Dell PowerVault DL2000 Backup Performance

A Dell Technical White Paper

Dell PowerVault DL2000 Powered By CommVault

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Introduction

The Dell PowerVault ™ DL2000 – Powered by CommVault ® Simpana ® 8 is a high performance backup solution that is available in two bundled suites, the Advanced Deduplication Edition and the Standard Edition. The Advanced Deduplication Edition that comes with the Performance Optimized hardware is for customers that require the data reduction benefits of end-to-end block based deduplication. The Standard Edition that comes with the Value Series hardware is for value conscious customers that do not require all the features of the Advanced Deduplication Edition.[1]

This whitepaper evaluates the backup-to-disk performance of the DL2000 – Powered by CommVault ® Advanced Deduplication Edition and the Standard Edition with heterogeneous backup clients that consisted of seven (7) Microsoft Windows 2008 Files Servers and three (3) Microsoft Exchange 2007 Servers.

Effective throughput measurements of over 1.5 TB/hr* were achieved for both the Advanced Deduplication Edition as well as the Standard Edition. The results show that the DL2000 – Powered by CommVault ® offers a robust solution capable of delivering outstanding performance in both its bundled suites.

[1]The Advanced Deduplication Edition is required to enable deduplication on the DL2000 – Powered by CommVault ®.
** Based on Dell Labs testing using Commvault Simpana 8, SP1 in May 2009. Actual performance will vary based on configuration, usage and environment variability.*

Test Setup

The test setup details are summarized in the table below:

<table>
<tr><th>Backup Solution</th><th>Backup Type</th><th>Clients</th><th>Network and Storage</th></tr>
<tr><td rowspan="2">DL2000 – Powered by CommVault ® Advanced Deduplication Edition with Performance Optimized hardware</td><td>First Full Backup with Deduplication Enabled</td><td rowspan="5">- Seven (7) Microsoft Windows 2008 File Servers with average data set size of approximately 43GB[2]

-Three (3) Microsoft Exchange 2007 Servers with average Information store size of approximately 50GB[2]</td><td rowspan="5">-Dedicated Dell PowerConnect 6248 GbE Switch

-CommVault ® Simpana ® 8 Datapipe Interface Pairs were used to distribute traffic from the clients across the six (6) GbE NIC ports on the DL20003

-Disk groups for backup were configured using the Automatic Disk Group Configuration tool[4]</td></tr>
<tr><td>Weekly Full Backup[1] with Deduplication Enabled</td></tr>
<tr><td rowspan="2">DL2000 – Powered by CommVault ® Advanced Deduplication Edition with Performance Optimized hardware</td><td>First Full Backup with Deduplication Disabled</td></tr>
<tr><td>Weekly Full Backup[1] with Deduplication Disabled</td></tr>
<tr><td rowspan="2">DL2000 – Powered by CommVault ® Standard Edition with Value Series hardware</td><td>First Full Backup</td></tr>
<tr><td>Weekly Full Backup[1]</td></tr>
</table>

[1]The average incremental data size was approximately 2% for File servers and approximately 10% for Exchange servers
[2]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
[3]Refer to CommVault Books Online for instructions on how to setup Datapipe Interface Pairs
[4]The mount paths for the deduplication database (referred to as the deduplication store in Simpana Interface) and backup data were shared. Each deduplication database was placed in a mount path corresponding to a different disk group.

For the DL2000 - Powered by CommVault ® Advanced Deduplication Edition, the following general guidelines were used to configure deduplication for the primary storage policy copies:

- Specified the magnetic library mount paths for the deduplication database (referred to as the deduplication store in the Simpana Interface).
- Set the block level deduplication factor to 64K for storage policies that backup file data and to 128K for storage policies that backup databases
- Configured software compression and deduplication on all subclients associated with these storage policies
- Applied the Spill and Fill mount path allocation policy to the DL2000 magnetic library
- Confirmed that the Deduplication Performance Pack was installed on the DL2000

Refer to the "*Configuring Deduplication for High Performance*" whitepaper available on http://www.dell.com/dl2000 for additional information.

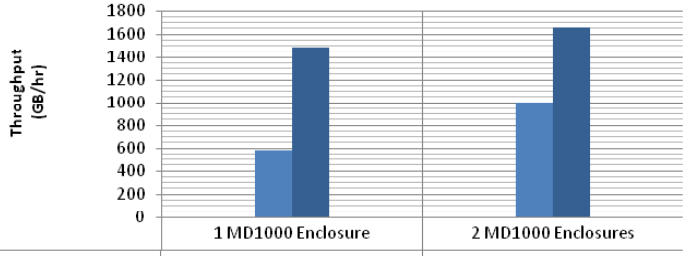
For the DL2000 - Powered by CommVault ® Standard Edition, default settings were used for all backups. Refer to CommVault Books Online for additional information.

Results and Analysis

Figure 1 and Figure 2 below compare the effective throughput measurements for First Full and Weekly Full backups on the DL2000 - Powered by CommVault ® Advanced Deduplication Edition utilizing one (1) and two (2) MD1000 enclosures. Figure 3 below compares the effective throughput measurements for First Full and Weekly Full backups on the DL2000 - Powered by CommVault ® Standard Edition utilizing one (1) and two (2) MD1000 enclosures.

Backup Throughput[1]

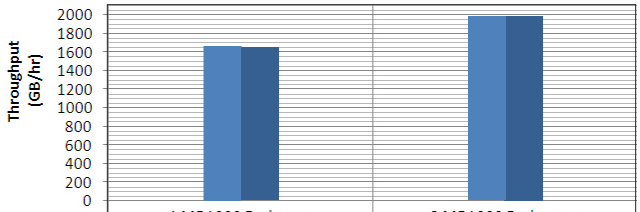
DL2000 - Advanced Deduplication Edition



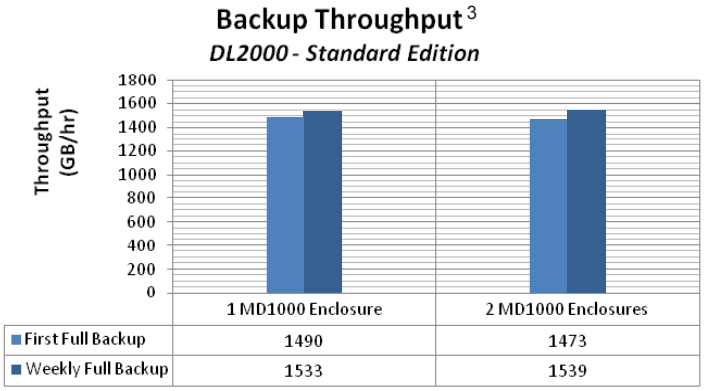
	1 MD1000 Enclosure	2 MD1000 Enclosures
First Full Backup with deduplication enabled	586	1002
Weekly Full Backup with deduplication enabled	1497	1669

Backup Throughput[2]

DL2000 - Advanced Deduplication Edition



	1 MD1000 Enclosure	2 MD1000 Enclosures
First Full Backup with deduplication disabled	1674	1989
Weekly Full Backup with deduplication disabled	1659	1994



As seen in the charts above, effective throughput measurements for the DL2000 Advanced Deduplication Edition with Performance Optimized hardware performing Weekly Full backups with deduplication enabled were consistently 1.5 TB/hr or above. Effective throughput for First Full backups for the DL2000 Advanced Deduplication Edition were ~600 GB/hr and ~1 TB/hr for one (1) and two (2) MD1000 enclosures, respectively.

With deduplication enabled, First Full backups (e.g. when performing the first backup or when performing a backup after sealing the deduplication store) have lower effective throughput than Weekly Full backups due to the overhead of seeding the deduplication engine. For both Weekly Full and First Full backups, effective throughput for two (2) MD1000 enclosures is higher than one (1) MD1000 enclosure. This is because the number of disk spindles shared between the deduplication store and the backup data is larger, and hence the I/O contention between the deduplication store and the backup data is reduced.

Effective throughput measurements for the DL2000 Advanced Deduplication Edition with Performance Optimized hardware with deduplication disabled were ~1.6 TB/hr and ~2.0 TB/hr for one (1) and two (2) MD1000 enclosures, respectively.

[1]Throughput was measured at each of the six (6) NIC ports of the DL2000 during a 10 minute interval of ingest. Compression ratios were factored in for the aggregate throughput measurements to arrive at end-to-end effective throughput.

Effective throughput measurements for the DL2000 Standard Edition with Value Series hardware performing both Weekly Full and First Full backups were consistently ~1.5 TB/hr, with two (2) MD1000 enclosures providing marginally better effective throughput than one (1).

With deduplication disabled, the DL2000 Advanced Deduplication Edition with Performance Optimized hardware outperforms the DL2000 Standard Edition with Value Series hardware due to its superior processor and memory capabilities.

Conclusion

The Dell PowerVault ™ DL2000 – Powered by CommVault® Simpana® 8 provides a high performance integrated backup-to-disk solution that fits into any data infrastructure environment. By incorporating deduplication as a feaure in the software into the backup environment, the need for dedicated deduplication target appliances is eliminated and long term operational savings can be achieved.

Further Reading

The Dell PowerVault ™ DL2000 – Powered by CommVault ® Simpana ® 8 Advanced Deduplication Edition delivers block-level deduplication as part of an end-to-end backup solution. Additional information about the deduplication feature of CommVault Simpana 8 can be found by visiting http://documentation.commvault.com/dell and clicking Simpana --> Features-Support Information --> Deduplication.