HPE APOLLO AND HPE CRAY SYSTEMS

A supercomputer for data centers of all sizes
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DENSITY-OPTIMIZED SOLUTIONS FOR HIGH-PERFORMANCE COMPUTING AND ARTIFICIAL INTELLIGENCE

The HPE Apollo Family is designed to deliver efficient rack-scale solutions for your high-performance computing (HPC) and artificial intelligence (AI) workloads. With rack-scale efficiency, the HPE Apollo Systems Family delivers excellent business benefits:

- Delivers just the right amount of performance and efficiency with systems that are optimized for specific workloads
- Accelerates time-to-value by reducing implementation time
- Provides architectural flexibility with both scale-up and scale-out solutions
- Helps you reduce capital and operating expenditures (CAPEX and OPEX)
- Gives you peace of mind with complete HPE service and support offerings

The scale-out compute portion of the HPE Apollo System portfolio includes the HPE Apollo 2000 System for hyperscale and general-purpose scale-out computing, the HPE Apollo 6500 System and HPE Apollo 20 for accelerated compute and compute built on emerging technology HPE Cray EX for supercomputing.

This complete range of offerings makes highly dense storage, high-performance, and rack-scale efficiency available to organizations of all sizes, with a tiered approach that provides a simplified starting point. HPE Apollo Systems are the logical choice for companies seeking to utilize HPC, AI, and supercomputing.

ENABLING THE EXASCALE ERA THROUGH PURPOSE-BUILT COMPUTE PLATFORMS

The ExaScale era is not just about a few large systems that only the largest national labs will purchase. It is about a new era of computing requirements that have emerged from the necessity to extract the most insight and value out of rapidly growing data.

Traditional data processing technologies are no longer adequate. It requires applying a broader set of analytics methodologies to your data in a coordinated fashion. Translates into using a varying combination of HPC, analytics, and AI workloads in a single workflow—often in real-time.

But winning in this new era requires more than just throwing resources at the problem. It requires taking an intelligent and nuanced approach to your data assets. An approach that supports both scale-out and scale-up architectures to provide capacity and performance scalability—one that recognizes that different data assets have different values, and optimizes investments across scale, performance, and cost-efficiency requirements for each type of data so you can manage the volume, velocity, and variety of data in the most efficient way possible. In other words—workload-optimized compute solutions.
Becoming a data-driven organization
The data-driven organization is one that utilizes data in ways that were impossible just a few years ago, due to expense, space limitations, or lack of compute capacity. It recognizes that there is "no one size fits all" approach to managing, processing, and storing data, and leverages different technologies—each specifically optimized across scale, performance, and cost-efficiency attributes—to deliver a specific value proposition for each type of data.

In short, the data-driven organization leverages workload-optimized compute solutions to turn data into an asset that directly impacts the bottom line—through initiatives that empower faster decision-making, improved operational efficiency, and direct content monetization.

The data-driven organization is here, and it’s powered by HPE density optimized systems.

TYPICAL HPC AND AI USE CASES

Supercomputing
Supercomputers enable the world’s leading research scientists and mathematicians to solve the world’s most complex problems. But while the human imagination is limitless, the massive space and energy requirements of contemporary supercomputers, combined with the drastic slowing of processor speed increases, are slowing the pace of research.

Hewlett Packard Enterprise, the leader in HPC, is breaking through traditional supercomputing barriers by rethinking cooling to enable high-density, energy-efficient supercomputing solutions. A prime example: the DOE’s Lawrence Livermore National Laboratory (LLNL) named El Capitan, which will be built on the HPE Cray EX supercomputer technology. It will be managed and hosted by LLNL for use by the three NNSA national laboratories: LLNL, Sandia National Laboratories, and Los Alamos National Laboratory. The system will enable advanced simulation and modeling to support the U.S. nuclear stockpile and ensure its reliability and security. This system is 10 times faster than today’s most power supercomputer and will hit a performance record of 2 exaFLOPS.

Divisional and departmental HPC
The demand for more compute performance for applications used by engineering design automation (EDA), financial risk modeling, life sciences, and other modern workloads is relentless. Performance gains from microprocessors have been limited by power and manufacturability challenges that affect scalability. Given today’s financial, power, and space constraints, Hewlett Packard Enterprise has taken a new approach: thinking beyond just the server and optimizing performance at the rack level to get the most out of the entire system infrastructure.
Scale-out data center
You need to deploy additional compute power for cloud, web-based applications, web hosting, and other workloads to speed research and get to market faster, but space and resource restrictions are getting in the way. HPE Apollo systems provide a bridge from traditional to scale-out architecture so you can achieve the power of HPC systems with the space and cost savings of density-optimized infrastructure—without disruption.

THE HPE APOLLO SYSTEMS FAMILY

HPE Apollo 20 System: Accelerated compute with flexible options
Purpose-built, high-density platform delivering advanced performance for memory and compute intensive HPC and AI workloads with innovative air and liquid cooled options.

HPE Apollo 2000 System: Density optimized, scale-out compute
Deploy more compute power to reap the benefits of cloud business, deploy web-based applications, and increase HPC power to speed research and bring new products and services to market faster—within space and resource boundaries.

The HPE Apollo 2000 Gen10 and Gen10 Plus Systems provide a bridge to scale-out architecture for traditional data centers so you can achieve the space and cost savings of density-optimized infrastructure in a non-disruptive manner.

HPE Apollo 6500 System: High density GPU compute
The HPE Apollo 6500 Gen10 system solves problems faster with up to 15 TFLOPS of single-precision performance per 2U node. The HPE Apollo 6500 increases your return on IT investment by accelerating the performance of your data center workloads with up to eight GPUs or coprocessors. With high-powered analysis and prediction, you will solve your most demanding AI and HPC problems in the shortest time.

HPE Cray supercomputer: Performs like a supercomputer, runs like a cloud
In the HPE Cray supercomputer, hardware and software innovations tackle system bottlenecks, manageability, and job completion issues that emerge or grow when core counts increase, compute node architectures proliferate, and workflows expand to incorporate AI at scale. It eliminates the distinction between clusters and supercomputers with a single new system architecture, enabling a choice of computational infrastructure without tradeoffs.
HPE APOLLO 20 SYSTEMS

Accelerating performance to support diverse workloads
Enterprise HPC and AI application require high memory bandwidth, low latency, and high-performance and the 2P HPE Apollo 20 System delivers to meet these needs. This 2P system with independently serviceable nodes, supports both compute and memory bound applications with 32, 48, or 56 cores and 12 DIMMs per socket.

AI Acceleration built in
The HPE Apollo 20 System, built on the Intel® Xeon® Platinum 9200 Series processors, is the only HPE Apollo platform that takes advantage of the Intel® Deep Learning Boost (Intel DL Boost) instruction to deliver exceptional AI performance with up to ~2.5x faster inference over the Intel Xeon Platinum 8180 processor. Intel DL Boost is a group of acceleration features that increases in data parallelism to enhance performance of targeted workloads. The rapid proliferation of AI inference services, the need for these services to render results quickly, and the tendency for increasingly complex deep learning applications to be processor-intensive are helping drive unprecedented demand for high-performance, low-latency compute.

Flexible platform to meet data center needs
Built to support both liquid-cooled and air-cooled options, the HPE Apollo 20 System takes advantage of the Hewlett Packard Enterprise experience in HPC cooling technologies as workloads continue to push power and density. Both versions are supported and managed by a comprehensive HPC software stack include HPE Performance Cluster Manager, as well as worldwide service and support through HPE.

Key features and benefits
High density system purpose built for memory and compute bound applications
• Up to four independently serviceable servers in 2U chassis
• Hot-swappable storage, fans, and power supplies for maximum uptime (model specific)

Standardized scale-out platform for diverse workloads
• 1U and 2U air-cooled and liquid-cooled trays
• Supports up to 350W in 2U air-cooled chassis or up to 400W with liquid-cooled versions

Advanced management and support integrated and validated high-performance software environment
• Global HPE Pointnext Services support
• HPE factory integration and testing tailored to your needs
## TECHNICAL SPECIFICATIONS: HPE APOLLO 20 SYSTEM

<table>
<thead>
<tr>
<th>Maximum number</th>
<th>1U half width—up to four per chassis</th>
<th>1U half width—up to four per chassis</th>
<th>2U half width—up to two per chassis</th>
<th>2U half width—up to two per chassis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling</td>
<td>Direct-to-chip liquid cooling via cold plates</td>
<td>High-velocity air cooling</td>
<td>Direct-to-chip liquid cooling via cold plates</td>
<td>High-velocity air cooling</td>
</tr>
<tr>
<td>Processor family</td>
<td>Up to two Intel Xeon Platinum 9200 processors</td>
<td>Up to two Intel Xeon Platinum 9200 processors</td>
<td>Up to two Intel Xeon Platinum 9200 processors</td>
<td>Up to two Intel Xeon Platinum 9200 processors</td>
</tr>
<tr>
<td>Processor</td>
<td>56C 400W, 48C 350W, 32C 250W</td>
<td>32C 250W</td>
<td>48C 350W, 32C 250W</td>
<td>48C 350W, 32C 250W</td>
</tr>
<tr>
<td>PCIe Gen3</td>
<td>Two low-profile PCIe cards through riser slot 1 and 2 riser cards</td>
<td>Two low-profile PCIe cards through riser slot 1 and 2 riser cards</td>
<td>Four low-profile PCIe cards through riser slot 1 and 2 riser cards</td>
<td>Four low-profile PCIe cards through riser slot 1 and 2 riser cards</td>
</tr>
<tr>
<td>Hot-swap storage</td>
<td>None</td>
<td>None</td>
<td>2x U.2 2.5&quot; SSDs</td>
<td>2x U.2 2.5&quot; SSDs</td>
</tr>
<tr>
<td>NVMe storage</td>
<td>2 M.2 per node</td>
<td>2 M.2 per node</td>
<td>2 M.2 &amp; 2 U.2 per node</td>
<td>2 M.2 &amp; 2 U.2 per node</td>
</tr>
<tr>
<td>Storage controller</td>
<td>Virtual RAID on Chip (VROC)</td>
<td>Virtual RAID on Chip (VROC)</td>
<td>Virtual RAID on Chip (VROC)</td>
<td>Virtual RAID on Chip (VROC)</td>
</tr>
<tr>
<td>System management</td>
<td>HPE Performance Cluster Manager</td>
<td>HPE Performance Cluster Manager</td>
<td>HPE Performance Cluster Manager</td>
<td>HPE Performance Cluster Manager</td>
</tr>
<tr>
<td>Size</td>
<td>2U 17.39” wide x 34.06” deep</td>
<td>2U 17.39” wide x 34.06” deep</td>
<td>2U 17.39” wide x 34.06” deep</td>
<td>2U 17.39” wide x 34.06” deep</td>
</tr>
<tr>
<td>Power supplies</td>
<td>3x hot-swap 2100W (Platinum) or 1600W (Titanium) PSUs</td>
<td>3x hot-swap 2100W (Platinum) or 1600W (Titanium) PSUs</td>
<td>3x hot-swap 2100W (Platinum) or 1600W (Titanium) PSUs</td>
<td>3x hot-swap 2100W (Platinum) or 1600W (Titanium) PSUs</td>
</tr>
</tbody>
</table>
HPE APOLLO 2000 SYSTEMS

Density optimized scale-out compute
To reap the benefits of cloud, web-based applications, and high-performance computing, you need to deploy more compute power—but you need to do so within space and resource constraints. The HPE Apollo 2000 System is a bridge to scale-out architecture for traditional rack-server data centers. It allows you to achieve the space and cost savings of density-optimized infrastructure in a non-disruptive manner.

Configuration flexibility for a variety of workloads
The HPE Apollo 2000 System is a very dense solution that packs a lot of performance and workload capacity into a small amount of data center space—making it ideal for your space-constrained data center or remote site. In fact, four independent hot-pluggable HPE Apollo 2000 servers in a single 2U chassis provide 2x the performance density of standard 1U servers—four servers in 2U vs. 4U of rack space—at a comparable cost.

Flexible configuration options make the HPE Apollo 2000 System a great fit for a variety of workloads, including HPC clusters. The ability to mix and match servers in the same chassis and the unique drive mapping flexibility allow you to create optimized configurations for many applications. Chassis, or groups of chassis, can be custom-configured to act as affordable, modular, 2U building blocks for specific implementations at scale—and for future growth.

Integrate seamlessly—and painlessly—into your data center
The HPE Apollo 2000 System is designed to be deployed in traditional enterprise data centers, without disruption or the need to change anything in your environment. The system can be managed at the individual server level with the same hardware and software tools and the same service procedures and practices used with traditional rack servers, significantly reducing the cost of change.

The HPE Apollo 2000 System has the right characteristics and delivers the right value to make it your enterprise bridge to efficient, space-saving, scale-out architecture.

Key features and benefits
Density-optimized for traditional data centers
- Up to four powerful servers in 2U chassis—2x the density of 1U servers
- Traditional racks and cabling for existing data centers
- Cost-effective in any configuration

Configuration flexibility for variety of workloads
- Mix and match servers for workload optimization Gen10 Plus
- HPC performance with accelerators, top bin CPUs, and fast HPC clustering
- Storage flexibility and a broad range of I/O options for workload optimization

Secure and manageable at scale—it’s HPE ProLiant
- Secure from the start with iLO 5 and Silicon Root of Trust which provides a series of trusted handshakes from lowest level firmware to BIOS and software to ensure a known good state.
- Management comes easy with HPE Performance Cluster Manager which is a fully integrated system management solution offering all the functionalities you need to manage your Linux-based high performance computing (HPC) clusters.
- Other system management tools like HPE Apollo Platform Manager for advanced power and server control or HPE OneView for integration into overall enterprise infrastructure.
## TECHNICAL SPECIFICATIONS: HPE APOLLO 2000 SYSTEM

### HPE Apollo 2000 Gen10 System

<table>
<thead>
<tr>
<th>Maximum number</th>
<th>1U half width—Up to four per chassis</th>
<th>2U half width—Up to two per chassis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>Up to two latest generation Intel® Xeon® Scalable processors per server node, up to 270W</td>
<td>Up to two latest generation Intel® Xeon® Scalable processors per server node, up to 270W</td>
</tr>
<tr>
<td>Memory</td>
<td>Supports up to 3200 MT/s DDR4 SmartMemory, 8 channels, 16 slots</td>
<td>Supports up to 3200 MT/s DDR4 SmartMemory, 8 channels, 16 slots</td>
</tr>
<tr>
<td>Network module</td>
<td>2 I/O slots for a choice of networking and clustering options including: 1 Gb, 10 Gb, 100 Gb Ethernet, 100 Gb/s EDR InfiniBand, 100 Gb/s Omni-Path, Fibre Channel and options for either 1 PCIe (x16) slot plus a FlexibleLOM or 2 PCIe (x16) slots</td>
<td>2 I/O slots for a choice of networking and clustering options including: 1 Gb, 10 Gb, 100 Gb Ethernet, 100 Gb/s EDR InfiniBand, 100 Gb/s Omni-Path, Fibre Channel and options for either 1 PCIe (x16) slot plus a FlexibleLOM or 2 PCIe (x16) slots</td>
</tr>
<tr>
<td>Storage</td>
<td>Up to 24 drives per node</td>
<td>Up to 24 drives per node</td>
</tr>
<tr>
<td></td>
<td>Dual SATA host based M.2 2242 NGFF SSDs—internal hot-plug HDD support</td>
<td>Dual SATA host based M.2 2242 NGFF SSDs—internal hot-plug HDD support</td>
</tr>
<tr>
<td></td>
<td>Internal USB port</td>
<td>Internal USB port</td>
</tr>
<tr>
<td></td>
<td>Hard drive mapping feature on r2800 chassis</td>
<td>Hard drive mapping feature on r2800 chassis</td>
</tr>
<tr>
<td>Storage controller</td>
<td>(1) HPE Smart Array S100i; optional: HPE Smart Array PCIe card optional: HPE Smart Array Controller</td>
<td>(1) HPE Smart Array S100i; optional: HPE Smart Array PCIe card optional: HPE Smart Array Controller</td>
</tr>
<tr>
<td>Supported accelerators</td>
<td>N/A</td>
<td>NVIDIA® Tesla T4, M10, P40, V100, V100s, RTX 4000, RTX 8000</td>
</tr>
<tr>
<td>Management interface options</td>
<td>HPE iLO (iLO 5)</td>
<td>HPE iLO (iLO 5)</td>
</tr>
<tr>
<td></td>
<td>HPE Apollo Platform Manager</td>
<td>HPE Apollo Platform Manager</td>
</tr>
<tr>
<td></td>
<td>HPE Performance Cluster Manager for cluster deployments</td>
<td>HPE Performance Cluster Manager for cluster deployments</td>
</tr>
<tr>
<td></td>
<td>HPE OneView only for integration into overall enterprise infrastructure</td>
<td>HPE OneView only for integration into overall enterprise infrastructure</td>
</tr>
</tbody>
</table>

### HPE Apollo 2000 System Chassis options

<table>
<thead>
<tr>
<th>HPE Apollo r2200 Gen10 Chassis</th>
<th>HPE Apollo r2600 Gen10 Chassis</th>
<th>HPE Apollo r2800 Gen10 Chassis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Storage configuration</strong></td>
<td>Up to 12 LFF hot-plug SAS/SATA HDD/SSD, allocated equally across server nodes</td>
<td>Up to 24 SFF hot-plug SAS/SATA HDD/SSD, allocated equally across server nodes or 16 SFF SAS/SATA + 8 NVMe HDD</td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td>2U: 17.64&quot; wide x 31.21&quot; deep</td>
<td>2U: 17.64&quot; wide x 29.61&quot; deep</td>
</tr>
<tr>
<td><strong>Power supplies</strong></td>
<td>800W, 1600W, or 1800–2200W Platinum Power Supplies, N+1 redundancy option</td>
<td>800W, 1600W, or 1800–2200W Platinum Power Supplies, N+1 redundancy option</td>
</tr>
</tbody>
</table>
### HPE ProLiant XL225n Gen10 Plus System

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maximum number</strong></td>
<td>1U half width—Up to four per chassis</td>
</tr>
<tr>
<td><strong>Processor</strong></td>
<td>Up to two AMD EPYC 7002 or AMD EPYC 7003 Series processors per server node, 280W</td>
</tr>
<tr>
<td><strong>Memory</strong></td>
<td>Supports up to 3200 MT/s DDR4 SmartMemory 8 channels, 16 slots</td>
</tr>
<tr>
<td><strong>Network module</strong></td>
<td>Choice of Ethernet (1 Gb to 100 Gb), InfiniBand (100 Gb HDR or 200 Gb HDR) InfiniBand 1x 1 Gb + OCP 3.0 Form Factor</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td>Dependent on chassis selection n2400 zero drives supported n2600 up to 24 SFF HDD/SSD or up to 8 NVMe SFF SSD Optional OS boot device: 2 internal M.2</td>
</tr>
<tr>
<td><strong>Storage controller</strong></td>
<td>HPE Smart Array S100i; optional HPE Smart Array PCIe card</td>
</tr>
<tr>
<td><strong>Supported accelerators</strong></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Management Interface</strong></td>
<td>HPE Performance Cluster Manager (HPCM), iLO Advanced (optional), Rack Consolidation Module (RCM) (optional) Two 1600W/1800W–2200W/3000W HPE Apollo Platform Manager option for rack level management</td>
</tr>
<tr>
<td><strong>Cooling</strong></td>
<td>(5) Single rotor fans (standard) and an additional 2 rotor fans can be added for additional cooling</td>
</tr>
<tr>
<td><strong>Warranty (parts, labor, on-site support)</strong></td>
<td>3/3/3</td>
</tr>
</tbody>
</table>

### HPE Apollo 2000 Plus System Chassis options

#### HPE Apollo n2400 Gen10 Plus Chassis

- **Storage configuration**: No drives supported with this chassis; optional M.2 SSD storage can be used for OS boot Utilizing a zero drive chassis enables support of CPUs up to 280W
- **Size**: 2U 17.32" wide x 36.38" deep
- **Power supplies**: Two 1600W/1800W–2200W/3000W HPE Apollo Platform Manager option for rack level management

#### HPE Apollo n2600 Gen10 Plus Chassis

- **Storage configuration**: Up to 24 SFF hot-plug SAS/SATA HDD/SSD, allocated equally across server nodes or up to 8 NVMe SSD
- **Size**: 2U 17.32" wide x 36.38" deep
- **Power supplies**: Two 1600W/1800W–2200W/3000W HPE Apollo Platform Manager option for rack level management
HPE APOLOGY 2000 GEN10 PLUS WITH HPE APOLOGY DIRECT LIQUID COOLING SYSTEM

Plug and Play cooling to reduce PUE
Built to deliver optimal OPEX, increase density, and reduce power usage effectiveness (PUE), the HPE Apollo Direct Liquid Cooling (DLC) System on the HPE Apollo 2000 Gen10 Plus System consists of a cold plate and tube running coolant over the components within the server and pulling the heat away from those components. A manifold runs the length of the rack bringing the coolant supply to the servers, with the hot water traveling to a coolant distribution unit (CDU) that is contained within the rack. The CDU then connects to the facility water, up to 32°C (89.6°F) and water return from the servers.

Features
• New flexible infrastructure offers multiple storage options, eight memory channels, and 3200 MT/s memory, PCIe Gen4, and OS boot with optional dual NVMe M.2 storage on dedicated riser.
• Enhanced from the start with firmware anchored into silicon with HPE iLO 5 and Silicon Root of Trust from HPE for the highest level of system security.
• Support for the full stack of 2nd and 3rd Generation AMD EPYC 7000 Series processors, which include the 7Fx2 models and support for processors up to 280W in the HPE ProLiant XL225n Gen10 Plus server.
• Comprehensive manageability including an extensive set of tools for node-to-rack management.
• Increases data center efficiency, unlocks top bin SKUs, and increases your power density.
• The HPE Apollo n2400 Gen10 Plus Chassis, a drive-less chassis option that provides power and cooling efficiencies ideal for supporting top bin processor.

Benefits
• The HPE Apollo DLC System is fully integrated, installed, and supported by HPE.
• Enables the HPE Apollo Gen10 Plus System to support processors up to 280W so the highest performing CPUs can be deployed.
• Cooler systems result in reduced component failures (memory, CPUs, and NICs) which means increased availability, higher infrastructure performance, and better reliability.
• Consumes up to 81% less fan power at the server level.
• The solution does not require centralized pumping unit so that price scales linearly.
HPE APOLLO 6500—MASSIVE GPU COMPUTE

Built for the ExaScale Era the HPE Apollo 6500 Gen10 Plus Systems accelerates performance with powered by NVIDIA HGX A100 Tensor Core GPUs with NVLink or AMD Instinct™ MI100 with 2nd Gen Infinity Fabric™ Link to take on the most complex HPC and AI workloads. This purpose-built platform provides enhanced performance with premier GPUs, fast GPU interconnects, high-bandwidth fabric, and configurable GPU topology, providing rock-solid reliability, availability, and serviceability (RAS). Configure with single or dual processor options for a better balance of processor cores, memory, and I/O. Improve system flexibility with support for 4, 8, 10, or 16 GPUs and a broad selection of operating systems and options all within a customized design to reduce costs, improve reliability, and provide leading serviceability.

The system consists of four key elements:
- The HPE ProLiant XL645d Gen10 Plus single processor system
- The HPE ProLiant XL675d Gen10 Plus is a dual processor system
- The HPE Apollo d6500 Chassis
- The HPE Apollo d6500 System: Your next accelerated computing solution.

High-bandwidth, low-latency networking is tightly coupled to the accelerators allow you to take full advantage of your network. And the four x16 PCIe Gen4 slots add to your flexibility when choosing high-speed fabrics.

What’s new?
- NVIDIA HGX A100 8-GPU and 4-GPU accelerators powered by NVIDIA A100 Tensor Core GPUs with NVLink.
- AMD Instinct MI100 with Infinity Fabric Link; broad choice of PCIe GPU for HPC or AI.
- Single or dual processor systems with 3rd Generation AMD EPYC 7003 Series processors, including the power, frequency, or core count processors to match your workload requirements.
- The HPE ProLiant XL645d Gen10 Plus is a single processor system for the NVIDIA HGX A100 4-GPU with four double-wide PCIe or eight single-wide PCIe accelerators.
- The HPE ProLiant XL675d Gen10 Plus is a dual processor system for the NVIDIA HGX A100 8-GPU with 8 to 10 double-wide or 16 single-wide PCIe accelerators.
- Coming soon: Direct Liquid Cooling (DLC) System fully integrated, installed, and supported by HPE. Also supporting PCIe Gen4 GPUs provides extreme compute flexibility.
- Enterprise RAS with an easy access modular design, fully redundant power.
- Save time and cost, gain improved user productivity with HPE iLO 5, and firmware with enhanced security from Silicon Root of Trust.
- Flexible support and options: InfiniBand, Ethernet, or in early 2021 HPE Slingshot, Ubuntu and Enterprise OS such as Windows, VMware®, SUSE, Red Hat®, Choice, and HPE Pointnext Services for advisory, professional, and operational services, along with flexible consumption model across the globe.
Features

Accelerated performance for the most complex HPC and AI workloads
- HPE Apollo 6500 Gen10 Plus System features your choice of accelerator technology from NVIDIA or AMD to support the most complex HPC simulations and AI models.
- Offers high-speed fabrics whether traditional Ethernet, InfiniBand, and HPE Slingshot high-performance networking.
- Get the most performance from your GPU with top bin 280W processors tailored to the processor bandwidth, core count, and frequencies you need.
- High-performance components demand high-performance power and cooling: Designed to provide fully redundant power and cooling for top bin CPU and 500W accelerators, allows your system to be ready for the business challenges of today and tomorrow.

Flexible to meet your workloads and data center requirements, and exceed capabilities
- HPE Apollo 6500 Gen10 Plus System features accelerator technologies from NVIDIA and AMD.
- Single or dual processor AMD EPYC servers offer a better balance of processor cores, memory, and I/O for HPC workloads.
- Comprehensive selection of options includes high-performance HPE SmartMemory, HPE Smart Array Controllers, and other options to round out your solution.
- A broad suite of Operating Software (OS) is available, whether HPE Cray OS, Microsoft Windows Server, Ubuntu, Red Hat, or VMware.
- Choose from a wide range of Hewlett Packard Enterprise support, professional, and financial services that are right for your service-level agreement and budget.

Customized design for reduced costs, improved reliability, and leading serviceability
- HPE Apollo 6500 Gen10 Plus System are supported by Direct Liquid Cooling (DLC) systems that come pre-filled, fully integrated, racked, and ready to connect to facility water for improved cost of ownership, enhanced cooling, and higher power densities.
- Easy to service or upgrade with fully redundant power, easy-to-access modular design, dual rotor hot-swap fans, and rear-cabled fabrics are all fit into a standard 1075 mm deep rack to deploy quickly and efficiently.

Comprehensive server security and management
- HPE Apollo 6500 Gen10 Plus System offers HPE iLO 5 with Silicon Root of Trust and the AMD Secure Processor, a dedicated security processor embedded in the AMD EPYC system on a chip (SoC), giving you advanced security.
- In the unlikely event of a firmware breach, enhanced security capabilities built into HPE Apollo 6500 Gen10 Plus System will be able to quickly and automatically recover the firmware to a previous known-good state, limiting system disruption.
- Firmware runtime validation provides a daily firmware check and alert of compromised code so that issues are contained, rather than impacting the system.
- HPE Performance Cluster Manager is a fully integrated system management software offering administrators all the functionalities they need to manage their clusters.
- A simple, resilient, and shared infrastructure with advanced security enables more efficient system management, lowering your TCO.
## TECHNICAL SPECIFICATIONS: HPE APOLLO 6500 GEN10 SYSTEM

### Platform information

<table>
<thead>
<tr>
<th>Feature</th>
<th>HPE ProLiant XL675d Server</th>
<th>HPE ProLiant XL645d Server</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chassis</strong></td>
<td>HPE Apollo d6500 Gen10 Plus Configure-to-order Chassis (6U Chassis)</td>
<td></td>
</tr>
<tr>
<td><strong>Density/Scale</strong></td>
<td>Dual Processor Server per chassis</td>
<td>Up to 2 Single Processor Servers per chassis</td>
</tr>
<tr>
<td><strong>GPU</strong></td>
<td>Up to 10 Double Wide PCIe or 16 Single Wide PCIe GPU</td>
<td>Up to 4 Double Wide PCIe or 8 Single Wide PCIe GPU</td>
</tr>
</tbody>
</table>

Choice between: NVIDIA HGX A100 8-GPU, AMD Instinct MI100 with 2nd Gen Infinity Fabric, and other leading accelerators

Choice between: NVIDIA HGX A100 4-GPU, AMD Instinct MI100 with 2nd Gen Infinity Fabric, and other leading accelerators

<table>
<thead>
<tr>
<th><strong>Interconnect</strong></th>
<th>Support for up to six high speed fabric interconnects; whether Ethernet, InfiniBand, or HPE Slingshot</th>
<th>Support for up to three high speed fabric interconnects; whether Ethernet, InfiniBand, or HPE Slingshot</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Processor</strong></td>
<td>Dual AMD 3rd Gen EPYC Series Processor per node, up to 280W</td>
<td>Single AMD 3rd Gen EPYC Series Processor per node, up to 280W</td>
</tr>
<tr>
<td><strong>Memory</strong></td>
<td>32 3200 MT/s DDR4 SmartMemory</td>
<td>8 3200 MT/s DDR4 SmartMemory</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td>Up to 16 SFF drives—Max. 6 NVMe per server (M.2 optional)</td>
<td>Up to 8 SFF drives—Max. 3 NVMe per server (M.2 optional)</td>
</tr>
</tbody>
</table>

**System management**

- HPE Integrated Lights Out (iLO 5), HPE Performance Cluster Manager (HPCM), HPE Container Platform, HPE OneView, Integrated Rack Consolidation Module (RCM)

**System security**

- iLO 5 Silicon Root of Trust, iLO Advanced (Optional)

**OS support**

- HPE Cray OS, Microsoft Windows Server, Red Hat, Ubuntu, VMware

**Power**

- Fully redundant power for all configurations with up to 6 3000W Platinum Hot Plug Power Supplies per chassis

- Power Capping available at the server and chassis level. Rack and Row level Power Capping available with Apollo Platform Manager Kit. Shared power infrastructure at the chassis level

**Cooling**

- 15–80 mm dual rotor hot pluggable chassis fans

**Storage controller**

- Embedded SATA; optional HPE E208i-a SR, P408i-a SR, and P816i-a SR series Smart Arrays

- Embedded SATA; optional HPE E208e-p SR and P408e-p SR series Smart Arrays

**Warranty**

- 3 years parts/3 years labor/3 years on-site support
HPE CRAY SUPERCOMPUTER: PERFORMS LIKE A SUPERCOMPUTER, RUNS LIKE A CLOUD

HPE Cray EX an entirely new design created to address the challenges of the ExaScale era. Hardware and software innovations tackle system bottlenecks, manageability, and job completion issues that emerge or grow when core counts increase, compute node architectures proliferate, and workflows expand to incorporate AI at scale. It eliminates the distinction between clusters and supercomputers with a single new system architecture, enabling a choice of computational infrastructure without tradeoffs.

The new system hardware architecture designed to support the multiple processor and accelerator options available today and in the future. The architecture supports processors, accelerators and interconnect in both liquid and air-cooled cabinetry to meet end-user requirements for density, performance, and efficiency.

For customers requiring the greatest performance, density, and efficiency for large-scale systems, the HPE Cray EX supercomputer is available in liquid-cooled cabinetry which supports direct liquid cooling of all components in a compact bladed configuration.

The initial air-cooled HPE Cray supercomputing solution is based on the HPE Apollo 2000 Gen10 plus with 4 dual socket AMD EPYC 7002 or AMD EPYC 7003 nodes with one HPE Slingshot interconnect per node, and running HPE Cray software. Functionally the processor equivalent versions of the liquid-cooled and air-cooled solutions are identical with the same interconnect and software support.

The HPE Cray EX supercomputer solution includes an optimized HPC interconnect, HPE Slingshot, which demonstrates high-throughput and sustained performance at ExaScale, and has the ability to run diverse workloads simultaneously without interference, and the flexibility to enable new approaches to computing such as supercomputing via the cloud.

The HPE Slingshot network is built around our new 64 port, 12.8 Tb/s switch providing industry leading 200 Gb/s connectivity to endpoints. This high radix switch coupled with HPE’s enhanced Dragonfly topology enables scaling to over 250,000 endpoints with a maximum of three switch-to-switch hops between endpoints. It also incorporates a host of new features to ensure packets are routed efficiently and network congestion is avoided. Based on the industry-standard Ethernet protocol, HPE Slingshot enables straightforward connectivity with standard data center environments, third-party storage devices, and can directly exchange IP/Ethernet traffic with the outside world.

The HPE Cray supercomputers are complete solutions with software and hardware that are tightly integrated and performance-tuned to offer the best system performance while bringing new standard in flexibility, manageability, and resiliency to supercomputing.

HPE Cray supercomputer software stack addresses the needs both system administrators and end users, including software developers and consists of:

HPE Cray System Management is a built-for-scale system management solution offering administrators all functionalities they need to keep the systems healthy, utilized to the maximum and accommodating wide range of workload requirements via aaS experience.

HPE Cray Operating System is a suite of high-performance software is designed to run large, complex applications and scale efficiently.

Software developers can then use HPE Cray Programming Environment—A fully integrated software development suite offering programmers comprehensive set of tools for developing, porting, debugging, and tuning of their applications so they can shorten application development time and accelerate their performance.

The whole software stack is supported by HPE Pointnext Services.
## TECHNICAL SPECIFICATIONS: HPE CRAY

<table>
<thead>
<tr>
<th><strong>Infrastructure architecture</strong></th>
<th>Standard 19’ rack</th>
<th>Proprietary cabinet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Density/Scale</strong></td>
<td>Up to 4 dual-socket nodes per 2U chassis</td>
<td>Up to 512 processors/256 nodes per cabinet</td>
</tr>
<tr>
<td><strong>Node architecture</strong></td>
<td>AMD EPYC 7002 or AMD EPYC 7003</td>
<td>AMD EPYC 7002 or AMD EPYC 7003</td>
</tr>
<tr>
<td><strong>Memory (type, channels, slots)</strong></td>
<td>Up to 8 3200 MT/s DDR4 channels per socket; 1 DIMM per channel; up to 1024 GB per node</td>
<td>Up to 8 3200 MT/s DDR4 channels per socket; 1 DIMM per channel; up to 1024 GB per node</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td>2 x 25” SATA or PCIe Gen3 NVMe SSD per node (up to 7.68 TB SSDs)</td>
<td>No local storage</td>
</tr>
<tr>
<td><strong>GPU support</strong></td>
<td>TBD</td>
<td>Q4 2020—Support for single socket AMD EPYC 7002 with 4 NVIDIA V100 GPUs with NVLink. 2 nodes per blade. Up to 128 GPUs per cabinet</td>
</tr>
<tr>
<td><strong>Infrastructure management</strong></td>
<td>HPE Cray System Management</td>
<td>HPE Cray System Management</td>
</tr>
<tr>
<td><strong>OS support</strong></td>
<td>HPE Cray operating system (OS)</td>
<td>HPE Cray operating system (OS)</td>
</tr>
<tr>
<td><strong>Power supply-hot plug</strong></td>
<td>HPE Apollo 2000 Gen10 Plus/Shasta compute: 1+1 hot-swappable power supplies</td>
<td>Hot-swap, redundant power supplies, support up to 300 kW per cabinet</td>
</tr>
<tr>
<td><strong>Interconnect</strong></td>
<td>HPE Slingshot switch</td>
<td>HPE Slingshot switch, switches integrated in cabinet</td>
</tr>
<tr>
<td><strong>Cooling</strong></td>
<td>Air-cooled</td>
<td>Direct Liquid Cooling, up to ASHRAE W4 water</td>
</tr>
<tr>
<td><strong>Storage controller</strong></td>
<td>System dependent</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Warranty (parts, labor, on-site support)</strong></td>
<td>3/3/3</td>
<td>3/3/3</td>
</tr>
</tbody>
</table>
SOFTWARE ECOSYSTEM FOR HPE APOLLO SYSTEMS

HPE offers customers a comprehensive software portfolio for HPC and converged workloads so you can choose the right mix of software to fit your exact needs—from choice of operating systems, system management software, workload and orchestration solutions to application development tools and more.

Our software has a proven track record of helping customers maximize the use of their HPC systems, including HPE Apollo clusters, so they can get results faster. Besides tools we created, we also offer leading third-party software and validate popular HPC open source solutions.

Interactive HPC software portfolio guide is available here.

System Management Software for HPE Apollo Systems

**HPE Performance Cluster Manager**
Delivers a fully integrated system management solution for standard Linux-based HPE clusters. The software enables fast system setup from bare-metal, comprehensive hardware monitoring and management (aggregating iLO information), image management and software updates, as well as power management.

The HPE Performance Cluster Manager reduces the time and resources spent administering HPC systems, lowering total cost of ownership. Learn more here.

**HPE OneView**
In enterprise and cross-discipline data center environments deploying HPE Apollo Systems, HPE OneView is a single, integrated management platform which also supports HPE Synergy, HPE BladeSystem, c-Class, HPE ProLiant server platforms, and HPE 3PAR storage systems. With best-in-class infrastructure lifecycle management, HPE OneView allows IT to manage their entire infrastructure lifecycle more efficiently through a single interface developed for the way you think and work. With greater visibility and control of infrastructure, HPE OneView helps IT become more efficient, agile and productive, saving time and money. HPE OneView discovery and monitoring is available on all HPE Apollo Systems. More information here.

Application Development Tools

We offer two homegrown application development and acceleration solutions alongside third-party tools:

**HPE Message Passing Interface (MPI)**
The MPI development environment is designed to enable the development and optimization of the HPC applications on InfiniBand-based HPE HPC clusters. The software suite helps customers tune and accelerate compute-intensive applications running on standard Linux clusters. HPE Message Passing Interface (MPI) can even boost performance of applications developed with other MPI implementations at runtime without the need to recompile.

**HPE Cray Programming Environment**
Is a set of tightly coupled compilers, libraries, debuggers performance analysis and other tools designed to help programmers shorten their software development cycle and improve performance of HPC applications on HPE Apollo 80 and 2000 systems.
HPE POINTEX SERVICES

HPE Pointnext Services help you confidently reduce risk, realize agility and stability, and make the most of your HPE Apollo System and high-performance compute investment. You can choose from a flexible selection of service levels to meet your requirements. We help you reap the benefits of your HPE Apollo solution as you successfully plan your solution, deploy and operate it with minimal disruption to your current environment. Connect to HPE to get advisory, operational, and training help while preventing problems and solve issues faster. Our support technology lets you tap into the knowledge of millions of devices and thousands of experts to stay informed and in control, anywhere, anytime. Our advisory experts help you to architect and integrate your AI/ML solution securely. Choose from a flexible selection of services:

- **AI and data advisory services**—Plan, architect, pilot and design advanced solutions, deploy AI, machine learning, deep learning workloads, and integrate it with partner technologies.
- **Installation and Startup**—Rapidly get up and running smoothly with knowledge transfer.
- **HPE Datacenter Care**—Delivered by an assigned team of HPE Pointnext Services experts, this service offers a personalized, proactive support approach with priority access to reactive support.
- **HPE Cray Advanced Support**—HPE’s most comprehensive support solution is tailored to meet specific requirements of HPE Cray high-performance computing.
- **HPE Foundation Care**—Provides hardware and software support with a simplified choice of coverage windows and response times. The service includes collaborative call management for assistance with leading x86 operating system software.
- **HPE Education Services**—Propel your IT staff to exceptional levels of performance by working with HPE Education Services, a leader in technical training. Our consultants can also help you prepare and support your staff throughout technology change.
- **HPE Integration and Performance Services**—Offer access to expertise for every step of the way—from strategy to design, as well as deployment and operations.

LEARN MORE AT
hpe.com/info/hpc