

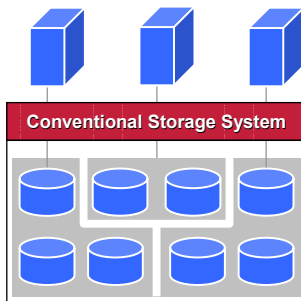
STORAGE MANAGEMENT BUILT RIGHT IN

Storage Center Core software suite provides essential storage features that have been traditionally offered only as add-on modules by storage vendors to increase performance and ensure availability.

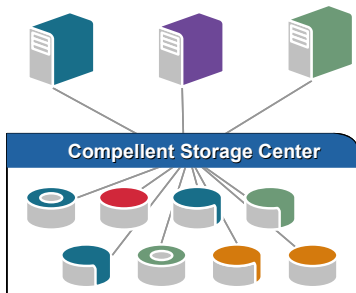
COST-EFFECTIVE PERFORMANCE THROUGH POWERFUL STORAGE VIRTUALIZATION

Compellent's Storage Center Core employs industry leading virtualization techniques for maximum functionality, performance, and recoverability.

Using a block-level approach, Compellent's virtualization accelerates databases, file-server storage, or any application requiring block I/O.



Conventional storage systems assign a subset of disks to each server using homogenous disks



Compellent Storage Centers' virtualization employs full disk parallelization across heterogeneous servers and disks

Capabilities

- Intuitive, wizard-driven functionality for all storage operations
- Advanced virtualization for straightforward, easy-to-execute storage operations
- Web-based interface allows access from any browser
- Heterogeneous OS support
- Sophisticated RAID algorithms tie directly to virtualization
- Multi-threaded read-ahead, mirrored write cache
- Full mapping and zoning
- User profiles for easy administration and security

Benefits

- Utilize all disk resources all the time for maximum efficiency
- Single software implementation for all disk and server interconnect technologies minimizes additional training
- Remote management enables administration from anywhere
- Maximize performance with disk parallelization, cache, and N+1 controller architecture

CORE FEATURES

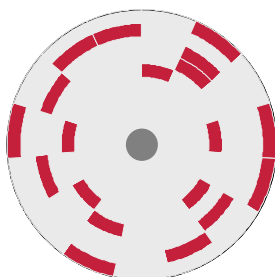
Compellent's Storage Center Core software provides all of the following features in a single product:

- **Virtualization** allows efficient utilization of storage resources by managing disks as a single pool and presenting disk resources to any server
- **Cache** boosts overall performance and availability through multi-threaded read ahead and mirrored write cache
- **Boot from SAN** allows servers to boot from the SAN eliminating internal drives
- **Copy-Mirror-Migrate** – Copy and migrate volumes without impacting users across different disk types, RAID levels, or storage enclosures
- **Data Prioritization** assigns service levels to individual servers, volumes, or disk folders, ensuring the highest performance for key resources
- **Heterogeneous OS** supports any number of simultaneous operating systems
- **Unified User Interface** streamlines administration by providing enterprise level functionality through a common intuitive user interface for all software applications

FULL I/O CONTROL FOR MAXIMUM DISK EFFICIENCY

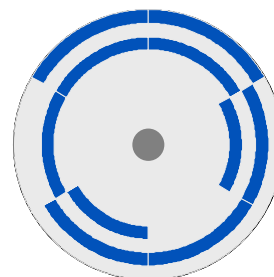
Conventional Approach

- Random data placement
- Elongated seek times



Compellent Approach

- Efficient data placement
- Faster seek times



CONFIGURE VIRTUAL VOLUMES BASED ON YOUR REQUIREMENTS

Compellent's virtualization engine employs a set of unique core algorithms that continually maximize disk resources while offering the utmost configuration flexibility. Specifically, the virtualization engine removes limitations of physical drives by aggregating them into logical, virtual volumes.

Conventional drive	Compellent Virtual Volume
▶ Fixed size	▶ Any size
▶ Fixed performance	▶ Any performance
▶ No time awareness	▶ Time aware
▶ Fixed interface	▶ Any interface
▶ No fault tolerance	▶ Fault tolerant
▶ No security	▶ Secure

The net result is a restrictionless system that enables you to configure virtual volumes based on your requirements rather than accepting preset volume characteristics.

STORAGE CENTER CORE

CORE

Architectural Highlights

Feature	Details	Benefits	Others typically
Block-level virtualization	Create high performance, redundant, secure virtual volumes of any capacity with any combination of disk drives	Disk drives managed as a single resource for greatest storage performance, availability, and utilization	Create volumes based on fixed groups of disks
Full disk parallelization	Write virtual volumes to the entire disk pool, or any subset of the disk pool	Parallelizing volumes across all drives increases IOPS and reduces hot spots	Stripe volumes across a limited subset of drives
RAID 0, 10, 5	Best-in-class RAID algorithms built in to virtualization <ul style="list-style-type: none"> RAID 10 across 2, 3 or more drives RAID 5 across any increment of 3 or more drives RAID 5 adjustable parity (3, 5, or 9) 	Flexible RAID algorithms boost performance and availability <ul style="list-style-type: none"> Eliminate configuration constraints N-spindle RAID 5 for higher performance Attain greater usable capacity with adjustable parity 	Limit the RAID configurations <ul style="list-style-type: none"> RAID 10 only across pairs of drives RAID 5 only across 5 drives Do not adjust parity
Hot sparing	Heterogeneous sizes <ul style="list-style-type: none"> A single large drive can fail over multiple smaller drives N hot spares Minimal performance impact Flexible rebuild priorities 	Removing drive constraints provides more choices for hot spares <ul style="list-style-type: none"> Rebuilds are faster since only data written, not allocated, is rebuilt 	Fix the hot spares per drive group or cabinet, and <ul style="list-style-type: none"> Limit the number of hot spares Suffer performance impacts during rebuild
Multithreaded read-ahead, mirrored write cache	Cache simultaneously stores and processes multiple data streams and reorganizes each individually Write cache can be mirrored across N storage controllers Battery-backed for resiliency	Multithreaded read-ahead cache boosts overall read performance Mirrored write cache guarantees high availability and recovery and also boosts performance	Cannot process multithreaded data streams Do not have battery backed, mirrored cache
I/O Concatenation	Condense two or more contiguous requests into one	Minimizes disk revolutions to improve system performance	Cannot concatenate I/O requests
Elevator sort	Automatically sort and send in-sequence requests sequentially to disk	Disks spend more time sending data than seeking data, increasing performance	Cannot sort commands, or use a restricted queue for elevator sorts
Flexible tagged command queuing	Send multiple commands simultaneously to disk	Remove the need for individual command acknowledgement and boost performance	Do not support tagged command queuing
Copy Mirror Migrate	Migrate volumes across different disk types, RAID levels, or storage enclosures	Copy and migrate volumes without impacting users	If available, provided as an extra cost item
Data Prioritization	Assign priorities to individual servers, volumes, or disk folders	Ensures optimization of key system resources	Cannot provide data prioritization
Heterogeneous OS support	Support any number of operating systems on a single Storage Center simultaneously	Dramatically reduce storage spending through consolidation	Limit the number of simultaneous operating systems on a single controller
Boot from the SAN	Create volumes with LUN 0	Enable diskless servers to share storage and boot from the SAN	Require servers to boot from internal storage

