ESG Lab Review

Veeam Backup & Replication – Built for Virtualization

Date: March 2013   **Authors:** Vinny Choinski, Senior Lab Analyst; Kerry Dolan, Lab Analyst; and Jason Buffington, Senior Analyst

**Abstract:** _This ESG Lab report documents hands-on testing of Veeam Backup & Replication, designed to assess Veeam's claims that they deliver a Powerful, Easy-to-Use, and Affordable data protection solution Built for Virtualization._

Introduction

Veeam has staked a claim that the company's purpose-built virtual machine data protection solution, Veeam Backup & Replication, is Powerful, Easy-to-Use, and Affordable. If true, these characteristics are right in line with customer requirements. As virtualization deployments expand, it becomes ever clearer that data protection methodologies designed for the physical infrastructure paradigm are insufficient. IT administrators need a powerful, easy-to-use, and affordable solution to today's IT challenges, which include exploding data volumes, shrinking backup windows, and more stringent recovery point and recovery time objectives (RPOs and RTOs).

Customer Challenges

Organizations have enthusiastically adopted server virtualization and continue to expand their implementations beyond dev/test, file/print, and web servers to include mission-critical applications. However, consolidating multiple workloads onto individual physical servers does add risk. A single server failure now impacts more than a single application. Virtualizing tier-1 applications magnifies the importance of enabling quick recovery of virtual machines (VMs). However, when ESG asked IT professionals about backup and recovery of virtual servers, 60% indicated that it was one of their top five data protection challenges.[1] Business managers have little tolerance for application downtime or lack of data availability, and IT managers need assurance that backed-up systems are, in fact, recoverable.

Virtualization helps to increase operational agility, facilitates higher availability, and reduces equipment, power, cooling, facilities, and management costs through consolidation. However, many existing backup solutions have not kept pace with these new environments and often negate the cost reduction and management simplification benefits. Traditional backup methods with agents in each VM increase the load on hosts and the time required to complete backups. In addition, bolted-on image-based backup adds significant complexity and often little capability. A purpose-built backup solution that leverages the core attributes of virtualization—including cost, agility, and availability benefits—will accelerate the virtualization of tier-1 mission-critical application workloads, which must be assured of high availability and full protection.
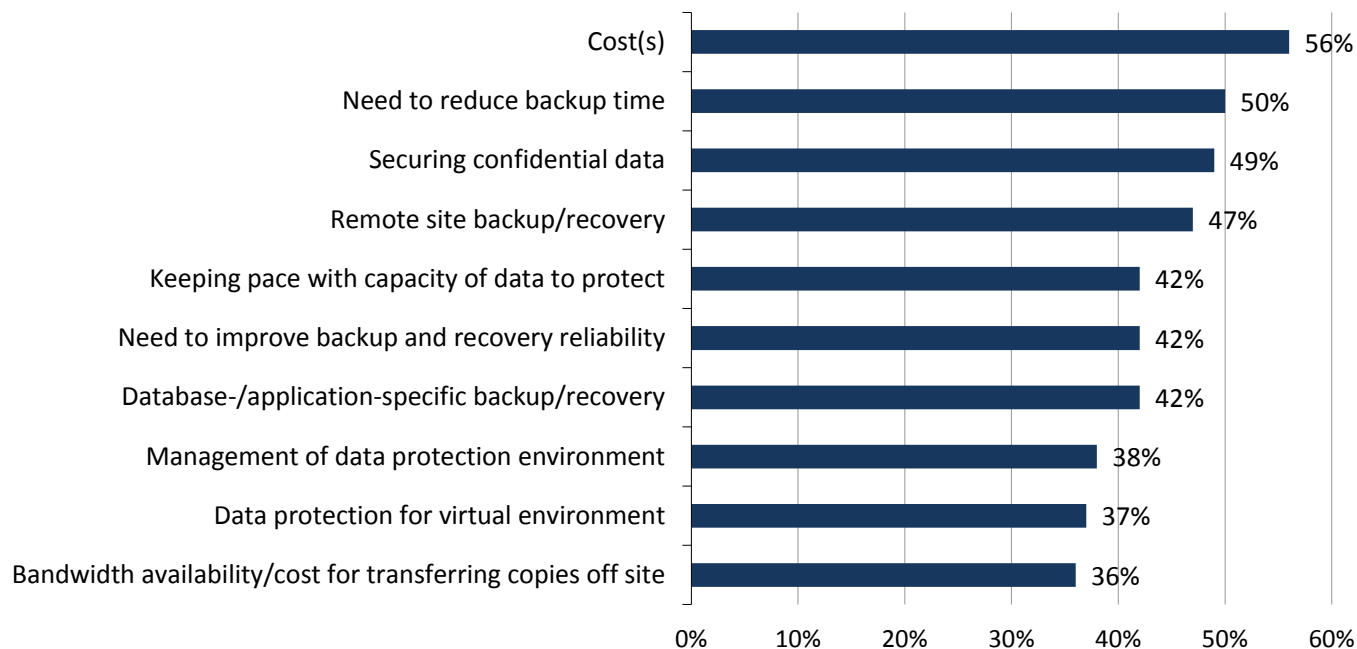
---

[1] Source: ESG Research Report, _Trends in Data Protection Modernization_, August 2012.

ESG research confirms this hypothesis. ESG recently asked IT professionals about their challenges with all current data protection processes and technologies. Figure 1 shows the top ten challenges: cost tops the list, with more than half (56%) of respondents citing it.[2] The need to reduce backup time is second with 50%. Other challenges that made the top ten include backup and recovery reliability and data protection for virtual environments (42% and 37% respectively).

Figure 1. Current Data Protection Challenges

Top 10 challenges with organization's current data protection processes and technologies (Percent of respondents, N=330)

Challenge	Percent
Cost(s)	56%
Need to reduce backup time	50%
Securing confidential data	49%
Remote site backup/recovery	47%
Keeping pace with capacity of data to protect	42%
Need to improve backup and recovery reliability	42%
Database-/application-specific backup/recovery	42%
Management of data protection environment	38%
Data protection for virtual environment	37%
Bandwidth availability/cost for transferring copies off site	36%

Source: Enterprise Strategy Group, 2012.

This report examines Veeam's innovative and affordable VM backup solution that provides organizations with powerful protection features that are also easy-to-use.

---

[2] Source: ESG Research Report, *Trends in Data Protection Modernization*, August 2012.

The Solution: Veeam Backup & Replication – Built for Virtualization

Veeam Backup & Replication was built specifically for virtual environments to provide fast disk-based backup and recovery of VMware vSphere and Microsoft Hyper-V virtual machines. It offers a 2-in-1 solution of image-based backup and replication, enabling organizations to meet all of their VM recovery time and recovery point objectives (RTOs and RPOs). Organizations can address specific budgetary and VM availability requirements by replicating onsite for high availability, replicating offsite for disaster recovery, and backing up using cost-effective storage and techniques. (While Veeam's simple and robust replication function is outside the scope of this Lab Review, it is very much part of Veeam's overall value.)

Veeam's backup solution delivers powerful features including instant object-level recovery as well as automated verification that backups are recoverable. It is easy to set up and uses no agents in VMs, eliminating the need for IT to license, deploy, manage, and maintain agents in VMs.

Figure 2. Backup Architecture and Data Flow
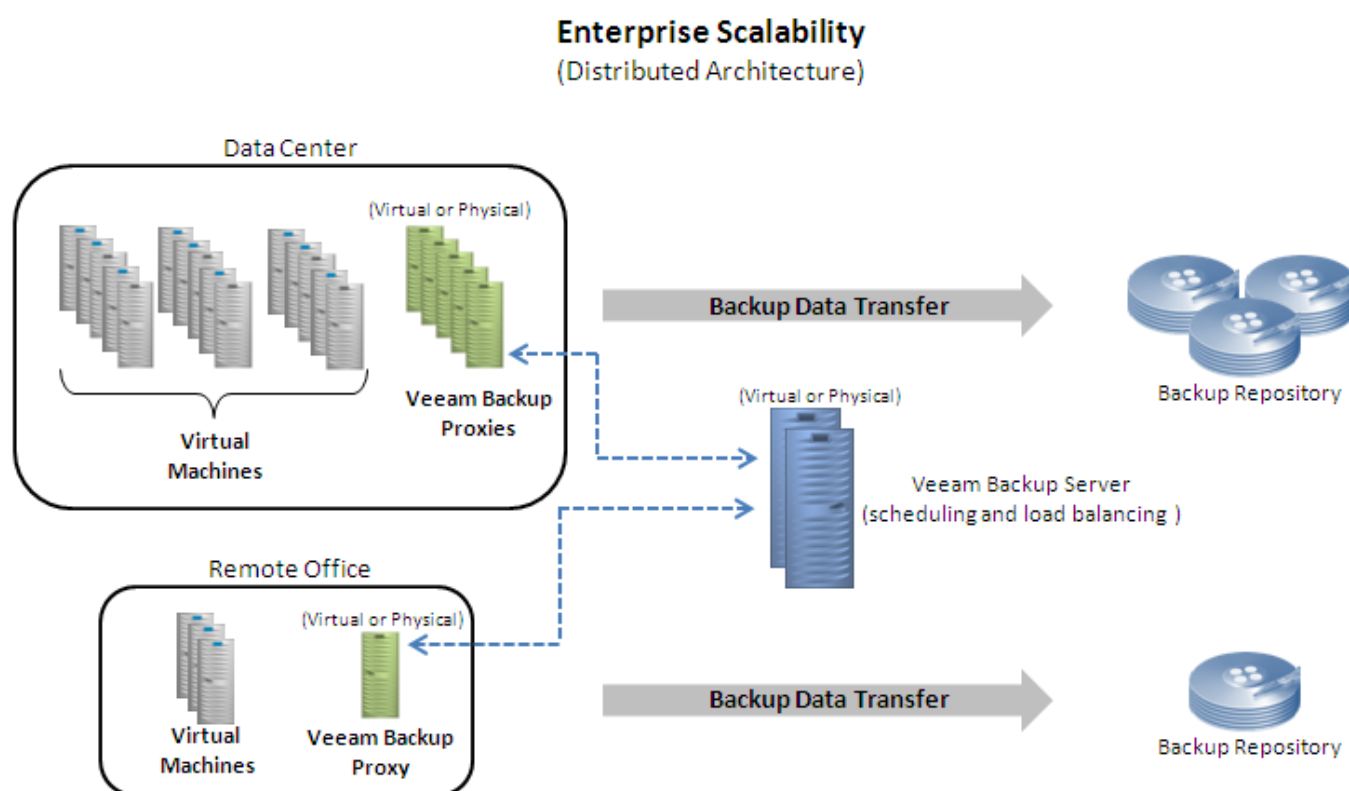
Veeam is storage agnostic, enabling customers to use any storage device (or mix of storage devices) for production and backup storage. With Veeam's distributed architecture, backup proxies can reside at any location and leverage the Veeam backup server for scheduling and load balancing (see Figure 2). Proxies can be automatically deployed and maintained, ensuring ease-of-use. Veeam uses minimal resources and can scale to any size environment through the use of multiple backup proxies and/or backup servers.

Because Veeam is built specifically for virtualization it offers a number of unique capabilities. For example, with Veeam's patent-pending vPower technology, VMware and Hyper-V hosts have transparent access to VM backup images. In essence, vPower enables a VM to run directly from a compressed and deduplicated backup file from any restore point (incremental or full), providing access to the VM without the wait time required by a standard restore. The VM does not need to be extracted, updated, and copied to production storage. Instead, it is started directly from the backup file in the backup repository. The result is a vastly simpler method of gaining access to protected VMs.

vPower enables Veeam to offer several unique capabilities (with multiple patents pending):

- **Instant VM Recovery** – An entire VM can be restored from backup in minutes. Through Veeam vPower, a host can connect to the native virtual machine files in the backup. By running the VM from the backup, a failed VM can be quickly restarted on any host. Complete recovery is done by migrating the VM to production storage non-disruptively in the background.

- **SureBackup** – Automatic verification of the recoverability of backups. Many organizations don't test backups because it requires additional dedicated resources and time. Instead, those responsible for disaster recovery simply hope that if needed, their backups will be recoverable. SureBackup automates verification using available resources in the production or test environment. Using Veeam vPower in concert with Veeam's Virtual Lab concept, the VM is run in an isolated environment directly from the disk-based backup. Veeam starts the VM, boots the OS, and confirms that the VM is functioning properly.

- **Universal Application-Item Recovery (U-AIR)** – Easy recovery of individual objects from any virtualized application. U-AIR is object-level recovery that needs no special agents, backups, or tools. It provides an elegant and inexpensive solution to problems such as accidental data deletion or corruption. With Veeam U-AIR, an application can be started on a recovery VM in a virtual lab from the desired restore point by leveraging Veeam vPower. Once powered up, application objects can be copied to the production instance using a Veeam-provided proxy appliance.

New capabilities provided in version 6.5 include:

- **Veeam Explorer for Microsoft Exchange** – Veeam provides visibility into backups of Microsoft Exchange VMs, enabling IT to effectively and affordably execute e-discovery and item-level restore. This capability allows administrators to browse, search, and selectively restore individual items such as mailboxes, folders, messages, notes, and contacts directly from Veeam backups, replicas, and HP StoreVirtual snapshots (see below).

- **Veeam Explorer for SAN Snapshots** – This capability enables granular recovery of VMware VMs from HP StoreVirtual snapshots (StoreVirtual VSA and StoreVirtual 4000 Storage). You can recover individual VMs, guest files and e-mail items directly from array-based snapshots.

- **Advanced monitoring, reporting, and capacity planning** – New integration with Veeam ONE provides visibility into the virtual infrastructure including real-time monitoring of backup components, identification of unprotected VMs, analysis of backup resources, and capacity planning. These are important capabilities for mission-critical workloads, and enable administrators to ensure full protection as well as optimize resource usage and document backup status.

- **Additional hypervisor support** – Veeam fully tested and now supports both VMware vSphere 5.1 and Windows Server 2012 Hyper-V, including Hyper-V over SMB.

Easy Installation and Setup

ESG Lab found that getting started with Veeam Backup & Replication is an easy process. The application was available on the Veeam website for download, and a fully functional 30-day evaluation key was provided. Once the application was downloaded, it took about 15 minutes to install (including installing Microsoft SQL Server Express) and get to the login screen of the Veeam backup console (see Figure 3). The Lab environment included both vSphere 5.1 and Windows Server 2012 Hyper-V.

Figure 3. Veeam Backup Console
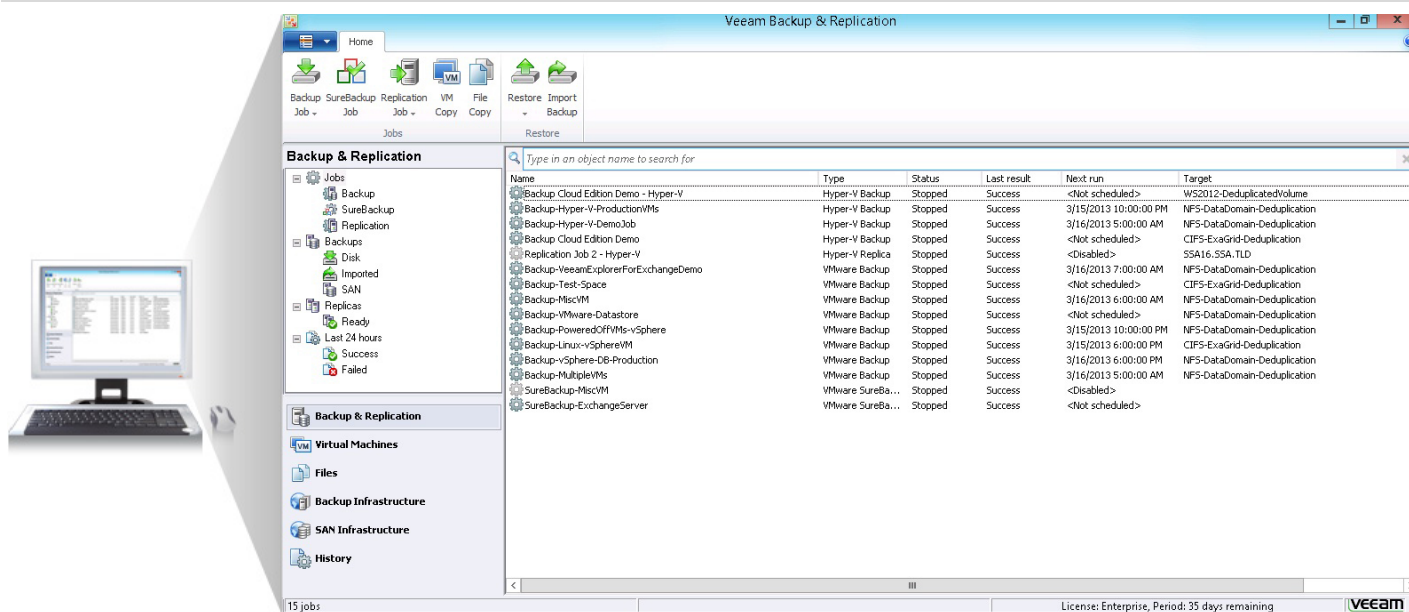
The Veeam backup console is used to configure and manage backup jobs, including schedules, retention, targets, deduplication, and compression. Many restore options are also managed with this console.

Because Veeam is built specifically for virtualization, the user interface is intuitive and completely reflects the task at hand (VM backup and recovery).

Veeam Backup & Replication offers three distinct data transfer modes to provide flexible support for VMware environments. All VMware modes leverage the vStorage APIs for Data Protection (VADP). Direct SAN mode retrieves data directly from the SAN and can be used when a Veeam backup proxy has direct access to SAN storage.

Virtual Appliance mode requires that a Veeam backup proxy be installed in a VM running on a virtual host with access to the datastores of the VM(s) to be backed up. With this mode, data is accessed via the hypervisor I/O stack.

Figure 4. Veeam Data Transfer Options (for VMware)
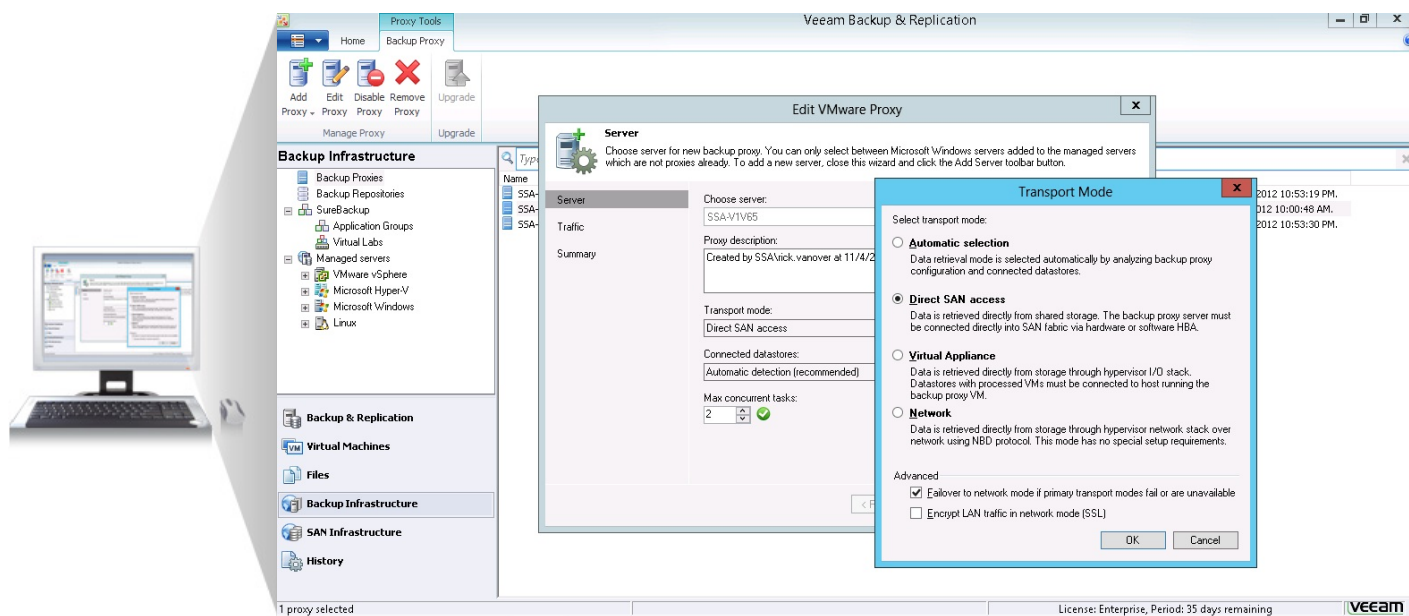
Lastly, Network mode can be used for environments that use locally attached storage. With Network mode, VM data is accessed over the LAN through the host using VADP and the Network Block Device (NBD) protocol. In Network mode, data can be transferred over an encrypted SSL connection.

For Microsoft Hyper-V environments, Veeam leverages VSS snapshot technology. Both on-host and off-host paradigms are supported. With a Veeam on-host backup, a VSS snapshot is created and backup data is transferred to the backup repository via the network. The off-host option requires a shared storage connection and allows the VSS snapshot data to be retrieved directly from the SAN.

Why This Matters

Simplifying operations is important as organizations expand virtual deployments, saving both time and money on the IT side and ensuring optimal data availability and business productivity.

ESG Lab confirmed that Veeam Backup & Replication is a flexible and easy-to-use solution that provides tightly integrated data protection for any type of VMware or Hyper-V configuration. Like the product itself, Veeam's intuitive user interface is built specifically for virtualization, making implementation and management easy. It is designed to walk you effortlessly through the configuration process. Wizards help streamline the recovery process and the multiple deployment options enable optimal use of existing resources. As a result, organizations can save money by requiring fewer dedicated backup components (including no agents in VMs) than traditional backup solutions.

Veeam Explorer for Microsoft Exchange and Veeam Explorer for SAN Snapshots

Two new features available in version 6.5 are Veeam Explorer for Microsoft Exchange and Veeam Explorer for SAN Snapshots. Explorer for Exchange is a free tool that allows an IT administrator to browse mailboxes and mailbox stores and easily locate mailbox items for review or restore. Explorer for SAN Snapshots integrates with HP StoreVirtual snapshots, enabling granular restore of individual VMs, guest files, and Exchange items from SAN snapshots using the Veeam interface.

ESG Lab tested the ability to do item-level recoveries from Exchange Server 2010 by restoring an individual e-mail message. As shown in Figure 5, the Lab browsed an Exchange instance and restored an individual e-mail message from a test user to its original location, making it accessible to the user from the user's mailbox.

Figure 5. Item-Level Restore
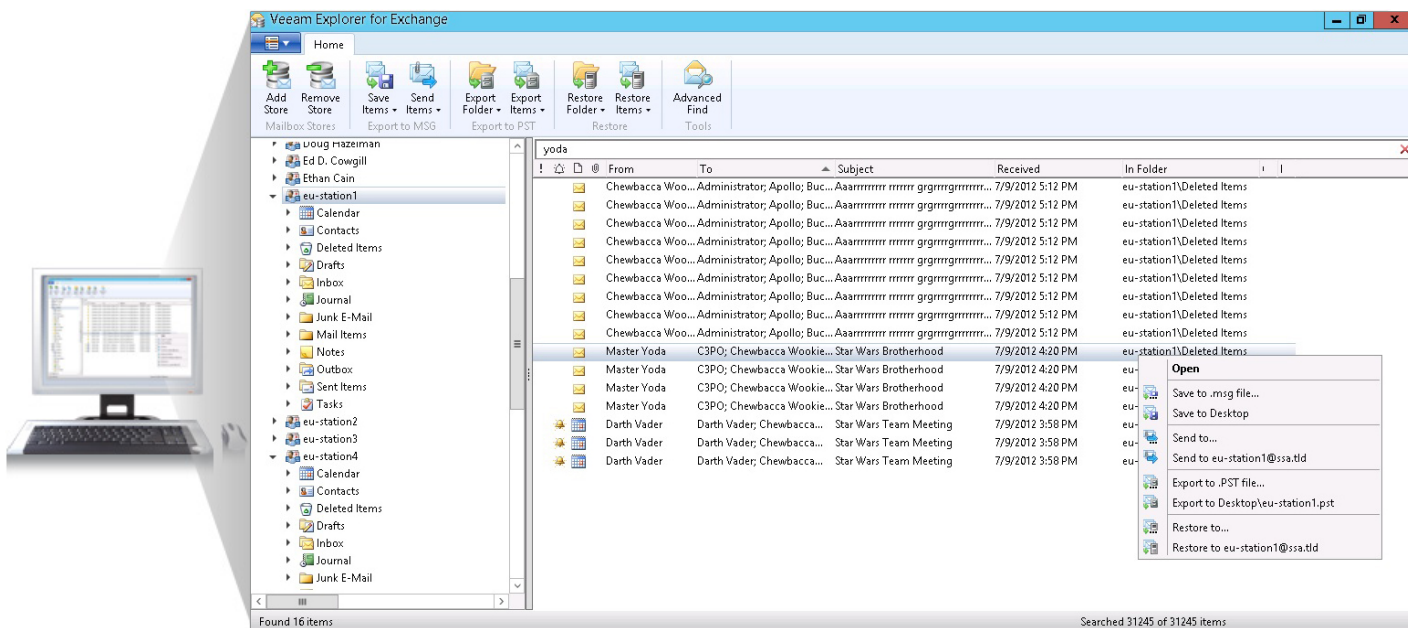
Next, the Lab used the advanced "Find" capability of Explorer for Exchange to search and group items based on a sender-level keyword search. As shown in Figure 6, a search for the word Yoda in the sender field was conducted on an Exchange database.

Figure 6. Advanced Find
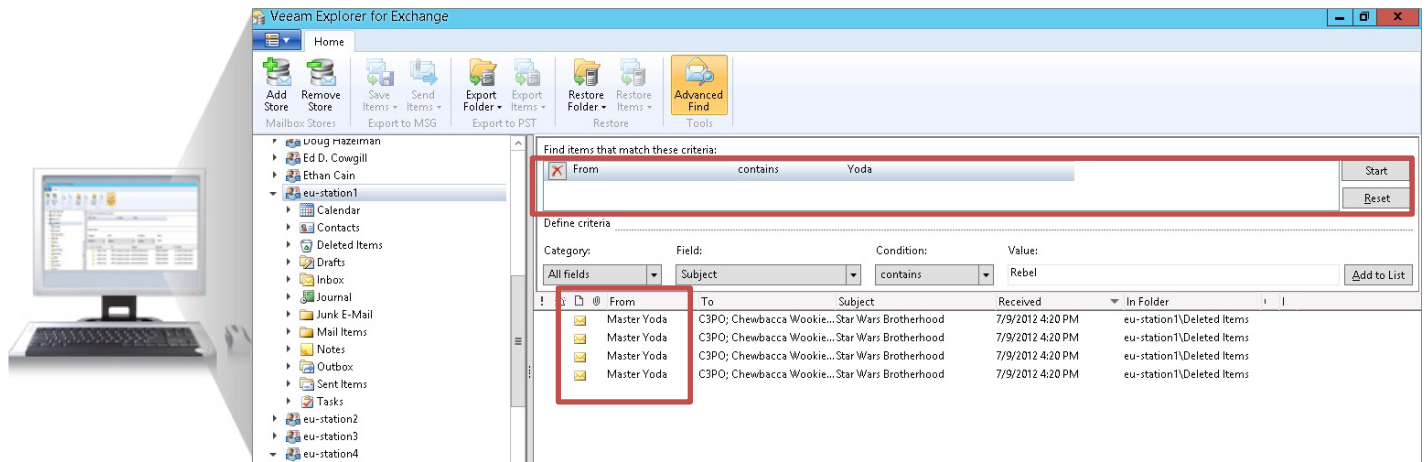
The search was easily built through the dropdown options available in the interface and can be refined by adding new search rules to the original search parameters. The interface made it easy to conduct and refine discovery and recovery operations on our test Exchange database.

Finally, ESG Lab used Veeam Explorer for SAN Snapshots to validate integration between Veeam Backup & Replication and HP StoreVirtual snapshots. The left side of Figure 7 shows the HP Centralized Management Console (CMC) and two snapshots under the *SAN-P4300-LUN01* dropdown. The same snapshots are also displayed in the Veeam backup console on the right side of Figure 7. ESG Lab used the Veeam backup console to conduct a number of different restores from one of the two snapshots. The right side of the figure shows the available recovery options (including VM recovery, Windows guest files, Linux guest files, and Exchange items).

Figure 7. HP StoreVirtual Snapshot Integration
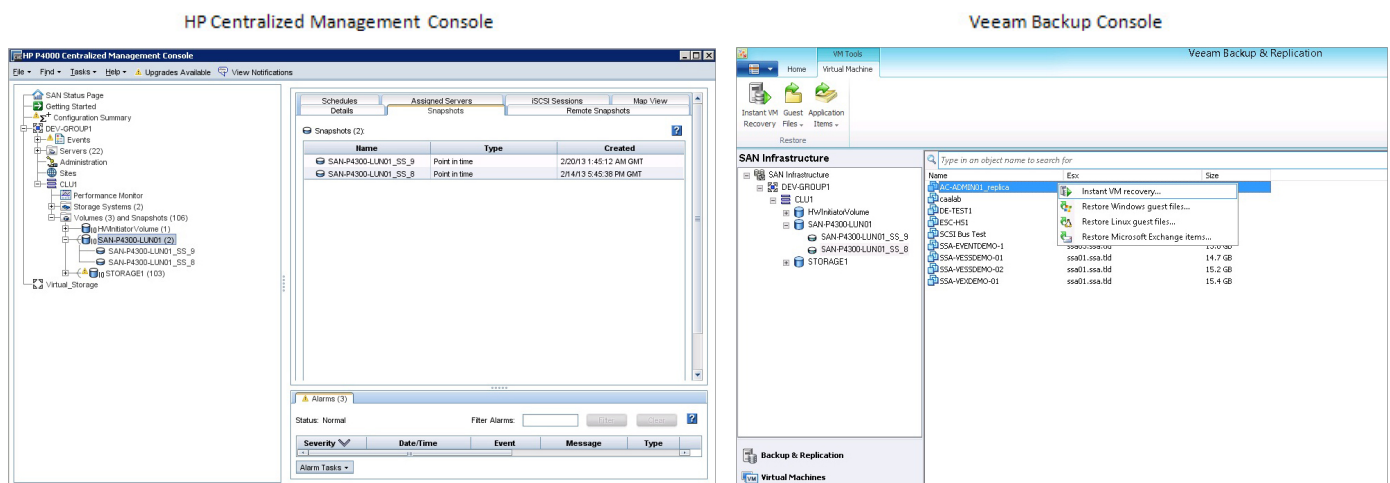
Why This Matters

Backing up systems and data is a key function of IT, but from the end-user standpoint, restore is the most important part of the equation. Users and IT are frustrated by the time it takes to execute a restore—it's better than losing the data, but still a productivity drain. This is especially frustrating when regaining access to a single item requires hours of effort to restore a complete virtual machine.

ESG Lab validated the ease with which Veeam Backup & Replication performs granular recovery for Exchange items using Veeam Explorer for Exchange, and for VMware VMs using Veeam Explorer for SAN Snapshots. These capabilities are included at no additional charge and expand Veeam's value, providing IT organizations with powerful capabilities—Exchange e-discovery and item recovery, plus the ability to leverage SAN snapshots for fast, easy recovery.
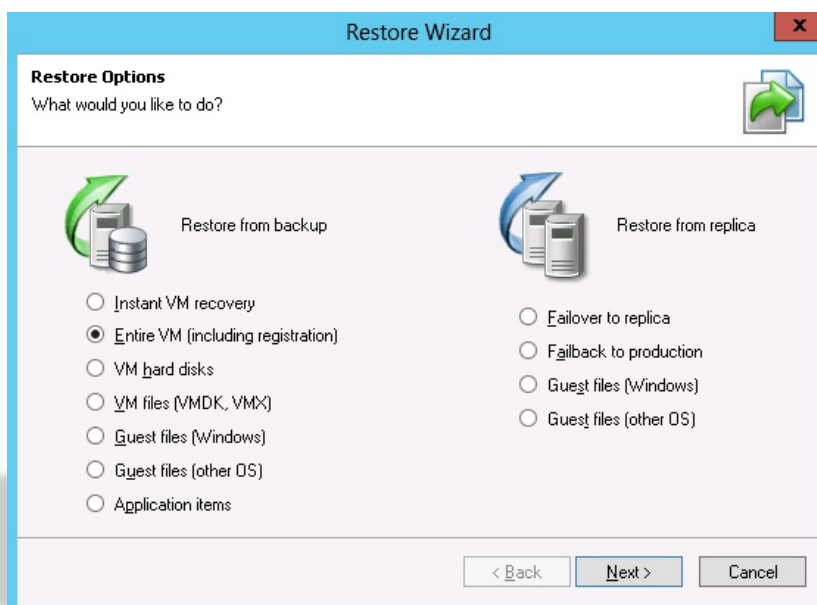
Instant VM Recovery

Instant VM Recovery enables recovery of a VM by presenting it to a virtual host directly from a deduplicated and compressed backup file. Instant VM Recovery is made possible by exposing the virtual machine files in the backup repository through a disk mount, as shown in Figure 8. Instant VM Recovery reads data directly from the backup through the mount point. The full recovery runs in the background while the VM is accessible to end-users. Local disk space provides a temporary write area to hold changes while the VM is running from the backup (so the backup remains unchanged).

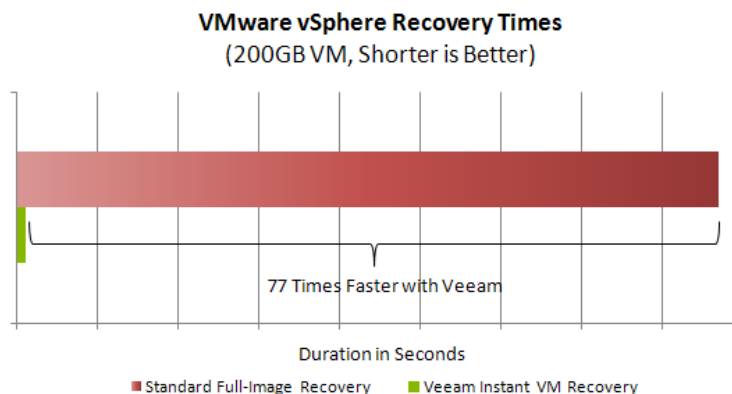*Figure 8. Instant VM Recovery with Veeam vPower*
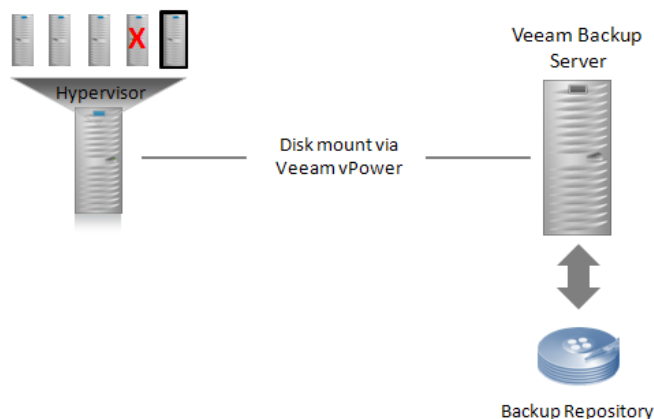
The Instant VM Recovery process is managed through the Veeam restore wizard, which walks the user through the intuitive restore process. As shown in Figure 9, the wizard is used for Instant VM Recovery as well as many other restore options.

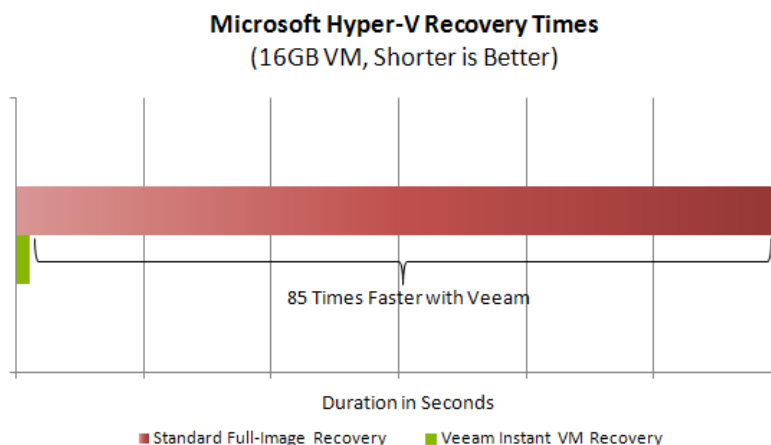*Figure 9. Veeam Restore Wizard (for VMware)*

ESG Lab tested Instant VM Recovery of a 200GB VMware virtual machine compared to a standard full-image recovery using a competing product, as shown in Figure 10. ESG Lab confirmed Veeam Instant VM Recovery was 77 times faster than the standard full-image recovery tested.

Figure 10. Veeam Instant VM Recovery of a VMware VM vs. Standard Full-Image Recovery with Competing Tool

VMware vSphere Recovery Times
(200GB VM, Shorter is Better)

77 Times Faster with Veeam

Duration in Seconds

■ Standard Full-Image Recovery   ■ Veeam Instant VM Recovery

ESG Lab also tested Instant VM Recovery of a 16GB Hyper-V virtual machine compared to a standard full-image recovery using a competing product, as shown in Figure 11. In this instance, ESG Lab confirmed Veeam Instant VM Recovery was 85 times faster than the standard full-image recovery tested.

Figure 11. Veeam Instant VM Recovery of a Hyper-V VM vs. Standard Full-Image Recovery with Competing Tool

Microsoft Hyper-V Recovery Times
(16GB VM, Shorter is Better)

85 Times Faster with Veeam

Duration in Seconds

■ Standard Full-Image Recovery   ■ Veeam Instant VM Recovery

The testing compared Veeam Instant VM Recovery against a standard recovery from an image-based backup using a competing backup application. In the standard recovery, the VM was restored from a deduplicated backup stored on a disk-based backup target. The detailed results for the 200GB VMware and the 16GB Hyper-V VM recoveries are documented in the accompanying bullet points.

Expanded Results

- Veeam Instant VM Recovery for a 200GB VMware VM was 77 times faster than a standard full-image recovery. Veeam took 113 seconds (1.88 minutes), while the standard method took 8,688 seconds (144.8 minutes, or 2.4 hours).
- Veeam Instant VM Recovery for VMware took less than two minutes no matter how large the VM.
- Veeam Instant VM Recovery for a 16GB Hyper-V VM was 85 times faster than a standard full-image recovery. Veeam took seven seconds, while the standard method took 597 seconds (9.95 minutes).
- Veeam Instant VM Recovery for Hyper-V took approximately seven seconds no matter how large the VM.
- The time savings (as a percentage) increases as the VM to be recovered gets larger.
- Performance of VMs recovered with Instant VM Recovery will vary depending on backup repository architecture and access.

Why This Matters

Server virtualization has accelerated the pace of business by enabling such feats as nearly instant infrastructure provisioning with greater flexibility and availability. Realizing the benefits, organizations are working to virtualize more production and mission-critical applications. At the same time, organizations have little tolerance for business interruption and downtime. In recent ESG research, 53% of respondents say they can tolerate less than one hour of downtime for tier-1 data without significant business impact.[3]

ESG Lab has validated that with Veeam Instant VM Recovery, IT administrators can easily boot VMs directly from compressed, deduplicated backup files—enabling restart of a VM in less than two minutes. This powerful feature minimizes downtime and disruption to not only business users, but also IT. Users don't have to wait to resume working until the entire backup file is recovered and presented back to production storage. Being built for virtualization, Veeam is able to leverage the virtual environment to reduce recovery time and streamline the recovery process.

---

[3]Source: ESG Market Landscape Report, *Replication Technologies for Business Continuity and Disaster Recovery*, August 2011.
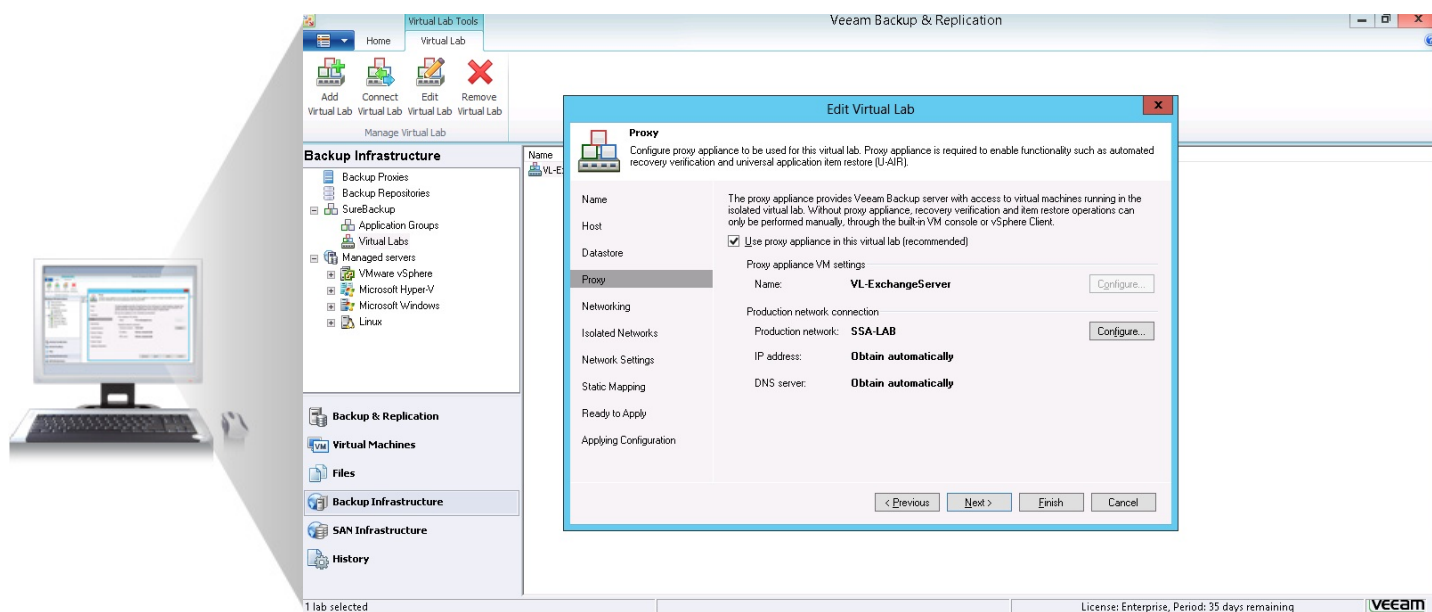
SureBackup

SureBackup is the ability to verify a backup by using that backup to power up and test the VM the backup was intended to protect. As with Instant VM Recovery, SureBackup leverages Veeam vPower to run a VM from a backup, but instead of running it in the production environment, it runs it in a Veeam-managed virtual lab, as shown in Figure 12. Virtual lab is currently available for VMware. With SureBackup, the VM is powered up and tested in a virtual lab isolated from the production environment.

Figure 12. Veeam SureBackup and U-AIR
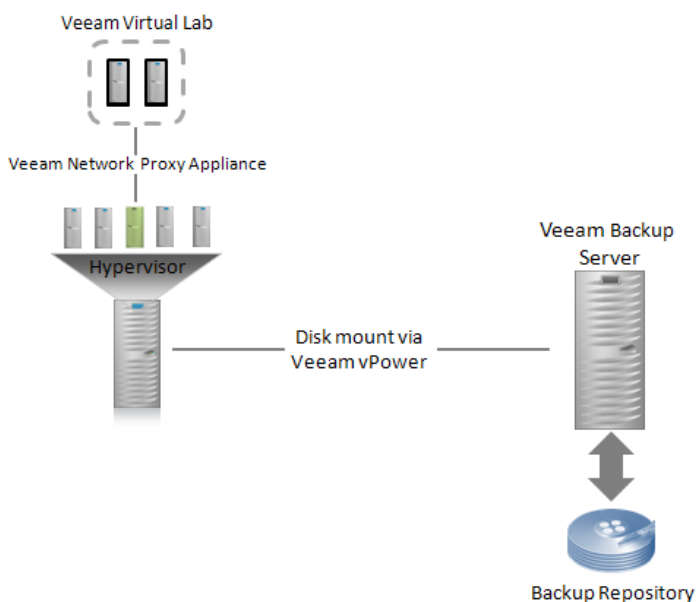
Veeam provides a proxy appliance with Veeam Backup & Replication to enable access to the virtual lab. This proxy appliance acts as a gateway between the production environment and the virtual lab. Figure 13 shows the actual proxy appliance created as part of the ESG testing process.

Figure 13. Veeam Proxy Appliance Configuration

ESG Lab validated SureBackup by starting an Oracle VM and a Microsoft Active Directory VM in a virtual lab environment. Virtual lab options that enable granular resource configuration and allow application dependencies to be maintained during verification were explored.

Figure 14 shows the memory allocation setup option. This option allows memory to be throttled back for SureBackup VMs so as not to impact the production environment during verification testing (in the event that production resources are used for SureBackup). The memory allocation option is set within the application group configuration. With application groups, VMs with application dependencies (e.g., Microsoft Exchange and Active Directory) can be grouped and tested together to ensure complete application functionality.

Figure 14. Virtual Lab Network Setup
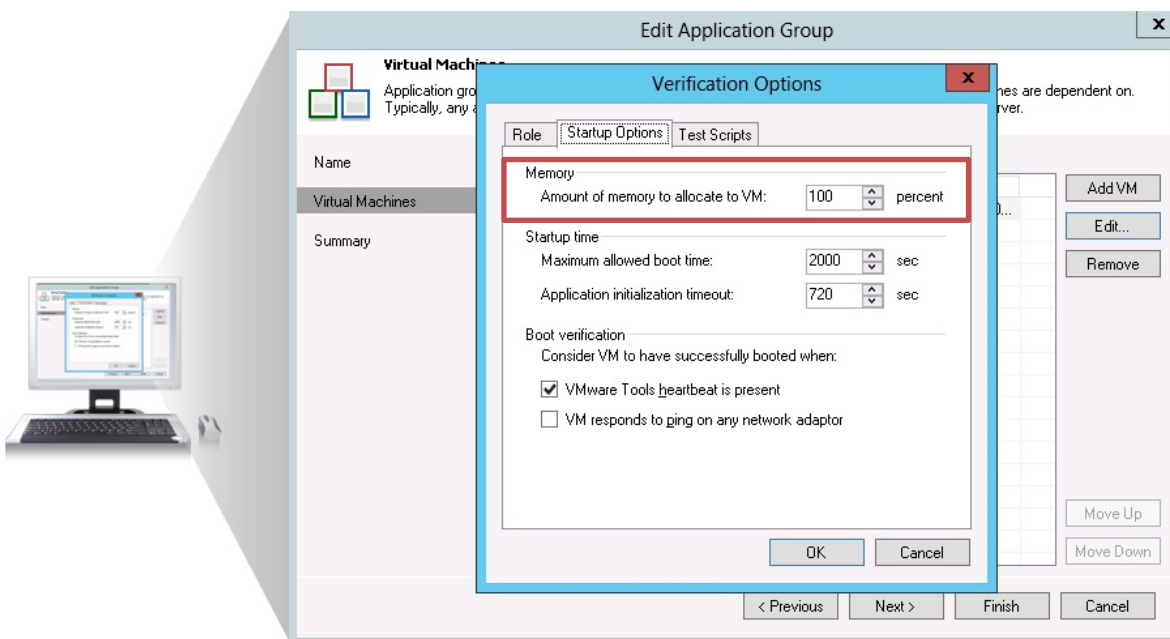
ESG Lab confirmed that SureBackup provides a flexible and comprehensive recovery test solution for VMware that can be run independently from scheduled backup operations.

Why This Matters

The importance of having a viable backup cannot be overstated. Backups are needed to recover from disasters occasionally, but they are frequently needed to recover from accidental deletions, failed updates, maintenance problems, and data corruption. However, the complexity and resources required to verify backups make it difficult for many IT organizations to test and, as a result, IT managers live in fear that when a restore is needed, the backup will be corrupted or unrecoverable. When asked about challenges they experience with virtual server data protection, 39% of ESG respondents cited data recoverability, and 32% mentioned validating recovery success.[4]

ESG Lab tested the SureBackup feature of Veeam Backup & Replication and found it eliminated the risk of unrecoverable backups by enabling IT to test every backup of any VM automatically and non-disruptively. SureBackup is a powerful addition to the administrator's toolset. Using available test or production resources, Veeam Backup & Replication creates a VM in an isolated environment and runs it directly from the backup—starting the VM, booting the OS, and confirming normal functionality. The verification process is efficient, so not only is backup viability assured, but it is also accomplished without distracting IT from other tasks. No additional backup infrastructure resources are needed.

---

[4] Source: ESG Research Report, *Trends in Data Protection Modernization,* August 2012.

Universal Application-Item Recovery

Universal Application-Item Recovery (U-AIR) enables easy recovery of individual objects (database records, directory objects, etc.) from any virtualized application. U-AIR is currently available for VMware. U-AIR uses the same process detailed in the SureBackup section of this document (see Figure 12). Once the VM is powered up, an application administrator can recover objects from the VM running in the virtual lab and copy them to the production VM through the Veeam-provided proxy appliance, which has visibility into both the production and virtual lab environments.

Like Instant VM Recovery, the U-AIR process is wizard-driven for ease of use. Figure 15 shows the Microsoft Active Directory recovery wizard. A Universal recovery wizard, Microsoft SQL Server recovery wizard, and Microsoft Exchange recovery wizard are also available.

Figure 15. Veeam U-AIR Wizard for Microsoft Active Directory
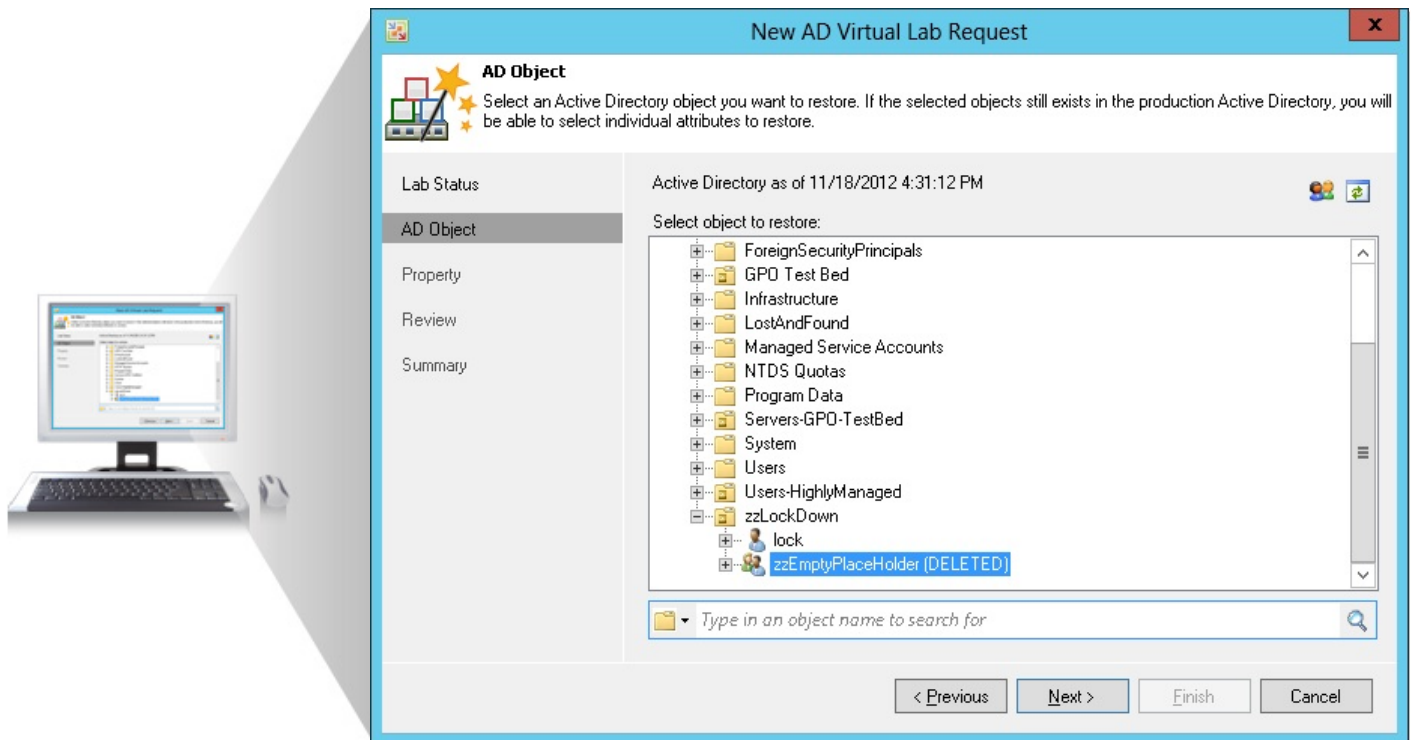
ESG Lab leveraged the Universal recovery wizard to facilitate the recovery of an Oracle table space for an Oracle instance running on a VM. The JOB_HISTORY table was deleted from the production version of the Oracle database. A recovery version of the Oracle VM was then powered up in a virtual lab. Oracle SQL Developer was launched to view the point-in-time backup of the database that contained the JOB_HISTORY table space, as shown in Figure 16.

Figure 16. Oracle Recovery View of JOB_HISTORY Table
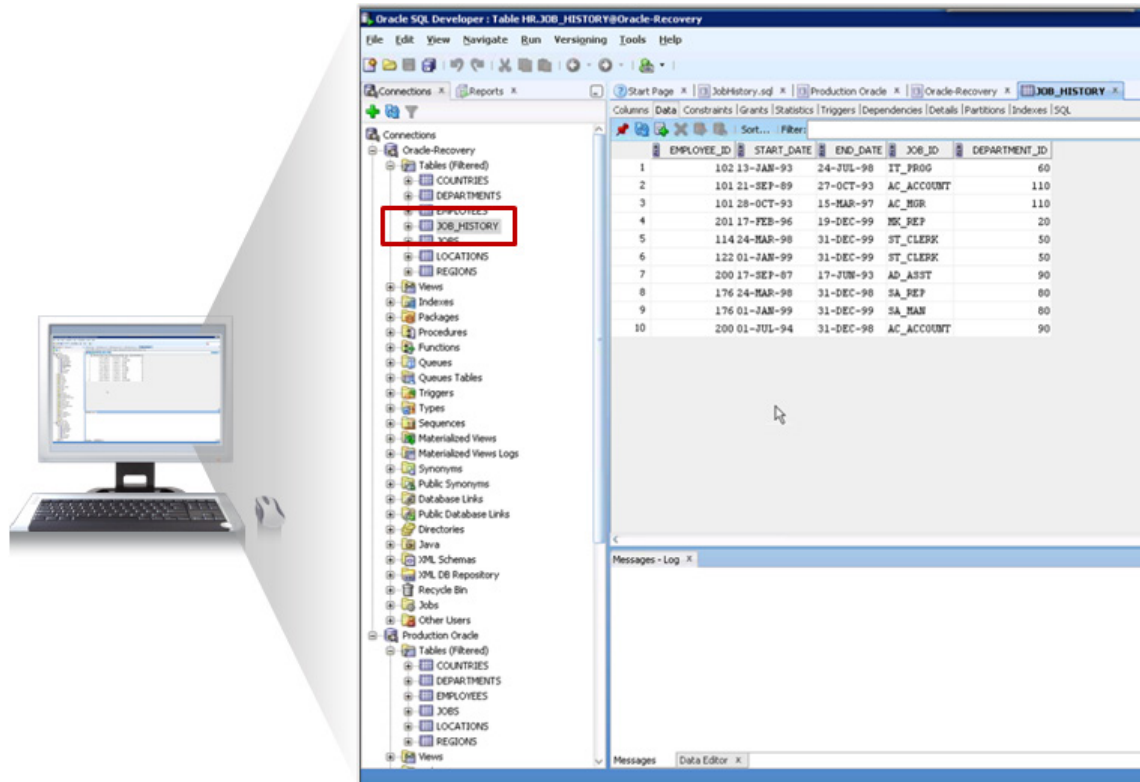
The red box in Figure 16 highlights the JOB_HISTORY table space from the point-in-time view of the Oracle recovery instance. Note that the JOB_HISTORY table space is missing from the production Oracle instance (shown at the bottom of the directory tree in the left pane).

Oracle SQL Developer was then used to copy the missing JOB_HISTORY table space from the recovery instance of Oracle back to the production instance of Oracle. As shown in Figure 17, the CREATE TABLE command was successfully used to do a hot insert of the missing table space into the running Oracle production instance.

Figure 17. Oracle Table Space Restore
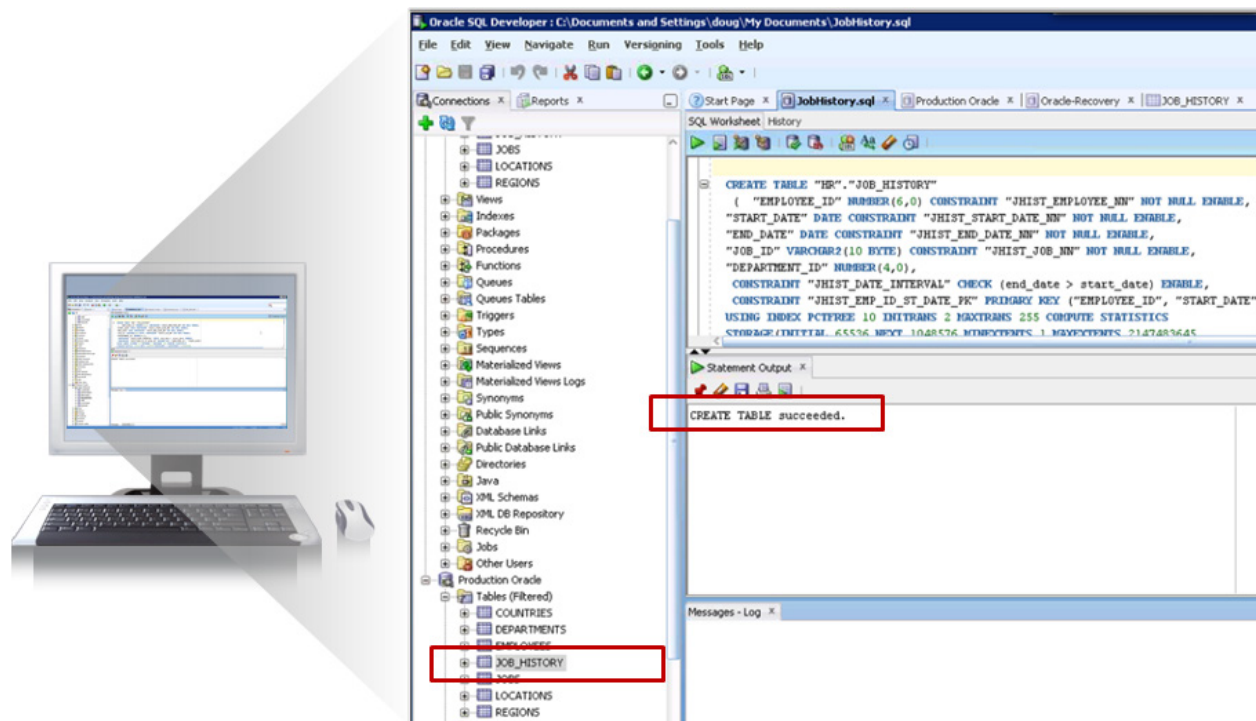
Why This Matters

Protection of business applications is a high priority for organizations. When asked to cite their challenges with current data protection processes and technologies, 42% of participants in recent ESG research mentioned database- and application-specific backup/recovery. Common IT problems come from users accidentally deleting records, directory objects being inadvertently deleted, etc. Performing a full application recovery in order to restore these individual objects wastes productive time and resources. This type of task is the antithesis of what server virtualization is implemented for: high availability, streamlined processes, and improved service levels.

ESG Lab confirmed that the U-AIR feature of Veeam Backup & Replication allows recovery of individual application objects for any virtualized application on VMware, without additional backup agents or special backups. Veeam accomplishes this by running the application in an isolated environment directly from the backup. As a result, it is easier to use, less expensive, and more reliable than standard object-level recovery methods, and it works with the native utilities and permissions of the virtualized application.

The Bigger Truth

Server virtualization has been widely implemented by organizations of all sizes as they recognize not only the economic benefits of consolidating workloads, but also greater flexibility, ability to quickly provision new applications, and opportunity to increase data and application availability. In fact, recent ESG research indicates that increased use of server virtualization was tied for the top IT priority for the next 12-18 months.[5]

This reflects the continued infiltration of virtualization into tier-1 applications and explains why backup of VMs is such a critical topic. Like other IT processes, traditional backup methods were built for the one-application-per-server paradigm. Backup solutions presumed that only a single workload at a time would be interrupted by backing up a server. That is no longer true with server virtualization and as a result, backing up multiple VMs can clog networks and interrupt operations. Trying to make physically based backup work in the virtual domain has proven difficult and has left IT spending significant effort and money, without much confidence that backups have been done properly and will be recoverable. When you add these challenges to a generally low tolerance for downtime, particularly of tier-1 applications, it is clear that a fast, reliable, non-disruptive backup solution purpose-built for VMs is urgently needed.

ESG Lab has verified that Veeam Backup & Replication offers an innovative "virtualization-powered" solution to VMware and Hyper-V VM backups that matches virtualization's key benefits: reducing costs and improving service levels. Using its patent-pending vPower technology, the Veeam solution can run a VM directly from a backup on disk, enabling instant recovery of VMs; the ability to automatically and non-disruptively verify backup recoverability; and object-level recovery from any virtualized application. ESG Lab found Veeam Backup & Replication easy and fast to install, with an option for each VM backup to be processed via the SAN directly, via the hypervisor I/O stack, or via the network. ESG Lab validated that Veeam Explorer for Exchange and Veeam Explorer for SAN Snapshots accomplish fast and easy granular restore. ESG Lab tested Instant VM Recovery of VMs in various sizes with both hypervisors. No matter what VM was tested, the Veeam method took under two minutes. In contrast, standard recovery time was at least 77 times longer and increased as the size of the VM increased. ESG Lab also verified a backup, including starting the VM and booting the OS. The U-AIR feature was tested and functioned as advertised. A deleted Microsoft Active Directory user account was recovered and a deleted table space from an Oracle database was quickly restored.

ESG Lab set out to validate whether Veeam Backup & Replication provides Powerful, Easy-to-Use, and Affordable virtual machine backup and recovery. After running it through its paces, ESG Lab can state unequivocally that it lives up to these claims. The features we tested demonstrate clearly that Veeam Backup & Replication addresses the key challenges of IT managers and the needs of users. Instant VM Recovery returns users to productivity by enabling VMs to be restarted on any host in minutes, while relieving IT of emergency full restores. It was extremely easy to deploy for both vSphere and Hyper-V, requiring no agents, and is operationally simple, leveraging VADP for VMware environments and VSS for Microsoft Hyper-V. The Veeam Explorer for Exchange and Explorer for SAN Snapshots features that are included make granular recovery, a key enhancement for users, more affordable as well as simple and fast. By building a data protection solution specifically for virtualization, Veeam has addressed both the challenges and the opportunities that virtualization presents to backup and recovery. In ESG's opinion, the multiple awards recently garnered by Veeam Backup & Replication are well deserved.

---

[5] Source: ESG Research Report, *2012 IT Spending Intentions Survey*, January 2012.