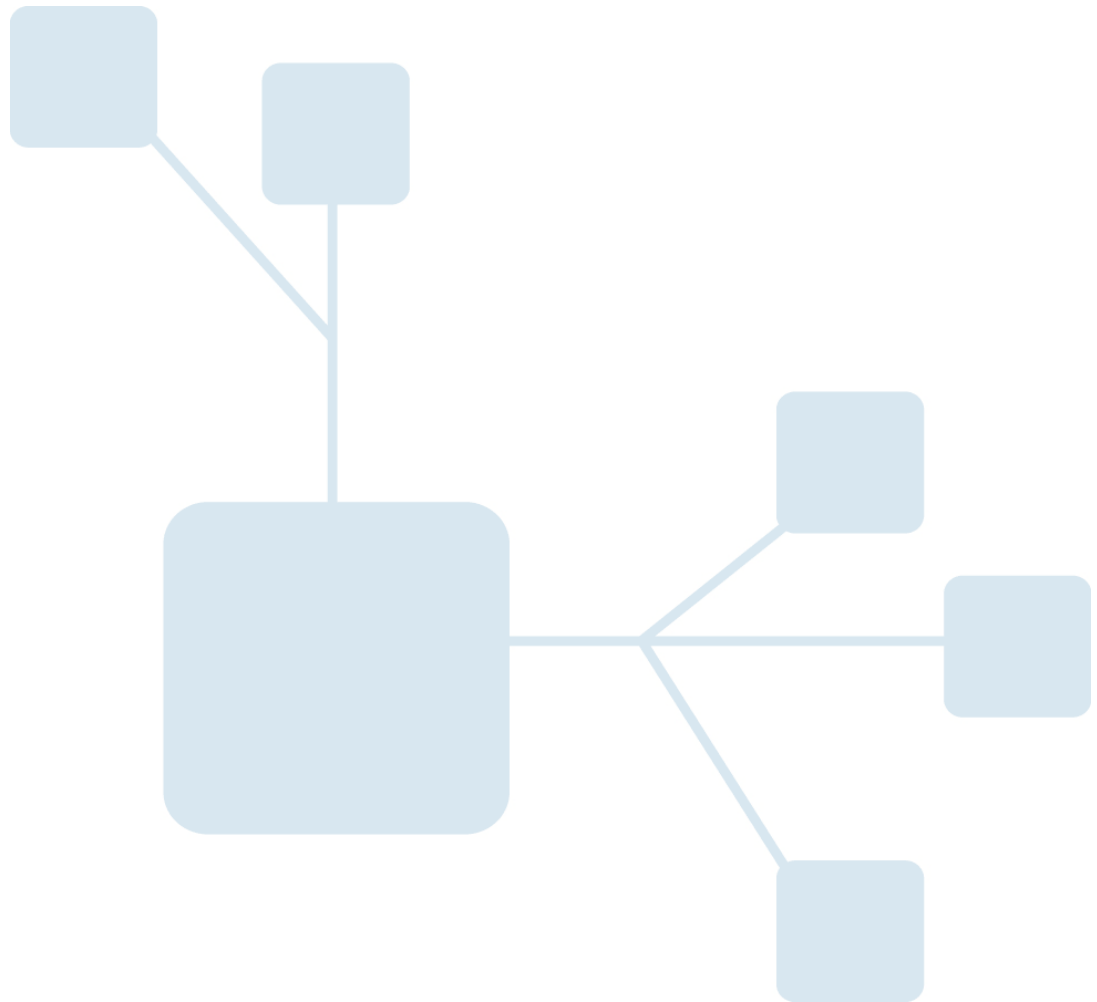# Cost-effective Data Protection for Microsoft Windows Environments

Abstract

Effective backup and restore are essential to any organization's survival. This white paper discusses the challenges of protecting Microsoft Windows files, databases, and email applications; and demonstrates how Amanda Enterprise, combined with its clients and agents, provides a powerful, low-cost solution.

Table of Contents

Executive Summary

Your employees, customers, and business partners all depend upon data to conduct daily business. Your business processes and applications rely on it. Government regulations now mandate its storage and retrieval. So, clearly, to keep your employees productive and your business running, you must protect your data and maintain service level agreements for high availability.

For many organizations, protecting data means protecting Windows systems. Scores of small and mid-sized businesses (SMBs), as well as departments within larger corporations, rely heavily on a Microsoft Windows environment to run their business. Email has become a mission-critical communications tool that is essential to business operations and productivity with Microsoft Exchange being the most popular business messaging platform. To support mission critical business applications like Enterprise Resource Planning (ERP), organizations are using Microsoft Windows servers and relational databases, such as Microsoft SQL Server and Oracle database.

IT administrators are faced with protecting servers, desktops, and laptops that are dispersed across the company in a wide-range of geographic locations. Their challenge is compounded by massive data growth and the need to backup data without impacting its availability to users and applications.

Let's face it—the question for organizations of all sizes is not whether to backup up data. The question is how to perform backup and recovery operations in a simple, rapid, reliable, cost-effective manner without impacting administrators' or employees' productivity. So, your IT staff can focus on your business needs and you can rest assured that your data—and your business—are safe and secure.

The purpose of this document is to explore the challenges of protecting your Windows data, systems, and applications, and demonstrate how Amanda Enterprise can meet all of your needs with subscription fees that are up to 80 percent less than licensing costs of major competitive products.

Windows Data Protection Challenges

As you probably understand all too well, organizations today face the challenge of managing an ever-increasing amount of data. As companies depend upon data to keep their business running and their employees productive, data protection is mandatory. Data, systems, and applications must be able to be backed up and quickly restored in the event of a hardware failure or human error. For Windows environments, this usually includes protecting Windows servers, desktops, and laptops, as well as Microsoft Exchange, Microsoft SQL Server, and Oracle Database.

Reduce costs and operator complexity

As the amount of data explodes and administrators' responsibilities increase, the one thing that never seems to grow is the IT budget. Reducing enterprise-wide costs is listed among chief information officers' top five priorities in Gartner's CIO survey for 2007, 2008 and earlier years. Improving enterprise workforce effectiveness is also one of the highest CIO priorities (#6 in the 2008 survey, and #4 in the 2007 survey). For backup operations, this translates into the need for reliable software that reduces costs and increases backup productivity for

administrators.

As companies add backup software for each new Windows application or database acquired over time, they often end up with a diverse mix of products, each with its own user interface. To simplify backup operations, companies require consolidation to a single backup software product with a centralized management console that protects all Windows file systems, databases, and applications—plus Windows-based servers and end-points—in a consistent manner. As most companies today have a distributed network encompassing a heterogeneous mix of computers and operating systems, the same interface needs to accommodate other platforms, such as Linux, Solaris, and Mac OS X, and support remote operations in order to maximize administrator productivity.

The need to simplify backup operations is even more important for SMBs where administrators are tasked with a wide range of operations versus being entirely focused on data and systems availability. Administrators assume the burden of installing, configuring, and managing multiple products from multiple vendors. SMB administrator productivity can be significantly improved by a centralized and streamlined solution that eliminates the complexity often found in backup products. As in any software that offers a plethora of complex features covering every situation imaginable, there is typically a trade-off between software that is jam-packed full of features and ease-of-use. More is not always better. Most users will agree that bloated software contains many unessential features that seldom, if ever, get used. And, of course, the complex backup solutions typically come with a high price tag and expensive annual fees.

Backup data without impacting user productivity

Many Windows systems are tasked with business critical applications, such as Enterprise Resource Planning (ERP) or email communications, that must be available day and night. If an application or database is taken offline for backup, users and applications cannot access the data. In order to maximize business productivity, data must be available to users and applications 24x7. Gone are the days when blocks of time were reserved for backup operations and those backup windows were sufficient to get the job done.

Database administrators now must find a way to ensure data reliability, while supporting a service level agreement for maximum data availability. In order to achieve these dual goals, companies must use backup software that provides online or "hot" backups. This requires support for open file backup—ensuring that data is backed up completely and uncorrupted, even if files are open and in use during the backup process.

Protect data on Windows desktops and laptops

Backup and recovery is most typically associated with protecting data residing on a server. Yet, a great deal of business critical information today is stored on Windows desktops and laptops. And, as more and more companies encourage their employees to work from home, Windows laptops have even surpassed desktop computers. As the global workforce continues to grow, companies need to protect information on both Windows desktops and laptops.

In addition to restoring lost data, companies must be able to respond quickly when a Windows desktop or laptop is lost, stolen, or unbootable. It can take days to reinstall the Windows operating system, service packs, patches,

updates, device drives, and applications on new hardware; configure the setting; reload the data; and test everything. Even after all that, the system may still not be in the same state as it was before the failure. In order to get users back in the saddle again quickly, it is crucial for the backup software to protect the Windows System State and Active Directory to enable fast and easy bare-metal and disaster recovery.

Ensure email availability and recoverability

During the past decade, e-mail has become a mission-critical communications tool that is essential to business operations and productivity. This growing dependence has placed enormous demand on IT staff to protect email from accidental loss, damage or destruction. Additional pressure comes from ever-expanding government regulations such as HIPAA and Sarbanes-Oxley that mandate compliance with data security, retention, and retrieval requirements. For some organizations, such as financial and medical services, email must be preserved longer and maintained in a place where it cannot be tampered with during this retention period.

Email management and protection is compounded by the enormous growth in volume and the need for 24x7 accessibility. As massive amounts of data passes in and out of e-mail servers on a daily basis, backup procedures and software must accommodate this huge expansion in volume. Employees are not only checking their messages constantly at work, but also using laptops to log on remotely at night. As a result, more-and-more Service Level Agreements require email to be available24x7x365.

Today, more organizations use Microsoft Exchange Server to support their e-mail communications than any other product. These businesses need a data protection product that will simplify, centralize, and automate the management of Exchange backup and recovery operations without disrupting users.

Protect databases scattered throughout the enterprise

Many organizations are using Microsoft Windows servers and relational databases, such as Microsoft SQL Server and Oracle Database for Windows, to support mission critical business applications like Enterprise Resource Planning (ERP), Customer Relationship Management (CRM) and electronic commerce. As these applications serve different departments within an enterprise, database administrators are faced with the challenge of managing Microsoft SQL Server and Oracle databases in multiple offices across a wide-range of geographic locations.

As companies rely on these applications to run their business, protecting the data is of paramount importance. Setting up and managing backup policies for each database in each department is complex and time consuming. Department staff are often strapped for time and limited in their knowledge of backup and recovery tools and methods. It is essential to have a centralized and automated data protection solution that will accommodate both SQL Server and Oracle databases, streamline backup operations, and reduce the burden on local resources, while lowering the overall cost.

While data reliability is immensely important, data availability is also crucial. Administrators need to be able to backup all Microsoft databases without impacting user or application productivity. In short, the ideal solution to protect Microsoft databases increases data availability and reliability, reduces management complexity, and

lowers overall costs.

Obtain flexible storage options

Various types of backup media each have their own advantages and disadvantages. For example, tape provides long-term archival and offsite storage benefits at a low cost. However, tape is slower and has lower capacity. Disks offer the benefits that come with fast random-access. Backing up multiple systems simultaneously to the same disk improves performance and reduces the total backup time. Data can also be recovered faster from disk than from tape. However, disks are mechanical and can "wear out." In fact, since they are always on, wearing out is a matter of "when", not "if."

To achieve the advantages of both disk and tape, users may choose to create multi-tier backup solutions. Data can be backed up to disk for easy on-line recovery and to tape for meeting the requirements of disaster recovery and long-term retention policies.

Online services provide a way for businesses of all sizes to backup, archive, and recover their data. Users do not have to change tapes or manually take the backup media offsite. Every company has data that is so crucial to their business that loss would be enormously expensive or even put them out of business. A fire, flood, or other disaster could wipe out your local data center. Windows shops need to be able to protect Exchange, SQL Server, and Oracle databases. As data explodes, online services provide virtually unlimited scalability. Of course, the service needs to be fast and secure. And, it must be easy to use and affordable—particularly for small and medium-size businesses.

Fully guarantee the security of data

Security is important on many different levels. All data needs to be secure during transfer as well as on the backup media. Furthermore, access to the backup process itself needs to be secured so that although you may provide backup services to many groups, each department will only have access to its own data. With role-based access, even engineers can have access to backup and restore their own Windows data. Support for access control lists (ACLs) and extended attributes is also important to ensure that recovered files have the same permissions as the original.

Safeguard the integrity of data and system information

When it comes to backup products, maintaining the integrity of your data is almost taken for granted. Yet, in addition to your data, you also need to ensure that all metadata is preserved as well. This includes reparse point information, hard links, object identifiers, alternate data streams (ADS), property data, junction points, and more.

It is extremely important that the Windows System State and the Active Directory are protected. As we discussed earlier, this enables complete recovery from "bare metal" in case of a disaster. The System State components that require protection vary for each device, such as servers, workstations, or domain controllers. For example, to protect the Windows XP System State on a desktop or laptop, the registry, COM+ Class Registration database, boot files, and files under Windows File Protection need to be saved. Whereas, to protect the Windows 2003 System State on server with a domain controller, the Active Directory and the SYSVOL directory need to be

protected as well as the above components.

Advantages of Open Source

In evaluating backup and recovery solutions that will meet your data protection requirements, be sure to consider the benefits of open source products.

Standard data formats, device drivers, and utilities

One level of safety that is often overlooked when purchasing a backup and recovery product is the ability to restore your files at any time in the future. Let's say you purchase a product and archive data. Then years later you switch to another backup product, and now you need to restore some of the files you archived with the first product. Well, you just can't do it. Each product uses its own proprietary file format. The only way to recover files is with the product used to back them up. You can end up locked into your backup product forever.

Open source products use industry standard data formats, such as ZIP. If you back up your files using an open source product, you can always use standard utilities such as WinZip for Windows Compressed Folder Viewer to restore your files.

More reliable and secure software

The very nature of open source means that the open-source community has the ability to analyze, fix, or modify the source code. In addition, open source software is routinely inspected by users and the code is externally audited. As a result, the code is much more robust and secure than closed-source software. With proprietary products, there is no assurance that the code is subjected to the same quality controls.

Importance of a Good Backup Plan

Employees, customers, partners, and suppliers often need to be able to access information at any time. Data loss and downtime can result in lost productivity, revenue, and customers. Organizations of all size require a plan to recover data and applications if a human error, software glitch, hardware failure, natural disaster, or other incident impacts their IT infrastructure. Even the loss of one file could result in losing many customers. And, catastrophic data loss could cost millions of dollars or shut down your business if you don't have a backup plan.

Analyze your data and its impact on your business

At a minimum, you need a plan to determine what data should be backed up; how quickly it needs to be recovered; and how, when, and where it will be backed up and recovered. Start by analyzing your data.

- **How important is your data?**
  The importance or your data will help you determine how frequently you need to back it up. Different data can have different levels of importance.

- **How often does the data change?**

The frequency of change will also influence how often you want to back up the data and whether you perform a full or incremental backup.

- **How quickly do you need to recover the data?**
  Since every minute lost can translate into dollars lost, define service level agreements (SLA) for data recovery time. Backup and recovery software should include simple, automated recovery procedures to enable you to meet your SLAs.

Disaster Recovery: RTO and RPO

Recovery time objectives (RTO) and recovery point objectives (RPO) help define your disaster recovery plan. Your data backup plans are an important part of your disaster recovery plan.

The RTO is the maximum tolerable length of *time* that a computer, system, network, or application can be down after a disaster. This is based on the extent that the interruption disrupts normal business operations and the amount of revenue lost. The RTO for a given application will influence your choice in backup media.

The recovery point objective (RPO) is the age of files that must be recovered from backup storage for normal operations to resume after a disaster. The RPO determines the minimum frequency with which backups must be made. For example, if the RPO is one hour, backups must be made at least once per hour.

Determine backup media

Many media options are available for backing up data. To determine which media is right for particular information, consider several key elements: (1) the capacity of the media format to accommodate your data, (2) the reliability of the backup media, (3) the speed at which the data can be backed up and recovered, (4) the ability of the media to scale as your data grows, (5) the cost of the backup media compared to your budget, and (6) the ability to move backup media offsite.

Tapes and disk are common media for backup. One advantage of tapes over hard disk backup is that tapes are removable and portable, making them ideal for archiving data offsite. Tapes are also less expensive. On the other hand, tapes are slower and less reliable than disks. Disks provide the fastest way to backup and restore files, but they cannot be taken offsite (unless portable disk drives are used).

Don't forget the importance of off-site archival

In the past, companies stored backup tapes offsite to use for recovery in case of theft, fire, or flood. More recently, many organizations have switched to Internet storage. You can use Internet storage to backup, archive and retrieve any amount of data, any time, from anywhere on the Internet. It is a more efficient and cost-effective way to archive your data than offline tape storage. There are no tapes to mount and restoring data is much faster.

Create a good backup process

A good backup process should be documented and tested. Some of the factors to consider in creating a backup

process include:

- **What backup method will be used?**
  Administrators frequently use a combination of full, differential, and incremental backups. A full backup moves all your data to the backup system. A differential backup copies the documents that changed since the last full backup. An incremental backup transfers the data that changed since the last backup of any kind.

- **When will backups be scheduled?**
  Determine how often you want to perform full backups, then schedule them so that you don't do all of your full backups at the same time. Running many backups simultaneously requires a great deal of bandwidth, media, and computer resources that would sit idle on the days you do incremental backups. So, be sure to stagger the full backups to maximize the use of your resources. You may also want to create an extended backup set for monthly and quarterly backups that includes additional files that aren't being backed up regularly.

  Consider the hours that applications can be shut down and backups performed. However, when backups start to exceed their allotted time window, or there is no backup window—applications need to be available 24x7—then hot backups are necessary. This requires backup software with the ability to protect the integrity of open files.

- **How will backup media be rotated?**
  Determine a schedule for rotating two or more sets of backup media. For example, if you use 10 tapes divided into two sets of 5, the first set of tapes is used one week and the second set of tapes is used the next week. If you add a third set of tapes, you can rotate one of the tape sets to off-site storage.

- **What is the recovery process?**
  If there is a system failure, determine who will be notified. Select a backup and recovery product that allows you to recovery quickly and easily.

- **How long will data be retained and where?**
  Define a data retention policy. Depending upon your industry, you may be mandated by government regulations such as HIPAA and Sarbanes Oxley to comply with specific data security, retention, and retrieval requirements.

Be sure to test your backup process and determine who will be the primary contact responsible for the process. Also, select the people who will be responsible for the day-to-day backup activities. No matter what your business, a well thought-out data protection plan will give you one of the best possible returns on IT investment.

Zmanda Solutions

Amanda Enterprise

Amanda Enterprise provides one comprehensive solution for your entire Microsoft environment. A single backup server and a single management console can protect hundreds of Microsoft servers, desktops and laptops, Microsoft Exchange, Microsoft SQL Server, and Oracle Database for Windows. The same solution also protects computers running Linux, Solaris, and Mac OS X operating systems, as well as Oracle databases for Linux and Solaris.

Open source. As an open source product, Amanda Enterprise does not use any proprietary formats. Industry standard technologies are employed, and, thus, freely available to anyone. In case of an emergency, you can recover data using standard utilities, even without Amanda Enterprise installed. All other commercial products use proprietary methods that lock you into their product, requiring its use to restore your data.

Low-cost solution. Subscriptions for Amanda Enterprise are up to 80 percent lower than licensing costs for major competitive products. Simplified and centralized operations improve administrator productivity, further reducing the cost of ownership.

Service and support. With your annual subscription to Amanda Enterprise, you can choose from three levels of technical support: Basic, Standard or Premium. Zmanda's professional services team is also available to help you design and implement the optimal backup solution for your environment. Services include training, legacy backup migration, storage and network capacity planning, and backup performance optimization.

Amanda Enterprise provides the following features and benefits:

- **Simplified, centralized management**. A graphic, Web-based management console simplifies all day-to-day activities for backup administrators.
- **Rapid installer**. Allows you to install and configure your backup and recovery environment in minutes.
- **Intelligent scheduler**. Optimizes backup levels by equalizing backup time from one backup run to the next. Administrators no longer have to estimate backup levels and can better plan their daily activities.
- **Backup fault tolerance.** Amanda Enterprise gracefully skips systems (e.g. Windows laptops) which cannot be backed up in a particular run. When this skipped system is available in a future backup run, the intelligent scheduler promotes its backup to an appropriate backup level. In case of backup media error (e.g. tape errors or inaccessibility of cloud storage), Amanda Enterprise caches the backup data on the holding disk which can be migrated to backup media after the fault has been resolved.
- **Comprehensive reporting**. Provides pre-defined and custom reports about backup operations, performance, compression, media utilization, and other backup parameters. Administrators can initiate one-click recovery right from these summary reports.
- **Flexible backup media options**. Provides a wide-variety of storage media for backup,

including tape, tape libraries, disks (DAS, NAS, SAN, file servers, RAID), optical jukeboxes, and online storage.

- **Internet storage using Amazon S3**. Offers a highly scalable, reliable, and low-cost way to store your data off-site using Amazon Simple Storage Service.
- **Standard zip data format**. Backup images are in native Windows Zip format.
- **Backup of open files**. Support for Volume Shadow Copy Service (VSS) allows backup of open files on Windows with minimal impact on users and applications.
- **Fast, flexible recovery**. Administrators can simply click on the file or files to be restored.
- **Encryption.** Administrators can choose which data to encrypt, which standard encryption algorithm to use, and whether to encrypt data on the client or on the server.
- **Compression.** Uses only industry standard compression utilities, and allows administrator to choose the optimal compression algorithm for the data and the resources available, as well as whether to compress the data on the client or the server.
- **Enhanced security**. Backup of Access Control Lists (ACLs) and extended attributes ensures that recovered files have the same permissions as the original.
- **Scalability**. A single backup server can scale to backup and recover hundreds of servers, desktops, workstations, and laptops.

The Zmanda backup server runs on either Linux or Solaris. If you have an all-Windows environment you might challenge the introduction of another operating system. However, there is a strong case for your backup server to run on a non-Windows operating system. What if your Windows machines are infected with a virus or other malicious attack? Your backup server and backup data will not be compromised if they are running on Linux or Solaris platforms. Don't put your eggs and your backup eggs into one basket!

Zmanda Windows Client

The Zmanda Windows Client provides reliable data protection for Microsoft Windows Server 2003, as well as Vista and XP desktop and laptops. It provides all the enterprise-class features listed above for Amanda Enterprise including central management, simplified administration, intelligent scheduling, security, scalability, open formats, low cost of ownership, and responsive technical support.

In addition, the Zmanda Windows Client provides the following functions:

- **Simple, flexible backups.** Supports full and multiple levels (0-9) of incremental backups.
- **Cross platform restores.** Provides the ability to restore data from a backup to a host with different operating system to simplify the recovery process.
- **Supports sparse files**. Supports the backup of sparse files to optimize the use of storage media for backups.
- **Timestamps unchanged.** File timestamps remain intact during backup.
- **Exclude lists.** Administrators can choose to include or exclude specific files and directories during backup.
- **Open source formats.** Uses industry standard zip format (Compressed Folders) for backup files.

To truly protect Windows computers, it is necessary to be able to protect the following components: (1) the System State, (2) the Active Directory (AD), (3) the integrity of open files, and (4) the integrity of metadata. The Zmanda Windows Client provides safe, secure protection in each of these areas.

- **Protects Active Directory**. Ensures the recovery of Windows Active Directory in case of a hardware or software failure.
- **Protects System State**. Simplifies bare metal recovery of Windows systems by providing the ability to roll back any system changes and restore the key operating system elements and files.
- **Protects Integrity of Open Files**. Leverages Microsoft VSS (Volume Shadow Copy Service) to enable backup of files currently in use.
- **Maintains integrity of metadata.** Backs up and restores all metadata: ACLs, extended attributes, reparse point information, hard links, object identifiers, alternate data streams (ADS), and property data.

Zmanda MS Exchange Agent

The Zmanda MS Exchange Agent provides a reliable and cost-effective solution to protect all your e-mail located on Microsoft Exchange servers. By leveraging Microsoft's native Volume Shadow Copy Service (VSS) snapshot technology, users can continue to access their email during backup operations. If a Windows laptop is offline during the schedule backup operations, the Zmanda MS Exchange Agent can accommodate the change during the next round of backup operations.

A central Linux or Solaris backup server allows you to consolidate and automate all email backup to one location. Or, you can choose to add additional backup servers. As your staff and email grow, Amanda Enterprise and the Zmanda MS Exchange Agent can scale to accommodate thousands of clients with hundreds of terabytes of data. No changes are required to your backup procedures when you add new desktops or other Exchange clients.

Your administrator can implement centralized management policies and procedures to ensure that corporate, legal, and regulatory requirements are being met. By automating email archival, you can ensure that you are complying with the mandated retention periods.

The Zmanda MS Exchange Agent provides the reliable, cost-effective data protection solution your business needs to simplify, centralize, and automate the backup and recovery of all your Exchange databases without disrupting users. The Zmanda MS Exchange Agent supports Exchange Server 2003 and 2007.

Zmanda MS SQL Agent

As Microsoft SQL Server databases proliferate within departments throughout the enterprise, companies need a secure and economical way to protect these mission-critical databases, without burdening local staff. Zmanda MS SQL Agent allows you to centralize, simplify, and automate all SQL Server backup and recovery operations. The Zmanda Management Console provides one easy-to-use, graphical user interface (GUI) for configuring, monitoring, and managing all MS SQL Server backups.

The Zmanda MS SQL Agent uses Microsoft's native VSS for backup operations, allowing hot backups without disrupting SQL Server database access by users or applications. Standard encryption algorithms and compression utilities are supported on the client and the server. And, administrators have the flexibility to perform full or incremental backups.

Zmanda MS SQL Agent allows your business to create a backup and recovery process for all your Microsoft SQL Server databases that is integrated, reliable, easy to manage, and cost-effective.

Zmanda Oracle Windows Agent

The requirements to manage Microsoft Oracle Databases throughout the enterprise are very similar to those for managing SQL Server databases. To meet these needs, Zmanda offers all the same powerful and cost-effective functions, at the same low-price, for Oracle Databases as you get with Zmanda MS SQL Agent. In fact, the Zmanda Management Console is used to manage all your Microsoft MS SQL Server and Oracle databases throughout the enterprise. So, administrators are not tasked with configuring and administrating backup policies for each database server.

The Zmanda Oracle Windows Agent utilizes VSS to ensure reliability during backups, allow administrators to perform backup operations at any time, while users and applications continue to access Oracle databases. Administrators can do a full backup of the entire Oracle database, or do incremental backup that only backs up data that is new or changed since the prior backup, saving time and storage space.

Zmanda Software Agents for Databases and Applications

Features	Zmanda MS Exchange Agent	Zmanda MS SQL Agent	Zmanda Oracle Windows Agent
Non-disruptive online backup	✓	✓	✓
Central management console	✓	✓	✓
Intelligent scheduler	✓	✓	✓
Full and incremental Backup levels	✓	✓	✓
Uses standard format for backup data	**Zip**	**Zip**	**Zip**
Uses application's native backup tools	**VSS**	**VSS**	**VSS**
Encryption	✓	✓	✓
Compression	✓	✓	✓
Supported releases	**2007** **2003**	**2005** **2000**	**Oracle** **11g**

Zmanda Clients and Agents leverage VSS for hot backups

As employees typically work on Windows applications at any hour of the day or night, data must be backed up without shutting down the Windows systems. The Zmanda Windows Client leverages Microsoft VSS (Volume Shadow Copy Service) snapshot technology to enable backup of locked and open files on Windows without impacting users or applications. VSS provides the backup infrastructure for Microsoft Windows XP, Microsoft Windows Server 2003 and 2008, and Windows Vista operating systems, as well as a mechanism for creating consistent point-in-time copies of data known as shadow copies.

Likewise, administrators must be able to backup email without taking the servers offline. To provide hot backups without disrupting Exchange users, the Zmanda MS Exchange Agent takes advantage of Microsoft's Volume Shadow Copy Service (VSS) and the fact that Exchange Server is a VSS-aware application. When an agent starts a backup, VSS coordinates communication between the Zmanda Agent requestor, the Exchange writer, and VSS providers that create the shadow copies (snapshots) of Exchange. A similar method is used to enable hot backup of Microsoft SQL Server and Oracle databases.

Addressing Windows Data Protection Challenges

Whether you use Windows systems to run Microsoft Office Word or Excel, Microsoft Exchange, mission-critical business applications that use Microsoft SQL Server or Oracle databases, or other Windows applications, you know how important it is to ensure the integrity and availability of your Windows data, systems, and applications. Amanda Enterprise, in concert with its Clients and Agents, provides a cost-effective data protection solution for organizations of all sizes. Let's take a look at how it meets each of the challenges outlined at the beginning of this document.

- **Reduce costs and operator complexity**
  Subscriptions for Amanda Enterprise and its Clients and Agents are up to 80 percent lower than licensing costs for major competitive products. Simplified and centralized operations improve administrator productivity, further reducing the cost of ownership.

- **Protect data without impacting user productivity**
  The Zmanda Windows Client, Zmanda MS Exchange Agent, Zmanda MS SQL Agent, and Zmanda Oracle Windows Agent all leverage Microsoft VSS (Volume Shadow Copy Service) snapshot technology to enable backup of locked and open files on Windows without impacting users or applications.

- **Safeguard data on Windows desktops and laptops**
  The Zmanda Windows Client protects data on Windows desktop and laptops. It also protects the Windows System State and Active Directory to simplify bare metal and disaster recovery of Windows systems by rolling back any system changes and restoring the key operating system elements and files.

- **Ensure email availability and recoverability**
  The Zmanda MS Exchange Agent provides a reliable and cost-effective solution to protect your e-mail located on Microsoft Exchange servers, as well as desktops and laptops scattered throughout your enterprise. Users can continue to access their email during backup operations.

- **Protect databases scattered throughout the enterprise**
  The Zmanda MS SQL Agent and the Zmanda Oracle Windows Agent allow you to centralize, simplify, and automate all SQL Server and Oracle database backup and recovery operations. The Zmanda Management Console provides one easy-to-use, graphical user interface (GUI) for configuring, monitoring, and managing all Windows backup activities. By leveraging Microsoft's native VSS for backup operations, administrators can conduct hot backups without disrupting database access by users or applications.

- **Obtain flexible storage options**
  Amanda Enterprise and its Clients and Agents provide a wide-variety of storage media for backup, including tape, tape libraries, disks (DAS, NAS, SAN, file servers, RAID), and optical jukeboxes.

Amanda Enterprise customers can also use Amazon Simple Storage Service (Amazon S3) to backup, archive, and retrieve any amount of data, at any time, from anywhere on the Internet. Zmanda is the only vendor today that offers online data backup using cloud computing. It is backed by Amazon's 99.9% service level agreement. The low fee for Amazon S3 makes online storage as economical as tape backup—with faster recovery and more reliability.

- **Fully guarantee the security of data**
  With Amanda Enterprise, you can choose which data you want to encrypt, which standard encryption algorithm you want to use, and whether you want to encrypt data on the client or on the server.

  You can also choose to give universal access to administrators, while operators are given limited access. This allows for configuration and management of more important data to be performed under tight control, while less sensitive data is managed by more people.

- **Safeguard the integrity of system information**
  In addition to protecting your data, Amanda Enterprise and its Windows Client and Agents protect the Windows System State, the Active Directory, the integrity of open files, and the integrity of metadata.

Conclusion

Protecting data, systems, and applications is no longer a choice; it is imperative for keeping your business running. As data expands and your budget doesn't, you need to perform backup and recovery operations in a reliable, cost-effective manner without impacting your employees' productivity or burdening your administrative staff.

Amanda Enterprise can meet all of your Windows backup and recovery needs—as well as Linux, Windows, and Mac OS X—with subscription fees that are up to 80 percent less than licensing costs of major competitive products. Amanda Enterprise reduces the cost and complexity of data protection.