Site Recovery Manager and vSphere Replication: What’s New Technical Deep Dive

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Disclaimer

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• This overview of new technology represents no commitment from VMware to deliver these features in any generally available product.
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• Technical feasibility and market demand will affect final delivery.
• Pricing and packaging for any new technologies or features discussed or presented have not been determined.
# Agenda for Today

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The Software-Defined Data Center

- Expand virtual **compute** to all applications
- Transform **storage** by aligning it with app demands
- Virtualize the **network** for speed and efficiency
- Management tools give way to **automation**
The Software-Defined Data Center

Transform storage by aligning it with app demands
Software-Defined Storage and Availability

Bringing the Efficient Operational Model of Virtualization to Storage

- Common policy-based management
- VM centric data services
- Abstraction and pooling of infrastructure

Policy-driven Control Plane

Virtual Data Services
- Data Protection
- Cloud DR
- Local Availability

Virtual Data Plane
- Hypervisor-converged Storage pool
- SAN/NAS Pool
- Object Storage Pool

Third-party Control Plane

Third-party Data Services

Third-party Control Plane API

Third-party Data Services API

x86 Servers

SAN / NAS

Cloud Object Storage
Availability Timeline

- SRM 4.x + ABR
- SRM 5.0 + ABR
- SRM 5.1 + ABR
- SRM 5.5 + ABR
- SRM 5.8 + ABR
- VR 5.0 (SRM Only)
- VR/SRM & SVR 5.1
- VR/SRM & SVR 5.5
- VR/SRM & SVR 5.8
Site Recovery Manager 5.8
Terminology

• Acronyms and terms we will be using
  – SRM (Site Recovery Manager)
  – ABR (Array Based Replication)
  – VR (vSphere Replication)
  – VRMS (vSphere Replication Management Server)
  – VRS (vSphere Replication Server)
  – “SVR” (Standalone vSphere Replication i.e. NO SRM involved)
Do we need SVR? Lots of acronyms for the audience to keep track of already.

Author, 8/9/2014
vCenter Site Recovery Manager

• What is vCenter Site Recovery Manager (SRM)?
  – SRM is the industry-leading disaster recovery automation solution for vSphere environments

• What are the key features?
  – Centralized recovery plans for thousands of VMs
  – Non-disruptive recovery testing
  – Automated DR workflows
  – Integrated with the VMware product stack

• What are the key benefits?
  – Lowers the cost of DR management by 50% or more
  – Eliminates complexity and risk of manual processes
  – Enables fast and highly predictable RTOs
  – Provides policy-driven DR control for any virtualized app

* Disaster Avoidance
Typical Uses Cases for SRM

**Disaster Recovery**
- Least frequent but most-critical use case
- Ensure fastest RTO
- Avoid $145,000 per hour of downtime (Forrester)

**Disaster Avoidance**
- Proactive, controlled workflow
- Ensures app-consistency and zero data loss

**Planned Migration**
- Frequent on-ramp use case for SRM
- Enables data center maintenance and global load balancing
Recovery Workflows

Failover Automation
- User defined recovery plan
- Minimize errors

Non-disruptive Failover Testing
- Isolated test environment
- Increase confidence in DR process

Planned Migration
- Zero data loss
- Operational migration

Failback Automation
- Re-protect VM’s, migrate back
What’s New in SRM 5.8
What’s New in Site Recovery Manager 5.8

**DR for the SDDC**

- Self-service, policy-based protection – vCAC integration through new vCO plugin
- Software-defined storage for DR – Virtual SAN integration through vSphere Replication

**Enhanced Scalability**

- 5x scale of protection – up to 5,000 protected VMs per vCenter Server*
- 2x scale of recovery – concurrent recovery of up to 2,000 VMs per vCenter Server*
- Performance enhancement – storage stack improvements reduces RTO

**Simplified Operations**

- Converged UI with vSphere – vSphere Web Client plugin
- Simplified IP address management – rule based customization at the subnet level
- Faster installation – embedded database option (vPostgres)

* Scale supported with array-based replication
Self-Service, Policy-Based DR Protection for Apps – And Other Workflows!

**Architecture**
- SRM using array-based replication
- vCAC management across two sites
- Integration via vCO plugin for SRM
- New APIs exposed for PowerCLI integration

**Capabilities**
- Self-service DR provisioning using vCAC blueprints
- Automated protection mapping according to pre-defined tiers

**Benefits**
- DR control delivered as a service to app tenants
- Quicker time to market for apps
- Reduced complexity for infrastructure admins
vCAC and SRM Workflow

- Load SRM plugin package into VCO
- Run workflow to attach SRM postprovisioning to a vCAC Catalog Item
  - Can do this against a ‘template’ CI
- Now when provisioning that CI, SRM priority and custom properties (callouts, etc.) will be prompted
- After deploy the workflow carries on:
  - Finds protection groups for the target datastore
  - Adds the VM to the protection group and associated recovery plans
vCAC Integration

SRM protection exposed through vCAC Portal
Runs a Standard VCO Workflow after Provisioning
Not Just for vCAC Though…

• The VCO plugin for SRM offers many other workflows as well:
  – Create protection groups and add VMs
  – Find protection groups by datastore
  – Add protection to unprotected VMs in a replicated datastore
  – … and almost anything else the SRM API exposes can now be accessed through the VCO plugin.
### Enhanced Scalability to Enable Large Enterprise Use Cases

<table>
<thead>
<tr>
<th>Feature</th>
<th>SRM 5.5</th>
<th>SRM 5.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection</td>
<td>1,500 VMs</td>
<td>5,000 VMs</td>
</tr>
<tr>
<td>Concurrent Recovery</td>
<td>1,000 VMs</td>
<td>2,000 VMs</td>
</tr>
</tbody>
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Performance Improvements

- Improved vmkctl call quicker than VSA!
- rescanAllHba() at VSA startup
- SCSI with default disk resignature
- Lock global FSS layer
- Scanset of VSI - GET direct to
- Rescan using
- SRA commands bached through single instance Perl space to minimize discovery around storage.
- VSI cache much quicker and other overhead and other overhead
Up to 75% faster RTO

Just trust me… there are lots of performance improvements
VMware Performance and Scale Testing

- 250 Protection Groups
- 2000 VMs with IP Customization ON

<table>
<thead>
<tr>
<th></th>
<th>Total Time</th>
<th>Storage Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old Method</td>
<td>29 h</td>
<td>17 h 15 m</td>
</tr>
<tr>
<td>New Method</td>
<td>13 h 53 m</td>
<td>4 h 13 m</td>
</tr>
</tbody>
</table>
SRM Is Now Even Simpler to Deploy and Manage

Converged UI with vSphere

New SRM plugin for the vSphere Web Client and enhanced workflows

Simplified IP address management

Rule-based management at the subnet level

Faster installation

Optional embedded vPostgres DB
New SRM Plugin for the Web Interface
New SRM Plugin for the Web Interface
New SRM Plugin for the Web Interface
No It’s Not Really the MUI
No It’s Not Really the MUI
No It’s Not Really the MUI
No It’s Not Really the MUI
**IP Subnet Mapping**

```
Dr-ip-customizer --cfg ..\config\vmware-dr.xml -o c:\example.csv --cmd generate --vc vcenter-recovery
```

```
Dr-ip-customizer --cfg ..\config\vmware-dr.xml --csv c:\example.csv --cmd apply --vc vcenter-recovery
```
IP Subnet Mapping

Dr-ip-customizer --cfg ..\config\vmware-dr.xml -o c:\example.csv --cmd generate --vc vcenter-recovery

Dr-ip-customizer --cfg ..\config\vmware-dr.xml --csv c:\example.csv --cmd apply --vc vcenter-recovery
IP Subnet Mapping

```bash
Dr-ip-customizer --cfg ..\config\vmware-dr.xml -o c:\example.csv --cmd generate --vc vcenter-recovery

Dr-ip-customizer --cfg ..\config\vmware-dr.xml --csvc:\example.csv --cmd apply --vc vcenter-recovery
```
IP Subnet Mapping
### IP Subnet Mapping

![IP Subnet Mapping](image)

**IP Customization Rule**

<table>
<thead>
<tr>
<th>Rule name:</th>
<th>10-10-10-x to 192-168-1-x</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site:</td>
<td>vc-l-01a.corp.local</td>
</tr>
<tr>
<td></td>
<td>vc-l-01b.corp.local</td>
</tr>
<tr>
<td>Network:</td>
<td>VM Network</td>
</tr>
<tr>
<td>Subnet:</td>
<td>10.10.10.0</td>
</tr>
<tr>
<td></td>
<td>192.168.1.0</td>
</tr>
<tr>
<td>Subnet mask:</td>
<td>255.255.255.0</td>
</tr>
<tr>
<td></td>
<td>255.255.255.0</td>
</tr>
<tr>
<td>Range start:</td>
<td>10.10.10.0</td>
</tr>
<tr>
<td></td>
<td>192.168.1.0</td>
</tr>
<tr>
<td>Range end:</td>
<td>10.10.10.255</td>
</tr>
<tr>
<td></td>
<td>192.168.1.255</td>
</tr>
</tbody>
</table>

**Network settings to be applied to the recovery site network:**

- **Gateway:** 192.168.1.254
- **DNS addresses:**
- **DNS suffixes:**
- **Primary DNS server:**
VSAN + VR and Site Recovery Manager

- **Virtual SAN is compatible with:**
  - vSphere Replication
  - SPBM configured as part of replication
  - vCenter Site Recovery Manager
  - SRM configuration based on VR replication

- **vSphere Replication & vCenter SRM**
  - Asynchronous replication – 15 minute RPO
  - VM-Centric based protection
  - Provide automated DR operation & orchestration
  - Automated failover – execution of user defined plans
  - Automated failback – reverser original recovery plan
  - Planned migration – ensure zero data loss
  - Point-in-Time Recovery – multiple recovery points
  - Non-disruptive test – automate test on isolated network
SRM Replication Options

**Storage-based Replication**
- SRM can utilize BOTH array based AND vSphere Replication
- SRM will “see” existing standalone vSphere Replication protected VMs

**vSphere Replication**
- SRM can install vSphere Replication from scratch if needed
vSphere Replication

- Per-VM host-based replication integrated with vSphere platform
- Included with vSphere Essentials Plus and higher editions
vSphere Replication

- Easy virtual appliance deployment
- Integration with vSphere Web Client
- Protect any VM regardless of OS and apps
- Flexible recovery point objective (RPO) policies
- Quick recovery for individual VMs
- Replication engine for Site Recovery Manager (SRM)
- Compatible with SAN, NAS, local, and VSAN storage

Replicate workloads to vCenter Server and vCloud Air
vSphere Replication Use Cases

• Data protection and disaster recovery
• Data center migration
• Replication engine for SRM
• Stand alone replication
• Within the same site
• Across sites - vCenter Server and vCloud Air
Replication to vCenter Server and vCloud Air

Configure Replication for sharepoint01

1 Replication type
   Replication type
   Select the type of replication to configure.
   - Replicate to a vCenter Server
     Select this option to configure replication to another vCenter Server
   - Replicate to a cloud provider
     Select this option to configure replication to a cloud provider

2 Target site
3 Replication server
4 Target location
5 Replication options
6 Recovery settings
7 Ready to complete
Replication to vCloud Air

<table>
<thead>
<tr>
<th>Name</th>
<th>Replication Status</th>
<th>Last Completed</th>
<th>Transfer Duration</th>
<th>Transfer Size</th>
<th>RPO</th>
</tr>
</thead>
<tbody>
<tr>
<td>techmarketing02</td>
<td>✔ Success</td>
<td>Today 02:04 PM</td>
<td>00:00:02</td>
<td>--</td>
<td>4:00:00</td>
</tr>
<tr>
<td>techmarketing01</td>
<td>✅ Initial Full Sync</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>4:00:00</td>
</tr>
</tbody>
</table>
vSphere Replication Components

- vCenter Server
- vSphere Web Client
- vSphere Replication Agent (VRA) built into vSphere
- Management and VRS
- vSphere Replication Management Server (VRMS)
- vSphere Replication Server (VRS)
vSphere Replication Limitations

- VM must be powered on to replicate
- RPO 15 minutes to 24 hours
- Up to 10 appliances per vCenter Server
  - One VRMS (required), up to nine VRS (optional)
- Supported max of 500 replicated VMs per vCenter Server
- VMs protected by vSphere FT not supported
- Physical Raw Device Mapping (RDM) not supported
vSphere Replication Disk Consistency

Within a VM:
- Yes

Across VMs:
- No

Source VMDKs
- Yes
- No

Target VMDKs
- Yes
- No
vSphere Replication Application Consistency

Configure Replication for exchange03

1. Replication type
2. Target site
3. Replication server
4. Target location
5. Replication options

- Replication options
  Select replication options for the virtual machine.

- Guest OS quiescing
  Quiescing might take several minutes and might affect RPO times. Use only for virtual machines that are configured to support quiescing methods.

Quiescing method:
- MS Shadow Copy Services (VSS)
- None
- MS Shadow Copy Services (VSS)
vSphere Replication Reporting
vSphere Replication Reporting
vSphere Replication Reporting
vSphere Replication MPIT Recovery

- Multiple point in time (MPIT) recovery - up to 24 recovery points
  - Examples:
    - 4 recovery points, last 6 days
    - 3 recovery points, last 5 days
vSphere Replication MPIT Recovery

- Recovered as VM with snapshots
  - vSphere Replication recovers latest replica
  - Use Snapshot Manager to roll back to recovery point
vSphere Replication Recommendations

• Set RPO to longest acceptable value
  – 15-minute RPOs: Just because you can, does not mean you should

• Leave VSS quiescing disabled unless really necessary
  – Majority of apps recover well from crash-consistent copy

• Configure minimum acceptable number of MPIT recovery points
  – Fewer recovery points = faster recovery time, less storage consumption
vSphere Replication Resources

- vSphere Replication Calculator
- Documentation
- Overview white paper
- Frequently Asked Questions
- Capacity Planning Appliance (Fling)
- Blogs
What Have We Covered?

- Site Recovery Manager 5.8
  - vCAC integration via VC Orchestrator
  - New web based user interface
  - Scale and Performance improvement
  - IP Subnet Mapping
  - vPostgres Database
  - VSAN Integration

- vSphere Replication
  - Recap
  - Use cases and architecture
  - Reporting
  - Recommendations
  - Resources
Software-Defined Storage and Availability

Bringing the Efficient Operational Model of Virtualization to Storage

Common policy-based management

VM centric data services

Abstraction and pooling of infrastructure

Policy-driven Control Plane

Virtual Data Services

Data Protection

Cloud DR

Local Availability

Virtual Data Plane

Hypervisor-converged Storage pool

SAN/NAS Pool

Object Storage Pool

x86 Servers

SAN / NAS

Cloud Object Storage

Third-party Control Plane

Third-party Data Services

API

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Supplemental Slides
vSphere Replication Simplifies DR for vSphere

- **What is vSphere Replication (VR)?**
  - VR is VMware’s proprietary technology for hypervisor-based replication of vSphere virtual machines

- **What are the key features?**
  - Asynchronous replication with customizable RPO
  - VM-centric management, storage-agnostic
  - Multiple point-in-time recovery (MPIT)

- **What are the key benefits?**
  - Simplifies replication of virtual machines
  - Eliminates storage hardware lock-in
  - Integrated with the VMware product stack
  - Included with vSphere at no additional cost
Workloads NOT Suitable for vSphere Replication?

- **Shared inter-site components**
  - AD, DNS, LDAP
    - Typically shared across sites
  - vCenter Server
  - Official solution, “Heartbeat”
    - Could be done, unsupported
  - High Churn & VSS
    - Usually = aggressive RPO
      - VSS Quiescence time overhead
  - Inter-VM write order fidelity
    - Array Based Consistency Groups
  - Zero RPO
    - VR Range is 15min-24hrs
      - Use array replication < 15min
  - Unsupported
    - Check release notes!
      - pRDMs, multi-writer VMDK’s etc.

- Typically shared across sites
- Official solution, “Heartbeat”
- Usually = aggressive RPO
- Array Based Consistency Groups
- Check release notes!
  - pRDMs, multi-writer VMDK’s etc.
What Use Is vSphere Replication without SRM?

- Disaster Recovery for smaller environments
- Individual VM recovery
- Local & Intra site replication implementations
- Location migration requirements
Ok… So What Do We Miss out on if We Decide Not to Use SRM?

- **Failover / Migration Workflow Automation**
- **Non-disruptive Failover Testing**
- **Built-in Reporting / Alerting & Customization**
- **Customizable Orchestration**
vSphere Replication Appliance Increase - Advantage for ROBO
Multi Point-In-Time Recovery (MPIT)

Retention of multiple points in time allows reversion to earlier known good states.
MPIT Configuration

Retention policy is specified during configuration of replication.
MPIT Presented as VM Snapshots after Failover

Use the snapshot manager to revert to earlier points
MPIT Details

- Retention “slots” differ from “replication instances”

- Example:
  - RPO = 4 Hours
  - Retention Policy = 3 instances for past 1 day(s)

Most recent complete instance is *always* preserved.
Most recent *might* be the second instance in the slot.
(Ensures you can always failover to the most recent copy)
MPIT Details

- Example:
  - RPO = 4 Hours
  - Retention Policy = 3 instances for past 1 day(s)

The oldest instance in any given retention slot is preserved, as is the most recent replication.
vSphere Replication

- Included with vSphere Essentials Plus and higher
- Per VM, async replication
- Replication at the VMDK level
- Fully integrated with vCenter / ESXi 5.x
- Use cases with AND without SRM
**vSphere Replication Appliance**

- Single Appliance to download
  - Same appliance used in SRM and non-SRM deployments
  - Initial instance performs two roles
- Role 1 - vSphere Replication Management Server (VRMS)
  - Configuration management
  - Only one appliance per site performs role
  - Warning if attempt to configure >1 per site
- Role 2 - vSphere Replication Server (VRS)
  - Manages replica instances
  - One or more per site (up to 10 max)
Simple Deployment

- Deploy and configure VR components
- Pair components with vCenter
- Configure VM for replication*

* Will need to define RPO, Target Datastore, Target Folder or Resource pool
Configuring vSphere Replication

VR replication is configured per VM in vCenter

Selectable RPO from 15 min up to 24 hours

Selectable destination datastore (per virtual disk)
Four Steps for Full Recovery

1. Right-click, select “Recover”
2. Select a target folder
3. Select a target resource
4. Click Finish

Will validate your choices as you go
vSphere Replication Use Cases
vSphere Replication Standalone

- Local site replica
  - Single site copy
  - Works with single vCenter
- Replication between sites
  - Each site own vCenter
  - Replicate in either direction
- Remote office / Branch office
  - Support for single vCenter
  - Support for single VR appliance
Local Site Replica
Remote Office Branch Office (ROBO)
Why Is vSphere Replication Not Using All Available Bandwidth?

Built for “Full” host scheduling
- VM replication optimized per VMDK
- Current implementation scales effectively, many VMs, many VMDKs
- Not ideal for single high churn use case, stay tuned
Thank You
Fill out a survey

Every completed survey is entered into a drawing for a $25 VMware company store gift certificate.
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