

Disaster Recovery Solutions Guide

OVERVIEW OF VERITAS
TECHNOLOGY AND SERVICES
USED FOR TECHNOLOGY
RECOVERY AT AN ALTERNATE
SITE

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INTRODUCTION

VERITAS Software has been providing flexible storage management software solutions to the world's leading companies for years. Starting with market-leading storage virtualization and data protection solutions, VERITAS has built a complete portfolio of proven solutions that help companies manage and protect critical data in demanding IT environments. As a leader in storage virtualization, data protection and high availability, VERITAS Software is a natural partner to help you meet your disaster recovery requirements. Our portfolio of hardware-independent solutions addresses a wide range of disaster recovery needs:

Over 86 percent of the Fortune 500 rely on VERITAS software for data backup and recovery.

- Backup and recovery: VERITAS NetBackup™ and VERITAS Backup Exec™ offer comprehensive backup and recovery with options for tape vaulting and bare metal restore capabilities.
- Replication and remote mirroring: VERITAS Volume Manager™, VERITAS Volume Replicator™ and VERITAS Storage Replicator™ protect critical data through mirroring or replicating to a secondary site.
- Clustering: VERITAS Cluster Server™ ensures application high availability on a localized level, while VERITAS Global Cluster Manager™ seamlessly migrates applications between clusters for fast wide-area recovery.
- Professional Services: In addition to world-class support and educational services, VERITAS has a team of disaster recovery professionals with the expertise you need to develop and implement your enterprise strategies and plans.

By implementing hardware-independent software solutions from VERITAS, you can leverage existing hardware and simplify the operational aspects of disaster preparedness in your organization.

This guide discusses how to make VERITAS solutions part of your disaster recovery strategy. It is meant to help you reassess current disaster recovery capabilities and ensure that you have the appropriate recovery technology in place for systems, applications and data that are vital to your organization.

A BUSINESS IMPERATIVE

Disaster recovery planning must compete with many projects and initiatives for limited IT resources. Even though we realize its importance, it often takes the back burner.

All kinds of potential problems can interrupt your business, from news-leading natural or man-made disasters to other everyday incidents such as telecommunication or power outages. Any of these can put your primary data center out of action for hours or even days.

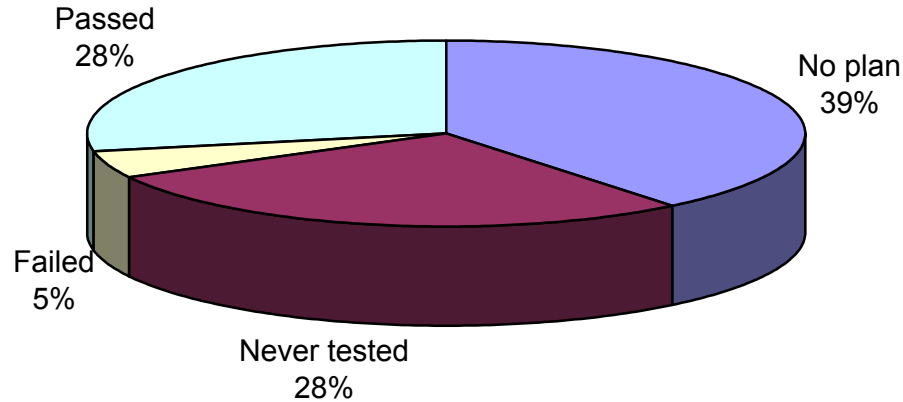
You may not know the exact cost of downtime for your most critical applications, but you can be sure it is significant. Typical costs can range from thousands to millions of dollars per minute, and inefficient or misaligned recovery strategies can unnecessarily prolong downtime. Indirect costs (market share loss, poor customer relations, productivity losses, litigation) often *accelerate* as downtime extends into multiple days. These costs can put many enterprises out of business.

“Two out of five enterprises that experience a disaster go out of business within five years. Business continuity plans and disaster recovery services ensure continuing viability.”

Gartner, “Disaster Recovery Plans and Systems Are Essential,” by Roberta Witty, Donna Scott,
Sept. 12, 2001.

It is surprising then, how many companies delay taking action when relatively simple steps can shave days off their recovery times. This guide shows you that disaster preparedness is achievable and provides a range of options for integrating preparedness into your daily operations.

How much confidence do you have in your disaster recovery plan?



In a VERITAS survey of over 3,000 IT professionals, 72 percent had no disaster plan, never tested their plan, or had a plan that failed.

DEFINING THE SCOPE OF THE PROBLEM

Business continuity – the ability to keep operating in the face of any disruption – is your ultimate goal. This is a broad topic that requires engagement at the highest level, and involves all departments and functions of the enterprise. A complete business continuity plan accounts for all of the critical elements of your infrastructure, including people, facilities, connectivity, data, applications and access.

The term *disaster recovery*, a critical part of business continuity, refers to the process of restoring mission-critical systems, applications and data at the time of interruption. VERITAS solutions focus on meeting your disaster recovery requirements.

Traditional disaster recovery planning uses an outside-in approach. This type of approach is usually very expensive, has a timeline of completion, and does not provide protection until the center ring of technology is reached. VERITAS uses an inside-out approach, addressing the center ring of technology first and providing an immediate benefit by protecting the business from the most common forms of disaster. Overall business protection is increased as the outer rings are addressed.

THE VERITAS METHOD OF DISASTER RECOVERY

Assessment	Design	Implement	Operate
<ul style="list-style-type: none"> • EDP GAP Analysis • Define EDP Business & App Drivers • Prioritized Recommendations • Metrics To Minimize TCO • “Solution Roadmap” 	<ul style="list-style-type: none"> • Design Options Meet Business Needs: • High Availability • Scalability • TCO • Provide Solution Cost “Blueprint” • Prototype “Pre-Production” Testing 	<ul style="list-style-type: none"> • Rapid Solution Deployment • Production Testing • Optimize Configuration Options • Solution “Knowledge Transfer” 	<ul style="list-style-type: none"> • Change Control “Health Checks” • Continually Review & Improvement • Educate Customer • Maintain Customer Satisfaction

THE DISASTER RECOVERY PLAN

Planning for a disaster is tough, but explaining to CNN and Wall Street why you didn't plan is tougher.

Anonymous

A disaster recovery plan defines tasks and resources for responding to and recovering from a business interruption that affects information systems.

As you create disaster recovery plans, consider the following guidelines:

- **Simplify and automate.** Organizations should simplify and automate routine operations as much as possible. For example, use VERITAS NetBackup Vault™ to duplicate and track tapes for offsite storage, so you can be sure the backup tapes are where they need to be.
- **Don't think, just do.** Recovery should be a "don't think, just do it" operation that can be implemented by key personnel on the IT recovery team. Document your recovery plans. Technology can help here as well. Use products like VERITAS Bare Metal Restore™ for VERITAS NetBackup™ to automatically rebuild system configurations at the recovery site. Implement a single-click failover with VERITAS Global Cluster Manager, so recovery is automated and error-free.
- **One size doesn't fit all.** Different applications have different requirements. Some can tolerate more downtime, others may be more sensitive to data loss. Your plan must not only contain methods for protecting these applications, but should also prioritize their recovery as well. VERITAS has a range of products and services to address these different needs.
- **Minimize complexity.** Disaster recovery technology must integrate easily into existing and future environments and IT practices. VERITAS solutions work on a variety of platforms, are simple to manage, and can adapt to a changing IT infrastructure for long-term success.

PROTECTING AGAINST FAILURES AND DISASTERS

Local failure, such as a CPU fault or a disk failure, are statistically very likely to occur, and their costs can be high if you are not prepared. VERITAS is a leader in high availability solutions that can reduce your risk of local failures. VERITAS Volume Manager creates resilient storage configurations that can withstand the loss of a single disk without data loss. VERITAS Cluster Server protects entire applications from component failures.

User errors and data corruption represent *logical failures*. You can protect yourself against these threats with comprehensive data backups or disk snapshots. VERITAS NetBackup, VERITAS Backup Exec and VERITAS FlashSnap™ allow undamaged copies of data to be retrieved from tape or other secondary storage.

Larger events such as natural or man-made disasters can cause *site failures*. Disaster recovery planning must include the possibility of site migration and re-creation of the data center.

Each of these threats to data and availability must be guarded against in any modern data center. Through intelligent planning and use of integrated VERITAS technology, an organization can implement a solution to protect against all three risks. Depending on the availability requirements of a particular application or data set, the solution may look slightly different. VERITAS has a complete line of solutions to ideally map disaster recovery technology to your organization's requirements.

CATEGORY	LOCAL FAILURE	LOGICAL DATA FAILURE	SITE FAILURE
Examples	<ul style="list-style-type: none"> ▪ CPU fault ▪ Disk failure ▪ Array failure ▪ Host bus adapter NIC ▪ Software 	<ul style="list-style-type: none"> ▪ Software bug ▪ Virus ▪ Data corruption ▪ Accidental delete ▪ Dropped table 	<ul style="list-style-type: none"> ▪ Telecommunications outage ▪ Power outage ▪ Ice storm ▪ Tornado ▪ Hurricane ▪ Earthquake ▪ Flood ▪ Contamination ▪ Act of war/terror
Solutions	<ul style="list-style-type: none"> ▪ Create sufficient redundancy within the data center 	<ul style="list-style-type: none"> ▪ Point-in-time recoverability 	<ul style="list-style-type: none"> ▪ Geographically separated data storage
Technology	<ul style="list-style-type: none"> ▪ Mirroring, RAID, clustering, backup 	<ul style="list-style-type: none"> ▪ Snapshots, backup 	<ul style="list-style-type: none"> ▪ Tape vaulting, remote replication, global clustering

IDENTIFYING A RECOVERY SITE

A recovery site is a critical part of your disaster recovery plan. Locating the site is a critical issue. The site should be:

- Far enough away so it won't be impacted by the same localized disasters as the primary site
- Close enough so it is accessible to staff, in case you have to relocate technical staff and transportation is a concern. (If you already have multiple data centers that are geographically separated, this is less of an issue.)

Some companies conduct detailed analyses of storm paths or flood plains when evaluating sites relatively close to each other. Travel concerns aside, further distances offer greater insulation and speed of recovery in the case of a far-reaching disaster.

The site can be cold, warm or hot, depending on your needs and budgets.

- A cold site is typically empty of any equipment except wiring and power; recovery involves procuring and moving in equipment and getting it running.
- Warm sites are partially equipped.
- Hot sites are a fully equipped data center that can be turned on for disaster operations.

VERITAS and our partners can help you configure a recovery site that meets your needs and budget.

In a VERITAS survey of over 3,000 IT professionals, only 32 percent have a secondary facility for disaster recovery, and of those, 61 percent can run only “days” in that facility before running out of capacity.

Companies with multiple data centers or very large campuses often plan to use existing sites as recovery sites. In case of a disaster, those sites would handle primary operations. Developing such an internal solution offers greater control, security and guaranteed access at the time of a disaster, provided there is appropriate budget and staffing in the IT organization.

DEFINING DISASTER RECOVERY REQUIREMENTS FOR CRITICAL APPLICATIONS

First you must prioritize your critical applications. Then you can design strategies that meet those goals. A successful disaster recovery strategy fits in your organization's budgets and capabilities. Although ideally you would like to have all of your applications available immediately at a recovery site, the cost may be prohibitive.

When assessing applications, there are two objectives to identify: Recovery Time and Recovery Point.

- **Recovery Time Objective (RTO):** The maximum downtime tolerable between a disaster and access to recovered systems by end users. Recovery time must include time to detect the problem; take action; bring systems, applications and data online; and finally validate recovery before allowing access to end users.
- **Recovery Point Objective (RPO):** Maximum acceptable data loss, or how current the data must be after recovery.

These measures will vary for different applications.

Business needs must drive your technology choices. Once you identify the recovery time and recovery point objectives for your data, applications and systems the next step is selecting the processes and technologies to ensure these objectives are always attainable.

Different technologies provide different degrees of mitigation against data loss and downtime. Offsite backup tapes protect your data, but recovery may take a day or more, and you could lose at least a day's worth of data, depending on how often you send backups offsite. Critical applications often need replication and advanced clustering technologies to shorten the time to recovery and eliminate data loss.

These technologies are described in the following sections. Remember that you should mix and match the approaches that meet your specific recovery needs.

OFFSITE BACKUP: THE ESSENTIAL FIRST STEP

You probably already perform routine backups of all of your critical applications. But those backups are useless in a disaster unless you also store backups in an offsite location. In addition to consistent and frequent backups, you need reliable, automated processes for rotating and tracking offsite tapes, also known as tape vaulting.

Backups are critical for all applications, even if you are implementing other disaster recovery technologies. Tape backups protect data against a wider range of problems than redundancy solutions, such as mirroring and replication, do. For example, tape backups protect data against user errors, while replication copies those errors to the recovery site.

Backup tape vaulting is a good basic approach to disaster recovery because it leverages existing processes (backups) and is easy and cost-effective to implement. It is suitable for many applications with fairly lenient recovery point and recovery time objectives. For example, standard file and print servers are not usually considered mission critical and can often be recovered several days later without severely impacting a business.

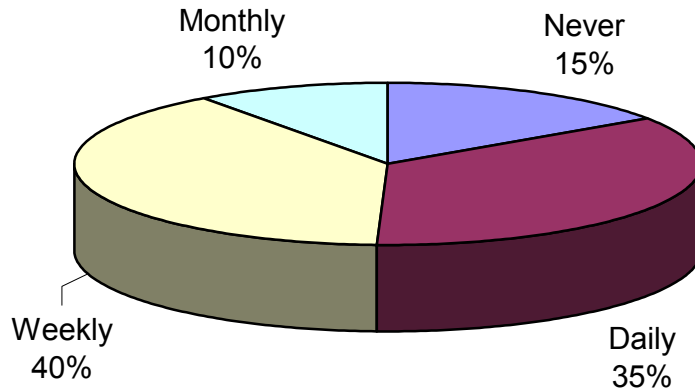
"Backup tapes were not easily accessible for the recovery process after Sept. 11 because the building that housed the backup tapes was also involved in the events and, therefore, it was not accessible. Alternatively, the tapes were not offsite and during the evacuation, no one took them out of the building."

Tactical BCP Lessons Learned From Sept. 11," R. Witty, Gartner , March 2002.

RECOVERY POINT/DATA LOSS WITH TAPE BACKUP

The recovery point using tape backups is determined by when the last good backup was stored offsite. Any data changed or added since that point is lost. Improve the recovery point by sending backup tapes offsite more frequently. Although sending tapes offsite every day is usually the best practice, surprisingly many companies send tapes offsite less frequently, exposing themselves to significant data loss in the event of a disaster.

How Often Do You Send Backup Tapes Offsite?



More than half of the respondents in the VERITAS survey do not send backups offsite daily.

For planning purposes, companies should expect to lose as much as one day of data if they send tapes offsite every day. If tapes are sent offsite once a week, data loss could be as great as a week, depending on when the disaster occurs. Offsite vaulting services can transport tapes so you don't have to.

RECOVERY TIME/DOWNTIME WITH TAPE BACKUP

Recovery time includes the following:

- The time to retrieve the appropriate tapes and transport them to the recovery site
- The time to set up systems to receive the data. This may include loading operating systems and other software.
- The time to restore the data from tape

Recovery time for a system can often take several days or more using tape backups, depending on the state of the recovery site, the amount of data to load, availability of personnel and tape device speed. You can improve the recovery time in a number of ways:

- Store at least one set of tapes offsite at a secondary data center.
- Store at least one set of tapes with an offsite vendor who can immediately deploy your tapes to any location at the time of a disaster. Make sure the vendor site is at least 50 miles from your primary site to ensure ease of transportation in the event of a regional disaster.
- Replicate the backup catalog at the recovery site with VERITAS Volume Replicator.
- Use "bare metal restore capabilities" such as VERITAS Bare Metal Restore to restore servers at the recovery location quickly, or have systems already configured to receive the data and applications.
- Use fast tape devices at the recovery site, and software that can drive the devices at capacity.
- Perform full backups as frequently as possible to speed recovery; it is faster to recover from full backups than incremental backups (especially for databases).
- Test, test, test. Practice recovery and regularly test your procedures to identify weaknesses and delays in your current plans and to ensure the staff understands procedures.

VAULT MANAGEMENT

Tape vaulting introduces administrative overhead – identifying and labeling the duplicate tapes for vaulting, tracking tape location and expiration, and retrieving tapes from the vault to reuse. In some companies, an administrator maintains a spreadsheet of offsite tape usage; this method is error-prone and may be difficult to access in case of a disaster.

As an integrated option for VERITAS NetBackup, **VERITAS NetBackup Vault** automates the complex and tedious process of backup duplication and offsite media management. Users can set up policies to control what, when and how backups are duplicated, and when tapes will be shipped to and from the offsite vault to ensure minimal data loss in the event of a disaster.

USING BARE METAL RESTORE FOR FASTER RECOVERIES

You can't restore data from a backup tape until there is something to restore to. One important factor in recovery time is the time spent getting the systems ready to receive the data. Installing operating systems and configuring hardware can be fairly complicated and time-consuming, requiring specialized skills that may not be readily available at recovery time.

VERITAS Bare Metal Restore simplifies and streamlines the server recovery process, making it unnecessary to manually reinstall operating systems or configure hardware. With a single command, complete server restores can be accomplished in a fraction of the time without extensive training or tedious administration.

Traditional Recovery	Bare Metal Restore
Repair hardware	Repair hardware
Collect necessary media	Execute Restore Command
Reboot	Reboot
Reload OS from CD-ROM or floppy disks	
Reboot	
Reload backup software from CD-ROM	
Reboot	
Reload recovery tape and restore system	
Reboot	

A “bare metal restore” speeds recovery time by reducing the number of manual steps.

VERITAS Backup Exec Intelligent Disaster Recovery Option™ provides the same “bare metal” capabilities with Backup Exec on Windows and NetWare platforms. Both of these products greatly improve recovery times when total server recovery is required.

REPLICATING THE BACKUP CATALOG

In a disaster recovery scenario, one of the first things you need to do is rebuild the backup environment and catalogs. One way to shave off hours from your recovery time is to replicate the backup catalog at the recovery site.

If you use VERITAS Volume Replicator to replicate the NetBackup or Backup Exec catalog at the recovery site, tape restores can begin immediately, without recataloging tapes or rebuilding the backup/restore server. This also is a good way to introduce replication technology into your infrastructure on a noncritical application.

PROTECTING DATA ON DESKTOPS AND LAPTOPS

No matter how well-designed your disaster recovery plan is, a flawed backup strategy will prevent your business from resuming normal operations. The largest hole in any organization's backup strategy typically resides where you least expect it: on the desktop.

The data on desktops and mobile laptops is essential to your users, and should be part of any disaster recovery plan. **VERITAS NetBackup Professional™** offers scalable, automated backups, even for laptops connecting through low-speed, low-quality dial-up connections. The centralized administrative interface makes it simple to configure and maintain the solution.

NetBackup Professional automatically writes data from desktops and mobile laptops to an online repository. Efficient backup technologies (Single Instance Store, Delta File Technology and compression) reduce the size of the backup repository and the amount of data transferred over the network. Users can retrieve lost data directly, and a "bare metal restore" CD offers fast recovery to new systems, which may be critical in a disaster.

To protect desktops and laptops from the effects of disasters, you can either store a tape backup of the repository offsite or replicate the repository to an alternate location. If you replicate the repository, then all desktop and laptop data is quickly and easily available to users.

REPLICATION: PROTECTING CRITICAL DATA FROM LOSS

For applications that cannot afford to lose a day's data under any circumstances, offsite tape backups alone are not sufficient. Data replication dramatically speeds recovery time and reduces potential data loss by making current data available instantly at the alternate location.

(Note: Replication technologies do not replace the need to create tape backup images. Replication must be supplemented with a consistent backup strategy since backups protect data from a range of failures, including logical failures, and provide needed long-term archival benefits.)

RECOVERY POINT/DATA LOSS WITH REPLICATION

How much data loss you can expect depends on which replication mode you use: synchronous, asynchronous or periodic. Periodic replication can result in hours of data loss, while asynchronous can range from seconds to milliseconds, or even zero data loss. Synchronous replication can completely eliminate the threat of any data loss.

RECOVERY TIME/DOWNTIME WITH REPLICATION

Replication on its own does not ensure a rapid recovery time; it is still necessary to restart applications with the replicated data, enable connectivity and switch IP addresses, and so on. Global clustering/failover, described in the next section, enhances replication with nearly instant application migration to the secondary site.

REPLICATION MODES

As mentioned above, the currency or freshness of the data depends on the replication mode. Which mode you need affects the replication technology you select.

- *Synchronous* replication is essentially mirroring over a network. Writes are not committed on the primary system until they are successfully replicated to the secondary system. This ensures that the systems are always identical and provides the most current Recovery Point. Network latency or other delays in writing to the secondary system can affect the write performance of the production system. For this reason, synchronous replication is not recommended for write-intensive systems over very long distances, such as hundreds or thousands of kilometers.
- *Asynchronous* replication eliminates the potential performance problems of synchronous methods. The primary site can commit data before it is replicated at the secondary site. The secondary site may lag behind the primary site, but typically only by milliseconds or seconds unless there is a network problem, offering essentially real-time replication. Some asynchronous products can introduce data corruption at the secondary site if they

do not carefully maintain write order during replication. VERITAS' replication solutions maintain write order integrity at all times.

- *Periodic* replication is the occasional replication of data from the primary to secondary site. The data, once replicated, is available immediately. But the data can be old (as of the last replication), and you may lose hours of data in case of disaster. If you need the most current data, choose a replication mode that guarantees less data loss. Some periodic replication solutions introduce inconsistency when the replicated data is resynchronized. To avoid inconsistency, these solutions need additional storage – adding to the expense of the solution. For this reason, asynchronous replication using **VERITAS Volume Replicator™** is a more cost-effective approach, while offering more current data

Whatever mode you select, you should ensure that the data at the secondary site is never corrupted or inconsistent. The last thing you need is a non-recoverable replicated data set at the secondary location the very moment you need it most. VERITAS replication solutions ensure complete data integrity at all times and under any replication mode.

REPLICATION TECHNOLOGIES

Open, software-based replication from VERITAS creates more cost-effective and flexible replication solutions when compared to hardware-dependent approaches. We'll look at two technologies: volume mirroring with VERITAS Volume Manager and replication with VERITAS Volume Replicator.

VOLUME MIRRORING

Mirroring data between physical devices is a common approach for providing highly available data. In a mirrored situation, data is written concurrently to devices (physical disks). Both writes must complete for the data to be considered committed.

Using fibre channel storage area networks (SANs), the distance between these devices or storage arrays can stretch to several kilometers. In this case, "remote mirroring" provides a campus or metrowide disaster recovery option. This scenario requires only **VERITAS Volume Manager™** to implement, making this a fast and cost-effective replication alternative.

If the recovery site is further than a SAN can reach, or if you do not have a stretched SAN in place, this approach may not be an option in your disaster recovery planning. For longer distances, you need to turn to replication technologies designed for higher latency connections, such as a wide-area network over IP.

HOST-BASED REPLICATION

VERITAS Volume Replicator enhances the capabilities of VERITAS Volume Manager with wide-area replication. It allows organizations to replicate data over very long distances cost-effectively, and ensures the consistency of the replicated data with write-order fidelity. Replication with Volume Replicator eliminates the distance limitations of mirroring and does not require an existing SAN infrastructure. As a host-based solution, Volume Replicator uses IP networks as well as existing storage hardware from virtually any manufacturer. It can even replicate from one SAN to another SAN connected via a wide-area IP network.

CLUSTERING FOR DISASTER RECOVERY PURPOSES

Replication and remote mirroring ensures only that the *data* will be immediately available at the recovery site. However, your ultimate recovery goal is to have critical applications up at the recovery site and available to users. Combining high availability technologies, such as clustering with replication, can result in a recovery time of *seconds or minutes* in the case of a disaster and eliminates the threat of human error from the application recovery process. Combining application clustering technologies with replication offers a superior disaster recovery solution for applications that cannot tolerate data loss or prolonged downtime under any circumstances.

RECOVERY POINT OBJECTIVE

Clustering for disaster recovery requires geographically mirrored or replicated data, so current data is in place at the recovery site. The recovery point depends on the replication mode used.

RECOVERY TIME

Clustering technology combined with replication can cut recovery time to seconds or minutes and eliminated manual procedures involved with bringing up applications at the remote site. VERITAS technology makes site-to-site migration a “push button” activity.

VERITAS Cluster Server™ is the industry’s leading clustering solution. It supports both UNIX and Windows server platforms, and provides scalable clustering for up to 32 nodes per cluster. Cluster Server supports the widest range of applications in UNIX and Windows clusters and provides the flexibility to configure multiple policy-based failover scenarios to meet individual uptime requirements.

VERITAS CLUSTER SERVER:

- Enables local high availability – a necessary prerequisite for disaster recovery planning.
- Supports “stretch” clustering, with nodes in a single cluster distributed across a stretched SAN or replicated over a highly reliable IP network.
- Provides the infrastructure for wide-area or global clustering, offering superior disaster recovery capabilities over extended distances.

LOCAL CLUSTERING

The function of an availability cluster is to identify faults, isolate problems and recover quickly. At its simplest, a local cluster has at least two servers with redundant network connections, connections to shared storage, and application monitoring/failover in place.

VERITAS Cluster Server supports a wide range of devices and offers active/active cluster configurations, so server capacity doesn’t sit idle in the cluster. Cluster Server identifies application service groups, or those groups of resources necessary to run an application. Policy-based failover automates responses to detected problems. If a failure occurs, Cluster Server automatically restarts applications on another server in the cluster according to predefined rules.

STRETCH CLUSTERING

Organizations using a recovery site on the same or nearby campus may choose to create a stretch cluster. You can do this by stretching a mirror over a SAN, or by replicating data over a highly reliable IP network, to another node in the cluster.

A stretch cluster can use VERITAS Volume Manager to mirror data between different sites on a fibre channel SAN. The remote node(s) participate in the same Cluster Server cluster. The distance between the nodes can stretch several kilometers to provide better tolerance of localized disasters.

If site A fails, site B can resume site A’s applications after mounting the mirrored volume.

In a replicated cluster, the data would be replicated over an IP network between nodes in a Cluster Server cluster, which could be geographically separated. This approach does not require an extended SAN infrastructure. For any stretch cluster, all nodes must be part of the same cluster and reside on the same subnet.

Both of these approaches have distance limitations and cannot address sites that are hundreds or thousands of kilometers apart. Because of distance limitations or the simple fact that most organizations do not have a SAN that stretches to their desired recovery facility, traditional replication with wide-area migration (described next) is the most common approach used to quickly bring up applications at the remote site.

CLUSTER TO CLUSTER MIGRATION

VERITAS Global Cluster Manager™ provides centralized, Web-based management of distributed Cluster Server clusters, running on a variety of UNIX and Windows platforms. When integrated with data replication, Global Cluster Manager lets you migrate applications, clusters or entire sites throughout your global infrastructure.

You can migrate applications completely with a single click – even updating the DNS servers to redirect clients to the recovery site. Global Cluster Manager, combined with replication, offers exceptionally rapid recovery over extended distances automating the migration process and eliminating the possibility of human error.

Global clustering reduces the cost and complexity of providing superior disaster recovery capabilities for your most critical applications. Fewer administrators are needed to manage the global availability environment if you have centralized control of geographically distributed clusters. Using a single Web console simplifies the way you interact with your high availability/disaster recovery environment. More important, by combining automated replication, application monitoring and wide-area migration, this solution eliminates potential sources of human error and speeds recovery in disaster situations.

CONCLUSION

Having a sound and seamless disaster recovery plan in place is a business necessity in today's economic and political world. As a leader in storage virtualization, data protection and high availability, VERITAS Software, with its portfolio of solutions that manage and protect critical data in the most demanding IT environments, is a natural partner to help you meet your disaster recovery requirements. VERITAS offers hardware-independent software solutions, which include backup and recovery, replication and remote mirroring, and clustering, let you leverage existing hardware for your disaster recovery needs.

With VERITAS solutions, your disparate recovery processes and guidelines can transform into a seamless, efficient and productive disaster-preparedness plan that will reduce recovery times, improve productivity and ensure business continuity of your organization. As disaster recovery professionals have stated for years, "it's not if you'll have a disaster, it's when." Proper planning along with VERITAS solutions can ensure that you're prepared when that day arrives.

VERITAS PROFESSIONAL SERVICES

It's helpful to bring in experts to make your disaster recovery plan a reality. VERITAS Software's VPro consulting services can help you implement a plan. VERITAS Education Services includes training in disaster recovery planning, as well as supporting technologies so you can make informed decisions. VERITAS Support Services are always there to help, especially when disaster strikes.

VERITAS Enterprise Consulting Services

The disaster recovery professionals of VERITAS Consulting understand the issues and technology involved in disaster recovery. With many years of experience in providing system and data availability solutions (and certification in disaster recovery planning and training), the disaster recovery/business continuance teams understand complex enterprise environments and effective disaster recovery strategy and program development.

VERITAS Consulting can design an infrastructure to help your business remain viable in the face of any potential disaster and train personnel to manage the system as your company grows.

VERITAS Education Services

Effective education and training is essential to maximizing the benefits of VERITAS technology in your business infrastructure and spreading the knowledge base of your VERITAS investment. VERITAS Education Services provides technical training across VERITAS network and storage management products — an approach that provides you with a high degree of autonomy and control over your environments. VERITAS also offers courses on general topics such as disaster recovery. A range of learning choices is available, from traditional classroom environments and onsite training, to eLearning via the Internet or CD-ROM.

Class	Length
VERITAS Disaster Recovery Workshop	2 Days
VERITAS NetBackup 4.5	3 Days
VERITAS NetBackup 4.5 – <i>Advanced</i>	2 Days
Upgrading VERITAS NetBackup Upgrade 3.4 to 4.5	2 Days
VERITAS Bare Metal Restore	2 Days
VERITAS Storage Migrator 4.5	3 Days
VERITAS Volume Replicator	2 Days

VERITAS Vsupport Services

VERITAS world-class/worldwide support provides customers of all sizes with flexible support offerings that prevent problems and decrease the time it takes to resolve a problem. In the case of an emergency or disaster, VERITAS can mobilize SWAT teams to respond quickly in recovering your data. The company's eight global support centers help companies around the world optimize return on investment and ensure continued availability of data.

THE VERITAS DISASTER RECOVERY TECHNOLOGIES

VERITAS Software offers a comprehensive portfolio of interoperable storage software solutions that address the most challenging IT environments. VERITAS solutions are hardware-independent, enabling you to manage complex and changing environments efficiently, and giving you the freedom of choice in storage and computing platforms.

As you build your disaster recovery plan, VERITAS can provide you with a layer of protection at every stage.

VERITAS BACKUP, RECOVERY AND VAULTING PRODUCTS

VERITAS NetBackup DataCenter™

VERITAS NetBackup DataCenter provides complete protection for the largest UNIX, Windows, Linux, and NetWare environments. Intuitive graphical user interfaces enable organizations to manage all aspects of backup and recovery and allow consistent backup policies to be set across the enterprise. NetBackup DataCenter provides database- and application-aware backup and recovery solutions for Oracle, SAP R/3, Informix, Sybase, Microsoft SQL Server, Microsoft Exchange Server, DB2 UDB, and Lotus Notes and Domino Server.

VERITAS NetBackup Vault™

VERITAS NetBackup Vault automates the complex and tedious process of backup duplication and offsite media management. Users can set up policies to control what, when and how backups are duplicated, and when tapes will be shipped to and from the offsite vault to ensure minimal data loss in the event of a disaster. NetBackup Vault takes care of the details so you and your staff can focus on more pressing matters.

VERITAS Bare Metal Restore™

VERITAS Bare Metal Restore simplifies and streamlines the server recovery process, making it unnecessary to manually reinstall operating systems or configure hardware. With a single command, complete server restores can be done in a fraction of the time without extensive training or tedious administration. One solution addresses the demands of a variety of platforms, eliminating the need for customized restore procedures on each platform. Server restores will be faster, easier and more successful, getting your business back online as soon as possible.

VERITAS NetBackup BusinessServer™

The heterogeneous workgroup, departmental and small-business environment requires a reliable, easy-to-use, high-performance data protection solution with enterprise-strength features. Until now, no backup and recovery product adequately addressed the needs of this market. VERITAS NetBackup BusinessServer is the first solution of its kind to deliver cost-effective enterprise-level backup and recovery capabilities for small to midsize UNIX, Microsoft Windows and Linux installations.

VERITAS Backup Exec™

VERITAS Backup Exec is a comprehensive, reliable backup system for Windows, NT and NetWare systems. Backup Exec offers the scalability and storage management options to fulfill the requirements of any network or enterprise. Advanced device and media management capabilities simplify tape device and library configuration and management for maximum, efficient access to stored information. Microsoft certification ensures operating system compatibility and application reliability. The Intelligent Disaster Recovery Option offers fast, bare-metal restores.

VERITAS NetBackup Professional™

VERITAS NetBackup Professional protects data loss on desktops and laptops due to hardware failure, viruses, user error or theft – common occurrences that can have enormous costs in user productivity and lost business. NetBackup Professional offers automated, event-driven backups to an online repository, without user intervention. Efficient backup technologies, such as Single Instance Store and Delta File Technology, reduce storage needs and the amount of data transferred daily. The product requires minimal IT administration, and reduces the burden on help desk staff by enabling users to retrieve their own files with an intuitive Windows Explorer interface. It also speeds complete system recoveries by creating bootable CD-ROMs that reload system images and user settings, without reinstalling software. With a centralized, online repository of desktop data, you can extend disaster recovery strategies to include the data your users access every day.

VERITAS REPLICATION, REMOTE MIRRORING AND STORAGE VIRTUALIZATION PRODUCTS

VERITAS Volume Manager™

VERITAS Volume Manager, the industry's leading storage virtualization platform, is available on most UNIX and Windows platforms. It improves application availability and simplifies management of diverse storage resources. Volume Manager is also included as part of the VERITAS Foundation Suite™ or VERITAS Database Editions™.

VERITAS Foundation Suite™

VERITAS Foundation Suite combines the high-performance, quick-recovery of VERITAS File System™ with the online storage management capabilities of Volume Manager.

VERITAS Database Editions™

The VERITAS Database Editions are optimized for database use, offering simplified management, enhanced availability and improved performance. VERITAS Database Edition™ *for Oracle* includes a unique database accelerator that delivers raw device speed with the administrative ease of traditional file systems.

VERITAS Volume Replicator™

Built on the power and flexibility of VERITAS Volume Manager, Volume Replicator reliably, efficiently and consistently replicates data to remote locations over standard IP networks for maximum business continuity. Volume Replicator provides robust, storage-independent replication technology when data currency and availability are critical. The product supports up to 32 secondary replication sites for many-to-one and one-to-many scenarios, and allows you to replicate over any distance — across the campus or across the globe.

VERITAS FlashSnap™

VERITAS FlashSnap is a flexible, manageable solution that enables administrators to create volume snapshots with minimal impact to the applications or users, and addresses issues such as shrinking maintenance and backup windows. These snapshots can be accessed from the same server or easily be imported to another host. This allows users to perform resource-intensive, essential processes, such as backups, decision support and reporting. To greatly reduce the resynchronization time and performance impact on the server when the volume snapshot is reattached, FastResync technology synchronizes only the changes that occurred while the volume snapshots were split. The VERITAS FlashSnap option lets users use different point-in-time technologies that meet their needs.

VERITAS Storage Replicator™ for Windows NT and Windows 2000

VERITAS Storage Replicator delivers robust, reliable data replication to Windows server environments. Whether the requirement is automated data distribution, disaster protection or many-to-one backup centralization, Storage Replicator handles the most demanding replication jobs on the Windows NT and Windows 2000 platforms. Robust monitoring and notification features support centralized, enterprisewide management of data protection. Storage Replicator can replicate entire server volumes, file systems and individual files, providing protection for all types of Windows data.

VERITAS CLUSTERING PRODUCTS

VERITAS Cluster Server™

VERITAS Cluster Server provides a comprehensive, architecture-independent availability management solution for minimizing both planned and unplanned downtime. Cluster Server provides policy-based cascading and multidirectional failover capabilities. Application services can be migrated manually to alternate nodes for maintenance or load-balancing purposes. Cluster Server supports clusters of up to 32 nodes in SAN and client/server environments. Cluster administrators can maximize resources and proactively focus on availability and performance by implementing increased automation and intelligent workload management.

VERITAS Global Cluster Manager™

VERITAS Global Cluster Manager™ reduces the complexity and administrative cost of keeping geographically distributed data and applications available. IT staff can view and manage distributed VERITAS Cluster Server clusters from a single location with this Web-based tool. The add-on Disaster Recovery Option integrates clustering and replication technologies to minimize planned and unplanned downtime. Consolidated monitoring and management lowers administrative overhead for any business with two or more server clusters. A single browser-based console manages multiple clusters of different architectures (e.g., HP-UX, Solaris and Windows NT) to leverage your existing infrastructure.

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