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Optimized Storage for Scalable AI Applications

Agenda

- AI Storage Requirements
- All Flash / Multi-tier Storage Solution
- Supermicro's Storage Products
- Summary

Supermicro Rack-Scale AI Total Solutions

5,000 Racks capacity per month expected by the end of FY 24 of which….
- **2,000+ Racks will be Direct Liquid Cooled**
- **100KW+ Racks** now ready to deploy

Total IT Solutions for Better Customer Value

Hardware + Software + Services

- Rack-scale plug-and-play solutions with Building Block Architecture

- Scalable optimized AI (Generative AI) & general compute, storage, switch, infrastructure cooling, software & service

- Free-air, liquid-cooling and traditional air-cooling technologies provide customers the optimized datacenter solution

- Leading energy efficiency and lower TCO

- One-stop shop

Server software management solutions drive optimization and higher infrastructure security

AI Storage for AI Factory or AI Cloud

- Large scale AI/GPU cluster infrastructures. Scale by Scalable Unit (SU, aka Pod, e.g. 256 GPUs)

- Highest performance AI training and inference.

- Storage requirements

  - All NVMe

  - Per SU performance requirement:
    Read 125 GBps / Write 62 GBps

  - InfiniBand or Ethernet/RDMA at 200Gb/s or 400Gb/s.

  - Parallel filesystem, High performance Object storage

Table 6. Guidelines for storage performance

Performance Characteristic	Good (GBps)	Better (GBps)	Best (GBps)
Single-node read	4	8	40
Single-node write	2	4	20
Single SU aggregate system read	15	40	125
Single SU aggregate system write	7	20	62
4 SU aggregate system read	60	160	500
4 SU aggregate system write	30	80	250

NVIDIA DGX SuperPOD storage requirements reference
https://docs.nvidia.com/https:/docs.nvidia.com/dgx-superpod-reference-architecture-dgx-h100.pdf

AI Storage for Enterprises

- Pod level deployments

- Enterprise use cases, inference vs training

- Storage requirements

  - All NVMe or Tiered in PB scale.

  - Balance between Performance and TCO.

  - > 100 Gbps, Ethernet preferred.

  - RDMA optional

  - Parallel filesystem, High performance Object storage

Where AIOps and MLOps
are performed

- GPU-dense servers accelerate
  AI training and inferencing

- GPUDirect storage transfers
  directly from/to GPU memory
  and eliminates CPU or
  main memory overhead

- Supermicro offers a range of
  GPU-dense servers to meet
  every level of application need

Supermicro-Powered Application Tier

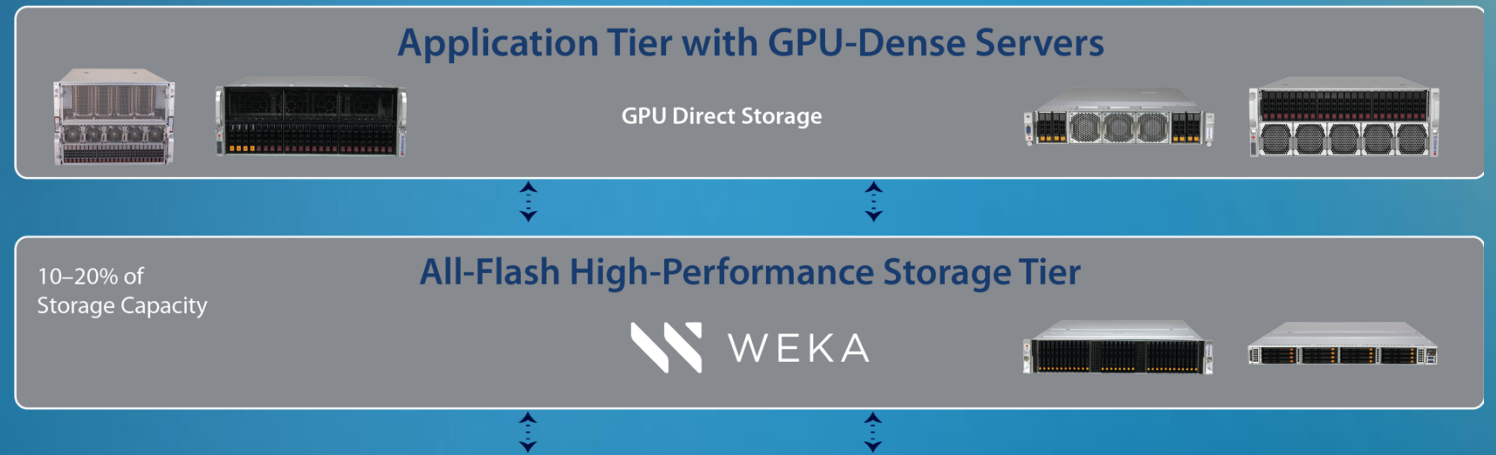**Application Tier with GPU-Dense Servers**

GPU Direct Storage

No vendor offers more choices for GPU-accelerated
computing

Active data is stored here

- Optimized for performance delivers data to applications as fast as they can consume it
  - More utilization -> Better ROI

- Supermicro Peta-scale storage systems
  - 1U and 2U servers using the latest E3.S NVMe storage

- WEKA Data Platform
  - Scale-out, hierarchical storage solution
  - Clustered storage solution
  - Data protection and performance

High-Performance All-Flash Tier

Application Tier with GPU-Dense Servers

GPU Direct Storage

10–20% of Storage Capacity
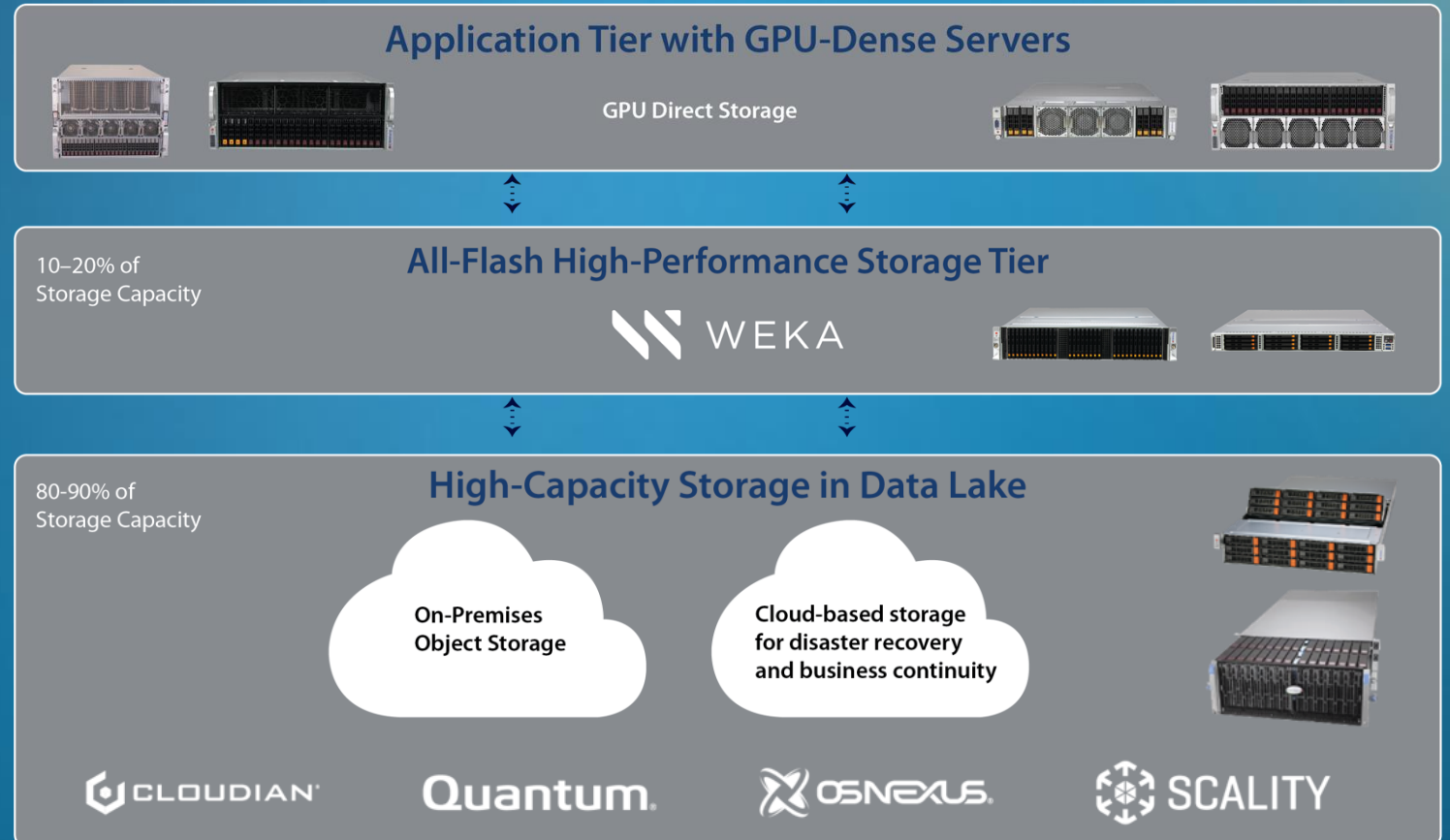
All-Flash High-Performance Storage Tier

WEKA

We worked with WEKA engineers to optimize for Supermicro storage servers

High-Capacity Data Lake

All training data sets and models stored on-premises

- Data lake uses capacity-optimized storage

- High-capacity spinning-disk storage at lower cost per TB

- Capable back up & Tiering to the private cloud

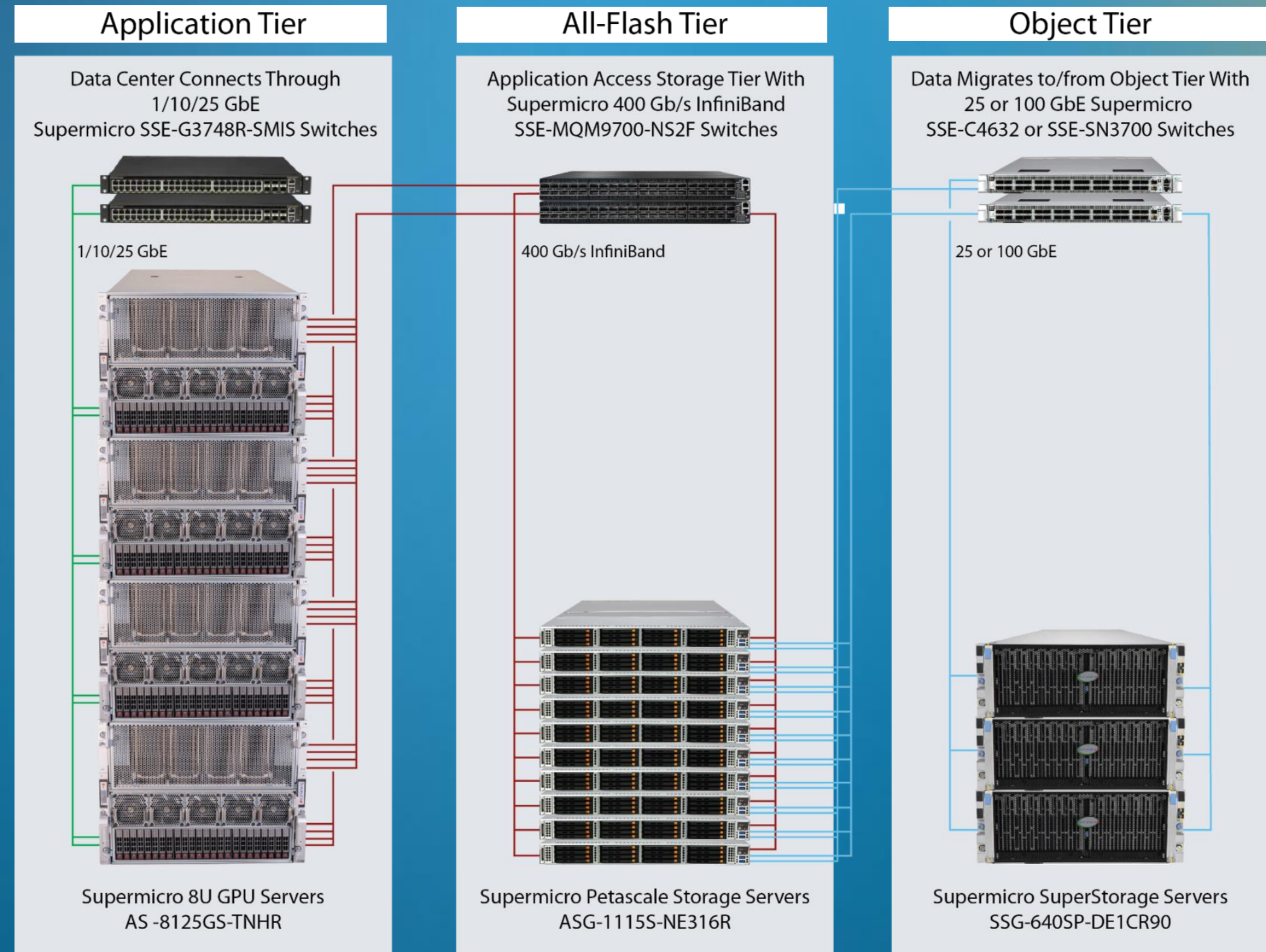- Supermicro servers join a scale-out cluster supported by 3rd party software partners

Application Tier with GPU-Dense Servers

GPU Direct Storage

10–20% of Storage Capacity

All-Flash High-Performance Storage Tier

WEKA

80-90% of Storage Capacity

High-Capacity Storage in Data Lake

On-Premises Object Storage

Cloud-based storage for disaster recovery and business continuity

CLOUDIAN   Quantum.   OSNEXUS.   SCALITY

The key to cost-effectively storing all your data, safely, on premises

- Flexible application tier
  - Range of GPU server choices
- Flexible all-flash tier
  - Petascale storage servers
- Capacity-optimized object tier
  - SuperStorage servers
- Interconnections
  - 100–400-Gbps InfiniBand or Ethernet to application tier
  - 25 or 100 GbE for object tier
- Designed for Ease-of-Use for AIOps / MLOps
- Tailored design, integration, testing and deployment to meet exact customer requirements.

Engineered for AI-powered manufacturing defect analysis

Tested and Validated Solution

Application Tier

Data Center Connects Through 1/10/25 GbE Supermicro SSE-G3748R-SMIS Switches

1/10/25 GbE

Supermicro 8U GPU Servers
AS -8125GS-TNHR

All-Flash Tier

Application Access Storage Tier With Supermicro 400 Gb/s InfiniBand SSE-MQM9700-NS2F Switches

400 Gb/s InfiniBand

Supermicro Petascale Storage Servers
ASG-1115S-NE316R

Object Tier

Data Migrates to/from Object Tier With 25 or 100 GbE Supermicro SSE-C4632 or SSE-SN3700 Switches

25 or 100 GbE

Supermicro SuperStorage Servers
SSG-640SP-DE1CR90

Supermicro Storage Server Portfolio Overview

From High-Capacity 90-Drive Systems to High-Performance All-Flash NVMe Systems

Capacity (vertical axis)

Performance (horizontal axis)

Enterprise

Featuring up to 36 LFF drives, front/rear drive access for enterprise storage building block.

Top Loading

Featuring up to 90 LFF drives and single or twin controller for cloud scale object and file storage.

Simply Double

Featuring up to 24 LFF and 4 NVMe drives for hybrid performance storage.

High Availability SBB

Featuring up to 24 dual port NVMe and dual canister design for high availability storage.
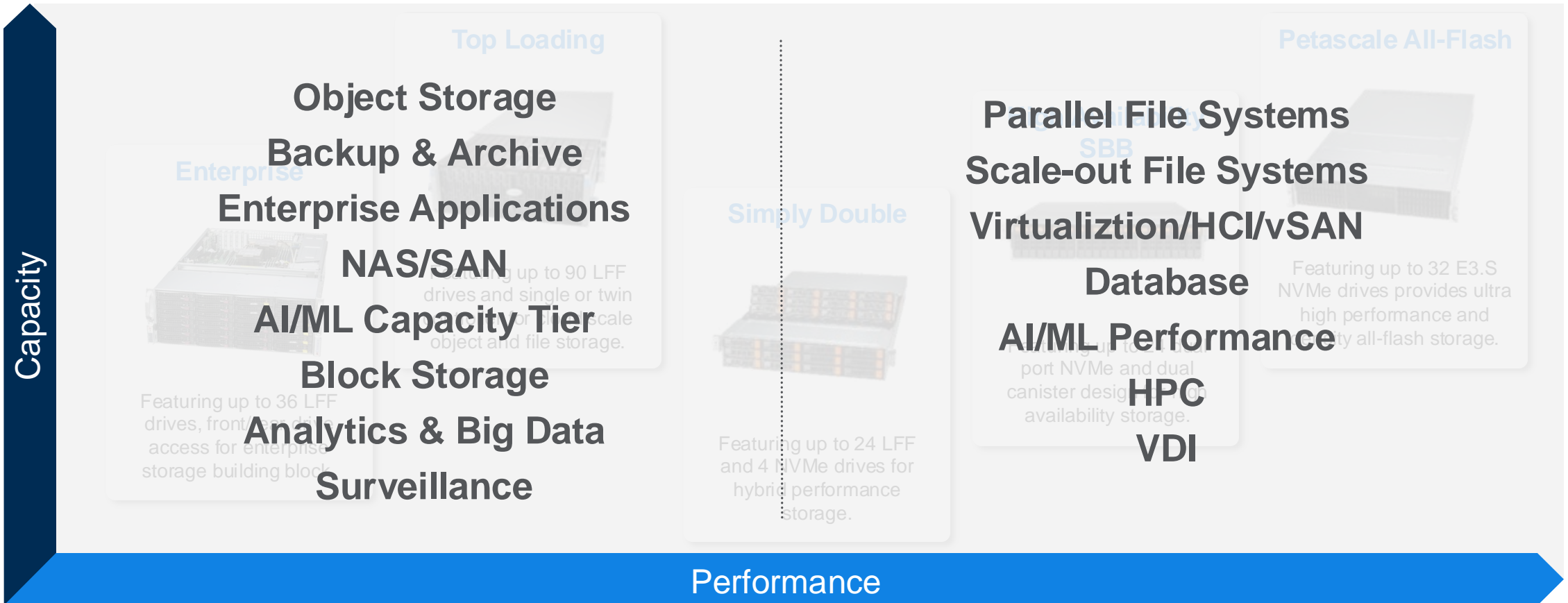
Petascale All-Flash

Featuring up to 32 E3.S NVMe drives provides ultra high performance and density all-flash storage.

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Object Storage
Backup & Archive
Enterprise Applications
NAS/SAN
AI/ML Capacity Tier
Block Storage
Analytics & Big Data
Surveillance

Parallel File Systems
Scale-out File Systems
Virtualiztion/HCI/vSAN
Database
AI/ML Performance
HPC
VDI

Performance

Supermicro PetaScale All-Flash Storage Systems


- **Key Features**
  - Support dual Intel and single AMD single PCIe Gen5 Processor
  - Support 1U E1.S and E3.S and 2U E3.3 TLC, QLC and CXL device and up to 1PB all flash in 2U
  - Optimized thermal design with EDSFF design
  - Balanced PCIe lanes for front SSD and rear IO design
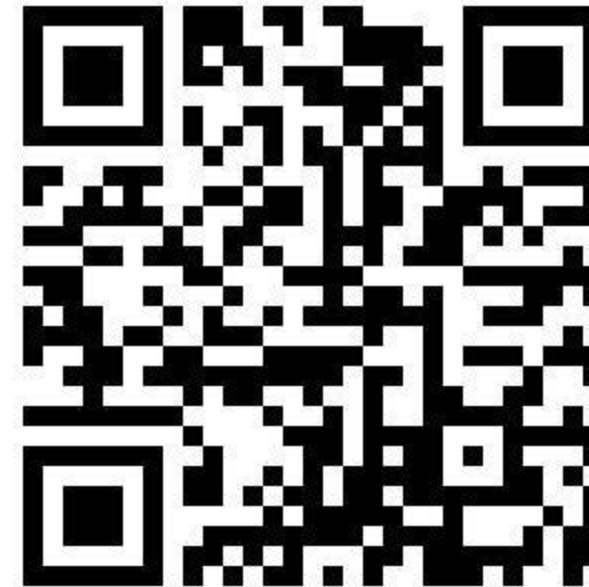 - Up to 30M 4KB RR IOPS and 230+ GB/s 128KB SR BW.

- **Target Solutions**
  - High performance AI SDS building blocks
  - Virtualization & dense VDI
  - High performance object storage
  - Hyperconverged infrastructure
  - High performance CDN and video streaming

AI Storage White Paper
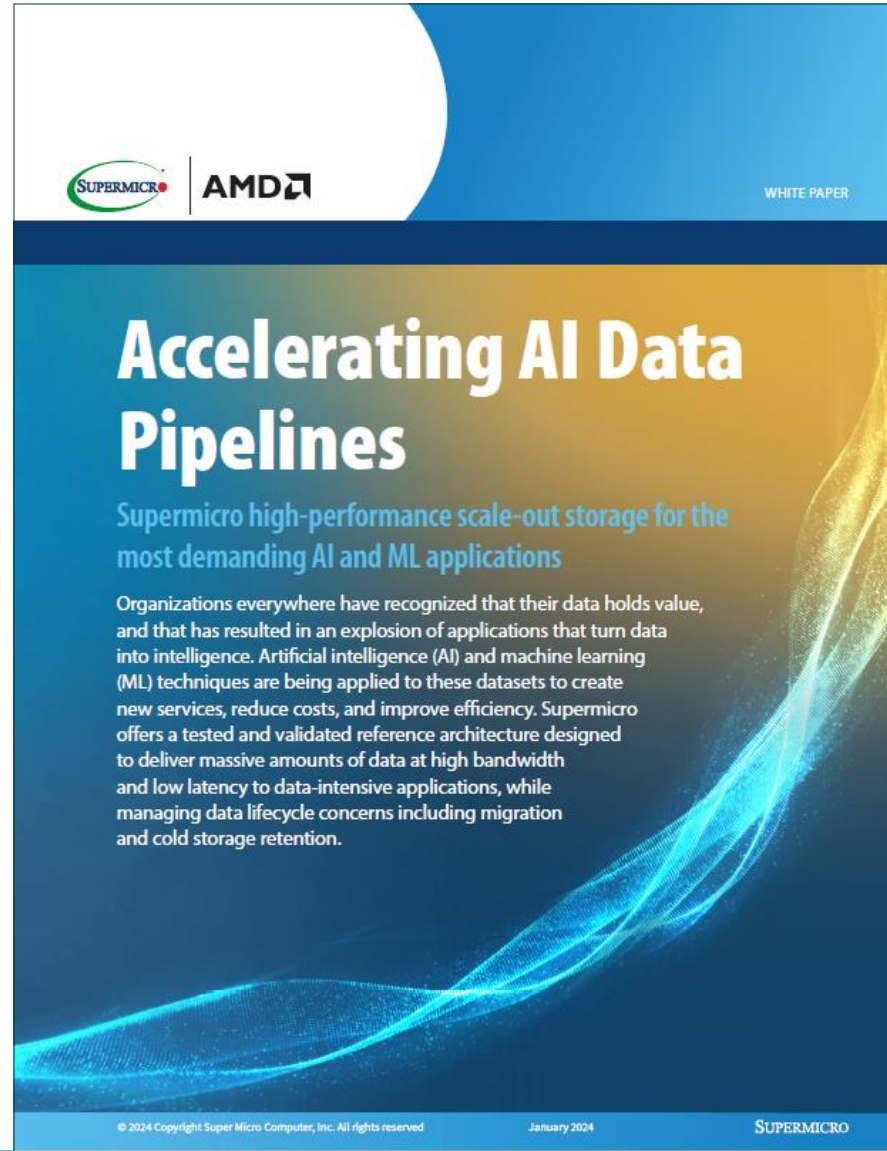
- This paper is available at www.supermicro.com/en/solutions/ai-storage

Thank You

www.supermicro.com

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