



# Disaster Recovery for Advent Portfolio Exchange® (APX) Using VMware vCenter™ Site Recovery Manager

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DEPLOYMENT AND TECHNICAL CONSIDERATIONS GUIDE

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## Introduction

VMware® vCenter Site Recovery Manager (SRM) is an extension to VMware vCenter that enables integration with array-based replication, discovery and management of replicated datastores, and automated migration of inventory from one vCenter to another.

SRM servers coordinate the operations of the replicated storage arrays and vCenter servers at the two sites that, as virtual machines at one site (the protected site) are shut down, virtual machines at the other site (the recovery site) start up and, using the data replicated from the protected site, assume responsibility for providing the same services. Migration of protected inventory and services from one site to the other is controlled by a recovery plan that specifies the order in which virtual machines are shut down and started up, the compute resources they are allocated, and the networks they can access. SRM enables you to test a recovery plan, using a temporary copy of the replicated data, in a way that does not disrupt ongoing operations at either site.

This paper describes the testing of Advent Portfolio Exchange® (APX) application behaviors in case of disaster occur and how SRM can help conveniently and easily in recovery process.

## Test Solution Overview

VMware and Advent jointly conducted testing that used the Advent Portfolio Exchange® (APX) 4.0 application with Site Recovery Manager 4.1.1 in a vSphere 4.1 U1 environment.

The testing had the following goals:

- Verify that Advent Portfolio Exchange® (APX) application can fail over to the recovery site using Site Recovery Manager without corrupting using asynchronous replication.
- Verify that both “Test Bubble” and “Actual Failover” works fine and Advent Portfolio Exchange® (APX) application components fail over successfully.

The testing results prove that Site Recovery Manager provides a flexible, high-performance, high-availability platform for disaster recovery that works well with Advent Portfolio Exchange® (APX) 4.0 running in a VMware environment.

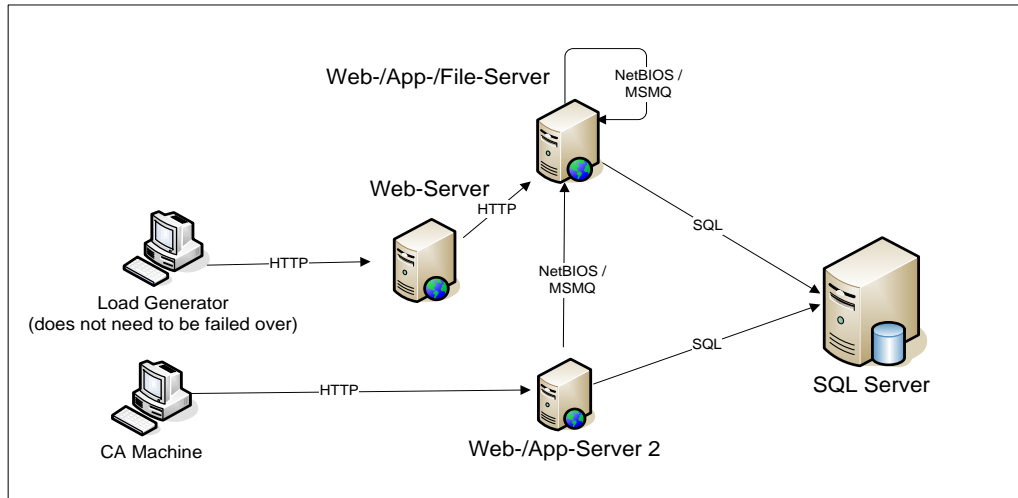
By using Advent Portfolio Exchange® (APX) 4.0 with Site Recovery Manager, businesses gain these key advantages:

- Gets your environment back in business rapidly; allows customers to avoid loss by expediting fail over and recovery from a major service disruption.
- Accelerates disaster recovery by minimizing its inherent risks and downtime such as by eliminating manual recovery steps.
- Delivers advanced capabilities for disaster recovery management, non-disruptive testing and automated failover, especially with long-distance replication.
- Enables automated failover across geographically dispersed locations.
- Requires minimal administration and minimal additional hardware.
- Enables customers to expand protection to other important systems and applications.

## Advent Portfolio Exchange® (APX) Overview

Advent Portfolio Exchange® (APX) is an investment management platform that includes a fully integrated portfolio and relationship management solution. It offers a wide range of functionality that helps Advent’s clients deliver superior service to their clients with optimal efficiency.

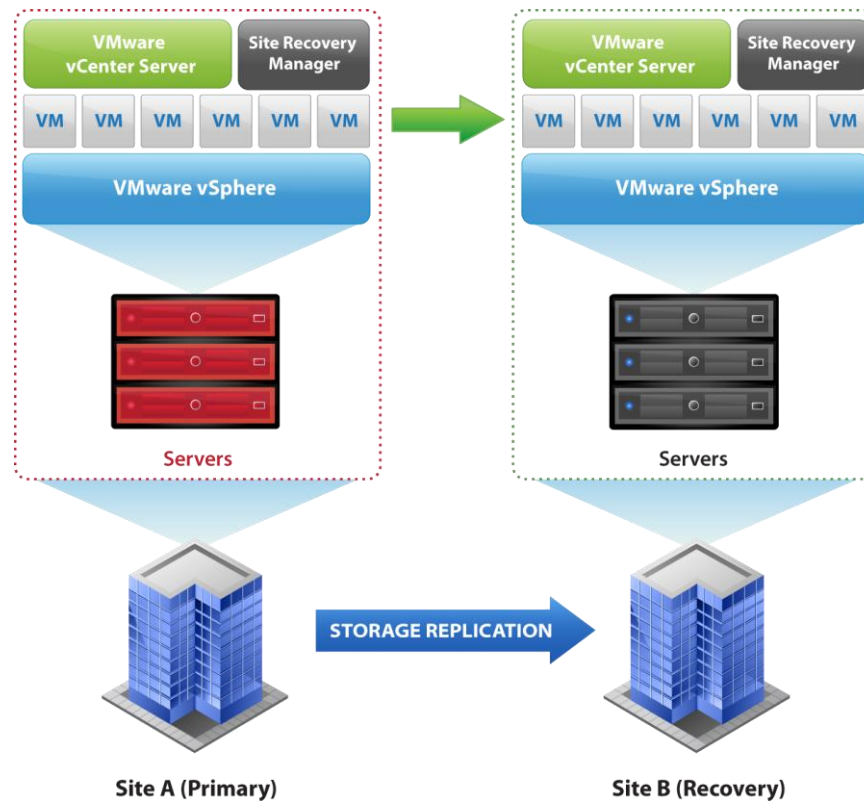
**Figure 1. Advent Portfolio Exchange® (APX) Application System Architecture**



## Site Recovery Manager

Site Recovery Manager is an extension to VMware vCenter that simplifies and automates disaster recovery when Advent Portfolio Exchange® (APX) 4.0 application runs in a VMware environment. Site Recovery Manager orchestrates disaster recovery and integrates failover with other enterprise applications.

Figure 2 depicts the typical architecture of Site Recovery Manager with storage array replication across two sites.

**Figure 2. Site Recovery Manager System Architecture**

Site Recovery Manager facilitates setup, test, and recovery workflows, and it offloads failover to the production storage array, rather than the vSphere front end. It coordinates the scheduled migration or unplanned failover of production datacenters to recovery sites, or between two sites with active workloads:

- As virtual machines at the protected site are shut down, virtual machines at the recovery site start up and use data replicated from the protected site to provide the same services.
- The two datacenters are not synchronized in real time, although the lag time for replication is just a few seconds. Failover and recovery require only a few minutes.
- Site Recovery Manager controls the transfer of services by using a recovery plan that specifies the order in which virtual machines are shut down and started up, compute resources are allocated, and network access is given.
- Site Recovery Manager enables fast and accurate recovery by maintaining duplicate copies automatically when data spanning multiple volumes and storage systems is replicated across long distances.

Site Recovery Manager enables the testing of recovery plans in a way that does not disrupt ongoing operations at either site. For example, it uses these approaches:

- Creates a temporary copy of the replicated data to test the failover process and ensure that the secondary image is consistent and usable.
- Relies on independent vCenter servers at both the protected site and the recovery site to facilitate the failover process.

With Site Recovery Manager, disaster recovery becomes an integrated part of managing the VMware virtual infrastructure. It is implemented using a vendor-supplied storage replication adapter (SRA) that is tightly integrated with vCenter, vSphere, and the storage platform.

The SRA plug-in, installed on the Site Recovery Manager server, manages communication with the storage platform. The storage platforms have an SRA for Site Recovery Manager that takes advantage storage replication technology, as described in the section below. For a complete list of storage platforms that are compatible with VMware, see the “Resources” section later in this paper.

**Note:** The latest release of Site Recovery Manager now supports host based replication, which can eliminate the need to maintain an identical storage array at the recovery site. It can enable the use of low cost, direct attach storage for disaster recovery purposes and allow for more granular, virtual machine level replication. For more information, see the Site Recovery Manager product page on the VMware website.

## SAN Storage and Data Replication

VMware vCenter SRM supports wide range of storage array for data replication between protected and recovery site and supports both synchronous and asynchronous replication.

In case of synchronous replication, real time mirroring of data between the protected and recovery site happens. Data must be successfully stored in both the sites before the acknowledgement happens.

In case of asynchronous replication, mirroring of data happens at pre-defined interval between both the sites. Based on storage vendor technology either full replication or changes from previous replication is updated.

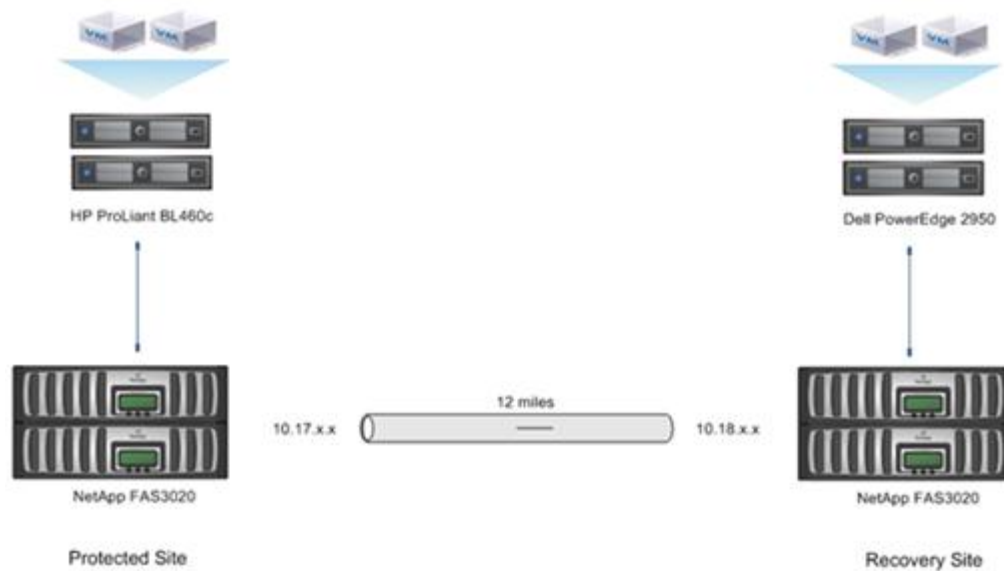
Recovery point objective (RPO), quantifies the minimal amount of data the business needs to restore for recovery and to what point in time the data needs to be restored, such as to the prior hour, day, week or month. Based on defined RPO, the appropriate storage and type of replication can be chosen to fulfill the business requirement.

## Test Solution Architecture

The test solution architecture for testing Advent Portfolio Exchange® (APX) 4.0 application with Site Recovery Manager is described in the following sections.

## Site Recovery Configuration

**Figure 3. Advent Portfolio Exchange® (APX) – Site Recovery Manager Solution Architecture**



The test solution architecture included:

- The Advent Portfolio Exchange® (APX) application is composed of five virtual machines:
  - App Server 1
  - App Server 2
  - Web Server
  - CA Machine
  - Database
- The lab environments for the protected site and the recovery site were built in two VMware datacenters in Palo Alto, California, with the sites located approximately 12 miles apart.
- Both the protected site and the recovery site run VMware vCenter Server in a virtual machine that is configured on VMFS storage. Each vCenter Server runs in a virtual machine to take advantage of VMware vMotion®, VMware High Availability (HA), and VMware Distributed Resource Scheduler (DRS).
- The protected site is configured using asynchronous storage platform for data replication.
- Similarly, the recovery site maintained an additional storage platform for replication and recovery purposes.
- Site Recovery Manager is installed in a virtual machine at the protected site and the recovery site to enable communication between these sites.
- Primary DNS was setup in protected site and secondary DNS was setup in recovery site. DNS requirement is critical for the validation as Advent Portfolio Exchange® (APX) application was configured to communicate between different application components using fully qualified domain name (FQDN).
- Asynchronous replication was supported, although asynchronous replication might result in minimal

data loss during failover. (Contact the storage vendor for detailed information.)

- After the Advent Portfolio Exchange® (APX) application at the protected site fails over to the recovery site, the new IP is automatically registered in DNS using Site Recovery Manager “dr-ip-customizer” utility.
- For validation in “Test Bubble” mode, the secondary DNS is cloned and no network is provided to it. When the recovery plan is executed in “Test Bubble”.
- The database server virtual machine backup disk was in non-replicated datastore.
- Virtual machine swap files were created in non-replicated datastore using vCenter management interface.

## Hardware and System Host Configuration

Table 3 describes the configuration of VMware ESX® host servers and storage in the solution architecture.

**Table 3. Hardware Configuration**

| Hardware                 | Configuration   |
|--------------------------|---|
| Server                   | <p><b>Protected site</b> – Two Hewlett-Packard ProLiant BL460c G6 servers, each equipped with</p> <ul style="list-style-type: none"> <li>• 2.8 GHz dual quad-core Intel Xeon E5560 processor</li> <li>• 48 GB RAM</li> </ul> <p><b>Recovery site</b> – 2 Dell PowerEdge 2950 servers, each equipped with</p> <ul style="list-style-type: none"> <li>• 2.3 GHz dual quad-core Xeon E5410 processor</li> <li>• 32 GB RAM</li> </ul> |
| Storage (protected site) | NetApp FAS3020 and SnapMirror 1.4.3   |
| Storage (recovery site)  | NetApp FAS3020 and SnapMirror 1.4.3   |

## Installed Software

Table 4 lists the software used in the solution architecture.

**Table 4. Software**

| Software Provider | Software Configuration                                       |
|-------------------|--|
| VMware            | vSphere 4.1, vCenter Server 4.1, Site Recovery Manager 4.1.1 |
| Microsoft         | SQL Server 2008, Enterprise Edition                          |
| Advent            | Advent Portfolio Exchange® (APX) 4.0                         |

For details on Advent Portfolio Exchange® (APX) prerequisite and installation, please refer the following link for details:

[http://connection.advent.com/documentation/sys\\_req/APXSR40.pdf](http://connection.advent.com/documentation/sys_req/APXSR40.pdf)



## Virtual Machine Configuration

Table 5 describes the configuration of Advent Portfolio Exchange® (APX) applications virtual machines running on ESXi host servers in the solution architecture.

**Table 5. Virtual Machines**

| Virtual Machine (APX Application Stack)                                      | Hardware Configuration  |
|--|---|
| App Server 1 (Windows Server 2008 R2 Standard SP1 64-bit)                    | <ul style="list-style-type: none"> <li>• 2 vCPU, 4 GB RAM</li> <li>• 1 NIC (e1000 adapter)</li> <li>• 35 GB (vmdk only)</li> </ul>  |
| App Server 2 (Windows Server 2008 R2 Standard SP1 64-bit)                    | <ul style="list-style-type: none"> <li>• 2 vCPU, 4 GB RAM</li> <li>• 1 NIC (e1000 adapter)</li> <li>• 35 GB (vmdk only)</li> </ul>  |
| CA Machine (Windows Server 2008 R2 Standard SP1 64-bit)                      | <ul style="list-style-type: none"> <li>• 2 vCPU, 4 GB RAM</li> <li>• 1 NIC (e1000 adapter)</li> <li>• 35 GB (vmdk only)</li> </ul>  |
| Web Server (Windows Server 2008 R2 Standard SP1 64-bit)                      | <ul style="list-style-type: none"> <li>• 2 vCPU, 4 GB RAM</li> <li>• 1 NIC (e1000 adapter)</li> <li>• 35 GB (vmdk only)</li> </ul>  |
| Database Server (Windows Server 2008 R2 Standard SP1 64-bit)                 | <ul style="list-style-type: none"> <li>• 2 vCPU, 4 GB RAM</li> <li>• 1 NIC (e1000 adapter)</li> </ul> <p><b>Disks:</b></p> <ul style="list-style-type: none"> <li>• OS/Page/PerfLogs (C:\) → 50 GB (vmdk only)</li> <li>• SystemDB Data/SystemDB Logs/User DBLogs/TempDB Logs/SQL Binaries/SQL trace &amp; Logs (F:\) → 80 GB (vmdk only)</li> <li>• User data files (G:\) → 100 GB (vmdk only)</li> <li>• Backup (Z:\) → 100 GB (vmdk only)</li> </ul> |
| Load Generator (Windows Server 2008 R2 Standard SP1 64-bit)                  | <ul style="list-style-type: none"> <li>• 2 vCPU, 4 GB RAM</li> <li>• 1 NIC (e1000 adapter)</li> <li>• 35 GB (vmdk only)</li> </ul>  |
| DNS and Active Directory (Windows Server 2003 Enterprise Edition SP2 64-bit) | <ul style="list-style-type: none"> <li>• 1 vCPU, 1 GB RAM</li> <li>• 1 NIC (e1000 adapter)</li> <li>• 15 GB (vmdk only)</li> </ul>  |
| Virtual Machine (Management Stack)   | Hardware Configuration  |
| vCenter Server (Windows Server 2003 Enterprise Edition SP2 64-bit)           | <ul style="list-style-type: none"> <li>• 2 vCPU, 4 GB RAM</li> <li>• 1 NIC (e1000 adapter)</li> <li>• 15 GB (vmdk only)</li> </ul>  |
| SRM Server (Windows Server 2003 Enterprise Edition SP2 64-bit)               | <ul style="list-style-type: none"> <li>• 2 vCPU, 4 GB RAM</li> <li>• 1 NIC (e1000 adapter)</li> </ul> <p><b>Disks:</b></p> <ul style="list-style-type: none"> <li>• OS and SQL Binaries for SRM DB (C:\) → 15 GB (vmdk only)</li> <li>• SRM server installation (E:\) → 15 GB (vmdk only)</li> </ul>  |

## Solution Configuration Steps

Site Recovery Manager can be used to add virtual machines that share common resources to protection groups at the protected site. Protection groups can be configured into recovery plans for restoration at the recovery site.

When the recovery plan is executed, Site Recovery Manager does the following:

1. Breaks the asynchronous storage replication relationships.
2. Maps the LUNs to existing storage snapshots.
3. Triggers the disaster recovery ESX hosts to rescan and detect the storage.
4. If desired, suspends virtual machines such as test/dev instances at the recovery site to free computing resources.
5. Reconfigures the virtual machines as defined for the network at the recovery site.
6. Powers on the virtual machines in the order defined in the recovery plan.
7. After boot up, the Advent Portfolio Exchange® (APX) application virtual machines automatically receive the new IP address that was customized using “dr-ip-customizer.exe” utility.

For more information, refer to the Site Recovery Manager Administration Guide ([http://www.vmware.com/pdf/srm\\_admin\\_4\\_1.pdf](http://www.vmware.com/pdf/srm_admin_4_1.pdf)), starting with “Report IP Address Mappings for a Protection Group.”

## Test Results

The testing of Advent Portfolio Exchange® (APX) application with Site Recovery Manager included manual tests with asynchronous storage configurations. A summary of the tests and resulting observations are described below.

### Testing Summary

The testing activity mainly consists of two sections: “Test Bubble” and “Real Disaster”. In each case, manual tests were run to validate the application functionality in disaster recovery scenario.

#### Test Bubble:

To facilitate real disaster testing, SRM can create a “test bubble” network to which recovered virtual machines are connected during a test. This network is managed by its own virtual switch, and in most cases recovered virtual machines can use it without having to change network properties such as IP address, gateway, and so on.

Advent Portfolio Exchange® (APX) application server needs Active Directory and DNS server to be available during startup of its application as part of windows services. The AD and DNS server at the recovery site need to be made available in the bubble network before the Advent Portfolio Exchange® (APX) application server virtual machines are powered on. In test bubble mode, the secondary AD and DNS servers are not available and putting it in “Test Bubble” network will eventually have serious problems if they do not see their peers on a regular basis. To facilitate this process, secondary AD and DNS servers are cloned and made part of the bubble network. Before the application server virtual machine is powered on; the cloned AD and DNS servers are joined to the bubble network.

VM power on priority is set in recovery plan as per the Advent Portfolio Exchange® (APX) application requirement.

Different functional tests such as navigation, search, dashboard viewing, different report run such as report, SSRS etc... were run in test bubble network to validate their correctness and accuracy.

Also database integrity was checked in the test bubble network.

All these functionalities worked as expected and it's been validated that during real disaster the Advent Portfolio Exchange® (APX) application can work in the remote site successfully.

### Real Disaster:

In case of real disaster, the storage replication link is broken and the virtual machines are brought up in the actual network instead of bubble network.

To simulate the disaster scenario, the ESXi hosts of the protected site are "cold booted" using ILO access. With this all the virtual machines (Advent Portfolio Exchange® (APX) application, vCenter, SRM, DNS) are abruptly powered off rather than graceful shutdown.

Same functionality of Advent Portfolio Exchange® (APX) application were verified and Advent Portfolio Exchange® (APX) application successfully failover to the remote site

### Test Matrix:

Following table describes the time taken for the recovery plan to be executed

**Table 6: Recovery Time Measurement**

| Operation             | Time Taken      |
|-----------------------|-----------------|
| Test Bubble Fail Over | 16 min. 45 sec. |
| Real Fail Over        | 16 min. 13 sec. |

Estimating an accurate time (RTO) is relatively difficult as there are a lot of variable parameters to consider, such as network latencies, resource availability, storage I/O and number of virtual machines. For instance, recovery operation latency during the "Prepare Storage" step in a test recovery differs from the latency during a real recovery since the two recovery modes entail different storage level operations.

The above numbers (Table 6) gives an estimate of time needed to recover the Advent Portfolio Exchange® (APX) application in case of disaster.

The actual numbers can vary in a real deployment and the numbers presented here are from the above setup. Also the storage provider whose storage replication adapters work in conjunction with Site Recovery Manager to enable a simple and a fully automated test or real recovery fulfills the recovery point objective (RPO).

## Recommendations

The testing results indicate that the best performance in implementing site recovery solutions can be achieved by using the best practices described below.

These and other recommendations are described in more detail in the VMware Site Recovery Manager documentation. For more information, see the "Resources" section later in this paper.

- Install the Site Recovery Manager database as close to the Site Recovery Manager server as possible to reduce the round-trip time. Reduce the effect of round trips on recovery time performance. Use the same database server to support the vCenter database instance and the Site Recovery Manager database instance.
- Enable faster testing and real recoveries by grouping virtual machines under fewer protection groups. Ensure that the virtual machines have no constraints preventing them from being added to similar protection groups.
- Enable DRS at the recovery site. Migrations might occur as DRS tries to load-balance the cluster during recovery.
- Enable Distributed Power Management (DPM) on recovery site clusters if your recovery site hosts are in the standby state. More hosts lead to increased concurrency for recovering virtual machines, and this enables shorter recovery times. If DPM is not enabled, and the hosts are in a standby state, bring the hosts out of standby mode manually and drag shadow virtual machines onto them.
- It is strongly recommended that VMware tools be installed in all protected virtual machines in order to accurately acquire their heartbeats and network change notification.
- Make sure any internal script or callout prompt does not block recovery indefinitely.
- Specify a non-replicated datastore for swap files to speed up replication between the two sites, and remote calls to vCenter Server. (During recovery, delete swap files for all virtual machines).
- VMware recommends a minimum of two ESX hosts at a recovery site. Although this is not a requirement, having two ESX hosts ensures availability for VMware services such as vMotion, HA, and DRS, and it improves the recovery time.
- Site Recovery Manager relies on the capabilities of the storage platform for failover. Recovery time can vary depending on the SAN vendor, replication type and other factors. It can take 5 to 10 minutes to make the changes to the back-end storage. Follow VMware best practices for Site Recovery Manager, along with SAN vendor best practices, to ensure optimal recovery time.

## Conclusion

When Advent Portfolio Exchange® (APX) 4.0 runs as an application in a VMware environment, Site Recovery Manager enables businesses to achieve cost-effective disaster recovery conveniently. This paper describes the advantages and technical considerations of using Site Recovery Manager for disaster recovery that runs in a VMware environment using block-based SAN storage replication. The testing demonstrates Advent Portfolio Exchange® (APX) application can be recovered in the recovery site conveniently and easily in a short interval of time.

Overall, the testing results prove that Site Recovery Manager provides a flexible, high-performance, high-availability platform for disaster recovery that works well with Advent Portfolio Exchange® (APX) application running in a VMware environment.

## Acknowledgement

The following team and individuals contributed to the creation of this deployment guide:

- On Demand Group, Advent
- Biswapati Bhattacharjee, ISV Validation Engineer, VMware



## Resources

For more information about VMware and related products, use the links and references below.

### VMware References

- VMware Documentation:  
<http://www.vmware.com/support/pubs/>
- VMware Licensing:  
<http://www.vmware.com/support/licensing/>
- VMware vSphere 4.1 Performance Best Practices:  
<http://www.vmware.com/resources/techresources/10161>
- VMware Global Support KB:  
<http://kb.vmware.com>
- VMware vCenter Site Recovery Manager Performance Best Practices:  
<http://www.vmware.com/files/pdf/VMware-vCenter-SRM-WP-EN.pdf>

### Advent References

- Advent Web site:  
<http://www.advent.com>
- Advent Client-Only web site:  
<http://connection.advent.com>

### Storage Platforms References

- Knowledge Base: Setting Up VMware vCenter Site Recovery Manager with Partner Storage Arrays:  
[http://kb.vmware.com/selfservice/microsites/search.do?language=en\\_US&cmd=displayKC&externalId=1014610](http://kb.vmware.com/selfservice/microsites/search.do?language=en_US&cmd=displayKC&externalId=1014610)
- Site Recovery Manager Storage Partner Compatibility Matrix:  
[http://www.vmware.com/pdf/srm\\_storage\\_partners.pdf](http://www.vmware.com/pdf/srm_storage_partners.pdf)

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