

Storage and the Modern Data Center

The modern data center is built around three core principles: massive scale-out; optimal power efficiency; and flexible software-defined orchestrations of both physical and virtual resources. One of the biggest challenges for the modern data center is how to provide massive scale-out capabilities in the storage architecture. Together WDC and Caringo are breaking the traditional rules of storage to deliver an innovative answer to one of the most challenging questions facing the modern data center - how to provide storage that is always scalable, available, accessible and secure on a cost effective basis to a global market of consumers and enterprises.

The Never Ending Appetite for Storage

According to IDC, the volume of stored data will grow from 7 Zettabytes (ZB) to over 40 ZB by the year 2020.¹ A Zettabyte is 10^{21} bytes of data. Over 90% of this new data will be unstructured data for video, pictures social media and storage objects.¹ This equates to roughly 1TB² of data for every person alive today growing to roughly 5TB person by 2020 as the world population approaches 8 billion people. This data is the currency of the new information driven economy and as the currency of this new economy, people, companies and governments are implementing regulatory requirements with the expectation that all data will be stored and available in perpetuity.

Access Intensity for the Information Economy

In our information economy, data lives in three main phases. The first phase is an active state when the data is created and experiences a high intensity of access for millions of purposes. This phase is typically under 90 days in duration, and is when 90% of the lifetime access demand occurs. The second phase is the passive state where the data is shared, repeated and accessed for social media and business needs that typically last up to one year for reporting and regulatory purposes. The third phase is the cold storage state; this is the longest phase and can last for decades. A few examples of cold storage are long term photo storage, medical records, or email archiving for legal purposes – these all need to last a lifetime or longer. What this means is that modern hyperscale data centers have to build a new kind of tiered storage solutions that can scale-out for zettabytes of capacity on a very cost effective basis so data can be available whenever and wherever you want.

Cold Solutions for Modern Data Centers

WDC and Caringo are working to build solutions for cold storage to meet the requirements of modern data centers to optimize access performance, capacity, power, utilization, data protection and business cost objectives. Every bit of storage and watt of power count in the long life cycles of cold storage implementations. This means that storage management and devices have to work together with a shared purpose. That is exactly what WDC and Caringo have done, resulting in a solution with four main goals in mind:

1. **Scale-Out Storage** – Caringo's Swarm™ Architecture and WDC's new power optimized AE drives combine to build massive cold storage solutions that can scale into the Zettabytes with optimized data pathing to reduce access times. WDC AE drives feature IntelliSeek™ which utilize

1 – EMC/IDC, Digital Universe Study, December 2012

2 - <http://www.worldometers.info/world-population/>

specific cold storage read/write algorithms to reduce delivery times, as well as integrated caching and load balancing to improve the user's access experience.

2. **Optimized Power Management with 70% Savings** – Together WDC's new AE drives and Caringo's Darkive™ feature provide one of the most efficient power management options for cold storage systems. WDC's AE drives feature reduced media speeds to optimize power per byte on an atomic level. The Darkive software uses Caringo's patented adaptive power conservation to spin down drives that are not being accessed. These innovative capabilities combine to provide power saving up to 70% vs. traditional storage solutions.
3. **High Availability Cold Storage** – WDC's uses 3D Active Balance Plus™ technology to improve overall drive performance and reliability. Hard drives that are not properly balanced may cause excessive vibration and noise in a multi-drive system, reducing the hard drive life span. Caringo's Elastic Content Protection™ combines automated management of replication and erasure coding (definable per object) to provide continuous integrity checks, and both passive & active recovery to ensure that data is always available with lower infrastructure cost than tradition RAID solutions.
4. **Maximize ROI with AE Drive Progressive Capacity** - WDC's new Progressive Capacity™ HDDs allow customers to realize incremental capacity gains due to manufacturing process improvements the hard drive model's lifecycle. By utilizing a drive's native capacity (vs. a fixed target drive capacity), customers can get more capacity-per-drive, more capacity-per-volumetric space, and reduced power per capacity unit. WDC's innovative Progressive Capacity model allows distribution of these incrementally higher capacity models, taking advantage of their full capacity up to 6.5TB. This variable approach to drive capacity can deliver Exabytes of new capacity for the same cost as fixed capacity systems, improving cost per GB by XX% and power per GB by xx%.

						Power Savings
		Standard enterprise HDD	WD Ae HDD	Standard enterprise HDD	WD Ae HDD	
100% operation	Drives (watts)	10,863	6,830	5,068	3,187	68%
	Chassis (watts)	2,640	2,640	1,200	1,200	
	Total	13,503	9,470	6,268	4,387	
						81%
75% operation	Drives (watts)			3,168	1,992	
	Chassis (watts)			600	600	
	Total			3,768	2,592	
						95%
10% operation	Drives (watts)			634	398	
	Chassis (watts)			300	300	
	Total			934	698	



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