



NetWorker Support for OpenVMS

*Enterprise-class Backup for OpenVMS
in Heterogeneous Environments*

White Paper

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Executive Summary

A major limitation of OpenVMS in heterogeneous systems environments has been the lack of integrated backup and archival solutions. Until now, no single solution has been available which could simultaneously meet the backup demands of OpenVMS, Windows, Unix and other system platforms. With the release of NetWorker Client for OpenVMS and NetWorker Storage Node for OpenVMS, LEGATO Systems has eliminated this difficulty. OpenVMS systems can now be backed up across a LAN, across a SAN or to locally attached storage while sharing resources with other Operating Systems. Regular backup and archival activities are scheduled and initiated by a central NetWorker Server, and users of OpenVMS systems can schedule ad hoc backups or recoveries of individual files, directories or file systems as necessary. LEGATO has taken great care to ensure that its OpenVMS products support important features of OpenVMS including the unique capabilities of the ODS-2 file system, OpenVMS clusters, and OpenVMS HSM. This paper discusses the integration of OpenVMS systems in a NetWorker environment.

Limitations of OpenVMS Backup

Thousands of customers around the globe depend on OpenVMS to run critical business and scientific applications. However, despite the wide use of OpenVMS, it has been difficult to integrate OpenVMS with Enterprise backup solutions that include Unix Windows, and/or other system platforms.

Solutions exist that allow Unix and Windows clients to be backed up across a local area network (LAN) to a system running OpenVMS, or that allow OpenVMS systems to be backed up to Unix or Windows systems. However, because of the rapid growth in data, solutions that rely entirely on LAN backup are proving inadequate.

The amount of data stored on many Unix and Windows systems has simply become too great for efficient LAN backup to an OpenVMS system or cluster. Similarly, older VAX systems are being consolidated into larger and larger Alpha Server systems that are also poorly suited for network backup. As a result, many sites have been faced with the necessity of using one solution to backup OpenVMS and another for their Windows, Unix or other systems, increasing management complexity and expense.

With the availability of LEGATO NetWorker Client for OpenVMS and LEGATO NetWorker Storage Node for OpenVMS, LEGATO Systems is the first backup vendor to completely integrate OpenVMS into a heterogeneous Enterprise backup and archival solution that allows sharing of resources. A LEGATO Network Server can control the backup of OpenVMS, Unix, Windows and other system platforms simultaneously, directing those systems to perform backup or archival operations to local tape libraries, to libraries attached to storage area networks (SANs) or over LANs to remote systems.

NetWorker Support for OpenVMS

The NetWorker Client for OpenVMS software enables LAN backup of OpenVMS systems, as appropriate for smaller OpenVMS systems. The NetWorker Storage Node for OpenVMS software allows OpenVMS systems to backup local data to directly-attached or SAN-attached backup devices and also allows an OpenVMS system to provide backup services to LAN clients of any type. Both support archival operations in addition to backup and work with NetWorker version 6.0.1 and later.

Both products offer full support for critical OpenVMS features such as OpenVMS Cluster environments, co-existence with OpenVMS HSM, and full support for the ODS-2 file system including the ability to accommodate all ODS-2 semantics, access controls, file types, file versions, and directory structures. In addition, both products make the full capabilities of NetWorker available on OpenVMS systems.

A typical NetWorker environment consists of a NetWorker Server, one or more storage nodes, and multiple LAN clients and associated tape libraries and/or standalone drives. (Note that an OpenVMS Alpha system can act as a client or storage node, but cannot act as a NetWorker Server.) The NetWorker Server controls and directs all NetWorker operations. Both the NetWorker Server and storage nodes can receive client backup data over LAN connections and write that data to an available tape drive. A storage node or server can also backup its own local data.

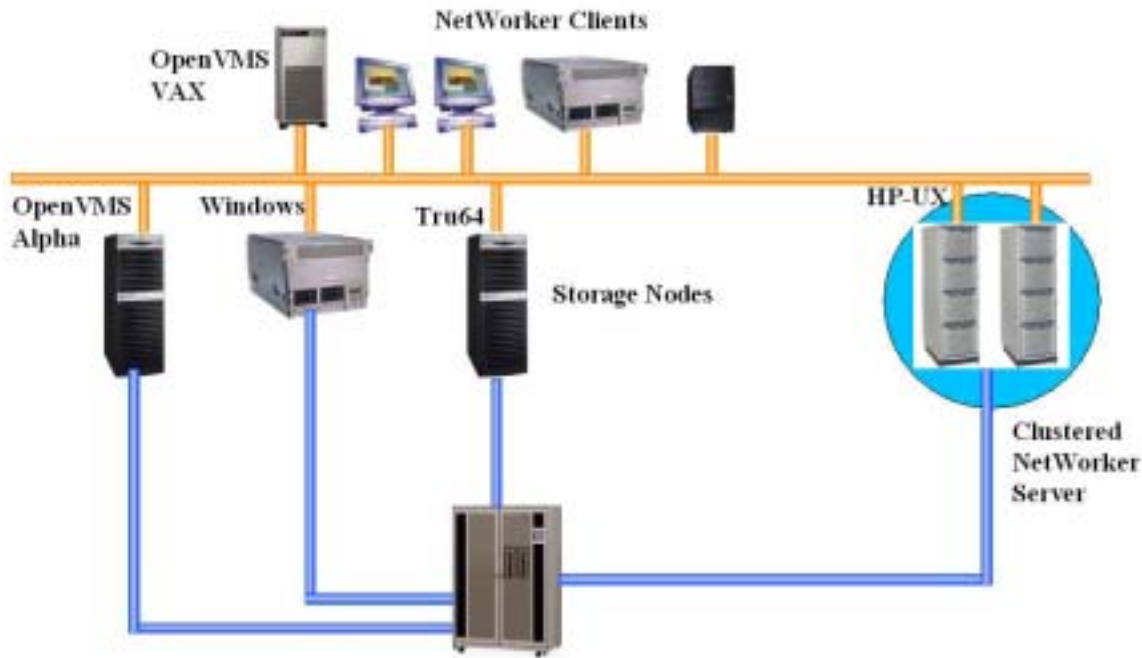


Figure 1. A typical NetWorker environment, with library sharing.

In a SAN environment, systems with a large amount of online data storage—such as database servers, file servers, and application servers—may be configured as storage nodes, allowing them to backup their data directly to SAN-attached backup hardware. SAN configurations can dramatically improve utilization of tape resources.

NetWorker Client for OpenVMS

A NetWorker OpenVMS client normally operates under the control of a NetWorker Server in accordance with guidelines and schedules established by an administrator. An administrator can schedule backup and archival operations using an administrative graphical interface. Users on a client system can initiate backup and recover actions as necessary, using a separate graphical interface provided for that purpose or through a command line interface (CLI). For instance, if an important file needs to be recovered from backup, that action can be initiated from the client without administrator intervention. Likewise, important files can be backed up manually without waiting for regularly scheduled backups to occur.

The NetWorker Client for OpenVMS also includes customizations that allow the software to backup files with all the important options associated with the VMSbackup command, such as the ability to backup open files, various options for handling alias files, etc. (See the later section entitled *NetWorker Replacements for OpenVMS backup Functions* for more information.)

NetWorker Client for OpenVMS is multi-threaded to enable several backup operations to occur concurrently. Optionally, client side compression can be used to reduce LAN traffic.

The NetWorker Client for OpenVMS also includes the ability to perform a point in time restore. You do not have to worry about which tapes need to be restored in which order. Provide NetWorker with the date & time that you wish to restore the system to, and NetWorker will take care of it all for you.

NetWorker Storage Node for OpenVMS

The NetWorker Storage Node for OpenVMS software allows an OpenVMS system to take on all the functions of a NetWorker storage node including receiving LAN backups from network clients and backing up local information. Because of the size and capacity of many AlphaServers running OpenVMS, backing up local data may be of greatest importance for OpenVMS storage nodes. An OpenVMS storage node has the backup, archival, and restore capabilities of an OpenVMS client as discussed in the previous section, plus the ability to direct data to direct-attached or SAN-attached storage devices. All OpenVMS tape devices are supported using standard OpenVMS naming conventions.

An OpenVMS storage node has all the capabilities of any NetWorker storage node including Dynamic Drive Sharing (DDS) (when used with a NetWorker Server running version 6.1 or later), staging, and cloning. DDS allows individual tape drives within a tape library connected to a fibre channel SAN to be dynamically shared between multiple storage nodes and a NetWorker Server. A system initiating a backup is allocated a drive only for the time it takes for its backup activity to complete. Upon completion, the drive is made available for use by other hosts. In other solutions, a library can be shared between multiple hosts, but individual tape drives are often permanently allocated to one system or another.

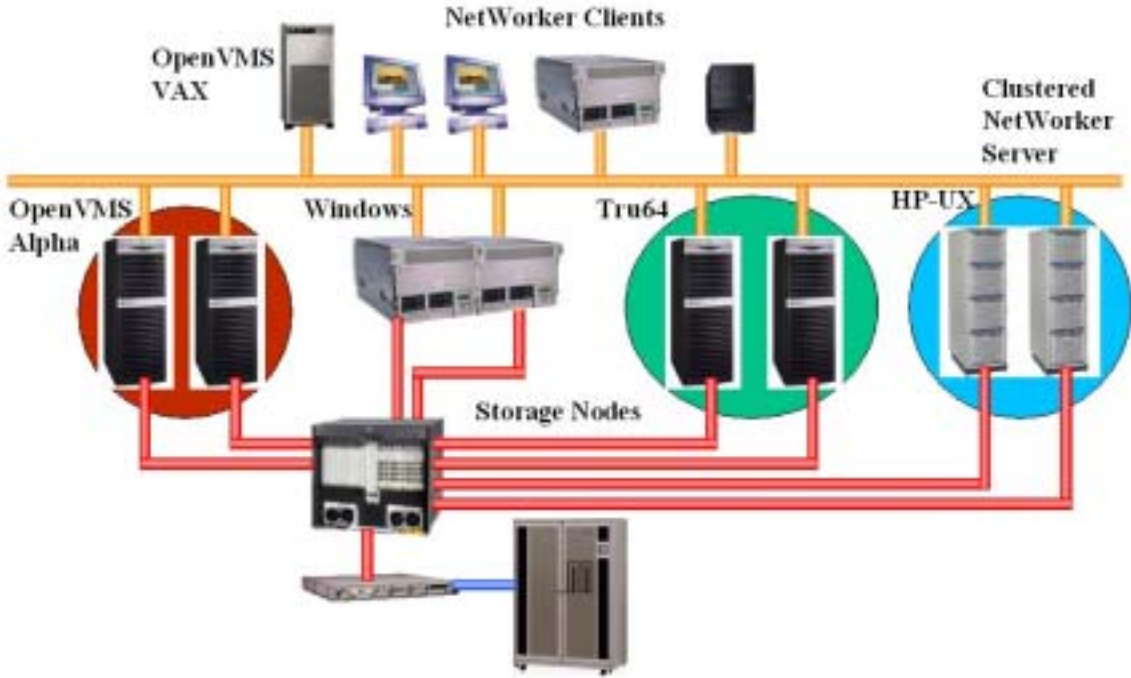


Figure 2. Sharing tape resources on a SAN with DDS. Tape devices within a shared library are not allocated to individual server. The NetWorker Server and each storage node can utilize any available tape device.

The use of SAN-based backup storage allows that storage to be centralized for better protection and much more efficiently managed. For instance, a single large capacity tape library can take the place of many smaller direct-attached libraries, substantially decreasing complexity and associated management costs, while increasing the level of protection for critical data.

Storage nodes also have the option of staging backup data to disk to dramatically increase backup speed. Data thus stored can be automatically transferred to tape at a later time. The recent availability of high capacity, low cost disk backup solutions also makes permanent or semi-permanent disk storage of backup data a possibility. The NetWorker DiskBackup option allows an unlimited number of NetWorker clients and storage nodes to be backed up directly to disk.

NetWorker storage nodes have the ability to make duplicates or *clones* of complete tape volumes or individual backups. Clones are frequently sent to offsite storage, used to transfer data to another location or simply retained to enhance the level of protection for important data.

Protecting an OpenVMS System Disk

The ability to quickly recover an OpenVMS system disk is critical should a disaster occur. There are a number of options for recovering an OpenVMS system disk in a LEGATO NetWorker environment:

1. Create a small standby system disk (including NetWorker software) that can be booted in case of failure. NetWorker can then be used to recover backups to a replacement system disk.
2. In environments with OpenVMS clusters, boot the failed system from the system disk of an operational system that has NetWorker installed. Use NetWorker to recover backups of the failed system disk to a replacement disk.
3. Occasionally use OpenVMS backup to manually backup the system disk. This results in a system disk image that can be restored using standalone backup. Once this Image is restored, the disk can be brought up to date using NetWorker.

NetWorker Equivalents to OpenVMS backup Functions

OpenVMS includes a backup utility as part of the Operating System. It has special features to deal with the specifics of the OpenVMS File System. The NetWorker Client for OpenVMS has the similar functionality to the OpenVMS backup utility, such as:

- `/Alias`. NetWorker automatically handles ODS-2 File aliases
- `/Incremental` and `/Image`. NetWorker performs Full, Incremental, or level backups
- `/Block Size`. By default, to maximize throughput, NetWorker selects the best block size for the backup device
- `/Delete`. NetWorker provides an archiving function that is equivalent to this capability.
- `/Exclude`. It is possible to exclude files with NetWorker. Depending on the interface used depends on how this function is performed.
- `/ignore=interlock`. By default, NetWorker will not backup open files. However, this can be enabled via a NetWorker for OpenVMS directive.
- `Ignore=nobackup`. By default, NetWorker will ignore files marked nobackup, and backup the file headers only. There is a directive for the NetWorker client for OpenVMS to backup these files.
- `/list`. When a backup is performed, the list of files backed up are store din the on-line indexes. A report can be run against the on-line indexes to find out what files were backed up. For a manual save, the files are displayed on the input screen as they are backed up.
- `/record`. NetWorker client for OpenVMS provides a directive to have the record date stamped on files.
- `/select`. NetWorker can be directed to backup anything from the entire system, down to an individual file. It supports OpenVMS wildcards for easy election
- `/tape_expiration`. NetWorker has a retention policy for tapes.
- `/unshelve`. NetWorker co-exists with HSM for OpenVMS. By default files will remain shelved, but it is possible to force them to be unshelved
- `/verify`. By default NetWorker does not verify the data. However, it can be achieved as a standard part of the product.

Conclusion

While OpenVMS continues to be the platform of choice for many important business applications, it increasingly co-exists with many other system platforms. Software solutions that facilitate the management and backup of OpenVMS systems in heterogeneous environments are essential to help control IT costs and decrease management complexity. With the introduction of NetWorker Client for OpenVMS and NetWorker Storage Node for OpenVMS, LEGATO makes it possible for the first time to fully integrate OpenVMS into a seamless enterprise backup solution.



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