



Up to 8 times Faster TSM Backups

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Tivoli Storage Manager (TSM) can be set up to do speedy backups and restore. Out of the box TSM will generally work on most hardware and will backup and restore data, but, as I showed one client recently, a little tweaking can improve throughput by a factor of eight.

Many things affect backup and restore performance. First, the TSM client and server must be capable of passing large quantities of data from the client disk, through the client machine, out on a network, through the server and onto the storage media. Each point along this path is a potential bottleneck.

For today's tech tip, we will examine the important performance related configuration parameters and tips for the client.

Communication Parameters

The simplest improvement can be the CommMethod. Use the fastest CommMethod available to the client. Shared Memory on UNIX will always be the fastest communication method on AIX clients which have a local TSM server. Named Pipes on Windows domains can be faster than TCP/IP.

Use LAN free or Server free if you can. SAN communication of data is more efficient than LAN and offers up to 2 Gb/sec rates.

If, as with most clients, the LAN is the only way, backup over the fastest LAN available. Some people even set up a separate Gigabit network just for backup (and restore). Make sure the network is properly configured and that there is no "Auto configure" set at either the client or at its switch/hub connection. "Auto" mode is notoriously unreliable and has been the root of many performance problems.



Set the TSM Options to Optimum Values

TCP Buffsize specifies the size of the TCP/IP communication buffer that TSM will use. You cannot make this value higher than the maximum that your OS allows. For speedy machines on speedy networks, this can be increased beneficially up to 512 kB.

TCP NoDelay tells TSM whether to immediately send every packet, or to instead, wait for the packet to fill completely. Generally, you want this to be YES.

TCP WindowSize specifies the amount of data that can be received before an acknowledgement is required. TCP sends out packets of data at a high rate, but each packet requires an acknowledgement. How many packets can be "in-flight" before an acknowledgement is received has a significant effect on performance. The default for TSM is 32, but, depending on the OS, the value can be increased up to 2048 kB. For Windows 2K clients, see the Microsoft knowledge base, article Q224829, for details regarding TCP features in Windows 2000. With the proper registry changes, Win 2K clients can be set up to the maximum.

TxnByteLimit specifies the amount of data that the client buffers into a single transaction (unit of work) before sending the data to the server. This works in conjunction with the TxnGroupLimit option on the server which specifies how many different files can be in a unit of work. Adjusting these parameters is vital for backups which may go directly to the tape if there are many small files. This is because the number of "units of work" for the server database is reduced, allowing more files/second to be transmitted. For most systems, the TxnByteLimit parameter should be set at 25600, but for systems using LTO drives (and possibly other drives such as DLT), TxnByteLimit should be set to 2079152. The TxnGroupMax on the server should be set to 256, the maximum.

Local Machine Parameters and Features

TSM has a few tweaks and features for optimizing the local client performance. The LargeCommBuffers option increases the memory buffer for data moving from disk to network. To make the best use of this, the OS must have its disk parameters properly tuned.

Journal Based Backups are offered on Windows clients. This option makes use of the Windows Index Service to keep track of changes to the disk. This eliminates the need for the TSM client to traverse the entire directory tree of each file system each time an incremental backup is run. This saves a large amount of time for systems with a large number of files where a portion of the files do not change often.

The Image backup option backs up the file system as a whole, not as individual files. This can be faster than backing up the individual files for systems with large numbers of small files. It also provides for speedy restores of such systems. Windows backup can be done "live" on Windows 2000 and XP clients. Tivoli provides an open file manager to facilitate this. On AIX clients, AIX logical volumes can be backed up "whole," but only if any file system on it is dismounted. Tivoli does not provide an open file manager for AIX.

A cheap way to speed backups is to NOT back up things which do not need backing up. The TSM Include and Exclude statements provide a way to manage this. These statements can be customized to the individual client and/or administered through TSM Server client Option Sets. The include/exclude list is also the way to control other TSM features such as compression control and encryption.

Just the parameter changes alone can get you the eight-fold improvement in performance. If you use the advanced features and some local disk and network tuning, your results will likely be even better.

Freebies

I have included some links to download the configuration files I use as my base. I have also provided links to some summary spreadsheets I maintain of the options where I collect tuning information. Enjoy!

[Windows Client Options File](#)
[Windows Include/Exclude List](#)
[AIX Server Options file](#)
[Windows TSM 5.1 Server Options spreadsheet](#)
[Windows TSM 5.1 Client Options spreadsheet](#)
[Windows TSM 4.2 Client Options spreadsheet](#)
[AIX TSM 4.2 Server Options spreadsheet](#)
[AIX TSM 4.2 Client Options spreadsheet](#)

References

Here is a list of URLs to help you in your own understanding of TSM performance

1. There is a list devoted to TSM. It can be contacted at <http://www.adsm.org>
2. Tivoli Performance Tuning Guide: <http://www.tivoli.com/products/solutions/storage/docs/tsm-tuning.html>
3. ADSM symposium at Oxford, September 2001: <http://adsm-symposium.oucs.ox.ac.uk/callfor.html>
4. Share proceedings, Nashville, March 2002: <http://www.share.org/proceedings/SH98/share.htm>
5. Manuals: <http://www-3.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html>

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