



*Where IT perceptions are reality*

# 5 Year TCO Case Study

**250TB of Archive Storage**  
Growing 25% Per Year

## Featured Products

EMC Unity 300

Red Hat Enterprise Storage

NetApp FAS2554

VMware Virtual SAN 6

IBM v5010

Scality RING

SUSE Enterprise Storage 4

# TCO Case Studies



## TCO Case Studies

IT professionals know the cost of owning servers, networking and storage equipment is more than the purchase price of the hardware. The total cost of IT equipment also includes installation, software licenses, service, support, training, upgrades, and other costs related to a specific product or situation.

TCO case studies are designed to provide busy IT Pros with vendor-independent data about the total cost of specific products. This case study examines eight comparably-equipped enterprise storage solutions: four from various disk array vendors, and four from software-defined storage vendors. It turns out one of the vendors stands-out with lower TCO based on industry standard hardware and attractively priced software licenses with support included.

Read the rest of this report to find out who it is. Hint: It isn't VMware!

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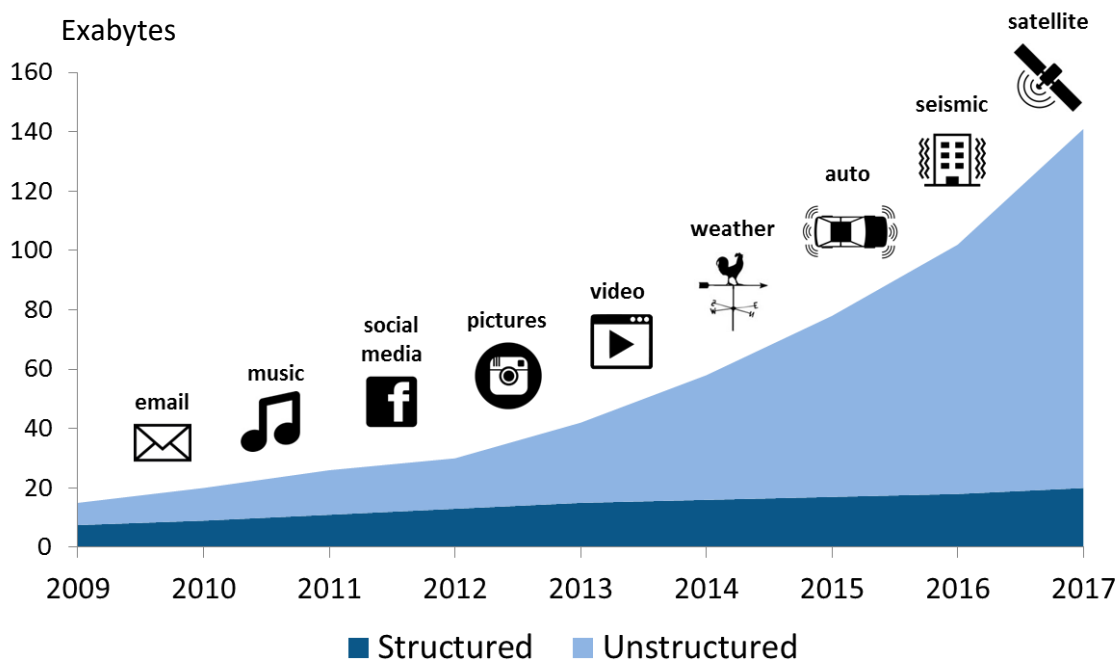
# The Requirement



## Industry Trend: Rapid Growth of Large Data

Unstructured data refers to information that typically doesn't reside in a traditional row-column database. Examples include e-mail messages, word processing documents, videos, photos, audio, web pages, weather/auto/seismic sensor data, and streaming satellite data. Unstructured data is often referred to as “Large Data” because files such as 8K video are huge, and there are large numbers of the files.

**Growth of Large (Unstructured) Data**



By 2017, 85% of data will be unstructured data, most of which is infrequently accessed. As a result, one of the biggest challenges for enterprise storage architects is migrating from proprietary, transaction-oriented disk arrays, which are expensive. The destination is more cost-effective software-defined storage which leverages open-source software and industry standard server hardware.

## Requirement for this TCO Analysis: Online Archive for Unstructured Data

The application for the systems evaluated in this report is storing large quantities of infrequently accessed data. Examples of applications which use mass storage are backup, archive, and replication for disaster recovery. In all cases, the data must be online and highly available. Other names for this application are “bulk storage” and “nearline storage.”

# The Cost of Owning Storage



## Cost Components

Below are the components used to calculate the total cost of owning mass storage over a five-year period:

*Hardware Product Cost* - The purchase price for storage array chassis, servers and HDDs.

*Recurring Software License Fees* - Annual license fees for software, if applicable.

*Recurring Annual Service & Support Fees* - The cost of a service agreement providing on-site service and spare parts, with next business day response time.

*Training* - The cost of certifying one network engineer for this class of product (not applicable in this report).

*Spare Parts* - The cost of on-site spare power supplies and SFPs (not applicable in this report).

*Total Cost of Ownership* - The sum of the hardware product cost, software license fees, service and support fees, training, and spare parts over a five-year period.

## Getting the Cost Data

The product pricing (cost) data used in this case study comes from on-line resellers and solution providers who responded to a request for quote (RFQ) from IT Brand Pulse.

## Apples-to-Apples Comparison

The hardware, software and service products used in this case study were selected based on comparability to one other. Differences in the products and services are described in the product overviews.

# The Storage Systems



## Disk Arrays and Software-Defined Storage

Storage architects and administrators are now faced with three distinctly different classes of storage solutions to evaluate: 1) cloud storage-as-a-service, 2) traditional hardware disk array, and 3) software-defined storage apps which run on industry-standard servers.

This report examines four disk array systems and four software-defined storage systems, including software server hardware from Supermicro.

Entry-level disk arrays were utilized because they met the performance, availability and useable capacity requirements of the online archive application evaluated in this report. If, instead, performance-oriented mid-range or high-end storage arrays were demonstrated, the five-year TCO would have been significantly higher.

Dozens of features could have been added to all the configurations to enhance the performance (SSD), availability (replication) and useable capacity (compression and dedup). But a simple storage configuration met our report's requirements for bulk storage, which is infrequently accessed.

Solution	Type	Configurations
EMC Unity 300	Disk Array	Starting at 250TB
NetApp FAS2554	Disk Array	Growing at 25% per year
HPE StoreServ 8200	Disk Array	(appx. 600TB after 5 years)
IBM v5010	Disk Array	Fully redundant
Red Hat Enterprise Storage	Software-Defined Storage	On-site service/next business day
VMware Virtual SAN 6	Software-Defined Storage	Cost of raw storage
Scality RING	Software-Defined Storage	(no compression, dedup, etc.)
SUSE Enterprise Storage 4	Software-Defined Storage	Includes server hardware for SDS

# Dell EMC Unity 300



## Dell EMC's Most Affordable Unified, Hybrid Storage Array is Flat-Out Expensive

Dell EMC recommended the Unity 300 because it's the most affordable unified, hybrid storage array available from the company. The system can support 150 HDDs and up to 900TB of raw capacity using 6TB HDDs. Add-on disk array enclosures support up to 15 of the 3.5" 6TB drives.

### Highlights

Unity hybrid storage systems support block, file, and VMware VVols, as well as native NAS, iSCSI, and Fibre Channel protocols. Unity includes automated data lifecycle management to lower costs, inline compression, built-in encryption, local point-in-time copies and remote replication, data-in-place conversions, and deep ecosystem integration with VMware and Microsoft.

### Why it Wasn't the Lowest Cost Solution

The Unity 300 may be Dell EMC's most affordable array, but that is like saying the C-Class is Mercedes's most affordable car starting at \$40,000. In addition, this system is not optimized for bulk storage. You can scale but with only fifteen 6TB drives per chassis, this results in the need for at least 1 new chassis every year.

### Five-Year Cost of Ownership: \$330,865

		Year 1		Year 2		Year 3		Year 4		Year 5		Total	
Hardware	Unit Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
Storage System	\$ 98,225	1	\$ 98,225	0	\$ -	0	\$ -	0	\$ -	0	\$ -	1	\$ 98,225
Expansion Chassis	\$ 1,646	0	\$ -	1	\$ 1,646	1	\$ 1,646	1	\$ 1,646	2	\$ 3,292	5	\$ 8,230
Disk Drives	\$ -	6	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	6	\$ -
Disk Drives	\$ 2,300	0	\$ -	11	\$ 25,300	13	\$ 29,900	16	\$ 36,800	21	\$ 48,300	61	\$ 140,300
<b>Software</b>													
		Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
SDS	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
<b>Service</b>													
		Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
Installation	\$ -	1	\$ -	0	\$ -	0	\$ -	1	\$ -	0	\$ -	2	\$ -
3-Year Controller	\$ 39,055	1	\$ 39,055	0	\$ -	0	\$ -	1	\$ 39,055	0	\$ -	2	\$ 78,110
3-Year Expansion	\$ 1,500	0	\$ -	1	\$ 1,500	1	\$ 1,500	1	\$ 1,500	1	\$ 1,500	4	\$ 6,000
			\$ 137,280		\$ 28,446		\$ 33,046		\$ 79,001		\$ 53,092		\$ 330,865





# Red Hat Ceph Storage



## Software that Scales; Pricing that Doesn't

Red Hat Enterprise Ceph Storage is designed to scale effortlessly and cost-effectively by adding x86 server nodes as needed. The object storage architecture is optimized for capacity over performance which is perfect for this report's bulk storage requirement. However, the product is priced at a premium which makes it difficult to scale from a cost standpoint.

## Highlights

Red Hat Ceph Storage is a self-healing, self-managing platform with no single point of failure. The software manages data on a single distributed computer cluster and provides interfaces for object and block storage. In the future, the software will include an interface for file storage.

## Why it Wasn't the Lowest Cost Solution

The low-cost hardware foundation used for Red Hat Ceph Storage is exactly the same as the configuration used for other software-defined storage solutions in this analysis. The result of the capacity-based software pricing model is the second most expensive solution for our requirement.

## Five-Year Cost of Ownership: \$328,847

		Year 1		Year 2		Year 3		Year 4		Year 5		Total	
Hardware	Unit Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
Storage Servers	\$ 10,966	4	\$ 43,864	0	\$ -	0	\$ -	0	\$ -	0	\$ -	4	\$ 43,864
Monitor/Mgt Servers	\$ 6,023	3	\$ 18,069	0	\$ -	0	\$ -	0	\$ -	0	\$ -	3	\$ 18,069
Disk Drives	\$ 699	0	\$ -	7	\$ 4,893	8	\$ 5,592	10	\$ 6,990	13	\$ 9,087	38	\$ 26,562
<b>Software</b>		Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
SDS	\$ -	1	\$ 25,773	1	\$ 44,903	1	\$ 44,903	1	\$ 44,903	1	\$ 68,958	5	\$ 229,439
<b>Service</b>		Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
Installation	\$ -	1	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	1	\$ -
5-Year Servers	\$ 1,559	7	\$ 10,913	0	\$ -	0	\$ -	0	\$ -	0	\$ -	7	\$ 10,913
			\$ 98,619		\$ 49,796		\$ 50,495		\$ 51,893		\$ 78,045		\$ 328,847

**RED HAT®**  
CEPH STORAGE



# VMware Virtual SAN



## Tightest Integration with vSphere

VMware vSphere is at the center of data center architectures for many IT organizations. That's why server admins prefer infrastructure which is tightly integrated with their hypervisor. The good news is Virtual SAN offers the strongest integration with vSphere. The bad news is cost of support more than doubles the price.

## Highlights

Virtual SAN delivers flash-optimized, high-performance storage for hyper-converged infrastructure. It leverages commodity x86 components and integration with VMware vSphere, as well as the entire VMware stack, to form a simple storage platform for virtual machines.

## Why it is the Lowest Cost Solution

If support was included in the price of the software license—like it is with some other software-defined storage products—Virtual SAN would scale cost effectively. But it's not; and the result is the cost of support exceeds the cost of the base product over a five year period.

## Five-Year Cost of Ownership: \$258,151

		Year 1		Year 2		Year 3		Year 4		Year 5		Total	
Hardware	Unit Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
Storage Servers	\$ 10,966	4	\$ 43,864	0	\$ -	0	\$ -	0	\$ -	0	\$ -	4	\$ 43,864
Monitor/Mgt Servers	\$ 6,023	3	\$ 18,069	0	\$ -	0	\$ -	0	\$ -	0	\$ -	3	\$ 18,069
Disk Drives	\$ 699	0	\$ -	7	\$ 4,893	8	\$ 5,592	10	\$ 6,990	13	\$ 9,087	38	\$ 26,562
<b>Software</b>													
Software		Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
SDS	\$ 5,000	12	\$ 60,000	0	\$ -	0	\$ -	0	\$ -	0	\$ -	12	\$ 60,000
Hypervisor	\$ 969	7	\$ 6,783	0	\$ -	0	\$ -	0	\$ -	0	\$ -	7	\$ 6,783
<b>Service</b>													
Service		Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
SDS Support	\$ 1,374	12	\$ 16,488	12	\$ 16,488	12	\$ 16,488	12	\$ 16,488	12	\$ 16,488	60	\$ 82,440
Hypervisor Support	\$ 272	7	\$ 1,904	7	\$ 1,904	7	\$ 1,904	7	\$ 1,904	7	\$ 1,904	35	\$ 9,520
5-Year Servers	\$ 1,559	7	\$ 10,913	0	\$ -	0	\$ -	0	\$ -	0	\$ -	7	\$ 10,913
			<b>\$ 158,021</b>		<b>\$ 23,285</b>		<b>\$ 23,984</b>		<b>\$ 25,382</b>		<b>\$ 27,479</b>		<b>\$ 258,151</b>





# NetApp FAS2554



## Mid-Range System; High-End Cost

NetApp recommended the FAS2554 which is designed for higher capacity needs. It is targeted at midsize organizations and distributed sites of larger organizations, Windows applications and virtual server consolidation with multiple workloads, and for customers who require cost-effective larger capacity.

## Highlights

The NetApp FAS2554 has a capacity of 1.1PB and 144 HDDs packaged in high-density drive enclosures supporting up to twenty four, 3.5" drives. The flexible system supports iSCSI, NFS, pNFS, and CIFS/SMB storage protocols.

## Why it Wasn't the Lowest Cost Solution

NetApp FAS2554 gets top marks for ease-of-use and for offering high-density configurations which *should* make scaling mass storage cost effective. But customers are asked to pay a hefty premium for the NetApp brand. For example, add-on 8TB drives for a NetApp FAS2554 can run well over \$2,000 — over four times the cost of add-on drives for industry-standard servers supporting software-defined storage.

## Five-Year Cost of Ownership: \$211,534

		Year 1		Year 2		Year 3		Year 4		Year 5		Total	
Hardware	Unit Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
Storage System	\$ 52,063	1	\$ 52,063	0	\$ -	0	\$ -	0	\$ -	0	\$ -	1	\$ 52,063
Expansion Chassis	\$ 42,661	1	\$ 42,661	0	\$ -	1	\$ 42,661	0	\$ -	1	\$ 42,661	3	\$ 127,983
Disk Drives	\$ -	48	\$ -	0	\$ -	24	\$ -	0	\$ -	24	\$ -	96	\$ -
Software		Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
SDS	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
Service		Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
Installation	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -
3-Year Controller	\$ 5,620	1	\$ 5,620	0	\$ -	0	\$ -	1	\$ 5,620	0	\$ -	2	\$ 11,240
3-Year Expansion	\$ 5,062	1	\$ 5,062	0	\$ -	1	\$ 5,062	1	\$ 5,062	1	\$ 5,062	4	\$ 20,248
			\$ 105,406		\$ -		\$ 47,723		\$ 10,682		\$ 47,723		\$ 211,534



# IBM v5010



## The Lowest Cost Disk Array Solution We Evaluated

The IBM Storwize v5010 is a hybrid block storage system capable of being deployed with HDDs, SSDs, or a combination of both. Although the packaging is not high-density, the system is feature-rich and aggressively priced.

## Highlights

The Storwize v5010 base unit supports iSCSI host connectivity, with options to add 16GB Fibre Channel, 12Gb SAS, and 10GbE iSCSI/FCoE, and up to 10 expansion enclosures for a maximum of 264 drives. The 2U controllers and expansion enclosures hold twelve 3.5-inch drives. Other key features include thin provisioning, FlashCopy, Easy Tier, and remote mirroring.

## Why it Wasn't the Lowest Cost Solution

If our application needed the additional features rolled into the v5010, this product might represent the best value for the money. But for our application—which requires the most capacity for the lowest cost—software-defined storage solutions are the ones to beat.

## Five-Year Cost of Ownership: \$195,458

		Year 1			Year 2			Year 3			Year 4			Year 5			Total	
Hardware	Unit Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	
Storage System	\$ 21,443	1	\$ 21,443	0	\$ -	0	\$ -	0	\$ -	0	\$ -	0	\$ -	1	\$ 21,443			
Expansion Chassis	\$ 4,742	3	\$ 14,225	1	\$ 4,742	1	\$ 4,742	1	\$ 4,742	2	\$ 9,484	8	\$ 37,934					
Disk Drives	\$ 1,400	34	\$ 47,588	8	\$ 11,197	10	\$ 13,997	13	\$ 18,195	16.25	\$ 22,744	81.25	\$ 113,722					
Software		Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	
Licenses	\$ 5,005	1	\$ 5,005	0	\$ -	0	\$ -	0	\$ -	0	\$ -	1	\$ 5,005					
Service		Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	
3-Year Software	\$ 2,002	1	\$ 2,002	0	\$ -	0	\$ -	1	\$ 2,002	0	\$ -	2	\$ 4,004					
3-Year Controller	\$ 4,950	0	\$ -	0	\$ -	0	\$ -	1	\$ 4,950	0	\$ -	1	\$ 4,950					
3-Year Expansion	\$ 1,200	0	\$ -	1	\$ 1,200	1	\$ 1,200	2	\$ 2,400	3	\$ 3,600	7	\$ 8,400					
			\$ 90,264		\$ 17,139		\$ 19,938		\$ 32,289		\$ 35,828		\$ 195,458					



# Scality RING



## From a Pioneer in Software-Defined Storage

Scality delivers web-scale storage that has been available since 2009. The Scality RING (its software-defined storage) turns commodity x86 servers into a storage pool for file and object storage at petabyte scale.

## Highlights

The Scality RING is an attractive alternative to tape for long-term archives with much lower latency. Leveraging any standard servers at the cost and density of your choice, the Scality RING enables IT organizations to deploy self-healing archives that grow to petabytes.

## Why it Wasn't the Lowest Cost Solution

The solution from Scality is the second, best-priced solution we examined. The difference between Scality, and price leader SUSE, was the cost of support. It's also worth noting the cost of Scality software is entirely front loaded, while the cost of SUSE software is spread out evenly over the five-year period.

## Five-Year Cost of Ownership: \$193,384

		Year 1		Year 2		Year 3		Year 4		Year 5		Total	
Hardware	Unit Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
Storage Servers	\$ 10,966	4	\$ 43,864	0	\$ -	0	\$ -	0	\$ -	0	\$ -	4	\$ 43,864
Monitor/Mgt Servers	\$ 6,023	3	\$ 18,069	0	\$ -	0	\$ -	0	\$ -	0	\$ -	3	\$ 18,069
Disk Drives	\$ 699	0	\$ -	7	\$ 4,893	8	\$ 5,592	10	\$ 6,990	12.5	\$ 8,738	37.5	\$ 26,213
Software		Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
SDS	\$ 52,500	1	\$ 52,500	0	\$ -	0	\$ -	0	\$ -	0	\$ -	1	\$ 52,500
Service		Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
Installation	\$ 11,200	1	\$ 11,200	0	\$ -	0	\$ -	0	\$ -	0	\$ -	1	\$ 11,200
SDS Support	\$ 6,125	1	\$ 6,125	1	\$ 6,125	1	\$ 6,125	1	\$ 6,125	1	\$ 6,125	5	\$ 30,625
5-Year Servers	\$ 1,559	7	\$ 10,913	0	\$ -	0	\$ -	0	\$ -	0	\$ -	7	\$ 10,913
			\$ 142,671		\$ 11,018		\$ 11,717		\$ 13,115		\$ 14,863		\$ 193,384



# SUSE Enterprise Storage 4



## First CEPH Storage to Offer CephFS

SUSE’s newest version of software-defined storage—SUSE Enterprise Storage 4 —is a comprehensive storage solution best suited for “Large Data.” Its scale-out architecture allows customers to simplify their environment, while providing limitless storage capacity for large data file applications such as video surveillance, CCTV, online presence, streaming media, medical (x-rays, mammography, CT, MRI), seismic processing, genomic mapping, CAD and backup datasets.

## Highlights

SUSE Enterprise Storage 4 (SES 4, for short) includes the industry’s first production-ready version of CephFS. By adding much-anticipated native filesystem access, SES 4 allows customers to deploy a unified block, object and file storage environment to reduce the capital and operational costs of their storage infrastructure.

## Why it is the Lowest Cost Solution

SUSE offers several layers of cost savings to enterprise storage IT professionals. The foundation is industry standard hardware. Layered on top, is storage software with comparatively low annual license fees spread out over the life of your storage. Finally, support is included in the cost of the software license. For applications generating a lot of data, SUSE Enterprise Storage 4 scales capacity but not cost.

## Five-Year Cost of Ownership: \$149,408

		Year 1		Year 2		Year 3		Year 4		Year 5		Total	
<b>Hardware</b>	Unit Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
Storage Servers	\$ 10,966	4	\$ 43,864	0	\$ -	0	\$ -	0	\$ -	0	\$ -	4	\$ 43,864
Monitor/Mgt Servers	\$ 6,023	3	\$ 18,069	0	\$ -	0	\$ -	0	\$ -	0	\$ -	3	\$ 18,069
Disk Drives	\$ 699	0	\$ -	7	\$ 4,893	8	\$ 5,592	10	\$ 6,990	13	\$ 9,087	38	\$ 26,562
<b>Software</b>		Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
SUSE SW	\$ 10,000	1	\$ 10,000	1	\$ 10,000	1	\$ 10,000	1	\$ 10,000	1	\$ 10,000	5	\$ 50,000
<b>Service</b>		Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost	Qty	Cost
Installation	\$ -	1	\$ -	0	\$ -	0	\$ -	1	\$ -	0	\$ -	2	\$ -
5-Year Servers	\$ 1,559	7	\$ 10,913	0	\$ -	0	\$ -	0	\$ -	0	\$ -	7	\$ 10,913
			\$ 82,846		\$ 14,893		\$ 15,592		\$ 16,990		\$ 19,087		\$ 149,408



# Side-by-Side Comparison



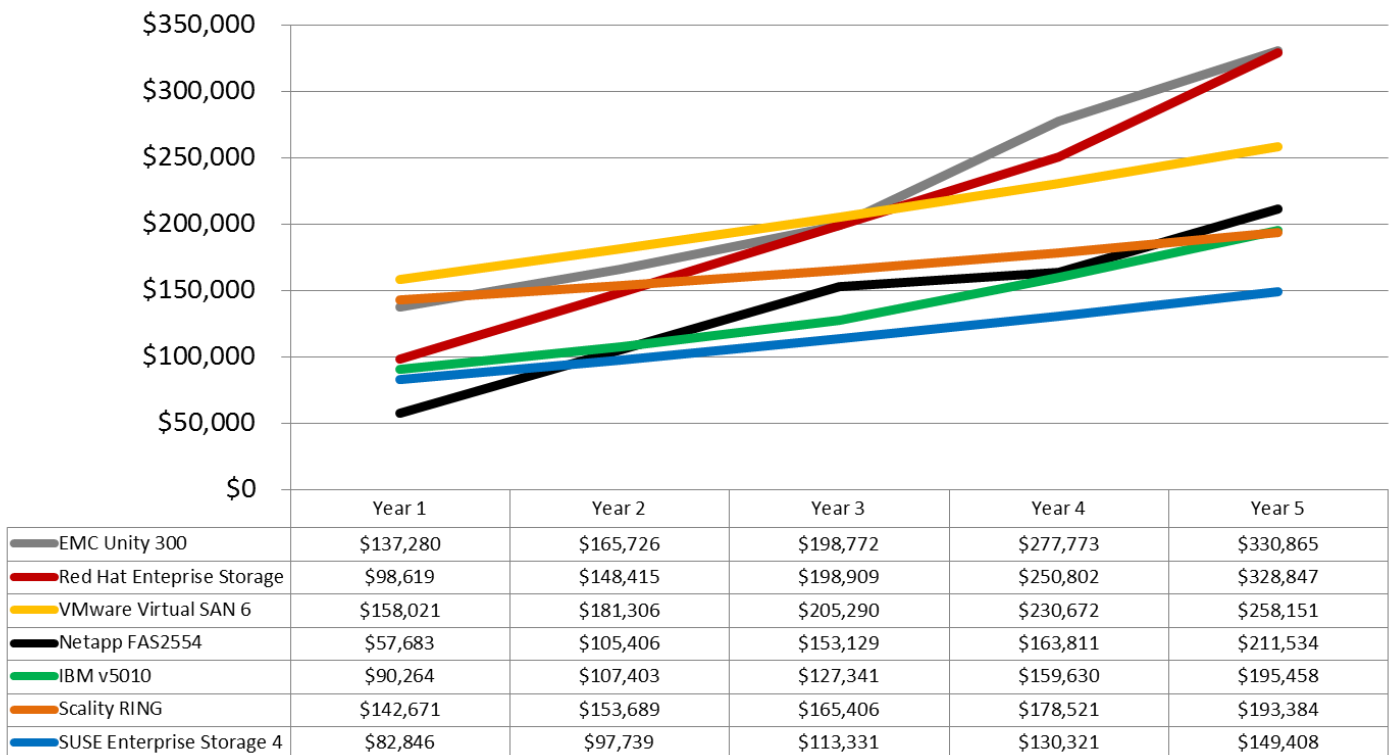
## Software-Defined Storage Eliminates Branded Storage Taxes

IT organizations have shown a strong preference for branded storage. Everyone knows they're paying a tax for the EMC or NetApp logo, but because they deployed the "Mercedes of storage arrays", they also figure they won't get fired when something goes wrong. This branded storage tax is applied to every disk drive a customer purchases during the life of the system, and is as much as 4x the cost of HDDs used in industry-standard servers and software-defined storage systems.

	SUSE	EMC	NetApp	IBM
Drive Capacity	10TB	6TB	8TB	8TB
Drive Price	\$699	\$2,500	\$3,000	\$1,400
Cost/GB	\$.070	\$.417	\$.375	\$.175

## Cumulative Five-Year Cost of 250TB Growing at 25% Per Year

The chart below shows a side-by-side comparison of eight bulk storage solutions based on pricing provided by the manufacturers or their channel partners. Surprisingly, 2 of the 3 most expensive solutions were SDS



*Note: On Year 1, all systems were approximately 250TB, except for the NetApp system which started at 190TB.*

# The Bottom Line



## The Future is Software-Defined Storage

The data in this report indicates that traditional enterprise storage is under tremendous price pressure from software-defined storage available from vendors like SUSE.

This report also reveals that Red Hat and VMware are positioning the price of their software-defined storage offerings at parity with traditional (expensive) enterprise storage solutions.

The bottom line? IT organizations looking to lower the cost of archived data should evaluate software-defined storage solutions. Based on easy-to-service x86 servers, the technology is proven by hyperscale public cloud providers and can be deployed in private clouds for 1/3 the cost of branded storage.

## Related Links

[Total Cost of Ownership Wiki](#)

[Dell EMC Unity 300 Product Info](#)

[IBM Storwize v5010 Product Info](#)

[NetApp FAS2554 Product Info](#)

[VMware Virtual SAN Product Info](#)

[Red Hat CEPH Storage Product Info](#)

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