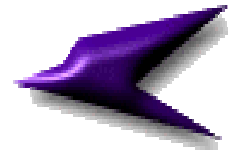


INFOTECH SA INC.

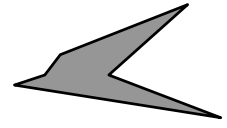


White Paper 2002



Tape Library Assessment

May 2002



TAPE LIBRARY ASSESSMENT

Acceptance Test Plan for Veritas NetBackup

Executive Summary

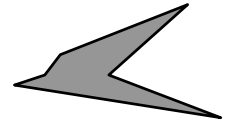
The U.S. Patent and Trademark Office requires an automatic tape library to backup high volumes of data. An assessment was performed on the ATL P4000, in comparison to the current HP Surestore. Not all tests performed on the ATL P4000 were conducted on the Surestore; a number of core tests defined further serve as baseline comparison.

Each test was conducted on both UNIX and NT platforms to determine the affects on performance. Each test used a HP-UX 11.0 Media server and Master server, as well as a Windows NT 4.0 Media server and Master server connected to the library. The table offers a comparison matrixes based on the tests conducted.

Test	ATL P4000	HP Surestore
True hot-swappable drives	Y	
Redundant Power Supplies	Y	Y
True hot-swappable power supplies	Y	
Successfully backs up on a single drive	Y	Y
Successfully backs up on multiple drive simultaneously	Y	Y
All other drive continue backups when a drive is powered down	Y	
All other drive continue backups during a drive failure	Y	
Maintains robotic control after drive failure	Y	

From the matrixes, it reveals the ATL P4000 is a notch above the Surestore in tests performed on 5 categories. In the test environment, the ATL library was observed to out perform the HP by almost double in average backup speeds, even though it was connected to a slower class server.





Hardware Specifications

ATL P4000

Background

The P4000 tape library comes equipped with high-availability and reliability, providing continuous access to business-critical information. The P4000 is offered with optional integrated Fibre Channel, Gigabit Ethernet, or SCSI interfaces and library management. With over 10 LTO™ Ultrium™ tape drives and 322 cartridges, the P4000 can reach performance up to 1.1 TB/hour and a capacity up to 70.8 TB. The expansion option allows P4000 system growth to over 500 TB of capacity or 6 TB/hour of throughput. In addition to providing all of the features and functionality desired for data center operations, the P4000 maintains a lowest total cost of ownership by being optimized to provide savings in service, installation, power consumption cooling requirements and floor space.

The loaner library used by PTO to conduct its performance testing included:

- 6 IBM Ultrium LTO drives
- 64MB Buffer on each Drive
- 322 Cartridges Slots
- 100/200GB Cartridges
- Single SCSI Bridge with a Fail-over Port

HP Surestore

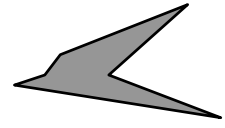
Background

The HP Surestore Tape Library 20/700 delivers high-end backup and restore where downtime is not an option. Its hot-swappable and redundant components provide for 24 x 7 operations. Its native capacity scales from 28 TB to 68 TB with a 20/700 configuration with HP Ultrium 230 drives.



The library, located on the 11th floor, used in testing includes:

- 10 HP Ultrium LTO Drives
- 32MB Buffer on each Drive
- 384 Cartridges Slots
- 100/200GB Cartridges
- Multiple SCSI Bridges



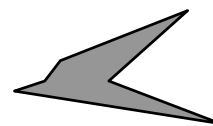
Comparison Data: (need to work data sheets in this section)

Data used as a baseline consisted of a single large file backed up several times over the course of three days to get a random sample from Protoss, an N-Class HP-UX 11.0 Surestore20/700 library. The ATL P4000 used L-Class servers, which are slower than the N-Class.

Speeds for the Surestore and P4000 are as follows:

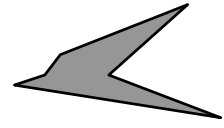
HP Surestore					
Test	Amount of Data (GB)	Total Time (min)	Average Speed (MB/sec)	Fastest Speed (MB/sec)	Slowest Speed (MB/sec)
Run #1	13.27	32	7.07	7.07	7.07
Run #2	13.27	33.5	6.76	6.76	6.76
Run #3	13.27	31.75	7.13	7.13	7.13
Protoss (All backups on a single drive)	39.81	97.25	6.98	7.13	6.76

ATL Netbackup Test Results (UNIX)						
Test	Amount of Data (GB)	Total Time (min)	Average Speed (MB/sec)	Fastest Speed (MB/sec)	Slowest Speed (MB/sec)	
All backups	778.86	1278.74	10.40	27.48	4.78	
Master	All Drives Running	60.35	157.75	6.53	21.98	5.00
	One Drive Running	309.76	586.34	9.02	10.78	5.00
	One Drive Powered Off	3.22	6.75	8.14	8.45	5.00
	One Drive Disconnected	6.44	13.00	8.45	9.16	5.00
Media	All Drives Running	63.57	80.25	13.52	21.98	6.47
	One Drive Running	314.59	408.00	13.16	21.98	6.11
	One Drive Powered Off	3.22	4.25	12.93	21.98	9.16
	One Drive Disconnected	6.44	5.00	21.98	21.98	21.98



ATL Netbackup Test Results (NT)						
Test		Amount of Data (GB)	Total Time (min)	Average Speed (MB/sec)	Fastest Speed (MB/sec)	Slowest Speed (MB/sec)
Master	All Backups	100.60	282.75	6.07	15.70	3.43
	All Drives Running	12.88	59.50	3.69	3.93	3.43
	One Drive Running	18.10	80.75	3.83	3.87	3.43
	One Drive Powered Off	8.05	37.25	3.69	3.93	3.43
	One Drive Disconnected	6.44	30.00	3.66	3.79	3.43
Media	All Drives Running	12.88	16.00	13.74	15.70	9.99
	One Drive Running	18.10	19.75	15.64	15.70	15.62
	One Drive Powered Off	9.66	10.50	15.70	18.32	13.74
	One Drive Disconnected	6.44	7.25	15.16	15.70	13.74

ATL/HP Performance Comparison					
Platform	Amount of Data (GB)	Total Time (min)	Average Speed (MB/sec)	Fastest Speed (MB/sec)	Slowest Speed (MB/sec)
HP Surestore	39.81	97.25	6.98	7.13	6.76
ATL P4000 (UNIX)	387.82	497.25	13.31	21.98	6.11
ATL P4000 (NT)	47.08	53.5	15.01	18.32	9.99



Problems/Observations

ATL P4000

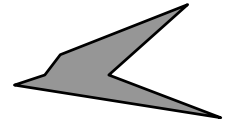
During testing several problems were encountered. When a drive would be powered off, during a backup, to simulate a failure, it would be unable to write an end-of-file marker on the tape. After powering it back on and placing the media back in the library, if that tape was requested again, it would down the drive and in two cases, it hung the library. The solution to this problem was to freeze the tape as soon as the drive was powered back on. In another instance when the drive was powered off to simulate a drive failure, the library became confuse and told NetBackup that drive #5, which had a different media in it, was backing up the to the media that was in drive #6 (the powered off drive). The library had to be rebooted along with the server.

In a few instances the drives were observed to exceed the specified performance rating, when a drive would be turned off. In on particular case the drive had a transfer speed of 21.98MB/sec compared to the rated 15MB/sec.

While in Robtest, a library diagnostic tool from VERITAS, an unload command does not need to be issued in order to eject a tape from a drive. This is important because sometimes the GUI interface stops working and this allows one to safely remove a tape from the drive without having to physically open the library and pull it out by hand.

HP Surestore

The HP Surestore 20/700 that is in the production lab has had several problems since the initial install. First, several of the servers could not recognize it until either the SCSI bridges were replaced or the firmware was updated on the bridges, drives, and libraries. Every so often the servers lose robotic control. This was mostly a single drive failure that takes down the whole library, but sometime it is caused by the SCSI bridge, that locks up. The loss of robot control is not only an inconvenience due to the loss of the night's backup, but typically the servers had to be rebooted before control could be restored (which is a problem with production servers). Since the drives are not hot swappable, the library's power must be recycled for the drive to go into service. With 4 20/700 libraries in production, there appears to be a drive failure every other week; thus the drives have replaced multiple times over the last few months.



Conclusion

Although the HP Surestore 20/700 is a decent library, the ATL P4000 far outshines it with features such as hot-swap ability of most of its components, fail-over hardware to maintain communication with the server in case of a network failure within the library, hardware to insure backups continue and robotic control is maintained when a drive goes down. Doubling the performance of the Surestore, while running off of a slower server, reveals how well the library was designed. The ATL P4000 would be an asset for any storage environment.