HP Converged Storage:

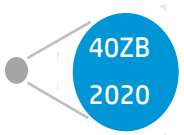
Enabling a New Style of IT

Storage must change to support the New Style of IT: Need to Simplify

The New Style of IT

- Security
- Big Data
- Mobility
- Cloud

Data Explosion

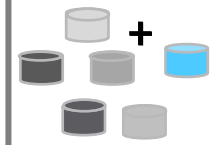


- Volume
- Variety
- Velocity

Technology Choices

- Flash
- Compaction
- Software-defined

Fragmented Complexity



- Training
- Management
- Replication
- Interoperability

New Models

- Converged (Hyper)
- Cloud
- Software-defined DC

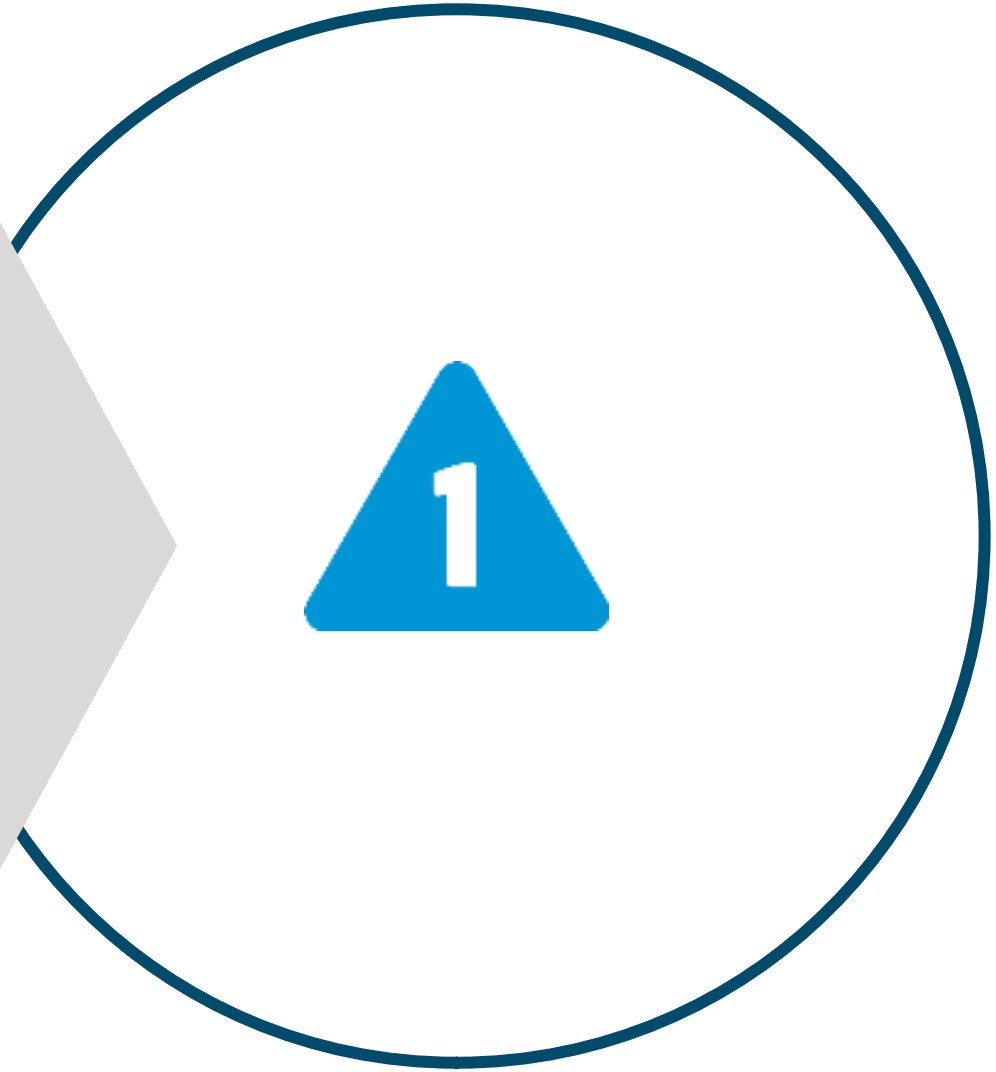
- Support growth without complexity
- Handle unpredictable demand gracefully
- Deliver responses as fast as necessary
- Offer high service levels at xSP costs
- Reduce and manage business risk
- Provide seamless investment protection

HP 3PAR StoreServ

HP has a clear vision for the future

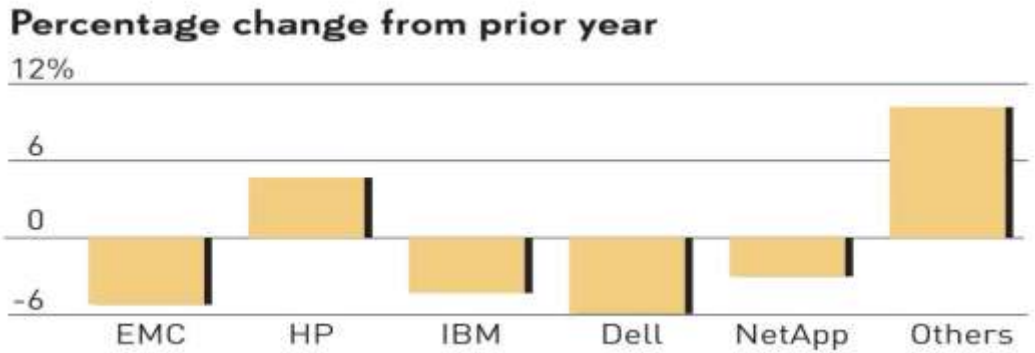
Our vision: Polymorphic Simplicity
Adj. Existence in several forms, shapes, & sizes

- **One** flash optimized primary storage system architecture with File, Block, and Object personas
- **One** hypervisor agnostic, software-defined storage platform approach with File, Block, and Object personas
- **One** converged data protection and retention architecture for ROBO, datacenter, & cloud
- **One** open, software-defined control plane for provisioning, interoperability and protection



Taking the road less traveled is paying off

"Hewlett-Packard, the second largest vendor, had the **strongest year-over-year growth among the top five vendors**. HP sales of storage systems rose 4.7%" – Investor's Business Daily



Gartner Critical Capabilities Use Case Report

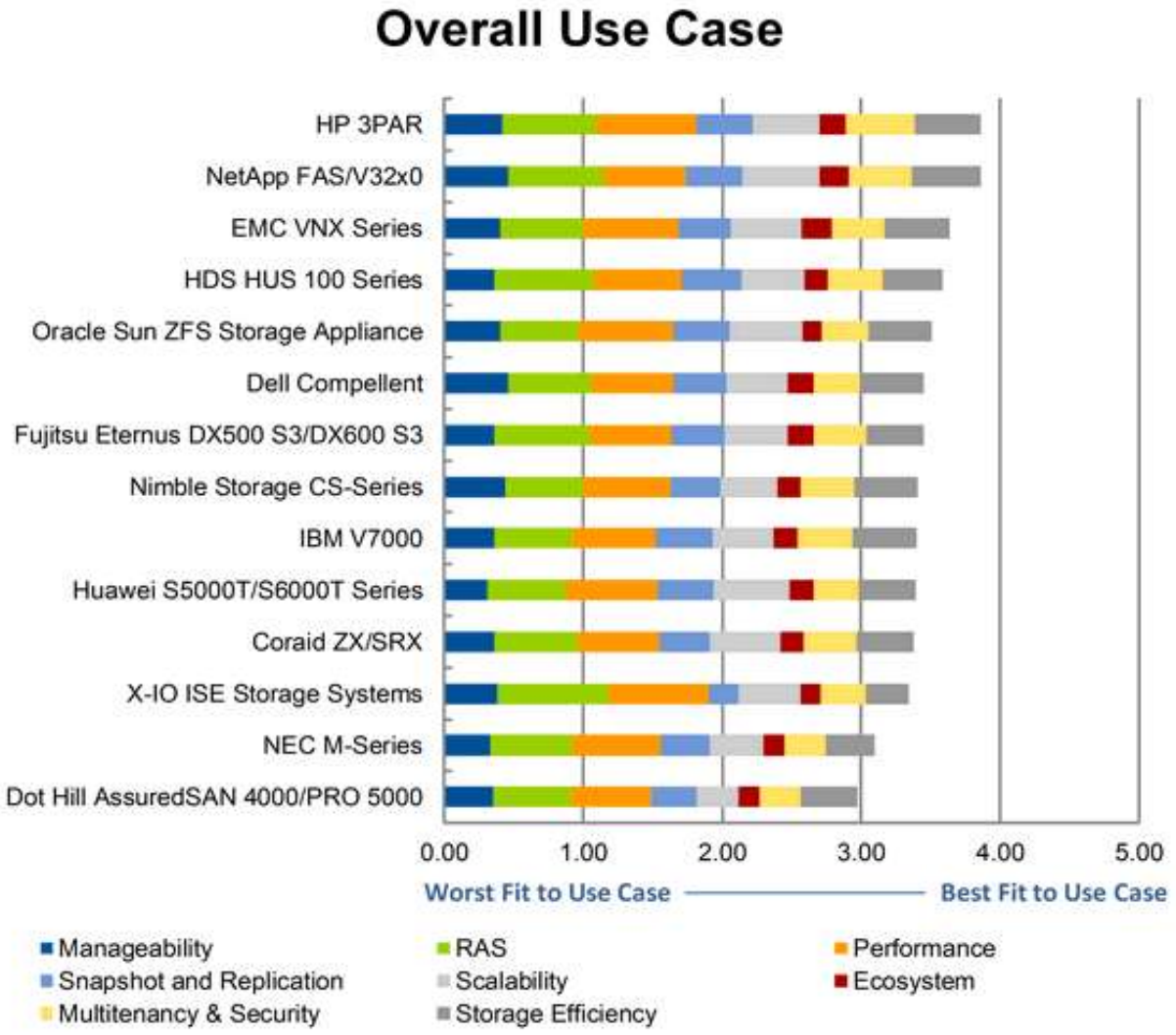


Table 4. Product Score in Use Cases

Use Cases	Dell Com-pellent	EMC VNX Series	HDS HUS 100 Series	HP 3PAR	IBM V7000
Overall	3.5	3.6	3.6	**3.9**	3.4
Consoli-dation	3.4	3.6	3.6	**3.9**	3.4
OLTP	3.5	3.7	3.7	**3.9**	3.4
Server Virtuali-zation and VDI	3.4	3.6	3.6	**3.9**	3.4
Analytics	3.4	3.6	3.6	**3.8**	3.4
Cloud	3.5	3.6	3.5	**3.8**	3.4

- Ranked #1 in Overall Use Cases
- Best Performance for all Workloads

2014 Gartner Magic Quadrant

for General-Purpose Disk Arrays

A Leader for General-Purpose Disk Arrays

HP is named a leader in the General-Purpose Disk Arrays report for HP 3PAR StoreServ, HP XP and HP StoreVirtual.

*This graphic was published by Gartner, Inc. as part of a larger research document and should be evaluated in the context of the entire document. The Gartner document is available upon request from HP.

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Gartner, Magic Quadrant for General-Purpose Disk Arrays, Stanley Zaffos, Roger Cox, Valdis Filks Novenber 20, 2014.

HP 3PAR StoreServ validated for the New Style of IT

Midrange Array
Best-in-Class
HP 3PAR StoreServ 7400

High End Array
Best-in-Class
HP 3PAR StoreServ 10000

Flash Memory Storage Array
Recommended
HP 3PAR StoreServ 7450

InfoWorld
Technology of the Year
HP 3PAR StoreServ 7400

#1

Gartner

Gartner Critical Systems Capabilities
#1 Mid Range Overall Use Case
HP 3PAR StoreServ 7000

Storage Magazine
#1 Midrange Storage Vendor
3PAR StoreServ 7400

#1

Gartner

Gartner Critical Systems Capabilities
#1 Solid State Arrays RAS,
Multi-tenancy, & Security Use Cases
HP 3PAR StoreServ 7450

The next phase of the 3PAR [R]evolution

- Delivering True Protocol Convergence
- Accelerating 3PAR Flash Everywhere
- Delivering The Ultimate Flash Array
- Enabling Easy EMC VMAX Transition

HP 3PAR StoreServ is eliminating boundaries

Polymorphic Simplicity
ONE Architecture

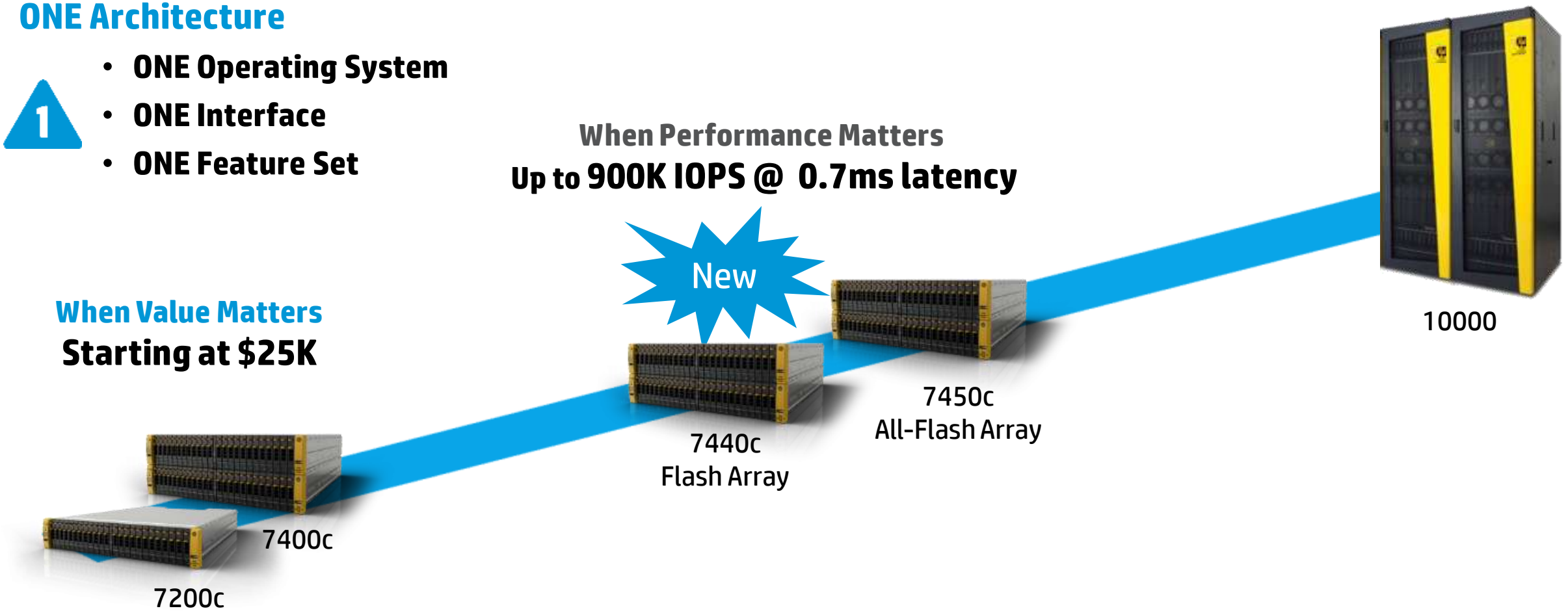
1

- ONE Operating System
- ONE Interface
- ONE Feature Set

When Value Matters
Starting at $25K

When Performance Matters
Up to 900K IOPS @ 0.7ms latency

When Scale Matters
Up to 3.2 PB



New 3PAR StoreServ Converged Controllers

HP 3PAR StoreServ 7000 Storage Converged Controller Models Overview

Tier-1 Truly Converged Storage Platform

The HP 3PAR StoreServ 7000 Storage Converged Controller Models are a refresh of the HP 3PAR StoreServ 7000 Storage family with a truly converged controller

What's new

- Support for truly converged file, block, and object access
- New HP 3PAR StoreServ 7440c model
- Higher scalability (drives, raw capacity, logical limits)
- New host I/O interfaces (16Gb/s FC, 1GbE/10GbE NICs)

NEW: HP 3PAR StoreServ 7000 Storage Converged Controller

Tier-1 Truly Converged Storage Platform

Convergence
Support for truly converged block, file, and object access

Tier-1 Resiliency
Persistent technologies deliver six-nines availability [1]

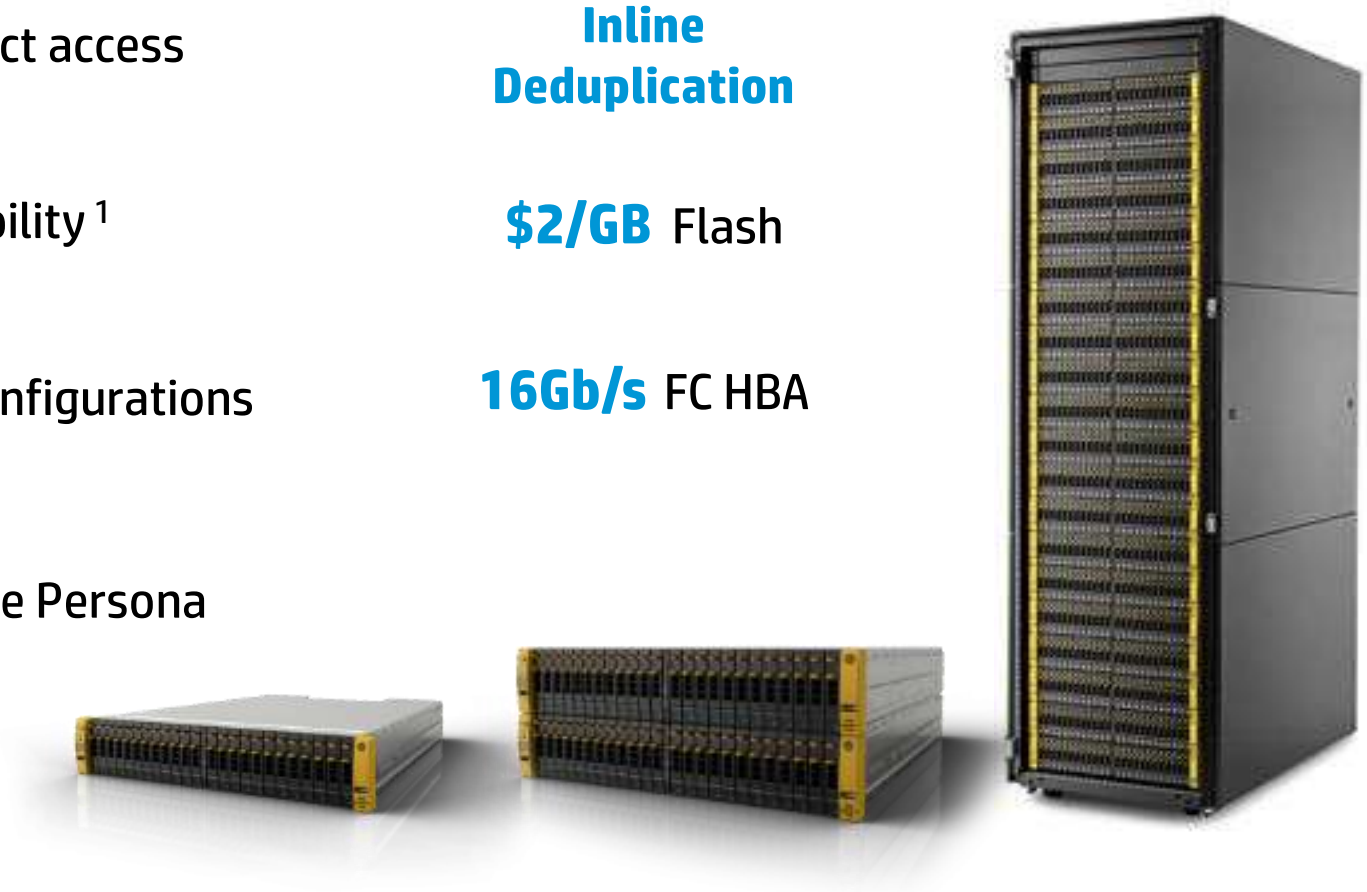
Performance
Application acceleration in hybrid or all-flash configurations

Rich Data Services
Deduplication, Flash Cache, QoS, Replication, File Persona

Inline Deduplication

$2/GB Flash

16Gb/s FC HBA



1. Under the six-nines availability program

16Gb HBA Support with 3PAR StoreServ Storage

End to End Accelerated Performance for Flash Storage

Option available for all HP 3PAR StoreServ Storage

- Improved throughput for certain workloads
- Future proof your storage

Supports Persistent Ports for improved availability

- Ensures no host path disruption during planned maintenance or SW upgrade

HP 3PAR StoreServ 7000 Converged Controller Storage HW Details

Enhancements to current HP 3PAR StoreServ 7000 Storage family are highlighted in **blue**

New

Item	7200c	7400c	7440c	7450c
Number of Controller Nodes	2	2 or 4	2 or 4	2 or 4
HP 3PAR Gen4 ASICs	2	2 or 4	2 or 4	2 or 4
CPU (per controller node)	**6-core 1.8 GHz**	6-core 1.8 GHz	8-core, 2.3 GHz	8-core, 2.3 GHz
Total Cache	800 GB	1.6 TB	3.2 TB	**192 GB**
Total Flash Cache	768 GB	1500 GB	3 TB	Not applicable
Total On-Node Cache	**40 GB**	**96 GB**	192 GB	**192 GB**
Number of Disk Drives	8 – 240	**8 – 576**	8 - 960	Not applicable
Number of Solid State Drives	8 – 120	8 - 240	8 - 240	8 – 240
Max Raw Capacity	**500 TB**	**1600 TB**	2000 TB	460.8 TB
Drive Enclosures	SFF: 24 slots in 2U LFF: 24 slots in 4U			
Number of Drive Enclosures	0 – 9	**0 – 22**	0 - 38	0 - 18
Host Adapters	4-port 8Gb/s FC	2-port 16Gb/s FC	2-port 10Gb/s iSCSI/FCoE	**4-port 1GbE NIC**	**2-port 10GbE NIC**

Adaptive Flash Cache

Adaptive Flash Cache provides performance acceleration for random reads

Included as part of Base Os Suite

Enable/disable on the entire system wide or on selected vvsets

Minimum Flash Cache per node pair is 64GB

	HP 3PAR 7200	HP 3PAR 7400	HP 3PAR 10400 old	HP 3PAR 10400 new	HP 3PAR 10800
Minimum amount of Drives per Node Pair	4	4	2xDMAG (8Drives)	2xDMAG (8Drives)	2XDMAG (8Drives)
Maximum Amount of Flash Cache per system	768GB	1.5TB	3TB	4TB	8TB
Maximum Amount of Flash Cache Node Pair	768GB	768GB	1.5TB	2TB	2TB
Total System Cache DRAM+AFC	792 GB	1,564 GB	3,384 GB	4,384 GB	8,768 GB

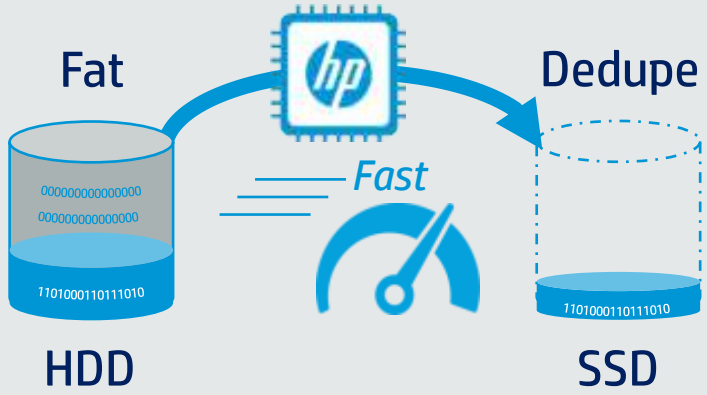
NOTE:

- The minimum amount of SSD drives will work for Adaptive Flash Cache **only**. For Provisioning and AO the minimum remains 8 per node pair.
- All SSDs are supported to be used for AFC with the only exception for the 480GB cMLC (E7Y55A/E7Y56A) SSD that will **not** support creation of Adaptive Flash Cache.
- Adaptive Flash Cache is **not** applicable to AFA not will accelerate data that is already stored within the SSD tier.

Free Capacity for existing HP 3PAR Customers

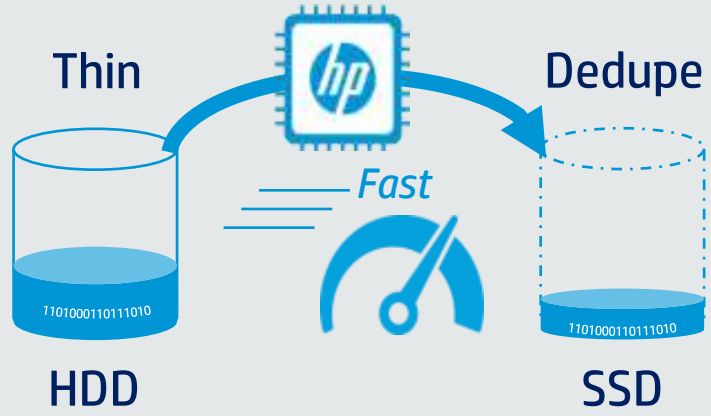
Transition to Flash without “rip and replacing” existing environment

New: Fat-to-Dedupe



Save capacity and accelerate performance by Migrating Fat volumes from an HDD tier to an SSD tier

New: Thin-to-Dedupe

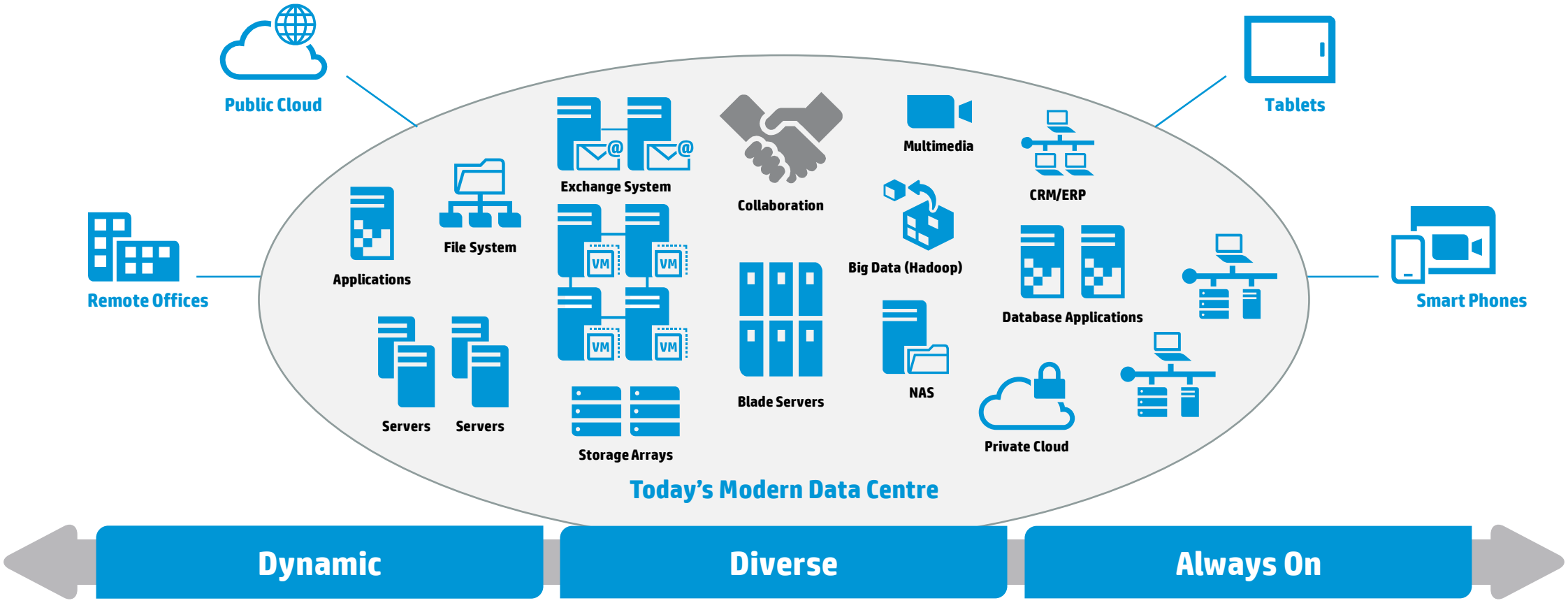


Save capacity and accelerate performance by migrating Thin volumes from an HDD tier to an SSD tier

Reduce the acquisition and operational cost of data center storage

Data Protection Challenges and Pain Points

Today's Data Centre resembles...



Thinking about managing and protecting data……

Typically we see sticking plasters not Transformation

Fighting conventional wisdom: common challenges and common responses

We are running out of capacity	Let's add more disks 
Applications are slowing down	Upgrade infrastructure 
Backup takes longer and longer	Change backup infrastructure 
We need to be compliant	Implement an archive, DMS, RMS 
We need to retain information for a period of time	We keep everything forever 
We need to retrieve information, historical information	Look into different sources, tapes 

Data Protection challenges – Areas to consider

Backup Process

How are you protecting it?

Array Snapshots
File-level Backup
Array Replication
Disk-To-Disk

Complexity

Backup Targets

Where are you protecting it?

Primary Data Center
Secondary Sites
Disk Tape

Remote Office & Corporate

Restore Process

How quickly can you get it back?

Files/Folders
Complete Applications
Full Systems
Storage Objects

Recovery

Expenditure

How much can you invest in it

Budget
Headcount
Management
Storage

CapEx and OpEx

Retention Needs

How long do you have to keep it?

Days
Months
Years
Forever

Retention Period

Backup or Archive? They are different.

Understanding the difference and value

	Backup	Archive
Method	Copy of production data	Original removed from production
Purpose	To recover data in the event of data loss, destruction,corruption etc.	To retain data for regulatory compliance, e-Discovery support Helps shorten backup & recovery windows Reduce total costs of storage
Data policies	Recovery Time Objectives (RTO) Recovery Point Objectives (RPO)	Retention periods Access controls
Data handling	Duplicate copies are periodically overwritten	Data cannot be altered or deleted before retention expires
Storage	Augmented with deduplication	Typically augmented by WORM
Discovery	Contents needs to be indexed before running discovery search requests	Indexed content readily available to satisfy expedited discovery search requests

Why transform now?

30% of typical IT budget is spent on data storage

60% of all enterprise space is taken by copies

85% of storage spend is for managing copies

8x more spent on copies as on storage for data and analytics

We want to sell you **LESS** storage and help drive **VALUE** from data

Source: IDC, 2013

Backup Solutions

"Protected by HP"

Why Disk for Backup?

Your IT Staff No longer needs to

- Swap Tapes
- Move Tapes on and offsite
- Store Tapes
- Track What Tapes are Where
- Have Daily Grind of Uncertainty on Backup to Tape
- No Longer Bogged down Trouble Shooting failed backup Jobs
- NO MIGRATION BETWEEN LTO GENERATIONS. NO COMPATIBILITY ISSUES

Frees up your Team for more Strategic Initiatives such as

Disk + Deduplication + Replication + Backup Software = Near-real Time

Business Continuity

Dedupe basics -

The principle behind how deduplication works

Traditional backup

1) You create a 10MB PowerPoint and email it to 9 other people
   - Traditional backup says 10 copies at 10MB = 100MB backed up

2) You change just the title slide and send out to the same 9 people.
   - Traditional backup says it is a new file
   - 10 copies at 10MB = 100MB backed up

Total data backed up = 200MB

Deduplicated backup

1) You create a 10MB PowerPoint and email it to 9 other people
   - Dedupe says I have 10 identical copies - I only need to backup one copy = 10MB
2) You change just the title slide and send out to the same 9 people
3) Dedupe says I only need to backup a single copy (10MB) **BUT** the only thing that has changed from the previous version is the title slide - so I backup just the title slide
4) In practical terms this might be say 10KB

Total data backed up = 10.01MB

Multiply the above principle by 10's, 100's, 1000's of employees, emails, MS Office data , databases, remote sites, daily backups; **deduplication can save organizations significant expenditure**

HP StoreOnce Family

Polymorphic simplicity
ONE Architecture

- Small sites to Enterprise to xSP
- Backup and Replicate anywhere

HP Data Protector

StoreOnce in
HP Data Protector

VSA
Series

VSA

2700
Series

5.5TB usable

4500
Series

Scalable to
124TB usable

4700
Series

Scalable to
160TB usable

4900
Series

Scalable to
432TB usable

6500
Series

Scalable to
1.7PB usable

StoreOnce Catalyst

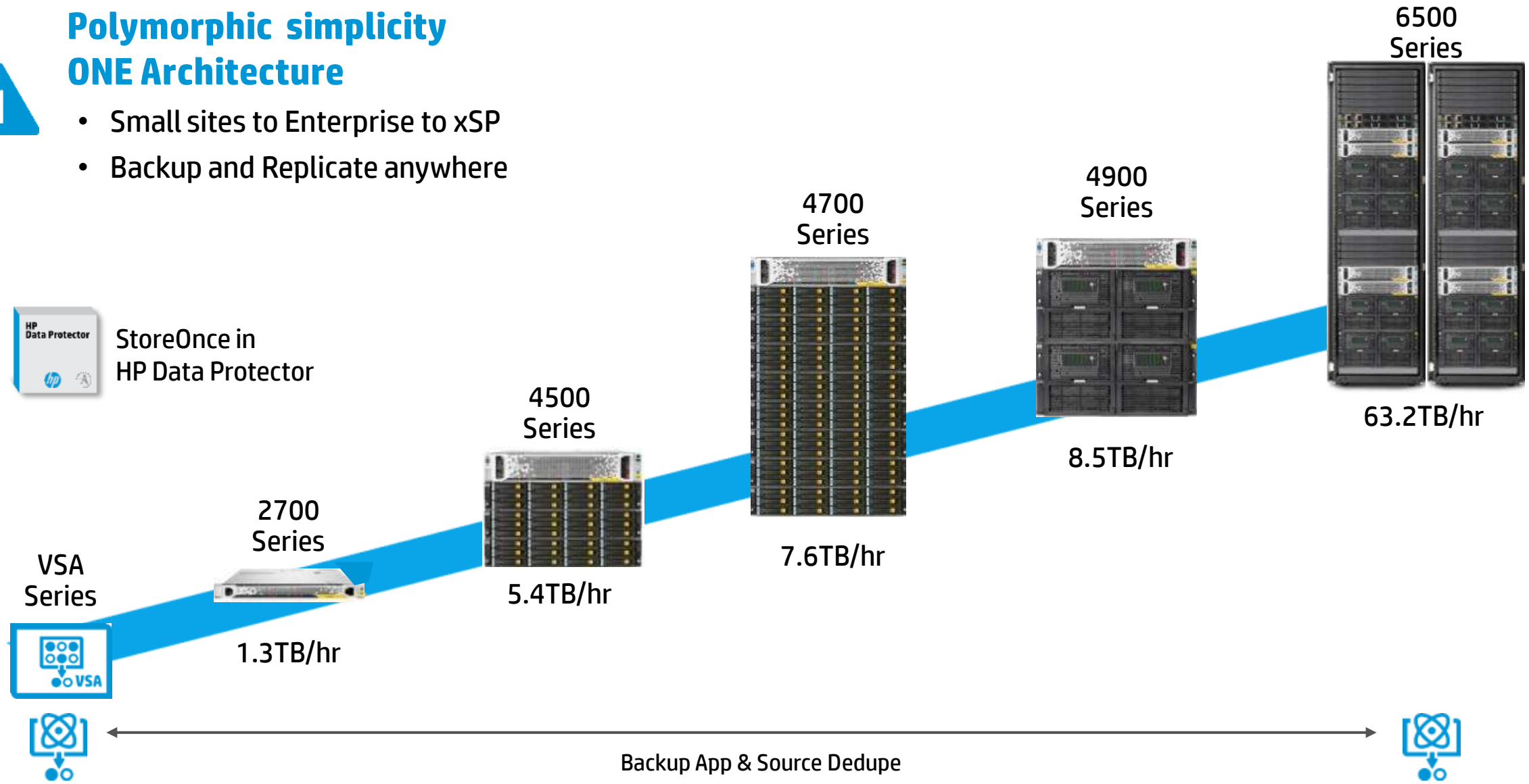
Backup App & Source Dedupe

HP StoreOnce Family (Performance – VTL)

Polymorphic simplicity
ONE Architecture

1

- Small sites to Enterprise to xSP
- Backup and Replicate anywhere



HP StoreOnce Family – (Performance – Catalyst)

Polymorphic simplicity
ONE Architecture

- Small sites to Enterprise to xSP
- Backup and Replicate anywhere

StoreOnce in
HP Data Protector

VSA Series

2700 Series

3.7TB/hr

4500 Series

14TB/hr

4700 Series

22TB/hr

4900 Series

22TB/hr

6500 Series

139TB/hr

StoreOnce Catalyst

Backup App & Source Dedupe

How Can We Help You?

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Thank you!