Dell PowerVault DL2000 Backup Performance

A Dell Technical White Paper

Dell PowerVault DL2000 Powered By Symantec

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Introduction

The Dell PowerVault ™ DL2000 – Powered by Symantec Backup Exec is a flexible, cost-effective backup solution for simple, manageable data protection.

This whitepaper evaluates the throughput performance capabilities of the PowerVault DL2000 in its two hardware configurations – Value Series and Performance Optimized[1]. With this information, the end-user will be able to accurately size their backup infrastructure to meet backup window requirements by scaling the number of DL2000s needed for their environment and by optimizing backup schedules and balancing backup workloads.

The PowerVault DL2000 Performance Optimized version was evaluated in a six (6) Gigabit Ethernet (GbE) port configuration and the DL2000 Value Series version was evaluated in both a six (6) GbE port and a two (2) GbE port configuration. The backup client system infrastructure consisted of a Microsoft® Exchange Server 2007 environment and a Microsoft® SQL Server® 2008 environment as illustrated in Figure 1 below.
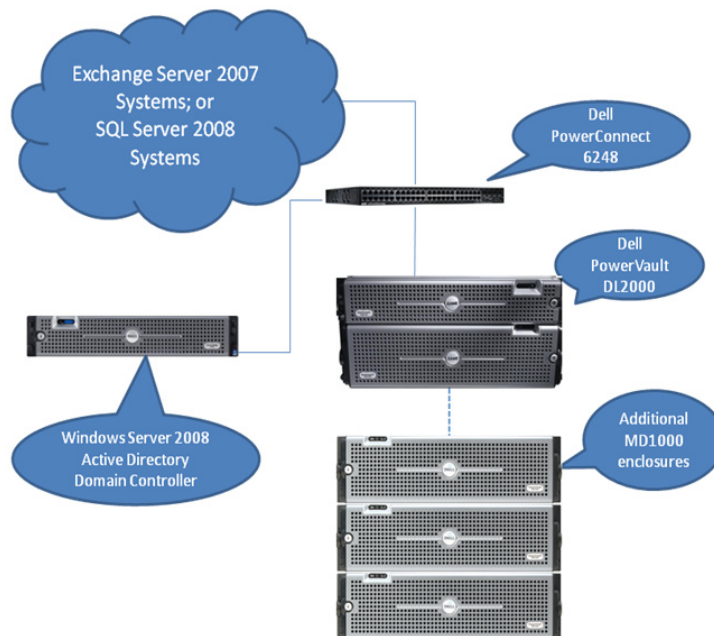

Figure 1 - Backup Infrastructure Environment

[1]*The DL2000 – Powered by Symantec also comes in four (4) different software editions but they have no impact on backup throughput, and hence are not compared in this whitepaper.*

The maximum backup throughput achieved for each of the three system configurations is summarized in the table below:

Configuration	End-to-end Effective Backup Throughput for Microsoft Exchange 2007 (GB/hr)	End-to-end Effective Backup Throughput for Microsoft SQL 2008 (GB/hr)
PowerVault DL2000 Performance Optimized with six (6) GbE ports	1833	2645
PowerVault DL2000 Value Series with six (6) GbE ports	1578	2218
PowerVault DL2000 Value Series with two (2) GbE ports	991	1403

These results provide an end-user with valuable data and insight for planning, sizing and using the DL2000 Backup to Disk Appliance within their IT infrastructure.

Test Setup

The test setup details are summarized in the table below:

Backup Solution	No. of MD1000 Enclosures[2]	Backup Type			Clients[3,4,5]
DL2000 – Powered by Symantec Backup Exec with Performance Optimized hardware and 6 GbE ports[1]	1	Standard	Software Compression	Software Encryption	6, 12 and 24 Microsoft Exchange 2007 clients with average Information Store size of approximately 36 GB
	2				
	5				
DL2000 – Powered by Symantec Backup Exec with Value Series hardware and 6 GbE ports[1]	1	Standard	Software Compression	Software Encryption	6, 12 and 24 Microsoft SQL 2008 clients with average database size of approximately 36 GB
	2				
	5				*Note: The 6, 12 and 24 clients were used for 1, 2, and 5 enclosure benchmarks respectively.*
DL2000 – Powered by Symantec Backup Exec with Value Series hardware and 2 GbE ports[1]	1	Standard	Software Compression	Software Encryption	
	2				
	5				

[1] The DL2000 NIC ports were set up in a Smart Load Balanced (SLB) team using the Broadcom Advanced Control Suite (BACS) with receive and transmit buffer sizes set to 1024. TCP Offload capabilities are not available to a team with heterogeneous network adapters. To enable TOE, configure the DL2000 with each GbE port assigned to a separate subnet. The Dell PowerConnect 6248 10/100/1000BASE-T Ethernet switch was used to connect the DL2000 with the client systems in a dedicated network environment.

[2] Each MD1000 enclosure contained 15 1TB 7.2K SATA disk drives and disk groups were automatically configured via the Symantec Backup Exec Storage Provisioning Option (SPO).

[3] The clients ran on Windows Server 2008 64-bit Standard Edition. Synthetic database load for the backup system clients was generated using the Microsoft Exchange Load Generation tool, version 08.02.0045.000 for Exchange clients and the RedGate SQL Data Generator version 1.2 for SQL clients.

[4] The size of the total backup set was sufficient to eliminate in-memory caching effects and maintain sustained performance through a 10 minute measurement interval

[5] Backups were performed in a homogenous application server environment, i.e. the environment consisted of only Exchange Servers or only SQL Servers). The Exchange Information Stores and SQL databases were backed up in a static environment, i.e. no transactional database activity was taking place during backup operations.

For the DL2000 - Powered by Symantec Backup Exec, the following additional configuration settings were used when performing backups:

- Each backup client system was configured as a separate backup job
- The maximum number of concurrent jobs per virtual disk was set to one (1).
- Consistency checks and backup verification were disabled on all backup jobs to minimize pre- and post-processing backup times.
- For Software Encryption backups, 128-bit AES keys were used.
- For Software Compression backups, Backup Exec's software compression feature was used. Note: For SQL 2008, the SQL Server 2008 Enterprise Edition software compression feature was disabled.

The next section provides a detailed summary of the throughput results obtained for Microsoft Exchange 2007 and Microsoft SQL 2008 clients respectively.

Results and Analysis

The figures below compare the end-to-end backup throughput results obtained for PowerVault DL2000 - Powered by Symantec Backup Exec with Microsoft Exchange and Microsoft SQL clients. The results compare systems with one (1), two (2) and five (5) enclosures for three (3) different backup types - Standard, Software Compression and Software Encryption.

Microsoft Exchange 2007
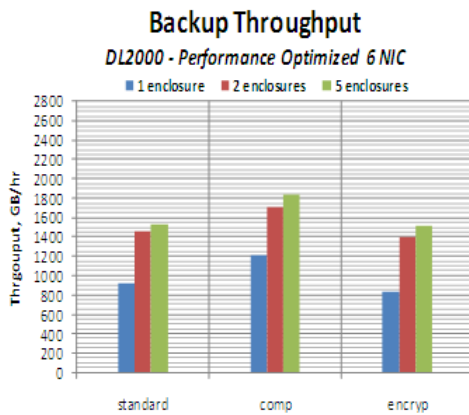
Microsoft SQL 2008
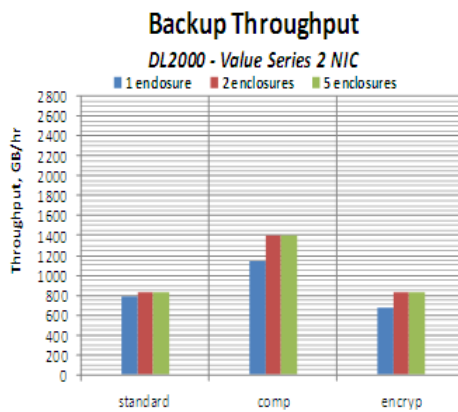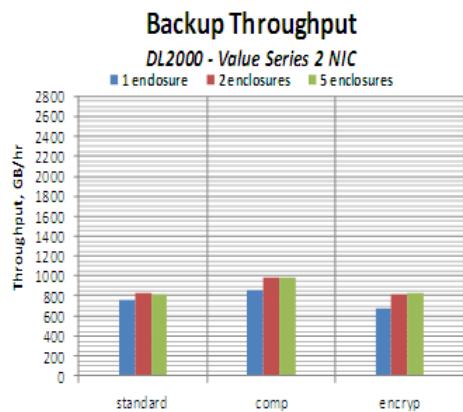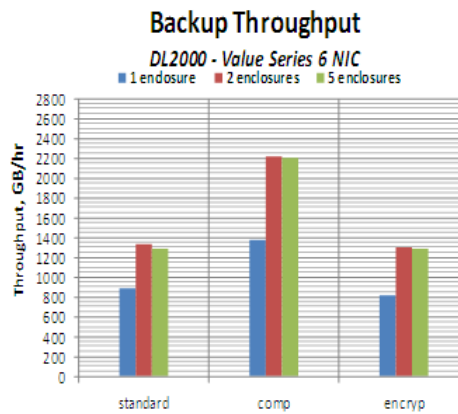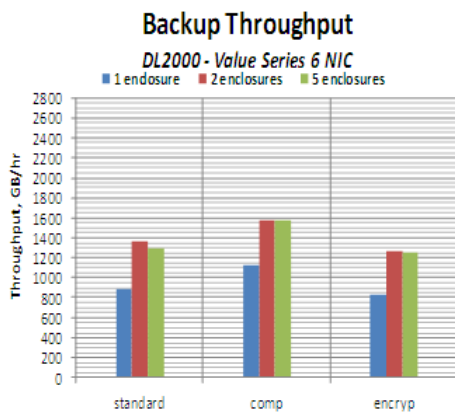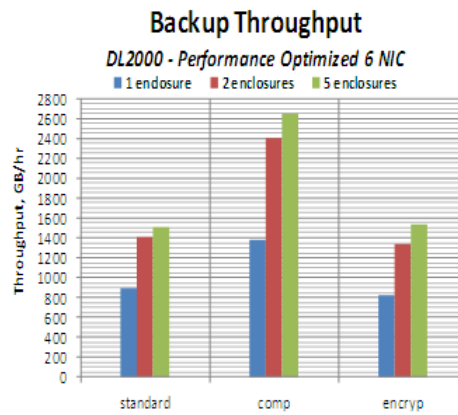
The maximum backup throughput achieved for each of the three system configurations is summarized as follows:

Backup Solution	Number of Backup client systems	Number of MD1000 Enclosures	Exchange Throughput[3] GB/hr	SQL Throughput[3] GB/hr
DL2000 Performance Optimized with 6 GbE ports	24	5	1833	2645
DL2000 Value Series with 6 GbE ports	12[1]	2	1577	2218
DL2000 Value Series with 2 GbE ports[2]	12	2	991	1403

[1] Adding clients beyond 12 reduced throughput due to processor limitations on the DL2000 Value Series.
[2] For DL2000 Value Series with two (2) GbE ports, throughput was limited by the two (2) GbE ports. Increasing the number of MD1000 enclosures and backup client systems had little to no effect on the backup throughput.
[3] Throughput was measured at each of the NIC ports of the DL2000 during a 10 minute interval of ingest. Values were adjusted by 4.3% to account for the Ethernet frame preamble, Ethernet header and TCP/IP Packet header overhead. Compression ratios were factored, where applicable in the aggregate throughput measurements to arrive at end-to-end effective throughput. Software compression ratios were 1.2 for Exchange and 1.7 for SQL.

As seen in the table above, backup throughput rates for the DL2000 Performance Optimized version with six (6) GbE ports were found to be up to 17% faster than DL2000 Value Series with six (6) GbE ports and up to 47% faster than DL2000 Value Series with two (2) GbE ports.

The following discussion analyzes the data gathered during the benchmark from three different perspectives.

Analysis by the Number of MD1000 Enclosures:

In general, going from one to two enclosures provided a significant increase in throughput. Beyond two enclosures the benefits were minimal. With the Value Series hardware, going beyond two (2) MD1000 enclosures resulted in a small decrease in throughput in a few cases since the processor became the limiting factor.

Analysis by number of GbE ports:

For the six (6) GbE port systems the backup throughput was never network limited. For the PowerVault DL2000 Value Series hardware with only two (2) GbE ports, backup throughput rates were network limited in all cases where there were two (2) or more enclosures. For the one (1) enclosure case, there were not enough clients to saturate the NIC bandwidth

Analysis by Backup Type:

Software compression and software encryption are performed by the backup clients and thus do not impact performance of the PowerVault DL2000 – Powered by Symantec media server. Software compression can however increase end-to-end effective backup throughput by reducing the size of the backup data before it is transferred from the backup clients, as demonstrated in the results above.

Note however that software compression and software encryption consume processor resources on the backup clients and can negatively impact end-to-end backup throughput if the clients do not have sufficient processing power.

Conclusion

The Dell PowerVault ™ DL2000 – Powered by Symantec Backup Exec provides a high performance, integrated backup-to-disk solution that fits into any data infrastructure environment.

Further Reading

Additional information about the Dell PowerVault ™ DL2000 –
Powered by Symantec Backup Exec can be found at

http://support.dell.com
www.dell.com/prosupport/mobility
www.dell.com/getprotectedandconnected