storwize™
an IBM Company

Case Study
Chip Design

Performance of the IBM Storwize Compression Solution in the Chip Design Industry

The IBM Storwize appliance achieved an average compression ratio of 66%, reducing the company's stored data to under 2TB, which was less than a quarter of its available storage. The company was able to post-pone the acquisition of additional disks by at least 2.5 years.

Customer Profile

This innovative engineering shop specializes in the design and manufacture of VLSI chips for real-time applications. The company has approximately 1,000 employees of whom 150 are simultaneously online at peak time.

The company uses the following IT and storage configuration:

IT and storage system specifications

Hardware	Approximately 30 Intel-based servers, Intel-based Windows (80%) and Linux (20%) workstations
System	Windows 2000/2003; Red Hat Linux WMware ESX running engineering virtual machines
Storage unit	NetApp FAS940c
Total storage	10TB
Types of data	Chip design software (Linux) Software development (Linux and Windows) Finance and administration software, MS Office, HTML, txt, and jpg for end users

The Challenge

Anticipating future growth in storage requirements, the chip maker was considering expanding its storage capacity from 10 to 15 TB. After analyzing the cost of this expansion and the time it would take to complete the necessary installations, configurations and migration, the company decided to explore the possibility of delaying this action by a year or two, by implementing an enterprise-wide data compression scheme.

The objectives of the chip maker were:

- Double the storage capacity using the installed storage hardware
- Delay a time-consuming migration project
- Implement a compression solution without disrupting business or IT operations
- Ensure that the compression solution is entirely transparent to users, applications, databases, storage and network environments
- Ensure that the compression system requires no workflow changes, no software agents, and no additional drivers

Highlights

The Customer.

An engineering shop specializing in the design and manufacture of VLSI chips for real-time applications.

The Challenge.

Delay the acquisition of additional disks by two to three years.

The Solution.

The IBM Storwize appliance.

Key Benefits:

- More than double the online storage space
- Slight performance improvement
- Transparent operation
- No change in workflow
- CPU utilization of the NetApp dropped from 45% to about 15%.

The Solution

To meet this objective the chip maker installed the IBM Storwize appliance to compress all its chip design, software development, back office, and end user data. The challenge before the IBM Storwize appliance was to achieve an overall reduction in the actual space occupied by the company's data of more than 60%, thereby giving the chip maker two additional years before it would be necessary to add new storage.

The Installation Process

Less than one hour after having been delivered to the chip maker, the IBM Storwize appliance was installed, configured, and ready to go. After a half-day training session, the chip maker's IT personnel were fully equipped to maintain and troubleshoot the unit.

Compression Rates

The following table summarizes the compression rates achieved by the chip maker for the various types of data it compressed with the IBM Storwize appliance:

Data type	Raw data (TB)	Compressed data (TB)	Compression rate (%)
Chip design data	3.2	1.06	67
SW development	1.2	0.34	72
Back office data	0.6	0.23	62
End user data	0.8	0.35	56
TOTAL	5.8	1.98	66

The IBM Storwize appliance exceeded the target compression rate in every category of data and achieved an overall space saving of 66%, reducing the total size of the company's stored data to under 2TB, which is less than a quarter of its available storage capacity.

Performance

Users noted the following changes in performance:

- Slight performance improvement for chip design applications and software development
- No changes in response for MS Office and back office applications

NetApp workload statistics performed before and after installation of the IBM Storwize appliance confirmed the changes experienced by users. The tests used two TAR files of 300MB and 600MB, consisting of CAD files, documents in a variety of formats, and spool files. The files were written to storage and read back before installation of the IBM Storwize appliance. After installation of the IBM Storwize appliance the files were compressed and written to storage, then read and uncompressed. The following parameters were measured:

- CPU utilization of the NetApp
- Disk-writing operations
- Disk-reading operations

The NetApp was sampled every 4 seconds using the Sysstat command from the NetApp command line interface.

The following charts show results before installation of the IBM Storwize appliance (blue line) and after (orange line).

The charts show a dramatic improvement in disk-write operations after installation of the IBM Storwize. Both files were compressed by 68%, and write time dropped for both from 85 to 70 seconds. At the same time, CPU utilization of the NetApp dropped from an average of 40% to about 20%, and disk-write load dropped by half, from an average of 15KB/s to 7.5KB/s. For disk-read operations end user response time remained about the same, but the workload of the NetApp was lightened considerably. Overall read time for the two files was reduced slightly, from 60 to 58 seconds, CPU utilization of the NetApp dropped from an average of 45% to about 15%, and disk-read load dropped from an average of 20KB/s to 7.5KB/s.

Financial Outcomes and Benefits

The dramatic reduction in storage requirements as a result of compression with the IBM Storwize appliance has produced a range of financial benefits for the chip maker. Some of these are direct savings resulting from delaying the planned purchase of new storage. Others are indirect benefits that follow from avoiding the ancillary expenses associated with added new storage, the attendant configuration, and the migration processes. Finally, and no less important, the instantaneous gain in storage made possible by the IBM Storwize appliance has had a beneficial effect on the company's time-to-market performance by avoiding the delays inherent in the long data migration process.

Capital Expenditure Avoidance and Roi

An ROI calculation was invoked to measure the savings achieved. The following assumptions were made:

1. Base storage size of 10TB.
2. Annual compounded storage growth of 45%.
3. Average price of $10K for 1TB of NetApp storage.
4. Average compression rate of 65%.

A conservative ROI calculation demonstrated savings of $180K over the next 3 years, $37K of which is realized immediately.

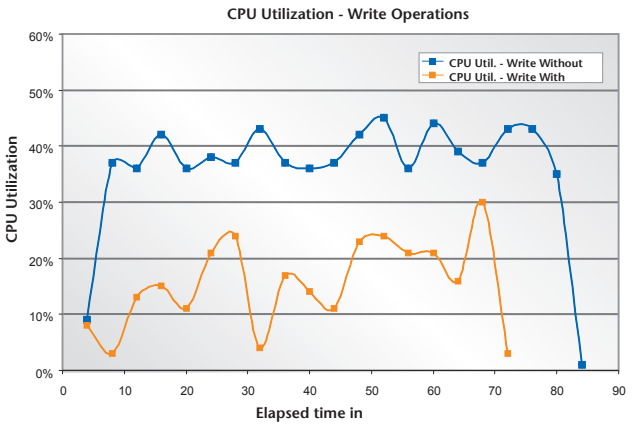
Additional Benefits

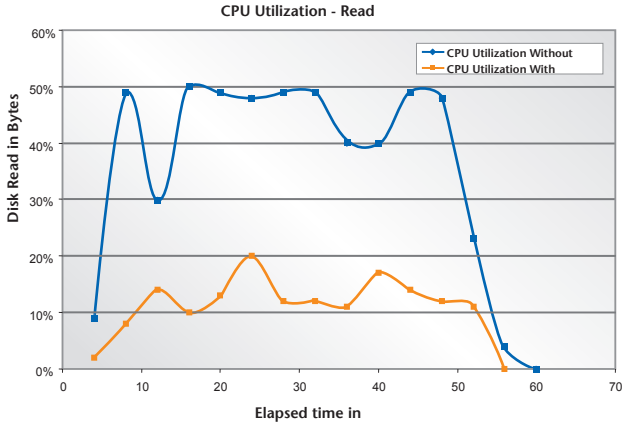
Additional benefits include savings both in direct expenditures and in the workflow of a wide range of IT operations such as:

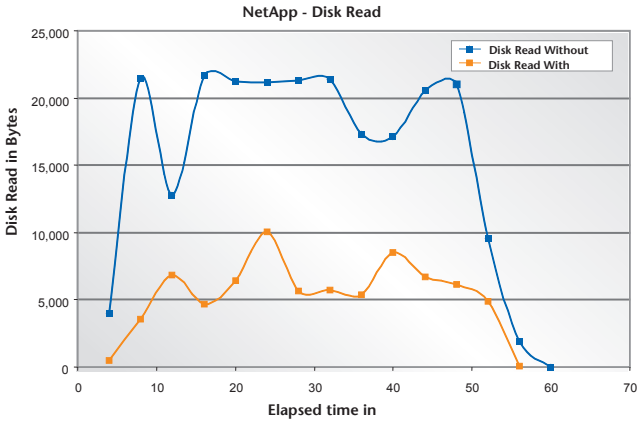
- Shortening the backup/restore window when performing tape backups. Naturally, the restore cycle is shortened correspondingly.
- Saving expensive floor space in the computer room as well as power and air-cooling.
- Enhanced ability of the IT staff to provide storage space almost immediately for new applications (especially space-consuming data warehouse applications).
- Reduced load on Remote DRP backups.
- Fewer units to manage service and support.

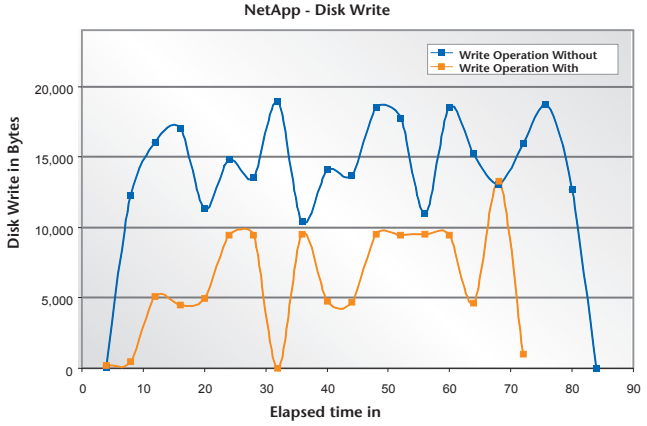
Summary

With an overall gain of 66% in storage space, the total size of the company's stored data was reduced to under 2TB, which is less than a quarter of its available storage. This achieved the company's stated objective of postponing the addition of new storage by at least 2.5 years.









About IBM Storwize

IBM Storwize provides on-line storage optimization through real-time data compression, delivering dramatic cost reduction without performance degradation. Based on the IBM Storwize's Random Access Compression Engine (RACE), IBM Storwize appliances transparently compress storage by up to 80% without changes in performance, storage, applications, networks, or processes. RACE ensures that IBM Storwize appliances deliver real-time, random access, deterministic, and lossless data compression, maintaining reliable and consistent performance and data integrity. IBM Storwize helps slow the growth of storage acquisition and related storage life-cycle costs, including reducing the amount of storage to be managed, powered, and cooled. IBM Storwize, optimize without compromise.

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