

## Tiered Storage Solutions for the Mid-Tier

2010: Shipping All New Mid Tier Platforms



## EMC Unified Storage



Industry's Newest  
Unified Storage Architecture

2010: ...with All the Latest Storage Capabilities



## EMC Unified Storage for FC and IP

**In the Array Tiering:** Flash Drives, Fibre Channel, SATA

**Simple, Efficient Management:** Virtual Provisioning, QoS

**Data Mobility:** Virtual LUN, Heterogeneous Copy over SAN

**Replication:** Local and Remote Replication Options

**Flexible Connectivity:** Dedicated Protocols or Unified

**Capacity Scalability:** ~1,000's of Disks in a Single Systems

**Unified Storage Architecture**

# EMC Unified Storage FC

## Next-Generation Innovation for the Mid-tier



- Five 9s (99.999%) availability
- 64-bit FLARE and multi-core CPUs
- UltraFlex technology
- Enterprise Flash drives
- Drive Spin Down
- Virtual Provisioning
- Virtualization-aware Navisphere Manager
- Fully Automated Storage Tiering (FAST)
- Advanced local and remote data protection
- NQM

# EMC Unified Storage

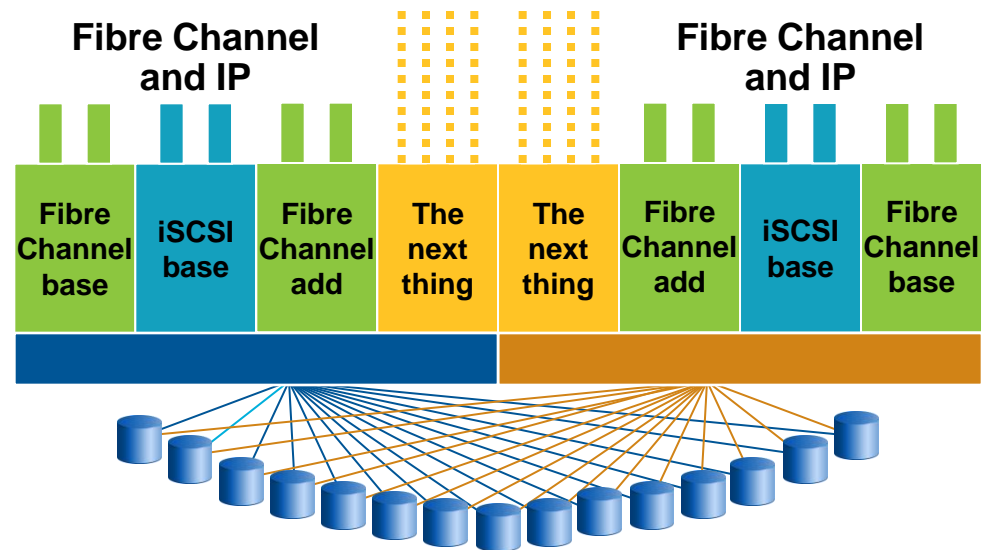
Next-generation architecture

## Designed for Flexibility, Expansion, and Future Technologies

- Flexibility to mix Fibre Channel and iSCSI
- Online expansion via hot pluggable IO modules
- Upgrade to support future I/O technologies

## FUTURE CONNECTIVITY

*i.e.* 10 Gb/s iSCSI, FCoE

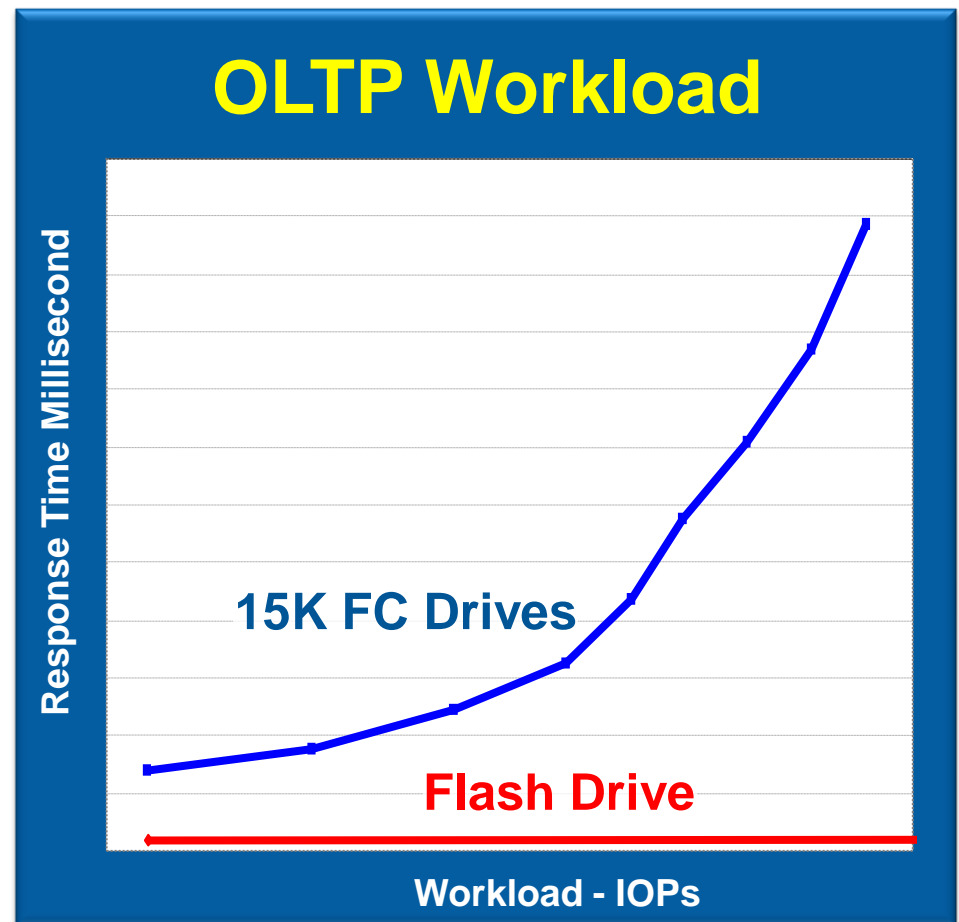


**Added Support for  
8Gb/s Fibre Channel  
and 10Gb/s iSCSI**

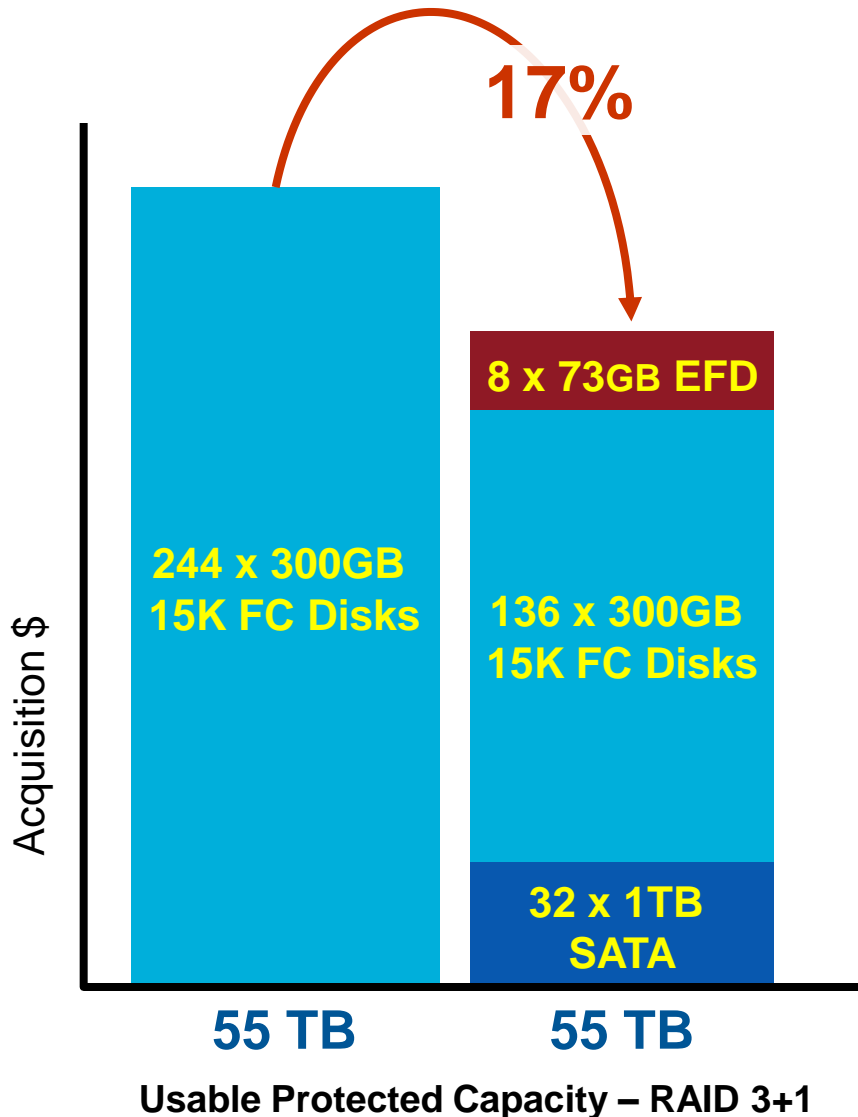
# Flash Drives Shatter Performance Barriers

## Unprecedented Application Performance Characteristics

- +30x IOPS improvement
- 10x faster response time
- 38% less power per drive
- 98% less power per IO
- 58% less weight per TB
- No moving parts for high reliability



# Lower Cost Through Tiering



**28% Fewer Drives**

176 EFD+FC+SATA vs 244 FC

**17% Lower Drive Costs**

+ Reduce Maintenance & SW costs

**21% Less Power & Cooling**

+ more efficient use of space

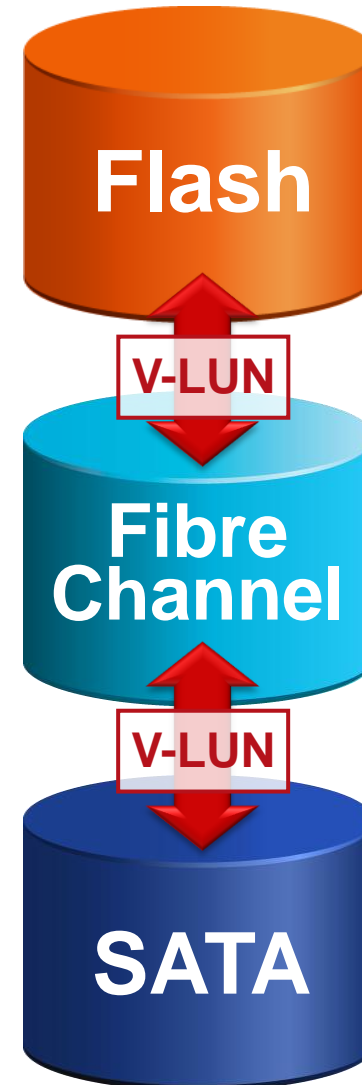
----- **AND** -----

**60% More Drive IOPS**

And more aligned with workloads

## “In the Array” Mobility to Support Storage Tiering Requirements

- Executes and monitors migrations across drive and RAID types
- Supports QoS capabilities to maintain performance levels
- Available across all EMC Storage Platforms

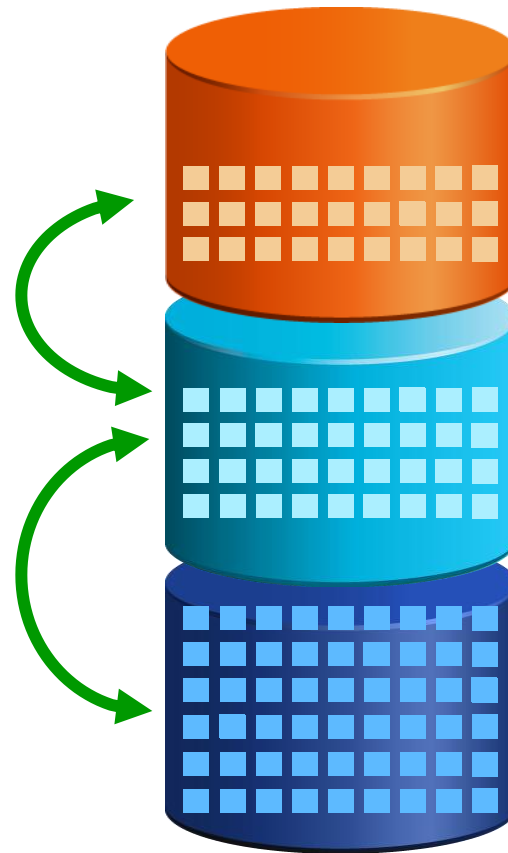


# Fully Automated Storage Tiering: FAST

**Automates movement and placement of data based changing needs**

- Enables the use of the latest drive technologies
- Optimizes both performance and cost
- Planned support across all EMC platforms

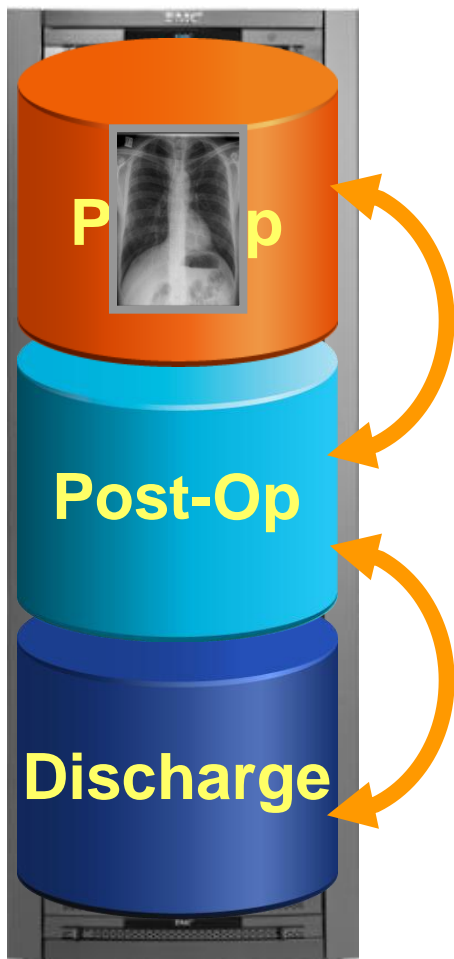
# FAST



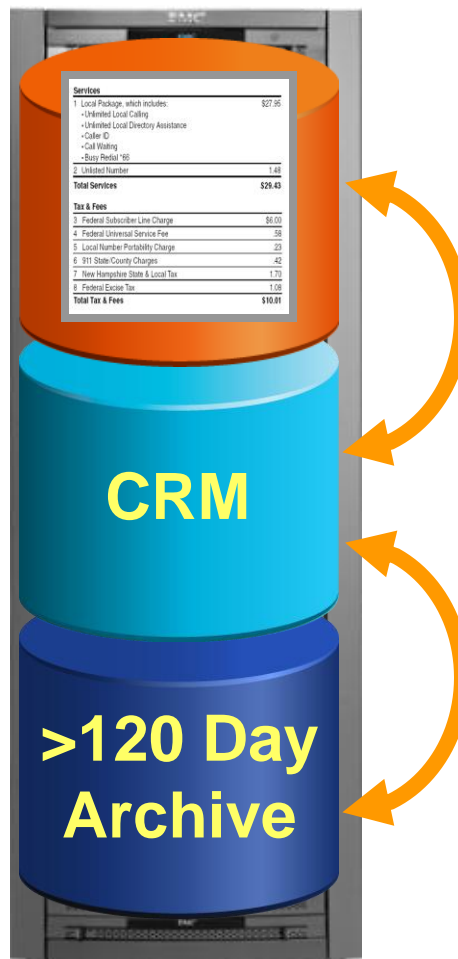
# Automated Placement and Movement of Data Based on Changing Needs



## Health Care



## Telecom



## Banking



# FAST: Storage Tiering Strategies



## Today's Storage Challenge

**10X More  
Capacity in  
5 Years**



## Tomorrow's Solution



**2X More Energy  
67% More Footprint**

## Tomorrow's Solution with FAST

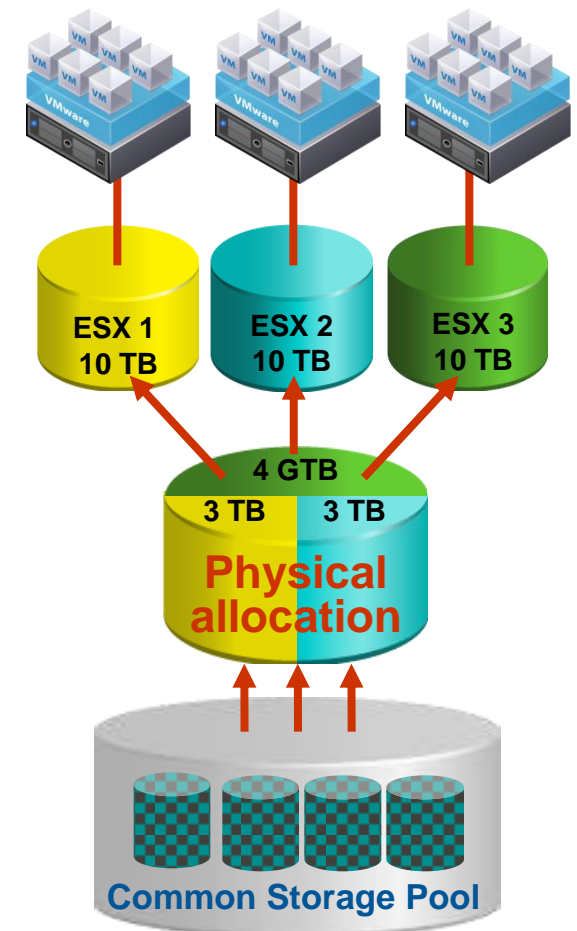


**10-15% Less Energy  
33-67% Less Footprint**

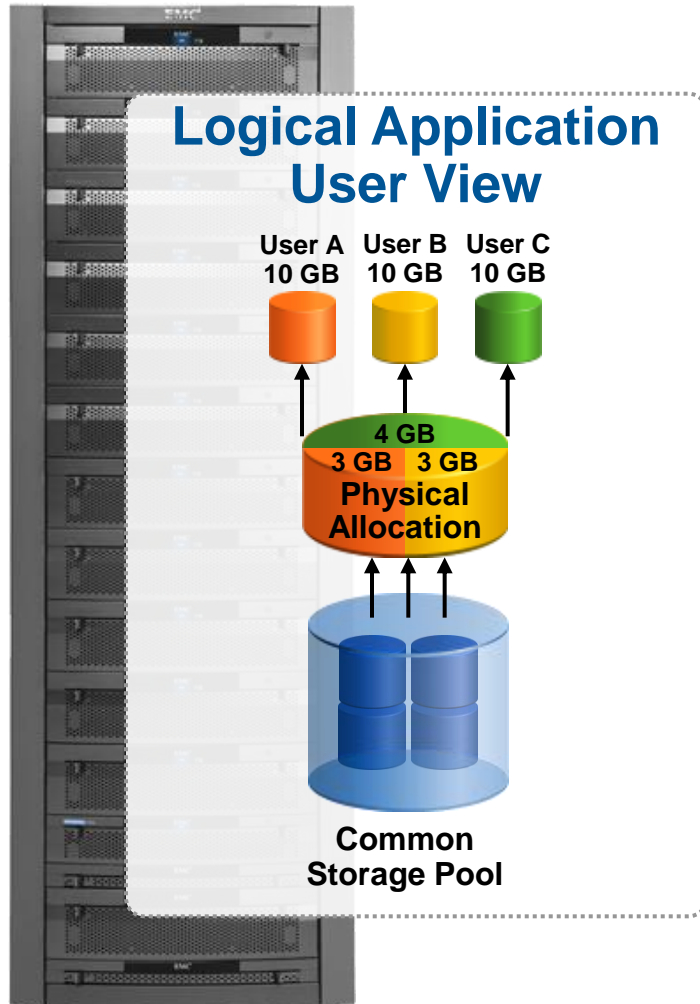
## Space Efficient, Easy to Manage Capacity on Demand

- Improves storage utilization
- Reduces storage provisioning complexity and overhead

**Available Across All  
EMC Storage Platforms**



# Unified Storage FC: Virtual Provisioning



## Virtual Provisioning to optimize capacity and provide efficient tiering

- Includes safety features to monitor growth and automate management
- Fully functional; supports advanced management and replication capabilities
- Array Based Remote Replication for thin LUN's
  - Snapview
  - MirrorView A & S
  - SAN Copy
- Thin LUN Taskbar Reports
  - Thin LUN details report
  - Thin Pool details report

## Drive Spin Down

- Inactive disks are placed in sleep mode; disks spin up on demand
- Leverages robust array capabilities to maintain drive quality
- Array-wide flexibility: ability to support a mix of disparate applications—some that utilize Spin Down, others that do not

**F29 Built-in Feature**

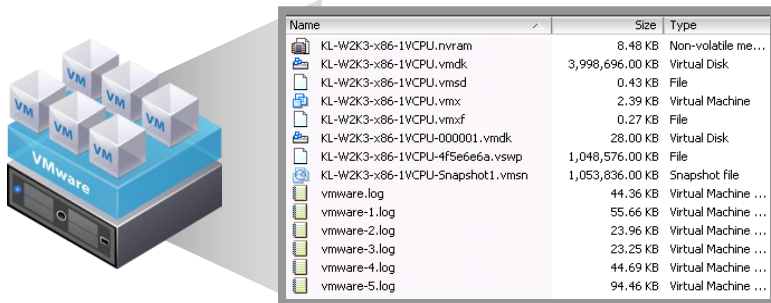
### Spin Down Use Cases

- Backup to disk
- Disk-based archiving
- Test and development
- Selective applications



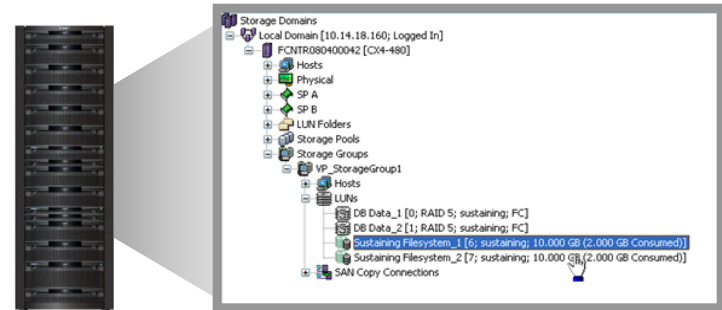
## Effective management and reporting of virtual server and storage environments adds new levels of complexity

### VMware Administrator



*“this is a VM, but I don’t know any server detail other than at the LUN level”*

### Storage Administrator



*“this is a LUN, but I don’t know any storage detail other than at the ESX level”*

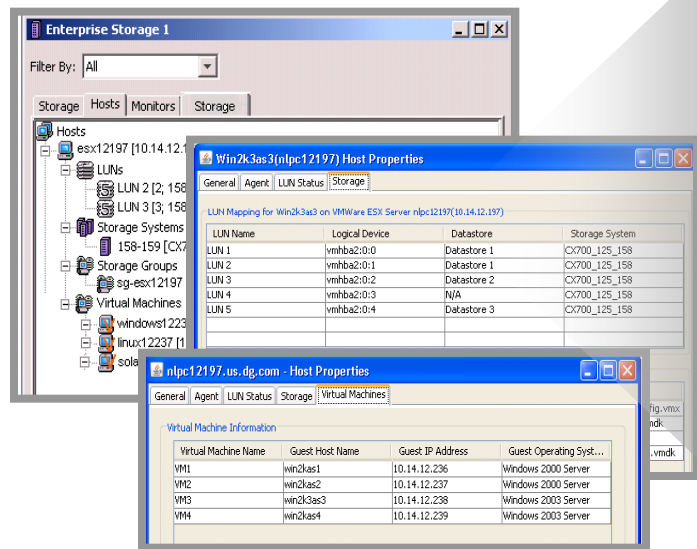
**Need Automated Management Tools to Help Easily Manage and Report on Who Is Using What, When...and Where**



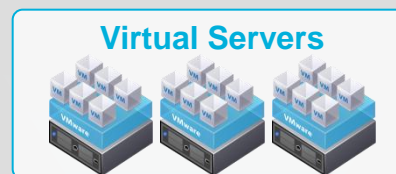
## Built in Automated Management for CLARiiON CX4

- End-to-end visibility and control for a single management screen
- Ability to discover, visualize, and manage storage to VM relationships
- Includes Taskbar automation and search for instant VM discovery

### Navisphere for CX4



End-to-End Visibility and Control



CLARiiON CX4



Unique  
**CLARiiON**  
Capability  
for the  
**Mid-Tier**

# VMware-Based Storage Management with EMC Storage Viewer Plug-in for vCenter Server



EMC Storage Viewer for Virtual Infrastructure Client

Canonical	Model	Rotation	Area	Device	Type	RAID	Capacity	META	VP	Detachable
virtba1:R27	SYMMETRI	5773	000196100899	03023	TOEY	RAID_6	120.00 GB	Concabo...	Yes	
virtba1:R29	SYMMETRI	5773	000196100899	03028	TOEY	RAID_6	120.00 GB	Concabo...	Yes	
virtba1:R26	SYMMETRI	5773	000196100899	0301F	TOEY	RAID_6	120.00 GB	Concabo...	Yes	
virtba1:R11	SYMMETRI	5773	000196100899	03023	TOEY	RAID_6	120.00 GB	Concabo...	Yes	
virtba1:R19	SYMMETRI	5773	000196100899	03049	TOEY	RAID_6	120.00 GB	Concabo...	Yes	
virtba1:R13	SYMMETRI	5773	000196100899	0303B	TOEY	RAID_6	120.00 GB	Concabo...	Yes	
virtba1:R10	SYMMETRI	5773	000196100899	0303F	TOEY	RAID_6	120.00 GB	Concabo...	Yes	
	SYMMETRI	5773	000196100899	03048	TOEY	RAID_6	120.00 GB	Concabo...	Yes	
	SYMMETRI	5773	000196100899	03063	TOEY	RAID_6	120.00 GB	Concabo...	Yes	
	SYMMETRI	5773	000196100899	03035	TOEY	RAID_6	120.00 GB	Concabo...	Yes	
	SYMMETRI	5773	000196100899	03027	TOEY	RAID_6	120.00 GB	Concabo...	Yes	
	SYMMETRI	5773	000196100899	03048	TOEY	RAID_6	120.00 GB	Concabo...	Yes	
	SYMMETRI	5773	000196100899	0305F	TOEY	RAID_6	120.00 GB	Concabo...	Yes	
	SYMMETRI	5773	000196100899	0303F	TOEY	RAID_6	120.00 GB	Concabo...	Yes	
	SYMMETRI	5773	000196100899	0307D	TOEY	RAID_6	120.00 GB	Concabo...	Yes	
	SYMMETRI	5773	000196100899	03027	TOEY	RAID_6	120.00 GB	Concabo...	Yes	

EMC Storage

White Paper

EMC  
where information lives

Using EMC Storage Viewer for Virtual Infrastructure Client  
A Detailed Review

Provides integrated views of storage use, configurations, and checks for best practice settings

[Free download for EMC customers](#)

## Next Generation Innovation for the Mid-Tier

### Gen 2 Flash Drives

+30x more IOPS and 94% less power per IOP vs FC Disks

### UltraFlex Technology

Hot pluggable, Dual Protocol  
iSCSI and 8GB/sec FC

### New Energy Efficiency

Spin-Down, Low Power SATA  
and Adaptive Cooling

### 64 bit FLARE + Multi-core

Up to 2x Performance,  
connectivity and capacity



### Virtual Provisioning

Increase utilization, and easy provisioning for virtual servers

### Advanced Virtual and Physical Replication

SRM + RecoverPoint + Array Splitter  
simplifies deployments

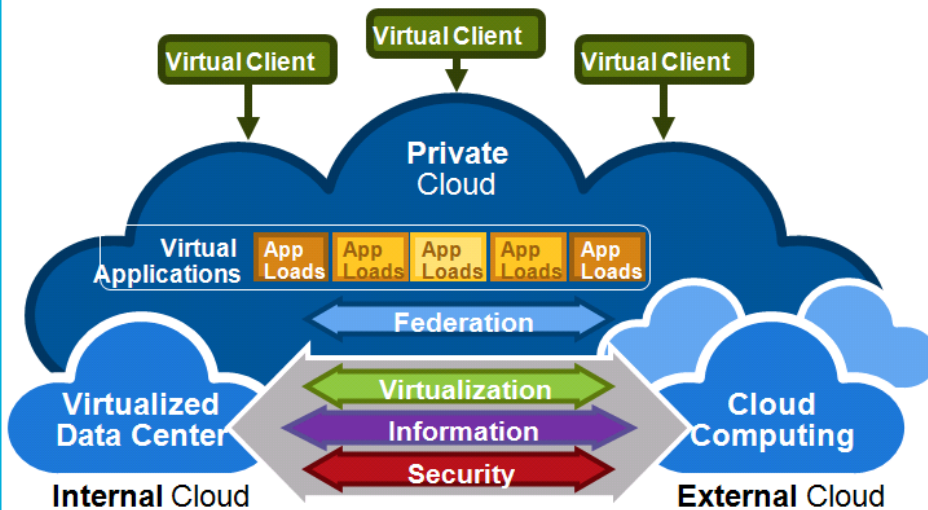
### Optimized for All Virtual Environments

Integration and Advanced Management Capabilities

### FAST

Fully Automated Storage Tiering

## Information Infrastructure



New strategies and operational models require an “Information Utility”

### DEPLOYED differently

- Mixed data types
- Blended use cases
- IP/FCoE adoption

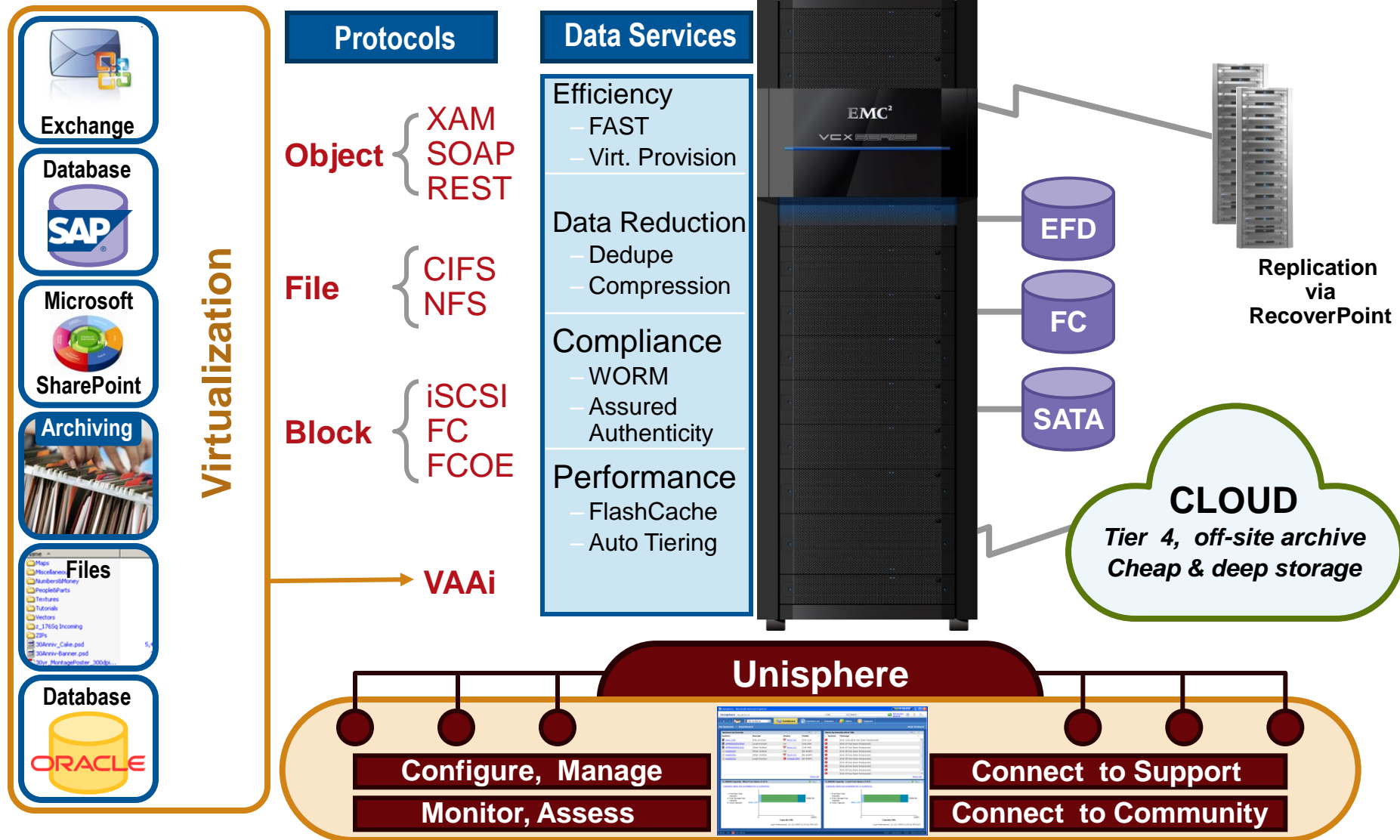
### OPERATED differently

- Highly virtualized
- Highly automated
- Highly dynamic

### PROCURED differently

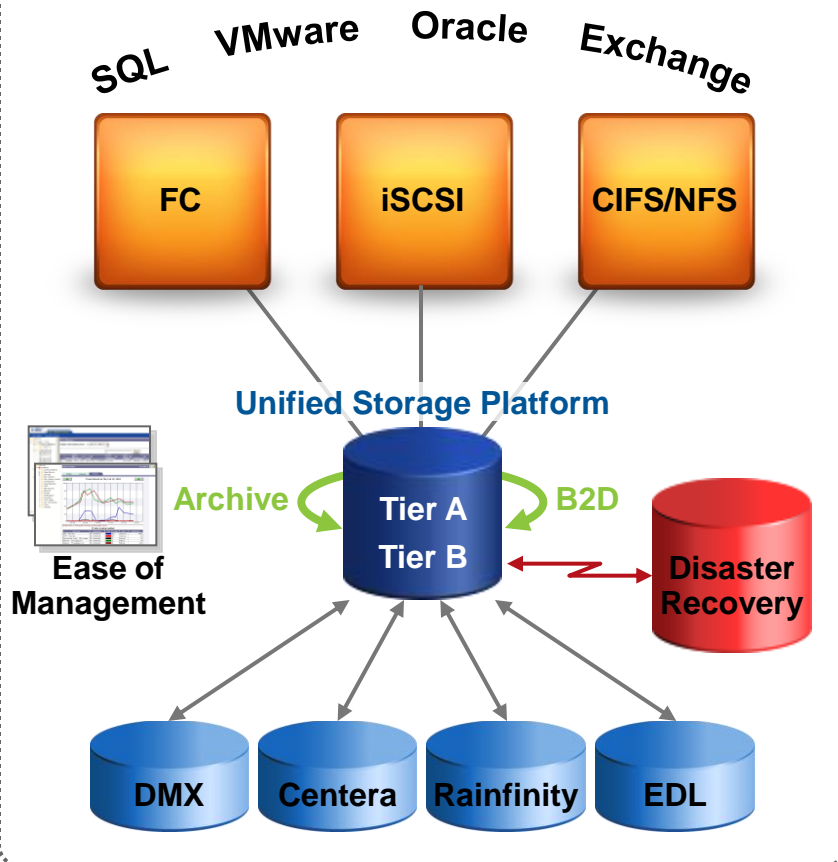
- On premise, off premise
- Private/public cloud
- Managed as a service

# Information Utility for the Private Cloud



# Unified Storage Benefits

## Unified Storage Application Value Proposition



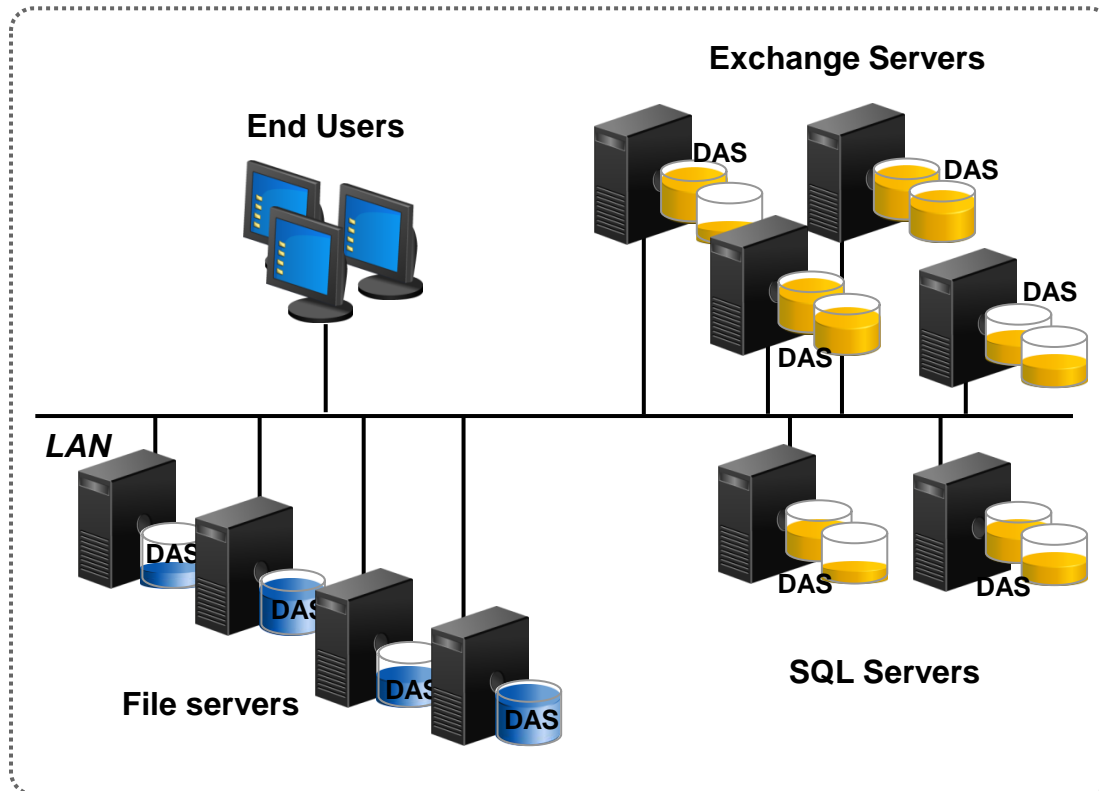
## Key Benefits

- Storage/file server consolidation via existing IP skills
- Extends consolidation benefits to stranded servers
- Control costs, simplify management, increase utilization, improve backups and increase availability
- Option to leverage Fibre Channel

## Ideal for

- VMware
  - Multi-protocol (NFS), SRM, VDI
- Oracle
  - dNFS, Writable Snaps for testing
- MS Exchange and SQL
  - VSS, Celerra Replicator for mixed Microsoft workloads, Writable Snaps for testing
- Windows, Linux/Unix File server consolidation

# Customer Example: Before



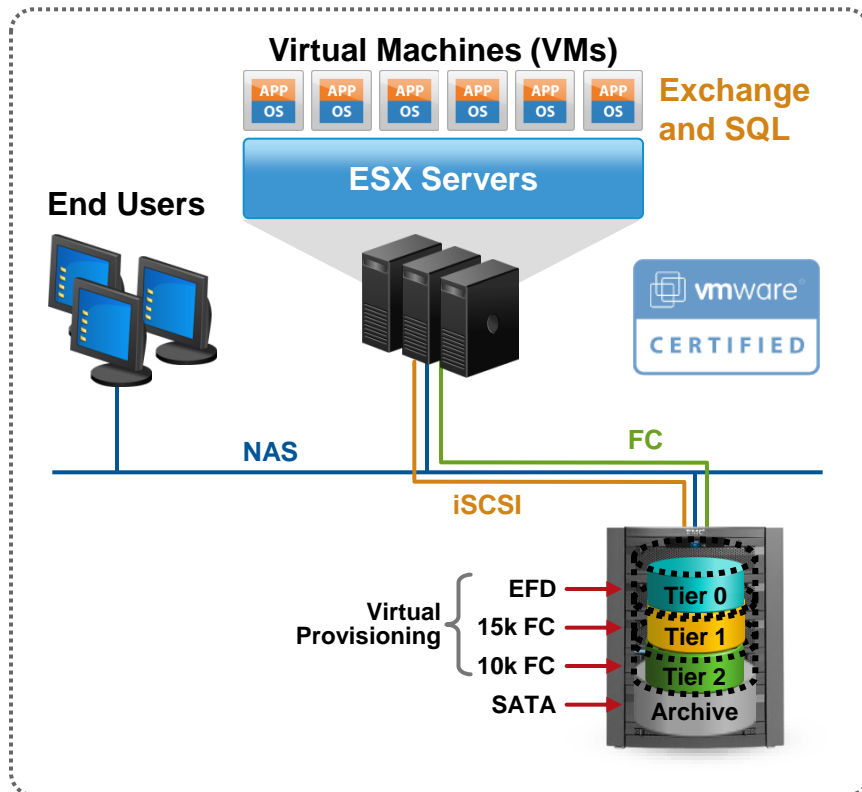
- **Current deployment**

- Several thousand mailboxes on multiple Exchange Servers
- Multiple file servers
- Terabytes of direct-attached storage

- **Issues**

- Poor utilization rates
- Excessive growth of unstructured data
- Difficult to scale (performance and capacity) without adding additional physical servers
- Limited floor space
- Excessive power and cooling costs

# Customer Example: After



- **Celerra Unified Storage consolidation with server virtualization**

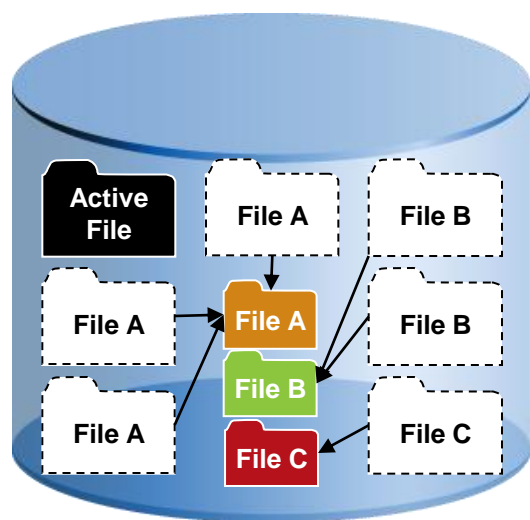
- Consolidated and virtualized all servers
- Consolidated all storage
- Eliminated all file servers
- Utilize:
  - All Open Systems protocols
  - Virtual Provisioning
  - File tiering with EFDs, FC, SATA drives
  - FileMover
  - Deduplication

- **Benefits**

- Improved utilization
- Lowered floor foot print
- Decreased power and cooling needs
- Reduced redundant data
- Leverages the existing LAN infrastructure
- Simplified management
- Lower total cost of ownership
- Utilize server virtualization

# Primary Data Deduplication

## Celerra Data Deduplication



Up to 50 percent storage savings for unstructured file share datasets

- Increased primary storage efficiency
  - Up to 50 percent savings
  - Built-in compression
  - Deduplicate files to remove duplicates
- Intelligent data selection
  - Targets inactive data
- Unobtrusive processing
  - Background processing with throttling
- Supports full Celerra functionality
- Easy to install and manage
  - One-click GUI enablement
  - Hands-off, policy-driven

**Based on Integration of Key EMC Technologies:  
Avamar De-duplication + RecoverPoint Compression**

## Celerra File-Level Retention

- Disk-based WORM for Celerra
- Prevents files from being modified or deleted
  - Set retention periods for files
  - Set on a per-file basis
- File-Level Retention Enterprise Option
  - Enables adherence to good business practices
- File-Level Retention Compliance Option
  - Meets SEC Rule 17a-4(f) compliance requirements

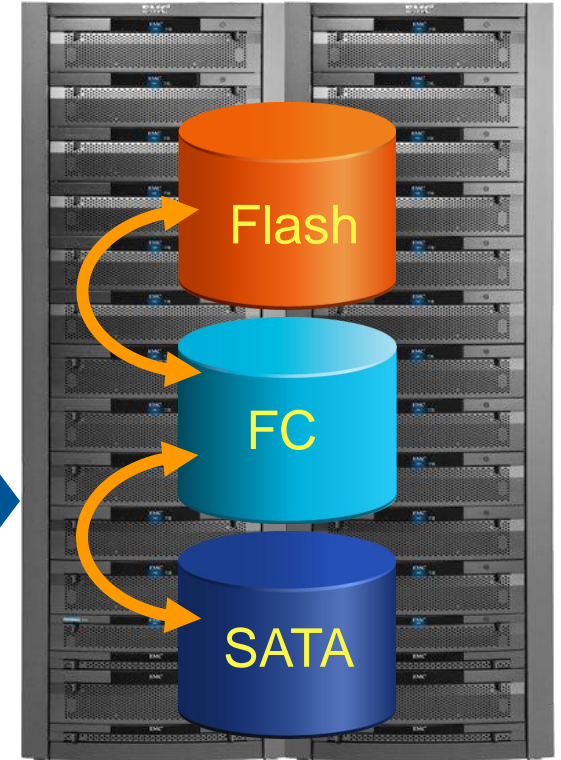
**Archiving with WORM  
Compliance in the Box**



# Fully Automated Storage Tiering: FAST

**Multi-protocol**  
+  
**Storage Tiering**  
+  
**Policy based mobility**  
+  
**De-duplication**  
+  
**Compression**

**Celerra  
FAST**

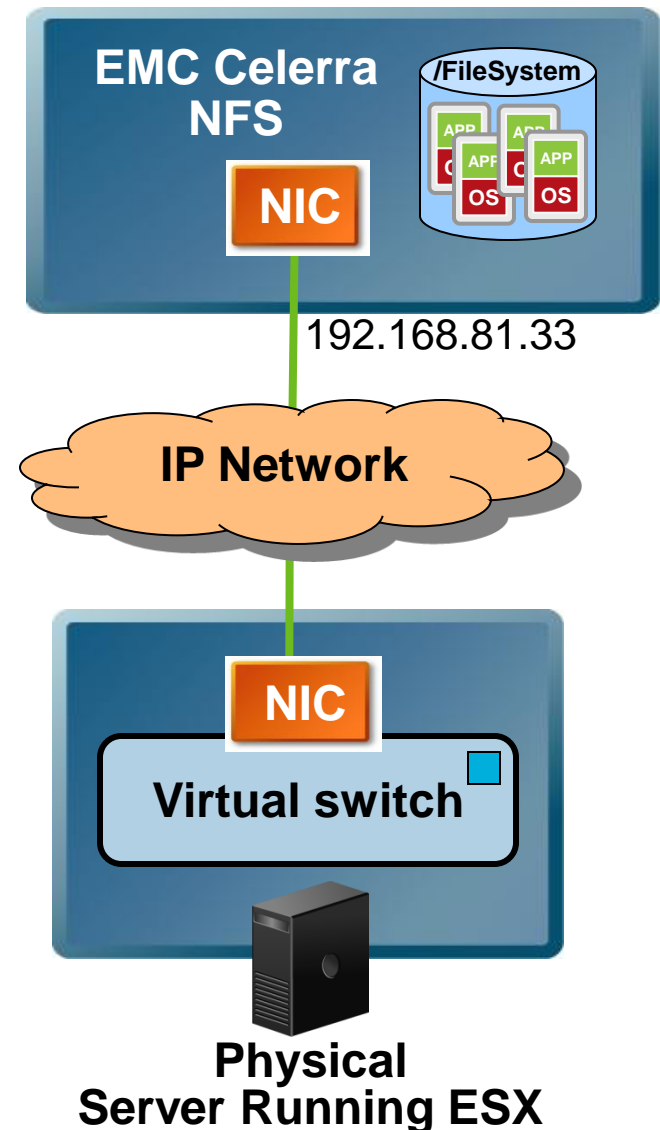


**Automates movement and placement of data based on changing needs**

# Why NFS for vSphere

## Every VMware guest image is a file... and managing files is what NAS is designed to do.

- ✓ De-duplication at the individual VMDK level
  - ✓ Through vSphere plug-in
- ✓ Fast and simple provisioning
  - ✓ vSphere plug-in- no storage tools required for data store creation
- ✓ Thin provisioning by default via VMWare
- ✓ Expand DataStore on the fly
- ✓ 10GbE performance that of 4Gb FCP
- ✓ Performance fit the profile of the majority of the uses
- ✓ No FC switches, zoning efforts
- ✓ No HBAs, no orange cables
- ✓ Granularity of storage based snapshots at the sub-VMDK level
  - ✓ Granular recovery of VMDKS, not entire data stores
- ✓ You can also backup whole VMs, or files within VMs



# Provision Storage from vCenter Client

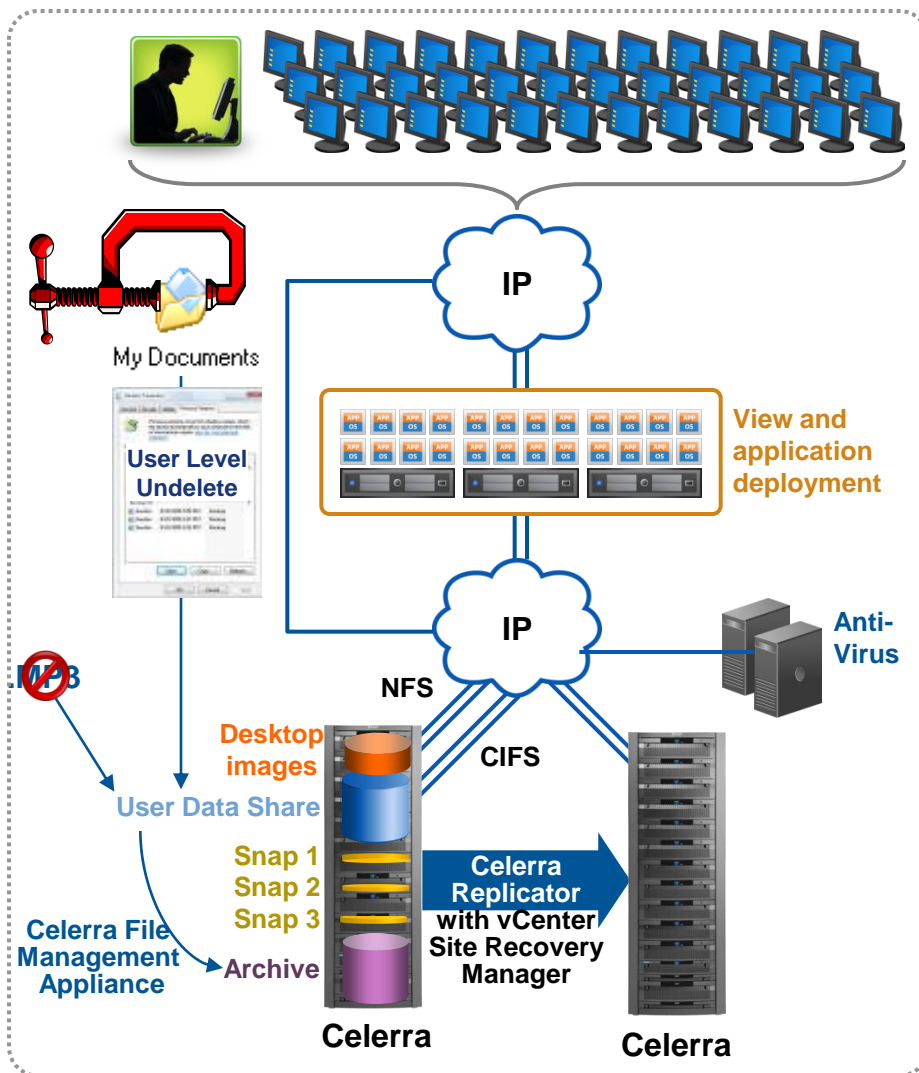
The screenshot displays the vCenter Client interface for a cluster named **CMHUNI\_HA\_CLUSTER**. The left-hand navigation pane shows the cluster structure, including hosts and virtual machines. The main pane shows the cluster's configuration tabs: **Getting Started**, **Summary**, **Virtual Machines**, and **Hosts**. A context menu is open over the cluster, listing various actions such as **Add Host...**, **New Virtual Machine...**, **New Resource Pool...**, **New vApp...**, **Rescan for Datastores...**, **Host Profile**, **Add Permission...**, **Alarm**, **Edit Settings...**, **Remove**, and **Rename**. The **EMC Celerra** option is highlighted, and its sub-menu is open, showing **Provision Storage...** as the selected action.

The **CMHUNI\_HA\_CLUSTER - Provision Storage** dialog box is open, showing the following configuration:

- Datastore Name:** NewDatastore
- Celerra Control Station:** 10.5.17.230
- Data Mover Name:** server\_2
- Data Mover Interfaces:** 192.168.17.233
- NFS Info:**
  - Create New NFS Export**
    - Storage Pool:** FCDrives (1.3 TB)
    - Initial Capacity:** 900 GB (Max: 1.3 TB)
    - Virtual Provisioning**
    - Max Capacity:** 12000 GB (Max: 16 TB)
    - Advanced...** button
  - Use Existing NFS Export**
    - NFS Export Name:** Choose One...
    - Advanced...** button

Buttons at the bottom of the dialog: **Help**, **OK**, and **Cancel**.

# Use Case: VMware View Infrastructure



- Efficient storage provisioning
  - NFS ease of management and provisioning
  - NFS FAST clones, array replicates, or VMware linked clones
  - Flash drives to meet I/O requirements-key
- Automated support for user data
  - Home directory Microsoft Management Console (MMC) plug-in
    - Integrated management for My Documents folders
  - Common CIFS share
    - Separate share security
- Efficient user data management
  - Quota management
  - Data deduplication
  - File filtering: primary storage and backup
  - Centralized anti-virus through Celerra Anti-Virus Agent (CAVA)
  - Active archive with Celerra File Management Appliance
- Improve data protection
  - User-level undelete
  - Celerra Replicator disaster protection
    - vCenter Site Recovery Manager integration with Failback plug-in
- Documented best practices

## Leverage EMC Global Services expertise to design optimum tiered storage strategies and improve storage economics.

### 1. Perform an assessment or data classification

#### **EMC Assessment services**

- Identify information utilization and growth
- Understand service level considerations for applications

#### **EMC Data Classification services**

- Map data categories within your organization
- Align core business function and associated storage tiers

*Typical findings:*

*Over 60% of files have not been accessed in over 6 months and are ideal candidates for tiered storage.*

### 2. Streamline data migration

#### **EMC Migration Suite**

- Reduce the time, cost, and disruption of relocating data
- Leverage data migration best practices

*EMC migrates petabytes of data every month.*

**13,000+ professionals worldwide, plus a global network of alliances and partners, deliver exceptional total customer experience, proven methodologies, and industry best**

**EMC<sup>2</sup>**<sup>®</sup>

**where information lives<sup>®</sup>**