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Designing a Scalable, High-Performance Protection Architecture for Large-Scale Virtual Deployments

Quest's Distributed Virtual Appliance Strategy for Backup, Replication and Recovery on ESXi Server Platforms

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TECHNICAL BRIEF

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Executive Summary

VMware vSphere 4.1 is designed for best practice use on ESXi platforms, as a better alternative to ESX systems currently in place. Most image-based data protection software, including vRanger Pro and vReplicator, are designed to leverage the ESX service console, which is not present in ESXi systems.

Quest's Virtualization Management Group (formerly Vizioncore) implemented support for ESXi platforms in vRanger Pro 4.x. The resulting differences in operation of backup and recovery, are detailed in a recent blog entry on the vCommunity site. However, for better scalability and performance on ESXi platforms, Quest's Virtualization Management Group (VMG) is in the process of implementing a virtual appliance (VA) architecture. This breakthrough architecture will retain the advantages of central management while adding distributing processing and data movement to the Quest Data Protection Platform (DPP). It ensures scalability, performance and manageability for data protection of ESXi platforms.

This document explains the VA architecture and its advantages over alternative approaches.

The Quest Virtual Appliance (VA) Architecture

When working with ESX platforms, vRanger Pro and vReplicator inject a binary at run time onto the ESX server. This binary performs the backup or replication job and moves images directly from the ESX server to a storage device on the network. This design has many advantages, including:

- Low maintenance **–** There is no need to deploy or maintain an agent of any type on the VMware system.
- Distributed processing **–** Images do not need to move through the vRanger Pro or vReplicator server, which keeps that server small and distributes processing of data movement naturally into the environment.

To reproduce these key advantages for ESXi systems, Quest's VMG has designed a distributed VA architecture. This architecture retains the central vRanger Pro/vReplicator server to ensure manageability, but substitutes new VAs for job processing and data movement previously performed on ESX servers using the service console. The VA architecture is illustrated in Figure 1:

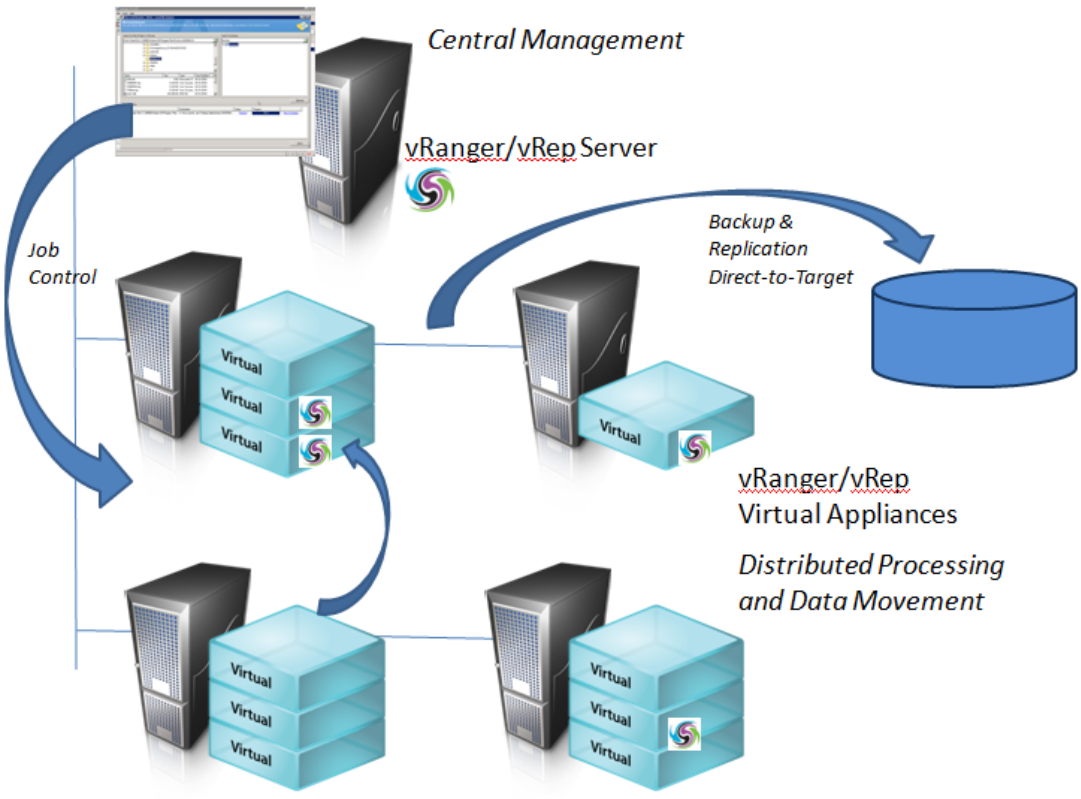

Figure 1: The Quest VMG VA architecture combines the advantages of central management with distributed processing and data movement.

Benefits

This VA architecture provides these key benefits for image-based virtual data protection, including backup, replication and recovery:

- **Seamless scalability** – Additional VAs can easily be deployed into the environment as required.
- **Manageability** – You can manage your environment from a central console, no matter how many VAs are deployed.
- **Low maintenance** – The VA architecture preserves the reduced maintenance of an agentless solution because the VAs can self-update to new versions as available.
- **Distributed processing –** The VA architecture preserves the Direct-to-Target movement of data; images are not sent through the vRanger Pro or vReplicator server.

Why This Is Simply Better Than Alternatives

Alternative data protection architectures for ESXi systems require all images to be moved through a single, central server. To scale this requires deployment of additional central servers—each of which must be individually provisioned, managed, and maintained. This approach is impractical for larger environments with four or more ESXi hosts running 30 or more VMs. The problems with this single-server architecture are detailed in a **recent blog entry** on the vCommunity site.

In environments with 30 or more VMs, a distributed VA architecture is essential to ensuring efficient administration, low infrastructure costs, and fast backup and replication.

Key Elements of the New Virtual Appliance Architecture

Profile	The virtual appliance is Quest VMG's own version of Linux, built to optimize backup and replication performance. This appliance was built to handle the I/O-intense operations needed for the best data processing and transmission without the service console.
Deployment	The process of deployment to the host will be handled by the Quest DPP platform. Since the hosts are already pre-configured in DPP, you will be able to pick the host or hosts to which the VA should be deployed. The VA assignment process can handle one-to-many or one-to-one relationships: • The one-to-many relationship works with many ESXi hosts assigned to a single VA on shared storage. This configuration can reduce the amount of management overhead, but can impair your ability to scale outward. • The one-to-one relationship assigns one ESXi host to a single VA. This configuration can add some management overhead, but expands your ability to scale outward for backup or replication.
VA management	Before the VA is deployed to a host, you will be able to configure the following items for the VA from the vRanger Pro user interface: • IP addressing, static or DHCP • Host name • Root password • Non-root user password • Quantity of virtual CPUs • Which virtual or distributed network to attach • Which datastore to deploy
Binary injection	The virtual appliance will not hold any of the Quest virtualization technology engines or runtime code; this code will be injected at VA deployment time. At run time of a backup or replication job, the version of the engine is checked; if it is out of date, the platform will inject new versions of the engines. Therefore, the VA infrastructure does not have to be redeployed if an update is made to the platform or engine, which significantly reduces management overhead for the VA infrastructure.
ESX and ESXi replication process	The Quest DPP platform will use the vStorage API "Hot-Add" function on the source to read the data. However, if the host running the VA does not have direct access to the storage where the source VMs is running the then the engine will failback to vStorage API network for the LAN to capture data. When it comes to data transmission the vRanger transmission the platform has its own transmission protocol designed for WAN links. During the streaming process over the WAN link the vRanger platform will use the vStorage API "Hot-Add" function to write the data to the target ESX(i) host. This allows the data to be encrypted and compressed for security and bandwidth savings.
ESX and ESXi backup process	The Quest DPP platform will use the vStorage API "Hot-Add" function on the source to read the data. However, if the host running, the VA will not have direct access to the storage where the source VM is running, and the engine will failback to the vStorage API network for the LAN to capture data. To write the resulting data to the target storage, DPP will use the protocol selected by the user (SFTP, CIFS, NFS, or FTP).

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