Single-Mailbox “Brick Level” Backup/Restore

This document will outline the Pros/Cons of Brick Level Backup.

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Section 1 – What is Brick Level Backup/Restore

Brick Level

While there are several ways to back-up an Exchange Database, the most common method is an online backup which utilizes Exchange's built in backup features to create a secure backup. One alternate method is a backup of an individual user's mailboxes. This type of backup is called a Single Mailbox, or Brick Level Backup, and for the purposes of this document, the terms Brick Level and Single Mailbox Backup will be used interchangeably.At first glance, this seems like it would be one of the most important features in a backup, as this allows someone to maintain a select group of users to easily back-up and restore without touching the remainder of the user groups. As explained in this article, however, the negatives of performing this type of backup far outweigh the positives that can be achieved by making a few small changes in how one thinks about Exchange backup.

What is Single Instance Storage, and Why Does It Matter?

One of the most important features of a Microsoft Exchange server is its ability to create Single Instance Storage. In an older "POP" Mail-based system, if one member of a company sent an email with a 1 Mb attachment to twenty other people, that message would be populated on each of their systems, generating twenty copies of that message and increasing the mailbox store by 20 Mb. In contrast, by utilizing Single Instance Storage, all of the attachments sent withinthe company are stored in a single location, and each individual email simply contains a pointer to that one message, greatly reducing the overall size of the database. In the above example, the message would only take up 1Mb of server (and backup) space rather than 20 Mb.

It is easy to verify how well this is being utilized by the current Exchange installation by viewing the "MSExchangeIs" object in the performance monitor on the mail server, which gives the ratio of messages to mailboxes. This means that if the ratio is 2, then on average every message in the server is in two mailboxes. When this number reaches 1, Single Instance Storage is effectively no longer being used. As of Exchange 2007, messages themselves are not single-instanced anymore, but their attachments are, so before factoring Single Instance Storage into a backup routine, it is important to check just how much space is being saving. Particularly since the cost of backup media and hard drive space continues to plunge, many IT professionals do not believe that Single Instance Storage is important, but if this saves a company a considerable amount of space, then it is worth considering this as part of the company's Data Protection Plan.

Single Mailbox Backup

The first issue with Single Mailbox-based restore is that when backing up mailboxes, they need to be backed-up separately. Since each file only contains a reference to its attachments, when backing up an individual mailbox, individual files need to be backed-up as well since one cannot count on them being available in the server storage. As such, each mailbox that is backed-up to be available in Single Mailbox Recovery mode for most systems will end up resulting in a broken Single Instance Storage system, and the size of the backup will likely be quite larger than the original mailbox store. Furthermore, due to this process needing to be maintained on each mailbox, this means backups will also take considerably longer since each mailbox needs to be processed individually.

Additionally, Exchange keeps transactional logs which can be utilized to restore a damaged mailbox store even without using mailbox backups. It is common practice for backup software to purge these logs once a backup is complete. This provides an extra layer of data protection and helps to diminish the overall disk commitment needed by exchange (a transactional log keeps track of everything that happens in Exchange, which means it grows just as quickly as the actual database). Single Mailbox Backup can be problematic when determining when to purge transaction logs if one is not performing full backups as well. Backing-up the entire mailbox store is easier, more secure, and faster than performing Single Mailbox Backups.

It is also worth noting that unless performing a full backup in addition to Single Mailbox Backups, the Exchange Server itself will not be restorable - only specific mailboxes - which means that when planning to use this backup method, a normal, full mailbox backup also needs to be run in order to ensure data is adequately protected.

The Two Single Mailbox Backup Methods

There are two methods of Single Mailbox Backups generally being performed, and while neither is ideal, they are both explained here.

The first solution that many premium or Enterprise level software providers offer is via MAPI (Messaging Programming Application Interface). This method uses Exchange's built-in functions to talk to the Exchange Database, building a temporary version of the mailbox and then backing it up, which allows for later Single Mailbox restores. However, this method of backup is extremely slow, and as mentioned above, can create problems with the transaction logs. One will also need to utilize software capable of doing MAPI-based single mailbox backups, and in most cases this functionality has an added cost, usually on a per-mailbox level, which can be easily avoided by utilizing Microsoft's Best Practices.

The second method is a similar strategy that utilizes a built-in Exchange function called EXMERGE. There is an excellent article written by Daniel Petri found at http://www.petri.co.il/brick_level_backup_of_mailboxes_by_using_exmerge.htm which explains some of the perils with Brick Level backup and how to do a backup/restore using EXMERGE. This tool will export Exchange mailboxes to PST files, and is usually used when archiving mailboxes for long-term storage; however, mailboxes can also be exported to PST files, then backed-up and utilized later as restore points for a Brick Level restore. Doing this process will have the same issues mentioned above, but this method does not require the use of any backup software. It is worth noting, however, that EXMERGE uses an Outlook 2000 tool to perform this export, which means it only supports mailboxes smaller than 2 GB.

In both of these cases, the general backup time will be greatly increased. To adequately protect data, one needs to run a full backup, then back-up individual databases as well. Usually, it is recommended to do a full backup once a week, then incremental backups each day during the week. By doing this, however, one will still need to decide when and how often to back-up individual user's mailboxes on top of the normal restore. This process will add considerable time and complexity to the existing backup schedule. Another point worth considering is that while the total Time to Restore is important, a backup needs to be run on a nightly basis, and this time is just as valuable. Consider how much extra time and size is added onto the nightly backup by performing Single Mailbox Backups and assessing whether or not this is really worth the time it saves on a restore.

Section 2 – Single Mailbox Restore

MAPI/EXMERGE

The good news for someone with his or her mind set on doing a Brick Level restore is that the Restore is fairly easy by comparison to the Backup. When performing a MAPI backup of the system, select the Mailbox to restore and follow the steps to do so. With EXMERGE it is slightly more complicated, and this is handled in the document mentioned above.

Single Mailbox Restore Pros/Cons

The largest advantage of a single mailbox restore is that the total restore time is less than using the proper method, but the larger issue is that even if performing a Single Mailbox Backup on every one of the mailboxes in an organization, one would still be unable to use this backup in case of a total system failure. Furthermore, once having restored a single user's mailbox, normal backups that are being run are no longer valid. Since the shape of the database has greatly changed and there are no transactional logs to reverse these steps, oftentimes errors can occur if later restores need to be done on this database before a full backup is run. Usually, a quick review of the support sites of many companies offering Single Mailbox Restore will demonstrate that this feature tends to cause more database corruption than any other feature in backup software.

Section 3 – The Right Way, and Why

Exchange Backup

What should really be considered when thinking about a Mailbox level restore is whether or not the repair is needed. The majority of the time, a user has deleted an email and is requesting that it get restored, the other times can involve retrieving archived data or other miscellaneous situations that are unique to everyone's individual business.

The important first step in establishing a Disaster Recovery Plan is to realize that by utilizing Exchange's built-in Message Retention Policies, a user's deleted information can be kept on the servers indefinitely. By keeping an appropriately- sized window here, one can significantly reduce the number of requests for restoring deleted information that needs to be recovered from a backup.

Otherwise, full and incremental backups should be run as needed by the particular organization. Most major pieces of backup software on the market offer this functionality and will purge the transactional logs once the Information Store is backed up. Exchange 2010 has also implemented further steps to decrease the need for single mailbox backups/restores.

An article by William Boswell provides further information about Exchange's email retention. This is an integral part of a Disaster Recovery plan when setting up an Exchange Server. The article is found here:
http://searchexchange.techtarget.com/news/article/0,,sid43_gci1119804,00.html#

The biggest benefit to this backup method is that by comparison it is considerably faster than a MAPI backup of all users, and as a backup will likely be run on a nightly basis, this is usually the more important time, though obviously Recovery Time is still important as well.

Through utilizing proper Data Retention Policies, simple informational restores are possible without ever turning on backup software at all.

Exchange "Single Mailbox" Restore, the Right Way

The method prescribed by Microsoft for restoring a single mailbox is still fairly easy, though it is a slightly more time-consuming process . There is an excellent article about how to perform a single mailbox restore in Exchange 2003 hosted on Microsoft's site here: http://support.microsoft.com/kb/823176. Another an article tailored specifically to using the Exchange 2007 Recovery Storage Group can be found here: http://technet.microsoft.com/en-us/library/aa997694.aspx. The specifics for this process vary slightly depending on the version of Exchange being used, and the steps that follow are for Exchange 2007 which are (in broad strokes):

1) Go to the Toolbox section of the Exchange Management Console.
2) Select "Database Troubleshooter."
3) Select "Database Recovery Management."
4) Connect to the Exchange Server.
5) Create a Recovery Storage Group (RSG).
6) Load the backup software and perform a full restore to the RSG, as normal.
7) Mount the RSG Database.
8) Copy the mailbox from the RSG to the normal Information Store.
9) Unmount the RSG database and remove it.

This process can also be performed via command line, and a detailed walkthrough for this process for Exchange 2007 can be found at the link below:
http://www.msexchange.org/tutorials/Working-Recovery-Storage-Groups-Exchange-2007.html

Some Data Is More Equal Than Others

It is a fact of life that some mailboxes in an organization are going to be important for faster restore time than others, and general mailbox size may not be as important for every organization. If this is the case, there is still a better alternative to a "Module'"or MAPI- based Brick Level Backup which is utilizes the storage groups in the backup. Most backup software will allows one to choose which Mailbox Stores to recover. By separating users who may need "faster access" to their deleted data into a separate Information Store, the restore time for this store may increase while the overall integrity of the database is still maintained.

It is worth mentioning, however, that backing-up data with this method breaks the Single Instance Messaging between those stores, as each database maintains its own set of messages. Therefore, it is important to decide if faster recovery time or smaller amounts of storage are more important to the company. Many arguments for single mailbox restore are based on an incomplete view of what is really required. While a fast time to recovery is important, this can often still be reached without the greatly increased backup time from a Single Mailbox Backup.

When concerned about the impact that breaking Single Instant Messaging will have on a store size, one can check the ratio of Single Instancing that will occur in order to easily determine how much compression will be lost by moving these users to a new mailbox. It is quite possible that a backup broken up this way will still utilize less backup media than backing up an entire store as well as each single user backup a second time.

Section 4 – Fact and Fiction

Pros and Cons of Brick Level Restore

While Brick Level Mailbox Restore is often advertised as being critical, it is quite possible to accomplish the goals of a single mailbox restore by utilizing Microsoft's Best practices and other software which has already been purchased. This becomes even more important since usually a single backup client charges a monthly fee of roughly $1-$2 per mailbox for an Exchange Module. This reoccurring cost can quickly skyrocket the price of data storage which could be better spent increasing network storage or providing offsite backup for data.

The complaints about using the Microsoft approved method of "single mailbox restore" are generally that the process takes too long (while restoring an entire Exchange DB), and that this increases the need for additional storage (since enough space to mount the DB is needed). However, these are easily surmountable problems which do not seem to outweigh the benefits of performing the operation correctly.

By reducing IT costs, more money is available to pay Exchange Module costs for additional network storage, and while Recovery Time is important, by utilizing Microsoft's Deleted Item Retention policies, the majority of "mission critical" data can be accessed just by using proper planning. Furthermore, by working with the database in a Best Practices sense, one can be sure that there will be no issues with Transaction Logs or lost user data. The overall backup size is also greatly decreased since one is able to retain Single Instanced Storage instead of being forced to replicate an entire database a second time just to enable "Single Mailbox Restore."

As with most practices in the IT world, a balance between size and speed is required, but using Microsoft's Best Practices to back-up and restore mailboxes results in more reliable data, faster backup times, lower IT costs, and smaller backups. The best steps to take are to educate oneself, create a deployment plan, and test to see what changes can be expected from the software. When paying for Single Mailbox restore, consider how often this functionality is actually needed. Then create a test bed and perform a recovery using Microsoft's prescribed methods to see how much time will be saved over the course of a month by doing things the wrong way. Usually, the increased backup size, backup time, and database instability that result make it clear that it is more efficient to run backups and restores the right way.