
Hewlett Packard
Enterprise
AMD
ACCELERATE INNOVATION AND DISCOVERY WITH HPE
D. I. Tsai
Presales, HPC & AI, APAC
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AMD Solution Days 2024

# THE CONFLUENCE OF MOD/SIM AND AI/ML REQUIRES A NEW KIND OF INFRASTRUCTURE

## Software

- End-to-end platform to train and tune AI-models
- Supercomputing programming environment for large-scale AI

## Compute

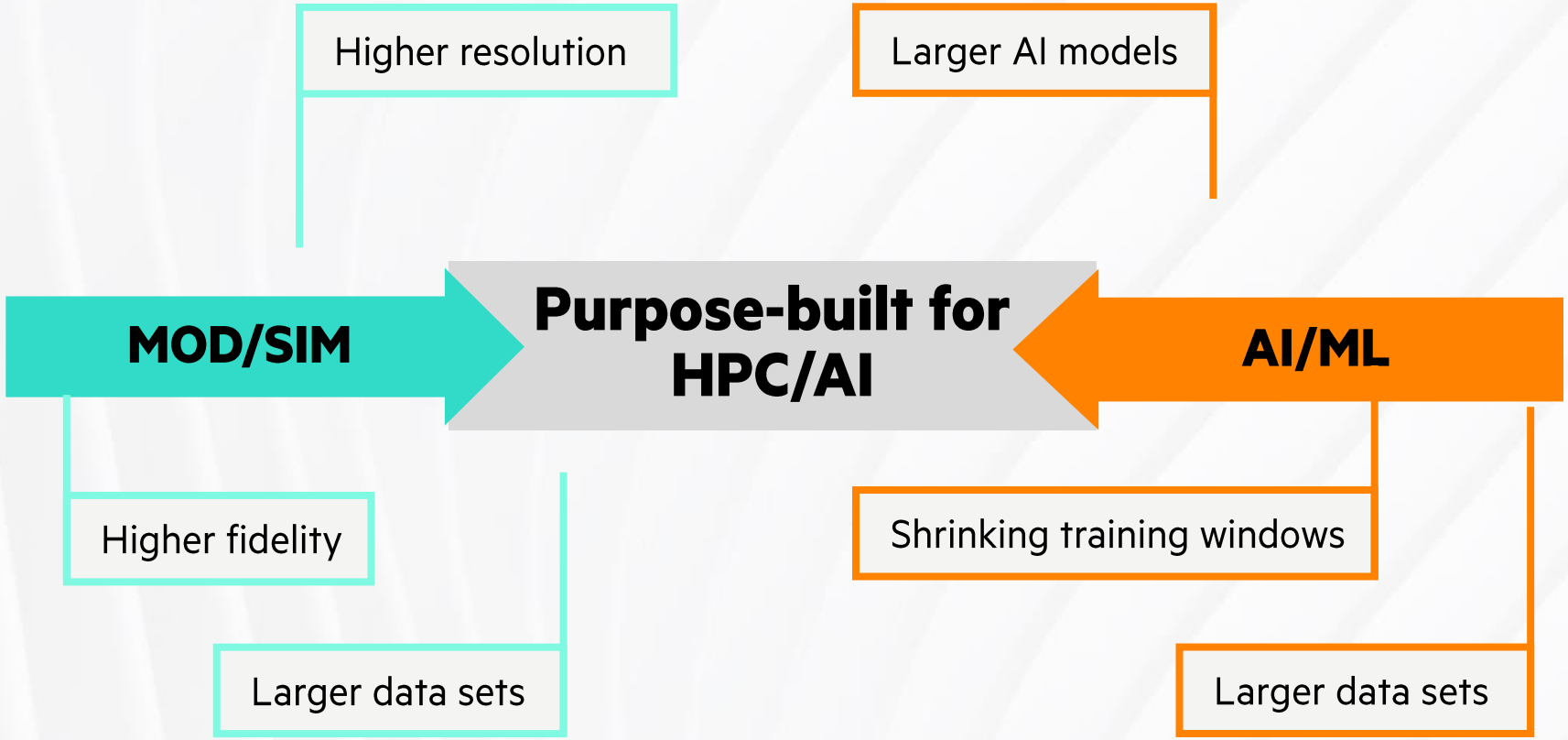
- Liquid cooling critical to sustainability for AI data center scaling
- Reliability and resilience of large-scale system for AI

## Networking

- HPE Slingshot enables open ecosystem including Ethernet
- Network behind the world's fastest supercomputer

## Storage

- Ability to read and write data exceptionally fast is critical for fault-tolerant MOD/SIM and AI jobs
- Storage behind the world's fastest supercomputer



# HPC AND AI COMPUTE PORTFOLIO

## Purpose-built supercomputing

The next frontier of supercomputing systems redesigned for HPC, AI, and converged workloads

**HPE Cray EX supercomputers**

**HPE Cray Supercomputing EX2500**

HPE Slingshot is purpose-built to combine the performance of InfiniBand with the cost-effectiveness of Ethernet

## Accelerated AI/HPC

Accelerated compute platform for AI and HPC workloads

**HPE Cray XD670**

**HPE Cray XD665**

**HPE Cray XD675**
**8x MI300X**

**HPE ProLiant XD685**
**8x MI300X/325X and other GPUs**

**NEW**

Integrated HPC and AI software portfolio, including application and software development ecosystem, system management suite, orchestration tools, enhanced compute environment & more

## Mainstream HPC/AI

Density-optimized, scale-out compute for HPC and AI workloads

**HPE Cray XD2000**

**HPE ProLiant**

## Purpose-built storage

Unprecedented data storage price/performance for HPC, AI, and converged workloads

**Cray ClusterStor E1000 Storage Systems**

**HPE Cray Storage Systems C500**

Experts globally for HPC, AI and converged workloads at your disposal to accelerate your strategic initiatives

# HPE DIRECT LIQUID COOLING OFFERED ACROSS ENTIRE PORTFOLIO

## Liquid to Air Cooling

Chilled water supply from the facility cools down the air-cooling system positioned close to the servers.


**HPE RDHX**
Rear Door
Heat Exchanger

**HPE ARCS**
Adaptive Rack
Cooling Solution

## 70% Direct Liquid Cooling

Combined direct liquid cooling and air cooling

**HPE Cray XD and HPE ProLiant**

## 100% Direct Liquid Cooling

Coolant flows through a network of tubes and coldplates to extract heat directly from all components on the server

**HPE Cray EX2500**

**HPE Cray EX4000**

Cooling efficiency and capacity (kW/rack) increases from left to right

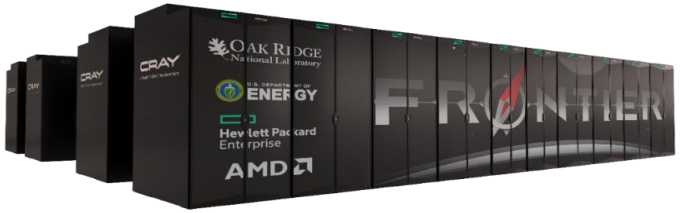
# HPE HAS TAKEN SUPERCOMPUTING INTO THE EXASCALE ERA

## Enabling unprecedented progress in **computational science**

AMD MI-250X

**#1**

ORNL's Frontier supercomputer is #1 on the TOP500




**1.21 exaflops** of performance (FP64 Rmax)

**Next**

AMD MI-300A

**#1**

LLNL's El Capitan supercomputer will be #1 on the TOP500


**2.0 exaflops** of performance (FP64 Rpeak)

### Clean Energy

**Faster**
path to clean fusion power

### Material Science

**More sustainable**
materials and designs

### Health Care

**Accelerated**
cancer research

### Environmental

**Better protection**
of biodiversity

*Sources: November 2023 Top500, Green500, and HPL-MxP mixed-precision benchmarks.*

# HPE IS THE PREMIER MANUFACTURER OF LEADERSHIP-CLASS SUPERCOMPUTERS

Based on the June 2024 Top500 and Green500 rankings, HPE has built:

**4** of the **Top10 Performing Supercomputers** in the world.

**18** of the **Top50 Performing Supercomputers** in the world.

**37** of the **Top100 Performing Supercomputers** in the world.

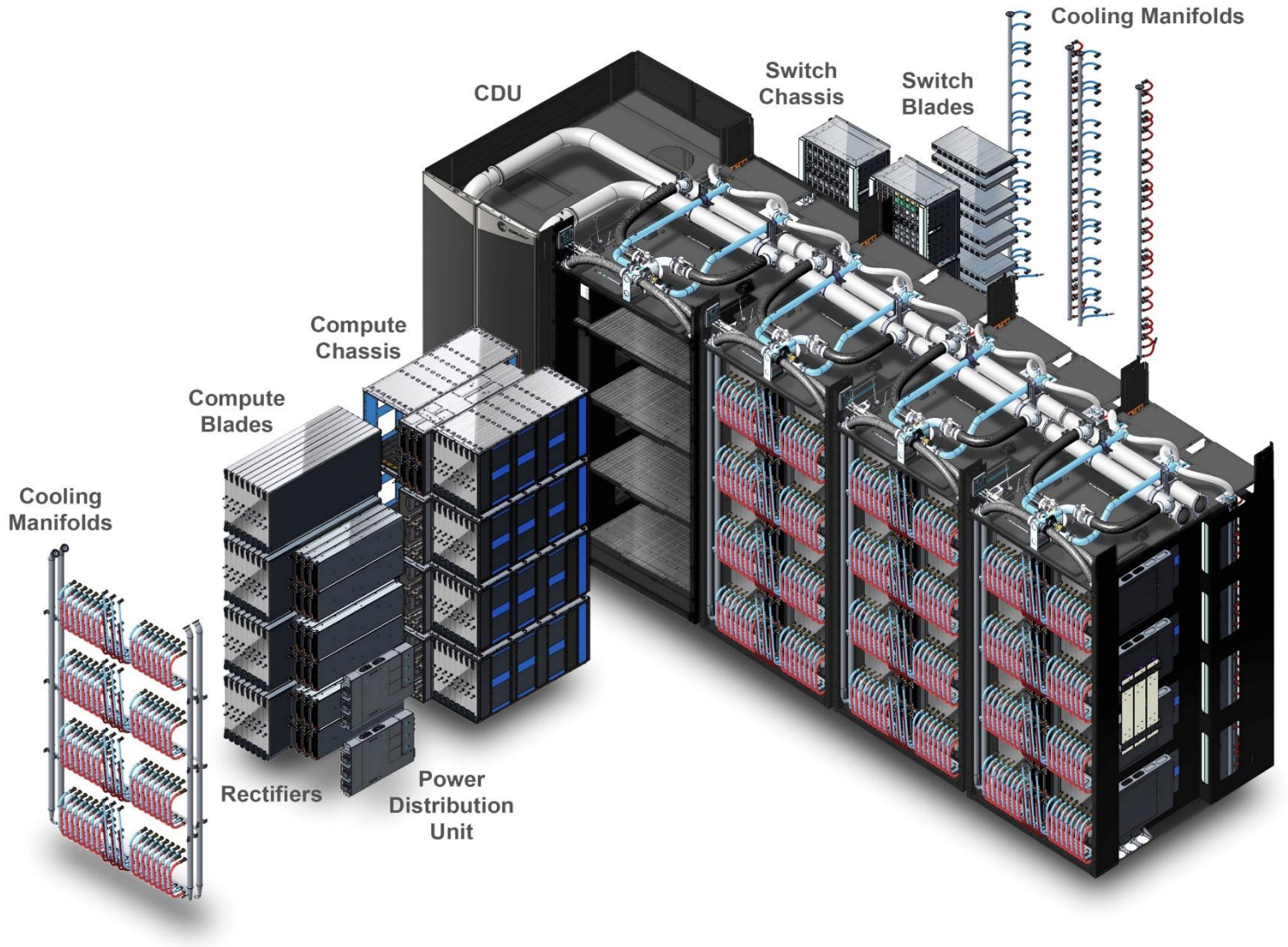
**7** of the **10 Most Energy-efficient Supercomputers** in the world.

HPE is **#1** In performance share on the TOP500, with more than **3x** the next provider.

*Sources: November 2024 Top500, Green500, and HPL-MxP mixed-precision benchmarks.*

# HPE CRAY EX4000 SUPERCOMPUTER

- 100% Direct Liquid Cooled (DLC)
- Up to 256 CPU nodes or 128 GPU nodes Per cabinet
- Up to 390 kW per cabinet
- Support for all HPE Cray EX Supercomputer blades
- Slingshot: Exascale era interconnect
- 120x176x240cm Up to 4,000 kg Per cabinet



# DRIVING EFFICIENCY AND MORE SUSTAINABILITY WITH LIQUID COOLING

## Liquid cooling vs air cooling comparison

## 5-year energy use comparison

**14.9%**

less chassis power

**20.7%**

more performance per kW

**87%**

carbon reduction

**86%**

cost savings

# HPE CRAY SUPERCOMPUTING EX – NEW CPU COMPUTE AND GPU ACCELERATED BLADES

LATEST GENERATION BLADES WITH HIGH DENSITY CORE COUNTS AND AI OPTIMIZED GPUS

**8 Compute Blades per Chassis***

**Compatible with**

**EX2500 and EX4000**

**GPU Accelerated**

**EX235a – AMD MI250**

**EX255a – AMD MI300a**

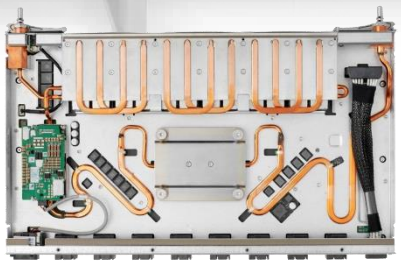
**EX235n – Nvidia A100**

**EX254n – Nvidia GH200 Grace-Hopper Superchip**

**X86 CPU Compute Blades**

**EX420 – Intel Sapphire Rapids**

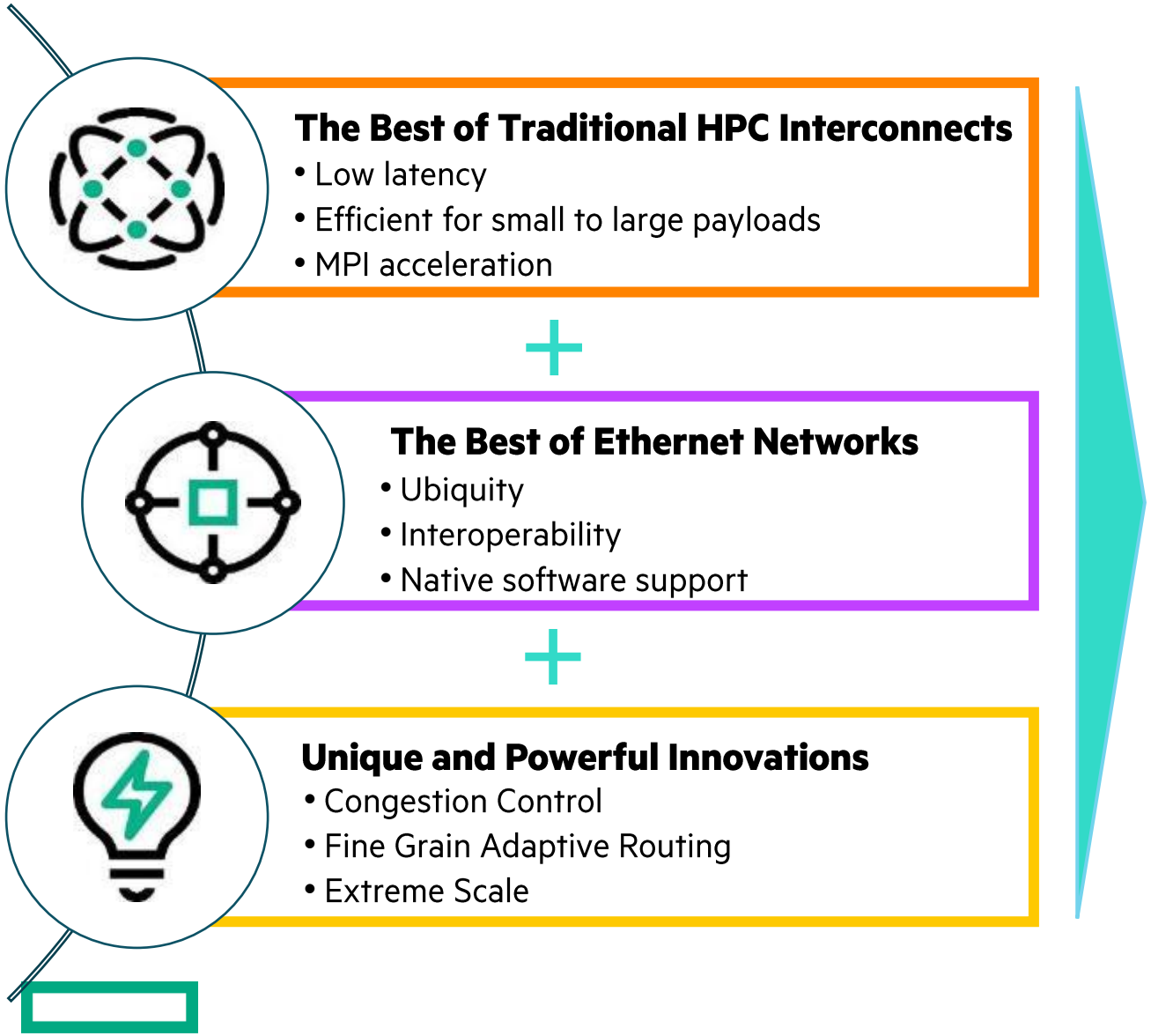
**EX4252 – AMD Genoa/Bergamo/Turin**



AMD 8x MI-300A

*Configurations are power and inlet water temperature dependent

# HPE SLINGSHOT IS THE BREAKTHROUGH INTERCONNECT FOR HPC AND AI




## HPE Slingshot

- ✓ **Efficient:** fewer optical cables
  - ✓ Use about ½ the optical cables versus fat tree for a given global bandwidth
  - ✓ Copper is much less expensive & more reliable, saves ~6-8W per AOC end
- ✓ **Lower latency:** no more than 3 switch-to-switch hops, up to 100,000s of endpoints
- ✓ **Reduced congestion:** Free up expensive computes from congestion-induced delays
- ✓ **Interconnect:** Native Ethernet connectivity
- ✓ **Optimization:** Performance under load, with better scaling, consistency, and utilization

# CLUSTERSTOR E1000 | STORAGE CONTROLLER

Two embedded storage controllers

POWERED BY AMD

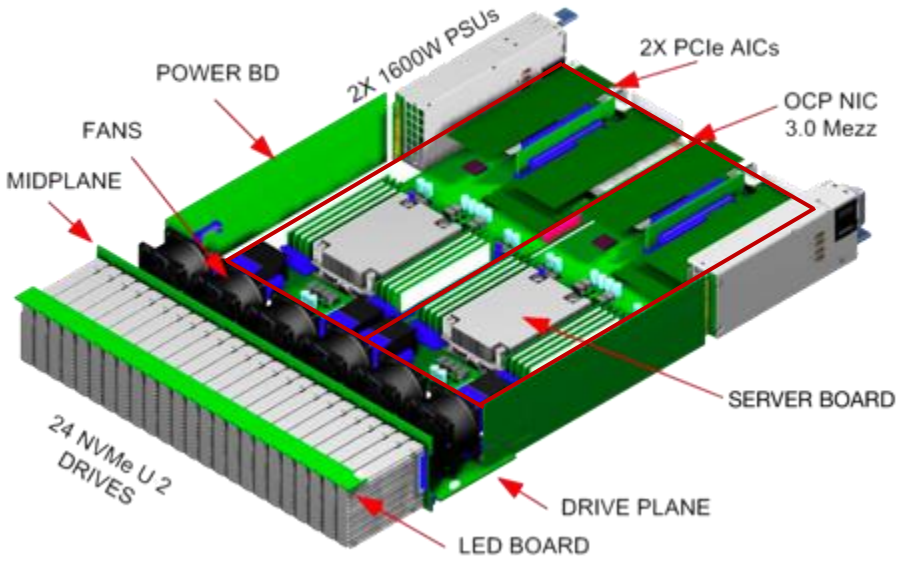
Up to 6 x 100/200 Gbps **PCIe 4.0** NICs (Slingshot, GbE, IB)

Dedicated Boot Devices

- 2x 256GB M.2 SSDs per nodes

24x NVMe U.2 Drives

(3.84TB/7.68TB/15TB/30TB)




| | GridRAID | | RAID-10 | |
|---|---|---|---|---|
| | BW (GB/s) | IOPS | BW (GB/s) | IOPS |
| Write | 45 | 50K | 20 | 1.3M |
| Read | 66 | 1M | 44 | 1.6M |

Up to **525 TB*** usable in **2 Rack Units** (88.9 mm)

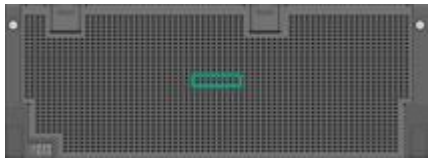
*Using 30TB Devices

## Common and flexible building block for ClusterStor E1000

**Metadata Unit**
(24 SSD)

**Flash Storage Controller**
(24 SSD)

**Disk Storage Controller**
(2 SSD)

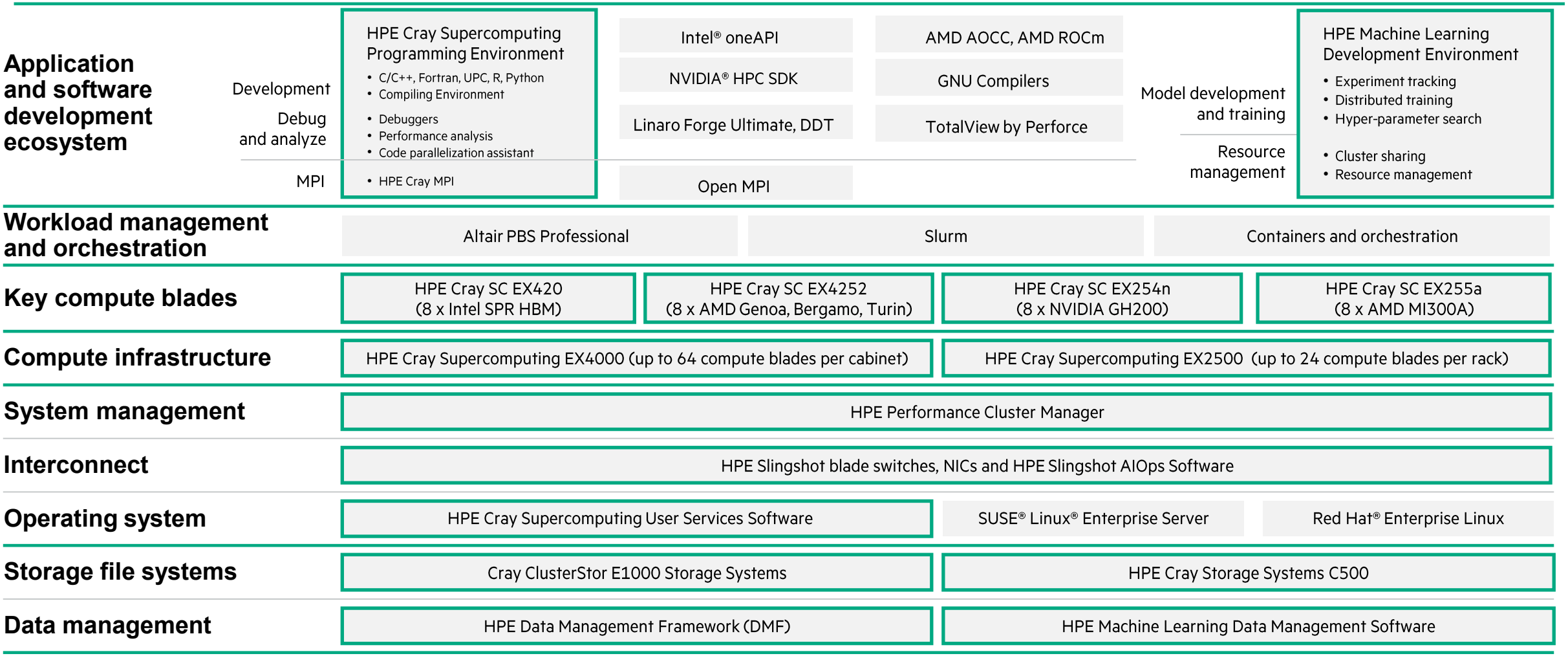


SAS-attached 4U106

**System Management Unit**
(5 SSD)

# THE COMPONENTS OF AN HPE CRAY SUPERCOMPUTING EX SOLUTION

Delivered as turnkey system with premium implementation and operational support services



# HPE HPC SOFTWARE SOLUTION FOCUS AREAS

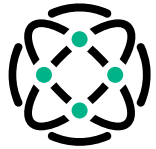
Building upon decades of HPC experience, HPE delivers solutions that help customers unlock the full potential of their HPC architecture to address the world's most complex problems.

## System management

- Solution unlocks detailed monitoring and management capabilities to keep clusters running at peak performance
- Meets a breadth of customers' operational requirements

## User services software

- New emphasis addressing emerging needs of complex HPC/AI workflows
- Provides advanced features to help enable workload management, containerization, virtualization, and more



## Development environment

- Includes comprehensive toolchain to develop software optimized for HPC systems
- Unleashes creativity and productivity via traditional and modern programming tools

# HPE SERVICES—BEST-IN-CLASS HPC AND AI EXPERTISE

HPE is dedicated to helping you make the most of your revolutionary compute environment.

- We offer numerous professional, advisory, and operational services to guide you in creating a road map to your specific goals and deploying the ideal solution for your initiatives.
- HPE Advisory and Professional Services experts work with you to underpin and successfully realize your vision.

**Pre-installation activities and solution implementation**

**API and CLI tool support**

**System Testing and performance validation**

**Lifecycle services**

**Advanced Hardware and software support**

**Customized customer training**

**Customer portal / self-help resources**

# Why HPE?

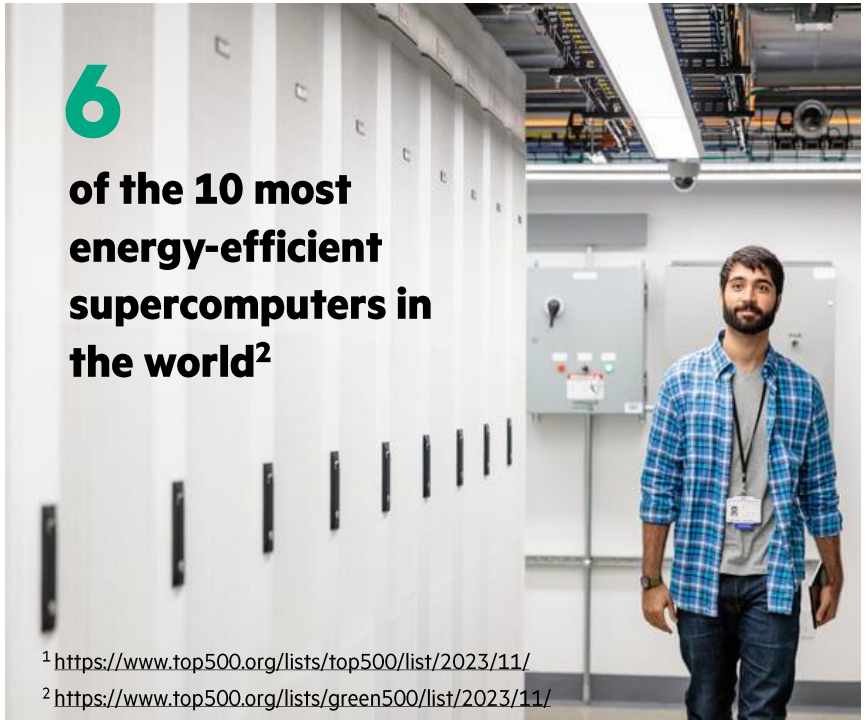
An industry leader
Global reach
Unique expertise
Full-stack innovation
Sustainability track record

**#1**

**vendor to take supercomputing into the exascale era with the #1 system on the Top500[1]**

**Global**

**supercomputing provider**



**6**

**of the 10 most energy-efficient supercomputers in the world[2]**

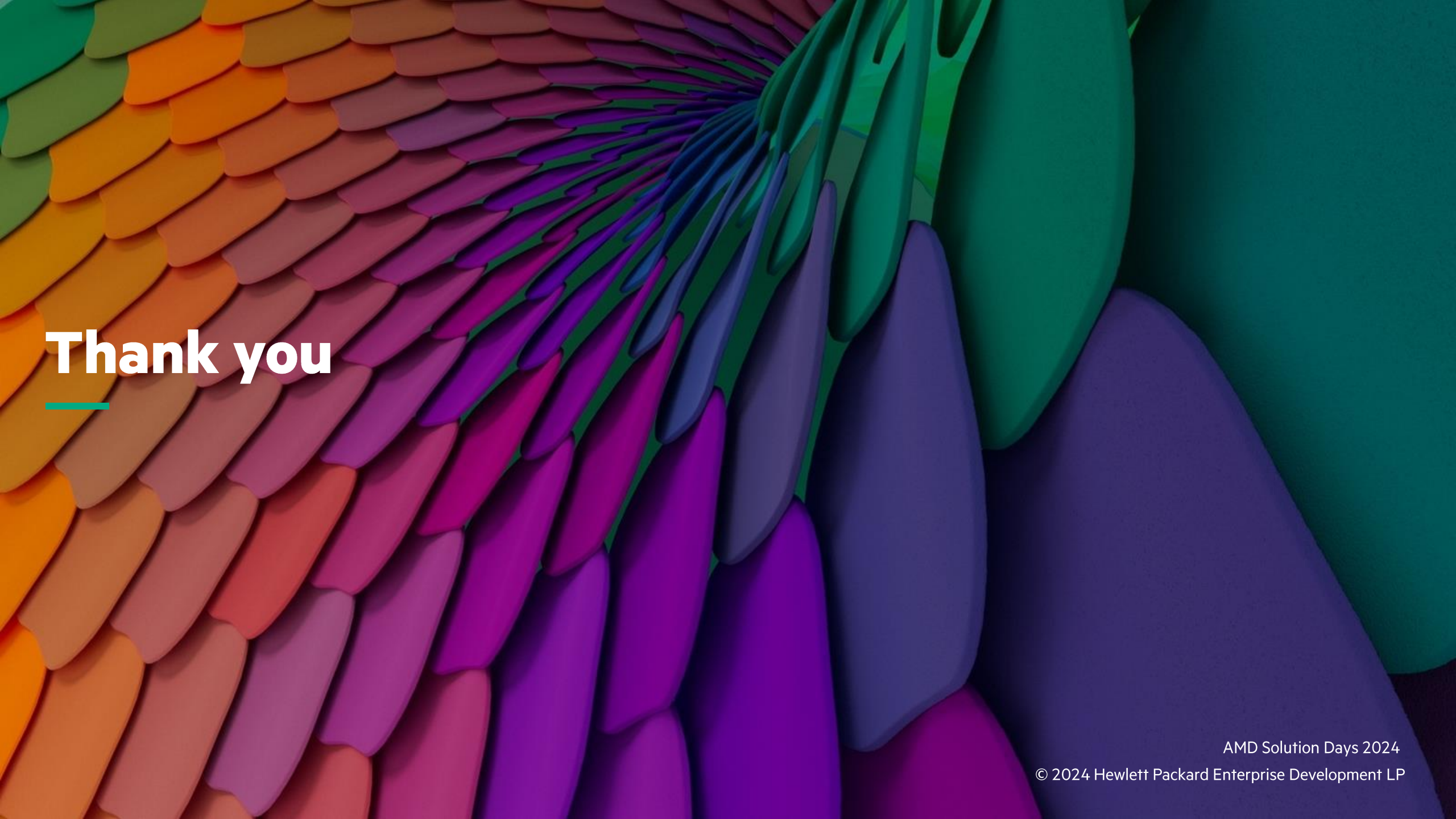
[1] https://www.top500.org/lists/top500/list/2023/11/

[2] https://www.top500.org/lists/green500/list/2023/11/

**Supercomputing IP**

**on every layer of the stack:**

Software
Compute
Interconnect
Storage





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