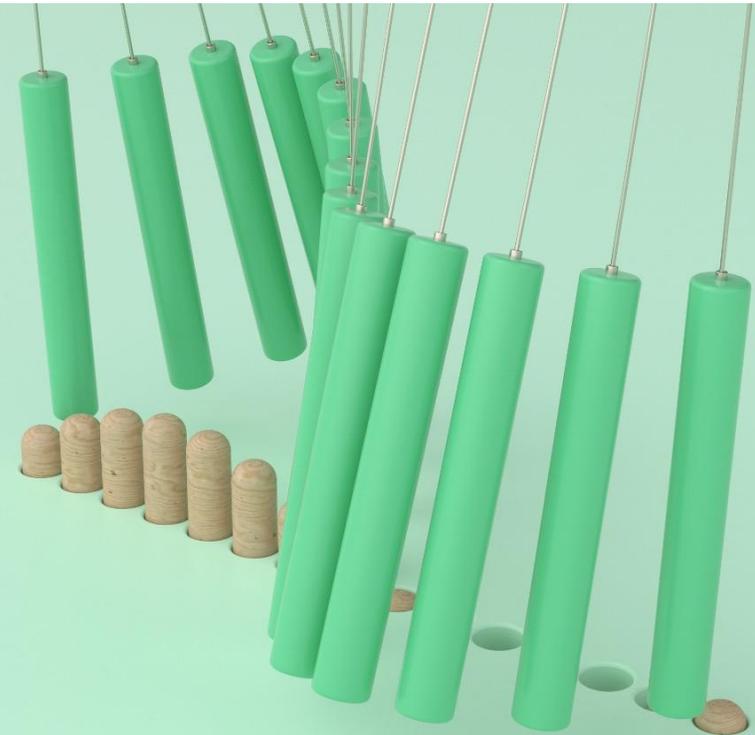


# NetApp AFF A-Series

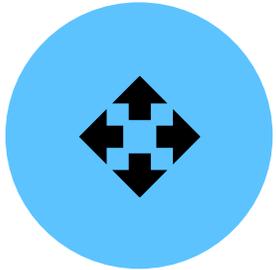
High-performance flash storage for your hybrid cloud



# Agenda

- Business and IT challenges
  - Challenges to meet the requirements of digital transformation
  - Modernize IT with cloud-connected flash
- NetApp AFF A-Series systems
  - AFF A-Series overview
  - What's new with AFF and NetApp® ONTAP® 9
  - Customer benefits
- Leadership and advantages
  - Honors and awards
  - Customer success
  - Flash promotion programs

# IT has moved front and center for your business



## **Flexibility is key**

Rapidly adapt to the changing new normal



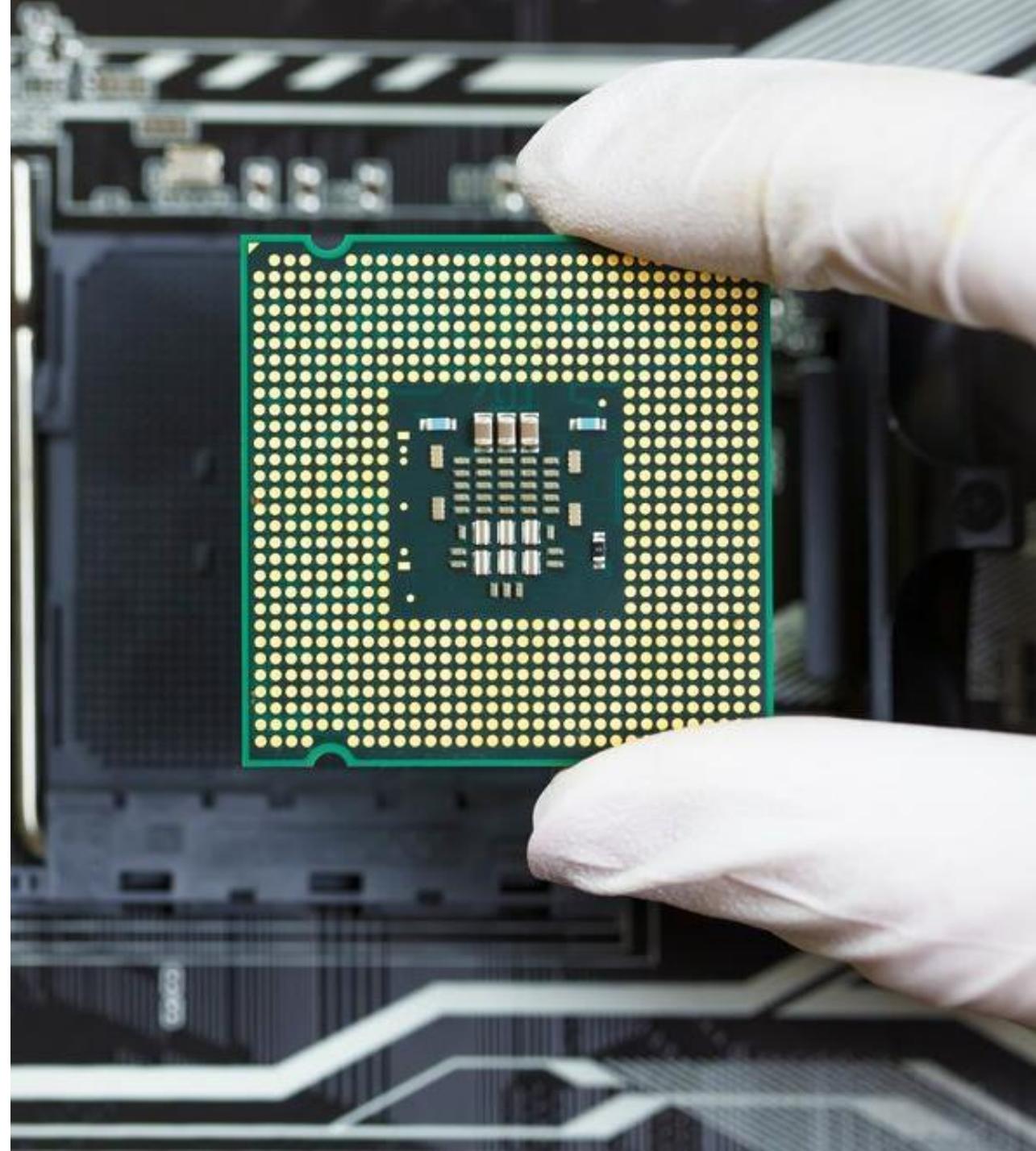
## **Business is unpredictable**

Cost controls and risk mitigation are paramount

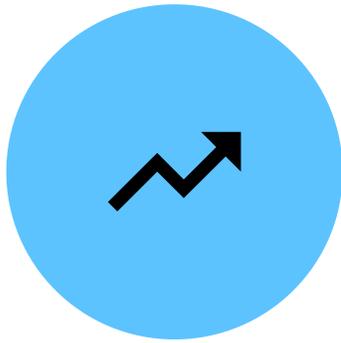


## **Beating the competition**

Accelerate transformation by building strategically to deliver the best of both worlds



## Our customers are challenged to...



Reduce cost while  
simplifying operations



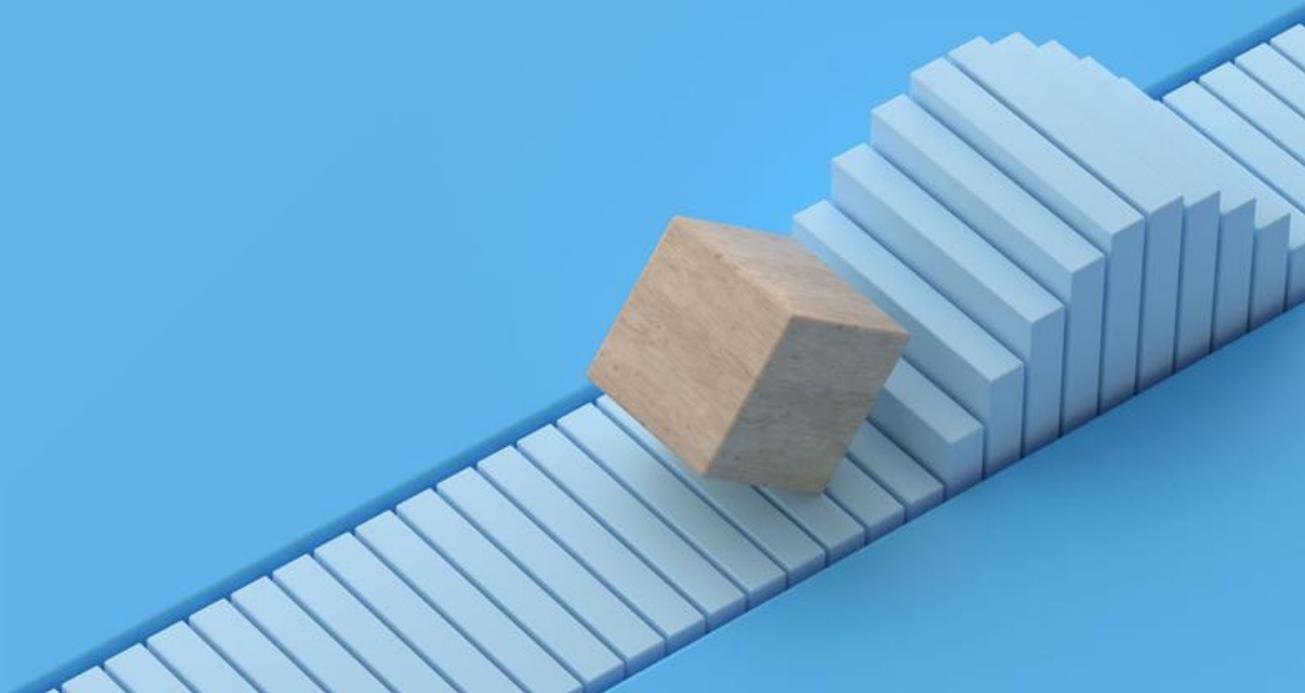
Boost performance and  
time to market



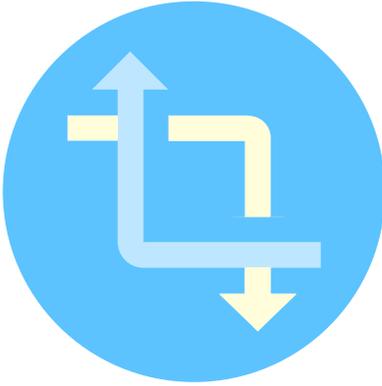
Scale to their choice of  
cloud

# NetApp AFF A-Series systems

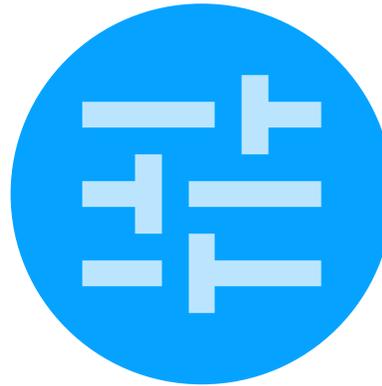
Enable a smooth data center transition to flash



# Modernize with cloud-connected flash



Simplify operations across the hybrid cloud



Accelerate every application



Keep data available, protected, and secure

# AFF A-Series: Smart, powerful, trusted end-to-end NVMe systems



**AFF A900**

Mission-critical workloads and data center that require performance, serviceability, and resiliency



**AFF A800**

Most demanding workloads that require high performance and ultralow latency



**AFF A400**

Enterprise applications that require <sup>150</sup>balance of performance and versatility



**AFF A250**

Mid-size businesses or remote offices of a large enterprise



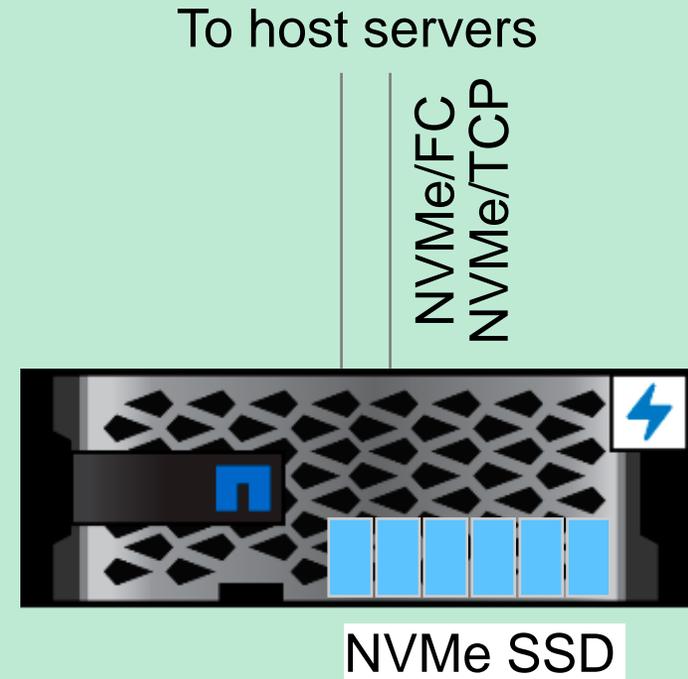
**AFF A150**

Midsized business and small enterprises that require performance at outstanding value

# End-to-end NVMe storage

For your most demanding workloads

- Accelerate enterprise apps with extremely low latency (100µs)
  - Traditional enterprise apps: Oracle, SAP, SQL Server
  - Modern apps: AI, deep learning, analytics
- Reduce data center costs by consolidating workloads on high-density storage
- Future-proof with NVMe technology, high-bandwidth network connectivity, and cloud integration



# AFF A900 and ONTAP for enterprise applications



NetApp® AFF A900



**AFF A900 and NetApp ONTAP®**  
The complete enterprise storage solution for high-performance applications and databases

- ✓ Unrivaled performance
- ✓ High-resilience design
- ✓ Multiprotocol support (NVMe/TCP, NVMe/FC)
- ✓ Nondisruptive upgrades
- ✓ Advanced RAS

# End-to-End NVMe Systems: Key Features

- Leading performance with low latency
- Ideal for EDA and Media & Entertainment workload
- Scale-out NAS, unstructured data

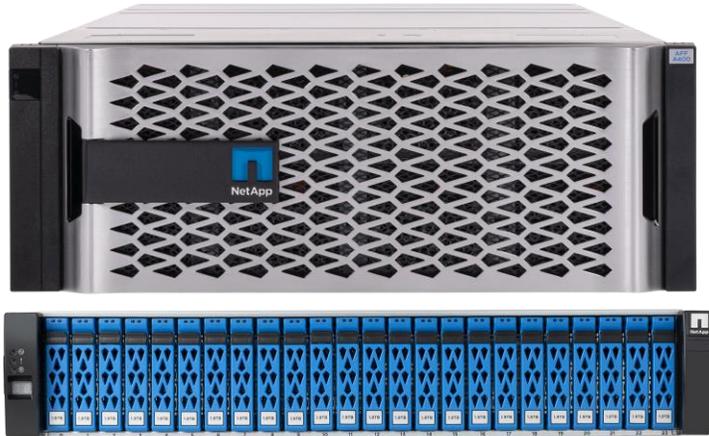
## A800: Ultimate performance and efficiency



Leading density of 2.5PiB in 4U with internal SSDs

# End-to-End NVMe Systems: Key Features

## A400: Best Value and Versatility



- Offload engine further enhances performance
- End-to-end NVMe (NVMe/TCP and NVMe/FC)
- High bandwidth connectivity: 25/40/100GbE and 32/16Gb FC
- Self-encrypting NVMe SSDs at no additional cost

# Entry AFF A250: Simpler, faster, and more efficient



## NetApp® AFF A250

- 2U chassis with 24 embedded NVMe SSDs
- NVMe/FC, 32Gb FC, 25GbE
- Unified and All SAN Array (ASA) configurations



## Key benefits

- **Simplify data services and cloud integration**
  - Integrated management tools (ONTAP System Manager, Active IQ®, Cloud Insight)
  - More cost-effective business continuity
- **Power enterprise apps with modern infrastructure**
  - 45% higher performance to drive more workloads, eliminating silos
  - Optimized resilience for SAN
- **Transform data center economics**
  - 2U compact design to reduce footprint, especially when you're replacing HDDs
  - Simpler, faster, and more efficient—at no extra cost

## Ideal for

- Midsize and large enterprises with remote offices
- Enterprise applications, virtualization, and consolidation

# Introducing AFF A150

Expanding the AFF A-series down market

- **20-40% higher performance vs. C190**
- **Increased scalability and expansion options**
  - Support for 24 internal 960GB, 3.8TB, and 7.8TB SAS SSDs
  - Up to 2 SAS SSD expansion shelves
  - Maximum 72 SSDs, max effective capacity 2.2PB\*
- **Continuous availability with support for NetApp MetroCluster technology**

\* At 5:1 storage efficiency, includes overhead



**Shipping: April 2023**

# AFF C190: Cloud-ready all-flash storage at the price of disk

- All-flash storage starting at less than US\$20,000
- Includes NetApp® ONTAP® Premium flash software
- 10x performance at the same price versus hybrid/HDD
- Compact 2U system for both file and block
- Four capacity options up to 55TB effective with 3:1 efficiency guarantee
- Two network options: Ethernet or Unified



NetApp AFF C190

Simple Smart Secure

# All SAN Array AFF

Resilience, record-setting performance, hybrid multicloud

## State-of-the-art resilience

- Symmetric active/active for instant failover
- Continuous data availability

## Agility and simplicity of modern storage

- Dedicated block-only storage
- One-step provisioning of multiple LUNs
- Proactive monitoring and predictive analytics

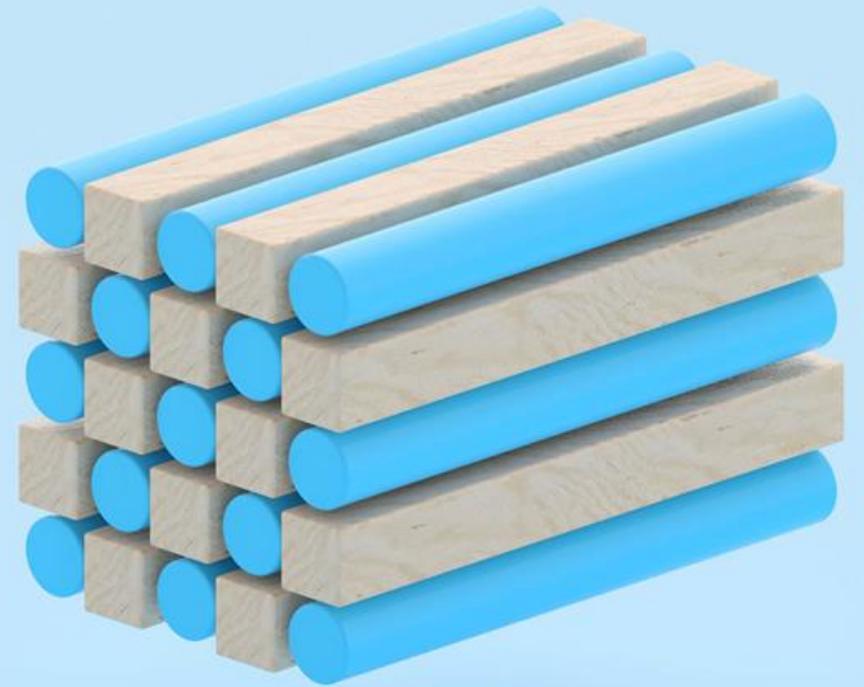
## World's fastest enterprise all-flash storage

- Performance and availability of tier 1 SAN
- Consistent low latency for all workloads

## Cloud integrated with all major clouds

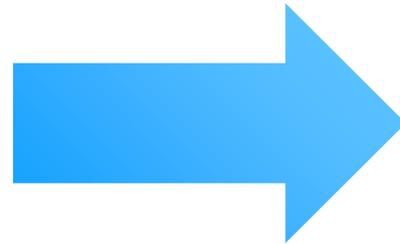
- Native cloud tiering to reduce primary storage costs
- Backup, disaster recovery, and migrate applications to the cloud

# Increase operational efficiency



# Application-aware data management

Deploy key workloads in less than 10 minutes with [ONTAP System Manager](#)



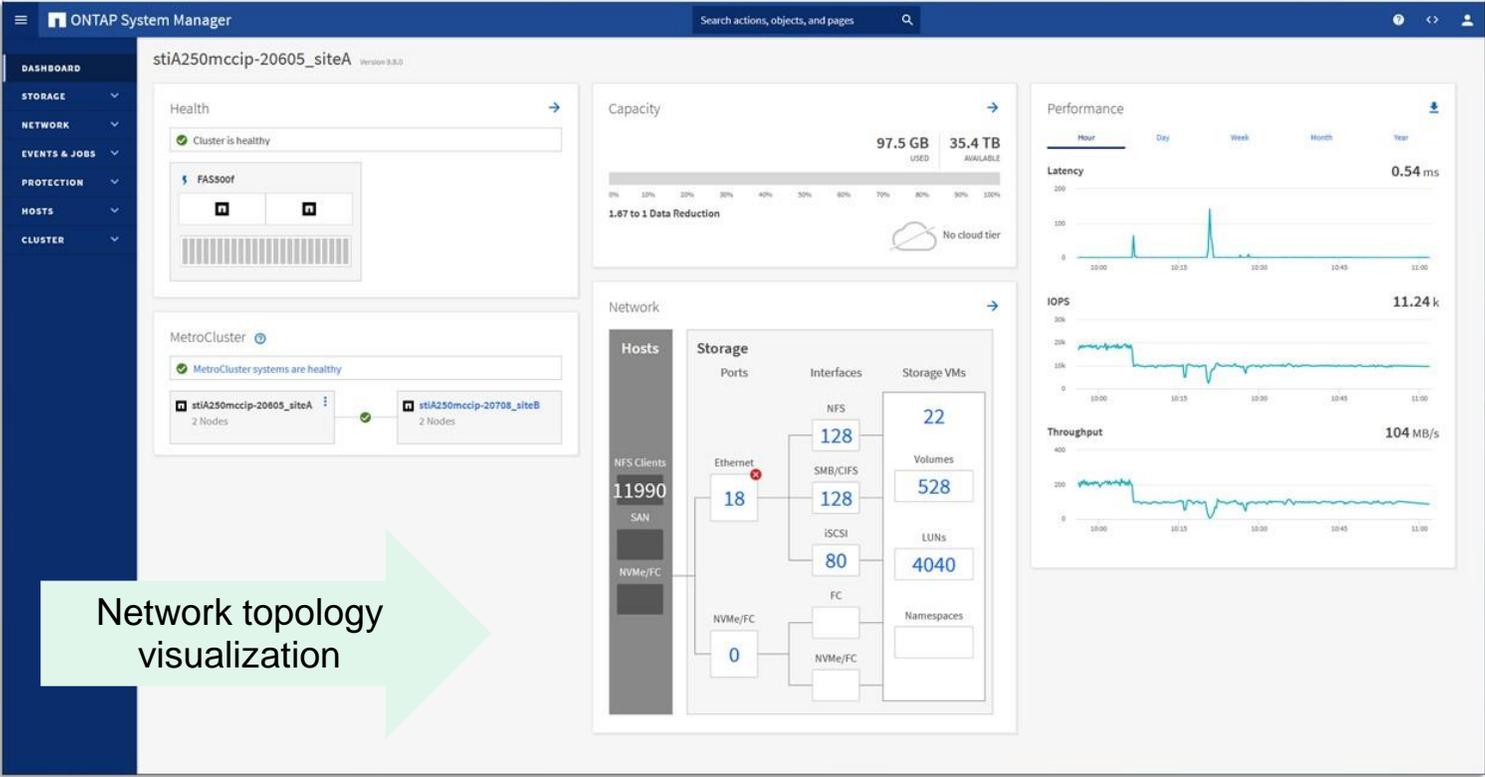
10 min.  
0 pages  
1 screen

NetApp® AFF fast provisioning workflows

# Intuitive ONTAP System Manager

Capacity status

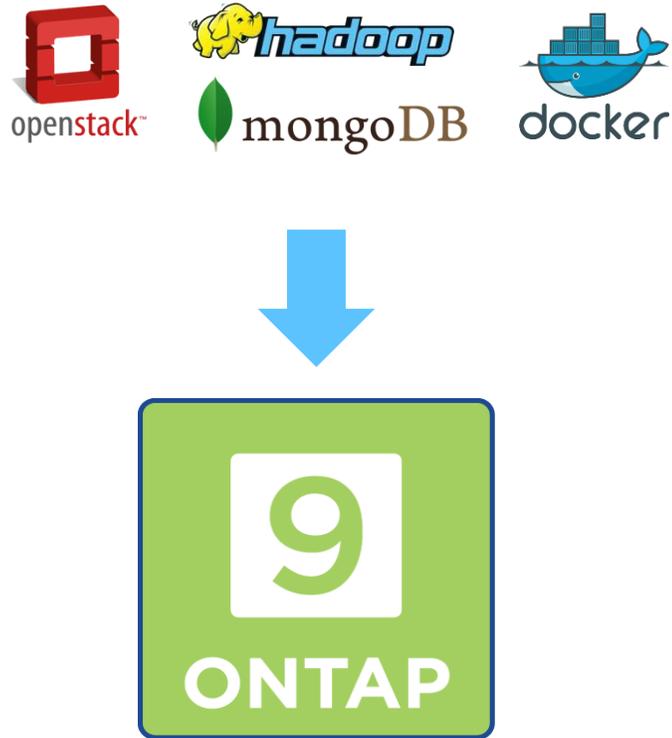
Health status with hardware visualization



Performance history

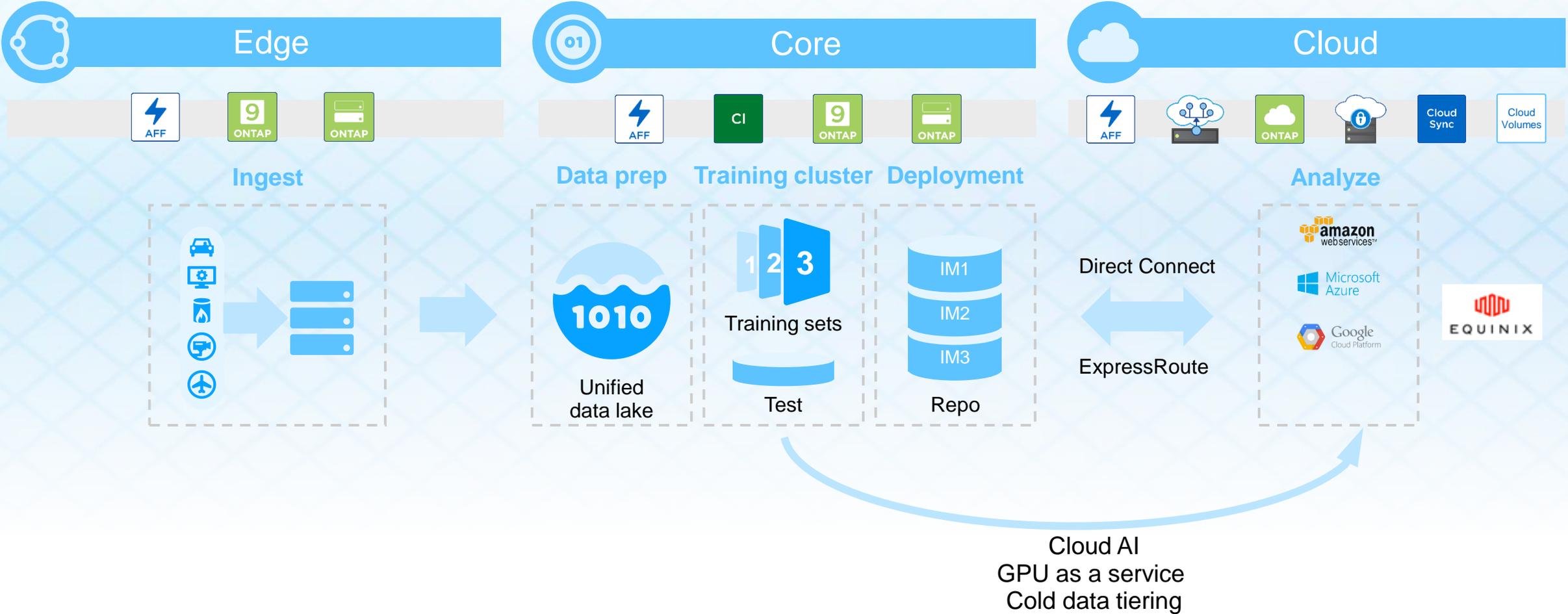
Network topology visualization

# Extend ONTAP infrastructure to new enterprise apps

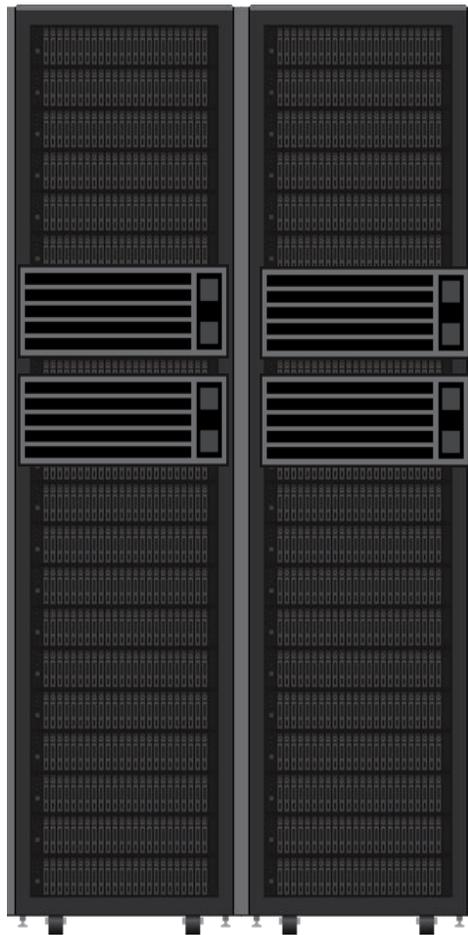


- Integration and support for new enterprise apps
  - OpenStack integration
  - Connector for Hadoop
  - Connector for Docker
  - Certification for MongoDB
- Ability to provide enterprise-grade data services
- Common infrastructure for existing and new apps

# Edge to core to cloud data pipeline for AI and DL



# Dramatically reduce data center costs



**HYBRID FLASH ARRAY**



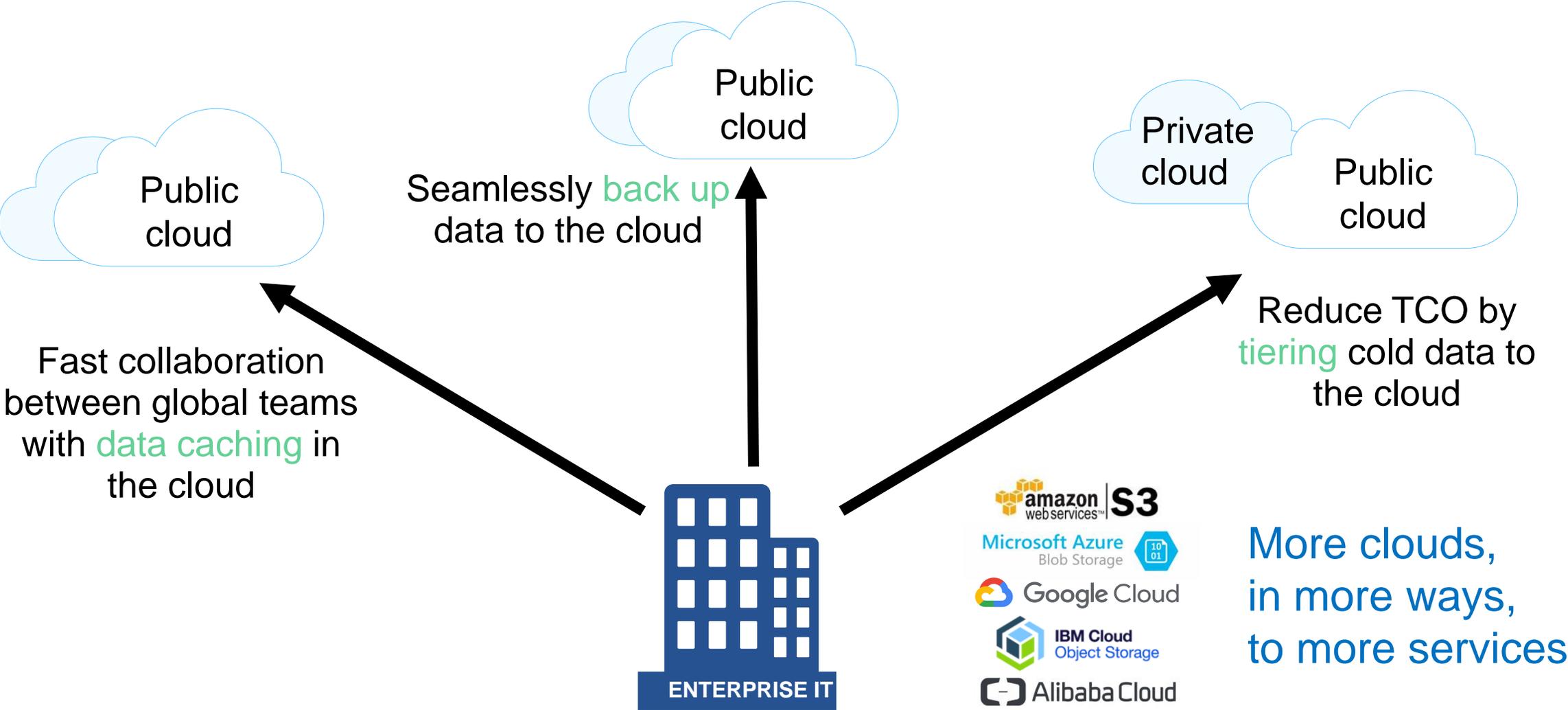
↑ **2.5PiB** effective in 4U  
↑ **1.4M** IOPS



**NETAPP® AFF A-SERIES SYSTEM**

↓ **15x** less power/cooling  
↓ **37x** smaller footprint  
↓ **67%** lower support costs

# Cloud-enable your data center



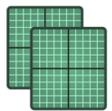
# Global data distribution—on demand

Efficient collaboration across your hybrid cloud with FlexCache



## Media rendering

Master set in single volume  
Fast access to remote artists



## EDA workloads

Chip design  
High file count



## Static repositories

Software distribution  
Reporting data

Data is everywhere, compute is everywhere, users are everywhere.  
Access data where it needs to be!

Support for SMB creates new opportunities

## Benefits

- Increased collaboration and productivity across multiple locations
- Lower read latency at remote locations
- Higher read throughput from a single volume or file

# Create a **unified**, simplified environment across SAN, NAS, and now object ONTAP S3



## Targeted Use Cases

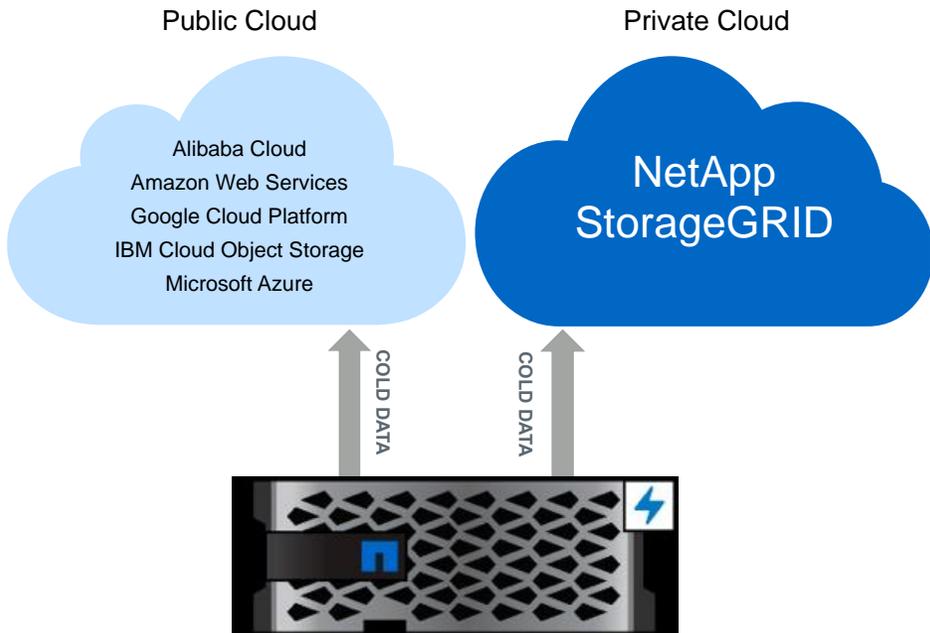
Edge to core data ingest  
Application back-end caching or storage  
Scratch space  
Archive—small scale  
AI/ML model training

## NetApp® hybrid cloud innovation spans:

- SAN/NAS/object
- Entry class to high end
- On premises to public cloud

# Automatic cloud tiering of your cold data

Maximize your flash environment with ONTAP FabricPool



- Improve TCO by reducing primary flash storage by >50%
  - Keep only hot data on your flash system
  - Decrease the size of new system configurations
  - Reclaim capacity and consolidate more workloads on existing systems
- Simple setup and automated management
- Many options for hot tier
  - NetApp® AFF systems, NetApp FAS systems, NetApp Cloud Volumes ONTAP®
- Many choices for hybrid multicloud targets
  - Private cloud: NetApp StorageGRID®
  - Public cloud: Amazon, Microsoft, Google, IBM, Alibaba

# Actionable intelligence for optimal storage health and availability

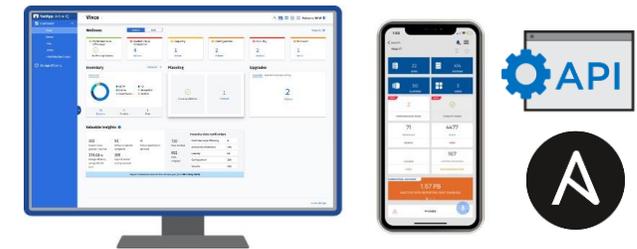
NetApp® Active IQ®: a digital advisor that supports the proactive care of your environment

- Expose risk factors and prevent problems before they affect your business
- Uncover/predict systems reaching performance or capacity limits to stay ahead of growth
- Use prescriptive and automated actions to reduce time spent on day-to-day operations

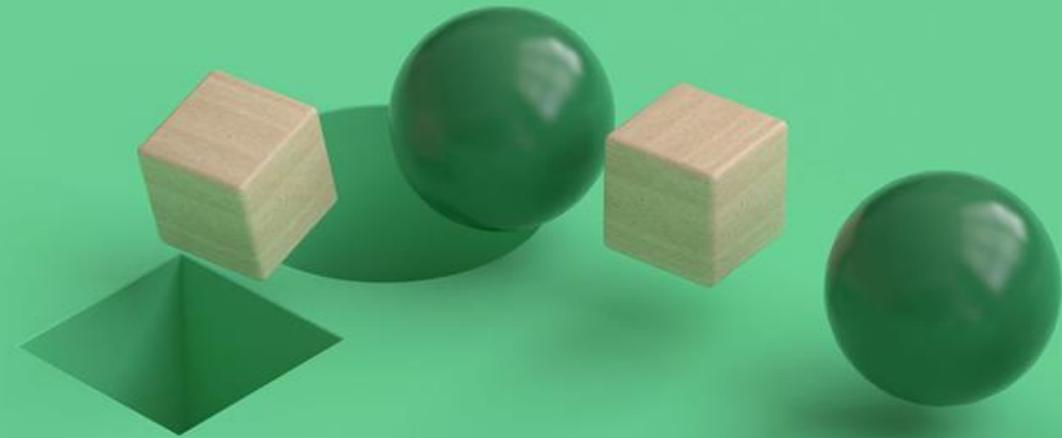
Data

Intelligence

Action



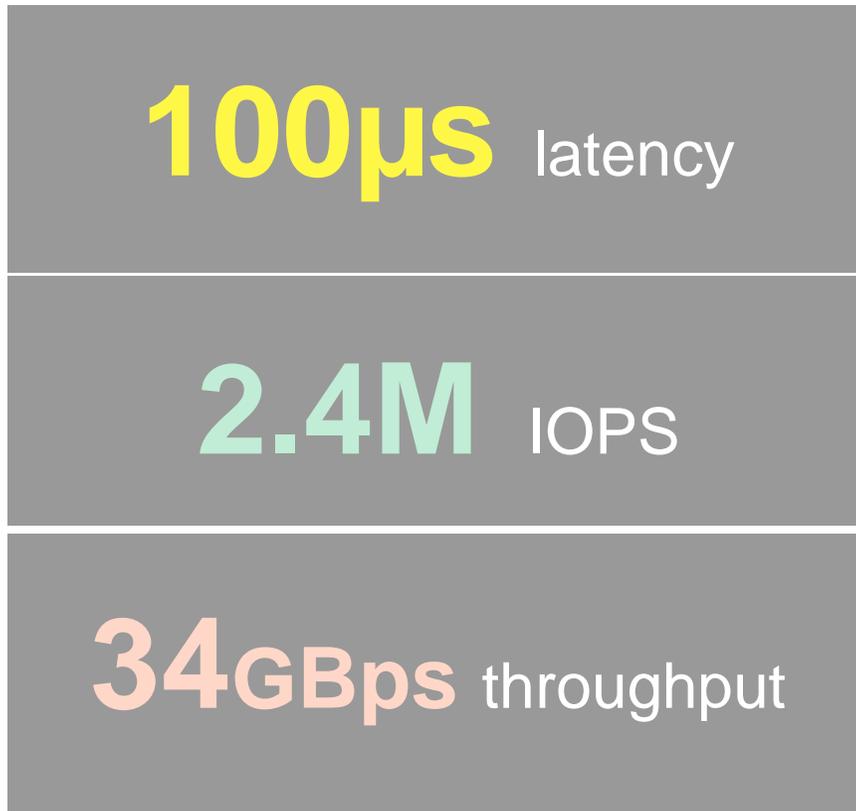
# Accelerate applications and future-proof your infrastructure



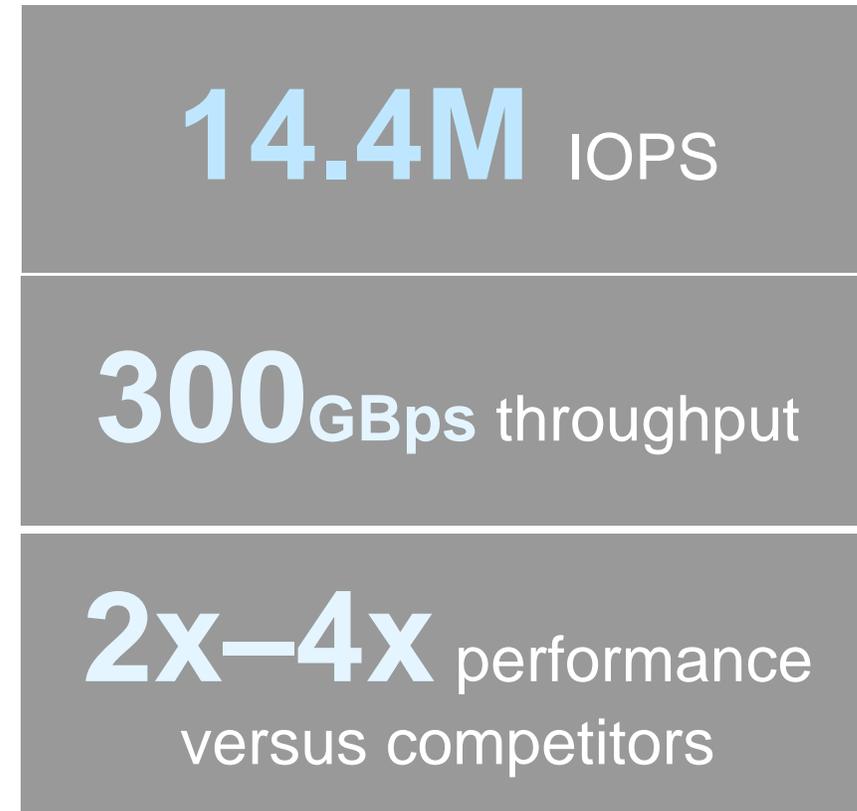
# The world's fastest NVMe flash and fabric

## AFF A-Series

A single system

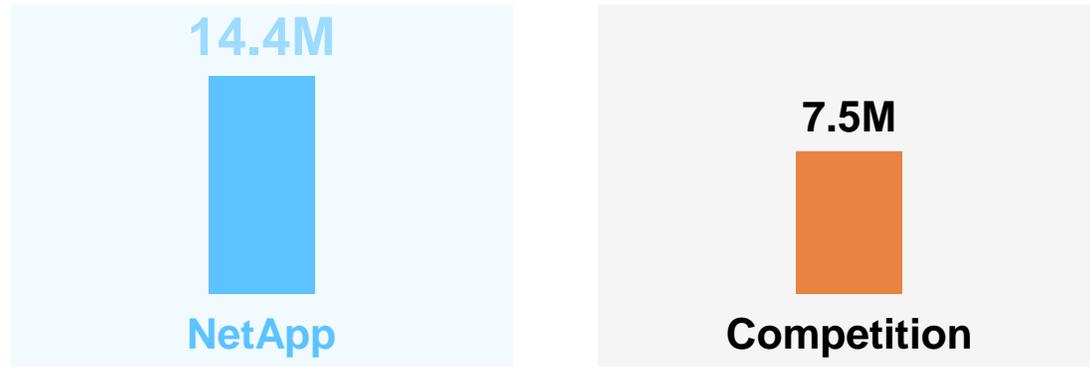


A 24-node cluster

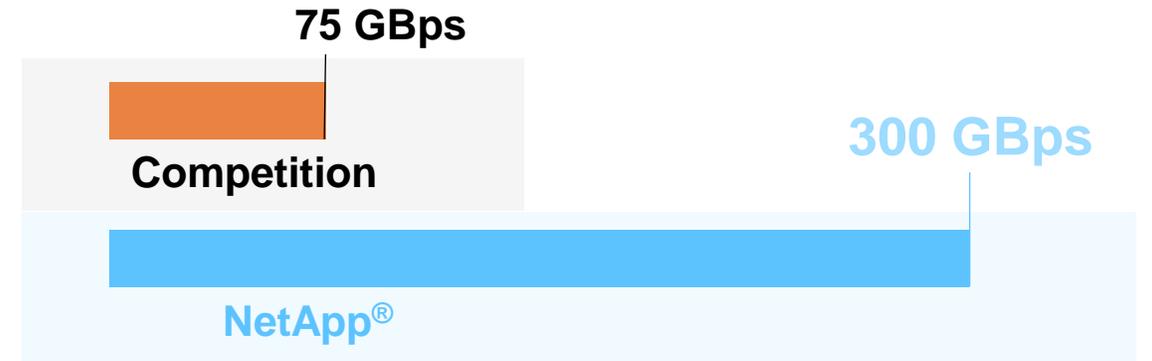


# NetApp AFF crushes the competition

## 90% more IOPS



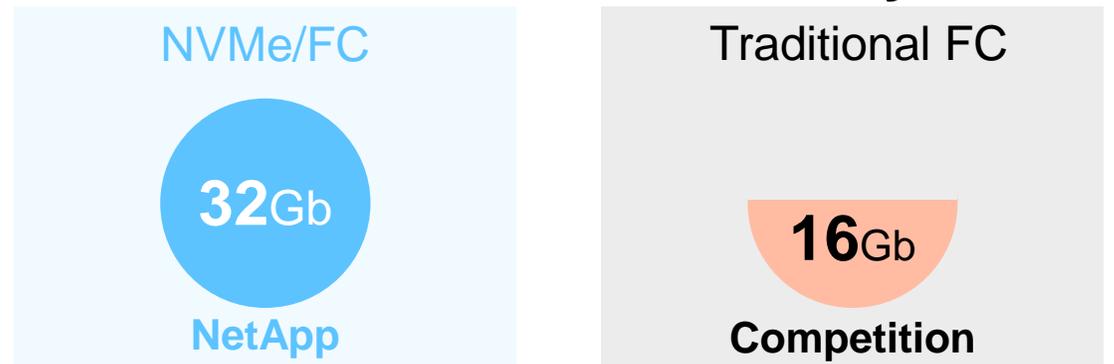
## 4x higher throughput



## Most cloud connected



## Fastest FC connectivity



# Storage for today's high-tech industry applications

NetApp ONTAP FlexGroup: a massively scalable, high-performance data container

Apps for electronic design automation,  
high-tech, oil and gas,  
media and entertainment



Single namespace

## Linear scale for performance and capacity

- Ability to scale to 20PB and 400 billion files

## Operational simplicity

- Single mount point with automated load and space distribution

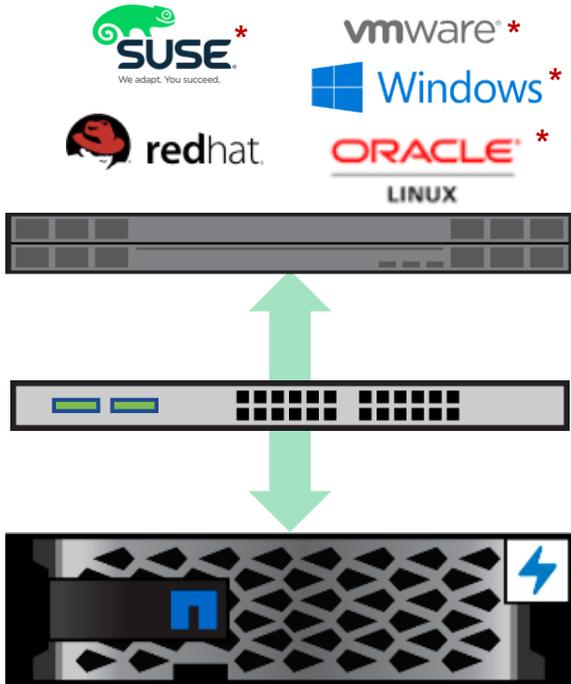
## Consistent high performance

- Predictable, consistent low latency
- All-flash containers

## Leading resilience

- NetApp® ONTAP® nondisruptive operations

# Modernize SAN with NVMe/FC



Performance improvement of NVMe/FC vs. FCP

- Up to 2x IOPS
- Up to 50% lower latency

Nondisruptive software upgrade to NVMe/FC

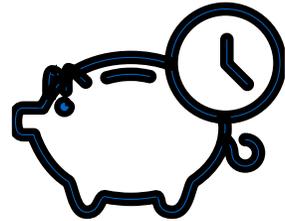
Asymmetric Namespace Access (ANA) storage path failover supported

# NVMe/TCP: For enterprises and Cloud Service Providers who are looking to deploy apps and databases with high performance and low TCO across hybrid clouds.



## High performance

- Achieve higher throughput and lower latencies than with iSCSI (upper/lower driver SCSI connections have more queues and queue depth).



## Lower TCO

- Get low host CPU utilization (lower costs for power and server licensing).



## Simplicity

- No infrastructure upgrades are required for deployment (only software change is required).

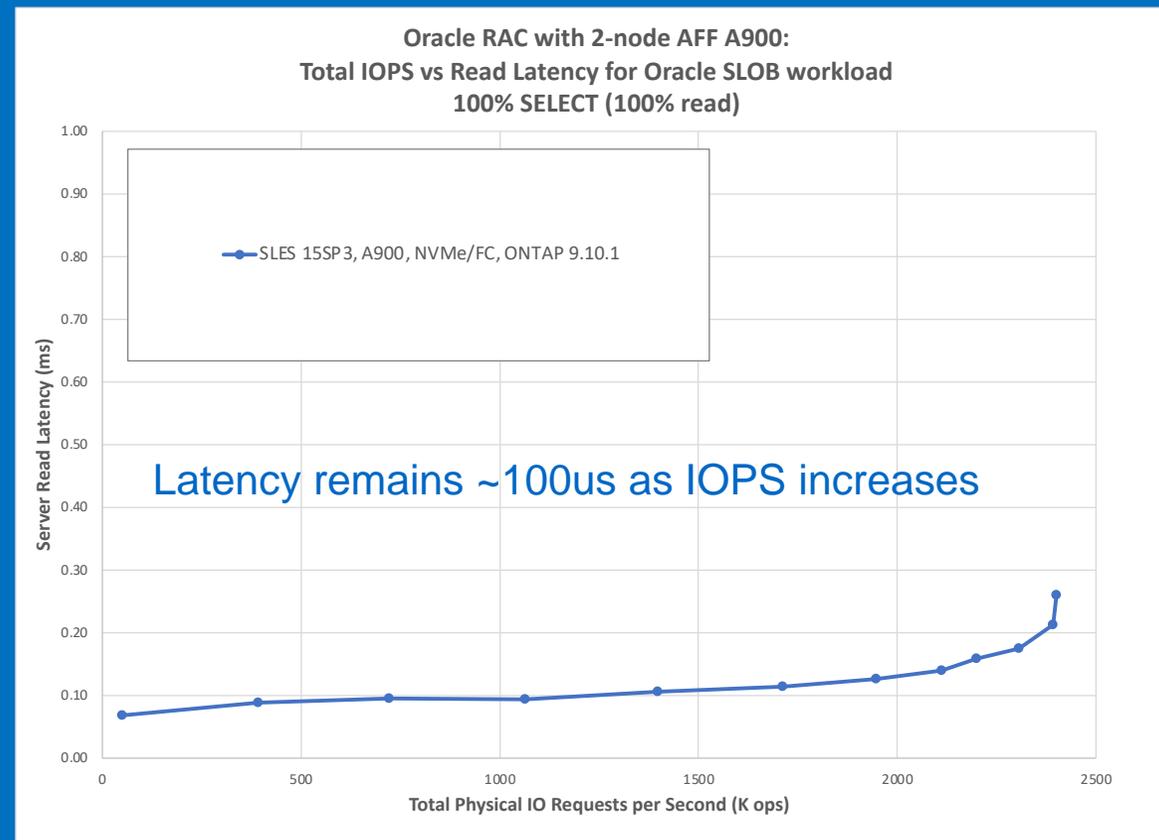


## Cloud flexibility

- Enable network consolidation on TCP both on premises and in the cloud.
- Extend NVMe over Fabrics (NVMe-oF) benefits to the cloud.

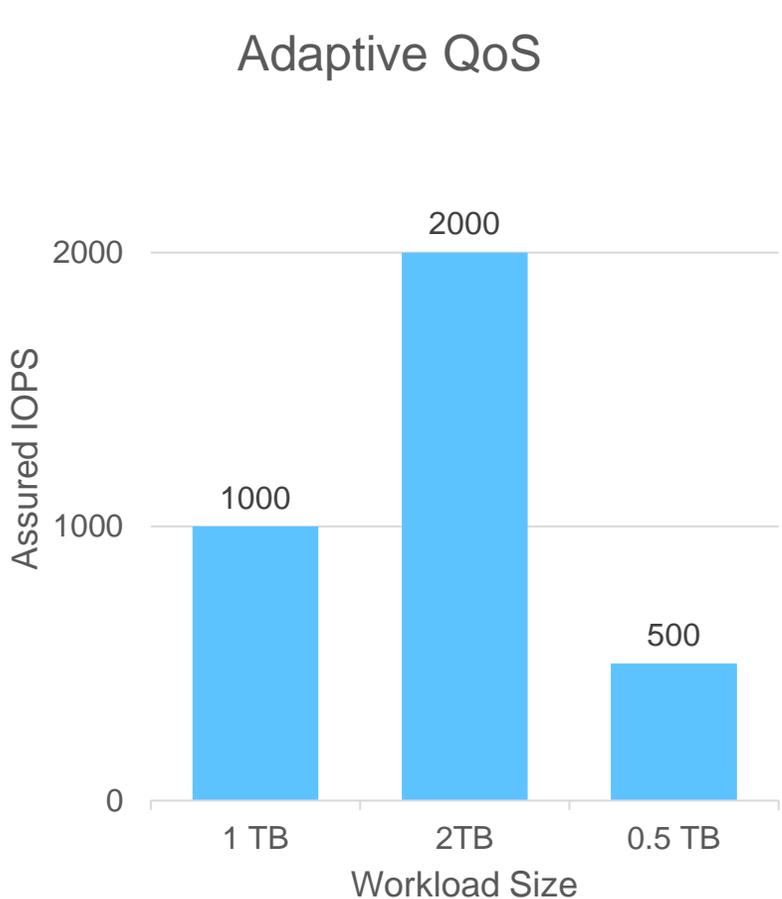
# Industry-leading performance for enterprise applications

- Read performance: NetApp® AFF A900 all-flash storage system running Oracle
- IOPS: up to 2.4 million IOPS per high-availability pair; 14.4M IOPS in a 12-node SAN cluster
- Faster application response time, with extremely low latency: ~100µs



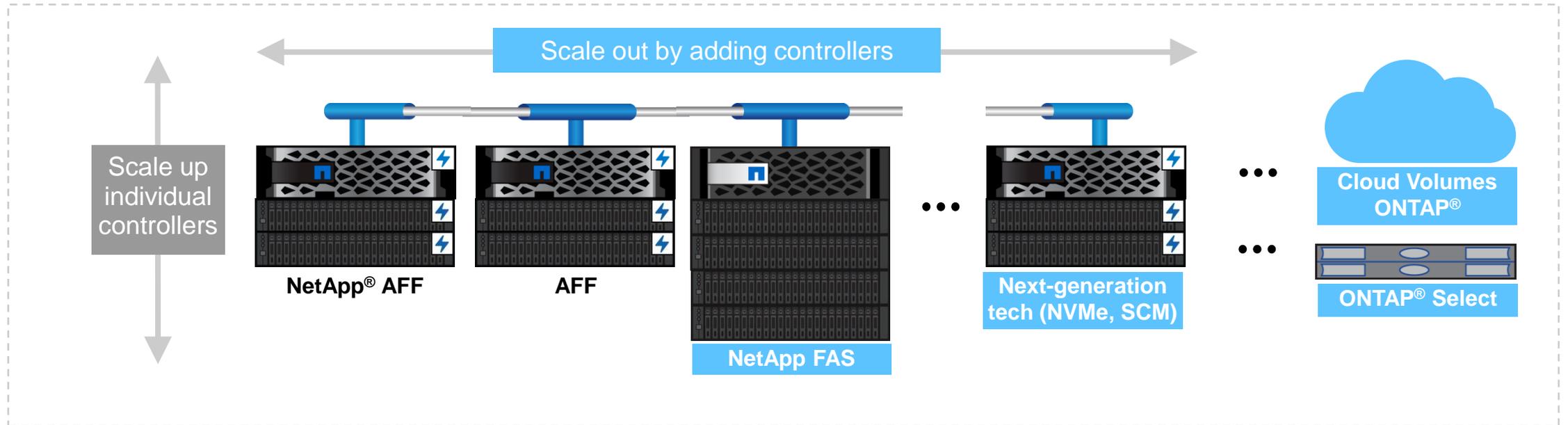
# Leading performance assurance

Adaptive QoS simplifies performance controls for shared environments



- Streamline setup of quality-of-service (QoS) policies
  - Leverage three preset policies (Extreme, Performance, Value)
  - Or create your own policies
  - Each policy is defined by peak IOPS/TB, expected IOPS/TB, and absolute minimum IOPS
- Automatically adapt resources as the workload size (in terabytes) increases or decreases
- Use total storage resources more efficiently
  - Protect performance of business-critical workloads
  - Shift freed-up IOPS to other workloads
- Supported for SAN on NetApp<sup>®</sup> AFF systems

# Respond to business needs with seamless scale-out without silos



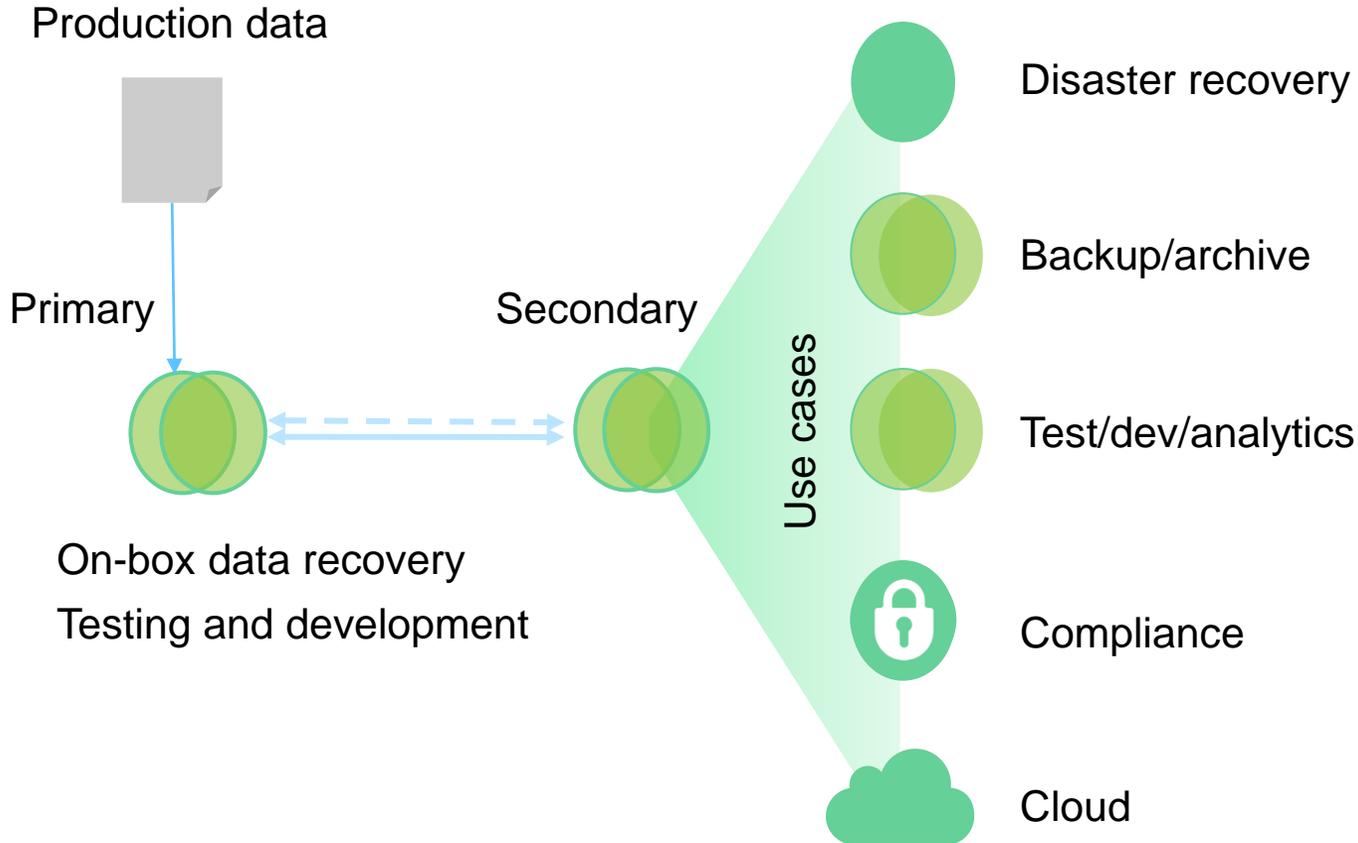
- **Unified scale-out for NVMe over Fabrics (NVMe-oF), FC, iSCSI, NFS, SMB, S3**
- Upgrade hardware and software or scale up without disrupting users
- One OS for software-defined, cloud, and future-generation flash
- Modern, Ethernet-attached media shelf

**Keep important data  
available, protected, and  
secure**



# Integrated data protection

One data management system for hybrid cloud

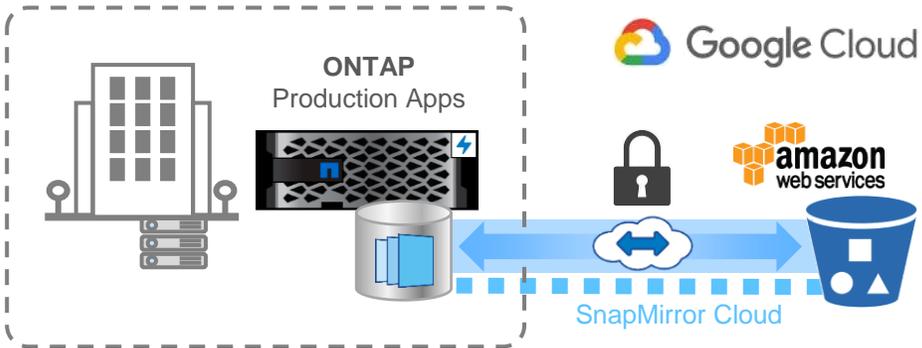


- Built-in data protection with simple and common management across systems
  - NetApp® AFF or FAS
  - NetApp ONTAP® Select
- Seamless cloud-integrated backup
- Native data format of secondary data copies that enables multiuse for
  - Disaster recovery testing
  - Backup and archiving
  - Testing and development
  - Analytics and reporting
- Flexible and granular synchronous replication
- Write once, read many (WORM) retention for compliance

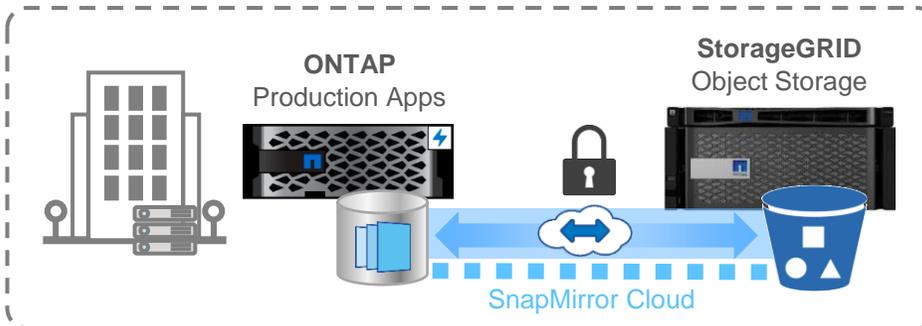
# Protect data across your hybrid cloud

Even more flexibility with SnapMirror Cloud

## On-premises primary to public cloud



## On-premises primary to StorageGRID



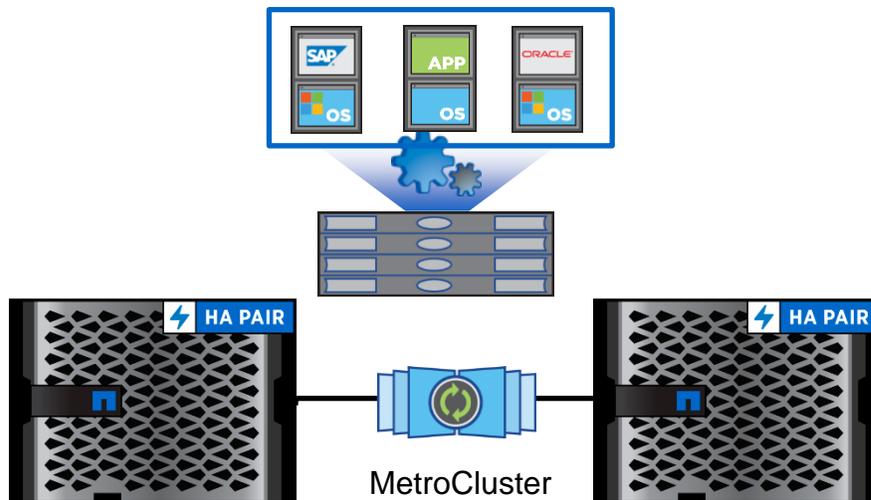
- NetApp® SnapMirror® replication to object storage
- Space-efficient backups of NetApp Snapshot™ copies to cloud object storage
- Support multiple backup-to-cloud use cases
  - Public cloud: on-premises NetApp ONTAP® to AWS, Azure, and Google Cloud
  - Private cloud: on-premises ONTAP to NetApp StorageGRID®

# Cost-effective choices for business continuity

## NetApp® MetroCluster™

Continuous availability infrastructure

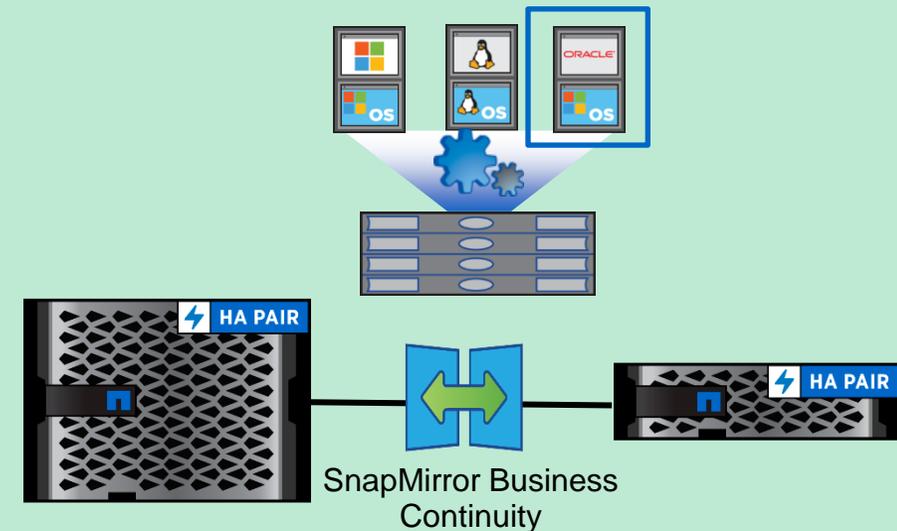
- Consolidate all critical SAN and NAS workloads on a dedicated solution



## NetApp SnapMirror® Business Continuity

More flexible, granular continuous availability for select applications

- Protect critical SAN workloads



# Secure application data anywhere

NetApp Volume Encryption and NetApp Aggregate Encryption: software-based, data-at-rest encryption



Get cutting-edge anti-ransomware for preemptive protection and postattack recovery

Software-encrypt any volume, any aggregate, any disk

- NetApp® AFF, FAS, and ONTAP® Select
- Lower cost: no need for hardware self-encrypting drives
- Flexible granularity: volume or aggregate level
- Onboard and external key manager, multifactor authentication
- Cryptographic shredding
- Compliance with FIPS 140-2 Level 1 requirements

Make full use of storage efficiency features

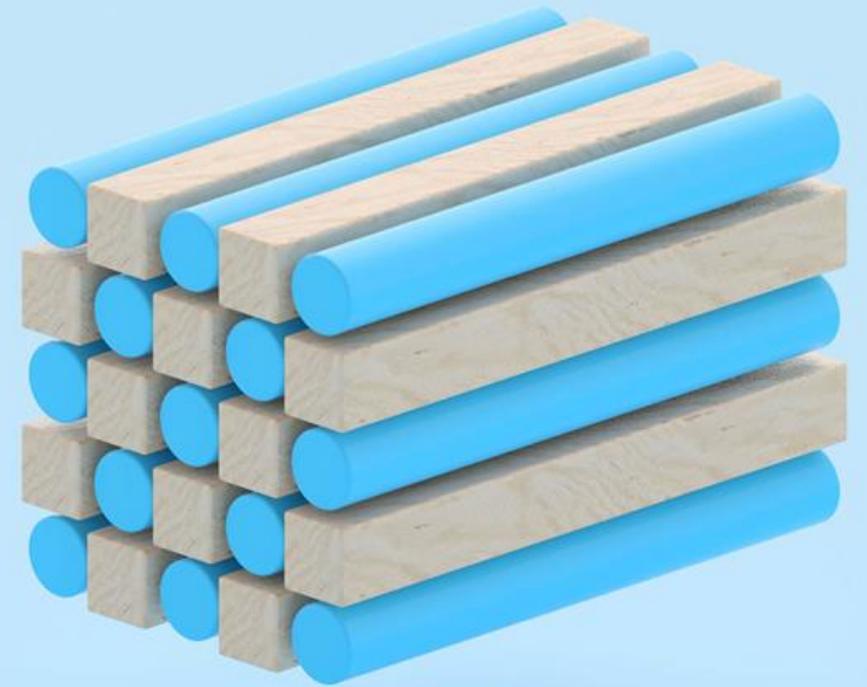
- Deduplication, compression, compaction

Future-proof your encryption solution

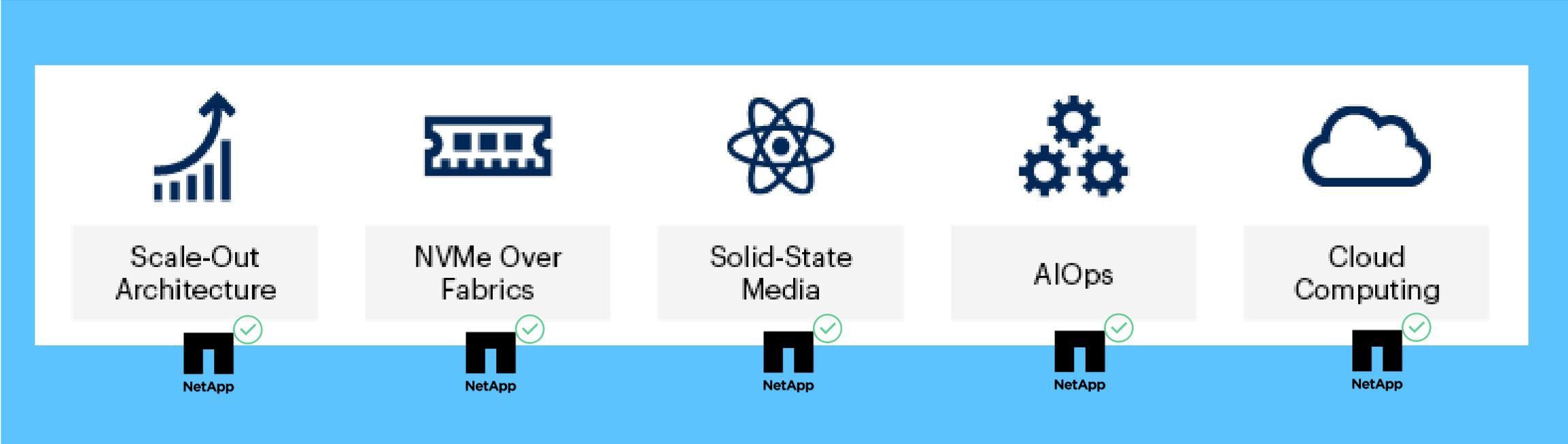
- Software updates to keep the algorithms up to date

# Why you should choose **NetApp** for primary storage

Leadership and advantages



# Leadership in primary storage



**NetApp has a proven history of relentless innovations in each of these critical external primary storage attributes**

# Gartner® Names NetApp a Leader in Primary Storage Arrays... Again!

- For three consecutive years, NetApp has been named a Leader in the 2021 Gartner® Magic Quadrant™ for Primary Storage.
- We believe we are well positioned to support organizations' primary storage workloads wherever their data lives—on premises or in the cloud.
- NetApp's leading portfolio of on-premises and cloud solutions, backed by ONTAP unified management software, allows customers to build a data fabric strategy and drive true business impact.

[Read the report here.](#)



Source: Gartner Magic Quadrant for Primary Storage, 11 October 2021, Jeff Vogel, Roger W. Cox, Joseph Unsworth, Santhosh Rao  
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# NetApp AFF A-Series First in the Cloud IT Operations Use Case

NetApp AFF received a top score for the Cloud IT Operations use case in Gartner 2021 Critical Capabilities for Primary Storage

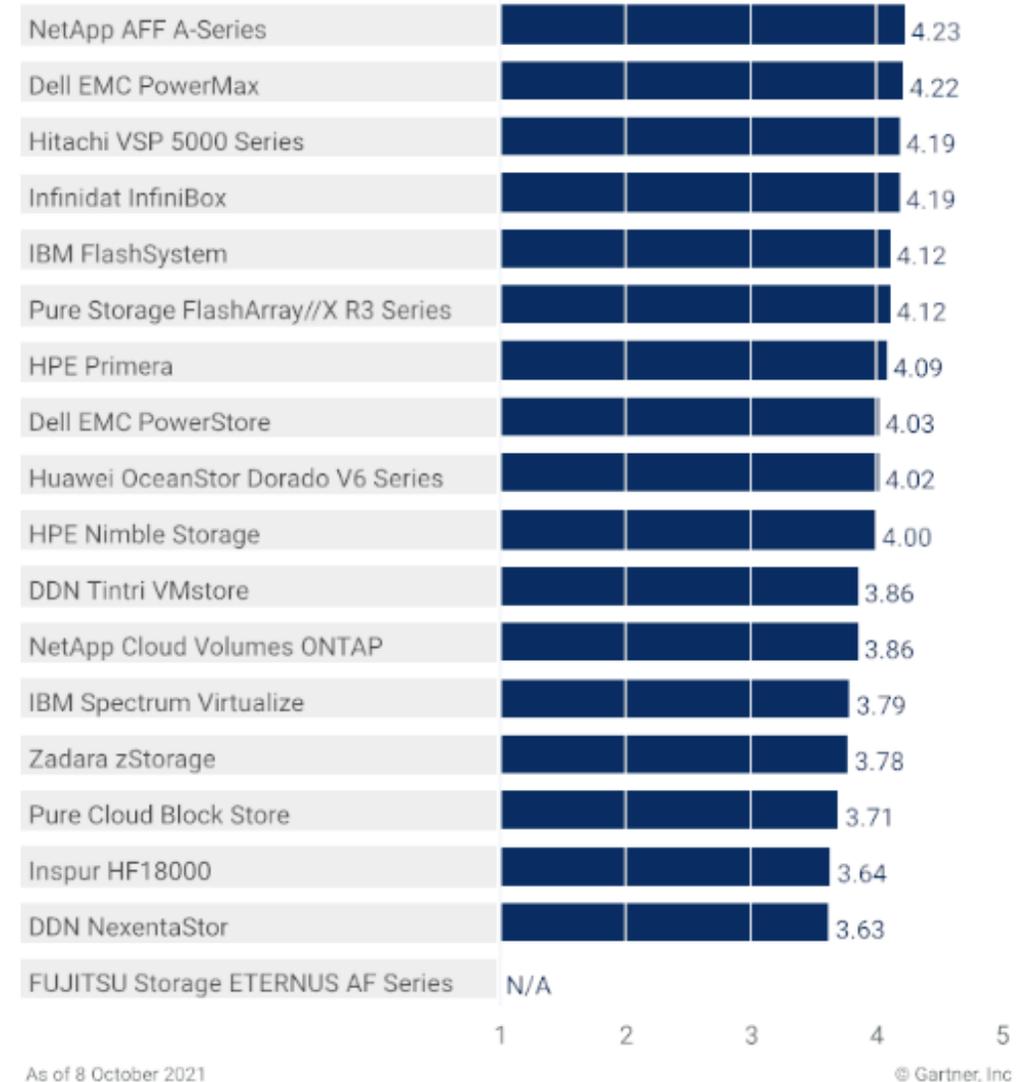
Download the research here.



Gartner Critical Capabilities for Primary Storage, 11 October 2021, Santhosh Rao, Roger W. Cox, Joseph Unsworth, Jeff Vogel

## Vendors' Product Scores for Cloud IT Operations Use Case

Product or Service Scores for Cloud IT Operations



Gartner does not endorse any vendor, product or service depicted in its research publications, and does not advise technology users to select only those vendors with the highest ratings or other designation. Gartner research publications consist of the opinions of Gartner's research organization and should not be construed as statements of fact. Gartner disclaims all warranties, expressed or implied, with respect to this research, including any warranties of merchantability or fitness for a particular purpose.

# Customer success



**Challenge:** Improve operations and time to market

**Outcomes:**

- Reduced time to develop prototypes and get new motorcycles to market by 30%
- Consolidated a wide range of workloads and over 200 applications onto NetApp® AFF infrastructure



**Challenge:** Efficiently and cost-effectively solve business issues, without sacrificing quality

**Outcomes:**

- Accelerated the enormous transaction volumes generated by ATOS customers, using NetApp AFF systems
- Integrated their data infrastructure into a single unified management system, using the hybrid cloud



**Challenge:** Modernize the IT environment

**Outcomes:**

- Reduced batch processing by 50% (from 6 hours to 3 hours) and lowered cost of operations
- Delivered advanced data security, low latency, cloud affinity, and data storage across any protocol, using AFF infrastructure
- Consolidated data from four different legacy vendors into one NetApp cluster

**NetApp unlocks  
the best of cloud**

