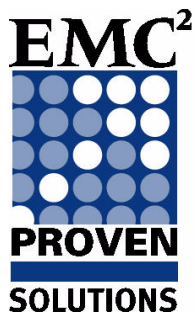


EMC Backup and Recovery for VMware

Enabled by EMC CLARiiON, EMC Replication Manager, and
EMC Avamar

Reference Architecture



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Published February 2009

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P/N H5928

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About this Document

Purpose

This document describes the reference architecture of the EMC Backup and Recovery for VMware Enabled by EMC CLARiiON, EMC Replication Manager, and EMC Avamar solution. The solution was developed by the Avamar Integration Lab.

Audience

This document is intended for technical staff interested in evaluating or implementing a solution that leverages the integration of generally available products and emerging technologies. Executives evaluating such a solution will also find this document useful.

Scope

This document provides an overview of the EMC Backup and Recovery for VMware Enabled by EMC CLARiiON, EMC Replication Manager, and EMC Avamar solution. An architectural overview and description of the hardware and software components used in the solution are also included. Detailed implementation instructions and best practices are beyond the scope of this document.

Note: This document describes only the features and methodologies specific to this solution. For more detailed information on specific components of this solution, or other EMC solutions, consult the appropriate EMC and third-party documentation.

The business challenge

Many companies are looking to leverage virtualization technology to reduce costs and maximize the use of IT resources. However, this increases the complexity in the environment in terms of critical IT processes such as disaster recovery, backup and archive, which drives up the operational and maintenance costs. Creating several virtual machines increases the number of “servers” that need to be backed up and managed. Introducing these new servers can present disparate backup processes and make it difficult to meet service level agreements consistently. Finally, this complexity makes it difficult to complete backups in the allocated time, impacting business and information availability and ultimately, revenue generation.

The technology solution

The EMC Backup and Recovery for VMware Enabled by EMC® CLARiiON, EMC Replication Manager, and EMC Avamar® solution addresses the backup and recovery challenges that a virtual environment presents.

In this solution the EMC CLARiiON® storage array works together with EMC Replication Manager and EMC SnapView™ to offload the backup resources from the production ESX server environment, effectively creating zero backup windows. Replication Manager centralizes backup processes, reducing complexity in the environment. Replication Manager coordinates integrated replicas at the VM (Virtual machine) level and integrates with VMware ESX server and VMware VirtualCenter APIs to ensure VM consistency.

The solution provides quick, seamless backup and recovery while greatly reducing the amount of data that needs to be backed up and stored. This is

accomplished by utilizing EMC Avamar to back up the mount point location (/vmfs/volumes) to an Avamar Data Store and then uses global, source-based data de-duplication technology to reduce the size of the backup data within and across VMs, dramatically reducing the required backup time, network bandwidth and storage infrastructure. This solution enables customers to consistently deliver one backup service across their virtualized environment.

Solution components

This section briefly describes the EMC components that are used in this solution.

EMC Replication Manager

EMC Replication Manager automates and centralizes backup processes and execution, independent of the underlying technology used. Replication Manager has many integration points that bring ease of use in implementing the solution and maintaining the solution in day-to-day operations as the environment grows. Replication Manager's first integration is with VirtualCenter (VC), VMware's Enterprise management interface.

EMC SnapView/Snap clone

EMC SnapView software allows the creation of mountable snapshots or full-copy clones of production data, enabling the user to run testing, decision support, backup, debugging, or reporting in parallel, without taking applications offline.

EMC CLARiiON® CX3-40

EMC CLARiiON CX3-40 is the OLTP (online transaction processing) workhorse of the EMC CLARiiON CX3 UltraScale™ series of networked storage systems. The CX3-40 gives you high-performance, high-capacity networked storage that meets the needs of demanding OLTP workloads and large-scale e-mail environments.

EMC Avamar

EMC Avamar backup and recovery solutions utilize patented global data technology to identify redundant data at the source, minimizing backup data before it is sent over the LAN/WAN. With Avamar, you can achieve new levels of data reduction and enable fast, secure backup for VMware environments, remote and branch offices, and data centers with a constrained backup window or limited bandwidth. In the process, you'll reduce backup time, growth of secondary storage, and network utilization.

VMware ESX Server 3.5

VMware ESX 3.5 is the market leading virtualization hypervisor in use across thousands of IT environments around the world. VMware ESX abstracts server processor, memory, storage and networking resources into multiple virtual machines, forming the foundation of the VMware Infrastructure 3 suite.

Environment overview

Virtual infrastructure requires flexible connectivity to take full advantage of VMware dynamic functionality, including DRS Scheduler. VMware DRS dynamically allocates and balances computing capacity across a collection of hardware resources aggregated into logical resource pools. When a virtual machine experiences an increased load, VMware DRS automatically allocates additional resources by redistributing virtual machines among the physical servers within the network.

This solution uses a single production DRS cluster. The cluster consists of two VMware ESX servers where 15 virtual machines are created on 2 TB of CLARiiON RAID 5 storage. The server breakdown for the solution tested is listed in the following table:

Table 1 **Server list**

| Server type | Configuration |
|--|--|
| 50 http servers (Windows 2003, Service Pack 2) | 10 GB boot device 20 GB data device |

Table 1 **Server list (continued)**

| Server type | Configuration |
|---|--|
| 50 general application servers (Windows 2003, Service Pack 2) | 10 GB boot device 20 GB binary device |
| 20 Linux servers (Red Hat Linux, Enterprise version 4) | 10 GB boot device 10 GB data device |
| 15 SQL Server 2005 (Windows 2003, Service Pack 2) | 10 GB boot device 20 GB binary device 220 GB database device 40 GB log device 220 GB dump device |

The site also has an ESX proxy host that replicas are mounted to, effectively providing a mount host. Installed on this same ESX host is a Replication Manager virtual machine.

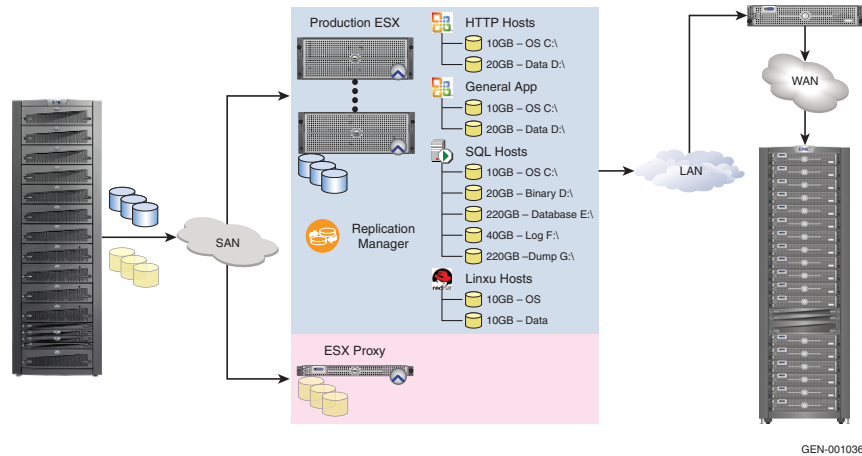


Figure 1 Overall physical architecture

The process is as follows:

1. Avamar calls a pre-script. The pre-script is the Replication Manager command line to start the Replication Manager job.
2. Replication Manager queries Virtual Center for a list of storage devices and presents them back to the user for replication selections.
3. Once the devices are selected, Replication Manager maps the VMware File System (VMFS) devices back to a LUN on the CLARiiON and then determines the storage needed to fulfill the snapshot/clone requirement.
4. Once Replication Manager synchronizes the data for the copy, Replication Manager then maps the new device to a mount host (another ESX host). Replication Manager programmatically makes the device visible to that mount host and then mounts the device to the /vmfs/volumes directory on that host.
5. Avamar backs up the mount point location.

Hardware and software resources

The following tables list the hardware and software resources used in the validated solution.

Table 2 Hardware resources

| Equipment | Quantity | Configuration |
|-------------------------------|----------|---|
| Production VMware ESX servers | Ten | Quad Core with 64 GB RAM |
| ESX proxy host | One | Single CPU 1 GB RAM |
| Storage array | One | CX3-40 with FLARE® 26 |
| Production disks | Three | RAID 5 4+1 metavolumes (three component members) equaling 1 TB each |
| Replica Snap disks | Six | RAID 5 4+1 devices 50GB |
| Network switch | One | 4506 Cisco switch |
| Fibre channel switch | One | Cisco MDS (Multilayer Director Switch) 9509 |
| EMC Avamar appliance | Two | Avamar Data Store Gen2 |

Table 3 Software resources

| Software | Version | Configuration |
|---|-------------|--|
| VMware Virtual Center | 2.5 | Installed on Dell 1950 |
| EMC Solutions Enabler | 6.5.0.19 | Installed on Replication Manager server/client (virtual machine) |
| EMC CLARiiON FLARE operating system | 6.26.5.0.95 | Installed on EMC CLARiiON CX3-40 |
| EMC CLARiiON NAVI CLI agent for Windows | 6.26.5.0.95 | Installed on Replication Manager server/client (virtual machine) |
| EMC Replication Manager | 5.1 SP2 | Installed on virtual machine |

Table 3 Software resources (continued)

| Software | Version | Configuration |
|----------------------------|----------------|---|
| EMC Avamar DS (Data Store) | 4.0.2-27 | Physical appliance |
| EMC Avamar Linux client | 4.0.2-27 | Installed on VMware ESX proxy and VMware ESX production servers |
| VMware ESX server | 3.5.2 | Installed on VMware ESX proxy and VMware ESX production servers |

Conclusion

The EMC Backup and Recovery for VMware solution is a highly scalable approach to backing up large VMware environments, ensuring application and information availability. The solution reduces the time it takes to perform backup and recovery, and minimizes the amount of infrastructure, disks, and power needed to support backup and recovery. This reduces the backup footprint, and eliminates all impact on production when backing up the production environment— an environment that might already be severely constrained by its underlying physical resources.

To learn more about this and other solutions contact an EMC representative or visit www.EMC.com/solutions.

