HPE PROLIANT RACK AND TOWER SERVERS

The intelligent foundation for hybrid cloud

THE FOUNDATION FOR TODAY'S HYBRID CLOUD REALITY

Modern IT is at the core of today's business, helping to create new value and experiences in a world where almost everyone and everything generates and shares data. Whether on- or off-premises; bare-metal, virtualization or containers; in a public or private cloud, modern IT must comprehend the full gamut of hybrid cloud possibilities composing and deploying resources faster than ever before, leveraging a secure, common operating model to meet individual application and user requirements while maintaining visibility and control over costs, security, and governance.

IT needs to be proactive, anticipating demand, ready with the flexibility and capacity to meet business needs in moments, not days or weeks. This means server monitoring and management must be simplified, deployment and provisioning automated, so people are free to focus on strategic initiatives that create real value.

Additionally, the threat of cyber-assault increases exponentially. With hackers getting more sophisticated with every wave of attacks, protecting software and networks is no longer enough. Security has to take on a 360-degree approach, a holistic view that begins with everything that goes into the server, right down to the silicon.

This hybrid reality requires a fresh approach, a flexible software-defined approach, building on a foundation of intelligence that begins with the server. HPE ProLiant is the intelligent foundation for hybrid cloud delivering unmatched automation, security, and optimization that advances the way people work and live.

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A COMPLETE COMPUTE SOLUTION
Choose HPE Rack and Power Infrastructure options to complete your foundation for a modern and optimized IT environment. Hewlett Packard Enterprise delivers the right value where it matters, with:

• Racks in a variety of height, width, and depth options

• Power distribution units (PDUs) ranging from enterprise to basic

• Various sizes of uninterruptable power supplies (UPSs)

• Kernel-based virtual machine solutions and other rack accessories

For a list of HPE Small Business Solutions including additional information, refer to hpe.com/info/smb (Solutions tab).

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¹ 33%—Reduces time to install and set up a new server from 6 hours to just 4. HPE internal testing, October 2018.

Optimization: The foundational intelligence of HPE ProLiant transforms IT with insights to optimize configurations, workload placement, and cost models, creating investment agility to deliver better outcomes faster.

Security: Secure to its core, HPE ProLiant provides an intelligent, 360-degree view to security that begins at the manufacturing supply chain and concludes with a safeguarded decommissioning.

Automation: The intelligence built-in to every HPE ProLiant simplifies and automates management tasks, establishing a solid foundation for an open, hybrid cloud platform enabled by composability.

WHY CHOOSE HPE PROLIANT RACK AND TOWER SERVERS?

HPE is committed to innovation, quality, and an excellent customer experience. Our approach to excellence in our innovation and quality is instilled across the product lifecycle, from our customer-first approach to design, to our supplier selection, quality and management, to our world-class manufacturing and rigorous product testing, to our global support services and network of channel partners.

With HPE ProLiant rack and tower servers, you can deliver a flexible software-defined approach that is built on a foundation of intelligence beginning with the server. HPE ProLiant is that intelligent compute foundation for hybrid cloud, delivering unmatched workload optimization, security and automation, all available as-a-Service your hybrid cloud infrastructure.

The rack and tower servers are available in these families:

• HPE ProLiant MicroServer

• HPE ProLiant ML

• HPE ProLiant DL

While all three families are designed to handle multiple workloads, each family is optimized for specific use cases.

HPE SMB ProLiant Offers, developed specifically with our customers in mind, are competitively and aggressively priced, in stock, and meets most small businesses purchasing patterns. These SMB Offers are regionally available as HPE Smart Buy Express Offers (NA), Top Value Offers (EMEA), or Intelligent Buy Offers/Intelligent Buy Express Offers (APJ) for the ProLiant MicroServer, ML, and DL Servers. A key part of this portfolio of SMB ProLiant Offers is HPE Small Business Solutions built for on-premises and for hybrid cloud use cases. To make server deployment easy and fast, we offer HPE Rapid Setup, a feature within HPE Intelligent Provisioning that makes every new server deployment a snap including setting up HW RAID at a click of a button. It is a simple, automated process for consistent system installation, setup, and configuration—**offering 33.3% faster installs**.¹ Through the Rapid Setup path, customers can also learn about how to purchase Azure and Office 365 public cloud services from HPE Pointnext Services.

HPE ProLiant MicroServer
Compact, quiet and stylish, the HPE ProLiant MicroServer is ideal as a first solution for small businesses. With just right performance in a form factor that is easy to use and service, the MicroServer helps you drive down expenses while improving productivity and efficiency. And best of all, you don't need a server room to have a server.

The HPE ProLiant MicroServer Gen10 Plus comes with even more of the features that SMBs love. It supports Intel® Xeon® and Pentium processors, HPE iLO 5 with HPE silicon root of trust, HPE InfoSight, and in a much smaller form factor compared to the previous generation.

HPE ProLiant MicroServer
Perfect for micro and small businesses

HPE ProLiant ML family
The ideal choice for remote or branch offices and growing businesses

HPE ProLiant DL family
Secure and versatile rack-optimized servers delivering performance, expansion, and manageability

The HPE ProLiant MicroServer Gen10 Plus provides the following benefits:

• Up to 53% performance increase with the Intel Xeon processor

• 4 x 1GbE embedded NIC

• Easy to set up and service

• Cool design, deploy horizontally or vertically, and ability to place it anywhere

HPE ProLiant tower servers
The ML family of servers delivers simple, efficient business value and is the ideal choice for remote or branch offices and growing businesses. Industry-leading compute innovations include simple management and storage tools, along with proven configurations that provide easy remote access and improved energy efficiencies to lower your total cost of ownership (TCO). Integrated with a simplified but comprehensive management suite and industry-leading support, the ProLiant tower portfolio delivers more business value and helps increase IT staff productivity and expedite service delivery. In addition, the complete, right-sized tower portfolio includes financing options, IT infrastructure support options, and a channel network to significantly increase the speed of IT operations and enable IT to respond to business needs faster.

The HPE ProLiant tower portfolio delivers:

• Up to 61% performance increase and 27% increase in core with the new Intel Xeon Scalable processors[2]

• Up to 82% greater memory bandwidth increasing application performance for memory-intensive applications[3]

• Energy efficiency leadership with the ProLiant ML350 Gen10 Server on Windows and Linux® based benchmarks[4]

HPE ProLiant rack servers
The DL family of servers are the most flexible, reliable, and performance-optimized ProLiant rack servers—ever. HPE continues to provide industry-leading compute innovations. The new HPE ProLiant Gen10 rack portfolio, with flexible choices and versatile design, along with improved energy efficiencies, ultimately lowers your TCO. Integrated with a simplified, but comprehensive management suite and industry-leading support, the ProLiant Gen10 rack portfolio delivers a more reliable, fast, and secure infrastructure solution, helps increase IT staff productivity, and accelerates service delivery. In addition, the rack portfolio is performance-optimized for multi-application workloads to significantly increase the speed of IT operations and enable IT to respond to business needs of any size, faster.

The HPE ProLiant Gen10 and Gen10 Plus rack portfolio delivers:

• Up to 61% performance increase and 27% increase in core with the new Intel Xeon Scalable processors[5]

• Up to 27X faster checkpoint operations enabling significantly faster business operations[6]

• 82% greater memory bandwidth increasing application performance for memory-intensive applications[7]

• 14% more processor cores for greater VM density and 33% greater memory capacity for better VM performance and price/performance using AMD EPYC™ processors[8]

• 9% memory speed improvement with 2nd Generation AMD EPYC processors.[9]

• 2X greater I/O bandwidth enabled by PCIe4[10]

• 2.4X greater storage capacity[11]

[2, 5] HPE measurements: Up to 61% performance increase of Intel Xeon Platinum vs. previous generation E5-4600 v4 average gains of STREAM, Linpack, SPEC CPU2006, and SPEC CPU2017 metrics on HPE servers comparing 4-socket Intel Xeon Platinum 8280 to E5-4699 v4 family processors. Any difference in system hardware or software design or configuration may affect actual performance. April 2019. Up to 27% performance increase of Intel Xeon Platinum vs. previous generation comparing 4-socket Intel Xeon Platinum 8280 (28 cores) to E5-4669 v4 (22 cores). Calculation 28 cores/22 cores = 1.27 = 27%. April 2019.

[3, 7] Percentage compare Gen10 vs. Gen9: Gen10 = 12 Channels x 2933 data rate x 8 bytes = 281 GB/sec. Gen9 = 8 channels x 2400 x 8 bytes = 154 GB/sec. 281/154 = 1.82 or Gen10 is 82% greater bandwidth. Any difference in system hardware or software design or configuration may affect actual performance. April 2019.

[4] HPE ProLiant ML350 Gen10 Takes 3 Records including Most Energy-Efficient Tower Server

[6] TPC-C Benchmark Throughput with Checkpoint (trans/sec). Calculated Time to Checkpoint and Restore a Docker Container running MySQL, compare HPE Persistent Memory vs. SSD, November 2018. HPE Persistent Memory is supported on 2nd Generation Intel Xeon Scalable processors only.

[8] AMD EPYC 7601 Processor as compared to the Intel Xeon Platinum 8176 Processor, October 2017.

[9, 10, 11] Improvements based on comparison to previous generation.

HPE GEN10 TECHNOLOGY PORTFOLIO

HPE ProLiant servers feature user-inspired innovations to make IT simpler,[12] including:

Workload Optimization

The foundational intelligence of HPE ProLiant transforms IT with insights that optimize workload performance, placement, and efficiency, delivering better outcomes faster.

- **Workload matching:** A standard feature of HPE ProLiant, workload matching encapsulates decades of HPE performance engineering expertise into preconfigured, user-selectable profiles that automatically optimize hundreds of BIOS setting combinations to precisely match server resources to workload requirements. Workload matching eliminates the trial-and-error—and risk—of server tuning, delivering the performance and efficiency of a server ideally suited to its workload tasks.

- **Workload Performance Advisor:** Changes in business requirements and workload characteristics can require adjustments to server resources. HPE Workload Performance Advisor complements workload matching, providing real-time operational feedback on server performance plus recommendations for fine-tuning BIOS settings to adjust to optimize for changing business needs.

- **HPE Right Mix Advisor:** Built on the experience of over a thousand hybrid cloud engagements, HPE Right Mix Advisor delivers data-driven guidance to quickly and confidently move workloads to the right mix of hybrid cloud platforms, ensuring optimized performance to meet business-specific needs while reducing costs as much as 40%.

360-Degree Security

Already the world's most secure industry-standard server, HPE ProLiant provides an enhanced holistic, 360-degree view to security that begins in the manufacturing supply chain and concludes with a safeguarded, end-of-life decommissioning.

- **Secure supply chain:** HPE ProLiant security begins with the corruption-free manufacture of the server, auditing the integrity of every component—hardware and firmware—providing an assurance that the server begins its lifecycle uncompromised.

- **Silicon root of trust:** Silicon root of trust anchors the essential firmware of HPE ProLiant to an HPE-exclusive ASIC even before the server is built, creating an immutable fingerprint that must be exactly matched before the server will boot. This ensures malicious code is contained and healthy servers are protected.

- **Server Configuration Lock:** Secured by a customer-supplied password, Server Configuration Lock creates a digital fingerprint of the server configuration, preventing it from booting should there be an unauthorized configuration change or tampering detected.

- **Security Dashboard:** A single interface to display the overall server security status, the current configuration for the Security State and Server Configuration Lock plus the status of numerous security features, the Security Dashboard also provides access to change security alerts and manage settings.

- **Production to CNSA security modes:** Equipped with HPE Integrated Lights Out (iLO), HPE ProLiant provides four security modes—Production, High Security, FIPS 140-2, and CNSA, the highest-level cryptographic algorithm available for commercial systems.

- **Server System Restore:** Should a server be compromised, the fastest path to bring it back online and into normal operations again is with HPE server system restore, a feature of HPE iLO. Server system restore provides an automated recovery including restoration of validated firmware, facilitated recovery of the operating system, application, and data connections.

- **One Button Secure Erase:** When it's time to retire or repurpose an HPE ProLiant server, One Button Secure Erase speeds and simplifies the complete removal of passwords, configuration settings and data, preventing inadvertent access to previously secured information.

HPE ProLiant sizer tools:
HPE server TCO calculator

Intelligent Automation

The intelligence built-in to HPE ProLiant simplifies and automates management tasks, establishing a solid foundation for an open, hybrid cloud platform enabled by composability.

- **HPE iLO RESTful API:** HPE iLO uses a fully Redfish-conformant RESTful application programming interface (API) to provide simple and secure management for today's cloud- and web-based infrastructures across a wide variety of operations and orchestration tools from HPE and others.

- **HPE iLO 5:** Embedded in HPE ProLiant, iLO 5 is the HPE-exclusive core intelligence that monitors server status, providing the means for reporting, ongoing management, service alerting and local or remote management to quickly identify and resolve issues.

- **HPE OneView:** A foundational element in the software-defined infrastructure of hybrid cloud environments, HPE OneView offers an automated, template-driven approach for deploying, provisioning, updating, and integrating compute, storage, and networking infrastructure.

- **HPE InfoSight:** Building on the operational data of tens of thousands of servers, HPE InfoSight provides continual AI-driven insight and oversight to server operations, predicting and preventing problems before IT operations are impacted.

For additional information on reference architectures including complete configurations, sizing, BOM, and deployment details, refer to hpe.com/info/ra.

Transition guide

The Gen10 family offers the right compute to meet all your diverse workload needs. As such, we're tailoring compute to offer more flexibility and choice, such as offerings from both Intel® and AMD, HPE FlexibleLOM, HPE Smart Array, HPE SmartMemory, NVMe, HPE Persistent Memory NVDIMMs,[13] HPE Persistent Memory, available in 128, 256, and 512 GB capacity modules featuring Intel Optane DC Persistent Memory,[14] and many more options.

Over the past several generations of the rack and tower portfolio, we have adjusted the product offerings to best address the needs of our customers. The following table shows the transition previous generations of servers to Gen10:

Gen8 models	Gen9 models	Gen10 models	Gen10 Plus models
HPE ProLiant MicroServer Gen8	N/A	HPE ProLiant MicroServer Gen10	HPE ProLiant MicroServer Gen10 Plus
HPE ProLiant ML10 v2	HPE ProLiant ML10 Gen9	HPE ProLiant MicroServer Gen10 or HPE ProLiant ML30 Gen10	HPE ProLiant MicroServer Gen10 Plus
HPE ProLiant ML310e Gen8 v2	HPE ProLiant ML30 Gen9	HPE ProLiant ML30 Gen10	
HPE ProLiant ML310e Gen8 v2	HPE ProLiant ML110 Gen9	HPE ProLiant ML110 Gen10	
HPE ProLiant ML350e Gen8	HPE ProLiant ML150 Gen9	HPE ProLiant ML110 Gen10 or HPE ProLiant ML350 Gen10	
HPE ProLiant ML350p Gen8	HPE ProLiant ML350 Gen9	HPE ProLiant ML350 Gen10	
HPE ProLiant DL320e Gen8 v2	HPE ProLiant DL20 Gen9	HPE ProLiant DL20 Gen10	
N/A	N/A	HPE ProLiant DL325 Gen10	HPE ProLiant DL325 Gen10 Plus
N/A	HPE ProLiant DL60 Gen9	HPE ProLiant DL160 Gen10	
N/A	HPE ProLiant DL80 Gen9	HPE ProLiant DL180 Gen10	
N/A	HPE ProLiant DL120 Gen9	HPE ProLiant DL160 Gen10	
HPE ProLiant DL360e Gen8	HPE ProLiant DL160 Gen9	HPE ProLiant DL160 Gen10	
HPE ProLiant DL380e Gen8	HPE ProLiant DL180 Gen9	HPE ProLiant DL180 Gen10	
HPE ProLiant DL360p Gen8	HPE ProLiant DL360 Gen9	HPE ProLiant DL360 Gen10	
HPE ProLiant DL380p Gen8	HPE ProLiant DL380 Gen9	HPE ProLiant DL380 Gen10	
HPE ProLiant DL385p Gen8	N/A	HPE ProLiant DL385 Gen10	HPE ProLiant DL385 Gen10 Plus
HPE ProLiant DL560 Gen8	HPE ProLiant DL560 Gen9	HPE ProLiant DL560 Gen10	
HPE ProLiant DL580 Gen8	HPE ProLiant DL580 Gen9	HPE ProLiant DL580 Gen10	

[13] Supported on first generation Intel Xeon Scalable processors.

[14] Supported on second generation Intel Xeon Scalable processors.

CHOOSE YOUR RACK OR TOWER SERVER

HPE ProLiant rack and tower servers are available in a variety of platforms to support different compute needs and workloads. The following charts will help you compare the offerings within the HPE ProLiant rack and tower families. These charts are organized according to server needs.

- HPE ProLiant 10 series—Small Scale Servers—Easy to buy and deploy
- HPE ProLiant 100 series—Right-Sized Servers—Balance of performance, efficiency, capacity, and manageability
- HPE ProLiant 300 series—Versatile Performance Servers—Industry-leading design with flexible choices for multi-workload compute and storage
- HPE ProLiant 500 series—Scale-up Servers—Scalable performance for business-critical workloads

SMALL SCALE SERVERS

Is this your first server? Consider these HPE ProLiant Essential servers.

	MicroServer Gen10 Plus	MicroServer Gen10
	The compact ProLiant server to make your own	The compact server to make your own
Number of processors	1	1
Processors supported	Intel Xeon E2200 series Intel Pentium G5400 series	AMD Opteron™ X3421 AMD Opteron X3418 AMD Opteron X3216
Cores per processor	2/4	2/4
Maximum processor frequency/cache	3.8 GHz/4 MB or 3.4 GHz/8 MB	3.4 GHz/2 MB
I/O expansion slots	Up to 1 PCIe 3.0, 1 x 16, LP	2 PCIe 3.0, 1 x 8, 1 x 4
Maximum memory/# slots/speed	32 GB/2/2666 MT/s	32 GB/2/2400 MT/s
Storage controller	S100i, optional HPE Smart Array Essential RAID Controller*	Embedded Marvell SATA controller (HW RAID 0, 1, 10 Support)
Maximum storage drive bays	4 NHP LFF or 4 NHP SFF HDD/SSD	4 LFF SATA, non-hot plug Optional (1) Slim SATA ODD or (1) Slim SFF SATA SSD
Maximum internal storage	16 TB	16 TB
Networking ports (embedded)/FlexibleLOM	4 x 1GbE/N/A	2 x 1GbE/N/A
VGA/serial/USB/SD ports	1/0/7/0 plus 1 display port	1/0/7/0 plus 2 display ports
GPU support	Optional Radeon Pro WX 2100	Optional AMD Radeon Pro WX 2100
Form factor/chassis depth	Ultra Micro Tower/9.65"	Ultra Micro Tower/10"
Power and cooling	180W External Power Adapter, non-redundant PS	200W ATX non-hot plug, non-redundant PS
Industry compliance	ASHRAE A2	N/A
System ROM	UEFI Legacy BIOS	UEFI
Management	HPE iLO 5, Intelligent Provisioning, Smart Update Manager, RESTful Interface Tool, HPE iLO Amplifier Pack Optional: HPE InfoSight, HPE iLO Advanced	N/A
Serviceability—easy install rails	N/A	N/A
Warranty—(years) (parts/labor/on-site)	1/1/1	1/1/1

* For a full list of supported options and details, see the server QuickSpecs at hpe.com/info/qs.

SMALL SCALE SERVERS (CONTINUED)

	DL20 Gen10	ML30 Gen10
	The most compact and versatile rack server	The ideal small office 1P tower with enterprise-class features
Number of processors	1	1
Processors supported	Intel Xeon E-2200/E-2100 series Intel Core i3 Intel Pentium	Intel Xeon E-2200/E-2100 Intel Core i3-9100/8300 Intel Pentium® G5420/G5400
Cores per processor	2/4/6/8	2/4/6
Maximum processor frequency/cache	3.8 GHz/12 MB	4.0 GHz/8 MB or 3.8 GHz/12 MB
I/O expansion slots	2 PCIe 3.0 slots	4 PCIe 3.0, 2 x16 FH/FL, 2 x 8 FH/HL
Maximum memory/# slots/speed	64 GB/4/2666 MT/s	64 GB/4/2666 MT/s
Storage controller	Standard HPE Smart Array S100i Software RAID Choice of HPE Smart Array Essential and Performance RAID Controllers for performance or additional features	S100i, optional HPE Smart Array Essential and Performance RAID Controllers*
Maximum storage drive bays	Up to 4+2 SFF/2 LFF max, HDD/SSD, M.2 2280 NVMe SSDs (optional)	8 SFF or 4 LFF HDD/SSD or 4 LFF NHP; 1 M.2 NVMe SSD slot; with optional 1 Slim line ODD
Maximum internal storage	91.8 TB	61.44 TB
Networking ports (embedded)/FlexibleLOM	2 x 1GbE embedded + Choice of FlexibleLOM + Standup	2 x 1GbE/N/A
VGA/serial/USB/SD ports	USB 3.0 Front (1), USB 2.0 iLO Service Port (1), internal USB 3.0 (1), USB 3.0 Rear (2)	1/1 (optional)/7/0
GPU support	N/A	Optional NVIDIA® P2000 or AMD WX 2100
Form factor/chassis depth	Rack (1U)/15.05" (ear to rear)	Micro ATX Tower (4U)/18.71"
Power and cooling	290W Standard NHP PSU with up to 94%[15] efficiency (80 PLUS Silver certified) 500W Flexible Slot Hot Plug Redundant PSU with 94% efficiency 800W Flexible Slot 48 VDC Hot Plug Redundant PSU with 94% efficiency	350W ATX PS or 500W 94% efficiency Flex Slot redundant PS
Industry compliance	ASHRAE A3/A4, ENERGY STAR® configuration (only on DL20 SFF chassis with RPS)	ASHRAE A3 and A4
System ROM	UEFI Legacy BIOS	UEFI Legacy BIOS
Management	HPE OneView and HPE iLO Advanced, HPE Insight Online with enhanced mobile application, HPE iLO 5, SUM, RESTful Interface Tool, UEFI optional: HPE InfoSight, HPE iLO Advanced, HPE OneView Advanced	HPE iLO 5, HPE OneView Standard, Intelligent Provisioning, Smart Update Manager Optional: HPE InfoSight, HPE iLO Advanced
Serviceability—easy install rails	N/A	N/A
Warranty—(years) (parts/labor/on-site)	3/3/3	3/1/1 or 3/3/3 (depending on regions)

* For a full list of supported options and details, see the server QuickSpecs at hpe.com/info/qs.

[15] 94% efficiency available in February 2020; up to 92% efficiency currently

RIGHT-SIZED SERVERS

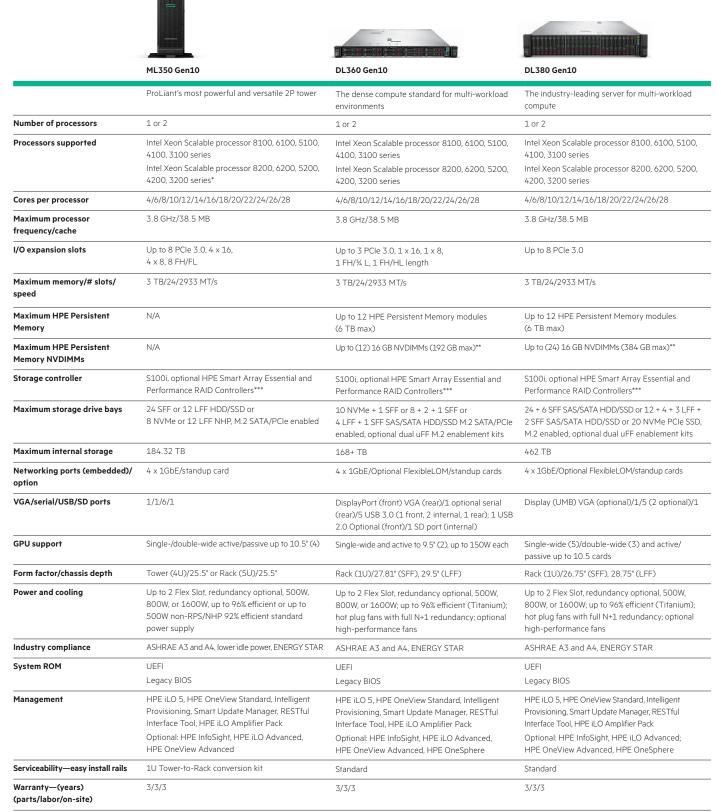Are your IT needs growing? Consider these HPE ProLiant 100 series servers.

	ML110 Gen10	DL160 Gen10	DL180 Gen10
	1P tower with enterprise-class reliability and performance	Right balanced dense server with exceptional value	Scalable and reliable server to run multi-workload for better business value
Number of processors	1	1 or 2	1 or 2
Processors supported	Intel Xeon Scalable processor 5200, 4200, and 3200 series Intel Xeon Scalable processor 5100, 4100, and 3100 series	Intel Xeon Scalable processor 8200, 6200, 5200, 4200, and 3200 series Intel Xeon Scalable processor 4100 and 3100 series	Intel Xeon Scalable processor 8200, 6200, 5200, 4200, and 3200 series Intel Xeon Scalable processor 4100 and 3100 series
Cores per processor	4/6/8/10/12/14/16	4/6/8/10/12/14/16/18/20/22/24	4/6/8/10/12/14/16/18/20/22/24
Maximum processor frequency/cache	3.8 GHz/22 MB	3.8 GHz/35.75 MB	3.8 GHz/35.75 MB
I/O expansion slots	Up to 5 PCIe 3.0, 2 x 16, 3 x 8, 1 FH/FL, 3 FH/HL, 1 FH/¾ L	Up to 3 PCIe 3.0, 1 x 16 FH/HL, 1 x 8 LP, 1 x 16 HH/HL	Up to 6 PCIe 3.0, 6 x 8, 2 FH/FL, 3 FH/HL
Maximum memory/# slots/speed	192 GB/6/2933 MT/s	1 TB/16/2933 MT/s	1 TB/16/2933 MT/s
Storage controller	S100i, optional HPE Smart Array Essential and Performance RAID Controllers*	S100i, optional HPE Smart Array Essential and Performance RAID Controllers*	S100i, optional HPE Smart Array Essential and Performance RAID Controllers*
Maximum storage drive bays	8 LFF, 16 SFF, or 8 NHP/HP LFF HDD/SSD	8 + 2 SFF or 4 LFF HDD/SSD + M.2 SATA support	8–24 SFF or 12 LFF HDD/SSD + 2 SFF rear enablement kit + M.2 SATA support
Maximum internal storage	96 TB	48 TB	144 TB
Networking ports (embedded)/FlexibleLOM	2 x 1GbE/N/A	2 x 1GbE/optional FlexibleLOM/standup cards	2 x 1GbE/optional FlexibleLOM/standup cards
VGA/serial/USB/SD ports	1/1 (optional)/8/1	1/0/4/1	1/0/4/1
GPU support	Optional (2)	N/A	Optional NVIDIA P2000
Form factor/chassis depth	Tower (4.5U)/< 19"	Rack (1U)/24.21"	Rack (2U)/24.99"
Power and cooling	Up to 94% efficiency. 800W RPS, ATX 350W/550W PSU Optional Redundant Fan Kit	Up to 2 Flex Slot, redundancy optional, 500W, 800W, up to 96% efficient (Platinum); hot plug fans with redundancy	Up to 2 Flex Slot, redundancy optional, 500W or 800W, or 1600W up to 94% efficient (Platinum); hot plug fans with redundancy
Industry compliance	ASHRAE A3, ENERGY STAR	ASHRAE A3 and A4	ASHRAE A3 and A4
System ROM	UEFI Legacy BIOS	UEFI Legacy BIOS	UEFI Legacy BIOS
Management	HPE iLO 5, HPE OneView Standard, Intelligent Provisioning, Smart Update Manager, RESTful Interface Tool, HPE iLO Amplifier Pack Optional: HPE InfoSight, HPE iLO Advanced	HPE iLO 5, HPE OneView Standard, Intelligent Provisioning, Smart Update Manager, RESTful Interface Tool, HPE iLO Amplifier Pack Optional: HPE InfoSight, HPE iLO Advanced, HPE OneView Advanced	HPE iLO 5, HPE OneView Standard, Intelligent Provisioning, Smart Update Manager, RESTful Interface Tool, HPE iLO Amplifier Pack Optional: HPE InfoSight, HPE iLO Advanced, HPE OneView Advanced
Serviceability—easy install rails	N/A	Standard	Standard
Warranty—(years) (parts/labor/on-site)	3/3/3	3/3/3	3/3/3

* For a full list of supported options and details, see the server QuickSpecs at hpe.com/info/qs.

VERSATILE PERFORMANCE SERVERS

Are you continuing to need traditional IT for diverse workloads? Consider these HPE ProLiant 300 series servers.

	ML350 Gen10	DL360 Gen10	DL380 Gen10
	ProLiant's most powerful and versatile 2P tower	The dense compute standard for multi-workload environments	The industry-leading server for multi-workload compute
Number of processors	1 or 2	1 or 2	1 or 2
Processors supported	Intel Xeon Scalable processor 8100, 6100, 5100, 4100, 3100 series Intel Xeon Scalable processor 8200, 6200, 5200, 4200, 3200 series*	Intel Xeon Scalable processor 8100, 6100, 5100, 4100, 3100 series Intel Xeon Scalable processor 8200, 6200, 5200, 4200, 3200 series	Intel Xeon Scalable processor 8100, 6100, 5100, 4100, 3100 series Intel Xeon Scalable processor 8200, 6200, 5200, 4200, 3200 series
Cores per processor	4/6/8/10/12/14/16/18/20/22/24/26/28	4/6/8/10/12/14/16/18/20/22/24/26/28	4/6/8/10/12/14/16/18/20/22/24/26/28
Maximum processor frequency/cache	3.8 GHz/38.5 MB	3.8 GHz/38.5 MB	3.8 GHz/38.5 MB
I/O expansion slots	Up to 8 PCIe 3.0, 4 x 16, 4 x 8, 8 FH/FL	Up to 3 PCIe 3.0, 1 x 16, 1 x 8, 1 FH/¾ L, 1 FH/HL length	Up to 8 PCIe 3.0
Maximum memory/# slots/ speed	3 TB/24/2933 MT/s	3 TB/24/2933 MT/s	3 TB/24/2933 MT/s
Maximum HPE Persistent Memory	N/A	Up to 12 HPE Persistent Memory modules (6 TB max)	Up to 12 HPE Persistent Memory modules (6 TB max)
Maximum HPE Persistent Memory NVDIMMs	N/A	Up to (12) 16 GB NVDIMMs (192 GB max)**	Up to (24) 16 GB NVDIMMs (384 GB max)**
Storage controller	S100i, optional HPE Smart Array Essential and Performance RAID Controllers***	S100i, optional HPE Smart Array Essential and Performance RAID Controllers***	S100i, optional HPE Smart Array Essential and Performance RAID Controllers***
Maximum storage drive bays	24 SFF or 12 LFF HDD/SSD or 8 NVMe or 12 LFF NHP, M.2 SATA/PCIe enabled	10 NVMe + 1 SFF or 8 + 2 + 1 SFF or 4 LFF + 1 SFF SAS/SATA HDD/SSD M.2 SATA/PCIe enabled, optional dual uFF M.2 enablement kits	24 + 6 SFF SAS/SATA HDD/SSD or 12 + 4 + 3 LFF + 2 SFF SAS/SATA HDD/SSD or 20 NVMe PCIe SSD, M.2 enabled, optional dual uFF enablement kits
Maximum internal storage	184.32 TB	168+ TB	462 TB
Networking ports (embedded)/ option	4 x 1GbE/standup card	4 x 1GbE/Optional FlexibleLOM/standup cards	4 x 1GbE/Optional FlexibleLOM/standup cards
VGA/serial/USB/SD ports	1/1/6/1	DisplayPort (front) VGA (rear)/1 optional serial (rear)/5 USB 3.0 (1 front, 2 internal, 1 rear); 1 USB 2.0 Optional (front)/1 SD port (internal)	Display (UMB) VGA (optional)/1/5 (2 optional)/1
GPU support	Single-/double-wide active/passive up to 10.5" (4)	Single-wide and active to 9.5" (2), up to 150W each	Single-wide (5)/double-wide (3) and active/ passive up to 10.5 cards
Form factor/chassis depth	Tower (4U)/25.5" or Rack (5U)/25.5"	Rack (1U)/27.81" (SFF), 29.5" (LFF)	Rack (1U)/26.75" (SFF), 28.75" (LFF)
Power and cooling	Up to 2 Flex Slot, redundancy optional, 500W, 800W, or 1600W, up to 96% efficient or up to 500W non-RPS/NHP 92% efficient standard power supply	Up to 2 Flex Slot, redundancy optional, 500W, 800W, or 1600W; up to 96% efficient (Titanium); hot plug fans with full N+1 redundancy; optional high-performance fans	Up to 2 Flex Slot, redundancy optional, 500W, 800W, or 1600W; up to 96% efficient (Titanium); hot plug fans with full N+1 redundancy; optional high-performance fans
Industry compliance	ASHRAE A3 and A4, lower idle power, ENERGY STAR	ASHRAE A3 and A4, ENERGY STAR	ASHRAE A3 and A4, ENERGY STAR
System ROM	UEFI Legacy BIOS	UEFI Legacy BIOS	UEFI Legacy BIOS
Management	HPE iLO 5, HPE OneView Standard, Intelligent Provisioning, Smart Update Manager, RESTful Interface Tool, HPE iLO Amplifier Pack Optional: HPE InfoSight, HPE iLO Advanced, HPE OneView Advanced	HPE iLO 5, HPE OneView Standard, Intelligent Provisioning, Smart Update Manager, RESTful Interface Tool, HPE iLO Amplifier Pack Optional: HPE InfoSight, HPE iLO Advanced, HPE OneView Advanced, HPE OneSphere	HPE iLO 5, HPE OneView Standard, Intelligent Provisioning, Smart Update Manager, RESTful Interface Tool, HPE iLO Amplifier Pack Optional: HPE InfoSight, HPE iLO Advanced; HPE OneView Advanced, HPE OneSphere
Serviceability—easy install rails	1U Tower-to-Rack conversion kit	Standard	Standard
Warranty—(years) (parts/labor/on-site)	3/3/3	3/3/3	3/3/3

* Intel Speed Select, 1-socket Optimized, NFV Optimized and VM.

** Supported on first generation Intel Xeon Scalable processors.

*** For a full list of supported options and details, see the server QuickSpecs at hpe.com/info/qs.

VERSATILE PERFORMANCE SERVERS (CONTINUED)

	DL325 Gen10 Plus	**DL385 Gen10 Plus**
	The secure and versatile single socket server delivering 2P performance at 1P economics	The price/performance leader for multi-workload compute
Number of processors	1	1 or 2
Processors supported	AMD EPYC 7000 Series	AMD EPYC 7000 Series
Cores per processor	8/16/24/32/64	8/16/24/32/64
Maximum processor frequency/cache	3.4 GHz/256 MB	3.4 GHz/256 MB
I/O expansion slots	Up to 3 PCIe 4.0	Up to 8 PCIe 4.0 + M.2 support in PCIe slot
Maximum memory/ # slots/speed	4 TB/3200 MT/s	8 TB/3200 MT/s
Maximum HPE Persistent Memory NVDIMMs	N/A	N/A
Maximum HPE Persistent Memory	N/A	N/A
Storage controller	Standard HPE Smart Array S150i, Software RAID (8 drives + 2 NVMe) Choice of HPE Smart Array Essential or Performance Controllers for performance or additional features	Standard HPE Smart Array S150i, Software RAID (only for 2 NVMe) Choice of HPE Smart Array Essential or Performance Controllers for performance or additional features. Tri-Mode Controllers for h/w RAID on NVMe drives
Maximum storage drive bays	Up to 12 LFF/24 SFF/24 NVMe	38 SFF/20 LFF + 2 SFF max, HDD/SSD, 32 NVMe (x4) PCIe SSD
Maximum internal storage	Up to 2 Single Width Active only	
Networking ports	Choice of OCP Adapter or Standup Card	Choice of OCP Adapter or Standup Card
VGA/serial/USB/SD ports	Front display port optional, Rear VGA & Optional Serial, 4 USB 3.0, Front Management port, and dedicated rear iLO port	Front display port optional, Rear VGA & Optional Serial, 5 USB 3.0, + 2 USB 2.0 optional, Dual Micro-SD, Front Management port, and dedicated rear iLO port
GPU support	Up to 2 Single Width Active only	Single-/double-wide (8) and active/passive up to 10.5" (3)
Form factor/chassis depth	1U, 31.8" (Up to 8 LFF/20 SFF) or 39.3" (12 LFF/24 SFF)	Rack (2U)/26.75" (SFF), 28.75" (LFF)
Power and cooling	Up to 96% efficient (Titanium)	Up to 96% efficiency (Titanium) to 1600W
Industry compliance	ASHRAE A3 and A4, ENERGY STAR, lower idle power	ASHRAE A3 and A4, ENERGY STAR, lower idle power
System ROM	UEFI Legacy BIOS	UEFI Legacy BIOS
Management	HPE iLO 5, HPE OneView Standard, Intelligent Provisioning, Smart Update Manager, RESTful Interface Tool, HPE iLO Amplifier Pack Optional: HPE InfoSight HPE iLO Advanced, HPE OneView Advanced HPE OneSphere	HPE iLO 5, HPE OneView Standard, Intelligent Provisioning, Smart Update Manager, RESTful Interface Tool, HPE iLO Amplifier Pack Optional: HPE InfoSight HPE iLO Advanced, HPE OneView Advanced HPE OneSphere
Serviceability—easy install rails	Standard	Standard
Warranty—(years) (parts/labor/on-site)	3/3/3	3/3/3

VERSATILE PERFORMANCE SERVERS (CONTINUED)

	DL325 Gen10	**DL385 Gen10**
	The single socket server delivering 2P performance at 1P economics	The price/performance leader for multi-workload compute
Number of processors	1	1 or 2
Processors supported	AMD EPYC 7000 Series Processor family	AMD EPYC 7000 Series Processor family
Cores per processor	8/16/24/32/64	8/16/24/32/64
Maximum processor frequency/cache	3.4 GHz/256 MB	3.4 GHz/256 MB
I/O expansion slots	Up to 3 PCIe 3.0	Up to 8 PCIe 3.0
Maximum memory/ # slots/speed	2 TB/16/2933 MT/s	4 TB/32/2933 MT/s
Maximum HPE Persistent Memory NVDIMMs	N/A	N/A
Maximum HPE Persistent Memory	N/A	N/A
Storage controller	Optional HPE Smart Array Essential and Performance RAID Controllers*	S100i for M.2 support, optional HPE Smart Array Essential and Performance RAID Controllers*
Maximum storage drive bays	8 + 2 SFF/4 LFF HDD/SSD, up to 10 SFF NVMe	24 + 6 SFF SAS/SATA HDD/SSD or 12 + 4 + 3 LFF + 2 SFF SAS/SATA HDD/SSD or 24 NVMe PCI and 2 M.2 connectors embedded on mother board SSD, optional dual uFF enablement kits
Maximum internal storage	154 TB	459 TB
Networking ports	FlexibleLOM/standup cards	FlexibleLOM/standup cards
VGA/serial/USB/SD ports	1 VGA/1 serial (optional)/5/1 Front management port and dedicated rear iLO port	Display (UMB) VGA (optional)/1/5 (2 optional)/1
GPU support	N/A	Single-wide (5)/double-wide (3) and active/passive up to 10.5 cards
Form factor/chassis depth	Rack (1U)/24.2"	Rack (1U)/26.75" (SFF), 28.75" (LFF)
Power and cooling	Up to 2 Flex Slot, redundancy optional, 500W, 800W, or 1600W; up to 96% efficient (Titanium) w/Flexible Slot PS or up to 1500W non-RPS/NHP 92% efficient standard power supply; hot-swappable fans with full N+1 redundancy	Up to 2 Flex Slot, redundancy optional, 500W, 800W, or 1600W; up to 96% efficient (Titanium); hot plug fans with full N+1 redundancy; optional high-performance fans
Industry compliance	ASHRAE A3 and A4, ENERGY STAR, lower idle power	ASHRAE A3 and A4, ENERGY STAR, lower idle power
System ROM	UEFI Legacy BIOS	UEFI Legacy BIOS
Management	HPE iLO 5, HPE OneView Standard, Intelligent Provisioning, Smart Update Manager, RESTful Interface Tool, HPE iLO Amplifier Pack Optional: HPE InfoSight HPE iLO Advanced, HPE OneView Advanced HPE OneSphere	HPE iLO 5, HPE OneView Standard, Intelligent Provisioning, Smart Update Manager, RESTful Interface Tool, HPE iLO Amplifier Pack Optional: HPE InfoSight HPE iLO Advanced, HPE OneView Advanced HPE OneSphere
Serviceability—easy install rails	Standard	Standard
Warranty—(years) (parts/labor/on-site)	3/3/3	3/3/3

* For a full list of supported options and details, see the server QuickSpecs at hpe.com/info/qs.

SCALE-UP SERVERS

Do you need to scale up? Consider these HPE ProLiant 500 series servers.

	DL560 Gen10	DL580 Gen10
	The high-density scale-up server for business-critical workloads	The resilient, highly expandable scale-up server for business critical workloads
Number of processors	1, 2, or 4	1, 2, 3, or 4
Processors supported	Intel Xeon Scalable processor 8100, 6100, and 5100 series Intel Xeon Scalable processor 8200, 6200, and 5200 series	Intel Xeon Scalable processor 8100, 6100, and 5100 series Intel Xeon Scalable processor 8200, 6200, and 5200 series
Cores per processor	4/6/8/10/12/14/16/18/20/22/24/26/28	4/6/8/10/12/14/16/18/20/22/24/26/28
Maximum processor frequency/cache	3.8 GHz/38.5 MB	3.8 GHz/38.5 MB
I/O expansion slots	Up to 8 PCIe 3.0	Up to 16 PCIe 3.0
Maximum memory/ # slots/speed	6 TB/48/2933 MT/s*	6 TB/48/2933 MT/s
Maximum HPE Persistent Memory NVDIMMs	Up to (24) 16 GB NVDIMMs (384 GB max)**	Up to (24) 16 GB NVDIMMs (384 GB max)**
Maximum HPE Persistent Memory	Up to 24 HPE Persistent Memory modules (12 TB max)	Up to 24 HPE Persistent Memory modules (12 TB max)
Storage controller (embedded)	S100i, optional HPE Smart Array Essential and Performance RAID Controllers*	S100i, optional HPE Smart Array Essential and Performance RAID Controllers*
Maximum storage drive bays	24 SFF SAS/SATA HDD/SSD with optional 12 NVMe SSD, M.2 enabled Optional: Dual uFF enablement kits	48 SFF SAS/SATA HDD/SSD Optional: 20 NVMe SSD
Maximum internal storage	367 TB	734 TB
Networking ports (embedded)/options	Optional FlexibleLOM/standup cards	Optional FlexibleLOM/standup cards
VGA/serial/USB/SD ports	2/1/9/1	2/1/9/2
GPU support	HL/FH (2)	FL/FH Double-wide (4)
Form factor/chassis depth	Rack (2U)/29.75" (SFF)	Rack (4U)/29.75"
Power and cooling	Up to 4 Flex Slot, redundancy optional, 800W or 1600W; hot plug fans with full N+1 redundancy	Up to 4 Flex Slot, 94% efficient 800W or 1600W; hot plug fans with N+1 redundancy
Industry compliance	ASHRAE A3 and A4, ENERGY STAR	ASHRAE A3 and A4, ENERGY STAR
System ROM	UEFI Legacy BIOS	UEFI Legacy BIOS
Management	HPE iLO 5, HPE OneView Standard, Intelligent Provisioning, Smart Update Manager, RESTful Interface Tool, HPE iLO Amplifier Pack Optional: HPE InfoSight, HPE iLO Advanced, HPE OneView Advanced, HPE OneSphere	HPE iLO 5, HPE OneView Standard, Intelligent Provisioning, Smart Update Manager, RESTful Interface Tool, HPE iLO Amplifier Pack Optional: HPE InfoSight, HPE iLO Advanced, HPE OneView Advanced, HPE OneSphere
Serviceability—easy install rails	Standard	Standard with CMA
Warranty—(years) (parts/labor/on-site)	3/3/3	3/3/3

* For a full list of supported options and details, see the server QuickSpecs at hpe.com/info/qs.

** Supported on first generation Intel Xeon Scalable processors.

HPE ProLiant rack and tower servers support the following operating systems and virtual environments:

- Microsoft
- Red Hat®
- SUSE
- Oracle
- Canonical
- ClearOS (supported on 10, 100, and 300 series servers)

You can purchase your entire operating environment from Hewlett Packard Enterprise; we resell and provide full service and support for Microsoft Windows operating systems; Red Hat Enterprise Linux subscriptions; SUSE Linux subscriptions; and Microsoft Hyper-V, VMware®, and Red Hat Enterprise Virtualization subscriptions.

ClearOS is a simple, secure, and affordable operating system with an application marketplace of over 100 applications that allows customers to lean on their trusted IT partner to build customized solutions. ClearOS is available via CTO, Intelligent Provisioning, or via download. To learn more on what you can do, please visit hpe.com/servers/clearos.

For the latest operating system support information and to learn more, see: hpe.com/info/ossupport.

GET ENHANCED FUNCTIONALITY AND ADDED BENEFITS WITH HPE SERVER OPTIONS

Inside each HPE server are essential performance building blocks—think core DNA—such as DDR4 memory, storage, and network adapters. We call these building blocks HPE Server Options—designed to deliver the highest performance for any workload, deliver that performance with persistent reliability, and at economics that don't slow down your business. Thus, ProLiant Gen10 servers configured with HPE Server Options are the ideal solution for any application workload and any IT environment, from the smallest SMB site to the largest enterprise data center.

HPE Server Options are integrated with many HPE system management tools for easy configuration, maintenance, and installation, lowering your operations costs when compared to non-HPE components.

HPE Server Options have gone through a rigorous testing process for flawless installation, maintenance, and upgrade. There's a wide range of options, from storage drives, memory, network adapters, and processors, to the Rack and Power Infrastructure and beyond.

HPE Server Memory
Choosing the right memory is the key to getting the highest application performance, system reliability, and faster return on your IT investment. HPE's portfolio includes HPE Standard Memory—suitable for smaller capacity needs—and HPE SmartMemory, for memory-intensive workloads. Customers may select from different HPE memory types and DIMM capacities to optimize server efficiency, capacity, and performance.

All HPE memory modules are tested on ProLiant server platforms beyond industry standards to diagnose problems, deliver rapid resolutions, and avoid failures. Additional authentication assures you that your memory is optimized and performance tuned for your server. For more information, visit hpe.com/info/memory.

HPE Server Storage
As data storage and accessibility requirements grow, you need solutions that can help overcome performance bottlenecks. HPE Server Storage for ProLiant Gen10 servers offer the industry's broadest portfolio of storage products, which include hard disk drives (HDDs), solid-state drives (SSDs), and Smart Array Controllers.

HPE Smart Array Gen10: HPE's new line of enterprise-class RAID controllers for Gen10 servers help maximize performance, data availability, and storage capacity. They deliver up to 1.6 million IOPS—65% better performance[16]—while using less power than previous generation controllers. And new mixed mode offers customers the flexibility of using both HBA and RAID mode, simultaneously, on a single controller freeing up a PCIe slot for other uses. Choose from Smart Array S-Class software RAID, and Smart Array E-Class or P-Class controllers.

- Ideal for entry-level solutions that use SATA drives in basic RAID configurations, **HPE Smart Array S-Class (Software RAID)** delivers the efficiency needed to address evolving data storage needs. Features include RAID levels 0/1/5, support for 6G SATA, and access to the Unified Extensible Firmware Interface (UEFI) configuration tool.

- Cost-effective **HPE Smart Array E-Class Controllers** provide simple RAID storage and enablement for software-defined storage with enterprise-class reliability and security. Key features include RAID on Chip (ROC) and RAID levels 0/1/5/10. This controller operates in mixed mode, encrypts any drive connected to it with HPE Smart Array SR Secure Encryption, and provides simplicity with the UEFI configuration tool.

[16] Internal lab testing performed in January 2017 comparing HPE Gen9 to Gen10 Smart Array Controllers with 4 KB random read test.

HPE Smart Array Hybrid Capacitors
The HPE Smart Storage Hybrid Capacitor is a battery-free technology for power storage that provides data protection for cached data while eliminating costs and environmental impact of lithium-ion batteries.

For those running HPE Gen10 servers, the HPE Smart Hybrid Capacitor is a centralized backup power source supporting multiple controllers where the NAND flash memory on HPE Smart Array Performance Class controllers and the HPE Smart Hybrid Capacitor work together to save cached data in the event of unplanned server power loss.

When the hybrid capacitor module detects power loss it keeps critical parts of the controller active long enough to allow data to be copied from the onboard controller cache to the flash memory.

Please note, although the hybrid capacitor module is mechanically compatible with the 96W Smart Storage Battery (P01366-B21 and P01367-B21), the module cannot be used in combination with the Smart Storage Battery. In most cases, only a single Smart Storage Battery or a single Smart Hybrid Capacitor can be used per system. Please check your server platform QuickSpecs for details.

- Maximize the performance of enterprise-class server storage with **HPE Smart Array P-Class Controllers**. These controllers are supported on HPE ProLiant rack and tower, BladeSystem, and Apollo servers, and Synergy Compute Modules. Key features include RAID on Chip (ROC), support for flash-backed write cache (FBWC), and advanced RAID levels 0/1/5/6/10/50/60 ADM. This controller operates in mixed mode, encrypts any drive connected to it with HPE Smart Array SR Secure Encryption, and provides simplicity with the UEFI configuration tool.

HPE hard disk drives (HDDs) deliver proven performance for any workload with reliable data integrity and security at the lowest cost per gigabyte. Available for three types of workloads: enterprise (performance optimized), midline (capacity optimized), and entry. With two interfaces: SAS (12G) and SATA (6G); two form factors: SFF (2.5") and LFF (3.5").

- **Enterprise HDDs** (SAS 15K and 10K) deliver the highest levels of performance and reliability for your mission-critical and I/O-intensive applications.

- **Midline HDDs** (SAS/SATA 7.2K) deliver high capacity, performance, and reliability for your business-critical applications.

- **Entry HDDs** are built for non-critical needs for today's server applications and storage environments. These high-capacity drives provide the lowest $/GB.

Accelerate the performance of your data-intensive applications with HPE solid-state drives (SSDs) offering high performance and low latency for enterprise environments. HPE SSDs come in six form factors: SFF (2.5"), LFF (3.5"), M.2, M.2 Enablement Kits, Mezzanine, and Add-in Cards. They are available in three broad categories based on target workloads: Read Intensive, Mixed Use, and Write Intensive.

The workloads indicate the number of drive writes per day (DWPD) that you can expect from the drive.[17]

- Read Intensive SSDs are typically the lowest price with endurance of <= 1 DWPD. Ideal for boot/swap, web servers, and read caching.

- Write Intensive SSDs typically have the highest write performance, with a typical endurance of >= 10 DWPD. Ideal for online transaction processing (OLTP), business intelligence, and Big Data analytics.

- Mixed Use SSDs are for workloads that need a balance of strong read and write performance, with Endurance typically > 1 and < 10 DWPD. Ideal for high I/O applications with workloads balanced between read and write.

All HPE server drives feature HPE digitally signed firmware, which prevents unauthorized access to your data by providing the assurance that the drive firmware comes from a trusted source and has not been altered. Each drive is also backed by 3.35 million hours of the industry's most rigorous testing and qualification program.[18] For more information, visit hpe.com/info/serverstorage.

HPE Persistent Memory
HPE Persistent Memory products will transform IT infrastructures, providing new levels of performance while delivering high levels of reliability and efficiency.

HPE Persistent Memory approaches the speed of traditional DRAM and adds the persistence of storage, ensuring ongoing data safety even in the event of an interruption in power due to an unexpected power loss, system crash, or normal system shutdown. The combination of affordable capacity and non-volatility will help you extract greater value from data-intensive applications.

HPE's Persistent Memory products based on 16 GB NVDIMMs are flash-backed DIMMs, and are supported on the first generation of Intel Xeon Scalable processors. HPE NVDIMMs are designed to eliminate smaller storage bottlenecks while delivering DRAM-level performance. This means customers can access, analyze, and act on data more quickly to gain competitive advantages.

[17] The workloads indicate the number of drive writes per day (DWPD) that you can expect from the drive. DWPD is the maximum number of 4K host writes to the entire drive capacity of the SSD per day over a five-year period.

[18] HPE internal lab testing. 3.35M hour test quant is derived from a combination of drive qualification test plans, specifically HDDQ spec-supplier responsibility to perform, HDDQ spec-HPE responsibility to perform, Reliability Demonstration Test (RDT) spec, CSI integration test spec and pilot test requirements. May 2017.

For complete information on the HPE Server Management portfolio, refer to the webpage at hpe.com/info/servermanagement.

New HPE Persistent Memory, which delivers performance and capacity for data-intensive workloads, features Intel Optane DC Persistent Memory, and is supported on the second generation of Intel Xeon Scalable processors. HPE Persistent Memory is the next step in the evolution of persistent memory and provides fast, high capacity, cost-effective memory and storage and will transform Big Data workloads and analytics possibilities in the data center by enabling data to be stored, moved, and processed at unprecedented speed.

HPE Persistent Memory helps customers keep pace with today's business demands by delivering the performance of memory with the persistence of storage. For more information, visit hpe.com/info/persistentmemory.

HPE Server Network Adapters
Cost-effective, dependable server networking products keep your IT running reliably and at peak performance. From switches to network adapters to transceivers and cables to the latest 50 Gb Ethernet technology, HPE Server Networking adapters are designed, developed, and tested to deliver state-of-the-art, secure performance.

These adapters help prevent, detect, and recover from cyberattacks by protecting applications, data, and server infrastructure through authentication of digitally signed firmware via a Root of Trust architecture. In addition, they offer secure boot, device-level Firewall, and other advanced security features. For more information, visit hpe.com/info/networking.

HPE Accelerators
Workloads can never finish their tasks too quickly. HPE offers a variety of accelerators to help customers accelerate the completion of their workloads. For increased computational and graphics requirements, HPE offers GPU accelerators from both NVIDIA and AMD. GPUs can be used for graphics acceleration, virtualization, as well as High Performance Computing and AI. HPE also offers Field Programmable Gate Array (FPGA) accelerators, which are programmable multi-function accelerators which can be tailored to fit specific workloads. For more information, visit hpe.com/servers/accelerators.

HPE Rack and Power Infrastructure
Your data center is required to provide the foundational agility and compute power to support your business and enable your customers. But it can't be overlooked that your data center also has the same needs—infrastructure, agility, and compute power—to perform effectively. HPE Rack and Power Infrastructure provides configurable, state-of-the-art infrastructure solutions out of the box that can meet the needs of businesses of all sizes, now and in the future. HPE Rack and Power Infrastructure offerings deliver server rack, power, and cooling solutions that give you the maximum level of efficiency and integration for data centers of all sizes. For more information, visit hpe.com/info/rackandpower.

HPE Power Supplies
HPE Power Supplies offer high-efficiency operation and multiple input and output options, allowing users to right size a power supply for specific server/storage configurations and environments. This flexibility helps to minimize power waste, lower overall energy costs, and avoid trapped power capacity in the data center.

HPE SERVER AND INFRASTRUCTURE MANAGEMENT SOFTWARE

For better insight and control
Today, most IT professionals wrestle with numerous management pains, including:

- **Infrastructure management complexity**—There are too many infrastructure management tools to learn and operate, resulting in high IT operating expenses. This proliferation drives up software license costs, as well as increases the time and cost of maintenance—including skills maintenance.

- **Scale and speed**—In enterprise data centers with thousands or tens of thousands of servers, traditional infrastructure management tools cannot scale or operate at the high speeds necessary to effectively manage server sprawl.

- **Siloed infrastructure and outdated IT operational models**—There are often too many non-standard manual tasks, an over-reliance on subject matter experts, and an ever-expanding backlog of projects. The answer to these challenges is to follow a new IT operational model—namely the software-defined data center (SDDC).

- **Planned and unplanned downtime**—Depending on your line of business, the cost of downtime can be millions of dollars of lost revenue. Knowing these costs, IT pros need tools and processes designed to eliminate or dramatically reduce downtime.

To address these gaps, a new management methodology is required—one that drives better system control and greater insight into problems before they occur. And Hewlett Packard Enterprise has it.

HPE infrastructure management is delivered through a complete portfolio of HPE ProLiant lifecycle management capabilities that can flexibly operate from embedded management and system utilities, converged management for software-defined data centers, and support management. Managing HPE ProLiant servers with HPE infrastructure management results in increased efficiency and precise control of resources, with a rich set of capabilities that are easy to access and simple to use, HPE infrastructure management encompasses critical areas such as server deployment and configuration, health and alerting, energy, power, remote management, and warranty and contract information access via a cloud-based portal. The core components that comprise HPE infrastructure management are Embedded Management, Integrated Lights Out (iLO), and HPE OneView. With HPE infrastructure management's built-in automation, HPE ProLiant servers are so intelligent that they practically manage themselves.

In addition, scripting tools such as the Scripting Tool Kit (STK) as well as Service Pack for ProLiant and Smart Update Manager provide breakthrough system maintenance tools that systematically update HPE ProLiant rack and tower servers with one-click simplicity at the scale of your data center.

HPE OneView infrastructure management
HPE OneView is your infrastructure automation engine to simplify operations, increasing the speed of IT delivery for new applications and services. Through software-defined intelligence, HPE OneView brings a new level of automation to infrastructure management by taking a template driven approach to provisioning, updating, and integrating compute, storage, and networking infrastructure. Designed with a modern, standard-based API and supported by a large and growing partner ecosystem, HPE OneView also makes it easy to integrate powerful infrastructure automation into existing IT tools and processes.

Take command with HPE OneView to:

- **Deploy infrastructure faster:** Software-defined, template-based automation, rapidly and reliably provisions resources within minutes, reducing the risk of human error.

- **Simplify lifecycle operations:** A single interface ensures visibility across your entire data center and enables you to securely define and maintain firmware baselines and system configurations with consistent availability and control.

- **Increase productivity:** The unified API lets you accelerate application and service delivery and better enable developers, IT admins, and ISVs to automate infrastructure with a single line of code. The open API also allows easier integration with a growing ecosystem of partner tools and services.

HPE OneView innovations provide you the industry's best infrastructure management experience, simplifying operations for HPE BladeSystem, HPE ProLiant servers, HPE Apollo servers and HPE Superdome X systems, HPE 3PAR StoreServ Storage, HPE StoreVirtual VSA iSCSI storage, HPE Networking, and HPE ConvergedSystem. It is an essential ingredient in the HPE Hyper Converged 380 virtual machine vending environment and powers management for the industry's first composable infrastructure, HPE Synergy. By deploying HPE OneView today, you place your IT operations firmly on the path toward a composable future.

Please note that the HPE OneView license includes the right to use HPE Insight Control until you complete your transition.

HPE InfoSight artificial intelligence for hybrid cloud
With HPE InfoSight for Servers, combines the cloud-based machine learning of HPE InfoSight with the health and performance monitoring of Active Health System (AHS) and iLO to optimize performance and predict and prevent problems. The end result is an intelligent environment that modernizes IT operations and enhances the support experience by predicting and preventing the infrastructure issues that lead to application disruptions, wasted IT staff time, and missed business opportunities.

HPE InfoSight for server is the extension of HPE InfoSight for your ProLiant Gen10, Gen9, and Gen8 servers with iLO 5 and iLO 4. HPE InfoSight for Servers will be a multi-step journey that starts with a basic integration with HPE InfoSight that will become more extensive over time. The initial release of HPE InfoSight for Servers will include:

Predictive analytics to predict and prevent problems

- Data analytics for server security

- Predictive data analytics for parts failure

Global learning that provides wellness and performance dashboards for your global inventory of servers

- Global inventory of servers

- Performance, capacity, and utilization graphs

A recommendation engine to eliminate performance bottlenecks on servers

HPE iLO 5 server management
HPE Integrated Lights Out (iLO) allows you to configure, monitor, and update your HPE servers seamlessly from anywhere in the world. Providing you with consistent insight into the health and operation of your servers, HPE iLO arms you with the tools to resolve issues and keep your business running. Featuring the latest innovations in simplified operations, performance, and security, HPE iLO allows you to manage your entire server environment with ease.

Upgrade your licenses for additional functionality, such as graphical remote console, multi-user collaboration, video record/playback, and much more. Use the HPE iLO Licensing Guide to determine which of our three licensing upgrade options is right for you.

iLO Advanced

Ideal for the enterprise environment, this license provides advanced remote functionality and all the HPE iLO features to improve speed, scale, and simplicity. Key features include Integrated Remote Console, Virtual Media, and iLO Federation (rapid discovery, inventory, and management at scale).

Learn more at iLO Advanced.

In addition to embedded offerings like iLO, other products and tools, such as System Utilities, Intelligent Provisioning, Smart Update Manager (SUM), Service Pack for ProLiant (SPP), iLO Amplifier Pack, Active Health System Viewer, and scripting tools such as RESTful Interface Tool, Scripting Toolkit for Windows and Linux, and Scripting Tools for Windows PowerShell, are available to all HPE ProLiant server customers.

Optimize performance with Embedded Performance Management

Through a partnership with Intel, HPE offers innovative server tuning technologies that enable you to dynamically configure server resources to match specific workloads. HPE server tuning features produce significant performance improvements, real savings, and a more intelligent server environment.

Jitter smoothing

Engaging processor turbo boost can cause frequency fluctuations or "jitter" which results in a constant struggle between maximum output and deterministic performance needs. HPE's jitter smoothing technology mitigates processor frequency fluctuation to reduce latency and deliver deterministic and reliable performance. In variable workloads where processor frequency changes occur often, jitter smoothing can improve overall throughput above turbo boost mode alone.[19]

Jitter smoothing is ideal for high frequency traders, high performance computing, and workloads where processor frequency is highly variable.

Available on all Gen10 Intel based servers with iLO 5 and an iLO Advanced or above license.

Workload matching

Automatically match internal server resources to the specific requirements of your workload. Workload matching offers preconfigured workload profiles that tune your server's BIOS settings for optimal performance and can save hours of server tuning time.

Available on all ProLiant Gen10 AMD and Intel based servers with iLO 5.

Workload Performance Advisor

Workload performance advisor complements workload matching, providing real-time feedback enabling you to monitor system performance and customize tuning settings based on actual workload behavior.

Maximize Security with AMD EPYC

The AMD EPYC processor provides several security related features, including AMD secure processor, Secure Memory Encryption (SME), and Secure Encrypted Virtualization (SEV). The AMD secure processor technology ties with and compliments, the HPE silicon root of trust at the UEFI or BIOS level as an added validation of the BIOS during the boot process. The AMD secure processor validates the BIOS, upon boot-up, that there are no firmware anomalies or compromised code present. After this confirmation, the server boot process is allowed to continue. The AMD Secure Memory Encryption provides encryption on data stored in the server memory. The AMD secure encrypted virtualization creates security between virtual machines on the HPE ProLiant server, when supported by operating system and hypervisor software.

Available on all ProLiant Gen10 AMD based servers with iLO 5.

[19] HPE internal testing from the Performance Engineering Benchmarking team, April 2017.

HPE STORAGE SOLUTIONS FOR HPE PROLIANT SERVERS

No matter what your storage needs, HPE offers virtualized shared storage, data protection, and data retention and archiving solutions that complement your HPE ProLiant investment and are designed to offer a seamless service, support, and management experience. With storage solutions for any scale, performance, or investment level, you can handle more workloads more simply and more affordably by combining servers and storage solutions from HPE.

HPE disk enclosures
Manage growing storage needs with modular solutions for ProLiant capacity expansion. HPE disk enclosures let you expand your ProLiant server storage capacity at a low cost for a variety of general use cases. For more information, visit hpe.com/storage/disk-enclosures.

Entry-level shared storage
When performance and scale are your priorities, HPE also offers low-cost external storage systems that deliver the benefits of virtualized, shared storage and file sharing capably designed with ProLiant server users in mind. Our flexible entry storage options let you choose from direct attached storage to extend your server capabilities, NAS appliances for file sharing and home directory consolidation, and highly scalable shared storage arrays for physical and virtual applications that can run on your existing IP network or a dedicated Fibre Channel SAN. For more information, visit hpe.com/storage/entry.

All-flash and hybrid flash storage
The world is changing, fast. An all-flash data center is now a reality thanks to HPE Nimble Storage—with a choice between all flash and adaptive flash arrays—and the HPE 3PAR StoreServ family of all-flash and flash-optimized arrays. These lightning fast arrays deliver 99.9999% uptime with built-in resiliency. In addition, HPE Nimble Storage offers radical simplicity of management and a transformative support experience through predictive analytics from HPE InfoSight. For more information, visit hpe.com/storage/flash.

Data availability, protection, and retention
Today's businesses demand aggressive service levels. Data loss, risk, and downtime must be avoided at all costs. When an outage does occur, recovery time must be minimized. HPE can equip you meet the most stringent Recovery-Time Objectives (RTOs) and Recovery-Point Objectives (RPOs), all while reducing your protection storage capacity requirements. Learn more about our affordable portfolio of modern data availability, protection, and retention solutions with the right scale, performance, and application integration to meet your needs. For more information, visit hpe.com/storage.

Storage management and orchestration
With Hewlett Packard Enterprise, you can get past hardware management limitations with open, automated orchestration. Control storage, compute, and networking resources as well as data services across physical and Virtual Domains. It's all compatible with many third-party tools and fully integrated into HPE data storage solutions—from flash-optimized to software-defined. For more information, visit hpe.com/storage/management.

Storage networking
Hewlett Packard Enterprise provides dynamic end-to-end solutions, solving your storage networking challenges with nearly 15 million storage area network (SAN) fabric ports deployed worldwide. Agile HPE StoreFabric host adapters, multi-protocol switches, and highly scalable directors for cloud-optimized SANs ensure reliability and high performance. For more information, visit hpe.com/storage/san.

INTEGRATION SERVICES

HPE Factory Express provides customization and deployment services along with your storage and server purchases. You can customize hardware to your exact specifications in the factory—helping speed deployment. For more information, visit hpe.com/info/factoryexpress.

TECHNICAL TRAINING COURSES

HPE Education Services focuses on your most important asset, your people, to help prepare them to have the right skills to deliver business outcomes. HPE is a market leader in technology training, as recognized by IDC for five years running. With over 35 years of experience, we lead the industry when it comes to modern skills-based IT training and digital on-demand learning. We deliver unmatched expertise across a broad range of HPE products, industry-leading technologies, and IT process disciplines by combining technical knowledge, business insight, and hands-on experience. hpe.com/ww/training

HPE POINTNEXT SERVICES

HPE Pointnext Services leverages our strength in infrastructure, partner ecosystems, and the end-to-end lifecycle experience, to accelerate powerful, scalable IT solutions to provide you the assistance for faster time to value. HPE Pointnext Services provides a comprehensive portfolio including Advisory and Transformational, Professional, and Operational Services to help accelerate your digital transformation.

Operational Services
- **HPE GreenLake:** An infrastructure service that offers on-demand capacity, combining the agility and economics of public cloud with the security and performance of on-premises IT.

- **Datacenter Care:** HPE's most comprehensive support solution tailored to meet your specific data center support requirements. It offers a wide choice of proactive and reactive service levels to cover requirements ranging from the most basic to the most business-critical environments. HPE Datacenter Care Service is designed to scale to any size and type of data center environment while providing a single point of contact for all your support needs for HPE as well as selected multivendor products.

- **Proactive Care:** An integrated set of reactive and proactive services designed to help you improve the stability and operation of your device.

- **Foundation Care:** Support for HPE servers, storage, networking hardware and software to meet your availability requirements with a variety of coverage levels and response times.

Advisory and Transformation Services—HPE Pointnext Services designs the transformation and builds a road map tuned to your unique challenges including hybrid cloud, Workload and Application Migration, Big Data, and the edge. HPE leverages proven architectures and blueprints, integrates HPE Enterprise Group and partner products and solutions, and engages Professional and Operational Services teams from HPE Pointnext Services as needed.

Professional Services—HPE Pointnext Services creates and integrates configurations that get the most out of software and hardware, and works with your preferred technologies to deliver the optimal solution. Services provided by the HPE Pointnext Services team, certified channel partners, or specialist delivery partners include installation and deployment services, mission-critical and technical services, and education services. For more information, visit hpe.com/info/pointnext.

HPE SERVER FAMILIES

A server for every need

Hewlett Packard Enterprise understands that when it comes to servers, one size does not fit all. That's why we offer you a comprehensive array of server families, designed for a wide variety of business needs. Explore our other server portfolios:

- HPE BladeSystem family—Simplify your data center with modular infrastructure platform.

- HPE Hyperconverged—Smaller, faster systems with integrated storage, networking, compute, and virtualization.

- HPE ConvergedSystem—Optimized for Big Data, client virtualization, cloud, and density optimized workloads.

- HPE Moonshot System family—Software-defined servers designed for specific workloads.

- HPE Apollo System family—Purpose-built platforms delivering extreme performance, scale, and efficiency for your AI and HPC workloads.

- HPE Edgeline IoT Systems—Edge computing that delivers secure control and accelerate time to insight from the Industrial Internet of Things.

- HPE Cloudline Server—Open systems that keep service providers ahead of growth, ensure adaptability, and reduce costs while complying with Open Compute Project standards.

- HPE Synergy—A new category of infrastructure that accelerates application delivery in both traditional and new IT environments.

- HPE Integrity server family—High-speed, resilient, mission-critical servers that exceed the demands of today's always-on world.

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