



HP 3PAR

A technical overview of the HP 3PAR Utility Storage
The world's most agile and efficient Storage Arrays

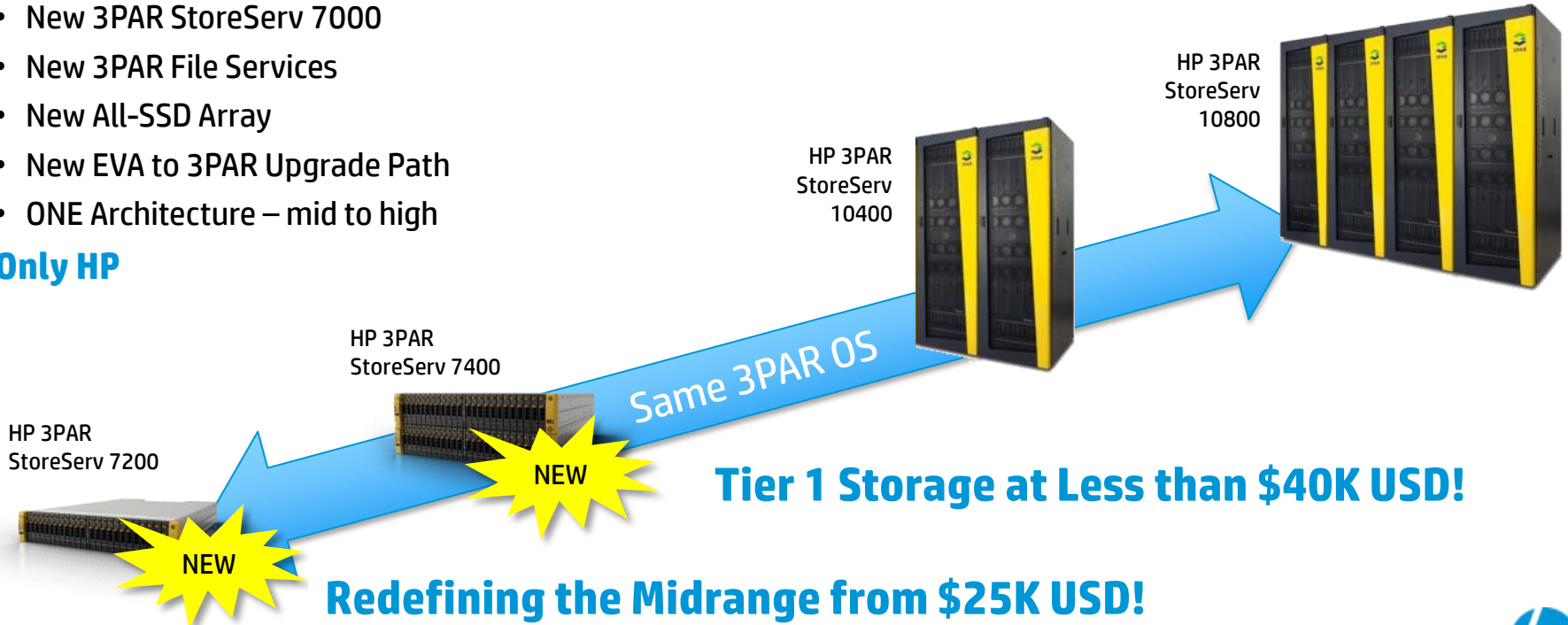


Eliminating distinctions between Midrange and Tier 1

Polymorphic Simplicity: Storage Without Boundaries

- New 3PAR StoreServ 7000
- New 3PAR File Services
- New All-SSD Array
- New EVA to 3PAR Upgrade Path
- ONE Architecture – mid to high

Only HP

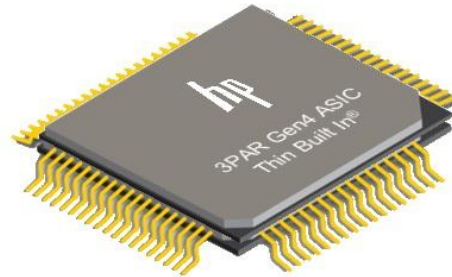


HP 3PAR ASIC

Hardware Based for Performance

Thin Built in Zero Detect

Fast RAID 10, 50 & 60
Rapid RAID Rebuild
Integrated XOR Engine

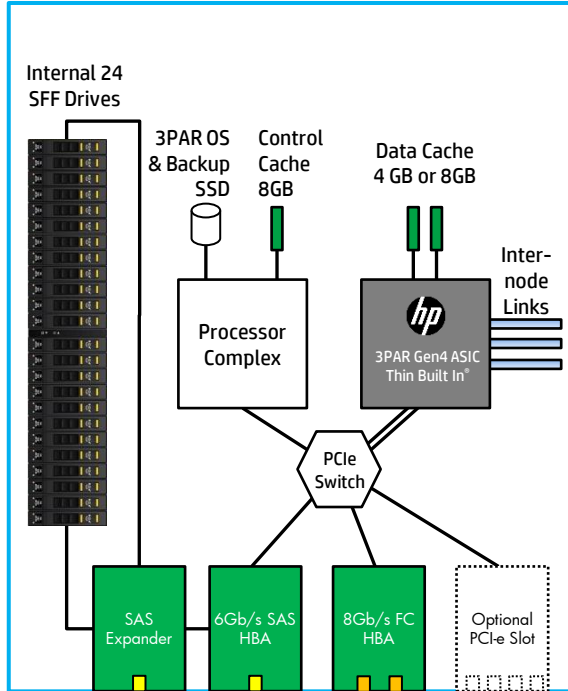


Tightly-Coupled Cluster
High Bandwidth, Low Latency Interconnect

Mixed Workload
Independent Metadata and Data Processing

HP 3PAR StoreServ 7000 Controller Nodes

2 to 4 nodes per system – installed in pairs

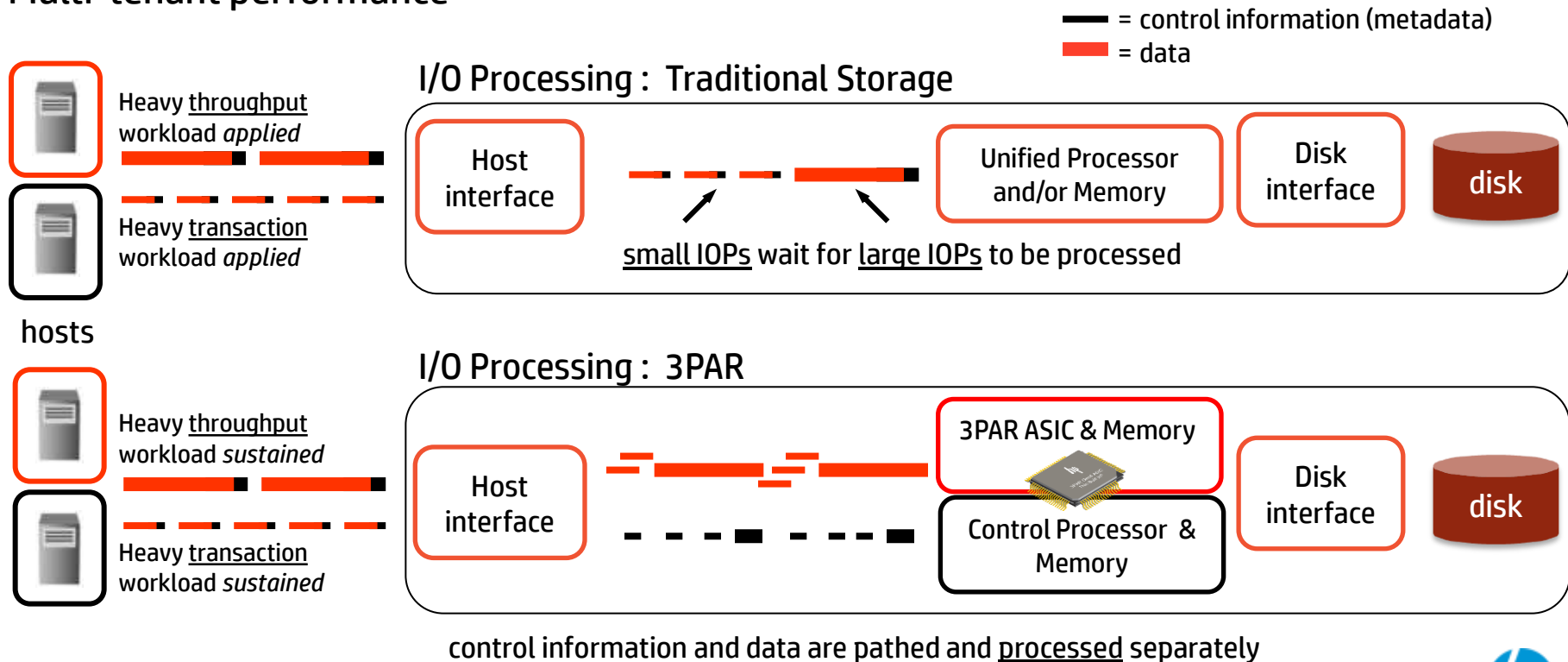


Per Node configuration

- Thin Built In™ Gen4 ASIC
- Intel 1.8 GHz Processor
 - 7200 4-core
 - 7400 6-core
- Data Cache
 - 7200 4GB
 - 7400 8GB
- 8Gb Control Cache
- 2 built-in 8Gb/s FC Ports
- Optional PCI-e Adapter
 - 4-Port 8Gb FC or
 - 2-Port 10Gb/s CNA

3PAR Mixed workload support

Multi-tenant performance





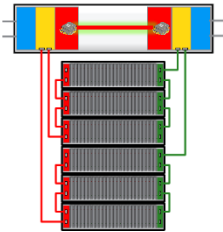
HP 3PAR OS™ Virtualization Concepts



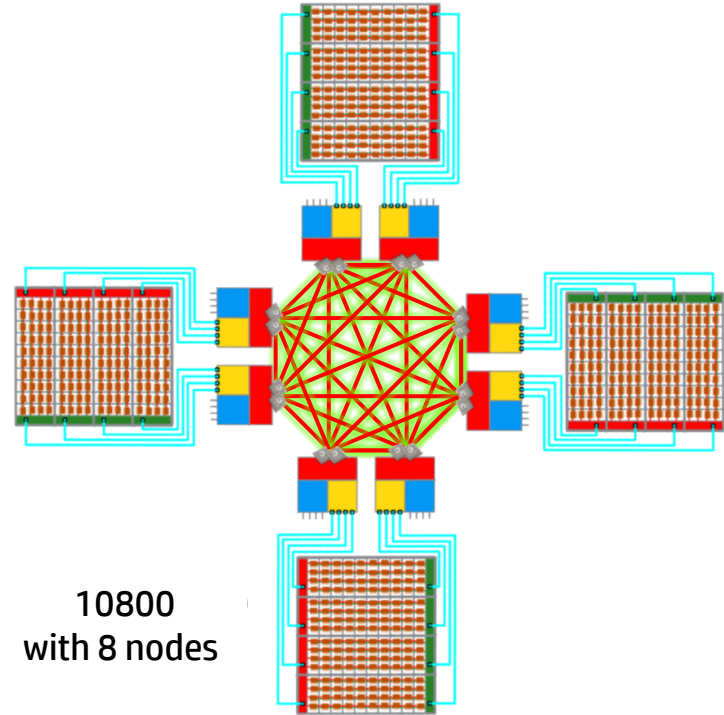
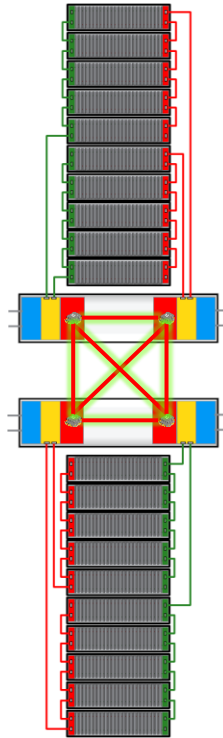
3PAR Hardware Architecture

Cost-effective, scalable, resilient, meshed, active-active

7200
with 2 nodes



7400
with 4 nodes



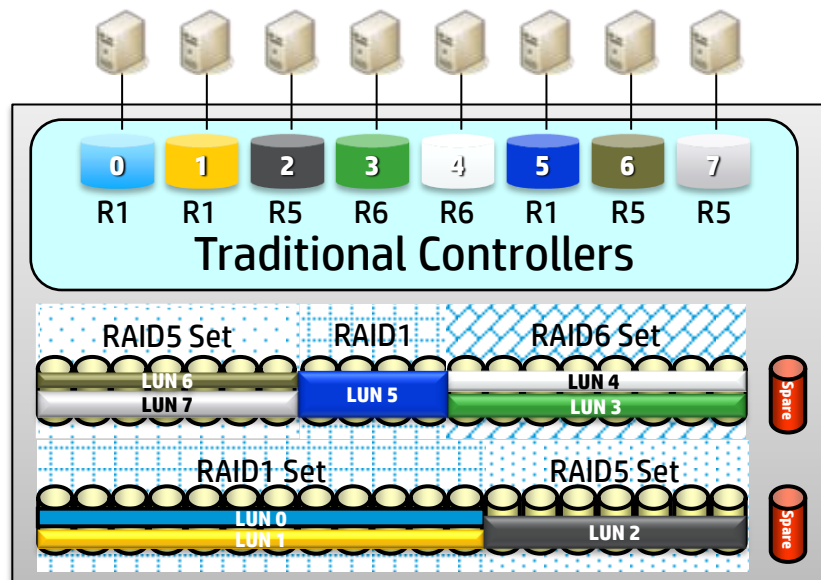
10800
with 8 nodes

- Host Ports
- Cache
- Disk Ports

HP 3PAR virtualization advantage

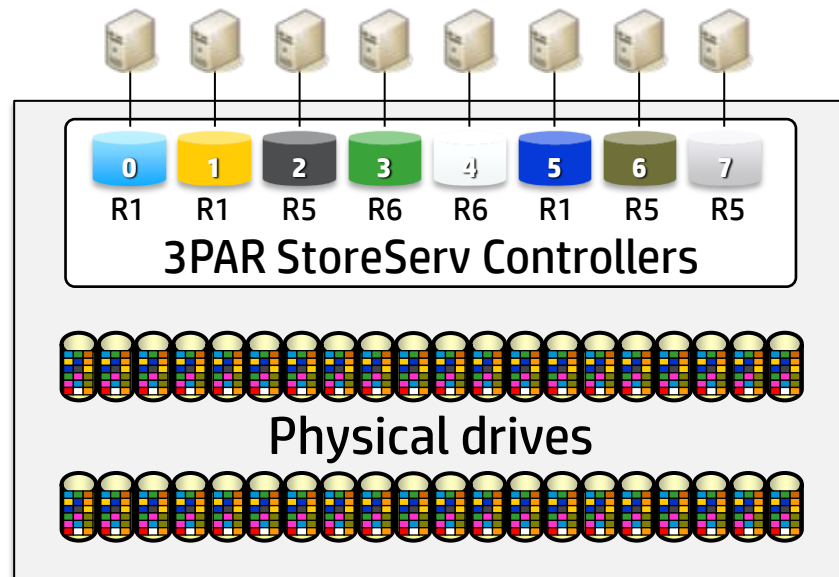
Traditional Array

- Each RAID level requires dedicated drives
- Dedicated spare disk required
- Limited single LUN performance



HP 3PAR

- All RAID levels can reside on same drives
- Distributed sparing, no dedicated spare drives
- Built-in wide-striping based on Chunklets



Why are Chunklets so Important?

Ease of use and Drive Utilization

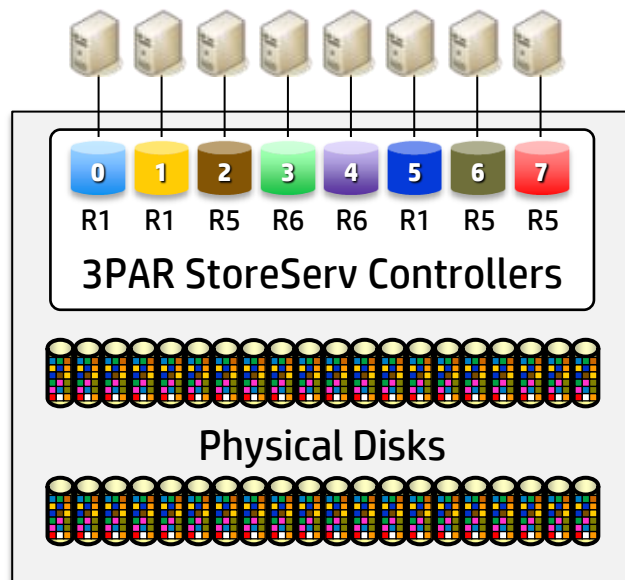
- Same drive spindle can service many different LUNs, RAID types and RAID sizes at the same time
 - RAID1
 - RAID5 – 2:1 to 8:1
 - RAID6 – 4:2; 6:2; 8:2; 10:2; 14:2
- Array managed by policies, not by administrative planning
- Enables easy mobility between drives, RAID types and service levels by using Dynamic or Adaptive Optimization

Performance

- Enables wide-striping across hundreds of drives
- Avoids hot-spots
- Autonomic data restriping after disk installations

High Availability – selectable by CPG

- HA Magazine - Protect against magazine failure (Industry standard)
- HA Cage - Protect against a cage (full disk shelf) failure.



Common Provisioning Groups (CPG)

CPGs are Policies that define Service and Availability level by

- Drive type (SSD, Fast Class, Nearline)
- Number of Drives (striping width)
- RAID level (R10 / R50 2:1 to 8:1 / R60 4:2; 6:2; 8:2; 10:2; 14:2)

Multiple CPGs can be configured and optionally overlap the same drives

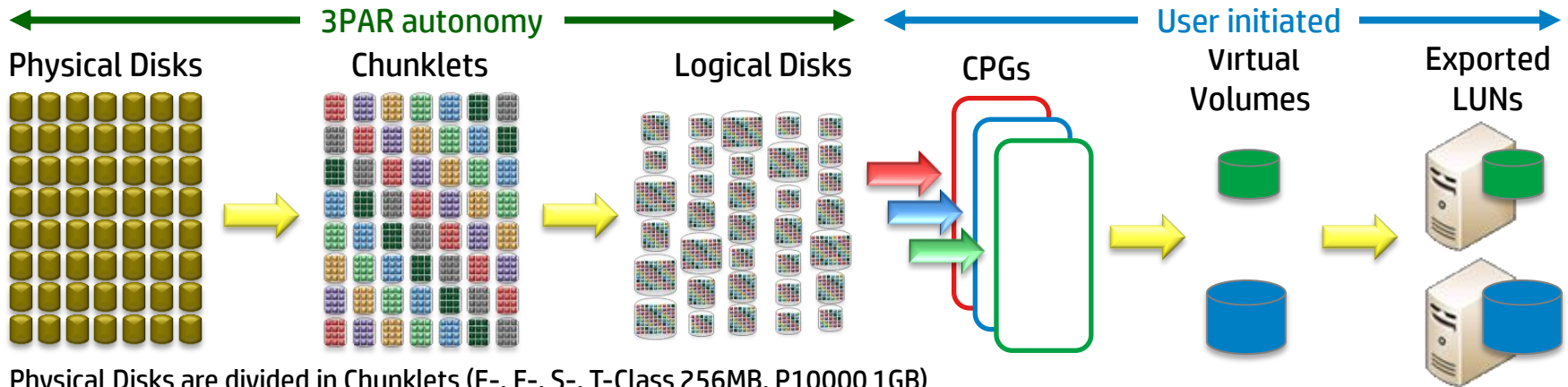
- i.e. a System with 200 drives can have one CPG containing all 200 drives and other CPGs with overlapping subsets of these 200 drives.

CPGs have many functions:

- They are the policies by which free Chunklets are assembled into logical disks
- They are a container for existing volumes and used for reporting
- They are the basis for service levels and our optimization products.



HP 3PAR Virtualization – the Logical View



Physical Disks are divided in Chunklets (E-, F-, S-, T-Class 256MB, P10000 1GB)

- The majority is used to build Logical Disks (LD), some for distributed sparing

Logical Disks (LD)

- Are collections of Raidlets → Chunklets arranged as rows of RAID sets (Raid 0, 10, 50, 60)
- Are automatically created when required and provide the space for Virtual Volumes, Snapshot and Logging Disks

Common Provisioning Groups (CPG)

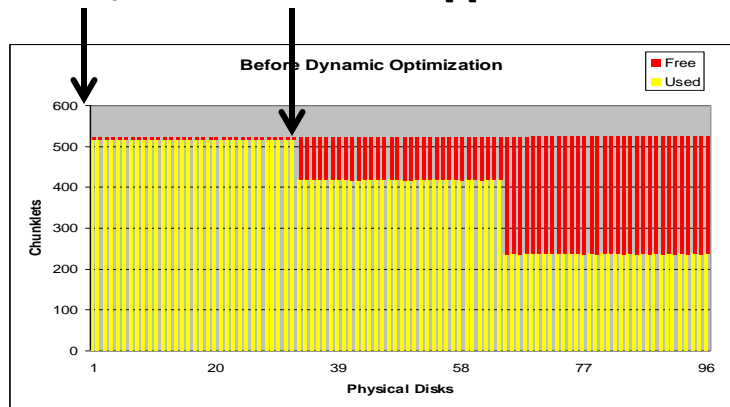
- User created virtual pools of Logical Disks that allocates space to virtual volumes on demand
- The CPG defines RAID level, disk type and number, striping pattern etc.

Virtual Volumes (VV) – Exported LUNs

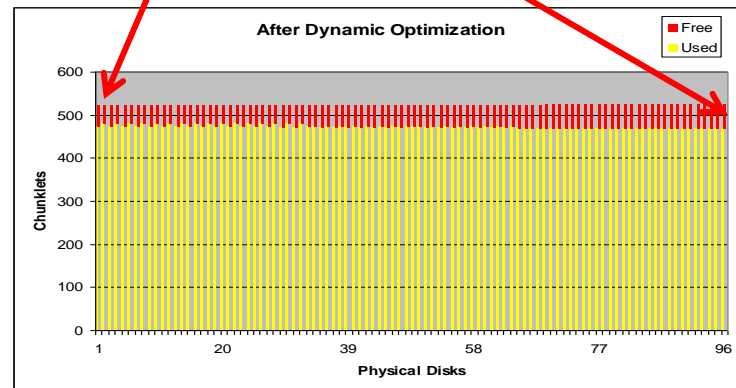
- User created fat or thin provisioned volumes composed of LDs according to the specified CPG policies
- User exports VV as LUN

Rebalancing and Tuning - Tunesys

6,400 IOP's Dbase Application



19,200 IOP's available Dbase Application



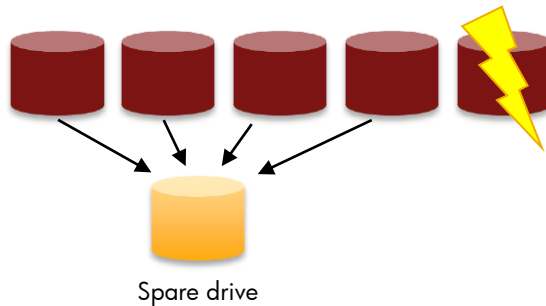
- Intelligently ordered
- Policy-abiding
- Throttled rebalance of all volumes
 - base volumes & snapshots
 - fat & thin, tiered or not
 - Intelligent sub-volume rebalance
- Ability to rebalance after upgrades for nodes and drives without Dynamic Optimization license for the 3PAR StoreServ 7000
- Ability to schedule on a regular basis

Optimize QoS levels with autonomic rebalancing without pre-planning

HP 3PAR High Availability

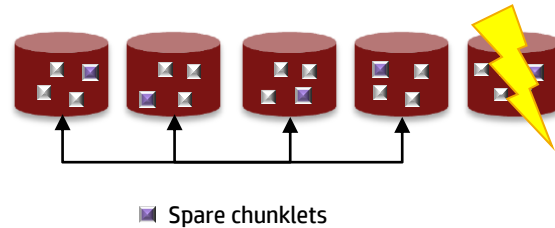
Spare Disk Drives vs. Distributed Sparing

Traditional Arrays



Few-to-one rebuild
hotspots & long rebuild exposure

3PAR StoreServ

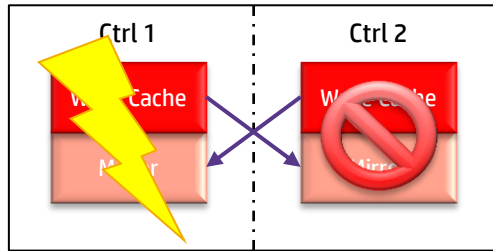


Many-to-many rebuild
parallel rebuilds in less time

HP 3PAR High Availability

Write Cache Re-Mirroring

Traditional Mid-range Arrays

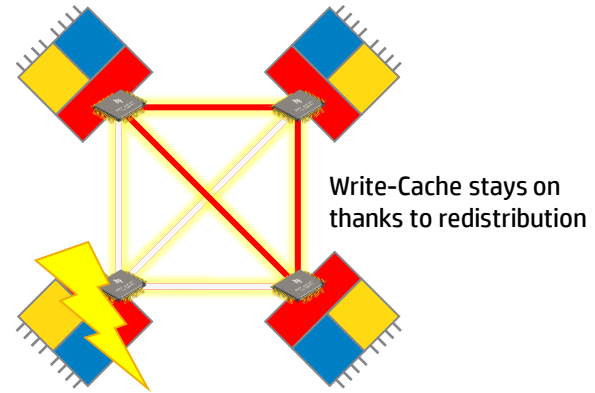


Write-Cache off for data security

Traditional Write-Cache Mirroring

Either poor performance due to write-thru mode
or risk of write data loss

3PAR StoreServ



Persistent Write-Cache Mirroring

- No write-thru mode – consistent performance
- Works with 4 and more nodes
 - ✓ F400
 - ✓ T400, T800
 - ✓ 7400
 - ✓ 10400, 10800

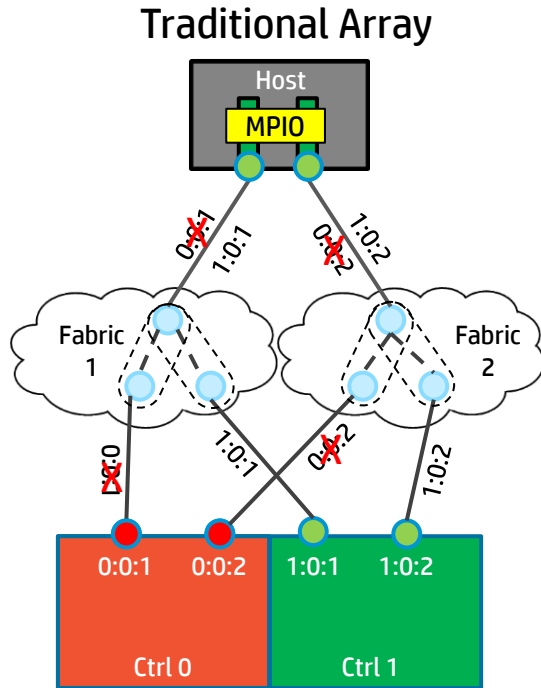
OnLine Firmware Upgrade

3Par

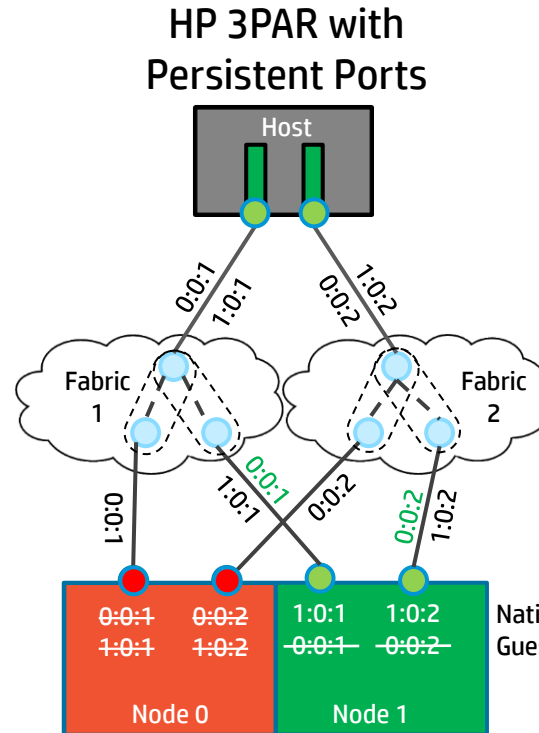
- Firmware loaded via Service Processor
- Firmware pushed to master node
- All nodes receive new firmware (cluster)
- Nodes independently, **one at a time**, update to new firmware but run on old till all nodes are updated
- After all nodes update firmware, upgrade finish command points all nodes to new firmware (userspace)
- Copy of old firmware (userspace) is left in altroot in case of a rollback
- NPIV will allow greater failover flexibility during node upgrades



HP 3PAR Persistent Ports



MPIO path failover required



All paths stay online
Node 1 takes over

Native Port Identity
Guest Port Identity

- All paths stay online in case of node maintenance or failure
- No user intervention required
- NPIV based port ID swap
- Server will not “see” the swap of the 3PAR port WWN thus no MPIO path failover required

HP 3PAR Online Import for EVA

Reduce cost and time to migrate your EVA data

Agile

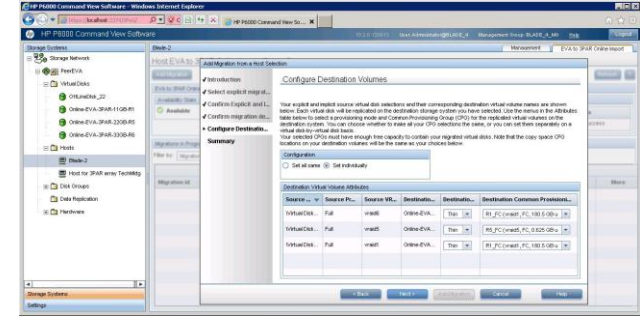
- Migrate your EVA data over to HP 3PAR StoreServ using the new Online Import feature
- HP Services available to help with your datacenter transition

Simple

- Start from what you know - All driven from your known Command View EVA interface
- Avoid the human errors of a manual migration

Efficient

- Get Thin with on-the-fly Thin Conversion
- No need for additional hardware or software needed
 - Online Import license included for free (6 month)



EVA to 3PAR Data Migration Options

Alternatives to HP 3PAR Online Import

Should the customer's environment not support the use of Online Import, you can still use existing migration technologies, for example:

- MPX200
- VMware Storage VMotion
- other host based solutions (e.g. volume manager based mirroring on Unix/Linux)

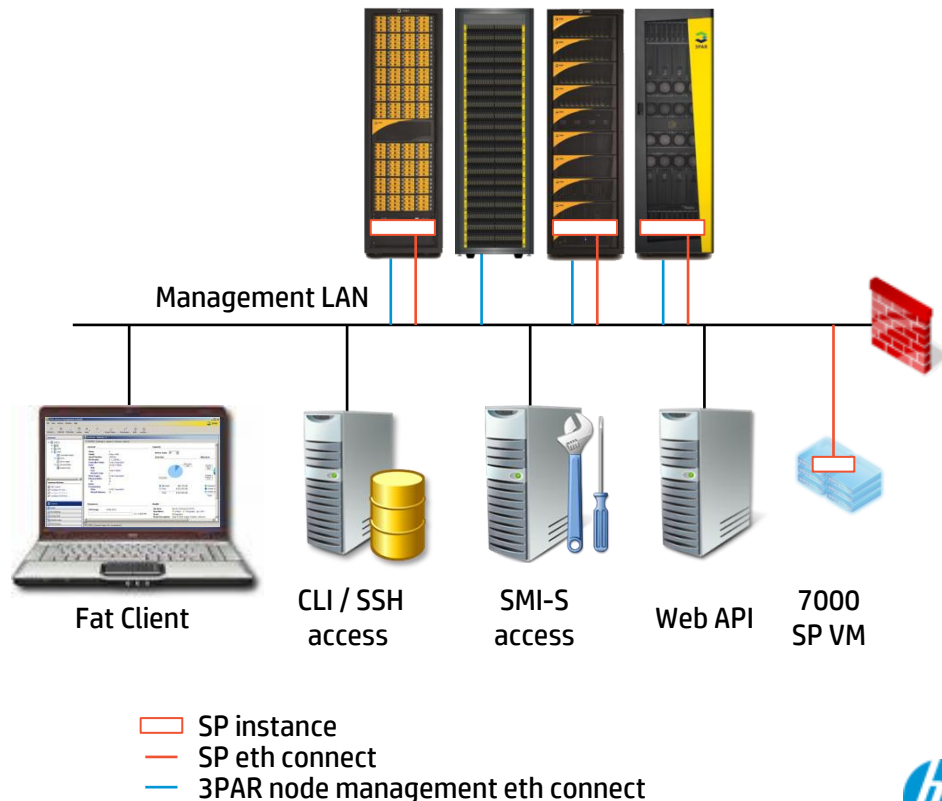
HP Consulting Services to assess and help the transition

- HP Consulting offers flexible «EVA to 3PAR Acceleration Consulting Services» including assessment and migration offering for EVA to 3PAR
- HP Consulting can utilize HP 3PAR Online Import as well as all of the above technologies as part of their Service offering
- Most importantly HP Consulting can help on the overall Infrastructure refresh, that often goes along with a storage migration.



HP 3PAR – Management Options

- **3PAR Management Client (GUI)**
 - Fat client GUI - Windows, RedHat Linux
 - Storage Management GUI
- **CLI**
 - 3PAR CLI or ssh
 - Storage Management Interface
 - Storage Server - very rich, complete command set
- **SMI-S**
 - Management from third party management tools
- **Web API**
 - RESTful Interface
- **Service Processor (SP)**
 - Health checks by collecting configuration and performance data
 - Reporting to HP 3PAR Central
 - Anomalies reported back to customer via OSSA
 - Array management



HP 3PAR Virtual Service Processor

Secure Remote Support

Virtual Service Processor

- Cost-efficient, secure gateway for remote connectivity
- Effortless, one-click configuration
- Supported on VMware vSphere
- Enables
 - Remote, online SW upgrade
 - Proactive fault detection with remote call home diagnostics
 - Remote serviceability
 - Alert notifications
- Optional HW Service Processor available

The screenshot shows the 'Service Processor Setup Wizard' window, specifically the 'Configure Remote Support' step. On the left, a 'Steps' list shows: 1. Welcome, 2. SP Networking, 3. Remote Support (highlighted), 4. Time and Region, 5. Change Password, 6. Summary, 7. Apply Settings, and 8. Finish. The main content area explains that Remote Support sends diagnostic information for analysis and fault detection, listing data types like system health statistics, configuration data, performance data, and system events. It notes that communications are encrypted and no customer data is transferred. Benefits include remote online upgrades, guided maintenance updates, and remote troubleshooting. A note states that the wizard will enable Remote Support upon completion and refers to the HP 3PAR StoreServ 7000 Storage Installation Guide. Below this, there are three sections: 1. 'Enable proxy server for remote support' with a checkbox, a protocol dropdown (set to 'http'), and fields for address and port. 2. 'Enable authentication' with a checkbox and fields for login ID, password, and re-enter password. 3. 'Advanced' with a checkbox for 'Make contents of Service Processor log files anonymous'. At the bottom right, there are navigation buttons: '< Prev', 'Next >', 'Finish', and 'Cancel'.



Introducing the HP 3PAR Arrays

- F-Class
- StoreServ7000
- StoreServ10000



3PAR StoreServ 7000

HP 3PAR StoreServ 7200



HP 3PAR StoreServ 7400



Controller Nodes	2	2	4*
Max SFF drives	144	240	480
Cache	24 GB	32 GB	64GB
8Gbit/s FC ports total (built-in/optional)	12 (4/8)	12 (4/8)	24 (8/16)
optional 10Gbit/s iSCSI/FCOE**	4	4	8
Built-in IP remote copy port	2	2	4
Controller Enclosures 2U with 24 SFF drive slots each	1	1	2
Drive Enclosures 2U with 24 SFF and/or 4U with 24 LFF drive slots each	0 to 5	0 to 9	0 to 18



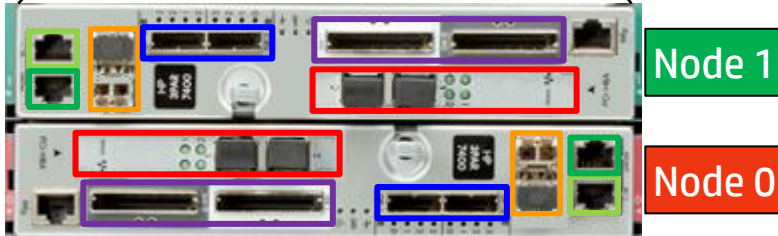
3PAR StoreServ 7000 controller enclosure



Rear view



Front view



Node 1

Node 0

- Built-in Eth Remote Copy Port
- Eth Mgmt. Port
- 2x built-in 8Gbit/s FC
- 2x 4-lane 6Gbit/s SAS for drive chassis connection
- Optional PCIe card
 - 4x 8GB/s HBA or
 - 2x 10Gbit/s CNA
- Controller interconnect (7400 only)

3PAR 7000 disk chassis

Mix and match drives and shelves as required

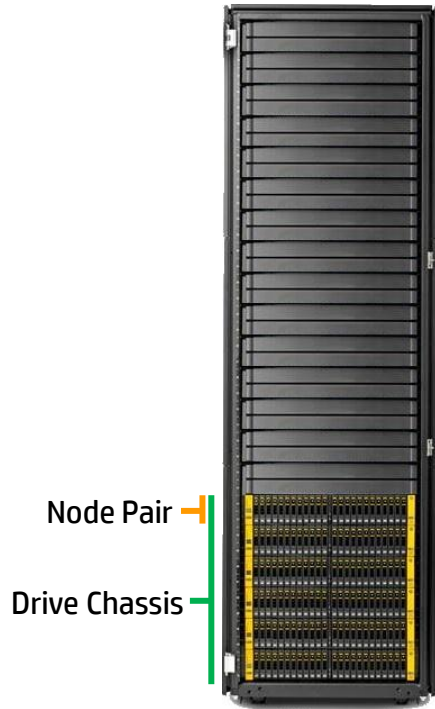
2U with 24 SFF drive slots



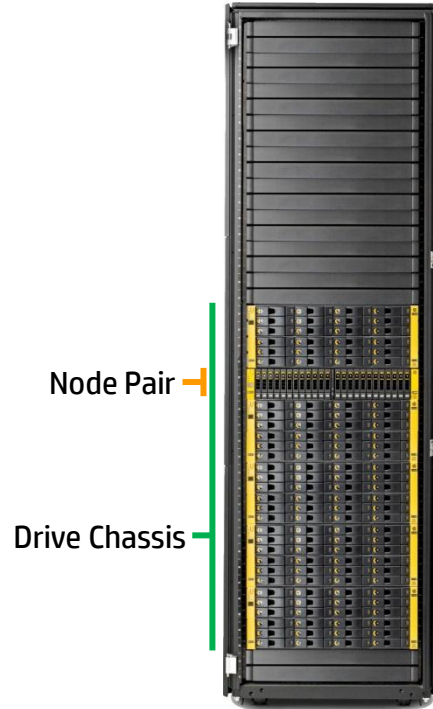
4U with 24 LFF drive slots



3PAR 7200 max. Configurations

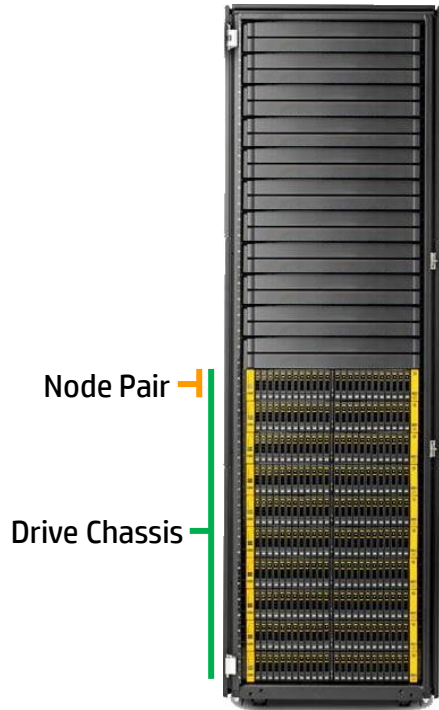


144 SFF drives

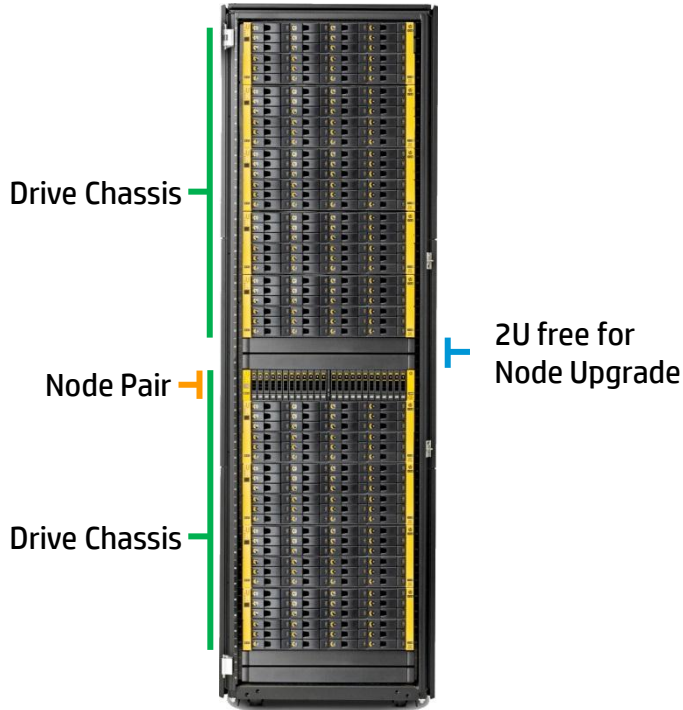


24 SFF + 120 LFF drives

3PAR 7400 2-node max Configurations



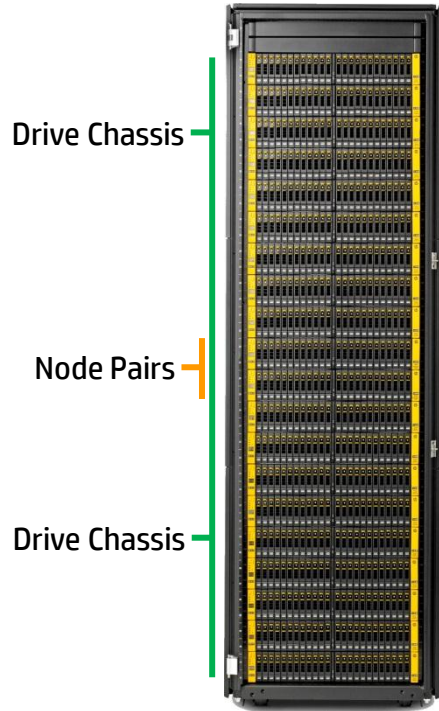
240 SFF drives



24 SFF + 216 LFF drives



3PAR 7400 4-node max Configurations

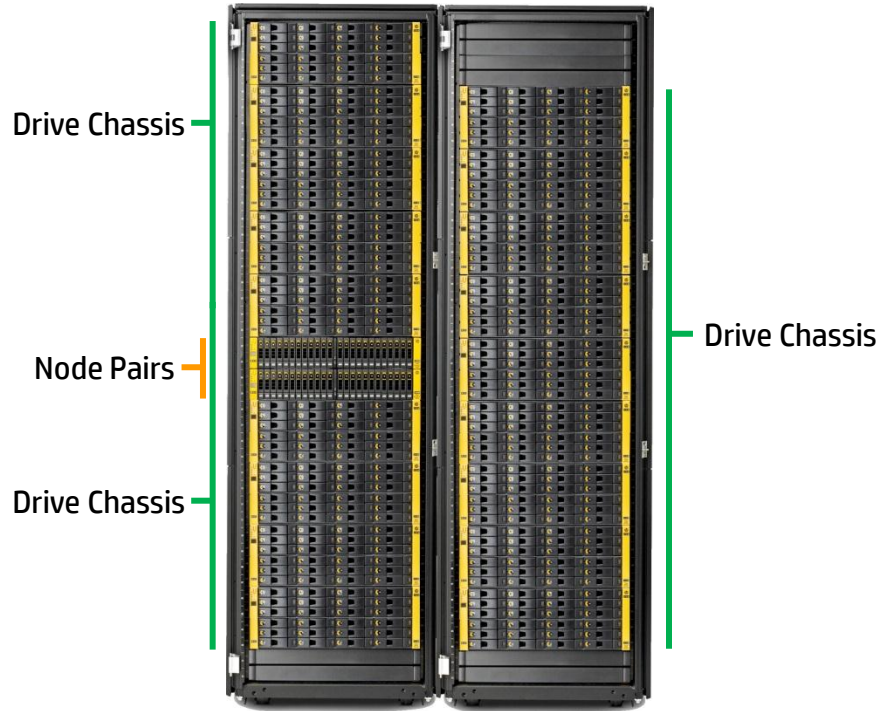


Drive Chassis

Node Pairs

Drive Chassis

480 SFF drives



Drive Chassis

Node Pairs

Drive Chassis

Drive Chassis

48 SFF + 432 LFF drives

Drive Specification Overview

Feature		HP 3PAR StoreServ 7200 2 Node System	HP 3PAR StoreServ 7400 2 Node System	HP 3PAR StoreServ 7400 4 Node System
RAID Levels		RAID 0, 10, 50, 60	RAID 0, 10, 50, 60	RAID 0, 10, 50, 60
RAID 5 Data to Parity Ratios		2:1 to 8:1	2:1 to 8:1	2:1 to 8:1
RAID 6 Data to Parity Ratios		4:2; 6:2; 8:2; 10:2; 14:2	4:2; 6:2; 8:2; 10:2; 14:2	4:2; 6:2; 8:2; 10:2; 14:2
Available SFF 2.5" Drives	SSD 15krpm 10krpm 7.2krpm	100GB, 200GB SLC SSD 300GB SAS 450GB, 900GB SAS NA	100GB, 200GB SLC SSD 300GB SAS 450GB, 900GB SAS NA	100GB, 200GB SLC SSD 300GB SAS 450GB, 900GB SAS NA
Available LFF 3.5" Drives	SSD 15krpm 10krpm 7.2krpm	100GB, 200GB SLC SSD NA NA 2TB, 3TB MDL SAS	100GB, 200GB SLC SSD NA NA 2TB, 3TB MDL SAS	100GB, 200GB SLC SSD NA NA 2TB, 3TB MDL SAS
Density	2U node chassis 2U drive chassis 4U drive chassis	24 SFF drives 24 SFF drives 24 LFF drives	24 SFF drives 24 SFF drives 24 LFF drives	24 SFF drives 24 SFF drives 24 LFF drives
# of 24 drive add-on Drive Chassis		0 to 5	0 to 9	0 to 18
# of Drives		8 to 144	8 to 240	8 to 480



HP 3PAR Software and Features



HP 3PAR 7000 Software Suites

Two License Models: Spindle and Frame

- Spindle Based Suite
- Spindle Based SW available standalone
- Frame Based Suite
- Not sold separately

Replication Suite

Virtual Copy

Remote Copy

Peer Persistence
(Note: requires Remote Copy)

Security Suite

Virtual Domains

Virtual Lock

Data Optimization Suite

Dynamic Optimization

Adaptive Optimization
(Note: requires System Reporter)

Peer Motion

Application Suite for VMware

Recovery Manager for VMware*

VASA

Mgmt Plug In for VMware

Host Explorer for VMware

*Note: Recovery Manager requires Virtual Copy

Application Suite for Oracle

Recovery Manager for Oracle*

Application Suite for SQL

Recovery Manager for SQL*

VSS Provider

Application Suite for Exchange

Recovery Manager for Exchange*

VSS Provider

Reporting Suite

System Reporter

3PARinfo

3PAR 7000 OS Suite

Thin Provisioning	System Tuner	Web Services API	Online Import license (180 days)	SmartStart
Thin Conversion	VSS Provider	Management Console	Host Explorer	Multi Path IO SW
Thin Persistence	Thin Copy Reclamation	Autonomic Rebalance	Scheduler	Virtual SP
Full Copy	Access Guard	Autonomic Groups	Persistent Cache	Persistent Ports
Rapid Provisioning	Host Personas	Autonomic Replication Groups	3PAR OS Admin Tools (CLI Client, SNMP)	SMI-S

HP 3PAR StoreServ 7000 software & support licensing

Software Suites

- 9 suites (4 main array software suites, 4 application suites, 1 reporting suite)
- Standalone software titles still available if needed—suites provide 25+ percent price advantage
- 3PAR OS Suite includes Thin Suite, rebalancing, and 180-day Online Import license

Licensed per drive

HP 3PAR 7000 OS Suite

HP 3PAR 7000 Replication Suite

HP 3PAR 7000 Data Optimization Suite

HP 3PAR 7000 Security Suite

Licensed per system

HP 3PAR 7000 Application Suite for VMware

HP 3PAR 7000 Application Suite for Exchange

HP 3PAR 7000 Application Suite for SQL

HP 3PAR 7000 Application Suite for Oracle

HP 3PAR 7000 Reporting Suite

Licensing

- Separate software LTUs per model (7200 vs. 7400)
- Licenses are enforced by the 3PAR Array

Drive-based licenses

- Two licenses to buy software title
 - Base LTU: one per system
 - Drive LTU: one per drive up to the system cap
- Software caps
 - 48 LTUs for 7200
 - 168 LTUs for 7400

System-based licenses

- 1 LTU per system

Service and Support

- Software Installation and Startup (I&S) services keyed to Base LTU SKUs* only; I&S is optional, although highly recommended for new array deployment
- Software support keyed to Base LTU SKUs only (system-based license)
- Support contract required to receive support, patches, and updates

*Software Installation and Startup services available for Replication Suite, Data Optimization Suite, App Suite for VMware, Microsoft® Exchange, SQL, and Reporting Suite.



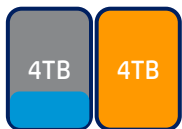
HP 3PAR Thin Technologies



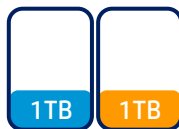
HP 3PAR Thin Technologies Leadership Overview

Start Thin

Traditional Provisioning



3PAR Thin Provisioning

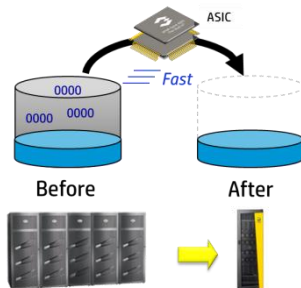


Thin Provisioning

- No pool management or reservations
- No professional services
- Fine capacity allocation units
- Variable QoS for snapshots

Buy up to 75% less storage capacity

Get Thin



Thin Conversion

- Eliminate time & complexity of getting thin
- Open, heterogeneous migrations for any array to 3PAR
- Service levels preserved during conversion

Reduce Tech Refresh Costs by up to 60%

Stay Thin



Thin Persistence

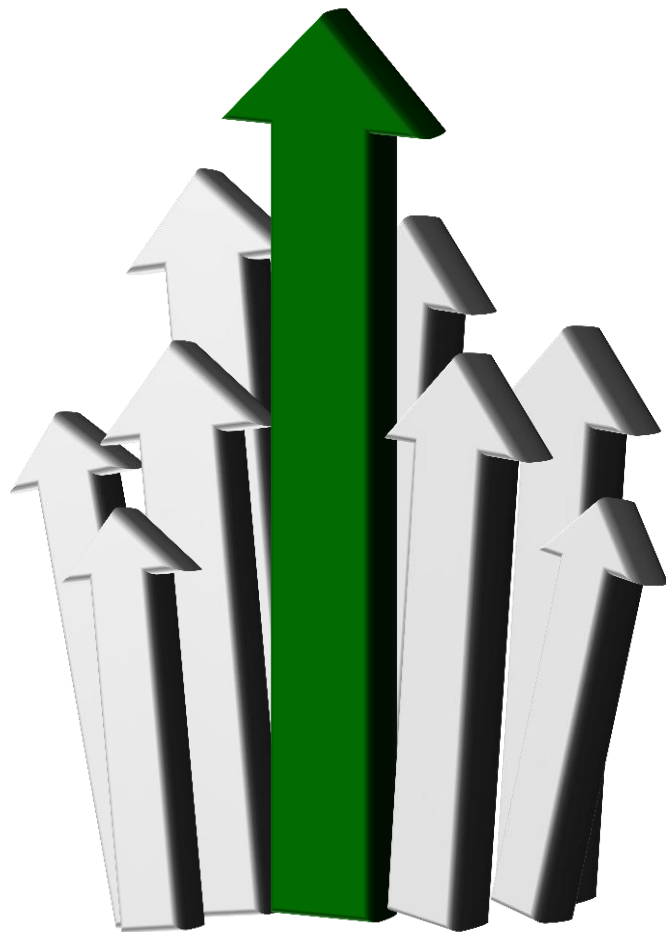
- Free stranded capacity
- Automated reclamation based on T10 write same or unmap operations
- Snapshots and Remote Copies stay thin

Thin Deployments Stay Thin Over time



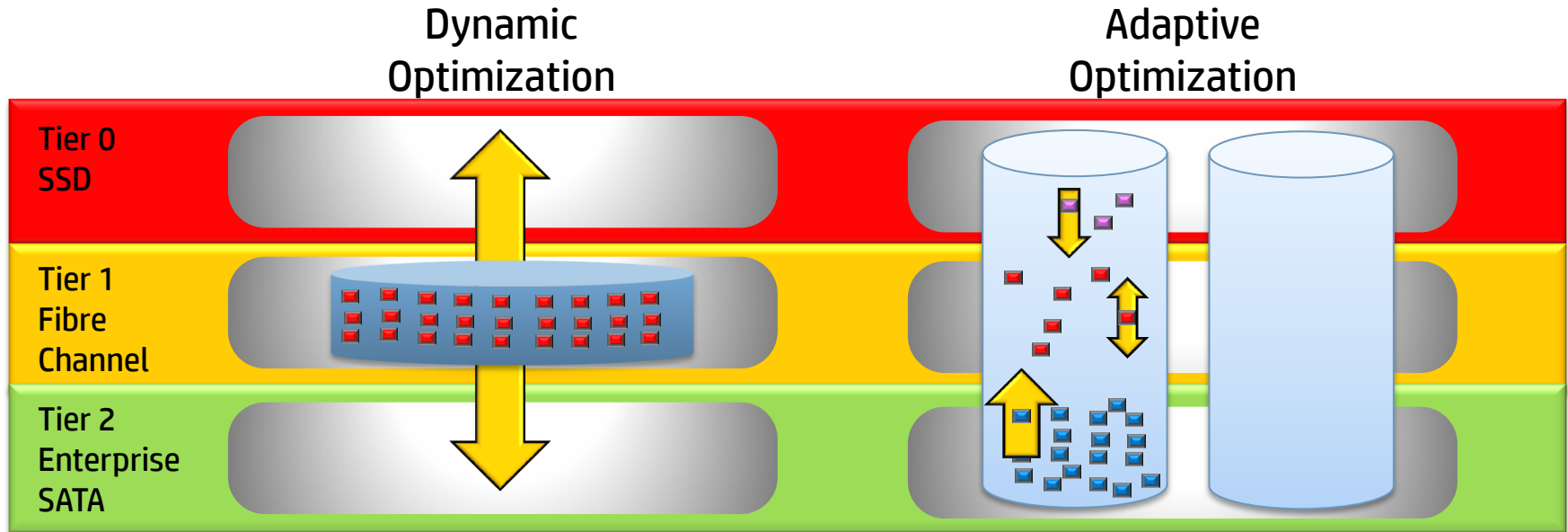
HP 3PAR Optimization

- Dynamic Optimization
- Adaptive Optimization



HP 3PAR Dynamic and Adaptive Optimization

Manual or Automatic Tiering



■ Region
CPG

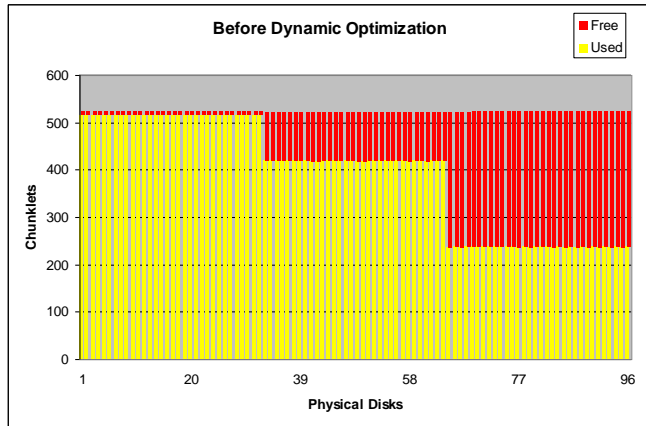
Autonomic data movement,
single/full volume level

Autonomic tiering and data movement,
sub-volume level

HP 3PAR Dynamic Optimization at a Customer

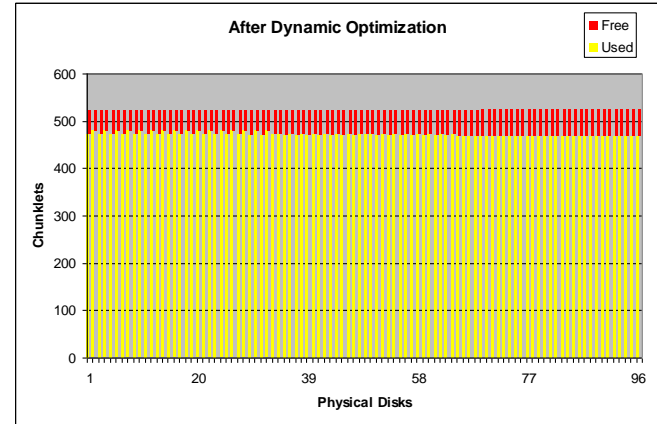
Optimize QoS levels with autonomic rebalancing without pre-planning

Distribution after 2 disk upgrades



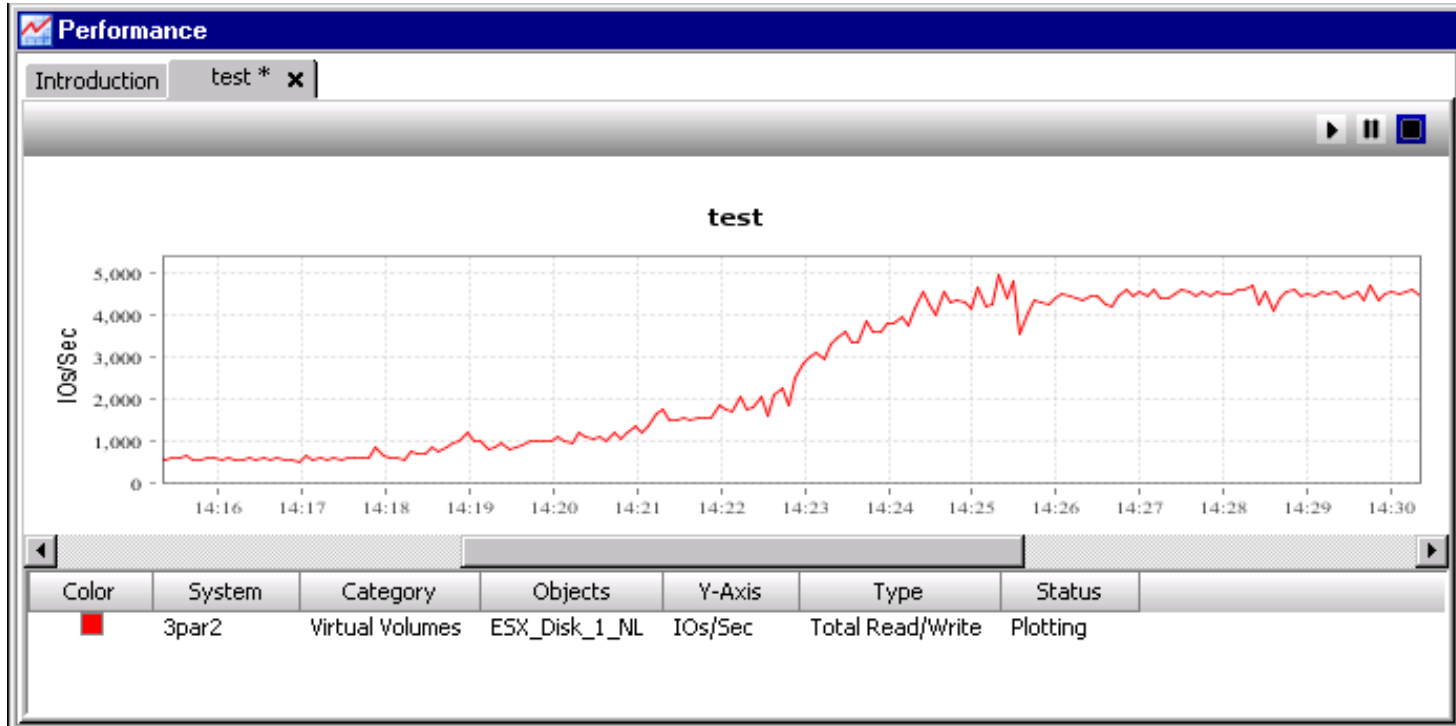
REBALANCE

Distribution after Dynamic Optimization



Performance Example with Dynamic Optimization

Volume Tune from R5, 7+1 SATA to R5, 3+1 FC 10K



Online fat-to-thin conversion

Part of Dynamic Optimization

- Non-disruptively migrate
 - fat-to-thin
 - thin-to-fat
 - between CPGs
- Original volume can either be
 - kept
 - kept and renamed
 - deleted

Convert Virtual Volume(s)

Convert the provisioning type of virtual volumes to balance space savings and cost.

- To save storage space, convert little-used fully provisioned volumes to Thin volumes.
- To reduce costs, convert fully allocated Thin volumes to fully provisioned volumes.

You do not need to take the volumes offline or stop I/O in order to convert virtual volumes to a new provisioning type.

General

System: 3PAR_7200 (9902397)

Domain: <none>

Conversion: Fully provisioned to Thin Thin to fully provisioned

Original Volume(s): Discard Keep and add Keep and rename to

Virtual Volumes

Virtual volumes possible to convert

Name	Provisioning	Virtual Size (GiB)	Reserved Size (GiB)	User CPG
FullV	Full	5.000	5.000	FC_r5_S_1 (RAID 5, FC)

CPG

Target CPG: <Original CPG>



On-Node Adaptive Optimization

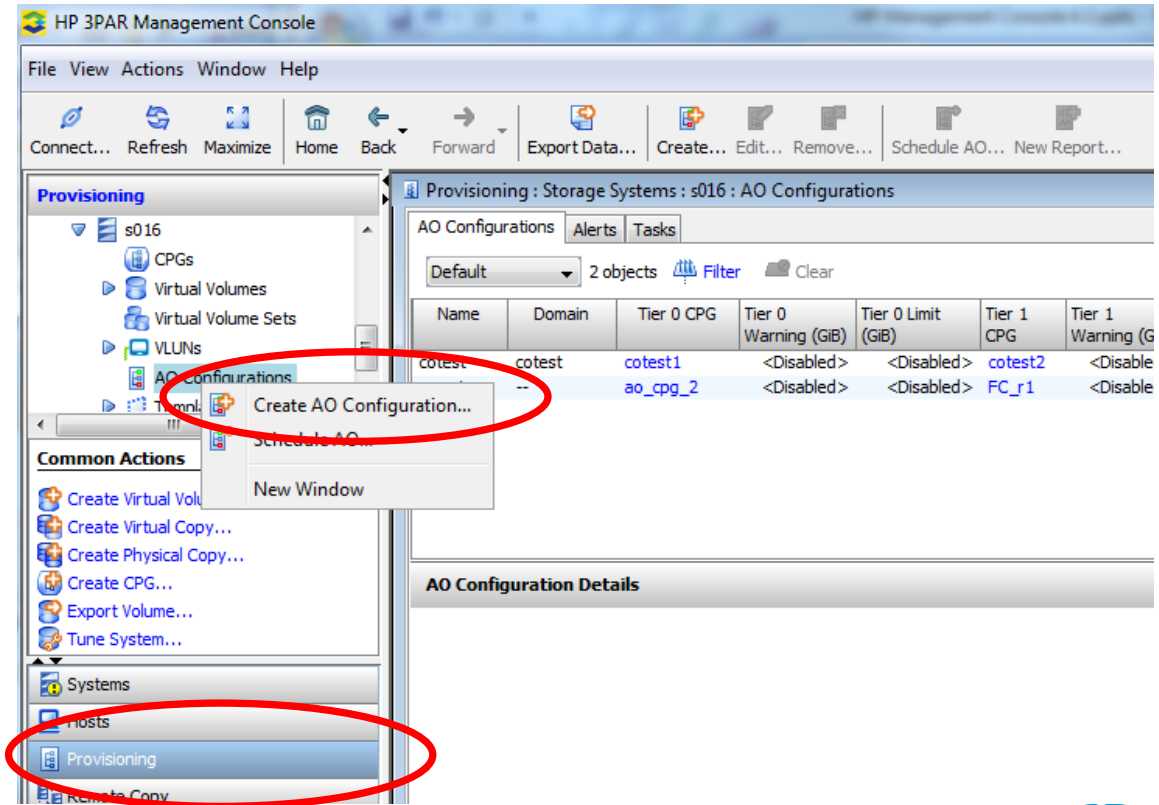
A new version of AO which runs entirely on the InServ



HP 3PAR Adaptive Optimization

Create a configuration

- Adaptive Optimization is defined in policies by tiers and schedules
- Up to 128 policies for different workload can be defined per 3PAR
- Each policy can be scheduled individually



HP 3PAR Adaptive Optimization

Creating a configuration

- Each Mode is either Cost, Balanced or Performance based
 - Cost: more data is kept in lower tiers
 - Performance: more data is kept in higher tiers
 - Balanced (default): balance between the two above
- 2 to 3 tiers per policy can be defined
- Each tier is defined by a selected CPG
- A CPG defines drive type, RAID level, redundancy level and step size

Create AO Configuration : s016 (1000016)

Steps

1. Welcome
2. **Configure AO**
3. Schedule AO
4. Summary

Configure AO

Enter a name for this AO configuration and select the mode appropriate for performance and cost considerations.

General

System: s016 (1000016)

Domain: <none>

Name:

Mode: Balanced

Tier CPGs

Select at least two CPGs to tier. Place the high-performance CPG in Tier 0, the medium-performance CPG in Tier 1, and the low-performance CPG in Tier 2. Each Tier list includes only CPGs in the selected domain that are not used in any other AO configuration.

Tier 0: <none>

Tier 1: <none>

Tier 2: <none>

Enter a name for this AO configuration

Help Prev Next Finish Cancel

HP 3PAR Adaptive Optimization

Creating a configuration

- Tier movement is based on analyzing the following parameters
 - Average tier service times
 - Average tier access rate densities
 - Space available in the tiers

The screenshot shows a web-based configuration interface for HP 3PAR Adaptive Optimization. The title bar reads "Create AO Configuration : s706 (1699706) : AO_Config_GroupX". The interface is divided into two main sections: "Steps" and "Schedule AO".

Steps:

1. Welcome
2. Configure AO
3. **Schedule AO**
4. Summary

Schedule AO:

Schedule this AO configuration to run immediately or at a later time. If you want to schedule this AO configuration at a later time, use the Schedule AO dialog box.

Start or schedule AO configuration

Run Now Create Schedule [?](#)

Settings

Measurement Duration (in hours) [?](#)

Analyze Only

Schedule

Name Generate alert if task fails

Recurrence **Advanced** at Every minute past every hour of every...

The "Advanced" option is selected in the recurrence dropdown menu, which also lists "Hourly", "Daily", "Once", and "Multiple Daily".

Adaptive Optimization

Best Practices

SSD recommendations; Default CPG growth

- For SSDs, the CPG grow size should be set to as small as the system will allow so as little space as possible is left empty (SSD space is expensive!).
Min: 8GB / Node Pair
- For SSD, set a growth warning to use up to 95% of the capacity
- Make sure that the default CPG for VV growth (both data/USR or copy/SNP) should have plenty of space to grow. (default growth increment recommended)
- The default growth CPG for VVs in an AO configuration should NOT be in an SSD CPG.



Sizing configurations for A0

Always include FC disks. When using A0, locality of IOs matters!

If unsure of what Tiers distribution should be, use the following rule of thumb:

- SSD : 1% of useable capacity – should be able to do 1/3 of workload
- FC : 40% of useable capacity – should be able to sustain 2/3 of workload
- NL : 59% of useable capacity – (not contributing to performance)

Always ensure that no less than 1/3 of the overall capacity is on FC or SAS disks and it can sustain 2/3 of the applications workload

Tiers should be evenly distributed throughout all disk chassis and node pairs



HP 3PAR Full and Virtual Copy

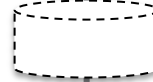


HP 3PAR Full Copy V1 – restorable copy

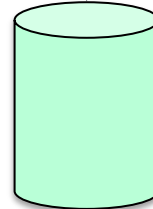
Part of the base 3PAR OS

- Full physical point-in-time copy
- Provisionable after copy ends
- Independent of base volume's RAID and physical layout properties
- Fast resynchronization capability
- Thin Provisioning-aware
 - Full copies can consume same physical capacity as thinly provisioned base volume

Base Volume



Intermediate Snapshot



Full Copy



HP 3PAR Full Copy V2 – instantly accessible copy

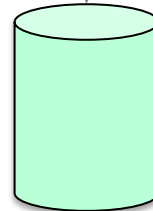
Part of the base 3PAR OS

- Share data quickly and easily
- Full physical point-in-time copy
- Immediately provisionable to hosts
- Independent of base volume's RAID and physical layout properties
- No resynchronization capability
- Thin Provisioning-aware
 - Full copies can consume same physical capacity as thinly provisioned base volume

Base Volume



Intermediate
Snapshot



Full Copy



HP 3PAR Virtual Copy – Snapshot at its best

Smart

- Individually erasable and promotable
- Scheduled creation/deletion
- Consistency groups

Thin

- No reservation, non-duplicative
- Variable QoS

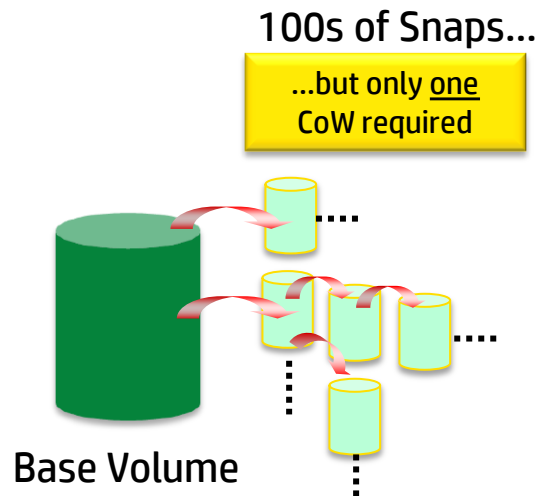
Ready

- Instantaneously readable and/or writable
- Snapshots of snapshots of ...
- Virtual Lock for retention of read-only snaps
- Automated erase option

Integrated

- MS SQL
- MS Exchange
- Oracle
- vSphere
- HP Data Protector
- ...

Up to 8192 Snaps per array



Top 10 Arrays WW as of July 2012

# of Snapshots	Model
6559	V800
6172	S800
6156	S800
5138	S800
4666	S400
4482	S800
4341	T800
4295	T800
3991	T400
3871	T800

Be careful - Keep spinning disk utilisation below 50%

Response Time of different drive technologies

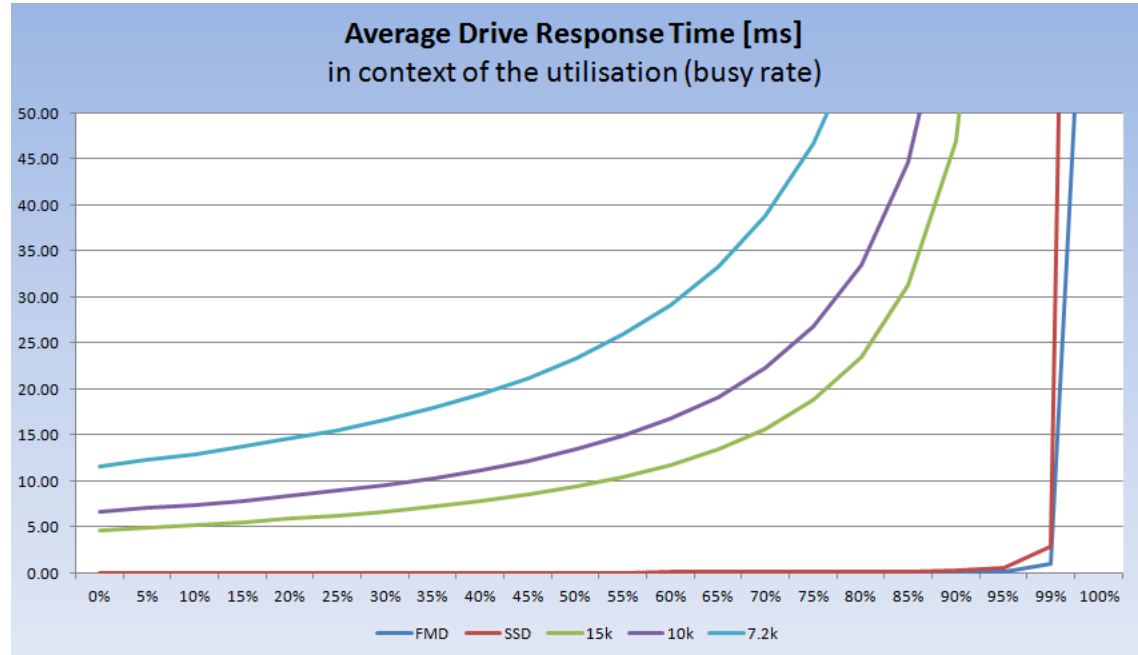
Rule of thumb

- Spinning disks should operate below 50% utilization

utilisation	~0%	~50%
15k	4.7ms	9.4ms
10k	6.7ms	13.4ms
7.2k	11.7ms	23.4ms

- FMD & SSD may operate up to 95% utilization

utilisation	~0%	~95%
FMD	0.01ms	0.2ms
SSD	0.03ms	0.6ms





HP 3PAR the right choice!

Thank you

