Modern Approaches to the Backup and Recovery of Virtual Machines
Agenda

1. The VM Protection Challenge
2. VMware vs. Microsoft Hyper-V Architecture Overview
3. How Symantec Improves on VMware VADP
4. How Symantec Improves on VMware and Hyper-V
5. Demo
The VM Protection Challenge
Taking the Physical Approach – Backup Client Installed in the VM

**Advantages**

- Backup less than the entire VM
- Backup non-virtualized storage (aka RDM – Raw Device Mapping)

**Disadvantages**

- Backup workload overhead on VM and ESX host
- Must install and maintain client software in every virtual machine
- No improvements to VM DR
  - Create VM, install OS, recover files...

Sad Fact: The majority of VM backups are still done this way.
Backup Agent in VM guest

Agent based backups

ESX Disk Load – KB/sec

200,000 KB/sec
Example Dialogue Between the VM and Backup Admin

**VM Admin**

Hi Backup Guy! Somebody in engineering accidently destroyed VM12, VM18 and VM23. Please restore those VMs from yesterday’s backup.

**Backup Admin**

I have no record of VM18 ever being backed up. When did you create that VM?

**VM Admin**

D’oh! #@&!^@%^$
The VM Backup Management Problem

• VM Sprawl
  – Very easy to provision Virtual Machines = more machines get provisioned
  – Machines come on line without the knowledge of the backup team
  – Leasing of VM’s is not actively implemented

• Virtual Machine Flexibility
  – Physical world = Static – administrators know where they are
  – Virtual world = Dynamic – locations can change pretty quickly
VMware vs. Microsoft Hyper-V Architecture Overview
Virtual Machines can be running Windows & Linux

Virtual Machines are based on VHD files

Hyper-V system is configured as a Windows “role”
VMware vStorage APIs for Data Protection (VADP)

• VADP provides easier, simpler backup implementation
  – No longer need to download anything (e.g. VCB Framework)
  – No additional disk (holding tank) required
• Not a backup application – a true API
• Key features includes:
  – Block Optimization - only backup “used” blocks
  – Changed Block Tracking (CBT) - image (vmdk) level incremental backup

Both Backup Exec 2012 and NetBackup 7.5 fully support all VADP advanced backup capabilities and is automatically installed.
vStorage API Backup Process

1. Snapshot is created
Symantec Backup Exec and NetBackup for VMware Backup Process

1. Snapshot is created
2. VM data copied directly to backup storage while Symantec V-Ray processes the stream inline for content mapping

Modern Approaches to Backup and Recovery of VMs
NetBackup 7.5 for VMware Backup Process

1. Snapshot is created
2. VM data copied directly to backup storage while Symantec V-Ray processes the stream inline for content mapping
3. VM Snapshot released
vSphere host load – Agent in guest vs. VADP backups

Agent based backups

VADP based backups

Essentially just the guest OS I/O

200,000 KB/sec

3,000 KB/sec
How Symantec Backup Exec and NetBackup Improves on VMware VADP
Both Backup Exec and NetBackup Provide Direct vSphere Integration

• Direct vSphere integration with VMware vStorage API

• Benefits
  – No client software to install or maintain
  – No direct backup impact on virtual machine
  – Restore anything – single file or DR
  – Fast, efficient, block level incrementals
  – VMware (vmdk) aware deduplication

Both Backup Exec and NetBackup support agentless and agent-based backups through vStorage APIs
NetBackup Operational Restore Provides a Self Service Portal for File Restores

- Quickly find files across multiple clients and domains
- Allows key stakeholders to recover own files
- Offloads backup admin for more strategic tasks
- View access control for security
- Restore cart to easily batch restore jobs

OpsCenter console provides an intuitive GUI for quick file restores
NetBackup VMware Intelligent Policy (VIP) is Designed for Two Major Tasks

1) Automatically add and backup new and moved VM’s

2) Automatically balance backups across entire vSphere environment (Fibre or network)

• VMs protected based on physical location
  – ESX server & ESX Datastore

• VMs protected based on logical attributes
  – vCenter folder & Resource pool

• Backup performance is maximized with VIP by using physical location of VM to define backup
Leverage the Backup Exec or NetBackup VMware vCenter Plug-in

Get a backup history of any particular VM

Backup Exec
VM Admins can easily sort, filter and track backup jobs from vCenter

NetBackup
How Backup Exec and NetBackup Improve on Both VMware and Hyper-V
Only Symantec Backup Exec and NetBackup Provide V-Ray Technology

Visibility into Reducing Cost, Faster Performance, Better Backup

Symantec V-Ray

• Patented visibility into virtual machines, applications, dedupe data streams
• Transparent backup and recovery
• Unifies both physical and virtual deployments
• Symantec’s 3rd Generation Granular Recovery Technology

Unified Protection • File & Application Recovery
Deduplication • Automated Protection

Modern Approaches to Backup and Recovery of VMs
V-Ray Visibility Enables Unified Backup Management

- vCenter plug-in for monitoring backup events

Physical Infrastructure & Backup Team

Virtual Infrastructure & VM Team

Unified Data Protection

Modern Approaches to Backup and Recovery of VMs
V-Ray Visibility for Single File and Application Restore

- Any-level of recovery from a single backup pass
  - Entire VM
  - VMDK & VHD
  - Files in VM
  - Databases in VM
  - Items in Databases in VM
- Microsoft Exchange, SharePoint, Active Directory and SQL server application items
- Both Backup Exec and NetBackup support direct restore from tape
Why Is Our Single File Restore Different?

- NetBackup discovers single files during VMDK backup
  - Backup to any storage technology
  - Restore from any storage technology
Why Is Our Single File Restore Different

- Other vendors discover single files after VMDK is on disk
  - Mandates disk only target for backups
  - Separate single file discovery process (slow, I/O intensive)
  - Restores must be processed from disk
Symantec Deduplication Difference
Scalable End-to-End Global Deduplication

Client/Source Servers
- Built-In Dedupe
- Virtual/Physical

Media Servers
- Built-In Dedupe
- Media Server

Media Server Options
- Backup Exec 3600 & NetBackup 5200 series
- Backup Server Appliance with Built-in Dedupe
- NetBackup 5000 series
  - Global Dedupe
  - 16TB → 192TB+

Dedupe Everywhere

Modern Approaches to Backup and Recovery of VMs
V-Ray Visibility for Global Deduplication

Combines off-host VM deduplication with physical machine deduplication

What We Can Do –
• “Single-Pass” Backup and Recovery → Fast
• “Intelligent” Deduplication → Data Aware

What We see

What They see

Without V-Ray –
• “Multi-Step” Backup and Recovery → Slow
• “Guess” at Optimized deduplication

Modern Approaches to Backup and Recovery of VMs
Cost Effective DR w/ NetBackup AIR & BMR

Auto Image Replication (AIR) & Bare Metal Restore (BMR)

- Migrate Physical to Virtual (P-V) with BMR
- Bi-directional WAN Optimized Replication
- Eliminates expensive and insecure tape shipments
- Superior RTO, restore now!

Modern Approaches to Backup and Recovery of VMs
Backup Exec “No Hardware Disaster Recovery” With P2V

Convert to Virtual (P2V)
- *Parallel* data streams
- One stream to media server
- Other stream to hypervisor
- Result is full VM (not just the virtual disk)

Backup to Virtual (B2V)
- *Serial* data streams
- Backup stream to media server
- Conversion job runs after or on different schedule
- Result is full VM (not just the virtual disk)
Backup Exec 2012 Dynamic Inclusion

- Dynamically adds new VMs to the backup job
  - Protects the VMs it finds at run-time
  - Independent of what you saw at job creation time
  - No VMs is a job failure
- Applies to folders (nodes) that hold VMs / VM-data
- Applies to VMware and Hyper-V
- Click to Exclude
- Ability to exclude VMs that are powered off
- Global/job exclusion can also be used to exclude VMs

So easy to add VMware Server

Modern Approaches to Backup and Recovery of VMs
Demo
Additional Web Resources

- Data sheets, whitepapers, videos, demos and more
  - NetBackup.com
  - Symantec.com/NetBackup
  - Symantec.com/VRay
  - BetterBackupforAll.com

Check out the Netting Out NetBackup Blog on Connect
Thank you!