TABLE OF CONTENTS

3 THE SMART SOLUTION FOR TRADER WORKSTATIONS

4 CHALLENGES AT TODAY’S FINANCIAL SERVICE FIRMS

5 HPE MOONSHOT INFRASTRUCTURE
   6 HPE ProLiant server blades for HPE Moonshot system
   6 HPE Common Slot power supply
   7 Common cooling fans
   7 Networking

8 HPE MOONSHOT MANAGEABILITY AND SECURITY
   9 Services that accelerate success
   10 Citrix is Moonshot’s #1 partner

10 ADDITIONAL WORKLOADS IDEAL FOR RUNNING ON HPE MOONSHOT
   10 High-performance computing (HPC) and big data workloads
   10 Media processing

10 CONSUME MOONSHOT ON YOUR TERMS

11 HPE GLOBAL IOT INNOVATION LABS
Exceptional performance with unmatched density and power efficiency

HPE Moonshot is a converged bladed system ideal for delivering secure desktops and virtual apps for the financial services industry. HPE Moonshot lowers IT costs through its unparalleled combination of high-performance, extreme server density, and energy efficiency.

THE SMART SOLUTION FOR TRADER WORKSTATIONS

HPE Moonshot was designed from the ground up to be a solution-focused, workload-optimized, and application-specific system. Gone are the days of having to buy more capacity and resources than you need, and then paying extra to segregate your tasks.

The innovation behind Moonshot is simple—replace traditional, power-hungry, general-purpose processors with more efficient Intel® Xeon® system-on-a-chip (SoC) processors tailored for specific workloads.

With integrated fabrics and a dense compute form factor, this solution-focused system is the smart choice for secure end-user computing applications found in many financial service organizations—specifically for desktop and application delivery.

<table>
<thead>
<tr>
<th>TABLE 1. HPE Moonshot system—delivering big value in a small package</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Best performance per dollar</strong></td>
</tr>
<tr>
<td>• Independent “small” nodes and bare-metal operation with no virtual machines (VMs)</td>
</tr>
<tr>
<td>• High CPU core-clock SoCs</td>
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</table>

Did you know?

HPE in Financial Services

• HPE solutions touch two out of three credit card transactions globally
• HPE powers 16 billion transactions globally every year
• HPE solutions process over $3 trillion annually
• HPE powers 130 of the world’s largest stock and commodity exchanges
• HPE ranks #2 in the Annual Fintech 25 by American Banker and IDC Financial Insights

1 Based upon HPE’s independent testing using industry average pricing, power draw, and rack density.
CHALLENGES AT TODAY’S FINANCIAL SERVICE FIRMS

Density and flexibility
Financial services industries need more users in a smaller space at a lower TCO. How do we provide a low-cost compute solution, with the level of performance traders demand to make split-second trading decisions?

- Real estate comes at a high premium in New York and London. How can I squeeze more users into a denser footprint?
- Use FlexDesk scenarios to optimize workspace usage with HPE Moonshot and Citrix®.
- Traders often work in teams and need to relocate frequently. Each move can cost thousands of dollars. With Moonshot, a trader move is as simple as logging in at a different workplace.
- Political situations (such as Brexit) might require office moves to different countries and cities. Moonshot simplifies or possibly eliminates the relocation of workstation equipment, as the service can be delivered from a data center.

Manageability
Distributed workplace solutions are usually found on trader floors. These solutions are expensive to maintain, troubleshoot, and secure. Moonshot offers centralized management and secures data inside a data center, while maintaining the performance of a desk-side workstation.

Performance
Trader workstation users want flexibility and performance. Virtualizing this workload has proven to be difficult—most would say impossible. With Moonshot, traders receive the performance they need, combined with a flexible workplace environment.

Data redundancy and recovery
For most banks, traders are the most critical user class. Therefore, it is understandable that they demand high SLAs with disaster recovery and failover scenarios. Typically, separate offices for disaster recovery are being set up and commissioned, using workstations that require staging and maintenance. Moonshot removes the required maintenance of this costly setup by providing redundancy across data centers, not physical user locations. In case of a disaster recovery situation, any workspace with a monitor and an access device allows a trader to log in and work.

User experience is key
Software developers are looking for high-frequency and fast NVMe storage environments for compiling. Thanks to Moonshot’s high-frequency CPUs, ultra-fast NVMe storage, and integrated GPU, software developers get the compiling power they need, and traders can run multiple screens, videos, and number-crunching applications persistently.

Power consumption greatly affects CAPEX
How many users can I get into a space before having to build a new rack? I need a compute node that delivers enough performance to optimize my workloads, while also remaining power-efficient.

FIGURE 1. Comparing HPE Moonshot to traditional financial trader model
HPE MOONSHOT INFRASTRUCTURE

HPE Moonshot is a converged blade system delivering the density of 45 server blades in a 4.3U high chassis. As such, the HPE Moonshot chassis delivers a large number of compute blades in a 42U rack cabinet. The Moonshot chassis offers everything you need—compute, storage, networking/switches, power supplies, hot-plug fans, and chassis management through the industry-leading HPE Integrated Lights Out 5 (iLO 5).

The HPE Moonshot chassis incorporates all the common resources found in a traditional server—power management, fans, and network—but they are shared across all 45 hot-pluggable server blades. Moonshot’s shared architecture enables large scale-out without a corresponding increase in complexity, energy consumption, and management overhead.

HPE Moonshot supports up to 45 hot-plug, high-performance compute blades

Depending on user needs, you can populate HPE Moonshot with a mix-and-match combination of high-performance Intel Xeon–based HPE ProLiant m750, m510, m710x, and m710x-L server blades (described in detail below). All server blades in the HPE Moonshot chassis are designed for low power consumption at a mere 70W per blade. Each blade includes Intel Xeon compute, memory, integrated networking, and integrated high-speed SSD storage—all on a single compact blade. Each blade also has dedicated HPE iLO for management, and is independent, providing dedicated and uncompromised performance for each individual user.
HPE PROLIANT SERVER BLADES FOR HPE MOONSHOT SYSTEM

Technical specifications

<table>
<thead>
<tr>
<th>Product name</th>
<th>HPE ProLiant m750 Server Blade</th>
<th>HPE ProLiant m510 Server Blade</th>
<th>HPE ProLiant m710x Server Blade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cores</td>
<td>1 Intel Xeon E-2286M eight-core processor</td>
<td>8 or 16 cores (D-1548/D-1587)</td>
<td>1 Intel Xeon E3-1585L v5 four-core processor</td>
</tr>
<tr>
<td>Memory</td>
<td>Up to 128 GB memory</td>
<td>Up to 128 GB memory</td>
<td>Up to 64 GB memory</td>
</tr>
<tr>
<td>Storage</td>
<td>Up to 16 TB NVMe storage</td>
<td>Up to 4 TB NVMe storage</td>
<td>Up to 8 TB NVMe storage</td>
</tr>
<tr>
<td>Connectivity</td>
<td>Dual 10GbE Ethernet</td>
<td>Dual 10GbE Ethernet</td>
<td>Dual 10GbE Ethernet</td>
</tr>
<tr>
<td>GPU</td>
<td>Intel® UHD P580 GPU with 128 MB of embedded DRAM (L4 cache)</td>
<td>No GPU</td>
<td>Intel Iris® Pro P580 Graphics (3D) with 128 MB of embedded DRAM (L4 cache)</td>
</tr>
<tr>
<td>Management</td>
<td>HPE iLO 5, HPE iLO Amplifier, and HPE InfoSight</td>
<td>HPE iLO 4</td>
<td>HPE iLO 4</td>
</tr>
<tr>
<td>Primary customer needs/usage</td>
<td>High-performance server blades to support workloads such as: • Rich application streaming • Remote workstation/desktop delivery • Video transcoding</td>
<td>High-density “compute workhorse” blades to enhance the performance of workloads such as: • Analytics • Machine learning • High-density application delivery</td>
<td>High-performance server blades to support workloads such as: • Rich application streaming • Remote workstation/desktop delivery • Video transcoding • Computational fluid dynamics (CFD) applications</td>
</tr>
</tbody>
</table>

For the latest listing of available software drivers—including how to obtain them from HPE—please visit OS support at hpe.com/info/ossupport and our driver download page at hpe.com/info/moonshot.

HPE COMMON SLOT POWER SUPPLY

HPE Moonshot system can accommodate up to four HPE Common Slot (CS) power supplies. These power supplies allow for commonality across a wide range of HPE ProLiant and Integrity servers, as well as HPE storage solutions.

HPE CS power supplies are designed to provide the highest power supply efficiency without degrading system performance. HPE CS power supplies are tested by the Electric Power Research Institute (EPRI) and certified through the ECOS 80 Plus power supply program. Providing efficiency ratings of up to 94%, HPE CS power supply options are available in 1200W and 1500W configurations for the HPE Moonshot 1500 System. All HPE CS power sources are UL listed, CE Mark Compliant, and hot-pluggable, and they support redundant configurations.
COMMON COOLING FANS

Five fans ship standard with the HPE Moonshot chassis. To operate the chassis, all five fans must be installed and operating. The chassis can operate normally with one degraded fan (one failed rotor) until that fan is replaced.

NETWORKING

Depending on which server blades you choose, your HPE Moonshot 1500 chassis will be outfitted with an integrated switch module paired with an uplink module to communicate to the external network. By disaggregating the uplinks from the internal switch, HPE Moonshot provides greater flexibility for deploying your choice of external interconnects and future-proofing your investment.

The HPE Moonshot system can support up to two switch and uplink module pairs, which can be independently configured for redundancy or traffic isolation. Multiple modules can be stacked within or across multiple chassis, reducing the cost of top-of-rack (ToR) switches and providing failover in the event of a switch or uplink failure.

- **HPE Moonshot 45XGc Switch Module**—Provides high-speed, low-latency connectivity while dramatically reducing the cost and complexity of deploying solutions at scale. The 45XGc Switch Module provides 10GbE network connections to cartridges within the HPE Moonshot 1500 chassis and 40GbE/10GbE connectivity external to the chassis. Up to two switch modules are supported in each chassis, and they can be combined and managed as a single entity with the HPE Intelligent Resilient Framework (IRF).

- **HPE Moonshot 4QSFP+/16SFP+ Uplink Modules**—Provides the Ethernet networking functionality for the HPE Moonshot 1500 chassis. Each chassis supports up to two Moonshot 4QSFP+ Uplink Modules or two Moonshot 16SFP+ Uplink Modules, which can be configured for redundancy or traffic isolation. Each uplink module delivers 160 Gbps of bandwidth to connect the HPE Moonshot system to an external network.

### Technical specifications—Uplink modules

<table>
<thead>
<tr>
<th></th>
<th>HPE Moonshot 4QSFP+ Uplink Module</th>
<th>HPE Moonshot 16SFP+ Uplink Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPF+ ports</td>
<td>40GbE or 10GbE, depending on the module inserted</td>
<td>10GbE or 1GbE, depending on the module inserted</td>
</tr>
<tr>
<td>Serial port</td>
<td>For out-of-band management</td>
<td>For out-of-band management</td>
</tr>
<tr>
<td>LEDs</td>
<td>For link connectivity and activity</td>
<td>For link connectivity and activity</td>
</tr>
</tbody>
</table>
HPE MOONSHOT MANAGEABILITY AND SECURITY

Robust manageability and security features are integrated into every Moonshot system. These advanced capabilities help with set-up, configuration, workload provisioning, health and power monitoring, and firmware management/maintenance of HPE Moonshot. Integrated management and security capabilities include the following.

**HPE iLO 5**—Embedded on each m750 blade, HPE iLO 5 provides the tools you need to manage your servers efficiently, resolve issues quickly, and keep your business running—from anywhere in the world. Featuring the latest innovations in simplified operations, performance, and security, HPE iLO allows you to manage your entire server environment with ease.

HPE iLO5 includes Trusted Platform Module (TPM), an international standard for securing hardware through integrated cryptographic keys. HPE iLO also includes the Unified Extensible Firmware Interface (UEFI), a specification for a software program that connects a computer’s firmware to its OS. With UEFI, you can:

- Select server-level power
- Turn the power on and off
- Perform server metering
- Enable dynamic power capping
- Manage assets

**HPE Moonshot Chassis Manager 2.0**—Included in HPE Moonshot, the HPE Moonshot Chassis Management module manages the health of the chassis and servers via a command-line interface accessible via SSH or a web-based graphical user interface (GUI). Using the management module, you can configure the chassis, define server settings, and flash firmware in HPE Moonshot. The HPE Moonshot Chassis Management Module 2.0 supports the HPE RESTful Interface Tool, which provides mass scripting configuration for rapid deployment of multiple HPE Moonshot systems. With the Management Module, you can:

- View extensive chassis, cartridge, node, and switch details, as well as health information.
- View firmware versions and update firmware for the chassis components, cartridges, nodes, and switches.
- Manage the power and booting of all server nodes, as well as the power for cartridges and switches.
- Configure Moonshot chassis networking and hostname.
- Configure SSL certificate security, time settings, and up to 12 local user accounts.

**iLO Amplifier Pack**—The iLO Amplifier Pack is an advanced server inventory, firmware, and driver update solution that enables rapid discovery, detailed inventory reporting, and firmware and driver updates by leveraging iLO advanced functionality. The iLO Amplifier Pack performs rapid server discovery and inventory for thousands of supported servers for the purpose of updating firmware and drivers at scale.

**Moonshot Component Pack**—This comprehensive firmware solution has been tested on the Moonshot system and delivered as a compressed file that includes the firmware files to update a Moonshot chassis and its server blades/cartridges, deploy firmware updates from a command line with the iLO Chassis Manager or the Moonshot 4SXGc Switch Module.

**RESTful API**—Enabling you to take full inventory of the Moonshot chassis, control power and reset, configure settings, fetch event logs, and more, this API follows the trend of the internet in moving to a common pattern for new software interfaces.
Intelligent provisioning—Embedded in HPE ProLiant m750, m510, m710x-L, and m710x server blades, this server assistance tool is simple to use and quick to deploy. To access intelligent provisioning, simply press F10 during the server boot process. This fully integrated system and OS configuration tool reduces server installation and set-up steps—enabling you to deploy servers faster.

Windows PowerShell scripts—These scripts enhance control and execution of Moonshot Chassis Manager tasks, as well as provide integration options for Microsoft deployment tools and Citrix Provisioning Services.

For more information, please refer to the HPE Moonshot 1500 Chassis QuickSpecs.

SERVICES THAT ACCELERATE SUCCESS

With 25,000 IT experts located strategically around the world, HPE Pointnext Services helps you boost performance, grow your business, and drive down cost at every stage of your digital transformation. HPE Pointnext Services experts can help you:

• Design your transformation and build roadmaps tuned to your unique challenges at the edge, with artificial intelligence, and in the cloud.
• Design, deploy, integrate, and configure solutions that drive the most value from your software and hardware; work with your preferred technologies to deliver solutions of your choice.
• Transform the workforce culture and update technical skills.
• Operate and consume IT as a service:
  - Free IT teams from the day-to-day heavy lifting through automation
  - Modernize your IT operations with new innovative ways to run IT, integrate CloudOps, and enable DevOps methodologies
  - Receive specialized support for complex mission-critical systems such as SAP HANA®, Microsoft Azure, and multi-vendor

Learn more at hpe.com/us/en/services/pointnext.html.

The HPE Moonshot System can be delivered as a service with HPE GreenLake, giving you flexible consumption that scales easily with your business needs. This innovative, consumption-based infrastructure service offers capacity on-demand—combining the agility and economics of the public cloud with the security and performance of on-premises IT. HPE GreenLake can help your IT organization:

• Scale—Immediately scale up available capacity when needed, in minutes, not months.
• Pay-as-you-grow—Pay only for the capacity you use above the minimum commitment, which will let you grow at the right pace for your business.
• Reduce risk—Keep key workloads on-premises, with IT retaining control.
• Make variable payments—With no up-front outlay and payments that vary with consumption, you can better align cash flows with the business and increase financial flexibility.
• Eliminate the cost of overprovisioning—Never pay for what you don’t use (above the minimum capacity commitment).
• Extend your team—The HPE GreenLake support team acts as an extension to your team, helping you plan ahead and simplify your hybrid cloud.
• Simplify your environment—One portal, one contract, and one invoice that can include certain Microsoft Azure public cloud services.
• Create a cloud experience in your environment—Automated processes include capacity management, break-fix services, and proactive support.

For more information on HPE GreenLake, visit hpe.com/us/en/services/flexible-capacity.html.
CITRIX IS MOONSHOT’S #1 PARTNER

Only Citrix provides a complete virtual app and desktop solution to meet all your business needs. Give employees the freedom to work from anywhere while also cutting IT costs. With HPE Moonshot running Citrix software solutions, you can deliver Microsoft Windows, Linux®, and web-based business applications or full virtual desktops from any cloud—public, on-premises, or hybrid—within a modern digital workspace.

ADDITIONAL WORKLOADS IDEAL FOR RUNNING ON HPE MOONSHOT

HIGH-PERFORMANCE COMPUTING (HPC) AND BIG DATA WORKLOADS

Optimizing aerodynamic performance is a top-of-mind concern for Formula 1 race car teams. A critical component of aerodynamics research is CFD simulations. To increase the number of CFD simulations—thereby improving car aerodynamics and competitiveness during races—the Alfa Romeo Sauber F1 Team uses a supercomputing solution based on an HPE Moonshot HPC server cluster. Read the case study at h20195.www2.hpe.com/v2/getmobile.aspx?docname=a00048382enw.

MEDIA PROCESSING

IT must deliver increasing volumes of media anywhere, on-demand, to a growing number of devices. Moonshot’s integrated GPU, high-density, and high-throughput—together with strong partnerships with innovative software providers—delivers breakthrough performance for video and media business. Moonshot media processing servers enable you to meet the growing demands in the market, reduce operational costs, and scale when your businesses demands. Learn more at hpe.com/us/en/servers/media-moonshot.html.

CONSUME MOONSHOT ON YOUR TERMS

HPE GreenLake is a service that delivers IT outcomes with hardware, software, and expertise on-premises in a pay-per-use model.²

Start with the HPE Moonshot capacity you need today and grow with business demand, leveraging active capacity management and variable monthly payments based on metered usage—helping to eliminate overprovisioning. Included services help to remove the heavy lifting in IT, freeing up IT staff to focus on delivering business value.

² hpe.com/GreenLake
HPE GLOBAL IOT INNOVATION LABS

Partner with HPE Moonshot experts
Designed to accelerate collaboration among customers, partners, and across HPE, HPE Global IoT Innovation Labs provide proof-of-concept design and testing of custom internet of things (IoT) and edge-to-cloud technologies and solutions. HPE Global IoT Innovation Lab personnel have the expertise and technology to assist you with testing on-site or remotely via secure network connections.

HPE Global IoT Innovation Labs are configured to explore and build a wide range of IoT solutions such as smart cities, industrial internet of things (IIoT) manufacturing, smart healthcare, and smart retail, as well as media processing and distribution, telecom, remote virtual desktops, and military applications.

For more information, please visit hpe.com/info/IoTlab.

LEARN MORE AT hpe.com/info/moonshot