the GORILLA GUIDE® to...

HPE Next-Gen Modular Servers

HPE ProLiant Compute Gen12 Servers Offer Next-Level Security, Performance, and Efficiency

ED TITTEL

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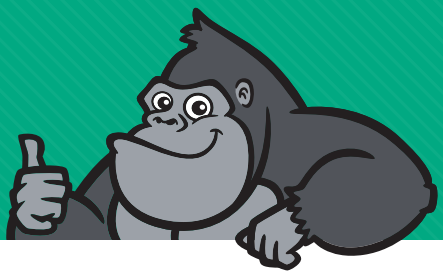

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By Ed Tittel

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ENTERING THE JUNGLE

CALLOUTS USED IN THIS BOOK

SCHOOL HOUSE

In this callout, you'll gain insight into topics that may be outside the main subject but are still important.

FOOD FOR THOUGHT

This is a special place where you can learn a bit more about ancillary topics presented in the book.

BRIGHT IDEA

When we have a great thought, we express them through a series of grunts in the Bright Idea section.

DEEP DIVE

Takes you into the deep, dark depths of a particular topic.

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Defines a word, phrase, or concept.

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KNOWLEDGE CHECK

Tests your knowledge of what you've read.

WATCH OUT!

Make sure you read this so you don't make a critical error!

PAY ATTENTION

We want to make sure you see this!

TIP

A helpful piece of advice based on what you've read.

INTRODUCTION

Welcome to The Gorilla Guide® To… HPE Next-Gen Modular Servers. In this guide we'll take you into the innovative and exciting world of modular data center server design, and explain a key set of specifications and designs for modular hardware systems. Then, we'll explain what makes such modular hardware systems important and worthwhile, and what role HPE plays in this world. Next, we'll explore the role that a baseboard management controller plays in securing, protecting, and managing modular data center servers, after which we'll conclude with a look at how one major service provider is putting open modular server designs to work.

This raises an interesting question: What's driving the server market toward modularity? A surprisingly major convergence of design and development trends is underway, inspired at least in part by lessons learned from transitioning monolithic, on-premises software and infrastructures into distributed, cloud-native architectures. Essentially, this means the disaggregation of server hardware following the model now typical for cloud-native software design, as shown in **FIGURE 1**. These same gains in agility transfer rather nicely from software to hardware. They come in similar fashion, too, by separating individual subsystems into discrete—including CPU and RAM, security, networking, storage, and power supplies—so that engineers can design them independently.

Indeed, modular server design is an approach whose time has come, and is gaining momentum in hardware design circles. It's at least arguable that this approach is a natural evolution of overall systems design, as depicted in **FIGURE 2**. It's also an approach that is of

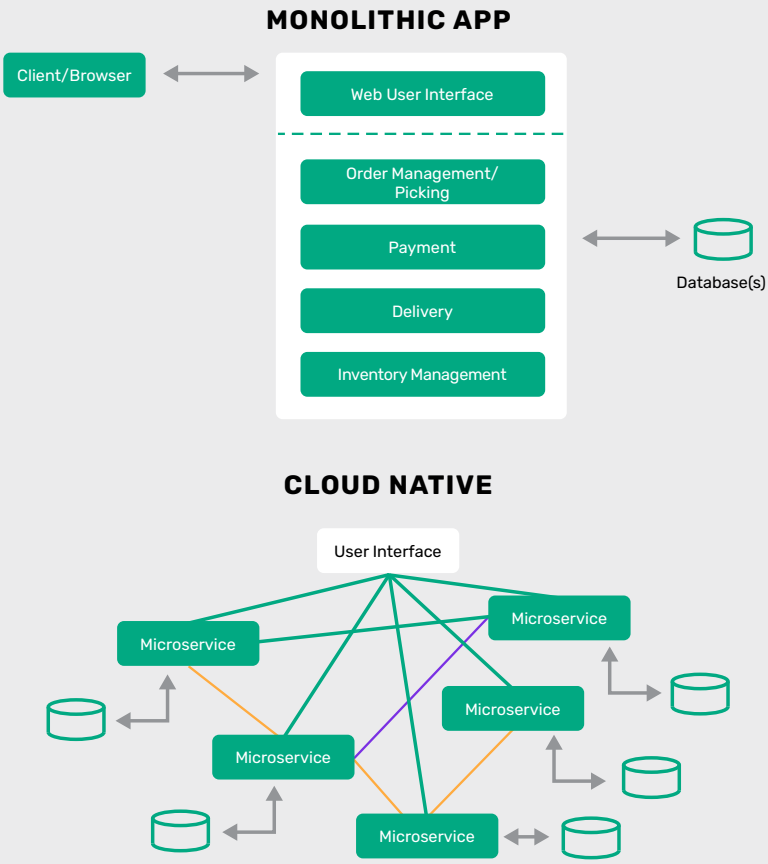


FIGURE 1: Monolithic apps are giving way to disaggregated collections of cloud-based microservices that serve as reusable software parts

interest to service providers, who have a keen interest in obtaining, using, and maximizing the return on their ever-growing investment in data centers. This not only reflects the growth of data centers for conventional and data-intensive workloads, but even for high-performance computing. It's also driven strongly by increasing use

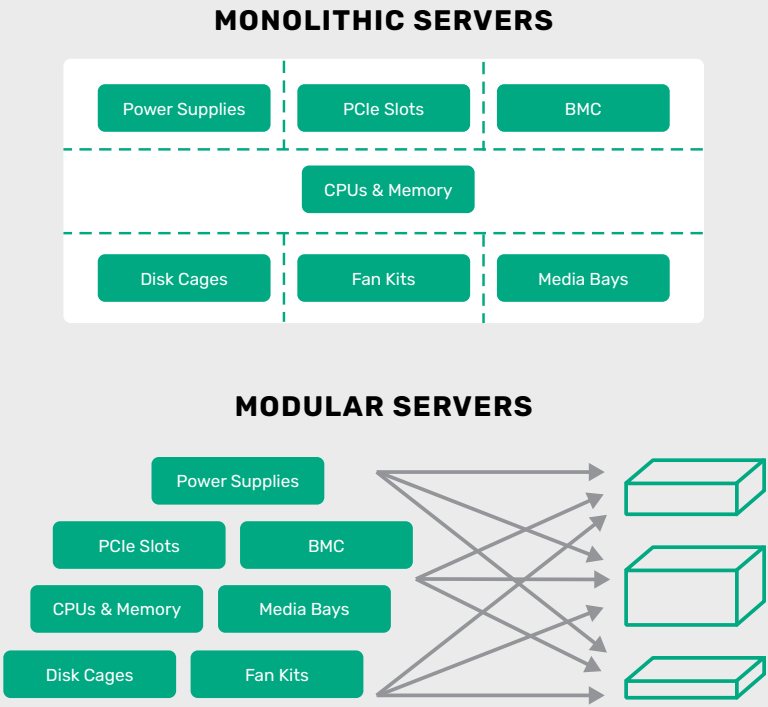


FIGURE 2: Monolithic servers are likewise giving way to modular designs, with specific functions within standard modules

of artificial intelligence, which consumed a "mere" 14% of global data center power demands in 2020[1]. That number jumped to 80% in 2024[2], and is expected to continue growing by 19% to 22% yearly through 2030[3].

[1] Goldman Sachs, AI, data centers and the coming US power demand surge, April 2024

[2] Data Center Dynamics, AI drove record $57bn in data center investment in 2024, March 2025

[3] Goldman Sachs, AI to drive 165% increase in data center power demand by 2030, February 2025

In recent years, service providers have accounted for 70% to 80% of new data center builds. Thus, they're one of the driving forces behind modular server design. That said, given that enterprises have the same needs for cloud services, AI workloads, and scalable infrastructures, they too can benefit from this new design approach. All this helps to explain why modular server and data center designs sit center stage for industry initiatives—led by the Open Compute Project's Data Center Modular Hardware System architecture and specifications. In fact, they serve as the impetus for this Gorilla Guide! In Chapter 1, you'll get a solid overview of this collection of modular server specifications and designs.

CHAPTER 1

Open Compute's Data Center Modular HW System

The Open Compute Project (OCP) is a global technology initiative that seeks to create more efficient, scalable, and sustainable hardware designs. It exerts a collaborative, industry-wide effort to develop open source, modular hardware solutions for data centers, edge computing, and more. The group's Data Center Modular

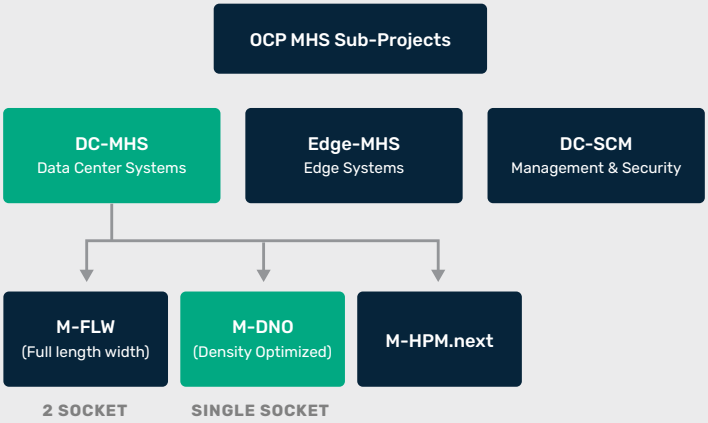


FIGURE 3: A block diagram of OCP MHS modules and components

Hardware System covers a set of specifications and descriptions designed to disaggregate server design into a collection of discrete, well-defined modules with equally well-defined interfaces and buses to tie them together (shown in **FIGURE 3**, with a table of related acronyms thereafter). This effort is known as the OCP DC-MHS project. Many major service providers, OEMs, technology companies, and

ABBREVIATION	MEANING
BMC	Baseboard Management Controller
DC-MHS	Data Center - Modular Hardware System
DC-SCM	Data Center Secure Control Module
DC-SCI	Data Center Security & Control Interface
DNO	See M-DNO
HPM	Host Processor Module (i.e., Motherboard)
M-CRPS	Modular – Common Redundant Power Supply
MCIO	Mini Cool Edge IO
MXIO	Modular Hardware System Extensible I/O
M-DNO	Modular – Density Optimized
M-SDNO	Modular – Scalable Density Optimized
MHS	Modular Hardware System
OCP	Open Compute Project
PDB	Power Distribution Board

TABLE 1: Key Open Compute Project Data Center Modular Hardware System acronyms and expansions

others are members of this organization, including Hewlett Packard Enterprise, Meta, Google, Intel, Microsoft, AMD, NVIDIA, and Dell Technologies.

TABLE 1 shows the most common DC-MHS acronyms in alphabetical order. There's a bit of "alphabet soup" to ingest to really understand the project, but that effort will be rewarded with an improved appreciation for its modules and elements.

The Impact of Modular Hardware

It's hard to overstate the advantages of transforming data center hardware from monolithic, rack-mounted devices built around specific CPU and memory architectures into something more modern and flexible. The benefits of breaking up such devices into individual modules—more on their kinds and capabilities follows later in this section—are many, as shown in **FIGURE 4**.

FIGURE 4: Top benefits from switching to a flexible, modular server architecture and design approach

Here's a recap of these benefits, simply stated:

- **Optimized fit:** common elements—such as storage, networking, power supplies, and more—may be reused across multiple server form factors and designs. This enables faster innovation, plus broader sourcing and support for those modules.
- **Faster Time-to-Market:** Because modules are common, reusable building blocks work in multiple designs for multiple markets. All are available at the same time, and work alike in various form factors and designs, so there's no need for separate, custom items.
- **Compatible:** Buyers can choose modules from multiple makers, and expect them to work together seamlessly. Likewise, multiple makers can support various form factors and designs.

Overall, modular implementations let buyers pick the modules they need to support easy right-sizing for data center servers and their local infrastructures. Also, replaceable modules improve future-proofing for devices, because individual modules may be swapped out with ease, to take advantage of technology changes and CPU speed boosts. This is particularly compelling for power supplies, where improved efficiency provides immediate value. And finally, service providers and organizations can mix and match individual components to deploy modular designs within an open, well-defined, trusted technology ecosystem.

All this said, the most important benefit by far is that disaggregation means modules are not tied to a monolithic development timetable. Thus, modules and related subsystems can evolve independently, so that enterprises and service providers can pick best-of-breed and optimally tailored components for their data center needs.

Enterprises and service providers can customize to optimize costs, while zeroing in on tailored configurations to meet current and projected workloads. Flexibility and a broad selection of components—including compute (CPU+RAM), security, storage, networking, and more—lets organizations achieve agility and obtain competitive advantage. As new modules incorporate new or improved technologies, modularity means accelerated time to market and reusable designs. This makes it easier than ever before to deploy new services and hardware platforms at the same time.

The OCP DC-MHS (sub)project aims to standardize and provide interoperability between key elements of data center, edge, and enterprise infrastructure by offering consistent interfaces and form factors among modules. Interoperability also means interchangeability.

OCP DC-MHS Overview and Guided Tour

OCP DC-MHS is best understood as a collection of electrical and mechanical specifications, where the focus is on designing modules that seek to improve efficiency, sustainability and scalability of data center servers, racks, and other related devices. In this Gorilla Guide, the emphasis is on the server parts of this framework and specifications.

Ultimately DC-MHS lets engineering and related firmware and software teams concentrate in specific areas of functionality to push such designs ahead as quickly as they can. This speeds up, separates, and simplifies design cycles. By way of contrast, earlier server designs focused on CPU and RAM generations and architectures, with other systems proceeding concurrently in lockstep. Modularization fosters disaggregation, with each module type subject to its own development and update cycles.

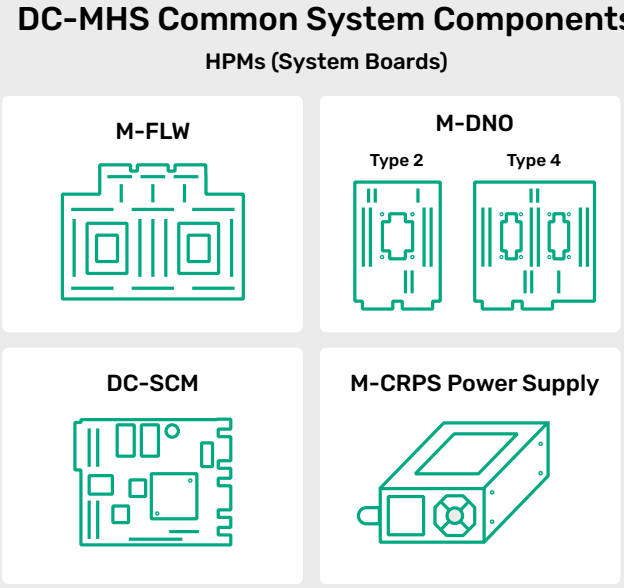


FIGURE 5: Host Processor Modules in the OCP MHS collection including CPU/RAM, security, and power elements

Within the DC-MHS framework and specifications, one can find designs and specifications for the following types of modules, some of which appear in **FIGURE 5**.

- M-HPM (Host Processor Modules): A set of designs for 2U and 4U servers that include one or more CPU sockets and various banks of RAM packages. Designs may incorporate one or more M-HPM modules, but must include at least one. In Figure 5, both M-FLW and M-DNO define various form factors for CPU/RAM packages ranging from 1U to 4U.

- DC-SCM (Datacenter Secure Control Module): An independent, secure, hardware-based firmware environment for remote access, plus server control, monitoring and management and upkeep. This module acts as gatekeeper to protect and secure servers; overall it's part of the Baseboard Management Controller (BMC) module family.
- M-CRPS (Modular Common Redundant Power Supply): A high-efficiency power supply design that works with multiple (two or more) instances to deliver reliable, scalable power in a compact form for flexible, reliable power delivery in data centers.
- M-PIC (Platform Infrastructure Connectivity): Standardizes connectivity between the HPM (and other modules) for power, cooling, and networking access (with options ranging up to 400 Gbps via SmartNICs and high-speed optical Ethernet).

Overall, there are a lot of modules and sub-systems included in the Data Center Modular Hardware System specifications and designs. Be prepared to spend some time getting familiar with them, so you can really appreciate the strengths of this approach. Service providers and enterprises can take advantage of its standardization and interoperability to help them optimize data center operations, expand existing markets and occupy new ones. All this comes courtesy of the finely focused and tuned capabilities that DC-MHS brings to data centers.

This chapter of the Gorilla Guide has covered the general benefits of modular server architecture and design. In Chapter 2, we'll explore what gives the Data Center Modular Hardware System its oomph and real value, especially as it pertains to development of certain modules for which HPE might otherwise have to wait on CPU vendors for update windows.

CHAPTER 2

Why DC-MHS Matters

The specifications and designs that make up the DC-MHS expand what system engineers and developers can do when building servers. In fact, DC-MHS lets them explore multiple design projects in parallel, each on its own separate timeline and basis.

That means CPU and RAM modules (M-HPM) can proceed on one track, while each such module also gets a Baseboard Management Controller (BMC) to bring in controls for BIOS/UEFI, FPGAs, and so forth. But at the same time, work can get underway on a separate DC-SCM for remote access, security, monitoring, and management, and likewise for storage modules, networking modules, power supplies, and even advanced functions modules (such as multiple GPUs for AI and other data and computationally intense workloads). It's important to emphasize that the DC-MHS specifications ensure interoperability (currently electrical and mechanical) between these modules.

Modularity enables parallel design cycles so individual modules can proceed independent of one another. Thus, for example, HPE can develop custom security for iLO and firmware with a specific DC-SCM design without waiting on CPU vendors to provide new processors to define M-HPM modules. This effectively decouples development of

silicon-based security and firmware from CPU (and other) vendor release cycles. Because HPE leads the market in this space, this is a win for their engineers—and their customers.

Design One Time, Reuse as Needed

Engineers can build modules to fulfill specific server functions, and then use those same modules in different configurations to meet different needs, workloads, or use cases. Decoupling modules for separate, discrete development, test, and deployment lets engineers focus on their specific areas of expertise and knowledge, and concentrate on accommodating newer, faster, and more capable modules on their own schedules. This offers benefits for certain specific modules where new technologies get introduced on a rapid cadence—especially true for hardware-based security, storage, networking, and connectivity modules (e.g., PCIe 6.0, which is out as of late 2024, and PCIe 7.0, currently in design-specification stages). Such technologies are especially helpful for servers where more, better, and faster links and buses establish important payoffs when advances get put to work sooner rather than later.

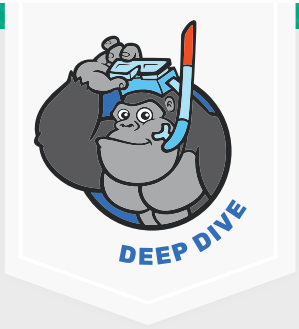
HPE has been part of the OCP since 2015, and is a founding core team member of the DC-MHS project since it launched in 2022. OCP DC-MHS offers HPE vital opportunities to deliver its modular servers, where it can take advantage of faster times to market for new modules and the related capabilities they bring to service providers and other data center customers. OCP DC-MHS vetting means that HPE's modular servers arrive in the market with a broad portfolio of pre-qualified options for the modules it builds into those servers—most notably security, networking, CPU/RAM (DC-HPM), and related baseline controller modules.

HPE's Role in DC-MHS

The company is contributing upstream with funding and engineering support for this project. Phillip Leech, senior technologist/architect at HPE, leads the DC-MHS Modular Plug-and-Play (M-PnP) workstream. This group focuses on creating standardized interfaces for seamless integration of modular components into OCP DC-MHS-compliant servers. The goal is to ensure interoperability between hardware modules within those servers, and to support their automatic discovery and automated configuration as they're brought up. Through providing (and adhering) to such standards, M-PnP boosts scalability and reduces complexity within data center environments. At the same time, HPE is also working on a full OCP DC-MHS family of ProLiant Servers (in both 2U and 4U form factors) so that data center operators can integrate them directly into that overall architecture.

Some of HPE's most interesting work in building DC-MHS modules comes in the area of DC Secure Control Modules (DC-SCMs). Here, the company is integrating its already well-known and award-winning Integrated Lights-Out (iLO) secure remote access, monitoring, and management into the OCP DC-MHS overall architecture. This promises to make serious, hardware-level security part of what data center operators can take as given (and for granted). The modular approach that DC-SCM allows also lets HPE accelerate the cadence on its development cycle, and produce new security modules as and when they're needed, instead of having to wait on CPU builds to release a new generation of silicon on which a new security module can run.

Understanding Integrated Lights-Out (iLO) Capabilities



HPE Integrated Lights-Out (iLO) is proprietary, hardware-based management technology designed to boost security and remote management capabilities. It includes a Silicon Root of Trust, which safeguards servers against firmware attacks and unauthorized access.

iLO supports secure remote monitoring and management of server hardware, via an independent, self-powered module that remains remotely accessible even when a server is powered off. iLO further supports 2FA and encrypted communications protocols to establish and keep things secure.
In addition to providing remote access to one server at a time, iLO also supports APIs for remote access, monitoring, and control that work with HPE's OneView platform in the data center, and HPE GreenLake in the cloud for automation and site- or cloud-wide management. Learn more about how HPE iLO helps safeguard the entire server lifecycle.

HPE Modular Server benefits

Greater operational flexibility lets enterprises and service providers adapt faster and better to changing demands, workloads, and software stacks. Infrastructure can be right-sized to achieve tighter alignment between hardware capabilities and software stacks, for optimal performance and little or no wasted or excess capacity. HPE's commitment to OCP and DC-MHS means buyers can navigate

a robust and active technology and partner ecosystem, with assured module interoperability and integration. Best of all, OCP and DC-MHS and their modular approach means modules may be swapped out and reused when and as they're needed. This provides added value for investments in new technology, now and in the future.

Tailored design for any workload comes from modular, open building blocks assembled to handle specific workloads. Servers open up and become vastly more configurable, where buyers can quickly and easily adopt new technologies as they emerge. Consider what a modular server architecture does for the following Q&A:

- **Want a faster CPU and more RAM?** Upgrade the SC-HPM module (e.g., HPE M-DNO-4 for 1U/2U modules; HPE M-FLW for 4U).

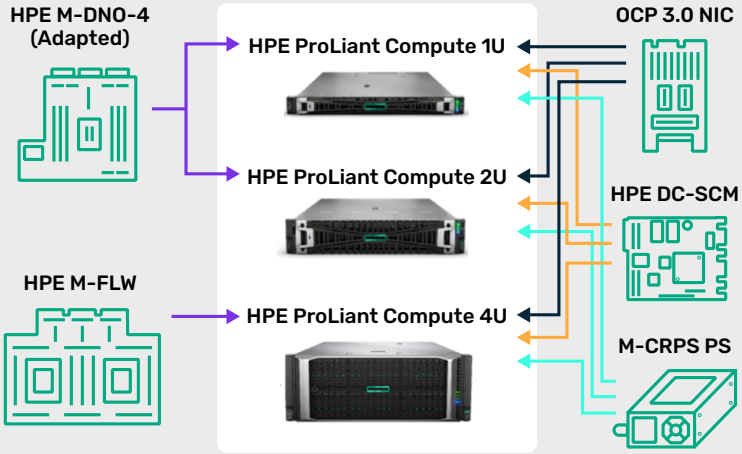


FIGURE 6: Various HPM, optical networking, security, and power supply modules can be added or switched

- **Want denser, faster solid state storage?** Upgrade one or more storage modules with newer NVMe drives and faster connections.
- **Want faster optical networking?** Upgrade one or more networking modules (e.g., OCP 3.0 NICs up to 400 Gbps).
- **Want a better, more efficient power supply?** Upgrade the M-CRPS PS to improve your power utilization and cooling costs.

As things change, you should know what to do. Indeed, you should purchase only what you need to match your specific workloads. Then when the time is right you can swap or upgrade modules to meet changing demands, add capability or capacity, and more. HPE's vision for the various scenarios are shown in **FIGURE 6**.

In this chapter, you've learned the importance of the DC-MHS architecture in enabling flexible, parallel development for server components and how with this modular approach different hardware modules, such as CPU, RAM, storage, networking, and power supplies, can be developed and upgraded independently. Next, we'll look at how modular servers can be managed and operated using the OpenBMC capability that HPE ProLiant Servers support, which includes how HPE iLO improves and expands on those capabilities.

CHAPTER 3

OpenBMC and Modular Servers

In the world of OCP data center servers, the Baseboard Management Controller (BMC) manages the HPM module for remote access, boot-up and firmware checks, access control and data protection, and more. In general, the BMC also provides hardware health monitoring, handles firmware updates, and generally keeps working even when the system is powered off. In a broad sense, a BMC does for the DC-MHS architecture what HPE's iLO (see previous chapter) has done for ProLiant Servers since it was introduced over 20 years ago.

That said, OpenBMC does not replace iLO. HPE provides OpenBMC enablement on ProLiant servers. If an organization wishes to pursue an OpenBMC strategy on ProLiant servers, HPE enables this capability through HPE Transfer of Ownership. Nevertheless, HPE expects most buyers to opt for iLO as the path of greatest security for least overall cost.

Basics of OpenBMC

OpenBMC is an open source firmware stack designed to run on DC-MHS baseboard management controllers (usually designated M-BMC in that nomenclature). Such controllers seek to enable and support simple, efficient server hardware management. The OpenBMC project originated with the Linux Foundation, and provides a customizable platform for a familiar litany of tasks—namely remote monitoring, firmware updates, and system diagnostics. OpenBMC supports standards like Redfish for hardware management, and leverages the Yocto Project for building and distribution. OpenBMC is has been adopted in enterprise, high-performance computing (HPC), and cloud-scale data centers. It's designed to promote interoperability and flexibility in server management. For further information on OpenBMC, consult its Wikipedia article or its GitHub documentation.

OpenBMC covers numerous technical management areas. These include the following:

- **Monitoring and management** (where applicable) of sensors and controls such as voltage and temperature in power supplies, and temperature sensors in all kinds of devices (e.g., CPU, storage devices, case interior, GPU, and so forth).
- **Fan control:** Managing cooling systems to establish and maintain optimal operating temperatures.
- **Firmware updates:** Enabling secure, remote updates for system firmware, including IAM, integrity checks, fallback restores, firmware updates, and more.
- **System diagnostics:** Monitoring system health and diagnosing potential issues.
- **Security management:** Using interfaces like Redfish for secure communications and management.

- **Event logging:** Capturing and analyzing system events for troubleshooting, anomaly detection, and auditing.

An OpenBMC strategy gives the customer total ownership of their BMC firmware, and confers to them the responsibility to design and maintain the features needed for their specific data center environment. Here again, iLO checks all the same boxes and supports the same APIs as does OpenBMC.

Key OpenBMC Features

In data center (and other) environments OpenBMC provides the basis for flexibility and added customization, including APIs for remote access, data collection, automation, and control. It offers enhanced security, to make sure that servers under its purview can only be accessed with appropriate credentials and controls, and that updates will be properly and securely performed only by authorized parties. It's designed to make data centers more manageable and reliable, and to do so cost-effectively without requiring swivel-chair integration across a collection of otherwise unrelated point solutions or individual consoles or control panels.

How HPE's Modular Servers Play into OCP and OpenBMC

HPE's modular ProLiant Servers are designed to align with OCP DC-MHS modular systems, and with relevant standards and requirements. These modular servers thus can optionally support OpenBMC, as an alternative to HPE's iLO technology. In general, HPE's ability to work through iLO on a server at a time basis, but also through HPE OpenView at the data center level, and through HPE GreenLake across private and public clouds provide ample scalability,

flexibility, automation, and control. For more information, please watch the YouTube video HPE ProLiant Compute Modular Servers (October 2024).

In this chapter, you've learned more about how modular servers may be managed and operated, using the OpenBMC option that HPE ProLiant servers support. You've also learned how HPE iLO improves and expands on those capabilities. In the next and final chapter, we'll explore how a major global service provider makes use of OCP DC-MHS in its operations, and how HPE modular servers are helping them succeed and thrive.

CHAPTER 4

Casing A Service Provider: phoenixNAP

phoenixNAP is a global IT service provider that focuses on Infrastructure-as-a-Service (IaaS) and other enterprise-grade IT technologies and services. A key goal is to commoditize its modular server offerings as part of this portfolio, and make them available to organizations of various sizes. Among the company's broad collection of offerings, you'll find:

- **Servers:** Dedicated servers are available to organizations that require single-tenant operations with all the options, flexibility, and scalability of the cloud.
- **Cloud:** Customers can choose among a variety of cloud types, including managed private cloud, data security cloud, hybrid cloud, and more.
- **Backup and restore:** Access to various backup and recovery options and services, including disaster recovery, multiple backup and recovery platforms, and more.
- **Security:** Data security cloud, encryption management platforms, confidential computing services, ransomware protection, and DDOS protection.

- **Networking services:** Geolocation, content delivery networks, load balancing, routing optimization, QoS, DNS optimization, and more.

In its explicit goal to commoditize cloud-based "as-a-service" offerings of all kinds, phoenixNAP has been an active and vocal supporter of OCP and DC-MHS since the project's inception in 2022. It advocates for, and uses, DC-MHS-compliant servers. phoenixNAP has also worked with various vendors that include Micron, Intel, AMD, Dell, and HPE[4] to promote and obtain DC-MHS compliant servers and modules.

Above all, phoenixNAP seeks to speed upgrades to new server and technology generations, to streamline deployment, and to let customers get right to work using its unique approach. Simply put: customers need only log into the phoenixNAP platform. They can begin to use a dedicated server in less than two minutes, and pay only for the resources they consume.

phoenixNAP seeks to be first to market with technologies the company believes in—especially OCP DC-MHS—made quickly and readily available to customers through a simple, direct consumption-based model using the latest technologies with the best value. Upgrades and migrations are designed to be simple, easy, and fast. Ideally, migrations involve little more than changing a set of data pointers from an old virtual infrastructure into a new one.

Finally, phoenixNAP uses modular servers to meet speed and agility demands of cloud-native, on-premises, and SaaS development customers across multiple markets. That includes advertising technology (AdTech), financial technology (FinTech), and state, local, and education (SLED) sectors. Indeed, phoenixNAP has switched from monolithic servers to modular, scalable, pluggable designs in its 18 global data centers to expand all of its multi-tenant facilities.

[4] Martin Wielomski (VP of Products, phoenixNAP), phoenixNAP Becomes the First in the World to Deploy a High-Performance, Power-Efficient Solution for Cloud-Native, Scale-Out Compute Workloads, November 2024

Modular Building Blocks Empower Expanding Services and Consumption Models

Indeed, phoenixNAP was HPE's first customer for DC-MHS modular servers. From the get-go, the impetus was to deploy reusable building blocks for multiple designs across multiple markets and business models. HPE's disaggregated servers make data centers interoperable and compatible, thanks to consistent interfaces and form factors explicitly engineered for security from silicon all the way through to software. A key principle is that phoenixNAP's IaaS platform speeds product introductions, by obviating ground-up custom designs, and reduced TCO from modular innovations and sourcing across the entire HPE partner ecosystem.

Mr. Peter Groth, HPE VP, GM, and CTO for Service Providers, says of this effort: "Service providers are investing in next-generation infrastructure to address evolving enterprise IT requirements across new workload demands, heightened security concerns, and flexibility needs as businesses scale or change." He continues "phoenixNAP is on the leading edge of delivering modernized, advanced solutions and we are thrilled to continue our partnership to power its cloud services. By leveraging the new HPE ProLiant Gen12 servers that deliver next-level security, performance, and efficiency, phoenixNAP is offering its customers a trusted, scalable, and versatile solution to fuel a new era of innovation." In short, HPE's new modular DC-MHS servers are powering delivery of high-performance, always-available infrastructure that work with cloud-like ease and simplicity, to bring apps and workloads closer to DevSecOps teams and users alike.

Modular Server Futures Explored and Explained

As HPE continues to develop its modular server platforms, it looks to go beyond electrical interfaces and signaling commonality like those currently defined in OCP DC-MHS specifications, to enabling real "plug and play" within modular server-based data centers. To that end, the company is driving the development of OCP DC-MHS M-PnP technologies and standards.

In the Windows world, PnP provides reasonable expectations that compatible devices may be plugged into a suitable connection and "just work." For DC-MHS servers, M-PnP envisions a suitably engineered runtime environment where compatible modules get plugged in, get discovered, and (where necessary) properly configured by some kind of BMC or related agent, and do the very same thing—that is, they "just work."

This could enable truly mix-and-match server configuration, where any combination of the right modules could be relied upon to come together and act like a complete data center server. This would allow organizations to put modules together as needed to handle workloads. But it would also allow organizations to upgrade modules without replacing servers outright. This would be especially useful for independent upgrades to CPU and memory modules, security modules, storage modules, networking connections, and more efficient power supplies. With that kind of reusability, sustainability, and energy efficiency, it opens new and better ways to build and operate data centers, and the servers that make them run.

Advancing at Full Speed

Modular servers decouple the development of server modules for security, storage, networking, and so forth, from dependence and timing of upstream CPU vendors. This allows new technologies to advance at full speed, with the ability to replace older modules with newer ones as available and support for flexibility, scalability, and efficiency. This is especially important for security, storage, and networking, which typically advance on a more rapid cadence than CPUs.

ABOUT HPE

Hewlett Packard
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HPE is the global edge-to-cloud company built to transform your business. How? By helping you connect, protect, analyze, and act on all your data and applications wherever they live, from edge to cloud, so you can turn insights into outcomes at the speed required to thrive in today's complex world. https://www.hpe.com/us/en/about.html#ourpurpose

ABOUT ACTUALTECH MEDIA

ActualTech Media, a Future B2B company, is a B2B tech marketing company that connects enterprise IT vendors with IT buyers through innovative lead generation programs and compelling custom content services.

ActualTech Media's team speaks to the enterprise IT audience because we've been the enterprise IT audience.

Our leadership team is stacked with former CIOs, IT managers, architects, subject matter experts and marketing professionals that help our clients spend less time explaining what their technology does and more time creating strategies that drive results.

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