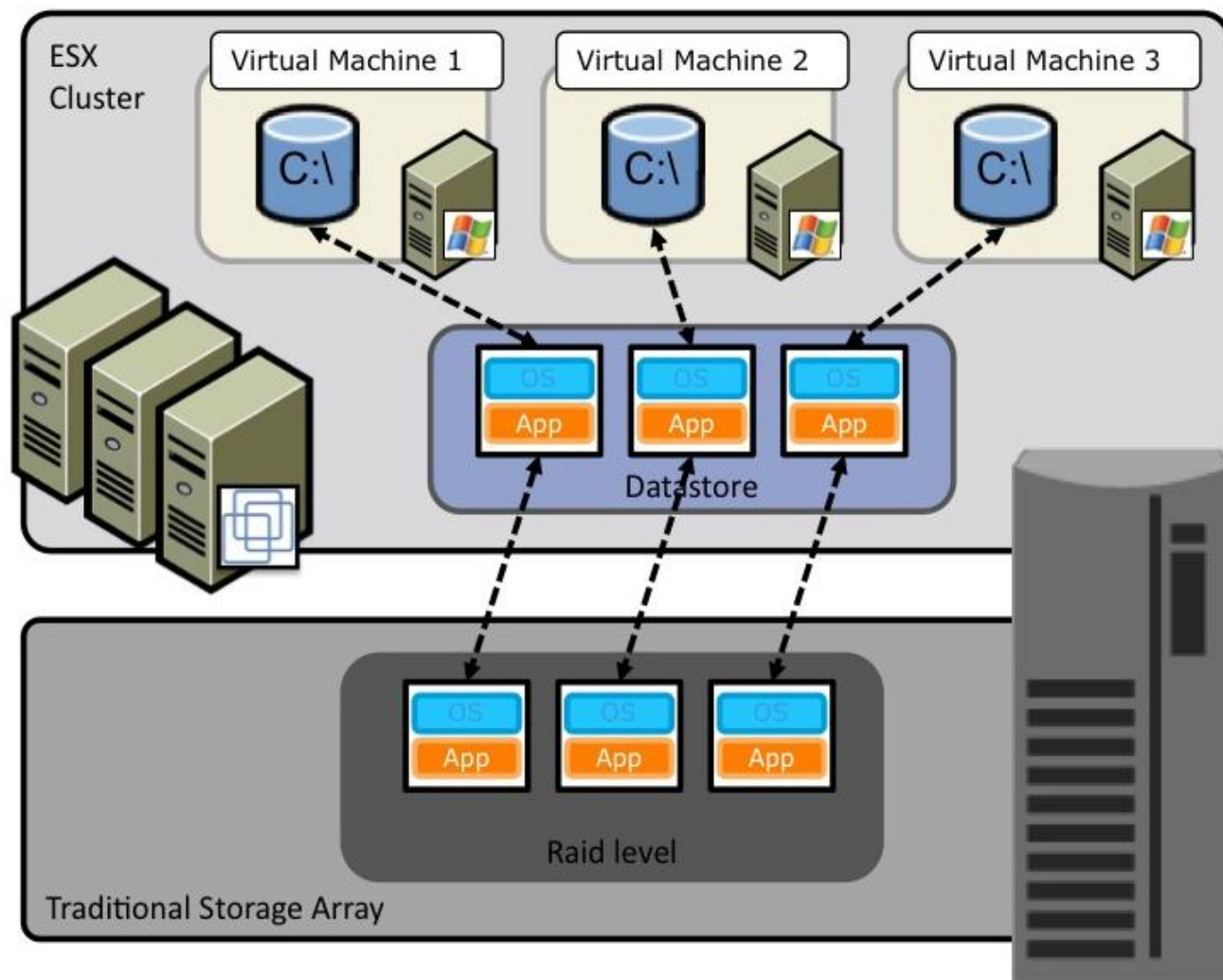
- Double disk failure is a mathematical certainty
- Failures are magnified in Vmware environments
- RAID 5 (single parity disk)
 - Insufficient protection
- RAID 10 (mirrored copy)
 - Double the cost

NetApp RAID-DP® Solution:

- Protects against double disk failure
- High performance and fast rebuild
- Same protection and performance as RAID 10 at half the cost
- High utilization (87.5% default)

	RAID 5	RAID 6	RAID 10	RAID-DP
Cost	Low	Low	High	Low
Performance	Low	Low	High	High
Resiliency	Low	High	Med	High

Traditional VMware Storage Utilization

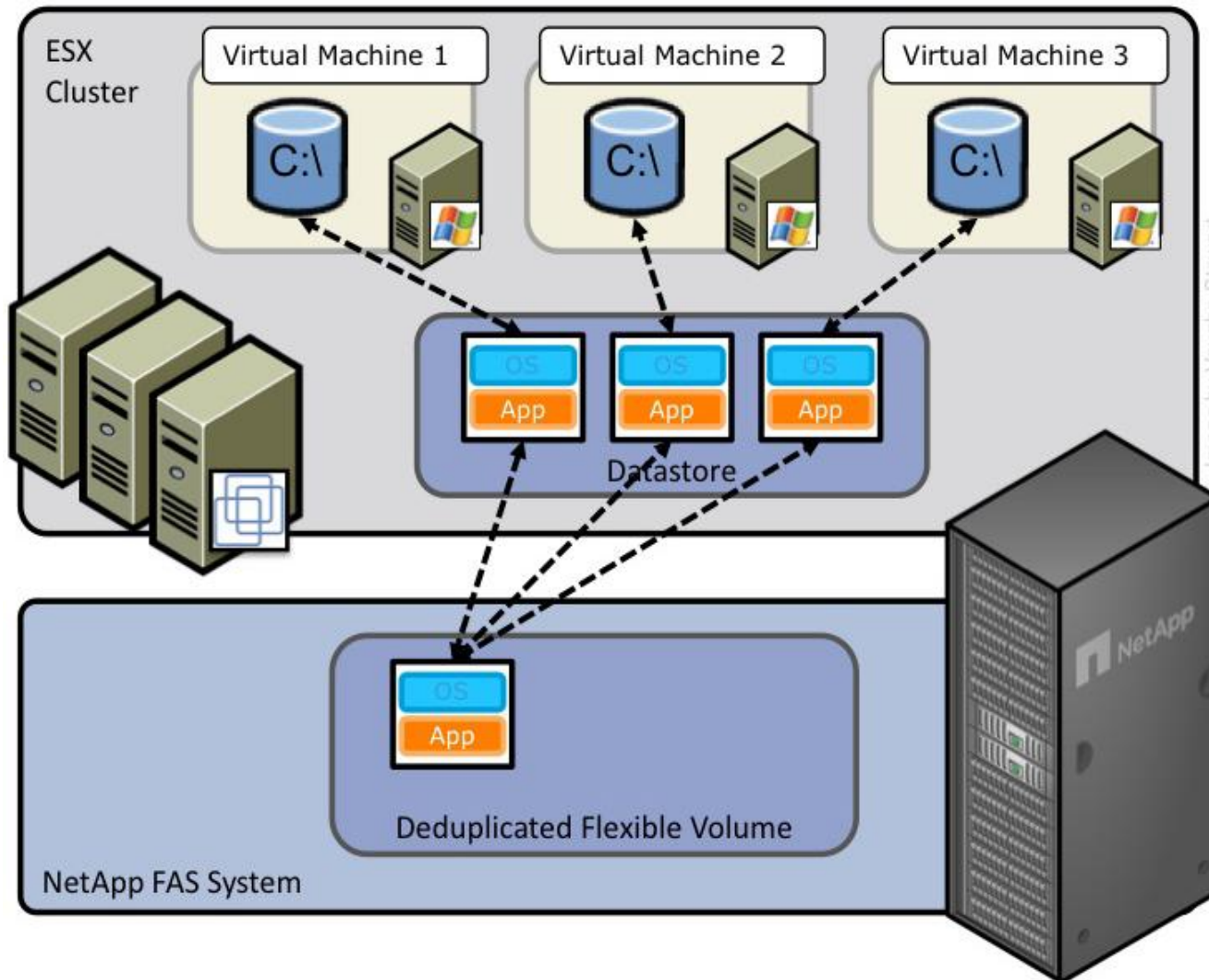


VMware templates and clones

- Clones are 100% identical
- Including OS and applications
- Clones consume storage equal to size of original template

By design VMware® environments are very redundant

VMware on NetApp Storage Utilization



Dedupe removes redundant data

- Supports FCP, iSCSI, & NFS
- 50% – 70% storage reduction
- Enhances linked clones in VDI w/ dedupe of:
 - User data
 - Persistent or
 - Non-Persistent Desktops

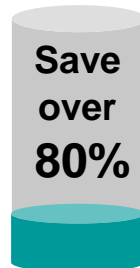
NetApp dedupe aware cache scales storage beyond limits

NetApp Software Efficiencies: Dramatic Reductions in Storage Space



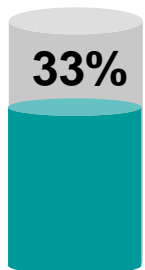
Deduplication

Saves up to 95% for full backups; 25% to 55% for most data sets



Snapshot™ Copies

NetApp Snapshot copies do not require “copy” space, serve local backup purposes, deliver savings of up to 80%



Thin Provisioning (FlexVol®)

20% to 33% typical savings



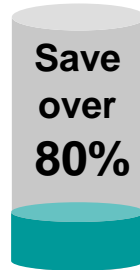
Thin Replication

Disk-to-disk data protection saves up to 95%



Double Parity RAID (RAID-DP®)

Saves up to 46% versus mirrored data or RAID 10

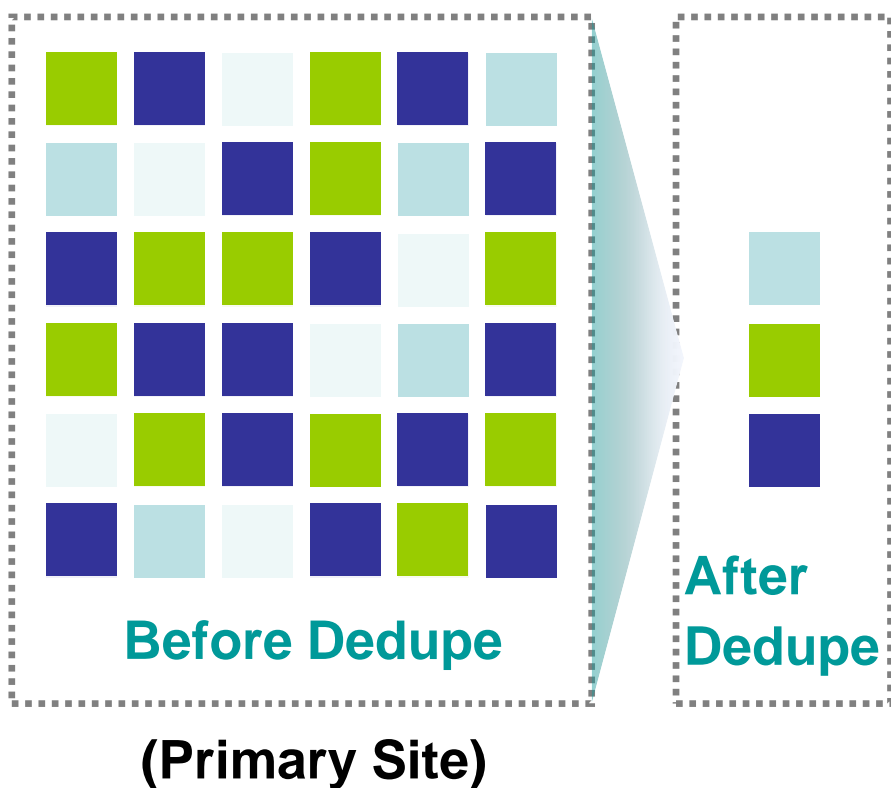


Virtual Clones (FlexClone®)

Savings equal size of the original data set minus blocks subsequently changed in clone

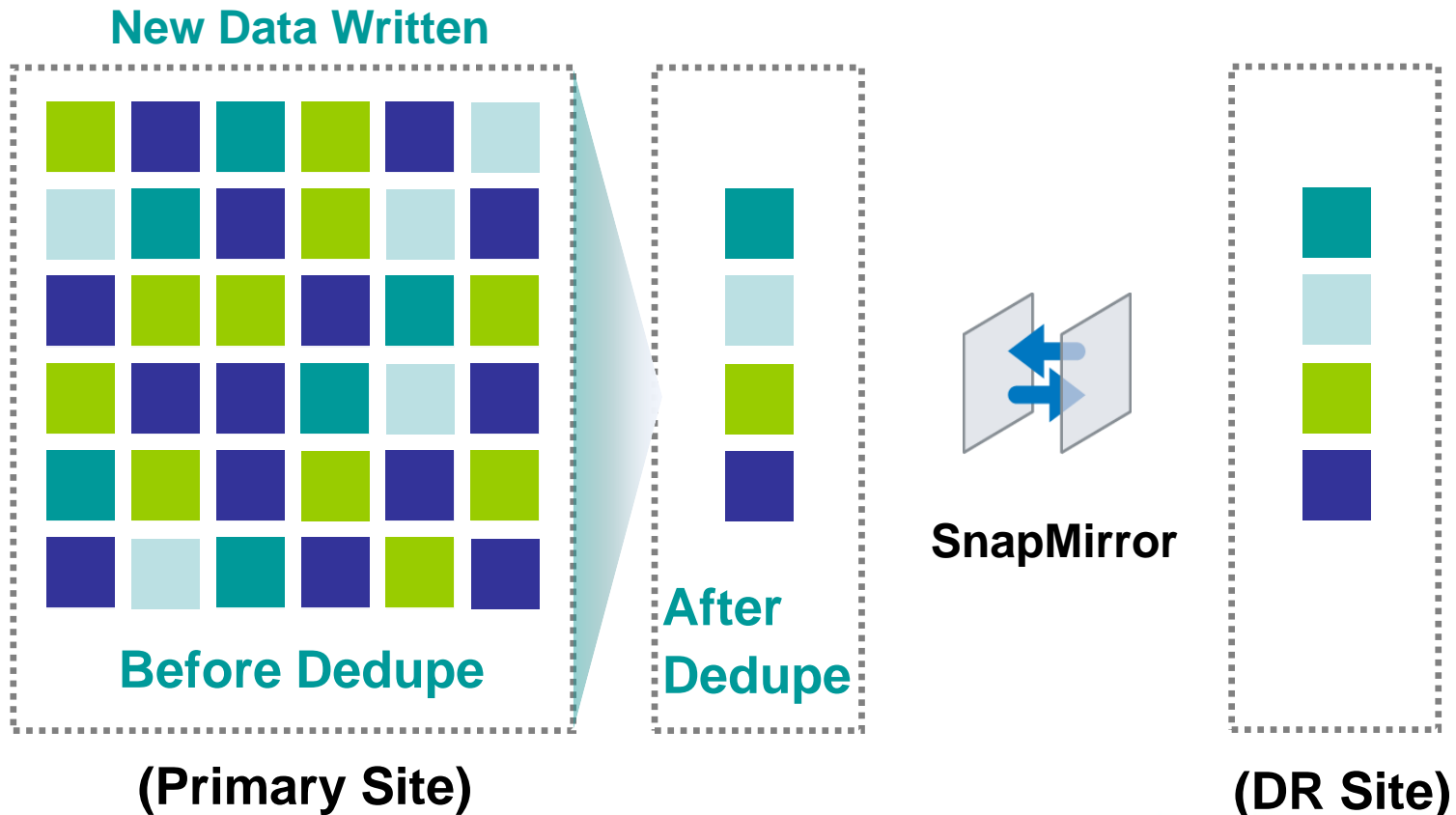
Storage Savings : Integrated Dedupe

- NetApp deduplication on primary storage



Deduplication and SnapMirror

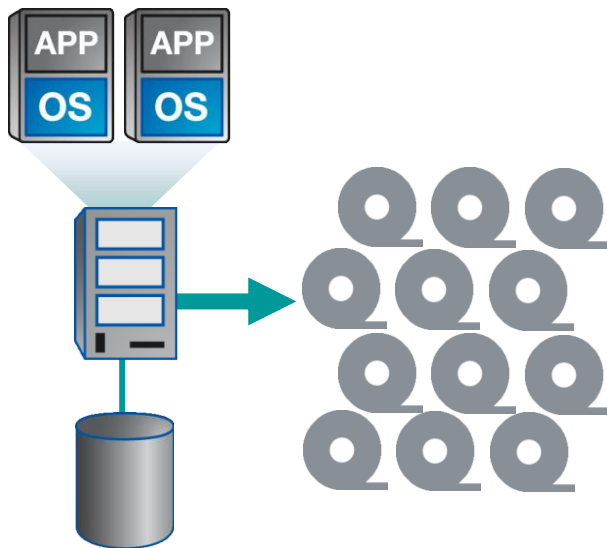
- Replicates only the deduplicated blocks
- Only unique data is replicated to the DR site



Instant Storage-Efficient Backups

The Problem

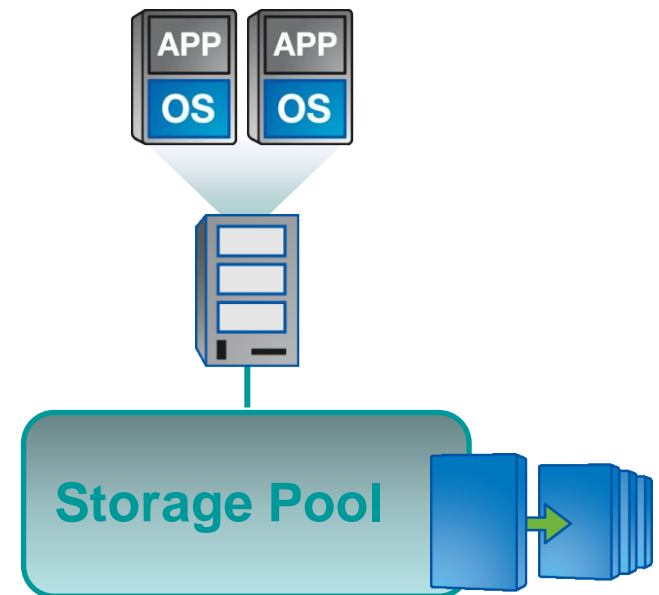
- Tape is slow, complex
- Backup / Recovery takes too long
- Recovery points are limited
- Large amounts of data



Traditional Backup Is NOT Practical

NetApp Snapshot™ Solution

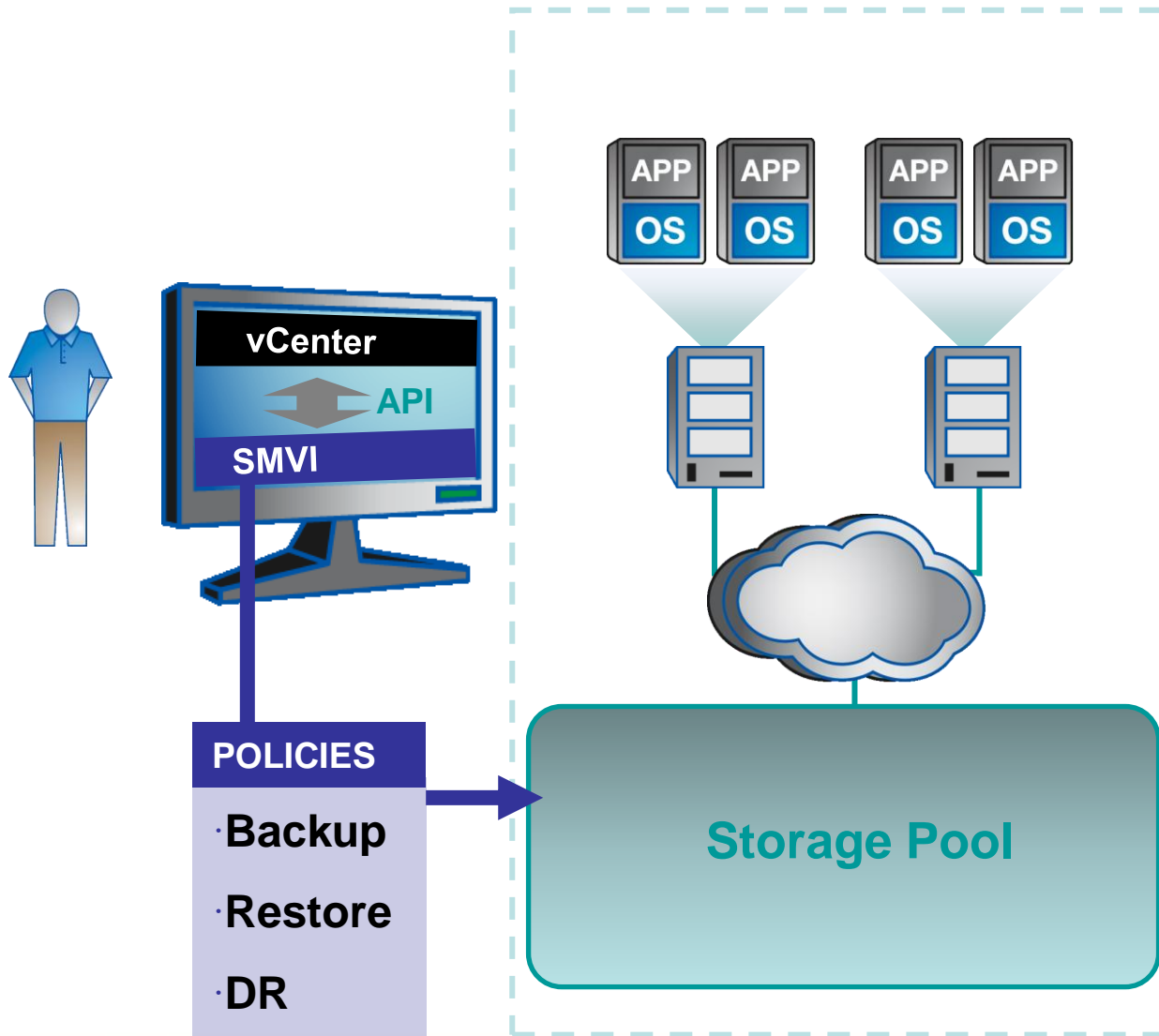
- Backups built in to the storage
- Instantaneous backup & recovery
- Space efficiency
- No performance penalty



Fast, Affordable, and Simple

SnapManager® for Virtual Infrastructure

Primary Site

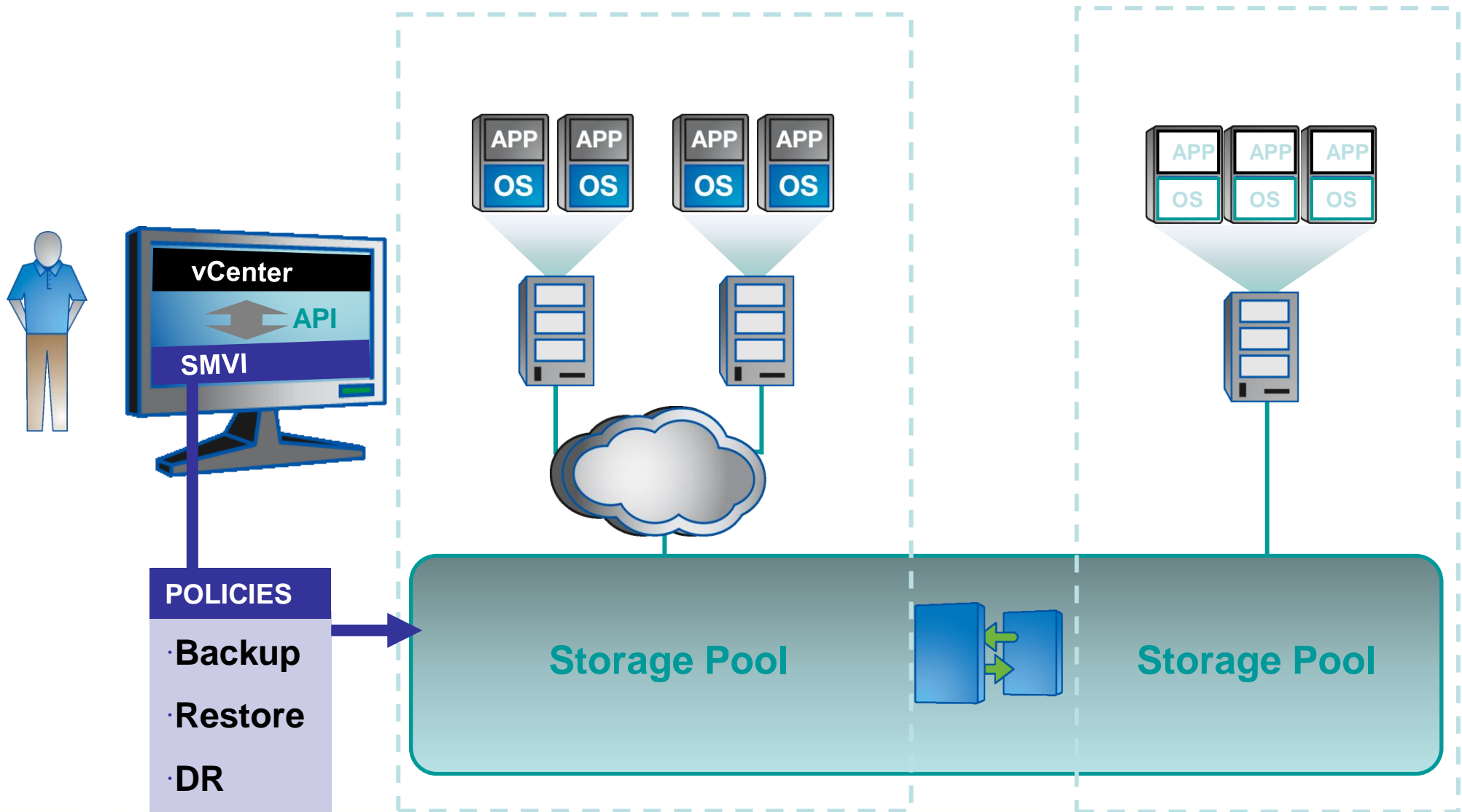


- Policy-based management of
 - Snapshots
 - Restores
 - Replication
- No performance hit
- Backup hundreds of running VM's in minutes
- Restore Datastore, VM, or Individual File
- SMVI coordinated with Virtual Center
 - VM-aware snapshot
 - VM locality

SMVI Automates DR Replication

Primary Site

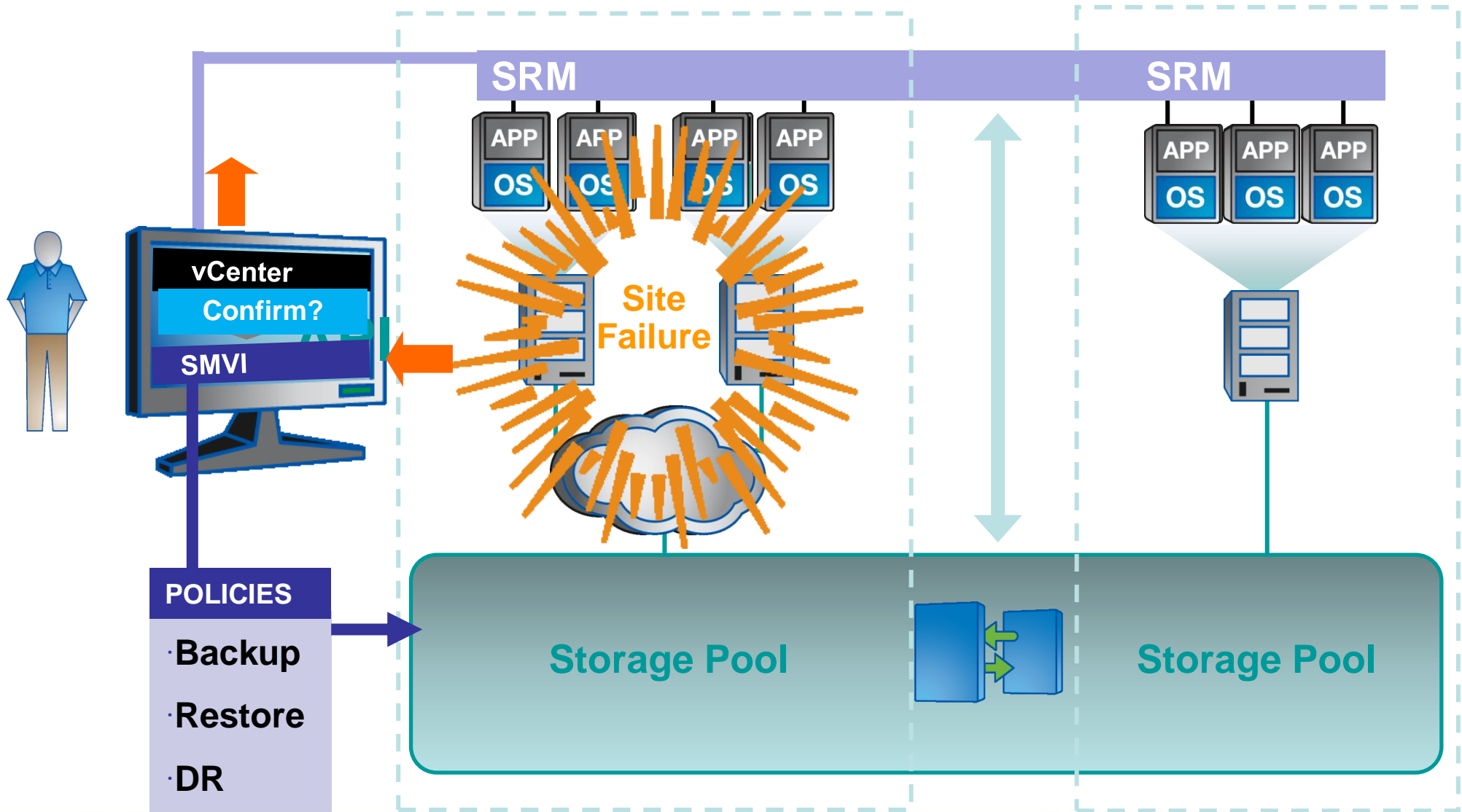
DR Site



VMware Site Recovery Manager

Primary Site

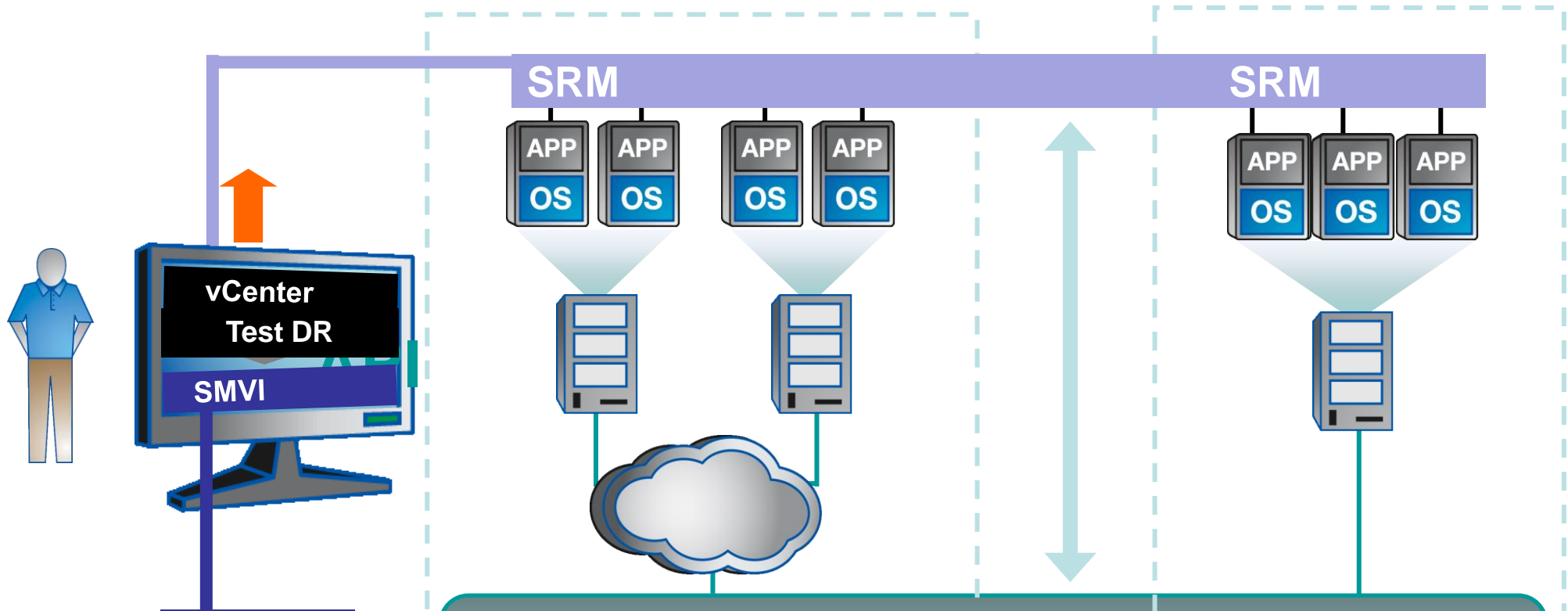
DR Site



SRM DR Testing w/FlexClone

Primary Site

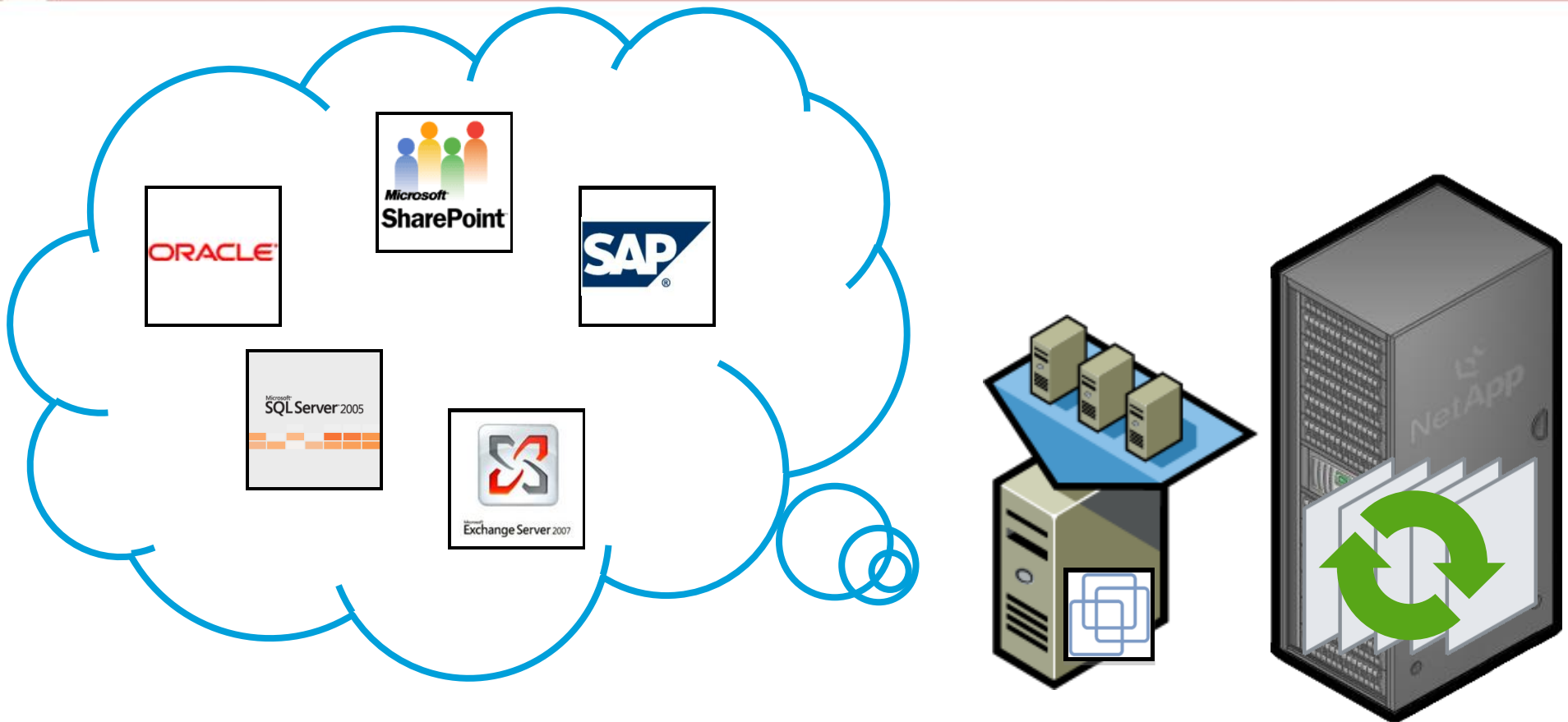
DR Site



“I can [also] quickly test and automate my DR with VMware® Site Recovery Manager and NetApp® FlexClone®. Bottom line: NetApp saves us a ton of time and money.”

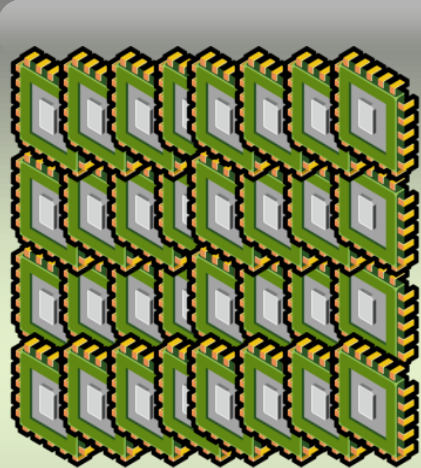
—Vincent Biddlecombe, CTO, Transplace

Business Continuance in the Cloud

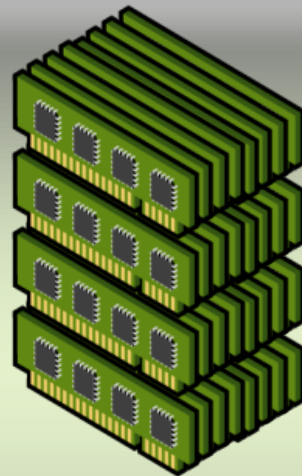


SnapManager for enterprise RPO & RTO:

- Co-Developed by NetApp Global Alliance Partners
 - Microsoft, Oracle, SAP & VMware



64 Cores



1 TB RAM

■ ESX 3.5 today

- 32-cores per server
- 256 GB RAM per server
- 170 VMs per server

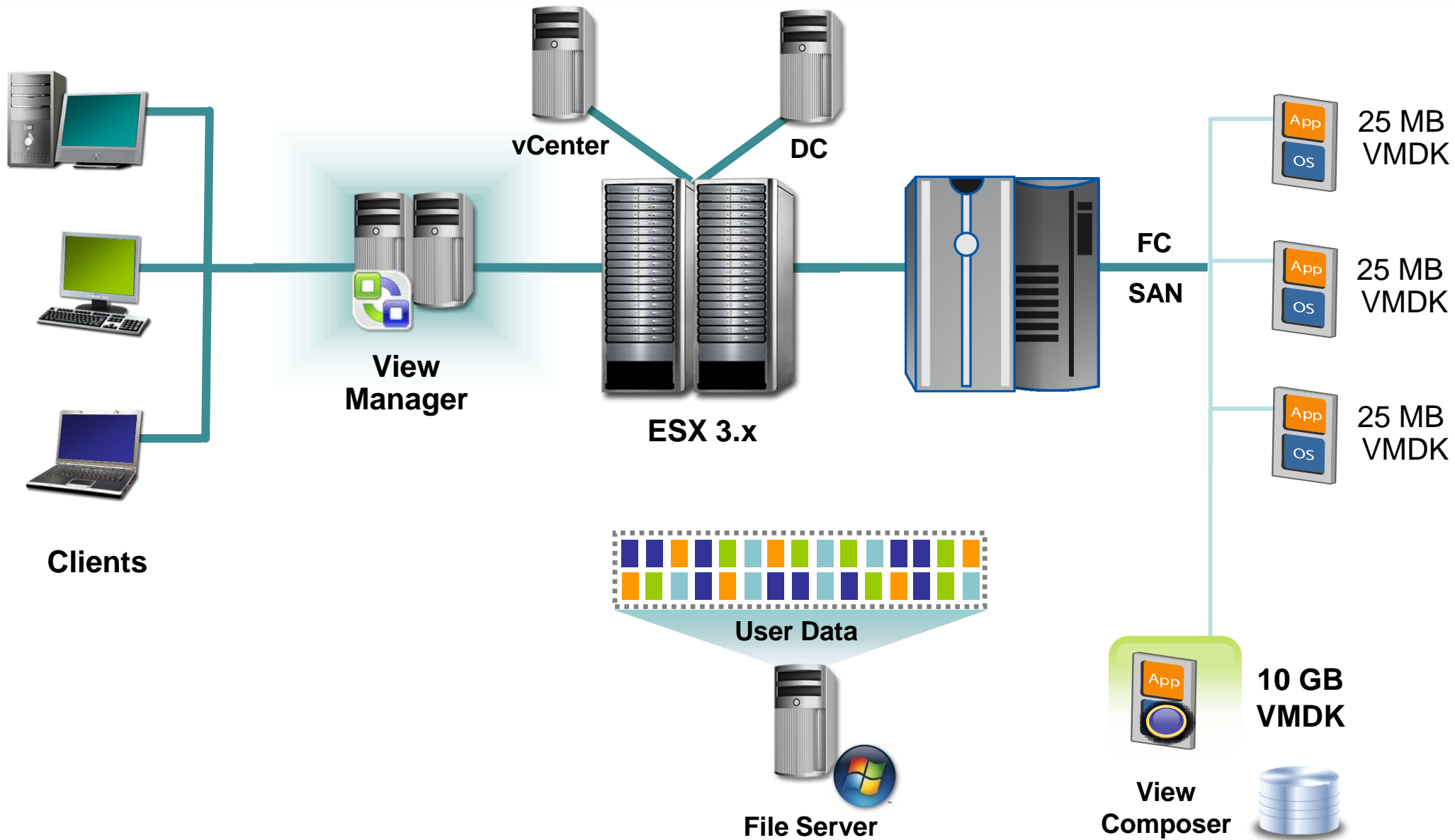
■ vSphere 4.0

- 64-bit hypervisor
- 8 vCPUs per guest
- 64-cores per server
- 1TB RAM per server
- 320 VMs per server
- Disk: 350K IOPS
- Network: 30Gbps+

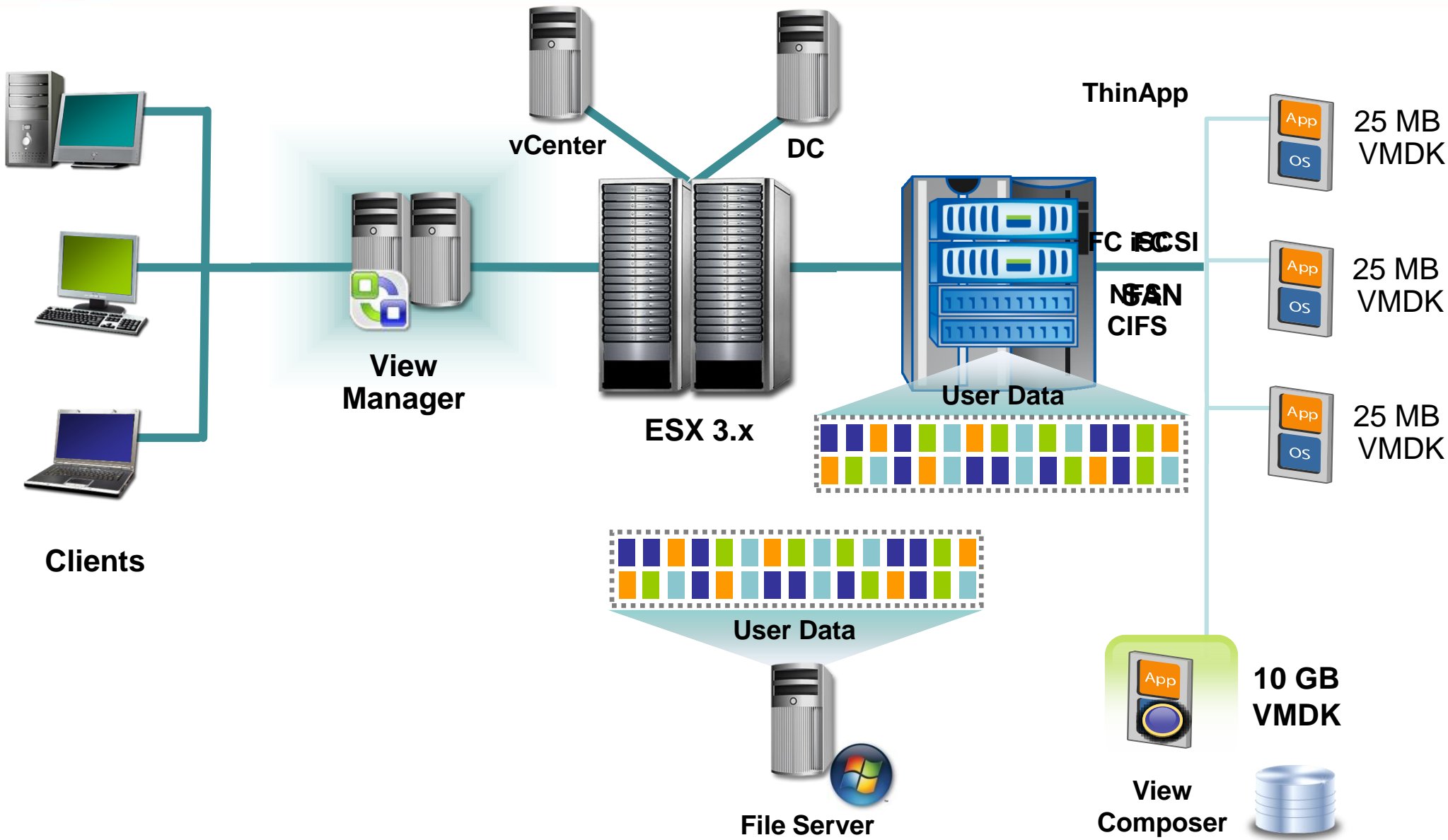
VMware vSphere Storage Enhancements

- vSphere is the foundation for cloud computing
- VMware is enabling storage functionality for small environments (those w/o intelligent storage)
 - Thin-provisioned virtual disks
 - Reduces initial storage consumption
 - Lacks support with all features
 - VMware Data Recovery
 - Provides backup to disk and simple recovery at a file or image level for small environments
 - Automating multipathing assignments
 - ALUA plug-n-play multipathing for SAN
 - Enhancements to iSCSI SW implementation

VMware View



VMware View on NetApp

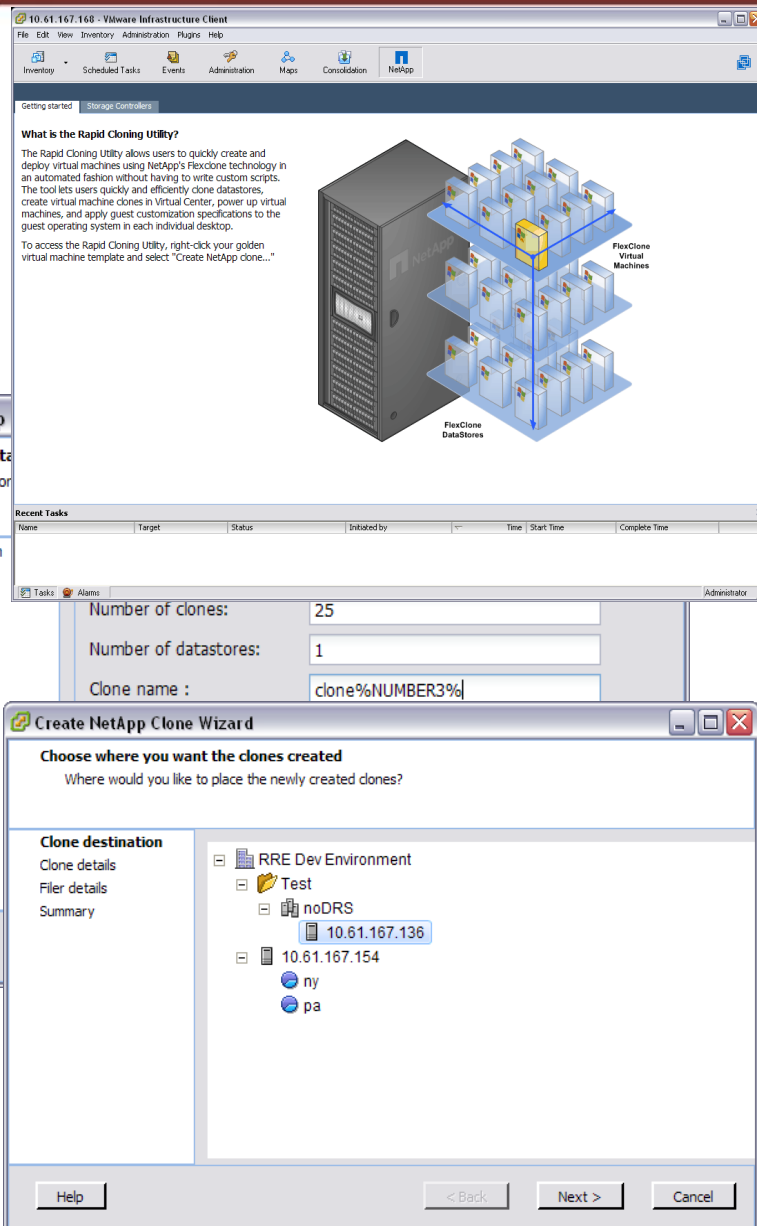


Automated Virtual Machine Cloning

NetApp Rapid Cloning Utility

- Integrated cloning and provisioning utility for VMware® virtual machines
- vCenter plugin
- Import cloned desktops into VMware View Manager
- Provided free of charge to NetApp customers

Provision thousand of VMs in just minutes (at zero cost)



Energy Sector Case Study: Before

- Exponential VM and storage growth.
- Complex mix of storage technologies (DASDI, iSCSI, FC) from multiple vendors.
- No flexibility for provisioning or expanding capacity.
- Critical application server backups taking 6+ hours and restores take longer.
- Single nightly backup limits recovery options
- Data movement between production and UAT takes days.



Energy Sector Case Study: After

- VMware storage & replication reduced by **64%** or **4,764 GB**
- A **single architecture**, management, and backup strategy for ESX, Direct Attached hosts, and Windows File Sharing
- Capacity is added & datastores resized online **on demand**
- Critical VM & application aware backups reduced to **minutes**
- Backups every two hours provide **multiple** recovery points
- Automated process to refresh UAT from production servers in minutes **without doubling the storage**

“...if you are looking over these core technologies, I’d suggest you talk to [Siwel] before making a decision.”

Senior Director, Enterprise Architecture

Reduce VMware Storage Costs

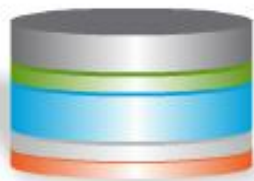


- Deduplicate redundant data
 - Virtual machines, user data, protection copies
- Double storage utilization levels
 - Avoid overprovisioning capacity
- Zero-capacity VM clones
 - Create virtual machines using no additional storage
- RAID 10 protection at ½ the cost



Traditional
Storage Requirements

192TB



NetApp
Requirements

67TB

**Use at least 50% less storage.
Guaranteed*.**

*For terms and conditions, go to netapp.com/guarantee



Thank You !

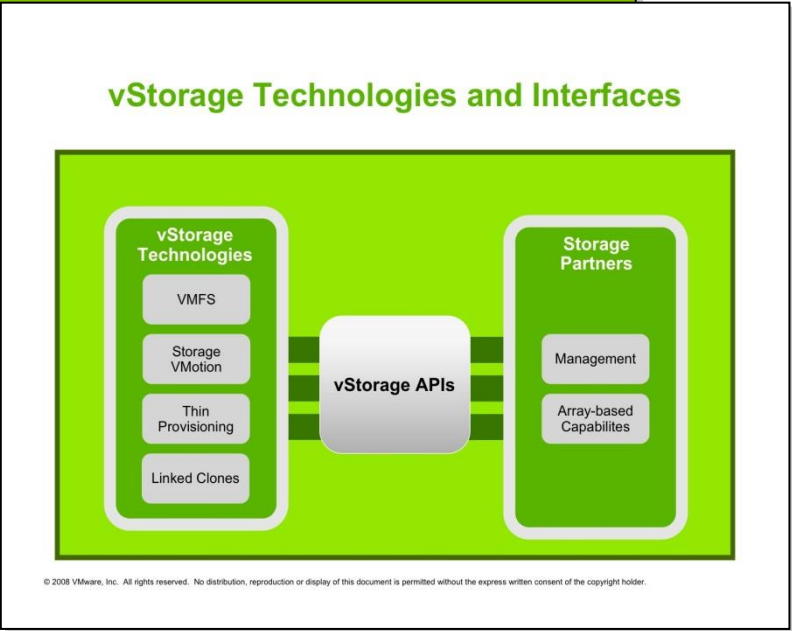
The VMware vStorage Initiative

Virtually anything is possible.

Partner Integrations

Dell/Equallogic
EMC
NetApp

vmworld 2008



VMware vStorage Initiatives

vStorage

Implementation

NetApp vStorage

Initiatives

Details

Implementations



Virtual Storage
Mgmt Appliances

Open Specifications

Virtual
Operations Mgr



Thin Provisioned
Mgmt Policies

Open Specifications

Implementing on
SAN & NAS



Linked Clones

Software
Implementation

API with FlexClone®
Integration



Virtual Storage
Appliances

Open Specifications

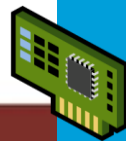
Data ONTAP®
Virtual Appliance



Multipathing APIs

Open API

Plug-n-Play
via ALUA



Offload Writing
Zeros

Open API

Implementing on
SAN & NAS

vStorage Virtual Appliances

vStorage

Initiatives



**Virtual Storage
Mgmt Appliances**



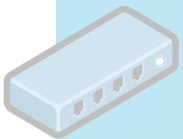
**Thin Provisioned
Mgmt Policies**



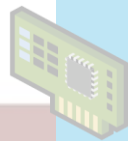
Linked Clones



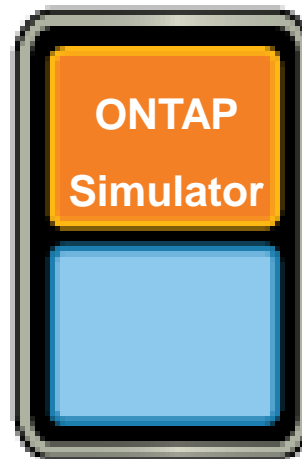
**Virtual Storage
Appliances**



Multipathing APIs



**Offload Writing
Zeros**



vStorage Intelligent Storage Policies

vStorage

Initiatives



Virtual Storage
Mgmt Appliances



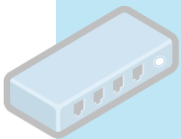
Thin Provisioned
Mgmt Policies



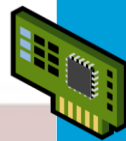
Linked Clones



Virtual Storage
Appliances



Multipathing APIs



Offload Writing
Zeros



Low Utilization

vStorage Multipathing

vStorage

Initiatives



Virtual Storage
Mgmt Appliances



Thin Provisioned
Mgmt Policies



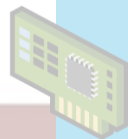
Linked Clones



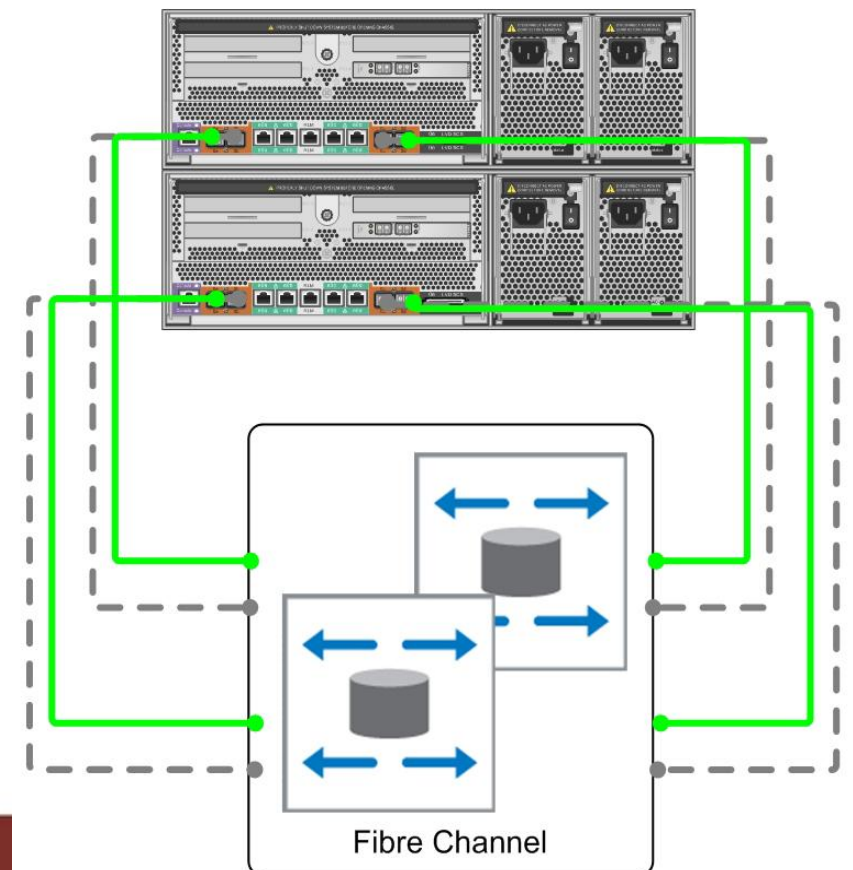
Virtual Storage
Appliances



Multipathing APIs



Offload Writing
Zeros



Initiatives



Virtual Storage
Mgmt Appliances



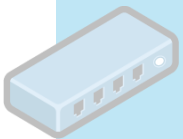
Thin Provisioned
Mgmt Policies



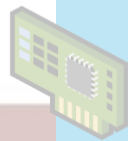
Linked Clones



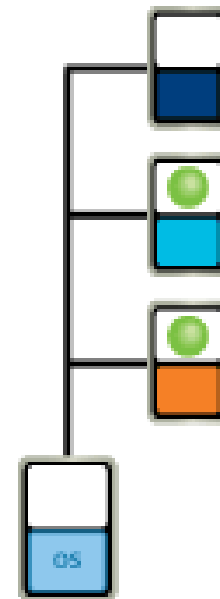
Virtual Storage
Appliances



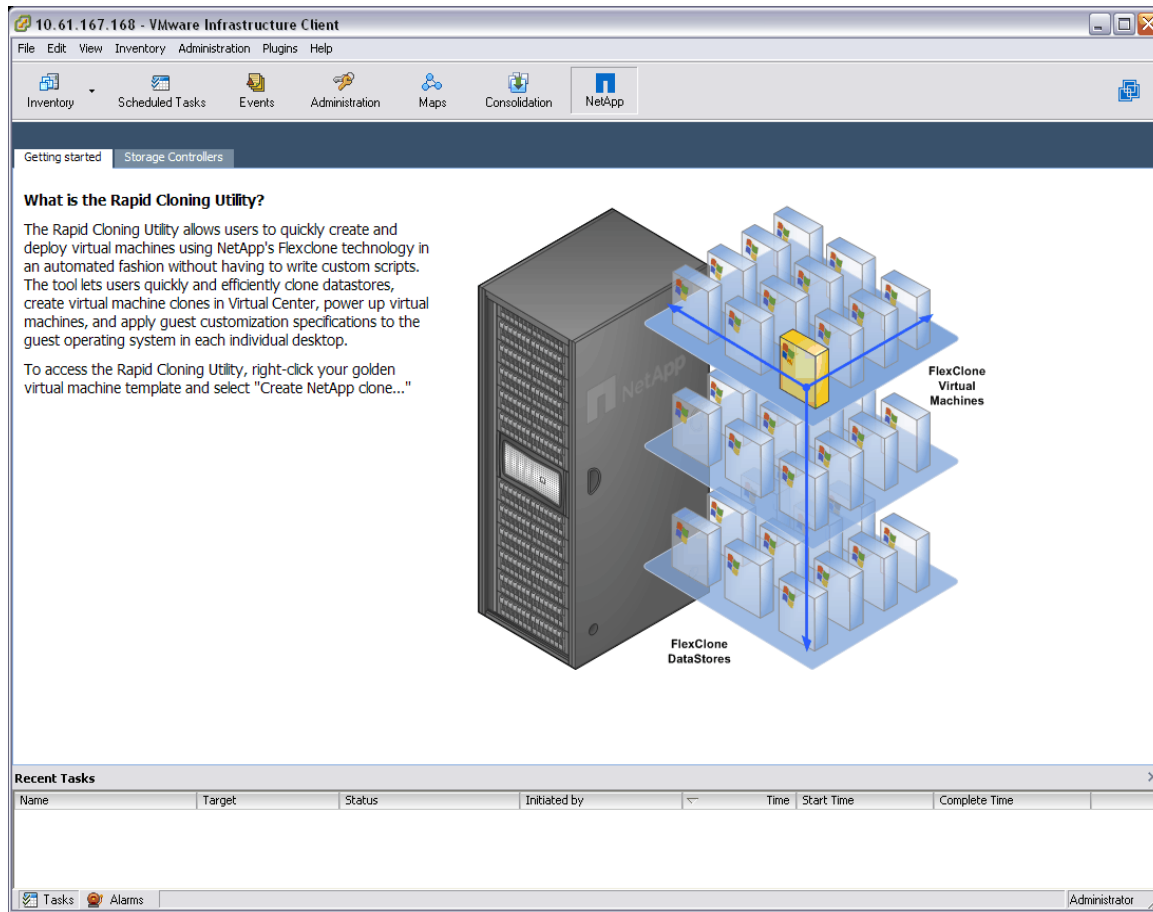
Multipathing APIs



Offload Writing
Zeros



Beyond Dedupe: Zero Cost Cloning



10.61.167.168 - VMware Infrastructure Client

File Edit View Inventory Administration Plugins Help

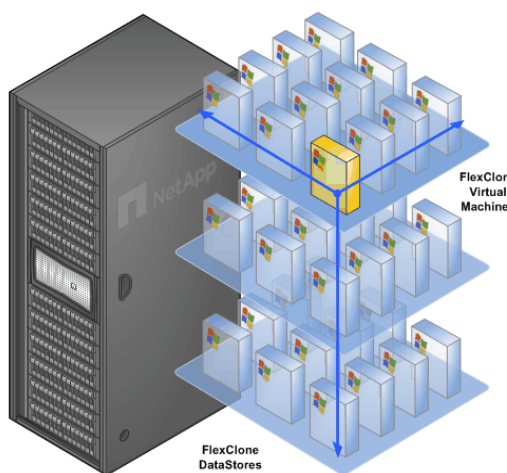
Inventory Scheduled Tasks Events Administration Maps Consolidation NetApp

Getting started Storage Controllers

What is the Rapid Cloning Utility?

The Rapid Cloning Utility allows users to quickly create and deploy virtual machines using NetApp's Flexclone technology in an automated fashion without having to write custom scripts. The tool lets users quickly and efficiently clone datastores, create virtual machine clones in Virtual Center, power up virtual machines, and apply guest customization specifications to the guest operating system in each individual desktop.

To access the Rapid Cloning Utility, right-click your golden virtual machine template and select "Create NetApp clone..."



NetApp

FlexClone DataStores

FlexClone Virtual Machines

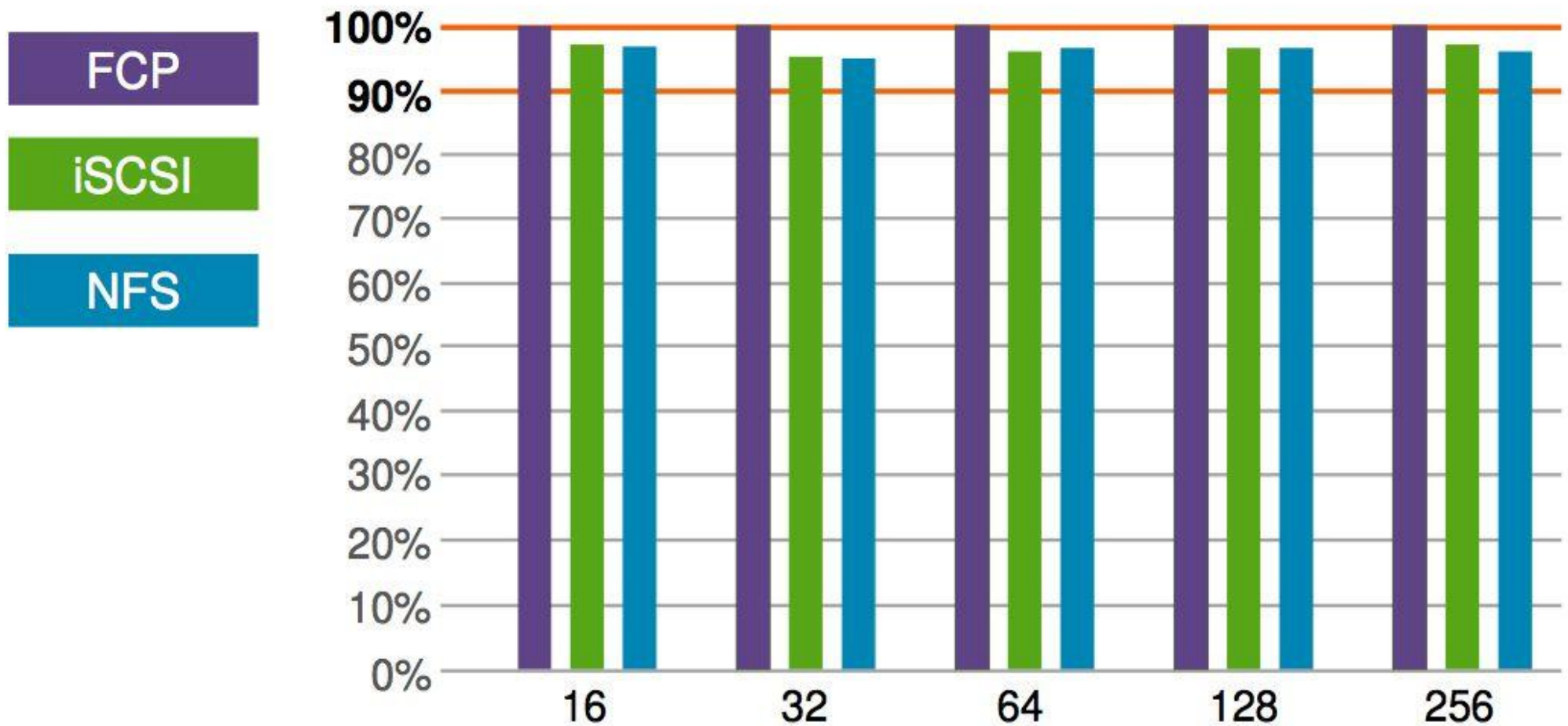
Recent Tasks

Name	Target	Status	Initiated by	Time	Start Time	Complete Time
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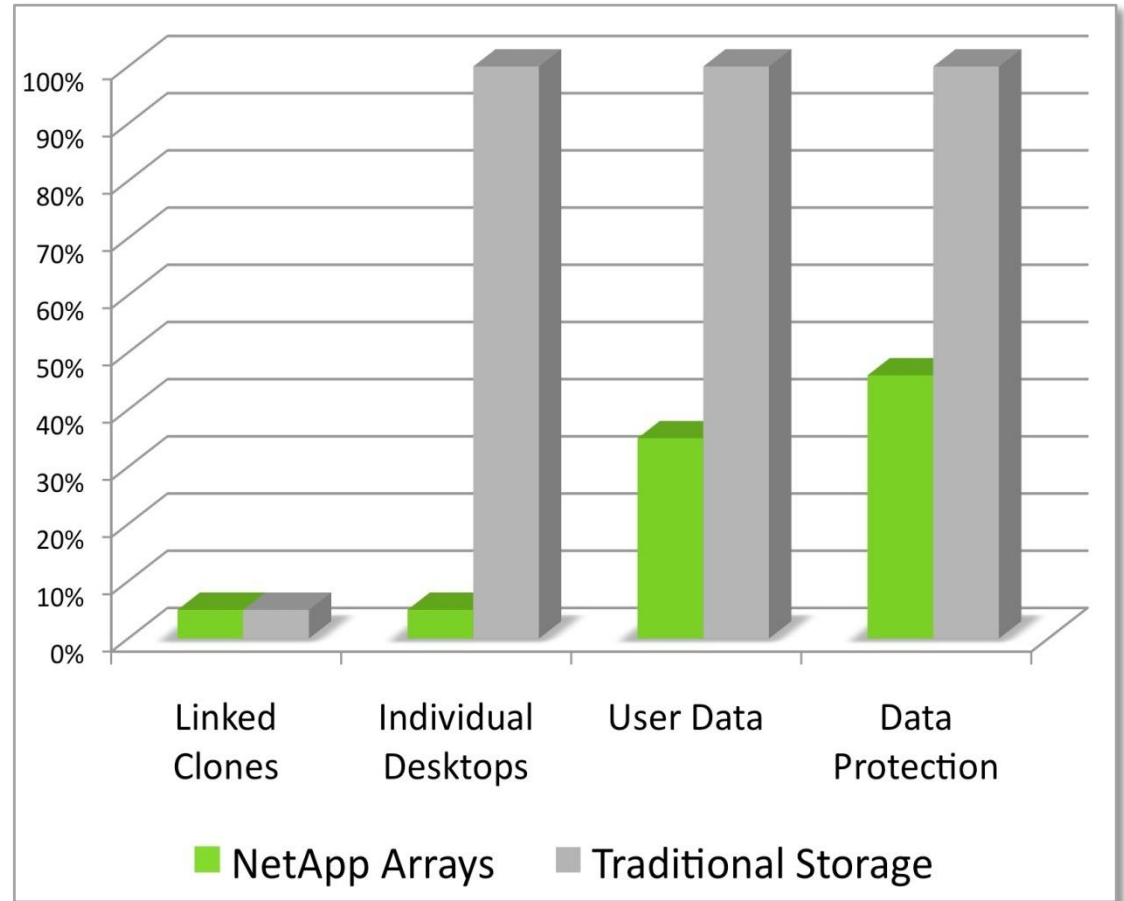
Tasks Alarms Administrator

Gigabit Ethernet: Fast & Cheap

NetApp & VMware Relative Performance Report TR-3697



NetApp VMware Joint Desktop Solution



Unmatched performance. Storage will integrate Linked Clones with FlexClone. NetApp Internal Use Only.

www.siwel.com

V2P Storage Management Tools

The screenshot displays the VMware vSphere Client interface for a NetApp storage management tool. The main window shows the 'Storage Management' section for the VM 'vmshe-ibm3650-04.rtp.netapp.com'. The interface includes a left-hand navigation pane with 'Storage Details' selected, and a main content area with several sub-sections:

- Storage Controllers:** A table listing storage controllers and their associated datastores.

Controller	Datastore	Datastore Capacity	LUN Pathname	Storage Capacity	Storage Status
Controller: vmshe-fas3020-7 (4 LUNs)	vmshe_datastore1	200.00GB	vol/vol1/lun1	205.00GB	Online
	vmshe_datastore2	73.50GB	vol/vol1/lun2	75.00GB	Online
Controller: vteam-fas3020-01 (2 LUNs)	vmshe_datastore3	1.82TB	vol/vol99/lunA	2.00TB	Online
- Details:** A section for the selected storage controller 'vteam-fas3020-01' with a partner 'vteam-fas3020-02'. It includes:
 - LUN:** Name: vmba33c8:10L3, LUN Pathname: vol/vol1/lun1, Serial Number: HnL.GolFHFz, Status: Online, Space Reservation: Enabled, LUN Type: vmware, Protocol: iSCSI, iGroup Name: vteam-igroup-1, iGroup Type: vmware, Initiators: [vmshe-dell3650-01.rtp.netapp.com]
 - Capacity:** Datastore Usage (23%), LUN Usage (23%), Volume Usage (2%)
 - Volume:** Name: vol1, Status: online, Type: Flexible, Guarantee: Volume, Aggregate: agr0, Snapshot Reserve: 20%, Autogrow Increment: 10.00GB, Autogrow Max Size: 240.00GB, Aggregate Size: 2.00TB
 - Deduplication (Advanced Single Instance Storage):** State: enabled, Status: active, Space Savings: 65%
- Recent Tasks:** A table showing the history of storage discovery tasks.

Name	Target	Status	Details	Initiated by	vCenter Server	Requested Start Time	Start Time	Complete
XXX.com.netapp.exoforce.NetApp Storage Discovery...	vmshe-ibm3650-04.rtp.netapp.com	In Progress		Administrator	WMSHE-VTEAM...	2/19/2009 10:20:49 A	2/19/2009 10:20:49 A	
XXX.com.netapp.exoforce.NetApp Storage Discovery...	vmshe-ibm3650-04.rtp.netapp.com	In Progress		Administrator	WMSHE-VTEAM...	2/19/2009 10:18:17 A	2/19/2009 10:18:17 A	
XXX.com.netapp.exoforce.NetApp Storage Discovery...	vmshe-ibm3650-04.rtp.netapp.com	In Progress		Administrator	WMSHE-VTEAM...	2/19/2009 10:15:16 A	2/19/2009 10:15:16 A	