



Education

# **Lowering Storage TCO: Reducing Expenses by Increasing Functionality**

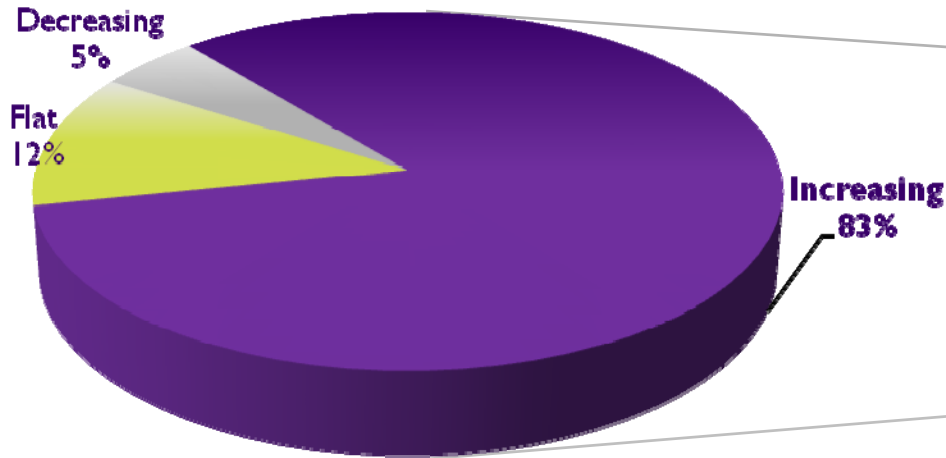
Jamie Blomquist, Compellent

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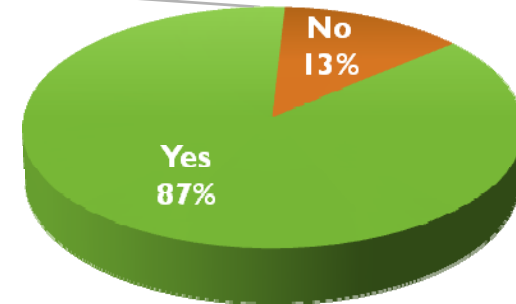
- **Lowering Storage TCO: Reducing Expenses by Increasing Functionality**
  - ◆ This session will appeal to IT Managers, Directors, and CIO's who are responsible for the evaluation and financial justification for enterprise data storage solutions. This session will identify the costs to consider in conducting a TCO analysis, highlight key technologies that help lower TCO, and provide tangible information for how to measure and conduct a TCO analysis. The audience will receive practical information that can be used to perform their own internal TCO analyses.

# Does it Matter?

Companies Annual Spend on Storage



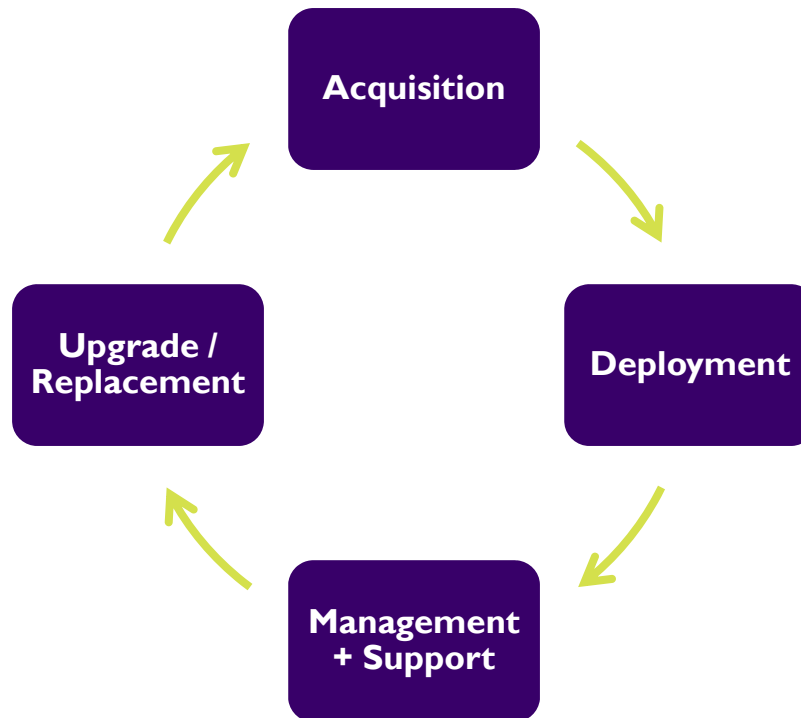
Increasing Costs Causing Financial Problems



Source: Monosphere. [http://www.monosphere.com/news/press2006/press\\_12182006\\_survey.html](http://www.monosphere.com/news/press2006/press_12182006_survey.html)

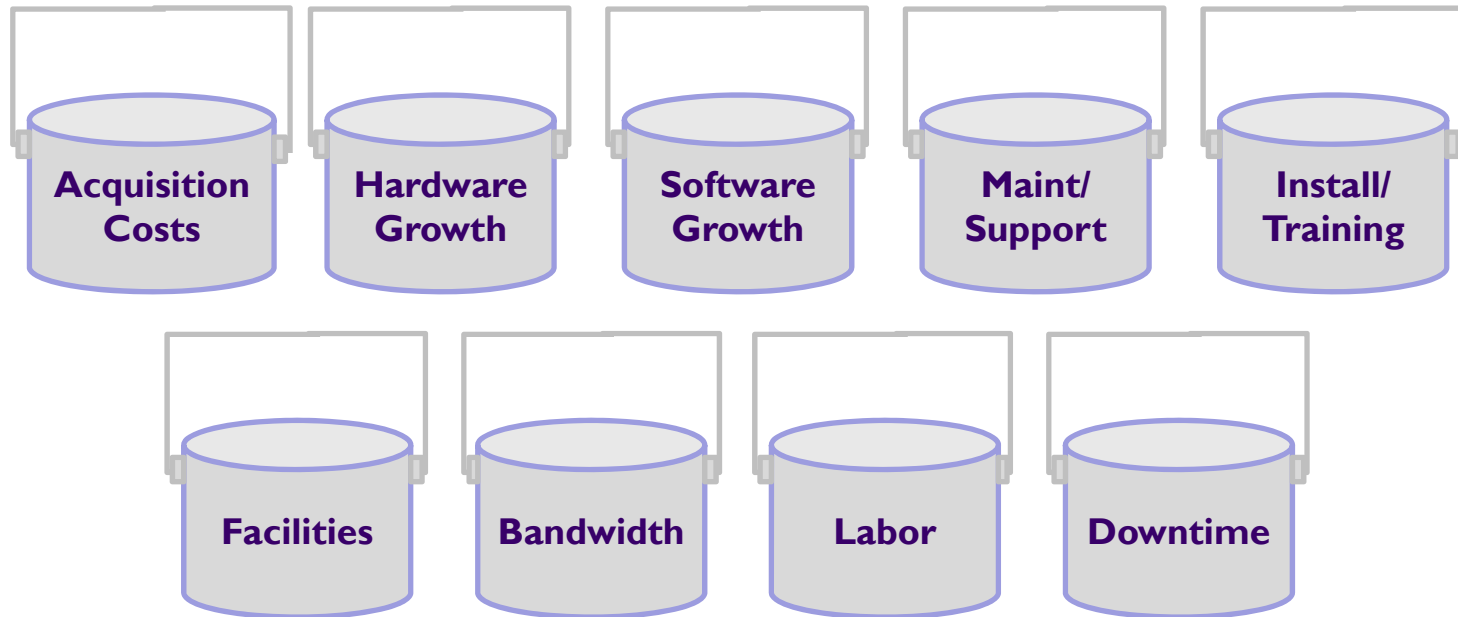
- Define TCO
- Value of Calculating TCO
- The New Storage Economics
  - ◆ Advanced features that enable lower TCO
- Conducting a TCO Analysis
- Q&A

- The holistic view of costs of an asset over time
  - ◆ Purchase price of an asset plus the additional costs of operation



# Costs and Storage TCO Buckets

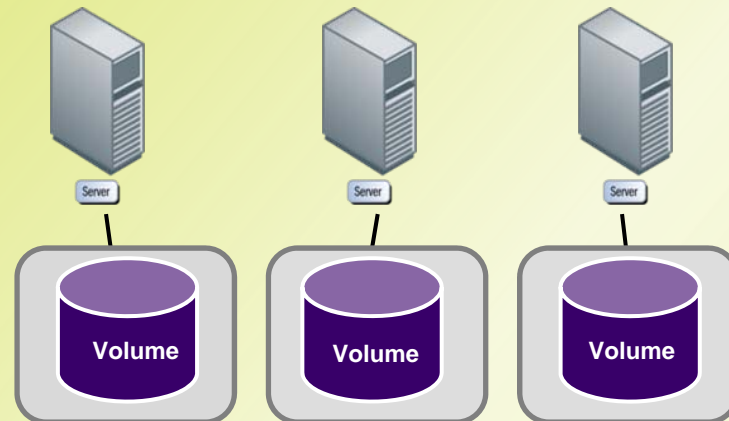
- CAPEX vs. OPEX
- Hard Costs vs. Soft Costs
- Direct Costs vs. Indirect Costs
- Storage TCO Buckets



# Value of Calculating TCO

- Storage is nucleus of datacenter
- Ensures successful projects
  - ◆ Create shareholder value
  - ◆ Don't overextend resources
  - ◆ Feather in the cap
- Identify unknown costs
  - ◆ Within project
  - ◆ Interdependency of costs beyond project

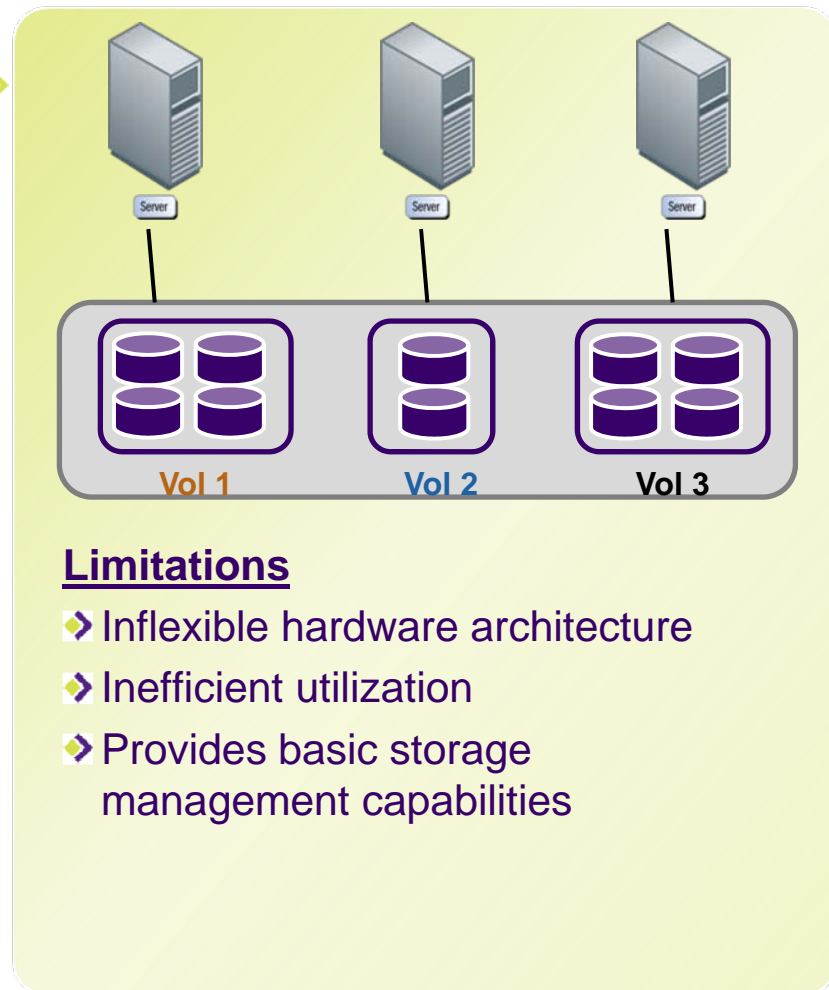
➤ DAS



## Limitations

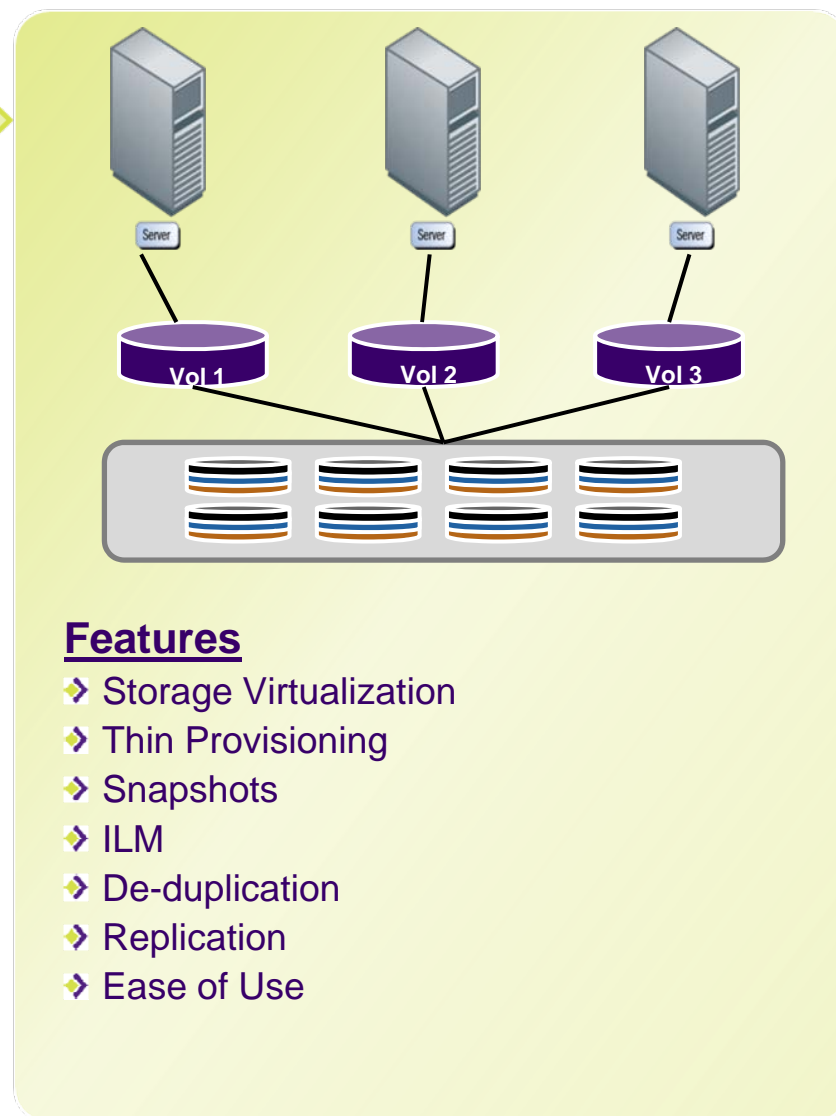
- Storage silos limit flexibility
- Lacks advanced storage management capabilities
- Labor intensive

## ➤ First Generation SAN



# Storage Economics: Game is Changing

## ➤ Next Generation SAN



### Features

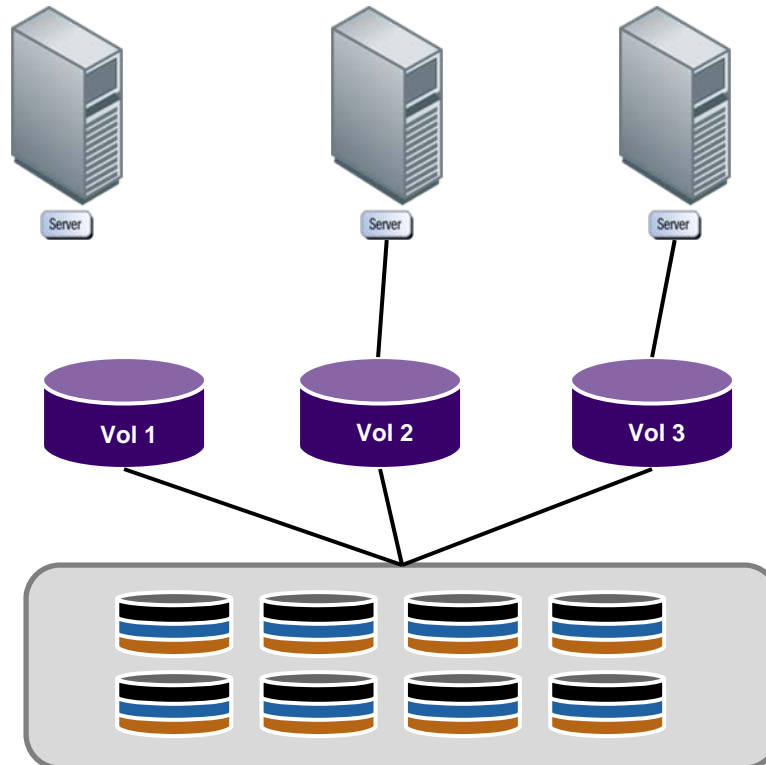
- Storage Virtualization
- Thin Provisioning
- Snapshots
- ILM
- De-duplication
- Replication
- Ease of Use

Aggregate multiple physical storage resources into a single storage pool enabling storage to appear as a single storage device.

## How it Lowers TCO

- Simplifies management
- Reduces storage requirements
- Leverage multiple drive types

## Storage Virtualization Unveiled



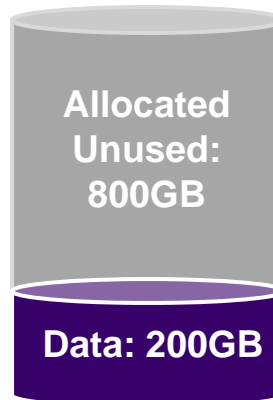
Ability to allocate more storage capacity than is physically available on the storage array.

## How it Lowers TCO

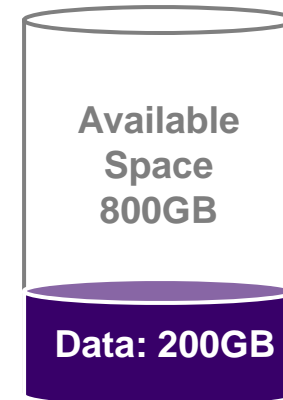
- Reduces initial capacity requirements
- Eliminates allocated, but unused space
- Efficient utilization decreases growth requirements
- Less spinning disk lowers facility costs
- Reduces time spent provisioning volumes

## Value of Thin Provisioning

Total Capacity	1 TB	Total Capacity	1 TB
Data Written	200 GB	Data Written	200 GB
Allocated/Unused	800 GB	Available Space	800 GB



**Thick  
Provisioning**



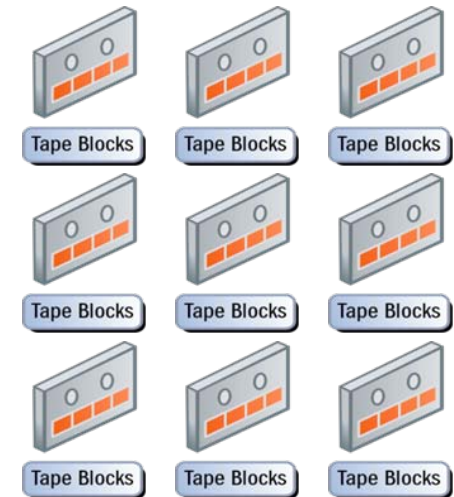
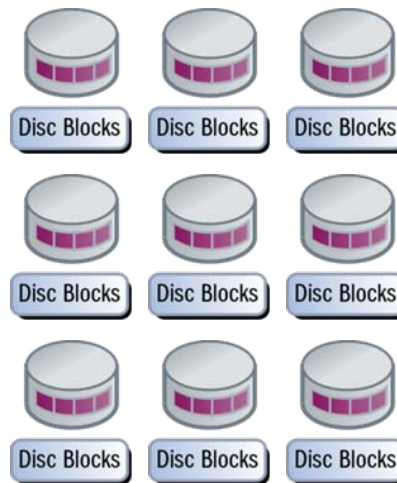
**Thin  
Provisioning**

Provides a point time backup of data by creating sets pointers that point to original data, rather than making full copies of data.

## How it Lowers TCO

- ❖ Space efficient backups reduce capacity requirements
- ❖ On-line backups reduce RTO
- ❖ Space efficient backups reduce RPO
- ❖ Reduce investment in alternative backup methods (tape, VTL)
- ❖ Reduce off-site storage transportation costs

## Value of Snapshots

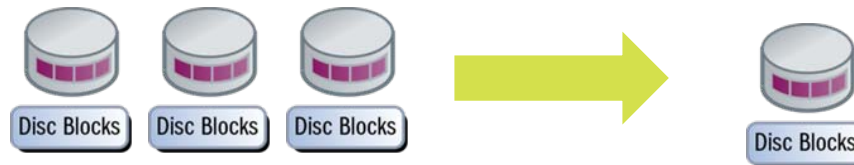


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## Value of Snapshots



ILM is comprised of the policies, processes, practices, and tools used to align the business value of information with the most appropriate and cost-effective IT infrastructure from the time information is conceived through its final disposition

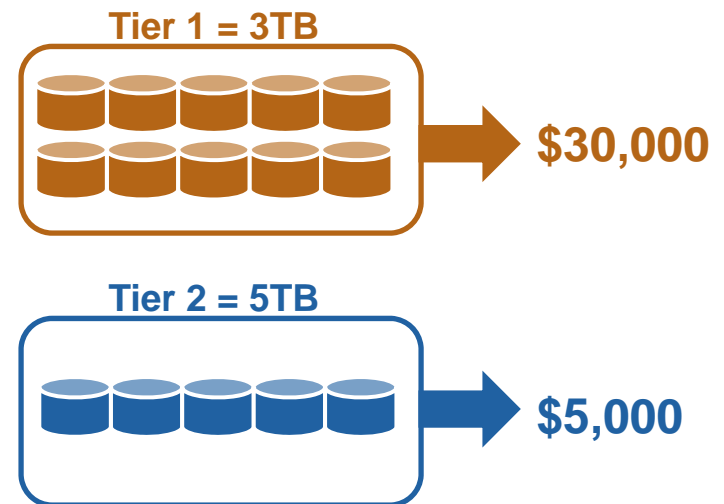
## How it Lowers TCO

- Lower capacity requirements and reduce acquisition cost
- Reduces Tier 1 storage needs
- Grow with cost effective disk
- Concentrate storage on cost effective storage
- Concentrate storage on energy efficient disk

## Value of ILM

### Data Classification

- Value of data?
- Type of data?
- Creation time?
- Frequency?



ILM the processes of defining the business value of data and placing it on the most appropriate and cost-effective tier of storage in the storage array.

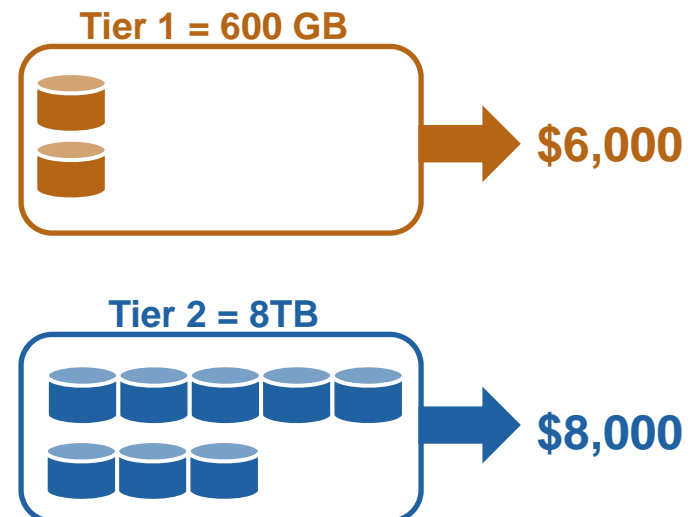
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## Value of ILM

### Data Classification

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De-duplication is a method of reducing storage by eliminating redundant data

## How it Lowers TCO

- ❖ Eliminates duplicated storage
- ❖ Reduces primary/secondary storage requirements
- ❖ Reduces bandwidth requirements for replication

## Value of Deduplication



2TB Volume



1TB Volume or Backup

Replication is the act of making a copy of a collection of data and sending it to a secondary site.

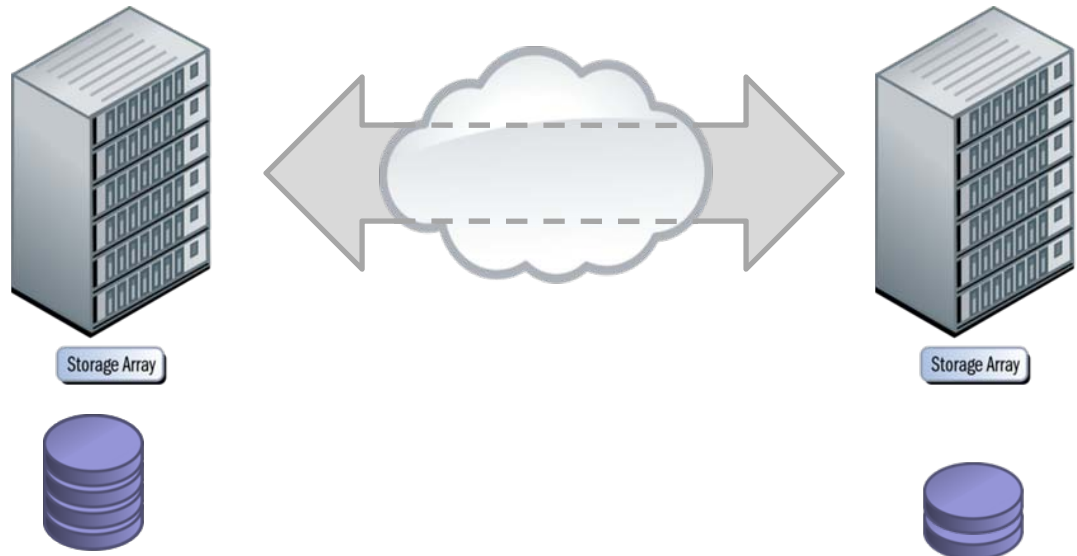
## How it Lowers TCO

- Reduces financial exposure of outages
- Reduces capacity requirements at second site
- Reduces bandwidth requirements

## Key Attributes

- Full volume copy?
- Remote replication?
- QOS?

## Replication Unveiled



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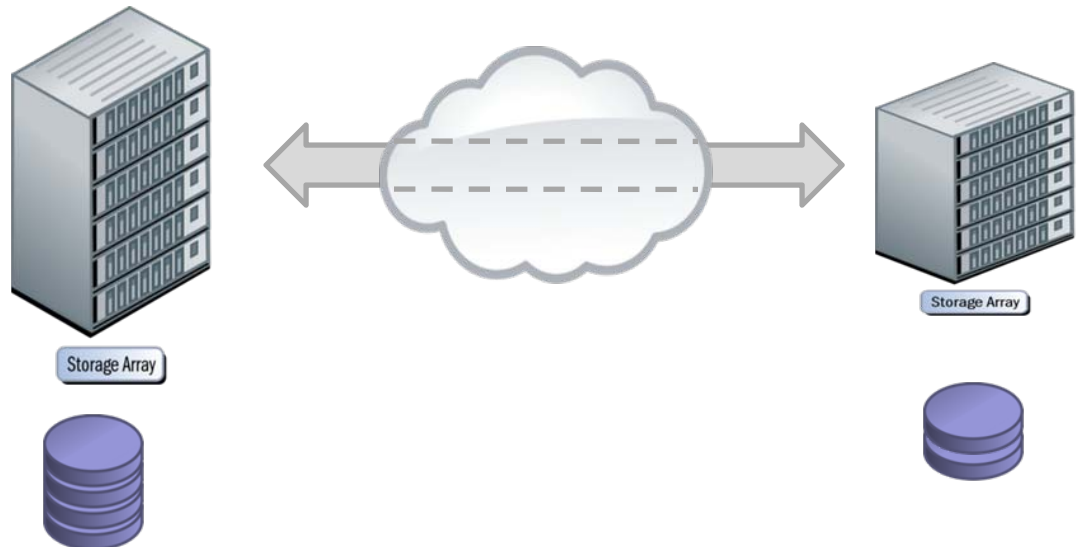
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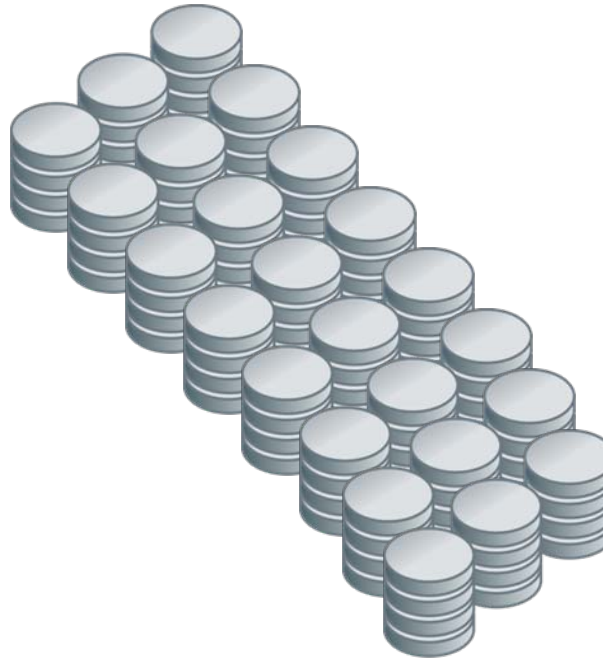
## Replication Unveiled



## How it Lowers TCO

- ❖ Simplified administrative tasks reduce time spent managing storage
- ❖ Intuitive GUI interfaces reduce training requirements
- ❖ CLI automates repetitive administrative tasks
- ❖ SRM reduces time spent performing capacity planning and management tasks

## Storage Capacity: Admin Ratio



Administrators

## How it Lowers TCO

- ❖ Simplified administrative tasks reduce time spent managing storage
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## Storage Capacity: Admin Ratio



Administrator

## ➤ Vendor Driven

### Pros

- Deep insight into architecture
- Competitive knowledge
- Industry expertise

### Cons

- Bias

### Tips

- Be involved in analysis/inputs
- Ask specific questions. How and Why?
- Take advantage of their expertise
- Obtain data and deliverables
- Be objective

## ➤ Consultant Driven

### Pros

- Objectivity
- Competitive knowledge
- Industry expertise
- Financial analysis expertise

### Cons

- Lack intimate technical knowledge
- Cost

### Tips

- Be involved in analysis/inputs
- Involve vendor in analysis
- Hire cross disciplined consultants
- Be informed

## ➤ Self Driven

### Pros

- Knowledge of business drivers
- Familiarity with technical environment
- Control of inputs and calculations

### Cons

- Time
- Lack familiarity of intricate technical details

### Tips

- Be thorough in analysis
- Work with vendor to understand business impact of technology
- Be objective and consistent
- Measure apples-to-apples

# Conducting a Basic TCO Analysis

<b>Step 1: Calculate Growth Requirements</b>		
Year 0 Raw Capacity	Base Raw Capacity	
Year 1 Raw Capacity	Year 0 Raw Capacity * (1+Growth Rate)	
Year 2 Raw Capacity	Year 1 Raw Capacity * (1+Growth Rate)	
Year 3 Raw Capacity	Year 2 Raw Capacity * (1+Growth Rate)	

<b>Step 2: Calculate Total Cost of Ownership (direct, hard costs only)</b>	
Acquisition Costs	
Hardware costs (Y1+Y2+Y3...)	
Software Licensing costs (Y1+Y2+Y3...)	
Maintenance and Support Costs (Y1+Y2+Y3...)	
Training, Installation, Consulting Costs (Y1+Y2+Y3...)	
	<b>3 year TCO</b>

1. Determine length of TCO analysis (3-5 years)
2. Baseline usable and raw capacity requirements
3. Determine acquisition costs
4. Measure direct growth related costs
  - ◆ Hardware, Software, Maintenance
5. Calculate impact on labor costs
6. Measure financial impact of downtime
7. Measure indirect operational costs
  - ◆ Bandwidth, Facilities, Power/Cooling
8. Estimate long term training and consulting costs

- Estimate current usable capacity requirements
- Determine % of storage on each tier
- Specify RAID overhead on each tier
- Identify other overhead requirements
  - ◆ Allocated Unused Space
  - ◆ Snapshots
  - ◆ Replication
  - ◆ Metadata
- How much data will be de-duplicated?
- Estimate annual growth rate

## TCO Step 2: Determine Acquisition Costs

- Always baseline with usable requirements
- Work with vendor to determine raw capacity requirements
  - ◆ Usable Capacity  $\neq$  Raw Capacity
- Request a line item quote
- Determine acquisition costs

$$AC = \text{Hardware} + \text{Software} + \text{Maintenance} + \text{Services}$$

## TCO Step 3: Measure Direct Growth Costs

- Determine cost per GB for hardware and software growth for all tiers
- Multiply cost per GB by yearly raw capacity requirements (reference step 1)
- Estimate future maintenance costs

$$\text{Growth Cost}_{\text{yrx}} = \$/\text{GB} * (\text{Total TB}_{\text{yrx}})$$

- Will labor be a part of your TCO?
- What is average burdened salary of storage administrator?
- Estimate how productive that person is in terms of capacity managed per admin
- Calculate how many FTE's are required to manage SAN

$$\text{Cost of Labor} = \text{Avg. Salary} * (\text{Total TB}_{\text{yrx}} / \text{Productivity})$$

## TCO Step 5: Measure Impact of Downtime

- Are there SLA's for RTO and RPO?
- Calculate the cost per hour of downtime to company
- Estimate total # hours of annual downtime expected

$$\text{Downtime} = [(\text{RTO} + \text{RPO}) * \$/\text{hr of Downtime}] * \text{Annhrs downtime}$$

## ➤ Bandwidth

- ◆ Determine bandwidth requirements for replication

## ➤ Power & Cooling

- ◆ Determine cost per kWh for electricity
- ◆ Estimate total power (Watts) to power and cool SAN
- ◆ Calculate Annual kWh (Total Watts \* Annual Working Hrs)

$$\text{Ann. Pwr/Cooling \$} = (\text{Total Watts} * \text{Ann. Working Hrs}) * \$/\text{kWh}$$

# Key Points and Best practices

- Leverage vendors' knowledge
- Be informed
- Don't have to be perfect – estimations are acceptable
- Compare apples-to-apples
- Know your audience: tell them what's important

- Please send any questions or comments on this presentation to SNIA: [storagemgmt@snia.org](mailto:storagemgmt@snia.org)

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