Hewlett Packard Enterprise

SC24 ATLANTA NOV 17-22

# DAOS At HPE


Lance Evans

Storage Architect

HPE HPC Chief Technology Office


November 18, 2024

# HPE's DAOS Involvement To-Date

DAOS Foundation:

HPE is a proud sponsor and founding member of the DAOS Foundation
We participate in the board, technical steering committee, and outreach committee
Your participation is encouraged!

DAOS Codebase:

HPE continues our contribution to core DAOS software
We will continue contributing beyond phase II of the Metadata on SSD project
Lots more features ahead, please contribute!

DAOS Team:

HPE intends to increase our commitment to the DAOS community by bringing in the Intel team
We intend to continue channeling all of the team's energy toward core DAOS design goals
Feel free to reach out to your DAOS colleagues as you have in the past!

# HPE's Growing DAOS Investment

Achievements

- Intel has proven DAOS can deliver higher I/O rates than Lustre-based solutions can alone
- Intel and HPE have together built one of the world's fastest systems leveraging DAOS and Lustre
  - The Aurora exascale supercomputer at Argonne National Laboratory
- HPE has extended offers to the Intel DAOS team to join its HPC & AI Infrastructure Solutions Org

Intents

- Build on Intel's DAOS success to enable DAOS development going forward
- Keep the DAOS team and community initiative strong and growing
- Keep HPE's DAOS contributions open, in pursuit of the DAOS community roadmap
- Help to fuel a growing DAOS-based ecosystem through the DAOS Foundation

Goals

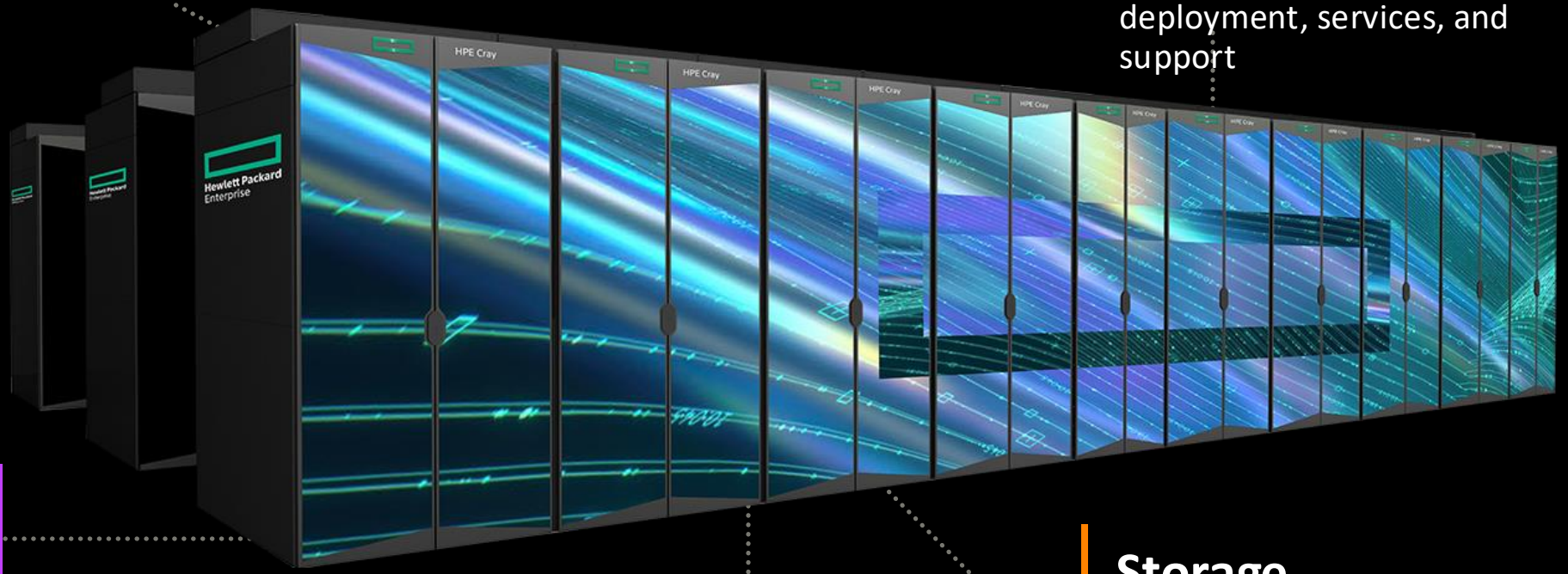
- Strengthen HPE's DAOS talent and capabilities
- Provide support to existing and future DAOS installations
- Collaborate with HPE HPC Software and Storage engineering R&D teams
- Develop future, next-generation high-performance storage solutions for the HPC market
- Complement HPE's continuing commitment to Lustre and ClusterStor
  - Now Renamed: Cray Supercomputing Storage System, CSSS

# HPC and AI Supercomputers Built on HPE Expertise

**Networking**
Slingshot

**End-to-end HPC & AI Solutions**
Racks and Facility Integration
World-Class Manufacturing
World-wide capability-class deployment, services, and support

**HPE leverages its vast expertise to produce open end-to-end solutions across all system components**




**HPC & AI Software**
User Developer Environments
System Management, User Services

**Sustainable Solutions**
Cooling
Power Management

**Storage**
ClusterStor, DAOS

# DAOS Reference Architecture Update

- Continues as an HPE HPC CTO Incubator
  - Unbundled repeatable solution delivery method
  - Individual elements sold separately
  - HPE-supported ProLiant server hardware
  - HPCM cluster management software
  - Light installation / configuration scripting
  - Reference doc set for field or factory integration
  - Customer system administration skills required
- Single-rack solution with maximum 32 nodes
  - DL-360 Gen11 single-socket Intel CPUs (Gen12 soon)
  - Up to 2TiB DDR5, 153TB TLC per node
  - Up to four high-speed network switches
  - Top-of-Rack Ethernet
  - Management node(s) for HPCM & gateway functions
  - Double density possible with H20-cooled door
- Next refresh and productization targeting DAOS 3.0
  - Considering various hardware bundling options

# HPE's HPC and AI Compute Portfolio To Enable With DAOS

## Purpose-built supercomputing

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

**HPE Cray SC EX4000 supercomputers**

**HPE Cray SC GX5000 supercomputers**

## Accelerated AI/HPC

Accelerated compute platform for AI and HPC workloads

**HPE ProLiant Compute XD680**

**HPE ProLiant Compute XD685**

**HPE Cray XD670**

**HPE Cray XD675**

**HPE Cray XD665**

## Mainstream HPC/AI

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

**HPE Cray XD2000**

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

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

# Direct Liquid Cooling Delivered Reliably at Scale

### Air Cooling

Fans, air conditioning, and vents circulate air and remove heat from computing equipment

### Liquid to Air Cooling

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

### 70% Direct Liquid Cooling

Combined direct liquid cooling and air cooling

### 100% Fanless Direct Liquid Cooling

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

### Next Generation 100% Fanless DLC

Innovative distributed cooling architecture designed for sustainability and advanced HPC/AI systems operating in warm (up to 40C+) water

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

# Discussion

Lance.evans@hpe.com