

QuickSpecs

Moab® Family of Data Center, Cloud and HPC products

Overview

The Moab software product family provides leading cloud management and HPC workload management optimized for HP ProLiant Servers and HP management software. The solutions are driven by a patented multi-dimensional policy engine that enables data center, private cloud, and HPC environments to accelerate delivery, maximize resource utilization and capacity, create and manage services, optimize service levels, and reduce operational costs.

What's New

- Adaptive Workload Optimization Pack
 - Moab HPC Suite - Basic Edition
 - Moab Cloud Suite
 - Moab HPC Suite - Application Portal Edition
 - Moab HPC Suite - Remote Visualization Edition
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Models

Licensing and Support Options

Moab Family of Data Center, Cloud and HPC products

Moab Value Unit Flex License

TC221A

NOTE: This part number is used to purchase products in the Product Table below, following the Instructions for Ordering Moab Software. This part number can also be used to purchase other products and services from Adaptive Computing as specified in a custom Statement of Work, to be developed with the help of the HP account representative and the Moab product manager. Customer will receive a printed entitlement certificate via physical shipment. The entitlement certificate must be redeemed online in order to obtain a license key, to download the software, and to register for support.

NOTE: Only one certificate is shipped for multiple-quantity licenses.

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Standard Features

Why use the Moab Product Family

- Improve the speed of IT service delivery and HPC job response and throughput with multi-dimensional policies that accelerate complex IT decisions and actions in real-time
- Improve IT resource utilization by up to 5X to reduce capital costs
- Reduce energy costs by up to 25% by applying intelligent workload consolidation and automated power management (Available in Advanced Workload Optimization Pack and Moab Cloud Suite))
- Consistently enforce and meet SLAs, service guarantees and resource sharing levels to ensure business priorities are met and risk is reduced
- Intelligently automate IT processes across existing or preferred heterogeneous infrastructure—including hardware, middleware, operating system, and virtualization investments to reduce management costs, errors, and delays
- Track resource usage and costs to make them transparent to users and business groups, enable better decisions, and enforce usage quotas and eliminate resource waste (Available in Adaptive Workload Optimization Pack and Moab Cloud Suite)
- Deliver policy-based auto-delivery and -governance across both physical and virtual environments throughout the resource and service lifecycle for data centers and clouds (Available in Moab Cloud Suite)
- Future scheduling of IT resources, services, and maintenance with advanced reservations and predictive, policy-based scheduling for a more proactive and accurate environment
- Increase user and IT administrator productivity by simplifying user self-service access, use, and control of IT services and resources

There are three main Moab products to choose from to meet your needs which are described below in the Standard Features section. These products can be combined with solutions and products such as HP's Business Service Automation products, to create an integrated and Adaptive Operating Environment™.

Moab Cloud Suite End-to-End Cloud Management Components

- Moab Cloud Suite
- Adaptive Workload Optimization Pack
- Moab HPC Suite - Basic Edition
- **Moab Viewpoint Portal:** Delivers both a user self-service portal and service catalog to request and manage services as well as an admin dashboard for service catalog creation, monitoring, reporting and management across the cloud environment.
- **Moab Intelligence Engine:** Automates the complex decisions and orchestrates the actions for creating and optimizing cloud services based on policies, service templates, and workflows. Moab Cloud Suite uses the patented Moab intelligence engine to automate service requesting, provisioning, optimizing, and management based on multi-dimensional policies that mimic real-world decision making.
- **Moab Accounting Manager for Showback and Chargeback:** Tracking and reporting of resource usage by user and cost center or project at the desired cost rates across the cloud environment. Moab Accounting Manager can also help manage and IT service budgets, providing up front service costs to users at time of request and validating new service request costs against budget limits.
- **Cloud Operations DB:** An integrated implementation of MongoDB provides the cloud operations database that aggregates all the rich real-time data on cloud resources across the environment that power policy decisions and actions. It can also be integrated with other CMDBs you may have in your environment.
- **Provisioning Manager:** for automated provisioning of complete physical and virtual (VMware & KVM) environments using the preferred methods, with xCAT or use the Moab connectors for out-of-the-box integration for HP Server Automation with HP Operations Orchestration workflows.
- **Nagios Resource Monitor:** An integrated implementation of Nagios provides monitoring of cloud resources and events that the Moab self-optimizing policies act on to help reduce mean time to recovery, optimize utilization, and ensure SLAs are met.



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NOTE: Moab Cloud Suite is sold by Operating System Instance (OS Instance).

Operating System Instance = Instance of an Operating System software image running on either a Virtual Machine or a Bare Metal Server. Includes virtualized and non-virtualized applications.

Adaptive Workload Optimization Pack

The Adaptive Workload Optimization Pack provides everything to quickly and easily complete an HPC cluster in one integrated package. It provides all the capabilities to optimize workload performance including comprehensive workload scheduling and management, industry-leading messaging passing interface (MPI), and seamless integration with HP Insight Cluster Management Utility (CMU) for reduced administration and improved control. The combination of an HP Cluster Platform and the Adaptive Workload Optimization Pack addresses all of the key challenges that can limit HPC potential. It provides the enterprise-level HPC workload optimization customers need to excel and compete.

Adaptive Workload Optimization Pack - Key Features

- Optimize throughput and utilization to 90-99% with intelligent scheduling policies that pack workload and backfill around priority jobs and reservations
- Multi-factor SLA and priority policies work together to make sure the highest priority workload is processed first and resource reservation guarantees are met (dynamic fairshare policies, hierarchical priority weighting policies, usage limits, access controls, etc.)
- Dynamic cloning of nodes based on workload OS requirements better meets demand while reducing administration and errors
- Reduce power consumption and costs with green policies that power nodes on and off based on workload
- Simplified job submission and management via a web portal and advanced job arrays
- Advanced scheduling and management of GPGPUs or Intel Xeon Phi™ co-processors for jobs
- Usage accounting and budget enforcement schedules resources in line with sharing agreements and usage budgets as well as reporting usage at user or group levels.
- Fine-tuned allocation policies maximize utilization and speed while preventing job errors
- Admin dashboards and reporting tools reduce workload management complexity, time and costs
- Automates uptime with intelligent resource placement that prevents failures and workload-aware maintenance scheduling
- Tight integration with HP Insight CMU harnesses CMU management capabilities and data for automation policies that optimize system performance as well as single point administration across node and workload data and tasks that reduces time and enhances control.
- Flexible, efficient and scalable cluster messaging that provides industry leading latency performance with scalability up to 120K processes

Adaptive Workload Optimization Pack Components:

- **Moab® HPC Suite** - Basic Edition: providing comprehensive workload scheduling and management to optimize performance
- **Intel MPI Library 4.1:** enables optimal performance for applications on Intel® architecture-based clusters with industry leading latency
- **HP Insight CMU Connector for Moab HPC Suite:** for integrated management across jobs and node resources that reduces administration and improves control
- **Direct vendor support:** Adaptive Computing provides direct support for all three components to ensure the best support response and experience.

Moab HPC Suite - Basic Edition (BE)

Moab HPC Suite - Basic Edition (BE)® is a policy-based intelligent workload management system that automates the scheduling, managing, monitoring, and reporting of HPC workloads on massive scale, multi-technology installations. Moab HPC Suite - BE policies orchestrate workload across the ideal combination of resources, including specialized resources like GPGPUs, to increase workload throughput and resource utilization so more work is accomplished in less time and in the right priority order.

Moab HPC Suite - Basic Edition (BE) - Key Features

- Massive multi-point scalability to accelerate job response and throughput, including high throughput computing



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- Workload-optimized resource allocation to get more results out of heterogeneous resources and reduce costs
- Optimized, intelligent scheduling packs workload and backfills around priority jobs to efficiently use resources, including topology-based scheduling
- Optimized scheduling and management of accelerators, both Intel® Xeon Phi™ and GPGPUs, for jobs to maximize utilization and effectiveness
- Unified workload management for heterogeneous clusters to maximize resource availability and administration efficiency
- Simplified job submission and management with advanced job arrays and web portal
- Administrator dashboards and reporting tools reduce management complexity, time and costs
- Automates uptime with intelligent resource placement that prevents failures and workload-aware maintenance scheduling
- Auto SLA enforcement with SLA, priority, and resource sharing policies that ensure high priority workloads are processed first and resources are scheduled in line with usage agreements (dynamic fairshare policies, hierarchical priority weighting policies, usage limits, access controls, etc.)

Moab® HPC Suite -

Application Portal Edition

Moab HPC Suite - Application Portal Edition provides easy single-point access to common technical applications, data, resources, and job submissions to accelerate project completion and collaboration for end users while reducing computing costs. It improves HPC ease of use and productivity for end users as they work across the design and research process utilizing both batch and interactive simulation applications. Moab HPC Suite - Application Portal Edition enables more of your internal staff and partners to collaborate from anywhere using the applications and resources they need without any specialized HPC training while your intellectual property stays secure. You can confidently centralize more of your resources with intelligent policies that optimize their sharing, utilization and higher throughput while still balancing different service levels and priorities. The optimization Moab provides significantly reduces the costs of keeping up with compute demand such as compute resources, application licenses, or data storage.

- **Improve ease of use and productivity for end users:**
 - Application-centric job submission templates for common manufacturing, energy, life-sciences, education and other industry technical applications
 - Supports batch and interactive applications, such as simulations or analysis sessions, to accelerate the full project or design cycle
 - No special HPC training required to enable more users to start accessing HPC resources with intuitive portal
 - Distributed data management avoids unnecessary remote file transfers for users, storing data optimally on the network for easy access and protection, and optimizing file transfer from/to the user desktops if needed
- **Accelerate collaboration between individuals and teams with optimized, secure access:**
 - Profile specific access controls access to applications, data or resources based on the novice to power user profile and varying work needs for remote and partner users. It improves collaboration while protecting infrastructure and intellectual property. (Tailor and audit secure access by class of user, service, application, and resources like infrastructure, data, or licenses)
 - Enable multi-site globally available HPC services available anytime, anywhere, accessible through many different types of devices via a standard web browser
- **Reduce costs with optimized resource utilization and sharing:**
 - Maximize HPC resource utilization with intelligent, optimized scheduling policies that enable more work to be done on HPC resources to better meet growing and changing demand
 - Optimize application license utilization and access by sharing application licenses in a pool, re-using and optimizing usage with allocation policies for lower costs and better service levels to users



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- Usage budgeting and priorities enforcement with usage accounting and priority policies that ensure resources are shared in-line with service level agreements and project priorities
- Leverage and fully utilize centralized storage capacity instead of duplicative, expensive, and underutilized individual workstation storage
- **Moab HPC Suite - Application Portal Edition Product Components:**
 - Moab HPC Suite - Basic Edition
 - ○ Integrated NICE EnginFrame application portal
 - Also Available & Recommended (at additional cost): Basic product implementation

Moab® HPC Suite - Remote Visualization Edition

Moab HPC Suite - Remote Visualization Edition significantly reduces the costs of visualization technical computing while improving the productivity, collaboration and security of the design and research process. It enables you to create easy, centralized access to shared visualization resources in a technical compute cloud to reduce the hardware, network and management costs of visualization technical computing instead of expensive and underutilized individual workstations. The solution centralizes applications, data and compute together with users only transferring pixels instead of data to do their simulations and analysis. This enables a wider range of users to collaborate and be more productive at any time, on the same data, from anywhere without any data transfer time lags or security issues. Moab's optimized workload management policies maximize standard and specialty resource utilization as well as scalability for large volumes of visualization workloads. These intelligent policies also guarantee shared resource access to users so they have a high service level as they transition from individual workstations. With Moab HPC Suite - Remote Visualization Edition you can turn your user's data and ideas into new products and competitive advantage cheaper and faster than ever before.

- **Reduce the hardware, network and management costs of visualization technical computing:**
 - Reduce hardware costs by consolidating expensive individual technical workstations into centralized visualization servers for higher utilization by multiple users; reduce additive or upgrade technical workstation or specialty hardware purchases, such as GPGPUs, for individual users.
 - Reduce management costs by moving from remote user workstations that are difficult and expensive to manage, maintain, and back-up to centrally managed visualization servers that require less admin overhead
 - Decrease network access costs and congestion as significantly lower loads of just compressed, visualized pixels are moving to users, not full data sets
 - Reduce energy usage as centralized visualization servers consume less energy for the user demand met
 - Reduce data storage costs by consolidating data into common storage node(s) instead of under-utilized individual storage
- **Improve workforce collaboration and productivity while decreasing security risk by transferring pixels, not full data, in a user friendly interface:**
 - Improve workforce collaboration and productivity as multiple users can access and collaborate on the same interactive application data at the same time from almost any location or device with little or no training needed
 - Eliminate data transfer time lags for users by keeping data close to the visualization applications and compute resources instead of transferring back and forth to remote workstations
 - Improve security with centralized data storage so data no longer gets transferred to where it shouldn't, gets lost, or gets inappropriately accessed on remote workstations, only pixels get moved.
- **Maximize resource utilization and scalability while guaranteeing shared resource access to**



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users and groups with Moab optimized workload management policies:

- Guarantee shared visualization resource access for users with priority policies and usage budgets that ensure they receive the appropriate service level. (Session priorities, session reservations, number of users per node, fairshare usage policies, usage accounting and usage budgets across multiple groups and users)
- Maximize resource utilization and scalability by packing visualization workload optimally on visualization servers using Moab allocation and scheduling policies (optimal resource allocation/placement by visualization session characteristics, session reservations, number of users per node, GPU policies)
- Improve application license utilization to reduce software costs with a shared common pool of applications across multiple users and intelligent allocation policies
- Optimized scheduling and management of GPUs and other accelerators to maximize utilization and effectiveness
- Enable multiple Windows or Linux user sessions on a single machine, managed by Moab, to further maximize resource and power utilization
- Enable dynamic OS re-provisioning to better meet changing visualization application workload demand, maximizing resource utilization and availability to users
- **Moab HPC Suite - Remote Visualization Edition Product Components:**
 - Moab HPC Suite - Basic Edition
 - Integrated NICE EnginFrame Views portal
 - Integrated NICE Desktop Cloud Visualization (DCV) for secure remote access to technical cloud sessions to 3D/2D applications with desired compression (Linux, Windows, or virtual environments)

Also available and recommended (at additional cost): Implementation and training services for product.

Software Included

Software included with Moab products only, not including Moab Application Portal Edition or Remote Visualization.

Moab Workload Manager

- Multi-dimensional decision engine that uses policies to manage workload scheduling and management and resource management
- Moab Workload Manager is a policy-based workload scheduler and event engine that enables utility-based and cloud computing for shared pools of resources. It integrates management data and automates actions across one or multiple hardware, operating system, storage, network, and license and resource manager environments to increase the ROI of pooled resources, and can improve resource utilization up to 90-99 percent.
- Moab Workload Manager has multi-dimensional policies that can make complex workload and resource decisions comprised of resource attributes, SLAs and business priorities, and workload requirements. It can also factor in real-time and predictive scheduling and forecasting of resources to ensure jobs and services are run on the right resources at the right time.

Moab Web Services

- Enables easier standard integration and customization for your cloud environment such as resource manager plug-ins for rich data integration, portal customization, or even script integration. Customers now have a standard interface to Moab with REST APIs that make it easier and faster to integrate and extend the value of their intelligent cloud management. This helps customers reduce the time and cost of implementing integrations as well as their ongoing management.



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Moab ViewPoint

- Web-based end user HPC job submission and self-service cloud portal and cloud administration dashboard
 - Moab ViewPoint is an end-user portal that works with Moab Workload Manager. It provides universally accessible workload and self-service request submission and management to Moab Workload Manager from any location without the need to install software on the client computer.
 - Moab Viewpoint empowers end users with web-based workload submission, an intuitive graphical interface and the other tools they need to track and manage their own workload and service requests, thus decreasing burdens on administrators.
 - Moab Viewpoint can also provide an administrator dashboard to view, manage, and optimize the cloud environment across physical and virtual resources, policies and events.
- Moab Accounting Manager
- Available only in Moab HPC Suite - Enterprise Edition and Moab Cloud Suite
 - Enhanced show back and chargeback flexibility enables IT to set and automatically track setup charges in addition to ongoing periodic service use charges. It also includes the ability to easily duplicate custom organizational hierarchies, such as business unit, groups, cost centers, etc. in the Moab Accounting Manager reporting and charging structure so usage is reported in the most useful way.

Moab Accounting Manager

- Available only in Adaptive Workload Optimization Pack and Moab Cloud Suite
- Enhanced show back and chargeback flexibility enables IT to set and automatically track setup charges in addition to ongoing periodic service use charges. It can also approve service requests and track resource usage against usage quota budgets for users and groups. It also includes the ability to easily duplicate custom organizational hierarchies, such as business unit, groups, cost centers, etc. in the Moab Accounting Manager reporting and charging structure so usage is reported in the most useful way.

TORQUE

- TORQUE is open source resource management software provided in the Moab HPC Suite product is also available for free download from www.adaptivecomputing.com TORQUE Resource Manager provides control over batch jobs and distributed computing resources. It is an advanced open-source product based on the original PBS project* (see <http://www.adaptivecomputing.com/products/open-source/torque/>) and incorporates the best of both community and professional development. It incorporates significant advances in the areas of scalability, reliability, and functionality and is currently in use at tens of thousands of leading government, academic, and commercial sites throughout the world. TORQUE may be freely used, modified, and distributed under the constraints of the included license.
- TORQUE is integrated with Moab Workload Manager to improve overall utilization, scheduling and administration on a cluster. Customers who purchase Moab family products also receive free support for TORQUE.

Warranty

HP provides third-party products, software, and services that are not HP Branded "AS IS" without warranties of any kind, although the original manufacturers or third party suppliers of such products, software and services may provide their own warranties.



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Complementary Products

- HP Cloud Service Automation
- HP Server Automation software
- HP Operations Orchestration software
- HP Cluster Management Utility

Other product information

Additional product materials are available from the Moab web pages at: <http://www.hp.com/go/max>.

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Ordering Moab Software

Ordering Moab Software To calculate the quantity of Moab Value Units to be ordered:

- Pick the product you want (see the table below), and whether the site is commercial or educational or governmental (only Moab HPC Basic and Moab HPC Suite Application Portal and Remote Visualization products receive an academic or government discount), and the number of years of support (1 or 3). Note that Adaptive Workload Optimization Pack has a 24 x7 support or 9x5 support option. Moab Cloud Suite comes with 24x7 support and Moab HPC Suite - Basic Edition comes with 9 x 5 support.
- For Adaptive Workload Optimization Pack, Support for Year 1 must be purchased and other years of Support may be purchased.
- For the Adaptive Workload Optimization Pack and for Moab HPC Suite - Basic Edition , multiply the appropriate table entry for 'number of MVUs per socket' by the total number of processors and accelerators (e.g. GPUs), to be licensed. Round up the result.
- For Moab Cloud Suite, multiply the appropriate table entry for 'number of MVUs per operating system instance' by the total number of operating system instances to be licensed. Round up the result.

Ordering Moab HPC Suite - Application Portal and Remote Visualization Software - To calculate the quantity of Moab HPC Suite Units to be ordered:

Application Portal and Remote Visualization Software

- Pick the product you want (see the table below), and whether the site is commercial or educational or governmental, and the number of years of support. Note that the license model for Adaptive Workload Optimization Pack, and Moab HPC Suite - Application and Remote Visualization Editions are Perpetual. Support for Year 1 must be purchased and other years of Support may be purchased.
- Determine the number of Sockets and GPGPUs for the customer for either the Application Portal Edition or the Remote Vis Edition then multiply the appropriate table entry for 'number of MVUs per socket' by the total number of processors and accelerators (e.g. GPUs), to be licensed. Round up the result.

Adaptive Workload Optimization Pack	Product Description	Years	# of MVUs per socket (inclusive of processors and accelerators)
(Includes Moab HPC Suite with CMU Connector and Intel MPI)	Adaptive Workload Optimization Pack (Perpetual License)	Perpetual	1.0000
	24x7 Support	1	.25
	9x5 Support	1	.20

Moab Software	Product Description	Commercial or Educational	Years	# of MVUs per socket (inclusive of processors and accelerators)
Moab Cloud Suite sold by OS Instance)		N/A	1	1.03053
			3	2.79458
Moab HPC Suite - Basic Edition		Commercial	1	0.2738
			3	0.73926
		Educational / Gov't	1	0.1643
			3	0.44361



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Ordering Moab Software

NOTE: For Moab Cloud Suite, the # of MVUs is 'per OS instance' and not 'per socket

NOTE: Part number TC221A is used to purchase products in the above Product Table, following the Instructions for Ordering Moab Software. This part number can also be used to purchase other products and services from Adaptive Computing as specified in a custom Statement of Work, to be developed with the help of the HP account representative and the Moab product manager.

Moab HPC Suite - Application and Remote Visualization

Product Description	Commercial or Educational	Years	# of MVUs per socket (inclusive of processors and accelerators)
Moab HPC Suite - Application Portal Edition			
Perpetual License - Application Portal Edition	Commercial	Perpetual	1.5600
	Educational / Gov't	Perpetual	0.9360
24x7 Support - Application Portal Edition	Commercial	1	0.3900
	Educational / Gov't	1	0.2340
Moab HPC Suite - Remote Visualization Edition			
Perpetual License - Remote Visualization Edition	Commercial	Perpetual	10.1550
	Educational / Gov't	Perpetual	6.0930
24x7 Support - Remote Visualization Edition	Commercial	1	2.5388
	Educational / Gov't	1	1.5233

Moab Cloud Suite is for data center, IT automation and Cloud deployments that include Virtual Machine management. It comes with 24x7 Support and the pay for use, show back, chargeback capabilities.

NOTE: Moab Cloud Suite minimum purchase is 100 OS Instances.

Use	Moab HPC Suite Basic Edition	Adaptive Workload Optimization Pack
Policy-driven workload scheduling	X	X
Real-time and predictive workload scheduling	X	X
Scalability for extreme-scale, high throughput computing	X	X
Advanced GPGPU scheduling and management	X	X
Workload optimized node provisioning (multi-OS)		X
Workload-aware auto-power management		X
Departmental usage budget setting and enforcement		X
Pay-for-use show back and chargeback		X
Intel MP Library		X
CMU Connector		X
Support Hours	9x5 only	9x5 or 24x7

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Technical Specifications

System Requirements Moab can be executed from a head node based on one of the following architectures:

- x86
- x64
- ia64

The head node must meet the following minimum requirements:

- Processor Requirements: Recommend quad-core server (quad-core Xeon equivalent, 3 GHz or higher)
 - Network Requirements: Medium (100 Mbps or higher)
 - Hard disk drive Requirements: 100 GB
 - RAM Requirements: 8 GB
 - Optional ODBC-compliant database
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Moab Supported Architectures Moab can manage workloads on servers with the following architectures:

- HP ProLiant BL-Series, ML-Series, DL-Series and SL-Series Series
 - IBM i-Series, p-Series, x-Series (System x), SP
 - Intel x86, IA-32, IA-64
 - AMD x86, Opteron
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Environment-friendly Products and Approach **End-of-life Management and Recycling** Hewlett-Packard offers end-of-life HP product return, trade-in, and recycling programs in many geographic areas. For trade-in information, please go to: <http://www.hp.com/go/green>. To recycle your product, please go to: <http://www.hp.com/go/green> or contact your nearest HP sales office. Products returned to HP will be recycled, recovered or disposed of in a responsible manner.

The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities. This information (product disassembly instructions) is posted on the Hewlett Packard web site at: <http://www.hp.com/go/green>. These instructions may be used by recyclers and other WEEE treatment facilities as well as HP OEM customers who integrate and re-sell HP equipment.

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