

MICROSOFT EXCHANGE 2003

BEST PRACTICES - DATA STORAGE SETUP

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Microsoft Exchange Storage Best Practices



Data Storage Setup Microsoft Exchange Server 2003

E-mail has become a business critical communication tool

For many businesses today, e-mail has become a business critical communications tool, fundamental to success. IT professionals administering a messaging system must contend with a multitude of security threats, compliance regulations and the consequences of system failures.

Build a disaster recovery solution with VSS and Data Snapshots

Using an external storage hardware VSS provider for the Microsoft Volume Shadow Copy Service (VSS) can greatly improve backup management processes for Microsoft Exchange environments. VSS combined with data snapshots can form the basis of a very effective Exchange disaster recovery plan.

Volume Shadow Copy Service (VSS) - Explained

The Microsoft Volume Shadow Copy Service enables 3rd party backup tools to take point-in-time copies of application databases with transaction integrity but without the backup tool needing knowledge of the internals of each application. When a backup tool uses VSS to request a point-in-time copy of a working application such as Microsoft Exchange, VSS will very briefly freeze the application and ensure that all pending transactions are completed before instructing the storage hardware to initiate the point-in-time copy (snapshot). Applications can provide specific support for VSS through VSS Writers which control how data is set to a consistent state at the beginning of a VSS operation and maintain that consistency throughout the process. Where external storage is being used the storage hardware vendor must supply a VSS provider file which is used by VSS to coordinate the backup process between the application level VSS writer, the hardware layer VSS provider and the backup application.

Best Practices Brief - Data Storage Setup Microsoft Exchange Server 2003

Designing a Microsoft Exchange environment requires significant study and planning, ranging from Microsoft Active Directory service design to disk group configurations. When planning the storage strategy for Exchange, administrators typically should consider four criteria:

- Performance
- Availability
- Recovery
- Capacity

These factors affect the cost, architecture, maintenance, and disaster recovery of an Exchange environment. This best practices brief presents sample configurations and outlines some basic setup considerations. This document is not intended to be an installation and configuration guide for Microsoft Exchange Server, but rather a starting point to tune and optimize the storage system within the Exchange environment. For additional information about Exchange Server, refer to the Microsoft Exchange server product page. Go to:
<http://www.microsoft.com/exchange/default.mspx>

Microsoft Exchange Server 2003 Considerations

When planning for Exchange external storage, performance should be the primary focus, followed by availability, recovery, and finally capacity (capacity can typically be handled by adding larger disk drives). A system that follows this design methodology will generally meet user expectations. When combined with the R/Evolution architecture and careful planning, the Microsoft Exchange environment can be a powerful tool and make backup and recovery options much less painful. With advanced features such as scheduled snapshots, VSS, and the flexibility of the R/Evolution architecture, it can improve backup operations, reduce recovery time from hours to minutes, and increase performance.

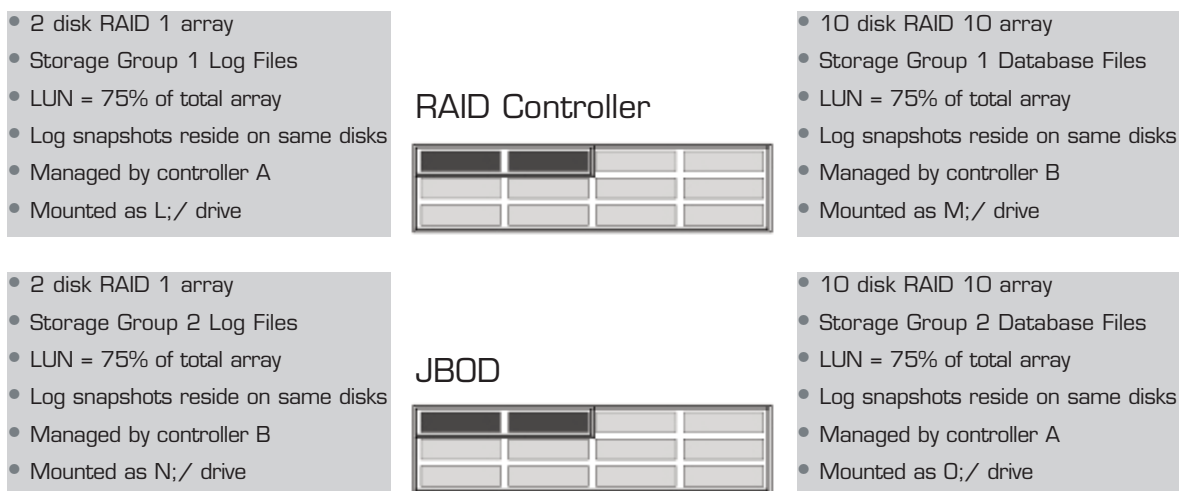
Data Storage Setup Microsoft Exchange Server 2003

Best Practices Overview

Best Practice Recommendation	Solution Benefit
Choose SAS 15K drives	15K RPM drive has one-third less rotational latency than a 10K RPM drive
Properly size the storage environment.	<ul style="list-style-type: none"> - A single storage module can support up to 1800 'Heavy' Exchange users - A 'Heavy' Exchange user is defined as one that sends 20 messages a day, receives 80, and has a mailbox size of about 1024MB.
Aligning Host I/O with RAID Striping	<ul style="list-style-type: none"> - Before formatting, run the diskpart.exe utility to align the sectors of all volumes - part of Windows 2003 Service Pack 1 support tools. - By aligning the sectors the physical and logical disks line up and eliminate inefficiencies
Create a single 2 disk RAID 1 array for log files	<ul style="list-style-type: none"> - RAID 1 provides the best performance and recovery options - Placing log files on different spindles than the database reduces disk contention
Create a single 10 disk RAID 10 array for database files	<ul style="list-style-type: none"> - RAID 10 provides the best performance and recovery options - Placing database files on different spindles than the log files reduces disk contention
Create two separate logical disks for each storage group, one for logs, one for database (for example drive 'L' and 'M'). Create the logical disk on the associated RAID set.	<ul style="list-style-type: none"> - By placing these on separate logical disks the storage group can be managed more efficiently - Backup and recovery operations can be run against a specific Storage Group
Create additional logical drive pairs for any additional Storage Groups that will be setup in the Exchange environment.	<ul style="list-style-type: none"> - Additional Storage Groups placed on separate logical disks can be managed as separate entities - Backup and/or recovery operations run against one storage group will not effect the others - A fully populated Exchange environment would have 8 logical drives, one pair for each of 4 Storage Groups
Balance I/O across the dual controllers of the storage system	<ul style="list-style-type: none"> - Strive to keep both controllers busy - Locate the database volume and its corresponding log volume on separate paths
Isolate Exchange volumes from other drive-intensive applications	- Sharing the storage with other applications might have a negative impact on Exchange performance
Implement a daily snapshot schedule	<ul style="list-style-type: none"> - A daily snapshot schedule provides instant access to any data that changed the previous day - In the event of database corruption, the affected database volume can be rolled back and the log file information replayed to recover the affected database up to the point in time where the error occurred
Implement a weekly VSS backup	<ul style="list-style-type: none"> - A weekly VSS backup schedule provides archival access to any data that changed over the past several weeks - Store the backup tape off-site - In the event of hardware loss, the entire database can be restored

Data Storage Setup Microsoft Exchange Server 2003

Best Practices Enclosure Diagram



Storage Sizing

When planning a new Microsoft Exchange Server implementation, it is critical to determine the total number of users in the configuration and the approximate user mailbox size before creating storage volumes. Without these values, you cannot accurately determine the amount of storage to allocate. Remember to allow for future growth in your calculations. From a capacity perspective those 12 drives, using 450GB drives, configured using best practice guidelines would typically support 1800 users with a 1024MB mail store and supply and provide an additional 20% unused space. For additional information about sizing a storage environment, refer to the Microsoft document, Mailbox Server Storage Design.

Go to: [http://technet.microsoft.com/en-us/library/bb123872\(EXCHG.65\).aspx](http://technet.microsoft.com/en-us/library/bb123872(EXCHG.65).aspx)

Storage Configuration: Aligning Host I/O with RAID Striping

Use the Microsoft Diskpart.exe utility to align the sectors of all Exchange LUNs prior to formatting. Microsoft provides the diskpart.exe utility as part of Windows 2003 Service Pack 1 support tools. For detailed steps about how to use Diskpart to align I/O with storage track boundaries, refer to the Microsoft document, How to Align Exchange I/O with Storage Track Boundaries.

Go to: [http://technet.microsoft.com/en-us/library/aa995867\(EXCHG.65\).aspx](http://technet.microsoft.com/en-us/library/aa995867(EXCHG.65).aspx)

Storage Configuration: Determining the Best RAID Level

Adding redundancy to your storage design is critical to achieving high availability. There are many RAID types; however, the three most common types used in server environments are RAID-1/0, RAID-5, and RAID-6. Based on the following table which compares these solutions on speed, space utilization, and performance during rebuilds and failures, RAID 10 is suggested for Exchange environments.

RAID type	Speed	Capacity Utilization	Rebuild Performance	Disk Failure Performance	Transactional I/O Performance
RAID 1/0	Best	Good	Best	Best	Best
RAID 5	Better	Best	Good	Good	Good
RAID 6	Good	Better	Good*	Good	Good

*Based on rebuilding 2 drives.

Data Storage Setup Microsoft Exchange Server 2003

Storage Group and Database Design/Layout

Locate all mail stores in a storage group on the same physical LUN. If desired you can place the mail stores in separate directories within the LUN. Make sure to place the Database file on LUN's associated with a 10 disk RAID 10 array set. Locate the log files associated with a storage group on a separate LUN. Make sure to place Log file data on LUN's associated with a 2 disk RAID 1 array set. Do not place multiple storage groups on the same physical LUN; use only one storage group per LUN. Remember to verify that your chosen LUN design can accommodate the required IOPS per storage group.

Recovery: Backup and Restore Factors

Proper design of an exchange environment is critical to backup and restore capability and directly impacts the length of time an Exchange storage group will be down. It is a best practice to implement both a daily snapshot schedule and a VSS backup schedule. If you plan on taking advantage of the snapshot functionality, create a schedule which supports one snapshot per day per volume, typically in the evening. This design allows you to snapshot and if necessary rollback single Exchange storage group with no performance impact or down time to other storage groups that might exist. If you plan on taking advantage of a VSS hardware provider to implement backups, design the LUNs to minimize impact to separate storage groups. Schedule the VSS backup to occur weekly. Each Exchange storage group should contain a single transaction log LUN and a single database LUN that are independent of other storage groups. This design allows you to back up and restore a single Exchange storage group with no performance impact to other storage groups that might exist.

Disclaimer

Due to the highly customizable nature of an Exchange environment, you must take into consideration the specific environment and equipment to achieve optimal performance from a R/Evolution storage system. Also note that many procedures within this document should be attempted only by experienced Microsoft Exchange Server administrators and trained storage specialists with intimate knowledge of the working environment.



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