Lab Validation Report

EMC NetWorker

Intuitive, Centralized Data Protection Management

By Vinny Choinski with David A Chapa

July 2011
Contents

Introduction .................................................................................................................................................. 3
Background .................................................................................................................................................. 3
EMC NetWorker .......................................................................................................................................... 4

ESG Lab Validation .................................................................................................................................... 6
The ESG Lab Test Bed ............................................................................................................................... 6
Enhanced VMware Integration .................................................................................................................. 7
Data Domain with DD Boost Integration .................................................................................................... 10
Clone-controlled Replication with Data Domain ........................................................................................ 12
Enhanced Data Recovery ........................................................................................................................... 14

ESG Lab Validation Highlights ................................................................................................................ 16
Issues to Consider ....................................................................................................................................... 16
The Bigger Truth ......................................................................................................................................... 17
Appendix ..................................................................................................................................................... 18

ESG Lab Reports

The goal of ESG Lab reports is to educate IT professionals about emerging technologies and products in the storage, data management and information security industries. ESG Lab reports are not meant to replace the evaluation process that should be conducted before making purchasing decisions, but rather to provide insight into these emerging technologies. Our objective is to go over some of the more valuable feature/functions of products, show how they can be used to solve real customer problems and identify any areas needing improvement. ESG Lab's expert third-party perspective is based on our own hands-on testing as well as on interviews with customers who use these products in production environments. This ESG Lab report was sponsored by EMC.
Introduction

Data protection activities remain a key area of investment for most organizations and represent a core function of the IT department. But constantly growing data volumes puts pressure on data protection systems, processes, and budgets, particularly as server virtualization deployments aggregate workloads and strain resources. This ESG Lab Validation Report describes the testing of several new capabilities of EMC NetWorker backup and recovery software that improve backup performance and help to consolidate backup and replication management.

Background

Backup/recovery and disaster protection are vital to organizational health for productivity, compliance, legal, and financial reasons— they can also be extremely complex, time-consuming, and expensive. Organizations are always on the lookout for ways to improve data protection processes and are willing to make investments in solutions that save time, reduce costs, and simplify management.

Respondents to a recent ESG survey indicated that their most significant data protection investments would be in the areas of improving disaster recovery (35%), backing up virtual server environments (30%), and improving application backup (26%) as shown in Figure 1.¹ Also among the top ten were implementing data deduplication and re-architecting backup processes.

Figure 1. Top Areas of Data Protection Investment for 2010

In which areas of data protection do you believe your organization is likely to make the most significant investments in 2010? (Percent of respondents, N=510, multiple responses accepted)

<table>
<thead>
<tr>
<th>Area</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improving disaster recovery capabilities</td>
<td>35%</td>
</tr>
<tr>
<td>Backup of virtual server environments</td>
<td>30%</td>
</tr>
<tr>
<td>Improving application backup</td>
<td>26%</td>
</tr>
<tr>
<td>Desktop/laptop backup and recovery</td>
<td>23%</td>
</tr>
<tr>
<td>Meeting compliance requirements</td>
<td>20%</td>
</tr>
<tr>
<td>Implementing data archiving</td>
<td>19%</td>
</tr>
<tr>
<td>Implementing data deduplication</td>
<td>19%</td>
</tr>
<tr>
<td>Re-architecting backup environment/processes</td>
<td>18%</td>
</tr>
<tr>
<td>Remote/branch office (ROBO) backup and recovery</td>
<td>18%</td>
</tr>
<tr>
<td>Transitioning from tape to disk-based storage</td>
<td>17%</td>
</tr>
<tr>
<td>Implementing backup reporting</td>
<td>13%</td>
</tr>
<tr>
<td>Using a third-party, online backup service</td>
<td>8%</td>
</tr>
<tr>
<td>We will not invest in data protection at all in 2010</td>
<td>2%</td>
</tr>
</tbody>
</table>


EMC NetWorker

EMC NetWorker is a well known and trusted backup and recovery solution that centralizes, automates, and accelerates data protection across the IT environment. It enables organizations to leverage a common platform for backup and recovery of heterogeneous data while keeping business applications online. NetWorker operates in diverse computing environments including multiple operating systems; SAN, NAS, and DAS disk storage environments; tape drives and libraries; and cloud storage. It protects critical business applications including databases, messaging environments, ERP systems, content management systems, and virtual server environments.

The April 2011 release of NetWorker added significant new functionality primarily focused on greater integration with VMware and Data Domain deduplication storage systems as well as improved Microsoft application recovery.

**VMware vStorage APIs for Data Protection (VADP).** VMware integration was extended by introducing support for VADP, VMware’s recommended off-host protection mechanism that replaces VMware Consolidated Backup (VCB). VADP improves performance by eliminating temporary storage of snapshots and enabling support for Change Block Tracking (CBT) as well as improving network utilization and reducing management overhead. CBT speeds backup and recovery by tracking incremental changes to virtual machine data, replacing the need for the backup software to scan the file system to identify and back up changed data. VADP also enables a single backup to capture the data and metadata required to enable both full image- and granular file-level restores. Physical or virtual proxy servers can be used for more efficient, centralized virtual machine backup. Additionally, NetWorker communicates with VMware vCenter to auto-discover and display a visual map of the virtual environment, streamlining administrative tasks dramatically.

**Figure 2. EMC NetWorker 7.6 SP2**

**EMC Data Domain Boost Integration.** This release extends NetWorker integration with EMC Data Domain deduplication storage systems using Data Domain Boost (DD Boost) software, enabling faster and more efficient data protection. While Data Domain systems were already available as disk targets for NetWorker backups, the
addition of DD Boost increases performance, provides visibility into Data Domain system information, and enables control of backup images and replication to remote Data Domain systems.

With DD Boost, portions of the deduplication process are distributed to the NetWorker storage nodes and/or application modules so that only unique, compressed data segments are sent to the Data Domain system. This increases aggregate throughput, reduces the amount of data transferred over the network, and decreases CPU requirements on the NetWorker storage nodes and application hosts. As a result, restart and completion of failed backups are faster and more backups can run from a single backup server. DD Boost also enables NetWorker to control replication between multiple Data Domain systems while maintaining a single point of management for tracking all backups and duplicate copies.

A key feature available with the integration of NetWorker and DD Boost is clone-controlled replication. Through the NetWorker GUI, administrators can create, control, monitor, and catalog backup clones using network-efficient Data Domain Replicator software. NetWorker also enables backup images to be moved to a central location where they can be cloned to tape, consolidating tape operations.

Enhanced Data Recovery. Additional new features include wizard-guided Windows disaster recovery as well as advancements in the NetWorker Module for Microsoft Applications and NetWorker Module for Databases & Applications. These advancements extend NetWorker support to include granular object recovery for Microsoft Exchange 2010, Microsoft SharePoint 2010, Microsoft SQL Server 2010, Windows 2008 R2, and Hyper-V R2 and Oracle databases.
ESG Lab Validation

ESG Lab performed hands-on evaluation and testing of NetWorker at an EMC facility in Hopkinton, Massachusetts. Testing was designed to demonstrate new features of NetWorker 7.6 SP2 including deep integration with VMware backup/recovery, Data Domain Boost integration including clone-controlled replication with Data Domain systems, and new database and application recovery modules.

The ESG Lab Test Bed

The configuration used for ESG Lab testing is shown in Figure 3. A NetWorker server and storage node were connected to a pair of Data Domain systems. The NetWorker storage node was configured as a VM in the VMware virtual environment leveraging VADP. The NetWorker server and storage node were connected to the Data Domain systems via DD Boost. Clone-controlled replication was used to manage backup copies between the two Data Domain systems.

*Figure 3. ESG Lab NetWorker Test Bed*
Enhanced VMware Integration

Enhanced VMware integration is a combination of new data protection features that improve management automation and performance for VMware environments. Included in NetWorker 7.6 SP2 is support for the VMware VADP API, Change Block Tracking, VADP Proxy Storage Node support, and vCenter integration.

The VADP API allows the SCSI (hotadd) feature to be leveraged for the backup of virtual client VMDK files. A NetWorker storage node is configured in the virtual environment and presented with client VMDK files through the SCSI (hotadd) feature to further offload backup processing from the production VMs. CBT is leveraged to improve incremental backup performance. The NetWorker storage node can be implemented with Data Domain Boost (detailed in the Data Domain section of this report) to further enhance data transfer through deduplication and compression.

Figure 4. NetWorker VMware Integration

The latest version of NetWorker also incorporates tight integration with VMware vCenter. With the correct login credentials, vCenter server details are scanned, enabling virtual machine information display and reporting directly from the NetWorker management console. Additionally, with NetWorker VMware vCenter integration, backup jobs for the VMware virtual environment are configured and managed from this NetWorker console topology view and the vCenter GUI can be launched from NetWorker should further management of the VMware environment be required.
ESG Lab Testing

ESG Lab confirmed that NetWorker vCenter integration creates an easy to understand, simple to manage view of the VMware environment. From the NetWorker management interface, the Auto Discovery feature was launched to build the VMware tree view shown in Figure 5. The tree view can be quickly enlarged or reduced, depending on requirements, to make viewing easier as shown in the upper right side of the figure.

Figure 5. NetWorker VMware vCenter Detail

ESG Lab used the virtual tree view of the VMware environment to configure a backup job for two virtual machines, one Linux and one Windows. The NetWorker backup configuration wizard was launched by right-clicking on the desired virtual machine. As shown in the blue detail box at the bottom right of Figure 5, the backup job for the two virtual machines was set up to leverage VADP connectivity to the NetWorker storage node virtual Windows machine. This NetWorker storage node then sent backup data directly to a Data Domain system via DD Boost.
ESG Lab leveraged the NetWorker Client Backup Configuration Wizard to set up a backup job for the two virtual machines selected in Figure 5. As shown in Figure 6, step two of the process is where the type of backup to be used is defined. In this test, VMware Proxy was chosen as the backup type.

**Figure 6. NetWorker VMware Proxy Backup Configuration**

### Why This Matters

Many organizations hesitate to implement or expand virtual server environments at least in part due to challenges with data protection. IT organizations need to feel comfortable in their ability to back up and recover VM data efficiently and reliably.

The ability to monitor virtual machines and even launch vCenter from within the NetWorker management console makes VM backup management simpler and faster. Administrators save time because they can manage data protection for physical hosts and virtual machines from a single NetWorker screen, drill down to a granular level, and make VM backup configuration changes—all from within NetWorker. CBT support speeds backups and restores, reducing resource contention, and proxy VM storage nodes offload backup processes from the VMs, allowing them to focus on applications. These improvements help administrators easily restore the right data in the most efficient manner, maximizing business and IT productivity.
Data Domain with DD Boost Integration

DD Boost integration expands the capabilities of Data Domain systems in NetWorker environments, making them more than target-based deduplication backup devices. DD Boost integrates with the backup application to efficiently distribute the deduplication process between the backup server and Data Domain system. This enables improved performance and enhanced management including integration with cloning and session monitoring processes.

**Figure 7. NetWorker Data Domain Integration**

![Diagram showing NetWorker Data Domain Integration](image)

**ESG Lab Testing**

ESG Lab confirmed the ease of integrating a Data Domain system into a NetWorker environment with DD Boost through the use of the NetWorker Device Configuration Wizard. As shown in Figure 8, the Data Domain device was first selected in place of the traditional Advance File Type Device (AFTD).

**Figure 8. NetWorker Data Domain Device Configuration**

![Image showing NetWorker Data Domain Device Configuration](image)

Selecting Data Domain as the device type within the configuration wizard enables the use of the DD Boost software functionality. It should be noted that the AFTD option is still a valid configuration option for use with Data Domain systems for those that do not wish to use DD Boost in their environment.
ESG Lab confirmed the extensive integration of Data Domain systems within NetWorker by validating the configuration of a recently added Data Domain appliance. From the NetWorker device menu, the new appliance is displayed under the Data Domain Systems tab, shown on the left side of Figure 9. Detailed Data Domain system information is displayed in the middle of the device menu screen including the device name, volume name, and capacity metrics. Capacity metrics for the Data Domain system were previously only available from Data Domain Enterprise Manager.

**Figure 9. Detailed Data Domain Device View**

![Detailed Data Domain Device View](image)

**Why This Matters**

Dealing with data growth in data protection environments is a constant challenge for many organizations. ESG research indicates that approximately 20% of backups fail to complete within the allotted time window. Efficient backup window management is vital to having complete and recoverable backups when business critical data is needed.

The addition of NetWorker integration with DD Boost offloads some deduplication processing to the host, increasing throughput and enabling more backups to be completed from a single NetWorker server or storage node. This type of performance improvement not only makes it easier to meet backup windows, but can dramatically reduce network bandwidth needs, freeing up resources for other traffic. Faster simultaneous backups, plus reduced CPU loads on backup and application servers, plus less network traffic all equals lower backup costs.
Clone-controlled Replication with Data Domain

Clone-controlled replication is the ability to manage Data Domain replication through the clone process native to the NetWorker backup application. Cloning is the process NetWorker uses to create and manage a secondary copy of a data set based on the primary backup data. Controlling replication through the clone process ensures that the data copy will be known to and managed by the NetWorker database. The latest version of NetWorker allows this process to be managed completely from the NetWorker Management Console, including setting attributes such as schedules, retention policies, pools, storage nodes, and granular selection of the data set to be cloned.

ESG Lab Testing

ESG Lab verified clone-controlled replication by configuring a clone job from the NetWorker Management Console (NMC). From the configuration tab within NMC, the clone dropdown was selected along with the option to create a new clone job. As shown in Figure 10, the “New” option launched the Create Clone view window within NMC. ESG Lab created a new clone job called “ESG Clone” with a monthly by day schedule and a one year browse and retention policy writing to the pool “DDBOOST CLONE.”

Figure 10. NetWorker Clone Creation Detail

The Save Set Filters tab was used to select the backup volume to be cloned. It should be noted that the Save Set Filters allows granular selection of what is going to be cloned from the group level down to a single save set by save set identification number (SSID). ESG Lab selected full backups for the specified volume.
To confirm the expected results of the clone job configuration, ESG Lab used the “start now” option to manually run the clone job prior to the next scheduled run time and monitor its success. The Clone Sessions tab was selected from the NMC and the clone session status was monitored. Figure 11 shows the source and target configuration of the two Data Domain systems used in for the configured cloning process.

**Figure 11. NetWorker Clone Session Monitoring**

![Clone Session Monitoring](image)

**Why This Matters**

Complete data protection solutions usually require the creation and maintenance of a secondary offsite copy of backup data. These copies can easily become disassociated from the primary backup data and backup application itself. When this occurs, offsite or DR recovery becomes a time-consuming, complex, and oftentimes impossible task, simply because there is no record of the copy in the backup application database.

With NetWorker clone-controlled replication, administrators can schedule Data Domain Replicator operations, track save sets, set retention policies, monitor the local and remote replicas available for recovery, and schedule cloning automatically. This makes NetWorker aware of and in control of every clone, regardless of whether they reside on disk or tape. It also takes advantage of Data Domain’s deduplication, compression, and high-speed replication to reduce data amounts and speed cloning. This functionality replaces previous complex, often custom-scripted and time-consuming tasks with an easy to navigate, GUI-driven process. The ease of management and time savings offer dramatic improvements that enable higher service levels and lower management costs while ensuring disaster recovery readiness.
Enhanced Data Recovery

Enhanced data recovery is a combination of new NetWorker features that simplify and automate complex recovery tasks. The latest version of NetWorker introduced a number of new recovery modules for both application and system recovery. For the purposes of this round of validation testing, ESG Lab explored new features of the NetWorker Module for Microsoft Applications, the NetWorker Module for Databases & Applications, and wizard-driven disaster recovery for Windows.

ESG Lab Testing

ESG Lab confirmed the recovery capabilities of the NetWorker Module for Microsoft Applications by conducting a message-level recovery from an Exchange 2010 backup. As shown in Figure 12, ESG Lab used the module’s recovery option to create and mount a Recovery Database (RDB) on the Exchange 2010 server. The messages were then recovered via the interface from the RDB and presented in a new folder through Microsoft Outlook.

As shown in Figure 13, the Database & Application Module was used to initiate and run an Oracle recovery.

© 2011, Enterprise Strategy Group, Inc. All Rights Reserved.
Figure 13 illustrates the set by step process ESG Lab leveraged via the client recovery wizard to complete the Oracle database restore. The recovery wizard was launched from the NMC in the configuration menu under the client dropdown and it guided ESG Lab through each step of the recovery process from specifying the correct RMAN script, through selecting database objects, to the successful recovery of the database.

ESG Lab also explored new Windows system recovery features available in the latest version of NetWorker. As shown in Figure 14, a NetWorker Windows client was configured to back up with the new “DISASTER_RECOVERY:\” save set option. After the successful disaster recovery backup, the Windows server was shut down and then booted from the NetWorker-supplied recovery ISO image, which automatically launched the NetWorker System Recovery Wizard. ESG Lab clicked through the recovery wizard prompts and made a successful recovery from the previous “DISASTER_RECOVERY:\” backup.

**Figure 14. NetWorker Disaster Recovery Save Set Option**

---

**Why This Matters**

System or application downtime equates to lost business revenue. When disasters occur, the quicker the recovery time, the quicker the return to normal business operations. Granular recovery of application data and wizard-guided system recoveries can be tremendous time savers.

ESG Lab confirmed that, with this NetWorker upgrade, IT can quickly recover a few accidentally deleted e-mails or rapidly run through a wizard-driven system recovery, returning users to productivity and eliminating a time-consuming task.
ESG Lab Validation Highlights

☑ ESG Lab verified the ease of use and granular management provided in the latest version of NetWorker thanks to VMware vCenter integration and enhanced configuration wizards.
☑ Wizard-driven configuration made NetWorker deployment of a Data Domain system with DD Boost software easy. Clearly, the Data Domain system has been deeply integrated into the NetWorker application fabric. Once configured, the system is displayed throughout the NetWorker GUI for easy management at every level.
☑ ESG Lab explored the use of clone-controlled replication with two Data Domain systems and found that using the cloning process to manage Data Domain replication provided very granular data retention and location management. With clone-controlled replication, it would be easy to architect a solution for centralized tape creation.
☑ The NetWorker Module for Microsoft Applications made Exchange recovery at any level a snap. Even the dreaded message level recovery request was easily handled. This module enables the backup administrator to conduct complex application recovery tasks that previously would have required the combined efforts of the backup and Exchange administrators.

Issues to Consider

☑ For off-host backups, NetWorker 7.6 SP2 only supports VADP. Proper planning is vital when upgrading an existing NetWorker environment that leverages VCB backups.
☑ When using Data Domain systems with DD Boost in a NetWorker environment, NFS services must be enabled on the Data Domain system. Network access should be verified to avoid unintended NFS access to the backup file systems.
☑ EMC best practices dictate that a Data Domain system used to store clone copy data should not be used for primary backup storage. This best practice must be considered when architecting a backup solution to avoid capacity shortfalls.
☑ Though the NetWorker Module for Microsoft Applications makes the recovery of Exchange messages and objects intuitive and easy, the backup administrator must take into account Microsoft best practices and plan for the extra space required on the recovery host for the creation of an RDB to ensure a quick and smooth restore.
**The Bigger Truth**

Backup and recovery are reputedly complex, cumbersome, and costly processes. Most IT administrators find accomplishing them to be a strain, but they have to be done—companies have literally gone out of business because they were not fully protecting data or were unable to recover it quickly. Complicating factors include diverse needs and processes: different applications have different availability and retention policies; backup targets can be local or remote, disk- or tape-based; and different backup applications and processes serve physical and virtual workloads. In addition, growing data volumes slow backup and recovery performance, particularly when the only restore options are large data volumes. Backup and recovery speed, more efficient processing, and consolidated, streamlined management are the keys to improving these critical business processes.

NetWorker has always been a robust backup and recovery solution. Recent improvements, including greater integration with Data Domain and VMware, enable NetWorker to accelerate backup performance, enhance replication control, and simplify administration. With this additional versatility, NetWorker offers new benefits: its seamless management across heterogeneous environments, including both backup and replication tasks, simplifies backup processes to reduce OPEX. By moving closer to a common management console, NetWorker helps drive both cost and complexity out of data protection operations. Deduplication helps minimize backup bandwidth requirements, CPU overhead, and network bandwidth, lowering the cost of backup overall. The advancements in the latest release also improve performance and efficiency and provide more recovery options.

NetWorker users, both new and existing, will find the features in the latest release to be extremely beneficial. Backup administrators that have worked with NetWorker over the years should immediately identify residual improvements in NetWorker’s usability and efficiency.

Clone-controlled replication with Data Domain not only highlights the comprehensive integration of the Data Domain system and features with the NetWorker framework, but also uncovers new automation features in the clone process that apply to both disk and tape cloning such as NMC managed scheduling, retention period control, granular selection of clone data, and storage node management.

VMware VADP support for NetWorker enforces EMC’s commitment to keep pace with the ever-growing virtualization paradigm. VADP support simplifies the off-host backup process of virtual machines and vCenter integration enables intuitive, granular management of the virtual environment directly from the NMC.

Finally, the latest application protection modules enable backup administrators to design, implement, and manage a comprehensive recovery solution that removes much of the burden of recovery from the database administrator or application expert and puts it in the control of the backup administrator.

Considering its stable of backup and deduplication solutions, EMC’s recent integration efforts were inevitable. These improvements demonstrate EMC’s commitment not only to better performance, but also to making backup and recovery easier to manage and less painful.
## Appendix

### Table 1. Test Bed Overview

<table>
<thead>
<tr>
<th>Configuration Type</th>
<th>Component</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NetWorker Configuration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NetWorker Server</td>
<td>Version 7.6 SP2</td>
<td></td>
</tr>
<tr>
<td>NetWorker Storage Node</td>
<td>Version 7.6 SP2</td>
<td></td>
</tr>
<tr>
<td>NetWorker Module for Databases &amp; Applications</td>
<td>Version 1.1</td>
<td></td>
</tr>
<tr>
<td>NetWorker Module for Microsoft Applications</td>
<td>Version 2.3</td>
<td></td>
</tr>
<tr>
<td><strong>Data Domain Configuration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Domain</td>
<td>Model DD580</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DDOS 4.9.1</td>
<td></td>
</tr>
<tr>
<td>Data Domain</td>
<td>Model DD660</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DDOS 4.9.1</td>
<td></td>
</tr>
<tr>
<td><strong>Software – Virtualization</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VMware vSphere</td>
<td>Version 4.1</td>
<td></td>
</tr>
<tr>
<td>VMware vCenter</td>
<td>Version 4.1</td>
<td></td>
</tr>
<tr>
<td><strong>Software – Guest OS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microsoft Windows</td>
<td>Version 2008 R2</td>
<td></td>
</tr>
<tr>
<td>Red Hat Enterprise Linux</td>
<td>Version 5.3</td>
<td></td>
</tr>
<tr>
<td><strong>Software – Middleware and Applications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microsoft Exchange</td>
<td>Version 2010</td>
<td></td>
</tr>
<tr>
<td>Oracle</td>
<td>Version 11G</td>
<td></td>
</tr>
</tbody>
</table>