



**Hewlett Packard  
Enterprise**

# HPE ALLETRA

POWER YOUR DATA FROM EDGE-TO-CLOUD



**Nam Vu**  
August 2021



# DISRUPTIVE FORCES BEHIND DIGITAL TRANSFORMATION

**DATA**

Creating Outcomes

**CLOUD**

Unlocking Agility

**AI**

Driving Insights

Together, creating the opportunity for innovation and shaping what's next

# DATA INNOVATION DRIVES GENERATIONAL SHIFT IN THE APP LANDSCAPE

## TRADITIONAL APPLICATIONS

VIRTUALIZATION  
DATA BASES  
ERP

## MODERN APPLICATIONS

CONTAINERS  
NoSQL DATABASES  
MACHINE LEARNING

Driving management complexity

# CLOUD HAS SET THE STANDARD FOR AGILITY BUT IT'S NOT ENOUGH

## EDGE

Remote, Multi-Sites,  
Space Constraints.  
Local Data Processing

## CORE

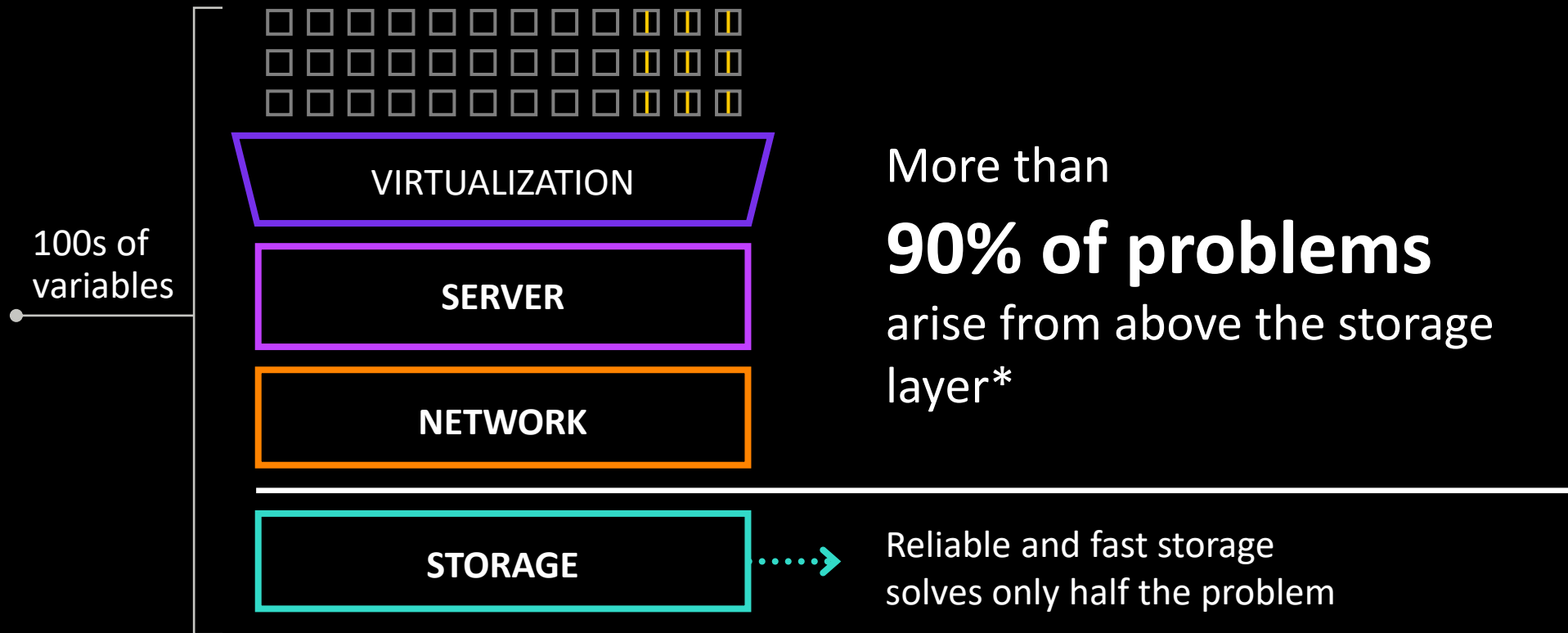
Enterprise-Class  
Requirements, Cost Control,  
Unpredictable Growth

## CLOUD

Speed of Development  
and Deployment, Access  
to Limitless Resources

You need the cloud experience everywhere

# AI IS NEEDED TO MAKE INFRASTRUCTURE INVISIBLE



Infrastructure is far too complex for humans alone to manage

# CLOUD-NATIVE DATA INFRASTRUCTURE IS THE ANSWER

## CLOUD OPERATIONS

Automated,  
Programmable, & Elastic

## BUILT FOR ANY APP

Workload  
Optimized

## HYBRID BY DESIGN

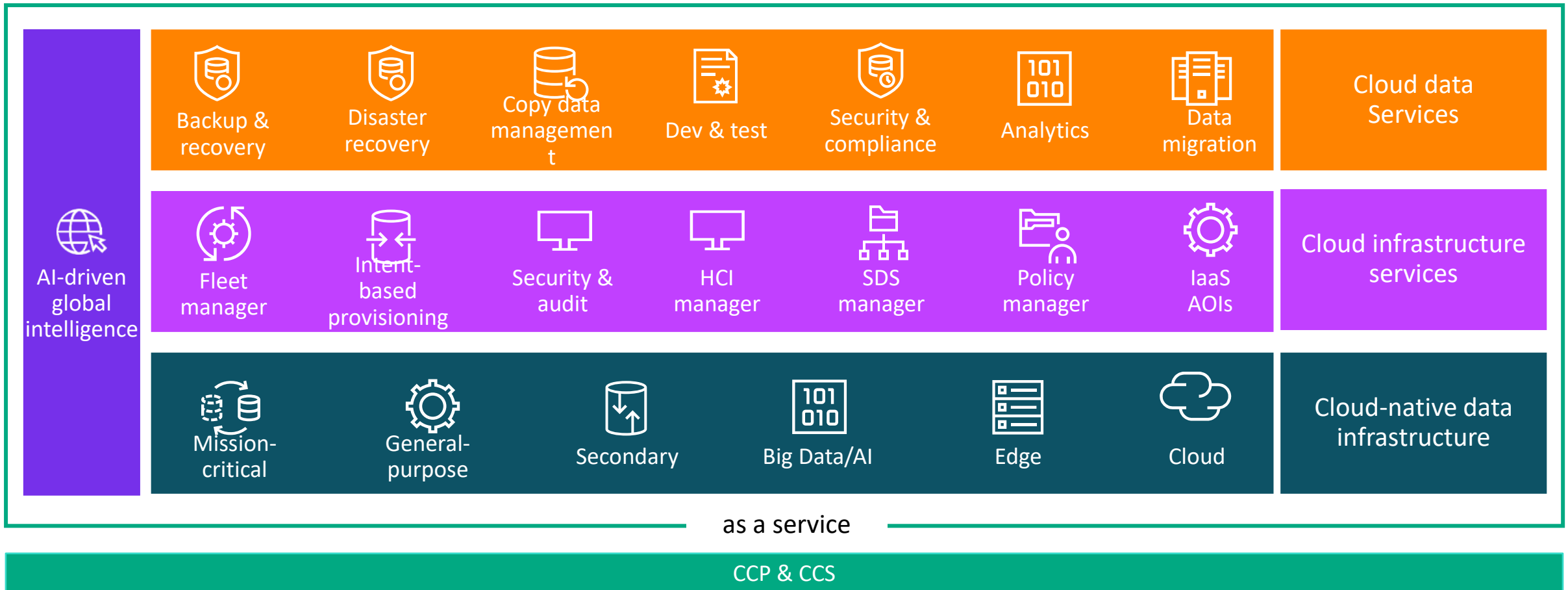
Consistent  
Experience

## AI-DRIVEN INTELLIGENCE

## AS A SERVICE

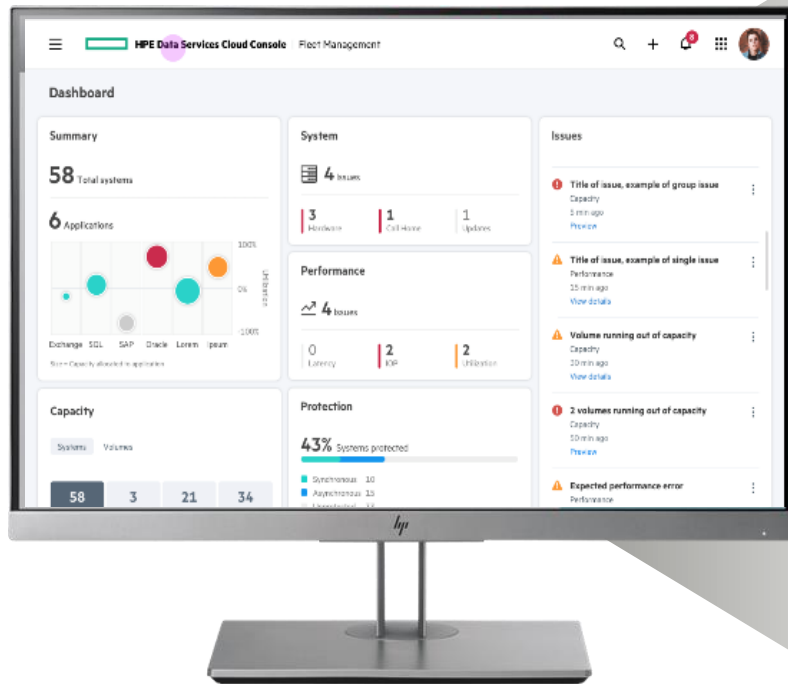
# HPE INTELLIGENT DATA PLATFORM ARCHITECTURE

More detailed view of the current and future Data Services Cloud Console deliverables



# DATA SERVICES CLOUD CONSOLE

A single destination for all new HPE data and infrastructure services



Data Services Cloud Console

## Cloud data services

### Access

Streamline data access to power apps and empower innovators

### Protect

Safeguard data for any SLA with app-aware data protection

### Search

Gain 360 edge-to-cloud visibility for all your apps and data

### Mobilize

Activate data and seamlessly move it where it needs to be

## Cloud infrastructure services—Fleet manager

### Deploy

Automate the setup, config, and deployment

### Manage

Manage a global fleet with point-and-click simplicity

### Upgrade

Make software upgrades intelligent and invisible

### Optimize

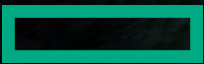
Apply intelligence to maximize efficiency, reliability, and resources





# HPE ALLETRA

Power your data edge-to-cloud



# ENGINEERED TO DRIVE UNIQUE VALUE

## AI-DRIVEN

Autonomous, self-managing



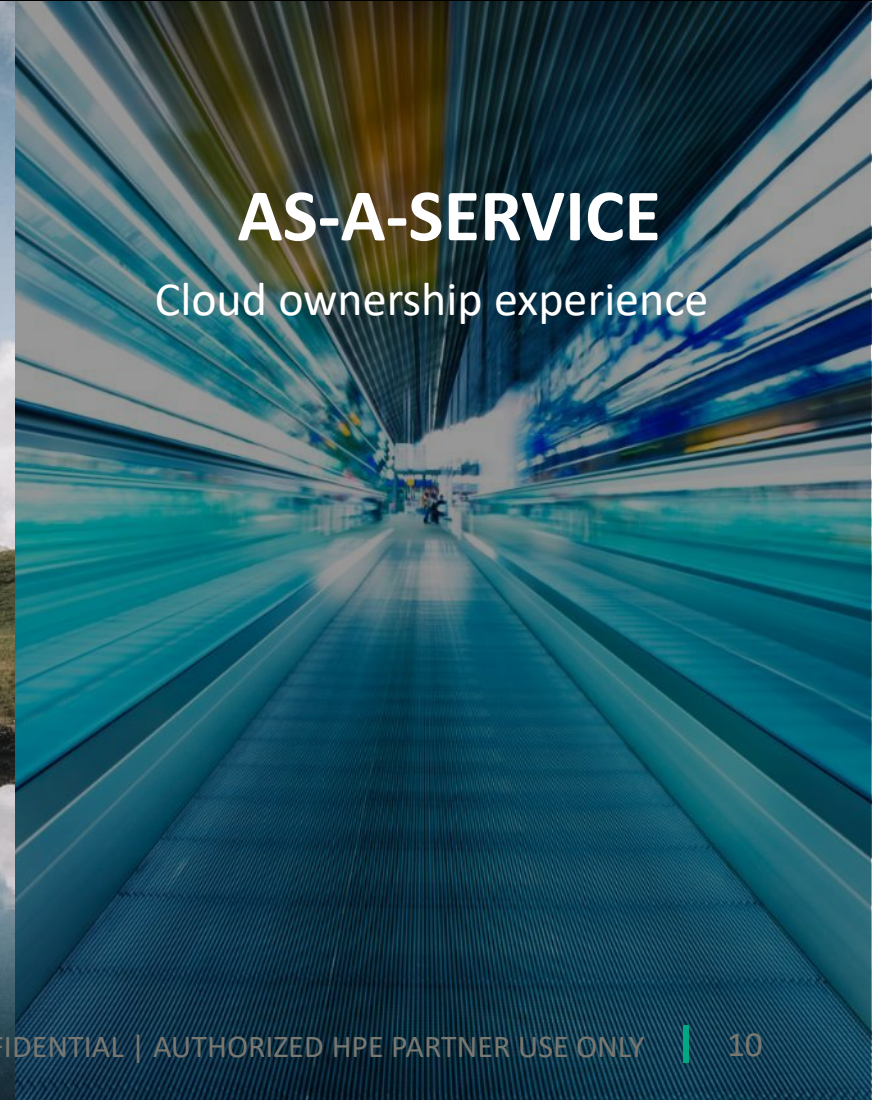
## BUILT FOR CLOUD

Cloud operations everywhere



## AS-A-SERVICE

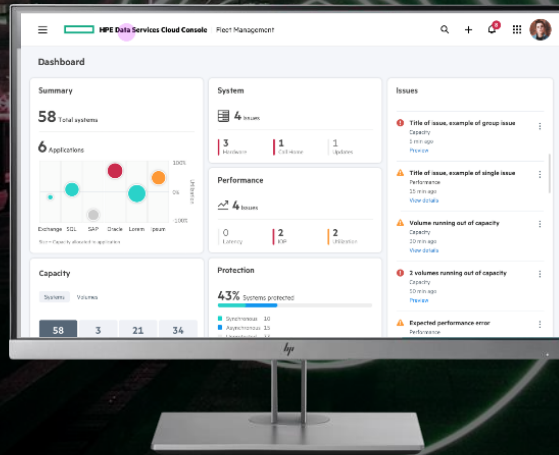
Cloud ownership experience



# RUN ANY APP WITHOUT COMPROMISE



**HPE ALLETRA 9000**  
for Mission-Critical Workloads



**HPE ALLETRA 6000**  
for Business-Critical Workloads

← AS-A-SERVICE →

# OUTCOMES ACHIEVED

Maximize Your Agility  
with the Cloud Experience

**99%**

Operational Time Savings<sup>1</sup>

Run Any Application  
without Compromise

**100%**

Availability guaranteed<sup>2</sup>

Free Your Data  
Across Hybrid Cloud

**40%**

IT Resource Savings<sup>3</sup>

<sup>1</sup> Comparison of infrastructure lifecycle management of HPE Alletra vs. ESG Market Research , April 2021

<sup>2</sup> HPE Brochure: HPE 100% Availability Guarantee, HPE Alletra 9000

<sup>3</sup> A commissioned study conducted by Forrester Consulting, The Total Economic Impact of HPE GreenLake, May 2020

# HPE ALLETRA 6000 FOR BUSINESS-CRITICAL WORKLOADS



HPE ALLETRA 6000



**ULTRA EFFICIENT**  
OPTIMIZED FOR DATA EFFICIENCY,  
UP TO 1 MILLION IOPS

**6-NINES AVAILABILITY**  
GUARANTEED AS STANDARD BENEFIT

**ALWAYS-ON DATA SERVICES**  
NO TUNING, KNOBS, OR TRADEOFFS

**FLEXIBLE SCALING**  
NON-DISRUPTIVE, MULTIDIMENSIONAL  
EXTENDS TO THE CLOUD

IDEAL FOR:



Databases



Test/Dev



VM Farms



Container Farms



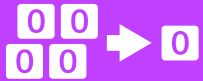
# SPEND LESS ON ALL FLASH STORAGE—GUARANTEED



Deduplication  
In-line + variable  
block



Compression  
In-line + variable  
block



Zero-pattern  
elimination

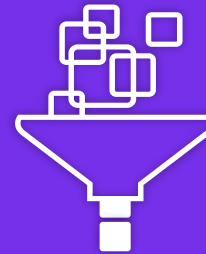


+ Thin provisioning  
+ Zero-copy clones

**HPE Alletra OS 6.x**

Advanced flash architecture  
Efficient storage foundation

**Best in class data efficiency**



On Average  
**5:1 or More**  
Data Reduction\*

\*Based on data efficiency capabilities that deliver on average 5:1 data reduction. Some workloads, like VDI see up to 21:1

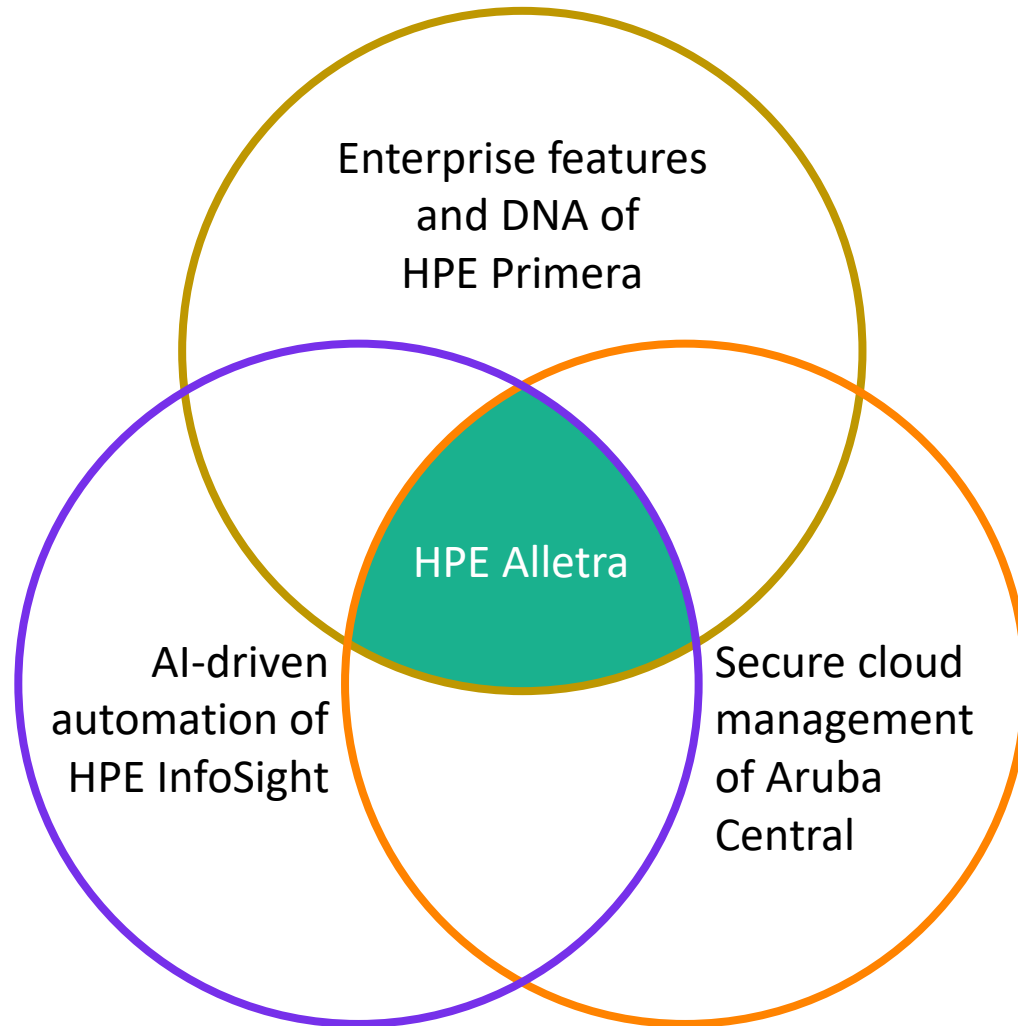
**Start with 20% more useable capacity**

# HPE ALLETRA 6000 MODELS

<b>AF-Series Arrays</b>	<b>6010</b>	<b>6030</b>	<b>6050</b>	<b>6070</b>	<b>6090</b>	<b>Scale-out<sup>1</sup> 4X 6090</b>
Raw capacity (TB)	23-92	23-184	23-575	23-1,104	23-1,104	92-4,416
Usable capacity (TB)	12-66	12-135	12-422	12-820	12-820	48-3,260
Effective capacity (TB)	60-330	60-675	60-2,110	60-4,100	60-4,100	240-16,400
Max. # of expansion shelves	1	2	2	2	2	8
RAID level support	Triple+ Parity					
Onboard Mgmt 1GBase-T ports per array	8	8	8	8	8	32
Optional iSCSI 10GBase-T ports per array <sup>6</sup>	8-24	8-48	8-48	8-48	8-48	8-192
Optional iSCSI 10GbE ports per array <sup>6</sup>	8-24	8-48	8-48	8-48	8-48	8-192
Optional iSCSI 25GbE ports per array <sup>6</sup>	4-12	4-24	4-24	4-24	4-24	4-96
Optional iSCSI 100GbE ports per array	4	4, 8	4, 8	4, 8	4, 8	4-48
Optional 2P 32Gb FC (16Gb) ports per array	4-12	4-24	4-24	4-24	4-24	4-96
Optional 4P 32Gb FC (16Gb) ports per array	8	8, 16	8, 16	8, 16	8, 16	8-64

# HPE ALLETRA 9000—THE NEW MEASURE FOR MISSION-CRITICAL STORAGE

Combines the best technologies of HPE





# HPE ALLETRA 9000—THE MEASURE FOR MISSION-CRITICAL STORAGE



HPE Alletra 9060 and 9080



## Massive parallelization

All-active and multi-node



## Best performance and density

From 8 to 173% better performance than HPE Primera  
Certified for up to 96 SAP HANA nodes  
2.1mio IOPS 8kB 100% read



## 100% Availability Guarantee

Included with every system



## Most advanced DR and HA

Active stretch cluster

Ideal for:

Large scale  
databases



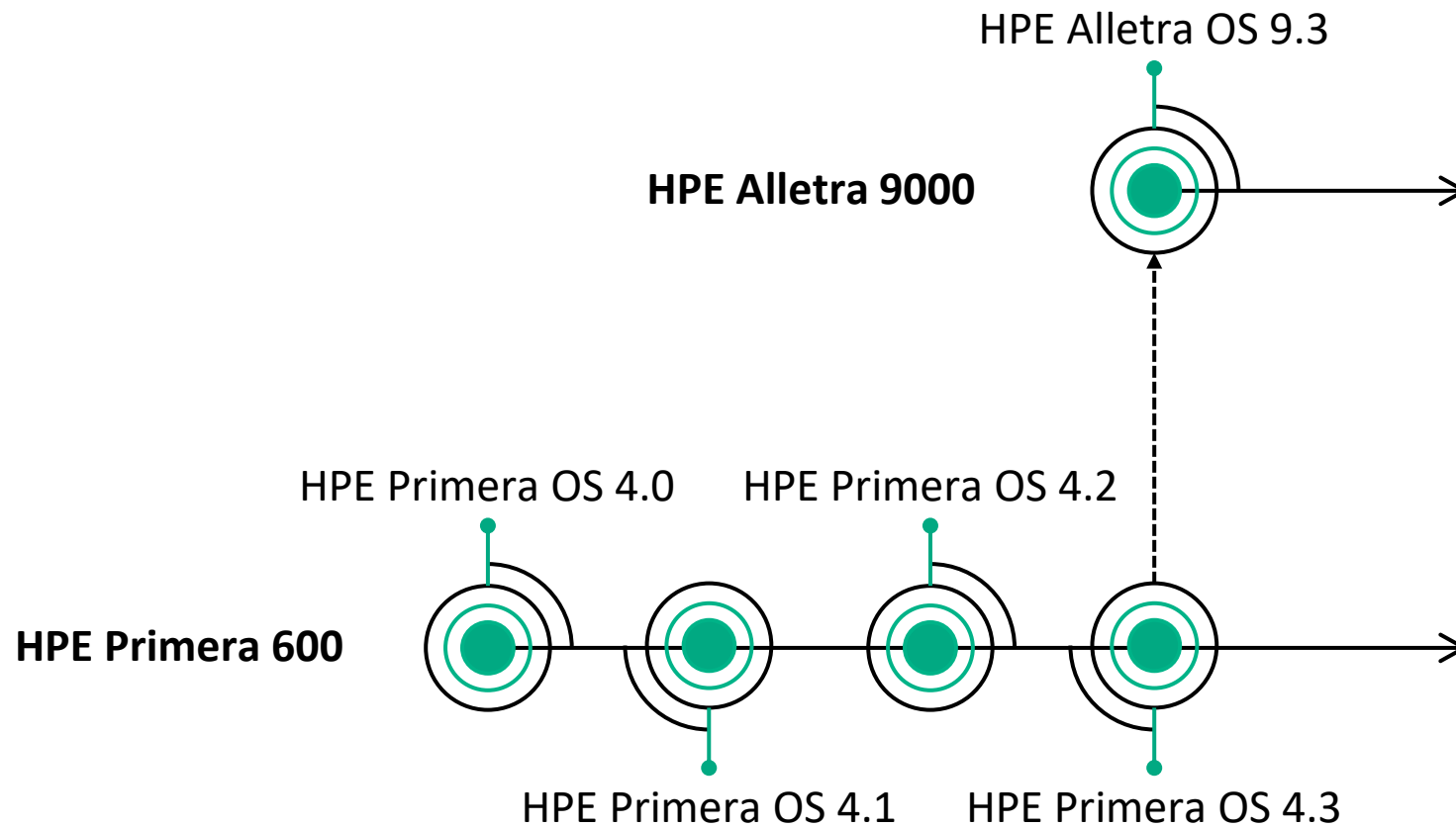
Large scale  
containers



Large scale  
consolidation



# HPE ALLETRA OPERATING SYSTEM HISTORY



# FEATURES OF THE HPE ALLETRA 9000 SERIES ARRAYS

HPE Gen6 ASIC

Powerful Intel CPUs

32 Gb Fibre Channel, 25 Gb IP,  
100 Gb RocE-v2 support

All-NVMe back-end, E2E NVMe ready

Designed with AI and ML support

Thin provisioning and efficient data reduction

100% Availability Guarantee

Secure cloud manageability

All-inclusive software

Customer self-installable and updateable\*

Timeless service option

Flat support pricing

\* Most customers prefer to have the systems installed by their trusted HPE partner

# ULTIMATE PERFORMANCE NEEDS ULTIMATE HARDWARE

## Storage array architectures

### Software-defined

For features and functionality, software implementations provide flexibility, simple delivery, and easy maintainability, but software-only platforms are held back by general-purpose hardware performance

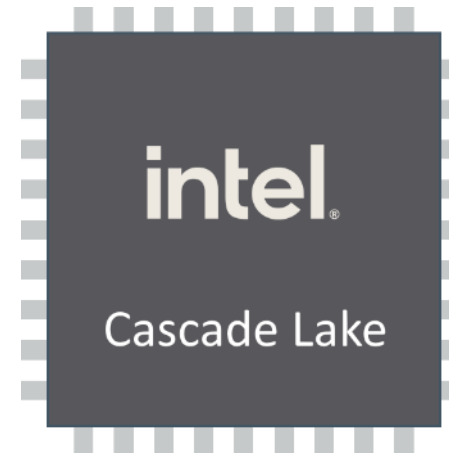
### Hardware-defined

Custom hardware solutions provide the highest possible performance, but lack flexibility and can be complex to maintain; it is often difficult, if not impossible, to add new features

### HPE Alletra

Software-defined, hardware-enabled

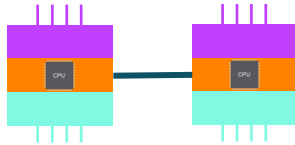
Extending general-purpose Intel CPUs with HPE custom ASIC acceleration allows for extreme performance without complexity by enabling features through software



# ARRAY ARCHITECTURES

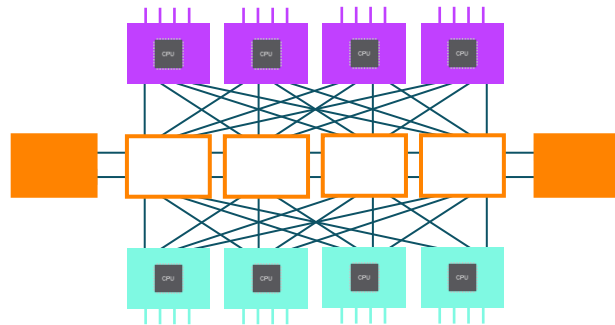
## Legacy array compared with HPE Alletra 9000 hardware architecture

### Traditional modular storage



Cost-efficient, usually active/passive or active/optimized, but dual-controller design limits scalability and resiliency

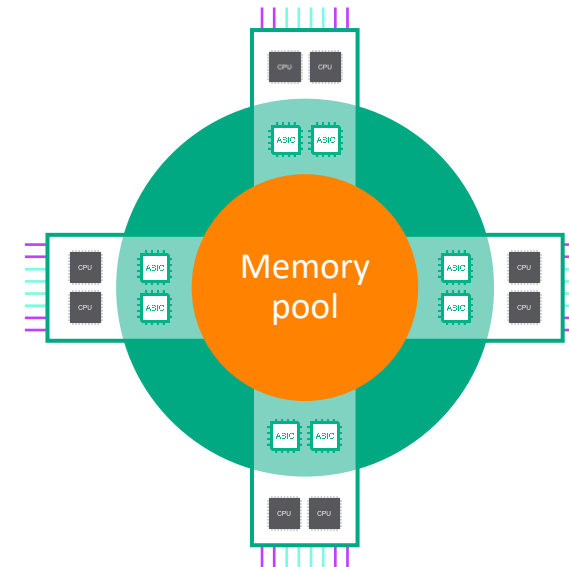
### Traditional monolithic storage



Scalable, resilient, and active/active, but complex, costly, static, and inflexible

- Host connectivity
- Data cache/memory
- Drive connectivity
- Matrix switches
- CPUs

### HPE Alletra 9000 architecture

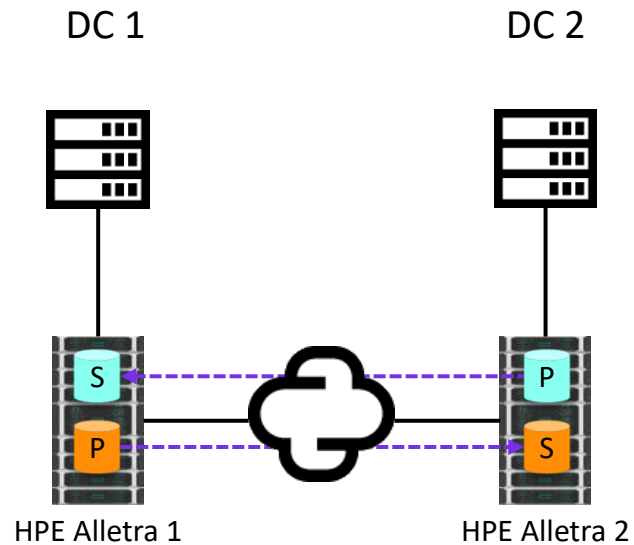


Cost-effective, scalable, resilient, meshed, active/active; meets cloud-computing requirements for efficiency, multitenancy, and autonomic management

# HPE ALLETRA 9000 LEADERSHIP—DATA AVAILABILITY AND PROTECTION

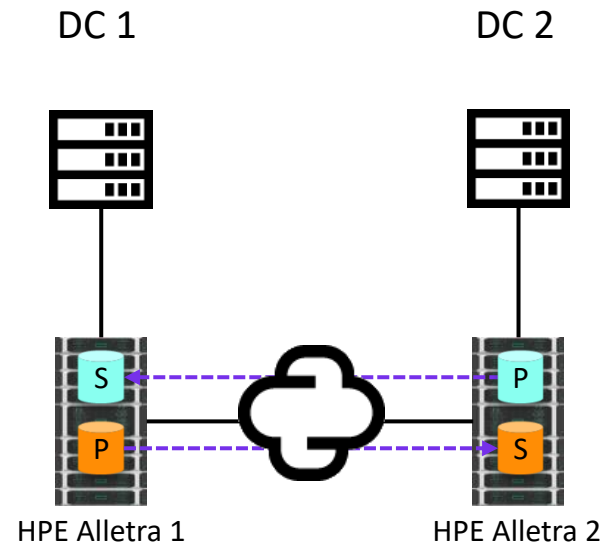
## Simplify disaster recovery and high availability

### Async Periodic Remote Copy



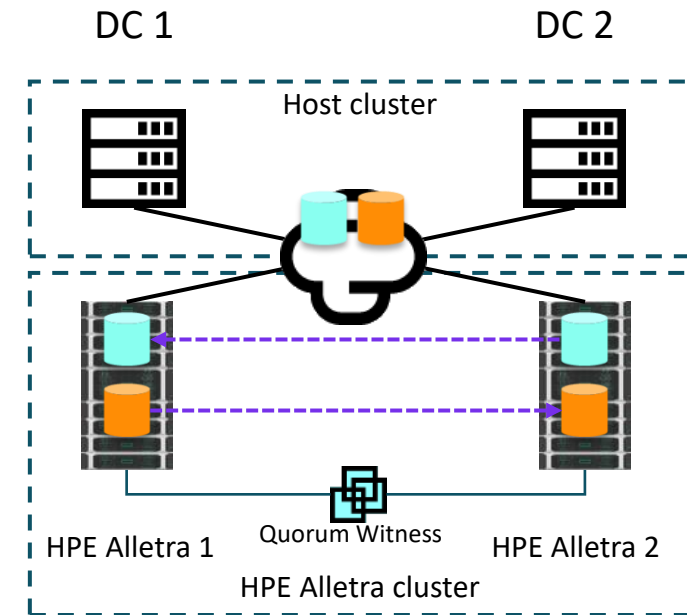
**RPO = from 1 minute to 1 year**  
Disaster recovery across continental distances  
up to 150 ms round-trip time (RTT)  
(~15,000 km)

### Sync Remote Copy



**RPO = 0**  
High availability across metro distances  
up to 10 ms RTT (~1000 km)

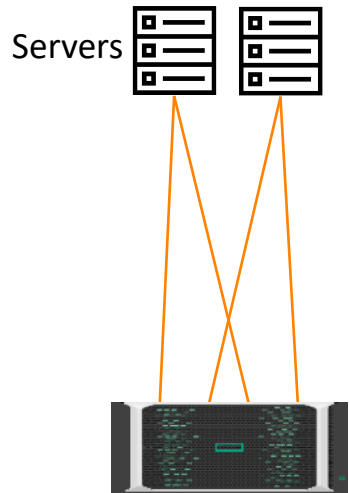
### Peer Persistence



**RPO and RTO = 0**  
High availability across metro distances  
with up to 10 ms RTT (~1000 km)

# HPE ALLETRA 9000 BLOCK I/O CONNECTIVITY

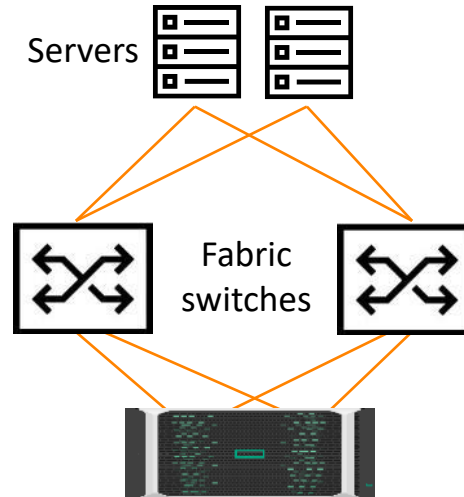
## Direct attach



- Fibre Channel (NVMeoF planned 2H21)
  - 8, 16, 32 Gb with SFP+ and optical cable

**Note:** iSCSI direct attach is not supported

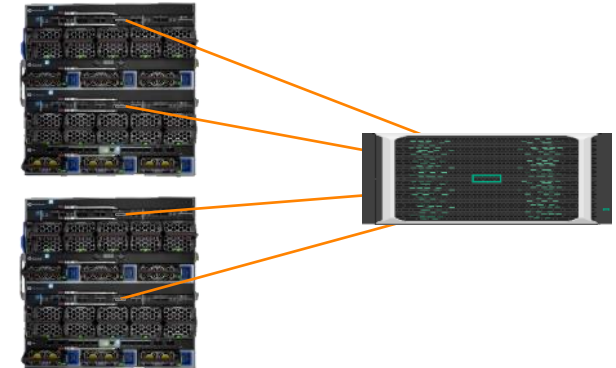
## SAN



- Fibre Channel (NVMeoF planned 2H21)
  - 8, 16, 32 Gb with SFP+ and optical cables
- IP SAN—iSCSI (NVMeoF planned 1H22)
  - 10 or 25 Gb with SFP+ and optical cables
  - Direct attach copper (DAC) or active optical cables (AOC)
  - 10GBase-T with CAT 6/7 cables

## HPE Flat SAN

HPE Synergy with  
Virtual Connect FlexFabric

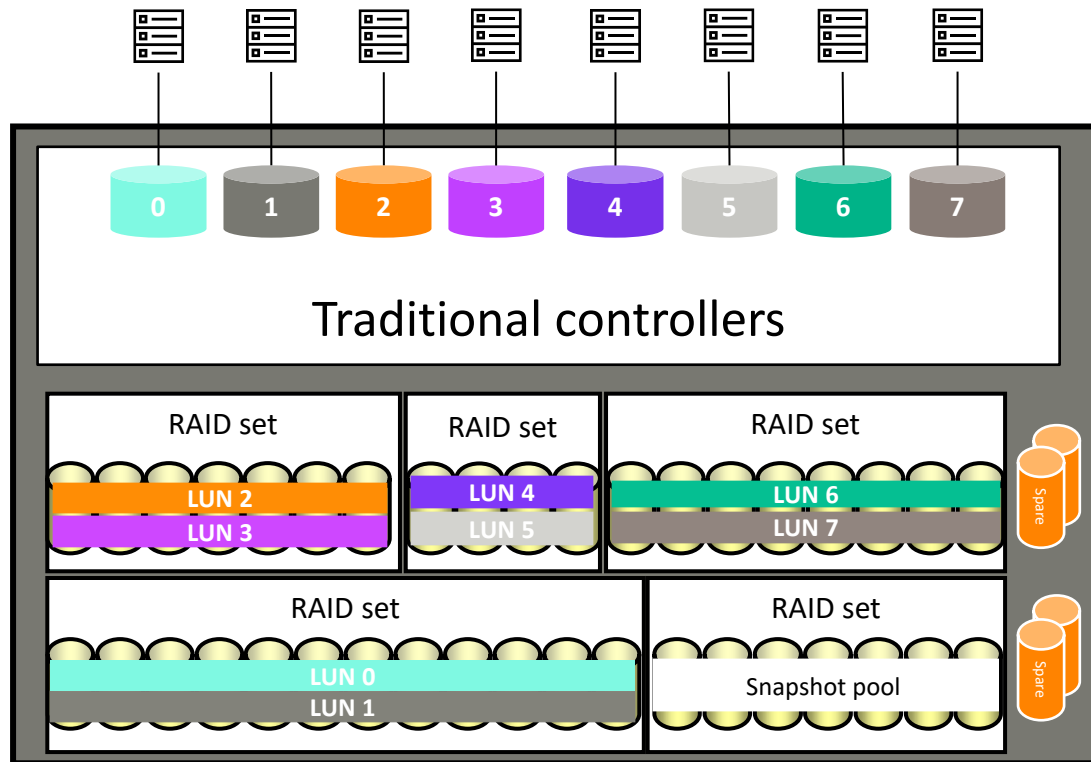


- Fibre Channel (NVMeoF planned 2H21)
  - 8, 16, 32 Gb with SFP+ and optical cables

# HPE ALLETRA 9000 OS VIRTUALIZATION ADVANTAGES

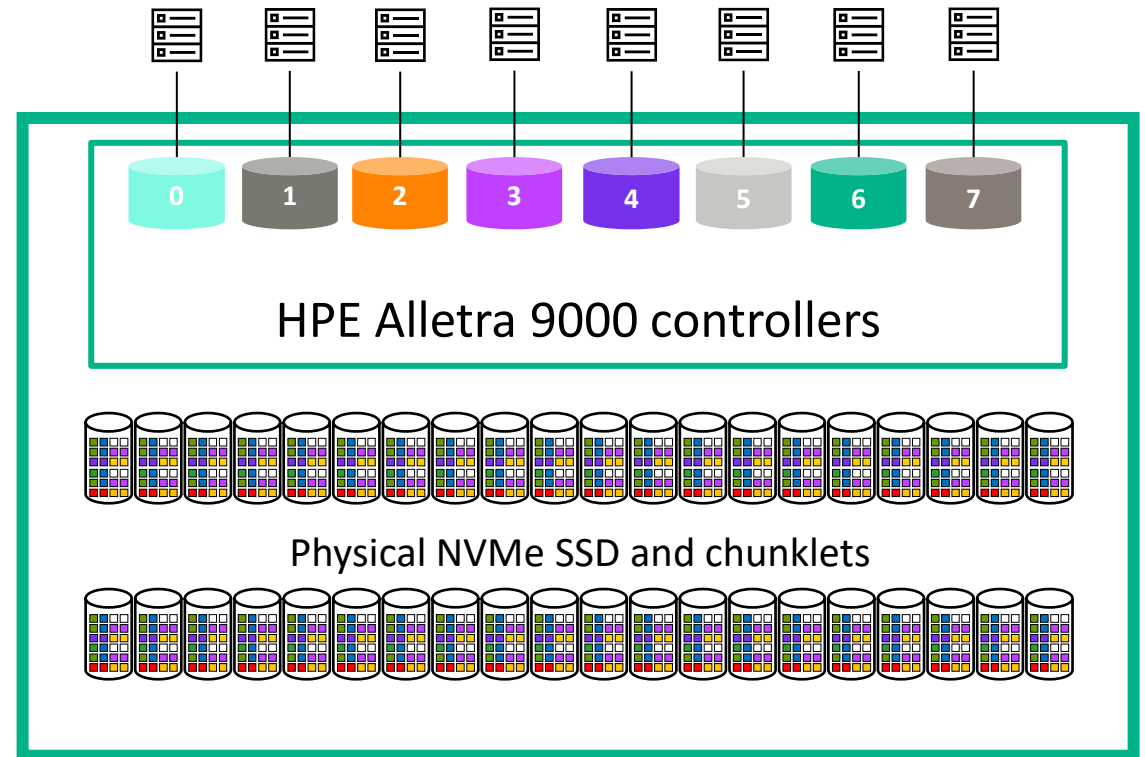
## Traditional arrays

- Add drives in groups of RAID sets
- Provide limited single LUN performance
- Require dedicated spare drives
- Some require dedicated snapshot pool drives



## HPE Alletra

- All drives are concurrently used and virtualized
- Built-in wide-striping is based on chunklets
- Features distributed sparing, no dedicated spare drives
- No pools or reservation are required





# THE HPE ALLETRA 9000 FAMILY

		HPE Alletra 9060	HPE Alletra 9080
<b>Controller nodes</b>		2–4	2–4
CPU cores per node/system		20 / 80	40 / 160
PCIe slots per node/system		3 / 12	3 / 12
10/25 Gb Ethernet iSCSI host ports		0–48	0–48
32 Gb Fibre Channel ports		0–48	0–48
Built-in 100 Gb RocE-v2 back-end ports per node/system		2 / 8	2 / 8
Built-in 10 Gb Remote Copy over IP (RCIP) ports per node/system		2 / 8	2 / 8
<b>Max cache per node /per system GiB</b>		256 / 1024	768 / 3072
<b>Max NVMe drives</b>	Today/planned after launch <sup>4</sup>	48 / 240	48 / 240
<b>Max presented capacities TiB<sup>3</sup></b>		5000	10000
<b>Max supported raw capacities TiB</b>	Today/planned after launch <sup>4</sup>	657 / 1600	657 / 3200
<b>Max random IOPS</b>	RAID 6—100% 8 KiB read <sup>2</sup>	1,100,000	2,100,000
	RAID 6—100% 16 KiB read <sup>1</sup>	590,000	1,150,000
	RAID 6—60/40 OLTP 16 KiB <sup>1</sup>	278,000	500,000
<b>Max sequential IO GiB/s</b>	RAID 6—256 KiB sequential read <sup>1</sup>	27	33.5
	RAID 6—256 KiB sequential write <sup>1</sup>	5.2	6.7

1. Sustained performance without any cache hits, 100% **data reduction enabled** (deduplication + compression)
2. Sustained performance without any cache hits, thinly provisioned and no data reduction enabled
3. Assuming a data compaction rate of 4:1
4. By adding up to eight 100GbE RocE-v2 NVMe drive enclosures



Q&A

THANK YOU!