HPE Apollo 4000 systems
Enabling the data-driven organization

Density-optimized solutions for high-performance computing and Big Data

The HPE Apollo 4000 family is designed to deliver efficient rack-scale solutions for your Big Data Analytics, scale-out Software-Defined Storage (SDS), high-performance computing (HPC), Backup and Archive and other data storage-intensive workloads. With rack-scale efficiency, the HPE Apollo 4000 systems family delivers excellent business benefits:

• Delivers just the right amount of performance and efficiency with systems that are catered to for specific workload requirements
• 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

Enabling the data-driven organization through purpose-built compute platforms

The mega trends of cloud, mobility, Big Data, and security are creating both challenges and strategic opportunities for companies of all sizes and in all industries. The race is on to see who can mobilize and monetize data most effectively to secure a sustained competitive advantage in this new era.

Traditional data processing technologies are no longer adequate. High velocity data demands high-performance technologies and systems that can process data instantly and scale on-demand. However, winning the race requires more than just throwing resources at the problem. It requires taking an intelligent and nuanced approach to your data assets. It is an approach that supports both scale-out and scale-up architectures to provide capacity and performance scalability. It is the 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. This helps 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.
Typical HPE Apollo 4000 system use cases

Big Data
Cloud and mobile technologies are fueling increasing amounts of data collection and use. Organizations of all kinds are looking to mine these growing collections of unstructured Big Data to unlock the insights. They are looking for unstructured Big Data that will allow them to streamline their operations and reduce costs, target products and services more efficiently and effectively to customers who need them, and build the next-generation of products and services to satisfy unmet needs ahead of competition. To help you compete, HPE Apollo 4000 systems offer a density-optimized platform with a focus on the requirements of Big Data solutions like Hadoop, Spark, Flink, etc.

Scale-out Software-Defined Storage
Inundated with data, businesses are constantly refining their storage infrastructures to make them more efficient. SDS eliminates complexity and frees your infrastructure from the limitations of dedicated hardware. Simply put, SDS is storage functionality that is not delivered in a specific chassis—it is delivered as software on industry-standard hardware. Scale affordably and accommodate petabytes of data and beyond using HPE Scalable Object Storage with Scality RING. More economical than legacy storage with leading performance, HPE Apollo 4200 server with Qumulo File Fabric (QF2) software forms a modern, highly scalable file storage solution.

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.

Backup and Archive
• Data backup solutions were once sold largely as proprietary appliances. Now, many enterprise backup solutions are delivered as software to be deployed on x86 servers. The data protection solutions with Veeam Availability Suite and Veritas Backup Exec utilize the Apollo 4200/4510 as an all-in-one target combining both compute and high-density storage in a single-chassis. By writing backup data to local storage in the HPE Apollo server, instead of to a separate storage system, time for backups and restores is significantly reduced.

• Active Archive broadly refers to long-term storage of types of data that are “completed files” but which need to kept fairly warm to cool. You could store this data close at hand on expensive high performance storage, but generally for this use case customers need to store so much of this data that it runs into petabytes. Or you could store this data on something very cold such as tape, but then it is not readily accessible. For many customers, object storage can be the ideal solution for their active archive needs. Scality RING is our object storage solution. HPE supports this on both Apollo 4200 and Apollo 4510. By using Apollo 4000 servers, customers can build object storage starting as small as a 3-node cluster and 200 TBs of data, and scaling up to tens of petabytes of storage. The Apollo 4200 Gen10 is ideal for Scality RING deployments between 200 TB and 2 PB, and the larger Apollo 4510 Gen10 may be introduced for situations needing multi-PB storage in one cluster.

Hyperscale
As its name implies, hyperscale is all about achieving massive scale in computing—typically for purposes of Big Data or cloud computing. Hyperscale infrastructure is designed for horizontal scalability that leads to high levels of performance, throughput, and redundancy to enable fault tolerance and high availability. HPE Apollo high-density server family is the HPE solution for hyperscale computing. Each HPE Apollo high-density server is built for the highest levels of performance and efficiency. Being density-optimized, HPE Apollo family enables organizations to achieve hyperscale within relatively small physical facilities.
HPE Apollo 4200 Gen10 Server—The enterprise bridge to Big Data solutions

The HPE Apollo 4200 Gen10 Server builds on years of proven leadership with an architecture designed for Big Data Analytics, SDS, backup and archive, and other data storage-intensive workloads. Its unique design allows you to save valuable data center space through a 2U standard rack depth chassis that holds up to 28 large form factor (LFF) or 54 small form factor (SFF) hot-plug drives. Unlike platforms from other vendors, these hot-plug drives can be easily serviced from the front/rear of the rack without having to slide out the entire system. This versatile 2U Big Data server integrates seamlessly into traditional data centers with the same rack dimensions, cabling, and serviceability, as well as the same administration procedures and tools.

Key features and benefits

• **Ultra dense and rack scale**
  - Highest data storage density in a unique, easy to service 2U standard rack depth chassis.¹
  - Up to 28 large form factor (LFF) or 54 small form factor (SFF) hot-plug drives and without I/O compromises.
  - Support for daisy chaining of out-of-band management network ports for 95% reduction in management network port required per 42U rack deployment.²

• **Workload optimized with accelerated performance**
  - Balanced system architecture with 62% higher bandwidth from a three Intel® Ultra Path Interconnect (UPI) design.³
  - The latest generation Intel® Xeon® Scalable processors with up to 24 cores each and DDR4 2666 MT/s HPE SmartMemory for up to 66% faster bandwidth.⁴
  - Up to six NVMe-connected SFF SSDs for low-latency and high-bandwidth metadata access or data caching.
  - HPE Smart Array Gen10 controllers with up to 65% better random⁵ and up to 25% better sequential performance,⁶ and network controllers up to 100 Gbps.

• **Data secure by design**
  - HPE iLO 5 and HPE silicon root of trust technology provides firmware protection, malware detection, and firmware recovery.
  - Optional HPE Smart Array SR Secure Encryption for storage controller-based FIPS 140-2 Level 1 data-at-rest encryption.

• **Ready for your applications, to be consumed your way, without headaches**
  - HPE has validated a wide range of Big Data Analytics, Software-Defined Storage, backup and archive, and other data storage-intensive applications.
  - Consumption-based IT via HPE GreenLake Flex Capacity for economic agility with on-premises security and performance.
  - Backed by services from HPE Pointnext, including support automation in the event of hardware components failure.

Two-processor server configuration options for:

• Intel Xeon Scalable processors family—It provides choices up to 24 cores, 1 GHz to 2 GHz CPU speed, and power ratings between 85 watts to 150 watts.

• 16 memory DIMM slots with up to 1024 GB DDR4 memory at up to 2666 MT/s—This is ideal for object stores needing fast performance with small objects or in-memory data processing for near-real-time analytics software.

• Storage performance options—The SFF HDD model supports SAS and SSD drives with 12G output and 15k rpm to speed data transfer for analytics workloads.

• PCIe Gen3 slots—Up to five low-profile PCIe Gen3 slots or six PCIe Gen3 slots with two of them as full-height half-length slots to meet networking and cluster performance needs in applications requiring higher speed I/O.

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¹ As compared to standard competition in the 2U category—reference publicly available data sheet.
² Based on comparison with standard 42U rack deployment (for Gen9) which needs at least 20 additional network ports for management, whereas, with daisy-chaining the number of network ports required for management (in Gen10) is 1 translating to 95% reduction.
³ Based on comparing Gen9 versus Gen10 system: Gen9 had 2X Intel UPI versus Gen10, which has 3X Intel UPI Gen10 = 3 x 10.4 GT/s versus Gen9 = 2 x 9.6 GT/s, which translates to 62%.
⁴ Percentage compare Gen10 versus Gen9: Gen10 = 12 Channels x 2666 data rate x 8 bytes = 256 GB/s, Gen9 = 8 channels x 2400 x 8 bytes = 154 GB/s. 256/154 = 1.66 or Gen10 is 66% greater bandwidth, July 2017.
⁵ HPE Internal lab testing performed January 2017 comparing HPE Gen9 to Gen10 Smart Array Controllers with 4 KB random read test.
⁶ Based on Gen9 versus Gen10 with 256 KB sequential writes, Jan 2017.
# Technical specifications: HPE Apollo 4200 Gen10 Server

- **Form factor**: 2U rack server
- **Storage type**: Up to 24 LFF hot-plug SAS/SATA/SSD + optional 4 LFF, 2 SFF, or 6 SFF NVMe in rear drive cage
- **Storage capacity**: Up to 336 TB (24 + 4 LFF 12 TB HDD)
  
- **Storage controller**: (1) HPE Smart Array 5100i; optional HPE Smart Array cards; up to 3 HPE Smart Array Gen10 controllers
- **Processor family**: Intel Xeon Scalable processor family 8100, 6100, 5100, and 4100 series
- **Processor number**: One or two per server
- **Processor cores available**: 8/10/12/14/16/18/20/24
- **Processor frequency**: From 2.1 GHz–3.2 GHz
- **Memory**: HPE SmartMemory 16 DIMM slots
  
- **Networking**: 2 x 1 Gb Ethernet and PCIe options
- **Expansion slots**: Up to 6 PCIe slots
  
- **Management interface options**: HPE Integrated Lights Out 5 (iLO 5)
  
- **Systems fans features**: 10 fans
- **Power supply type**: Up to 2 power supplies, 800W and 1600W Flex Slot, hot-plug redundant power
Object storage: HPE Apollo 4510 System

HPE Apollo 4510 system is ideal for a wide variety of object storage solutions including collaboration and content distribution, content repositories and active archives, backup repositories, and cold storage—and everything in between. You can take advantage of object storage solutions supported by the HPE partner ecosystem, such as Scality, Ceph, and OpenStack® or Swift.

Key features and benefits
A 4U, 1-server system that has been purpose-built for object storage solutions with up to 60 hot-plug SAS or SATA HDDs/SSDs with up to 720 TB storage capacity per server and up to 7.2 PB of storage per 42U rack.

Density-optimized for space and power efficiency at scale
- High direct-attach storage capacity per server for large-scale object storage systems:
  - Up to 720 TB per 4U chassis (with 12 TB SAS HDDs)
  - Up to 7.2 PB per 42U rack (with 10 HPE Apollo 4510 systems and 600 LFF HDDs)

Configuration flexibility to help optimize for capacity, throughput, and responsiveness
- Flexible performance and I/O options to match the variety of object storage response and throughput criteria:
  - Intel Xeon Scalable processors family with choices from 4 to 26 cores, 1.8 GHz to 3.6 GHz CPU speed, and power ratings between 85 watts and 150 watts
  - 16 memory DIMM slots with up to 1024 GB DDR4 memory at up to 2666 MT/s
  - SSDs and high-performance storage controllers to speed data transfer
  - Up to three PCIe slots with flexible performance and I/O options to match the variety of analytics workload performance and throughput criteria

Technical specifications: HPE Apollo 4510 Gen10 System

<table>
<thead>
<tr>
<th>Form factor</th>
<th>4U shared infrastructure chassis</th>
</tr>
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<tbody>
<tr>
<td>Server</td>
<td>1 server per chassis</td>
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<tr>
<td>Storage type</td>
<td>Up to 60 LFF hot-plug SAS/SATA/SSD</td>
</tr>
<tr>
<td>Storage capacity</td>
<td>Up to 720 TB per server (60 LFF 12 TB HDD)</td>
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<tr>
<td></td>
<td>Up to 7.2 PB per 42U rack (10 servers 12 TB HDD)</td>
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<tr>
<td>Storage controller</td>
<td>HPE Smart Array S100i SR Integrated, HPE Smart Array E208i-a/P408i-a controllers plus additional HPE Smart Array controller options for bulk storage</td>
</tr>
<tr>
<td>Processor family</td>
<td>Intel Xeon Scalable processor family 8100, 6100, 5100, and 4100 series</td>
</tr>
<tr>
<td>Processor number</td>
<td>One or two per server</td>
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## Technical specifications: HPE Apollo 4510 Gen10 System (continued)

### HPE Apollo 4510 System

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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<tbody>
<tr>
<td>Processor cores available</td>
<td>4/6/8/10/12/14/16/18/20/24/26</td>
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<tr>
<td>Processor frequency</td>
<td>From 1.6 GHz–3.6 GHz</td>
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<tr>
<td>Memory</td>
<td>HPE SmartMemory 16 DIMM slots</td>
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<tr>
<td></td>
<td>Up to 1024 GB DDR4 memory at up to 2666 MT/s</td>
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<tr>
<td>Networking</td>
<td>2 x 1GbE plus FlexibleLOM and PCIe options</td>
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<tr>
<td>Expansion slots</td>
<td>Up to three PCIe slots</td>
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<td>Management interface options</td>
<td>HPE iLO 5</td>
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<td></td>
<td>HPE Apollo Platform Manager</td>
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<tr>
<td></td>
<td>HPE Insight Cluster Management Utility</td>
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<td></td>
<td>HPE iLO Advanced (optional)</td>
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<td>HPE OneView</td>
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<tr>
<td>Systems fans features</td>
<td>Five hot-plug fan modules</td>
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<tr>
<td>Power supply type</td>
<td>Up to 4 power supplies, 800W and 1600W</td>
</tr>
<tr>
<td></td>
<td>Flex Slot, hot-plug redundant power supplies</td>
</tr>
</tbody>
</table>

### Security and system management

Hewlett Packard Enterprise builds the Gen10 servers with some of the industry’s most advanced security capabilities, out of the box, with the foundation being the fifth generation HPE iLO management chipset (HPE iLO 5). HPE iLO chipset, included in HPE servers for years, provides secure out-of-band management functionality regardless of the server hardware or OS status, and it is available whenever the server is connected to a power source, even if the server main power switch is in the Off position.

Because HPE iLO is so powerful, HPE has designed iLO to help ensure that its functionality is protected against unauthorized users. It offers strong authentication, highly configurable user privileges with strong authorization processes, and encryption of data, keystrokes, and security keys.

With HPE Gen10 servers, the HPE iLO 5 chipset provides an unprecedented level of hardware security with its silicon root of trust. The silicon root of trust:

- Is based in the silicon hardware itself
  - Is impossible to alter
  - Enables the system to authenticate the firmware as far back in the supply chain as possible
- Provides a secure startup process, and most importantly, provides Firmware Runtime Validation and secure recovery in the unlikely event of a security breach

**FIPS 140- 2 Level 1**

HPE iLO 5 chipset in HPE Gen10 servers allows you to operate in FIPS 140-2 mode, which is one of the four possible HPE iLO 5 security modes. It is the next highest security setting compared to CNSA mode. FIPS mode mandates high-grade encryption ciphers and closes down insecure interfaces and cipher that does not meet CNSA government standards.
**HPE OneView**
In enterprise and cross-discipline data center environments deploying HPE Apollo systems, HPE OneView is a single, integrated management platform that also supports HPE Synergy, HPE BladeSystem, HPE c-Class, HPE ProLiant server platforms, and HPE 3PAR storage systems. With superior 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.

**HPE Apollo Platform Manager (APM)**
HPE APM provides industry-leading power and chassis level management as an option for HPE Apollo 4510 systems. It delivers power control and measurement at server, chassis, and rack levels, PDU level power outlet control and current measurement, and rack and chassis thermal component management. For energy-efficient and power-constrained data centers, APM provides critically important rack level static or dynamic power capping. HPE APM also provides DC power shelf management and integration with HPE UPS subsystems. HPE APM functions with other HPC system management components, like CMU, or independently, providing interfaces to third-party management systems.

**HPE Pointnext**
**Help to optimize infrastructure for current and new generation of apps and data**
Your applications and data are the fuel of the enterprise in a digital world. We can help establish the right mix of infrastructure solutions for apps and data from advisory and design to implementation and daily support.

HPE Pointnext is focused on helping to unify and remove complexity across traditional data centers, cloud, and edge environments to deliver a seamless hybrid cloud experience. We are uniquely positioned with the expertise to help optimize infrastructure solutions for today, tomorrow and for current workloads. Also, we have the expertise to help build hybrid cloud and edge environments for a new generation of apps and data that will accelerate their enterprise in the future. We have the expertise to make it happen—making hybrid cloud simple and to power the edge.

**Aligned to your needs—Advisory and Professional, consumption-based IT, and Operational Services**
Advisory Services is at the forefront, where we focus on your business outcomes and goals. We partner with you to design your transformation and build a road map tuned to your unique challenges helping digitize the core, innovate offerings, and drive better IT experiences for the business.

In every industry today, customers face a significant challenge to rapidly support the modernization, migration, and development of modern day apps, truly transforming the apps of today and tomorrow. We bring the benefit of our substantial expertise, purpose-built IP, and deep technical knowledge to your hybrid cloud digital transformation.

Our edge practice helps build-out the edge to enhance user experiences, drive business value from mobility and IoT, and transform workspaces. Finally, the need for security and risk mitigation is integrated into each of these practices and applied to IT, data, apps, and the mobile edge network. Protection is built-in and interwoven as part of the solution to each use case. Professional Services specializes in flawless and on-time implementation, on-budget execution, and creative configurations that get the most out of software and hardware alike. We bring the IP and experience of thousands of implementations and deployments globally to derisk transformation and get it done on time, on budget, and on target. We collaborate with your IT team from technical design to implementation, built to migration, distribution, and finally to operational consulting and service.
Consumption-based IT services—HPE GreenLake
Gain the flexibility of the public cloud on-premises and under your control with HPE GreenLake—a set of consumption-based IT solutions. Choose from a catalog of complete, curated solutions that deliver IT outcomes with hardware, software, and expertise on-premises in a pay-per-use model. HPE Pointnext implements and operates these solutions for you, enabling you to focus your own IT resources where they add the most business value. Alternatively, you can consume the technology of your choice, also using the pay-per-use model, in a manner suited to how you operate IT.

Operational Services
Our Operational Services team understands that success means being accountable for the whole solution, accountable across the ecosystem, and accountable across old and new infrastructure and apps. We have redefined the concept of operational efficiency helping to create new IT experiences for our customer’s business, from the core to the edge. Our innovative services, such as HPE Datacenter Care and HPE Campus Care, offer new ways of delivering IT by managing and helping to optimize workloads, and resources on-premises and in the cloud. Technical experts are available to work with you on a daily basis to make sure you get the most out of your digital transformation, as well as support services specialists to help keep your business operating at peak performance.

Learn more at hpe.com/storage/apollo